OECD-FAO Agricultural Outlook 2022-2031

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Food and Agriculture Organization of the United Nations

OECD-FAO Agricultural Outlook 2022-2031

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Foreword

The *Agricultural Outlook 2022-2031* 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), Gaëlle Gouarin, Lee Ann Jackson (Head of Division), Tatsuji Koizumi, Claude Nénert, Daniela Rodriguez Niño, 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 Eszter Palotai (Department for Environment, Food and Rural Affairs United Kingdom). 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 Carla Barisone, Caitlin Boros, Helia Mossavar-Rahmani and Michèle Patterson. Wilfrid Legg provided language review for the publication. Technical assistance in the preparation of the *Outlook* database was provided by Karine Lepron, Marc Regnier and Eric Espinasse. Many other colleagues in the OECD Secretariat and member country delegations provided useful comments on earlier drafts of the report.

At the Food and Agriculture Organization of the United Nations, the baseline projections and Outlook report were prepared by members of the Markets and Trade Division (EST) under the leadership of Boubaker Ben-Belhassen (EST Division Director) and Josef Schmidhuber (EST Division Deputy Director), with the overall guidance of Máximo Torero (FAO Chief Economist) and by the Economic and Social Development Stream Management team. The core projections team consisted of: Sergio René Araujo Enciso, Giulia Caddeo, Martina Guerra, Aikaterini Kavallari, Holger Matthey (Team Leader), Svetlana Mladenovic, and Irmak Yaka. For fish, the team consisted of Adrienne Egger, Pierre Charlebois and Stefania Vannuccini from the FAO Fisheries and Aquaculture Division. Advice on fishmeal and fish oil issues and historical data were provided by Enrico Bachis from the Marine Ingredients Organisation (IFFO). The section on cotton benefited from data and technical advice by Lorena Ruiz from the International Cotton Advisory Committee(ICAC). The section on bananas and major tropical fruits was contributed by Sabine Altendorf, Giuseppe Bonavita and Pascal Liu. Francesco Tubiello advised on greenhouse gas emissions. Commodity expertise was provided by ElMamoun Amrouk, Erin Collier, Shirley Mustafa, Fabio Palmeri, G.A. Upali Wickramasinghe, and Di Yang. Monika Tothova contributed material and expertise to Box 1.1. Research assistance and database preparation were provided by David Bedford, Harout Dekermendjian, Annamaria Giusti, Grace Maria Karumathy, Yanyun Li, Lavinia Lucarelli, Emanuele Marocco, and Marco Milo. This edition also benefited from comments made by various colleagues from FAO and member country institutions. The authors would like to thank Araceli Cardenas, Yongdong Fu, Jonathan Hallo, Jessica

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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 2022-2031* is available in the OECD's iLibrary and FAO Document Repository.

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Abbreviations and acronyms

AfCFTA	African Continental Free Trade Area
AFOLU	Agriculture, Forestry and Other Land Use
AMIS	Agricultural Market Information System
ASF	African Swine Fever
B30	Alternative diesel fuel consisting of regular petroleum diesel (70%) blended with biodiesel (30%)
bln	Billion
bln L	Billion litres
bln t	Billion metric tonnes
BRICS	Emerging economies of Brazil, Russian Federation, India, China and South Africa
BSE	Bovine Spongiform Encephalopathy
CAP	Common Agricultural Policy (European Union)
CETA	Comprehensive Economic and Trade Agreement
CIF	Cost, insurance and freight
COP21	21st Conference of the Parties to the 1992 United Nations Framework Convention on Climate Change
CPI	Consumer Price Index
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
c.v.	Coefficient of variation
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
ESCAP	Economic and Social Commission for Asia and the Pacific
est	Estimate
EU	European Union (excludes the United Kingdom)
EVs	Electric Vehicles
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
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
GMO	Genetically modified organism
GSSE	General Services Support Estimate
GtCO2-eq	Giga tons of CO_2 equivalents
ha	Hectares
HFCS	High fructose corn syrup
HORECA	Hotel, restaurant and catering
HSS	Heavy grains, sorghum and soybeans
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
LULUCF	Land use, land use change and forestry
lw	Live weight
MBM	Meat and bone meal
MDER	Minimum Dietary Energy Requirement
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
NENA	Near East and North Africa
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
PoU	Prevalence of undernourishment
PPP	Purchasing power parity
PSA	Partial stochastic analysis

PSE	Producer Support Estimate
R&D	Research and development
RECC	Riz Economie Changement Climatique
RED	Renewable Energy Directive (European Union)
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
SAF	Sustainable aviation fuel
SDG	Sustainable Development Goals
SDG2	Sustainable Development Goal 2 (zero hunger)
SMP	Skim milk powder
SPS	Sanitary and Phyto sanitary measures (WTO agreement)
SSA	Sub-Saharan Africa
t	Metric tonnes
t/ha	Metric tonnes/hectare
TFP	Total factor productivity
tq	Tel quel basis (sugar)
TRQ	Tariff rate quota
UCO	Used cooking oil
UK	United Kingdom
UN	The United Nations
UNCTAD	United Nations Conference on Trade and Development
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, Türkiye, 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, Türkiye, 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, 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	Developed and East Asia	Australia, China, Japan, New Zealand, Korea
	South and Southeast Asia	India, Indonesia, Iran (Islamic Republic of), Malaysia, Pakistan, Philippines, Thailand, Viet Nam
	South and Southeast Asia - Asia Least Developed	Afghanistan, Bangladesh, Bhutan, Myanmar, Cambodia, Lao People's Democratic Republic, Nepal, Timor-Leste
	South and Southeast Asia - 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
	South and Southeast Asia - 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 *OECD-FAO Agricultural Outlook 2022-2031* provides a consensus-based assessment of the ten-year prospects for agricultural commodity and fish markets at national, regional, and global levels, and serves as a reference for forward-looking policy analysis and planning. The report is a collaborative effort between the OECD and FAO, prepared with inputs from Member countries and international commodity organisations. It highlights fundamental economic and social trends driving the global agri-food sector assuming no major changes to weather conditions or policies. In this year's *Outlook*, a scenario was run to assess the level of productivity growth required to achieve the UN's Sustainable Development Goal 2 (SDG-2) on Zero Hunger as well as a considerable reduction in agricultural greenhouse gas (GHG) emissions by 2030.

Current international prices are high for most agricultural commodities due to the recovery in demand following the outbreak of the COVID-19 pandemic and the resulting supply and trade disruptions, which have been exacerbated by the Russian Federation's (hereafter "Russia") war against Ukraine (hereinafter referred to as "war"). The war is already having considerable impact on agricultural and input markets, especially for grains and oilseeds, for which Russia and Ukraine are key exporters. The *Outlook* projections account for reduced production prospects in Ukraine, and reduced export availabilities from both Ukraine and Russia, in the marketing year 2022/23.

The macroeconomic environment over the next 10 years is also particularly uncertain. While the global economy is expected to recover from the COVID-19 pandemic, the war adds further uncertainty. In April 2022, the International Monetary Fund projected global GDP to grow at 2.7% p.a., on average, over the next decade, which is below the pre-crisis projections. Moreover, the Outlook projections are made under the assumption that current high energy prices will adjust down by 2023 and remain fixed in real terms for the rest of the decade.

Global food consumption, which is the main use of agricultural commodities, is projected to increase by 1.4% p.a. over the next decade, and to be mainly driven by population growth. Most additional demand for food will continue to originate in low- and middle-income countries, while in high-income countries it will be constrained by slow population growth and a saturation in the per capita consumption of several food groups.

The projected evolution of diets continues to be largely determined by income levels in the coming decade. In high-income countries, heightened concerns about health and the environment are expected to result in a decline in per capita consumption of sugar and a sluggish growth in the consumption of animal protein. In contrast, consumers in middle-income countries are expected to increase their food consumption and the diversity of their diets, with growing shares of animal products and fats over the next ten years. Diets in low-income countries, however, will remain largely based on staples, and the projections suggest that food consumption will not increase sufficiently to meet SDG 2 on Zero Hunger by 2030.

The *Outlook* highlights the strong contribution of low and middle-income countries to feed demand growth over the next decade, given the rapid expansion and intensification in their livestock production. In high-income countries and some upper-middle income countries, lower growth in livestock production and improved feeding efficiency should result in slower growth in feed demand compared to last decade. The rebuilding of pig herds following the African swine fewer (ASF) outbreak in The People's Republic of China, which is characterised by the installation of modern, feed-intensive production facilities, is assumed to lead to further intensification in feed use.

Demand for first generation biofuel feedstocks is expected to grow slowly over the next ten years, mainly due to declining fuel use and weaker policy incentives in key markets, such as the European Union. Most additional demand for biofuel feedstocks is expected to originate in India and Indonesia, driven by increasing fuel use, and efforts to support the domestic farm sector through higher biofuel blending rates and subsidies supporting domestic production. The biofuel share of global sugarcane use is projected to increase to 23% by 2031, while the biofuel share of maize is expected to decline.

Over the next decade, global agricultural production is projected to increase by 1.1% p.a., with the additional output to be predominantly produced in middle- and low-income countries. The *Outlook* assumes wider access to inputs as well as increased productivity-enhancing investments in technology, infrastructure, and training as critical drivers of agricultural development. However, a prolonged increase in energy and agricultural input prices (e.g. fertilisers) will raise production costs and may constrain productivity and output growth in the coming years.

Investments in raising yields and improved farm management are foreseen to drive growth in global crop production. Assuming continuing progress in plant breeding and a transition to more intensive production systems, yield growth is projected to account for 80% of global crop production growth, cropland expansion for 15%, and increasing cropping intensity for 5%. Cropland expansion is expected to be regionally concentrated in Asia, Latin America, and Sub-Saharan Africa.

Similar to trends in crop production, a large share of the projected 1.5% annual growth in livestock and fish production will result from improvements in per-animal productivity, stemming from more efficient herd management and higher feed intensity. Poultry is projected to account for more than half of the global growth in meat production due to sustained profitability and favourable meat-to-feed price ratios. Global milk production is projected to grow strongly in the coming decade, with half of the growth originating in India and Pakistan. Despite its limited growth prospects, aquaculture is expected to overtake the global production volume of capture fisheries by 2023.

The *Outlook* highlights the significant contribution of agriculture to climate change. Direct GHG emissions from agriculture are projected to increase by 6% in the next decade, with livestock accounting for 90% of this increase. Yet, agricultural emissions will grow at a lower rate than production, thanks to yield improvements and a reduction in the share of ruminant production, indicating a decline in the carbon intensity of agriculture. However, more efforts are needed for the agricultural sector to effectively contribute to global reductions in GHG emissions, as set out in the Paris Agreement on climate change. This includes large-scale adoption of climate-smart production processes and technologies, especially in the livestock sector.

Agricultural trade is essential to ensure food security, diversification of diets, and better rural incomes in many regions. Globally, trade in the main agricultural commodities and processed products is projected to grow in line with production over the next decade. However, some regions are expected to export a growing share of their domestic production (e.g. Latin America and the Caribbean, Europe and Central Asia), while others are foreseen to import a growing share of their total consumption (e.g. Sub-Saharan Africa). This increasing interdependency between trading partners underscores the critical importance of a well-functioning, transparent, and rules-based multilateral trading system.

Transportation costs are a pivotal element in trade costs and have been increasing since mid-2020 due to rising oil prices and trade disruptions. Although vulnerable to uncertainty, the *Outlook* projections assume that trade facilitation costs return to their pre-COVID-19 levels from 2022 onwards.

The agricultural price projections presented in this *Outlook* result from the interplay of fundamental supply and demand factors under normal weather, macroeconomic and policy assumptions. Based on these fundamentals, the current price rally of agricultural commodities is projected to be temporary. While prices may remain high in the 2022/23 marketing year, they are expected to subsequently resume their long-term declining trend in real terms. The *Outlook* is based on the latest information available at the time of producing the baseline, but, naturally, there is unavoidably a degree of uncertainty attached to the projections and to the underlying assumptions.

The *Outlook* projections suggest that, following a business-as-usual path, SDG 2 on Zero Hunger would not be achieved by 2030 and GHG emissions from agriculture would continue to increase. To achieve the Zero Hunger target while simultaneously keeping agricultural emissions on track to reach the Paris Agreement targets, average global agricultural productivity would need to increase by 28% over the next decade. This is more than triple the increase recorded in the last decade. For crops, the necessary 24% increase in average global yields – which acts as a proxy for crop productivity – is close to double the increase achieved over the past decade (13%). Global animal productivity would have to increase by 31%, on average, vastly exceeding the growth recorded during the last decade. Comprehensive action to boost agricultural investment and innovation and to enable the transfer of knowledge, technology, and skills are urgently required in order to put the agricultural sector on the necessary trajectory for sustainable productivity growth and the transformation towards sustainable food systems. Additional efforts to reduce food loss and waste and limit excess calorie and protein intakes, particularly from animal sources, would also be necessary.

1 Agricultural and food markets: Trends and prospects

Following a description of the macroeconomic and policy assumptions underlying the projections, including those related to Russia's war against Ukraine, this chapter presents the main findings of the *Agricultural Outlook*. It highlights key projections for consumption, production, trade, and prices for 25 agricultural products for the period 2022 to 2031. Agricultural demand growth is expected to slow down over the next decade and to be mainly driven by population growth. Varying income levels and income growth projections, as well as cultural preferences around diets and nutrition, will underlie continuing differences in consumption patterns between countries. 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. At the end of the chapter, a scenario assesses the level of productivity growth required to achieve the UN's Sustainable Development Goal 2 (SDG-2) on Zero Hunger as well as a considerable reduction in agricultural greenhouse gas emissions by 2030. Over the next decade, weather variability, animal and plant diseases, changing input prices, macro-economic developments and other uncertainties will result in variations around the projections.

Introduction

The *OECD-FAO Agricultural Outlook 2022-2031* is a collaborative effort of the Organisation for Economic Co-operation and Development (OECD) and the Food and Agriculture Organization of the United Nations (FAO). The *Outlook* presents a consistent baseline scenario for the evolution of agricultural commodity and fish markets at national, regional, and global levels for the period 2022 to 2031. This baseline scenario incorporates the commodity, policy, and country expertise of both organisations, as well as input from collaborating Member countries and international commodity bodies.

The baseline projections are based on the OECD-FAO Aglink-Cosimo model, which links sectors and countries covered in the *Outlook* to ensure consistency and global equilibrium across all markets. The projections are influenced by current market conditions (summarised in Figure 1.1), as well as assumptions about macroeconomic, demographic, and policy developments, which are detailed in Section 1.2.

The Russian Federation's (hereafter "Russia") war against Ukraine (hereinafter referred to as "war") is already having considerable impact on agricultural markets, especially for grains and oilseeds, for which Russia and Ukraine are key exporters (Box 1.1). In a number of International organisations, members have expressed their condemnation of Russia's war against Ukraine (e.g. United Nations General Assembly and OECD), and/or affirmed the General Assembly resolutions adopted in this regard (e.g. FAO Council and Regional Conference for Europe).[1] The *Outlook* projections account for reduced production prospects in Ukraine, and reduced export availability from both Ukraine and Russia, in the marketing year 2022/23. The medium-term impact of the war cannot be assessed based on data that is currently available.

The baseline of the *Outlook* serves as a reference for forward-looking policy planning, and the underlying Aglink-Cosimo model allows simulation analysis, including the assessment of market uncertainties. A detailed discussion of the methodology of the projections, as well as documentation of the Aglink-Cosimo model, are available online at www.agri-outlook.org.

The *Outlook* contains four main parts:

- *Part 1: Agricultural and food markets: Trends and prospects*. Following the description of the macroeconomic and policy assumptions underlying the projections (Section 1.2), this chapter presents the main findings of the *Outlook*. It highlights key projections and provides insights into the main outcomes and challenges facing agri-food systems over the coming decade. The chapter presents trends and prospects for consumption (Section 1.3), production (Section 1.4), trade (Section 1.5), and prices (Section 1.6). In Section 1.7, an illustrative scenario is used to assess the level of productivity growth required at the global level to eliminate hunger and reduce agricultural GHG emissions by 2030.
- *Part 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, which is split into Developed and East Asia (Section 2.2) and South and Southeast Asia (Section 2.3), Sub-Saharan Africa (Section 2.4), Near East and North Africa (Section 2.5), Europe and Central Asia (Section 2.6), North America (Section 2.7), and Latin America and the Caribbean (Section 2.8). It highlights the regional aspects of production, consumption and trade projections and provides background information on key regional issues.
- *Part 3: Commodity chapters*. These chapters describe recent market developments and highlight medium term projections for consumption, production, trade, and prices for the commodities covered in the *Outlook*. Each chapter concludes with a discussion of the main issues and uncertainties that might affect markets over the next ten years. This part consists of nine chapters: cereals (Chapter 3), oilseeds and oilseed products (Chapter 4), sugar (Chapter 5), meat (Chapter 6), dairy and dairy products (Chapter 7), fish (Chapter 8), biofuels (Chapter 9), cotton (Chapter 10), and other products (Chapter 11).

- *Part 4: Statistical Annex*. The statistical annex presents projections for production, consumption, trade and prices for agricultural commodities, fish and biofuels, as well as macroeconomic and policy assumptions. The evolution of markets over the outlook period is described using annual growth rates and data for the final year (2031) relative to a three-year base period (2019-21). The statistical annex is not part of the printed version of the *Outlook* but can be accessed online.

Box 1.1. Russia's war against Ukraine

Russia's war against Ukraine (hereinafter referred to as "war"), including the annexation of Crimea, started in 2014. Policy responses and their economic consequences have shaped global agricultural markets since then. Previously significant, Russian imports of meat, dairy products, as well as fruits and vegetables, from the European Union, North America and several other countries opposing the 2014 annexation virtually ceased as a result of an import ban. On 24 February 2022, this long-standing situation escalated into an open war when Russia invaded Ukraine, further affecting global markets and threatening global food security at the time of already elevated global commodity prices.

Importance of Ukraine and Russia for global agricultural markets

Ukraine and Russia are among the most important producers and exporters of arable crops in the world, particularly of wheat, barley, maize, sunflower seed and rapeseed. Production of animal commodities, however, mainly supplies their domestic markets.

Based on the average of the last five seasons, Russia and Ukraine accounted for 10% and 3% of global wheat production, respectively. Russia and Ukraine are the first and fifth largest wheat exporters, accounting for 20% and 10% of global exports, respectively. Both countries also play a critical role in supplying wheat to global markets, including to the Near East and North Africa region, where wheat is the main staple food.

Russia and Ukraine account for 20% of global barley production, and are the third and fourth largest exporters, respectively. A large share of the barley produced in both countries is used as feed in domestic animal husbandry.

Ukraine is the world's largest producer of sunflower seed, followed by Russia. Together, they account for more than 50% of the global production. Most of the production is crushed domestically into sunflower oil and meal. Sunflower oil is also exported to the global market, making Ukraine the fourth largest exporter of vegetable oil.

For rapeseed, maize and soybean, Ukraine and Russia account for less than 5% of global production, with Ukraine having the larger share. As domestic consumption is limited, most of their production is exported; Ukraine is the third largest exporter of both maize and rapeseed. Ukraine is also the largest exporter of soybean outside the Americas. For all three products, Ukraine plays a specific role in global markets, as it is the largest non-GMO exporter and an important exporter of organic feed.

Developments in global input markets

Russia also plays an important role in global energy and fertiliser markets. Russia is the world's top natural gas exporter, second-largest oil exporter, and the third coal exporter; accounting for 10%, 11% and 18% of global exports, respectively, in 2021 (FAO, 2022[1]). Russia is also the world's top exporter of nitrogen fertilisers, the second leading exporter of potassic fertilisers, and the third leading exporter of phosphorous fertilisers (FAO, 2022[1]), accounting for over 15% of total global fertiliser exports in 2020 (UNTAD, 2022[2]).

Global energy and fertiliser prices increased from their already high levels due to the war against Ukraine and the resulting uncertainty related to the availability of Russian energy and fertiliser globally. As the agri-food sector is highly-energy intensive, rising energy and fertiliser prices are translating into higher production costs and contributing to food price increases, as discussed in Box 1.4.

Impact on Ukrainian production and exports of agricultural commodities

As of May 2022, 8 million people are internally displaced in Ukraine and 6.3 million people fled Ukraine following the start of the war, while 1.9 million Ukrainians have returned to Ukraine during the same period (UNHCR, 2022[3]). This large number of displaced people raises significant food security concerns. For internally displaced people, in particular, domestic logistics channels have to be maintained to provide food and other essential goods and services, including in the areas where a large number of people sought refuge from active fighting. Many initiatives are focusing on addressing these food security needs, both through the direct supply of food and through efforts to ensure distribution channels remain open.

Ukrainian farmers have shown a high degree of resilience to the disruptions caused by the war and, agricultural field security conditions permitting, are continuing to produce crops and livestock products. At about 9 Mha, the area planted with winter crops in autumn 2021 reached levels similar to the 2020 season, with some shifts away from wheat and barley to rapeseed. As of May 2022, winter crop climatic conditions are favourable and, as per agricultural calendar, will require fertiliser application and other maintenance before the harvest starts in late June 2022. The sowing of the 2022 spring crops is nearing completion, with levels expected to be about 20% below last year, especially for the main spring crops i.e. sunflower seed, maize and spring barley. Overall, a smaller harvest is expected due to, among other factors, direct damages on winter crops caused by active fighting, remnants of the war preventing planting of the spring crops, and high input costs. Preliminary forecasts suggest reductions of more than 30% compared to the 2021 harvest (FAO, 2022[1]) (USDA, 2022[4]) but still production is expected to exceed domestic requirements.

The monitoring of animal production is considerably less detailed than that of crops but famers are also continuing to produce. However, the war is likely to affect Ukraine's ability to control animal diseases, notably the African swine fever (ASF), significantly increasing the risk of disease proliferation within Ukraine and in neighbouring countries.

As more than half of the crop production of Ukraine is exported, logistics of the export supply chain play a vital role. Any disruptions could result in substantial export losses. In the past, over 90% of Ukraine crop exports were channelled through seaports at the Sea of Azov and the Black Sea. These ports are currently not accessible due to the ongoing war. Other export channels – road, rail and river ports – do not have the capacity to handle the same quantities as maritime ports. Therefore, current industry estimates suggest that current exports can only reach 20% of normal export quantities. National and global efforts are under way to increase the capacities of alternative export channels, and to find other outlets. Yet larger quantities than usual remained in storage as current logistics constraints have limited exports of the 2021 harvest. The upcoming harvest in June-September 2022 will rapidly produce large quantities that will also need to be stored to avoid significant losses. In addition, some storage and processing facilities have been damaged, further delaying and constraining exports.

Impact on Russian exports of agricultural commodities

The 2021 Russian wheat harvest was below average due to adverse weather in the growing period. As a result, Russia imposed export restrictions, including export taxes, on its wheat before the start of the war. The war led to reduced access to ports, especially at the Sea of Azov, and an increase in export restrictions. However, some export flows from Russia have continued. Sanctions imposed on Russia have so far not targeted agricultural trade but many international companies, including those active in the agribusiness sector, have reduced their engagement in Russia. Financial sanction, insurance classification, and other economic uncertainties have led to a price discount for Russian wheat compared to other origins. Moreover, any loss of export markets for agricultural commodities could depress farmer incomes, thereby negatively affecting future planting decisions.

Russian agriculture depends on imports of pesticides, veterinary medicines and agricultural technology (e.g. machinery and software). Reduced access to these inputs could affect the future production potential of Russian agriculture.

Global food security impacts

Consumers in many countries depend on cereal, especially wheat and oilseed imports from Ukraine and Russia. Moreover, many farmers rely on Russia for fertiliser exports. The majority of the wheat and a large share of other commodities distributed by the World Food Programme (WFP) was sourced from Ukraine. Market balances as of April 2022 by the G-20's Agricultural Market Information System (AMIS) suggest globally sufficient supplies of wheat and other monitored commodities, although markets remain tight, and any shocks are reflected in the balances. Nevertheless, adjustments in trade flows and increasing energy costs are leading the increases in international agricultural commodity prices. In March 2022, the FAO Food Price Index (FFPI) reached its highest level on record since 1990, at 159.7 points. The FFPI retreated slightly in April 2022, to 158.5 points, though still 30% above its value in the corresponding month in the previous year (FAO, 2022[5]). Particularly exposed to price hikes are vulnerable populations, which spent a large share of their income to food, particularly in the Low-Income Food-Deficit Countries (LIFDCs).

Given necessary adjustments to global cereal trade to find alternative supplies should exports from Ukraine, and to a lesser extent from Russia, remain disrupted, it is important to keep trade in food and fertilisers open to prevent the war from negatively affecting global production and consumption needs. Any policy measures put in place as a response to high prices must be carefully weighed against their potential detrimental effect on international markets in the short term and over the longer term. In addition, global market transparency plays a key role when agricultural commodity markets need to adjust to shocks affecting supply and demand. Initiatives like AMIS play a critical role in improving market transparency.

The war and its economic implications on the world economy are the main uncertainties around the baseline projections in this year's *Outlook*, particularly for the first years of the projection period. The *Outlook* only accounts for the impact of the war in the marketing year 2022/23 and assumes that the recovery starts thereafter. The medium-term impacts of the war on agricultural markets cannot be assessed based on data that is currently available.

Several scenarios have been conducted with the Aglink-Cosimo model that assume different impacts on the harvest and export levels of all crops in Ukraine, and on the export levels of wheat in Russia for the next marketing season (2022/23). Table 1.1 shows the impact of these scenarios on the international wheat price. The full loss of Ukraine capacity to export would lead to a 19% increase in the global wheat price. This highlights the importance of maintaining Ukraine's production and export capacity. In the extreme scenario where Russian exports are also affected, wheat prices would be 34% higher than without the war. In this scenario, Russia and Ukraine would jointly export 36 Mt less wheat, but other countries would increase their exports by 16 Mt due to the higher international prices.

Table 1.1. Relative change in global wheat prices: Scenarios with Aglink-Cosimo for marketing year 2022/23

		Restriction of wheat exports by Russia			
		0%	**-10%**	**-25%**	**-50%**
Reduction of Ukraine exports	**0%**	0	2%	5%	11%
	-25%	4%	6%	10%	16%
	-50%	9%	11%	15%	21%
	-100%	19%	22%	26%	34%

Note: The upper left cell in the table refers to the hypothetical situation where exports from both countries are at the same levels as in the past years, not the data presented in the *Outlook*. Vertically, the production and export of cereals in Ukraine are reduced. Horizontally, the wheat exports of Russia are restricted.
Source: OECD (2022), Scenario calculation with Aglink-Cosimo.

In a separate analysis, based on the development of international prices and the price transmission, the (FAO, 2022[1]) projects undernourishment to increase by about 1% globally in 2022/23, which is equivalent to between about 8 and 13 million people, depending on the assumed severity of the export reduction. A scenario simulating a severe export shortfall from Ukraine and Russia in 2022/23 and 2023/24, and assuming no global production response, suggests an increase in the number of undernourished by close to 19 million people in 2023/24. This adds to the recent increase in global undernourishment following the COVID-19 pandemic.

The described impacts are based on the current situation and only take into account the impact of the war during the marketing years 2021 and 2022. Any prolongation of the war beyond 2022 will add additional complexity to the situation and uncertainty to the ten-year projections.

Figure 1.1. Market conditions for key commodities

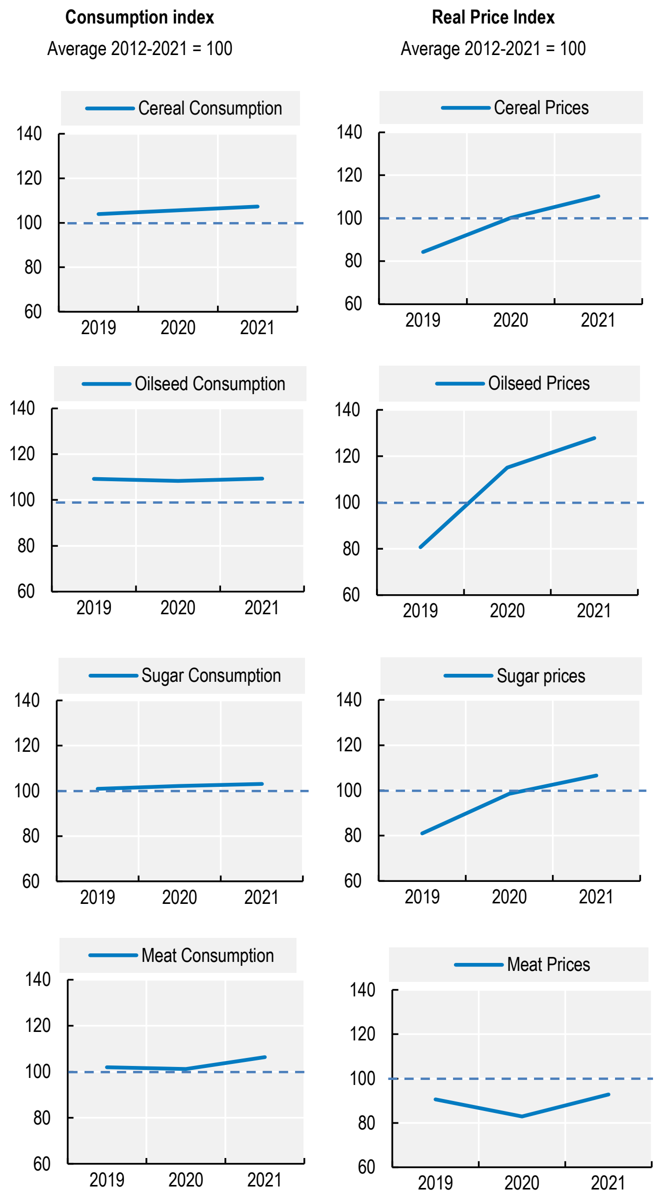
Current market conditions

Cereal: Cereal prices have been increasing since mid-2020, continuing in the 2021/2022 marketing season. Wheat prices increased strongly, following reduced harvests in major producing countries as well as reduced exports from Ukraine. While coarse grain prices also increased strongly, international rice prices in 2021 were on average 4% below their 2020 level as a result of ample supplies.

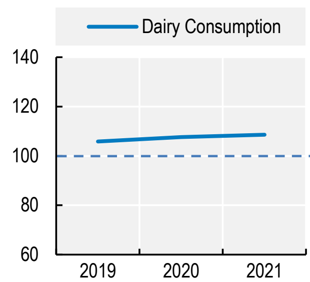
Oilseed: International prices for oilseeds have continued to climb, supported by strong demand for soybean from China amid reduced global production. The rapeseed harvest in Canada is low, while soybean in Latin America was affected by drought and palm oil in Malaysia is still impacted by the Covid-19 pandemic disruptions. Food price inflation is hampering growth in demand for oilseed products.

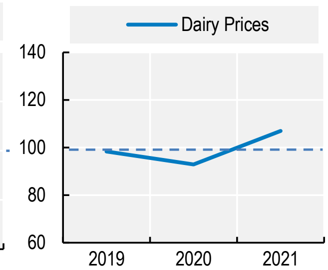
Sugar: Global sugar consumption continues to rebound from the COVID-19 related downturn, while supply is recovering thanks to better weather conditions in some key producing countries, with the exception of the world's main supplier, Brazil. The surge in crude oil prices is increasing competition from sugarcane-based ethanol production in Brazil and supporting higher international prices of sugar.

Meat: International meat prices trended upward in 2021, reflecting higher demand due to the economic recovery, and higher marketing and transport costs. However, the meat to feed price ratios fell significantly, putting pressure on sectoral profitability. The ongoing recovery from ASF in China was the largest driver of growth in global meat markets.

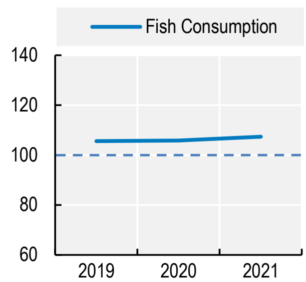


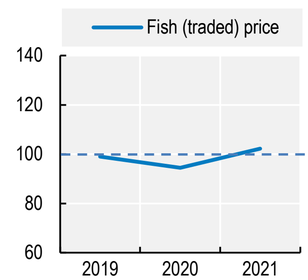
Dairy: Despite lockdowns and transport disruptions caused by the Covid-19 pandemic, the dairy sector has been resilient. Growth in the consumption of dairy products has resumed, supported by strong demand from Asian countries and to a lesser extent the Middle East. Prices of dairy products, which had fallen in 2020, rebounded in 2021, driven by Chinese import demand for cheese and milk powders, met by exports from New Zealand and the European Union.



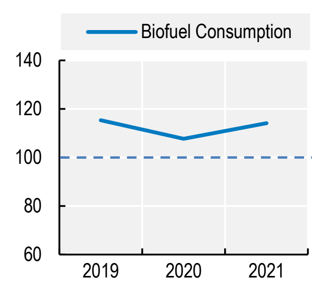


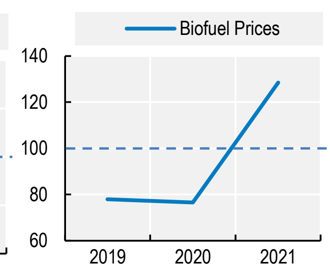
Fish: Efforts to mitigate the spread of COVID-19 resulted in reduced demand for fish, and disruptions in production, supply chains and markets during 2020. In 2021, consumption rebounded, particularly strongly in Europe and America. The rapid reopening of economies after lockdowns leads to a significant recovery in prices of fish products in 2021.



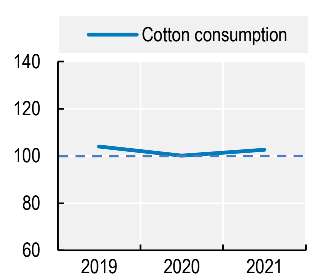


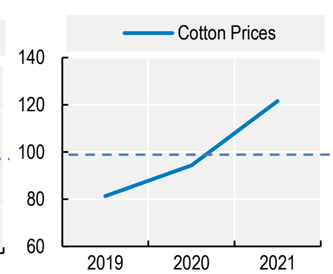
Biofuels: Supported by the economic recovery, demand for fossil fuels, and higher blending mandates in some countries, biofuel consumption is recovering from the drop in demand in the first year of the COVID-19 pandemic. However, costs of raw materials and production are high, which erodes the profitability of biofuels production, such as biodiesel in Argentina. Biofuel prices were historically high in 2021.





Cotton: International prices of cotton increased in 2021, continuing the upward trend that began in May 2020. In early 2022, cotton prices averaged nearly 50% above their 2021 levels. Strong prices were mainly a result of consumption increases in most major textile-producing countries.





Note: All graphs expressed as an index where the average of the past decade (2012-2021) is set to 100. Consumption refers to global consumption 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 in the Annex and the online commodity chapters.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

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1.1. Macroeconomic and policy assumptions

1.1.1. Main assumptions underlying the baseline projections

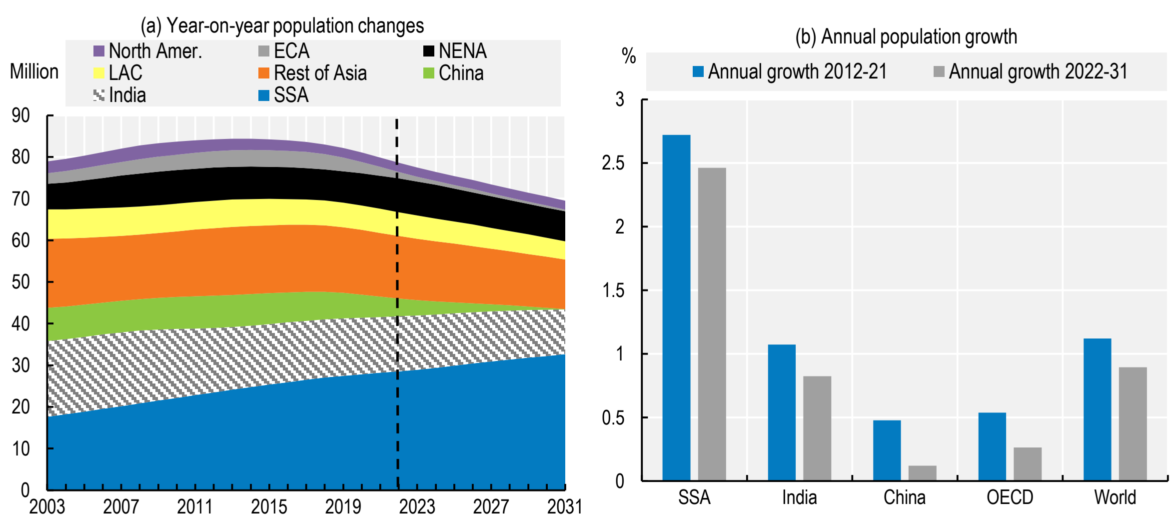
This *Outlook* presents a consistent baseline scenario for the medium-term evolution of agricultural and fish commodity markets based on a set of macro-economic, policy and demographic assumptions. The main assumptions underlying the projections are highlighted in this section. Detailed data are available in the Statistical Annex.

1.1.2. 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 is expected to grow from 7.8 billion in 2021 to 8.6 billion people in 2031. This corresponds to an average annual growth rate of 0.9%, a slowdown compared to the 1.1% p.a. 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 at 2.5% p.a. over the coming decade (Figure 1.2). With a population of 1.51 billion people in 2031, India is expected to overtake the People's Republic of China (hereafter "China") as the most populous country of the world.

Figure 1.2. World population growth



Note: SSA is Sub-Saharan Africa; LAC is Latin America and Caribbean; ECA is Europe and Central Asia; NENA stands for Near East and North Africa, and is defined as in Chapter 2; Rest of Asia is Asia Pacific excluding China and India.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

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1.1.3. GDP growth and per capita income growth

National GDP and per capita income estimates for the coming decade are based on the *IMF World Economic Outlook* (April 2022). Per capita incomes are expressed in constant 2010 US dollars.

After a rebound of 5.4% in 2021 following the 2020 recession due to the COVID-19 pandemic, global GDP growth is expected to slowdown in 2022 and 2023 and to stabilise at an average rate of 2.7% over the next decade. However, the path of recovery is expected to differ among countries and regions. The economies of Asia Pacific, North America, and Sub-Saharan Africa had already recovered to their pre-COVID-19 levels in 2021. In Latin America and the Caribbean, Europe and Central Asia, and Near East and North Africa, GDP is projected to return to the 2019 value in 2022. Over the period 2022-31, GDP will continue to grow strongly in the Asia Pacific region, in particular in India, China and Southeast Asia, at an average of about 4% p.a. In Sub-Saharan Africa, and Near East and North Africa, average GDP growth of 4% p.a. and 3% p.a., respectively, is projected over the next ten years. Lower average GDP growth is expected overall in OECD economies, at 1.8% p.a.

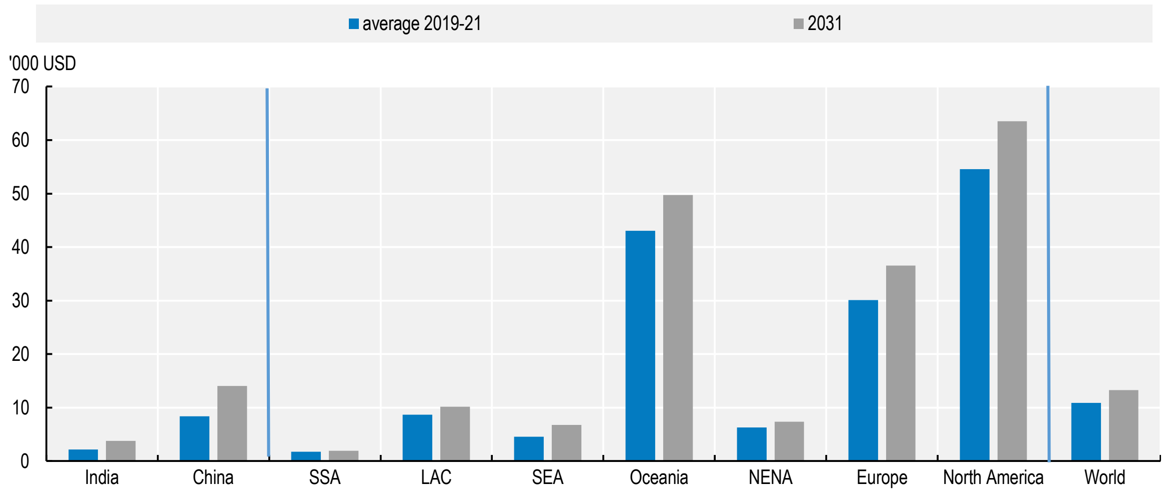
National average per-capita income is approximated in this *Outlook* using per capita real GDP (Figure 1.3). This indicator is used to represent household disposable income, which is one of the main determinants of demand for agricultural commodities. As shown in the World Bank's *Poverty and Shared Prosperity 2020* report, however, national economic growth is unevenly distributed. 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, national average food demand projections in this *Outlook* can deviate from what might be expected based on average income growth. In addition, the COVID-19 pandemic has deepened income inequalities within countries. In 2020-21, the annual growth rate in per capita income of the poorest 40% of the population declined sharply in all economies (compared to 2012-17 period).

After falling in 2020, global per capita income increased by 4.4% in 2021 but is expected to slow down in 2022 and 2023. Over the next decade, an average annual growth rate of 1.8% in real terms is projected. Strong growth is expected in Asia, with per capita income increasing by 5.3% p.a. in India, and by 4.8% p.a. in China. Growth in per capita income is also expected to be strong in Viet Nam, at 5.8% p.a., and in the Philippines, Indonesia, and Thailand at 4.9%, 4.2% and 3.1% p.a., respectively.

In Sub-Saharan Africa, average per capita incomes are projected to grow slowly at 1.3% p.a. over the coming decade. Real per capita income is projected to stagnate in Nigeria and South Africa but to be robust in Ethiopia, at 3.5% p.a. In the Latin America and the Caribbean, average per capita income growth is projected at 1.6% p.a., driven by high growth in Colombia, Paraguay, and Chile at 2.9% p.a., 2.4% p.a. and 2% p.a., respectively, while an average annual growth rate of 1.5% and 1.7% is expected in Brazil and Argentina, respectively. In the Near East and North Africa region, average per capita income growth is projected at 1.6% p.a., led by the Near East region, especially Jordan, and the Emirates at 2.7% and 3.1% p.a., respectively. Strong growth in per capita income is also expected in Egypt, at 3.8% p.a., while in Saudi Arabia per capita income is expected to grow at 1.6% p.a. over the next ten years.

Average per capita incomes are expected to rise by 1.8% p.a. and 1.3% p.a. in Europe and Oceania, respectively, to 2031. These growth rates are in line with the OECD average, where per capita income is projected to increase at around 1.3% p.a. Among OECD countries, the highest growth is expected for Colombia, followed by Türkiye and Korea at 2.9%, 2.6% and 2.5% p.a. respectively, while per capita incomes are expected to grow slowest in Canada at 0.9% p.a. In the European Union, the United States and Japan, per capita incomes are projected to increase at 1.8%, 1.2% and 1.1% p.a., respectively.

Figure 1.3. Per capita income



Note: SSA is Sub-Saharan Africa; LAC is Latin America and Caribbean; SEA is Southeast Asia; NENA stands for Near East and North Africa, and is defined as in Chapter 2. The graph shows per capita GDP in constant 2010 US dollars.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

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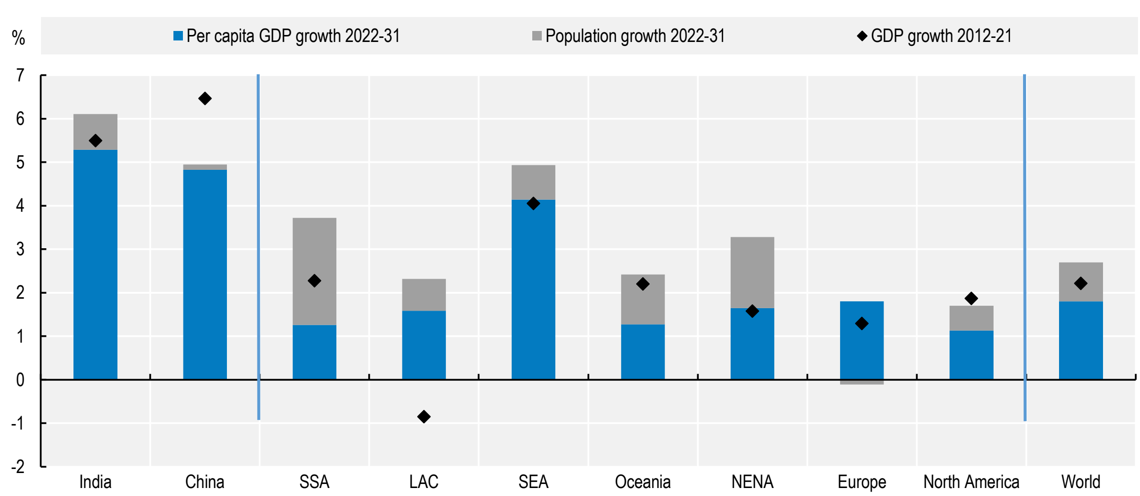
Figure 1.4 decomposes the GDP growth projections into per capita GDP and population growth for key regions and selected countries. Globally, economic growth will be mainly driven by per capita income growth. This is especially the case in OECD countries and China. By contrast, high population growth in Sub-Saharan Africa means that the relatively high rate of economic growth in the region (3.8% p.a.) corresponds to only a modest growth in per capita terms (at around 1.3% p.a.). The same applies to a lesser extent in the Near East and North Africa region. By contrast, the modest economic growth in Europe at 1.7% p.a., where population is expected to decrease over the next ten years, translates into a per capita income growth rate of 1.8% p.a. over the coming decade.

Figure 1.4. Average annual GDP growth rates



Note: SSA is Sub-Saharan Africa; LAC is Latin America and Caribbean; SEA is Southeast Asia; NENA stands for Near East and North Africa, and is defined as in Chapter 2.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

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1.1.4. Exchange rates and inflation

Exchange rate assumptions are based on the IMF's World Economic Outlook (April 2022). Nominal exchange rates against the US dollar are primarily determined by differences in inflation against the United States. With high inflation expected in Argentina, Egypt and Ethiopia in particular, the currencies of these countries should depreciate significantly in nominal terms. In real terms, exchange rates are assumed to be more stable for the period 2022-31; but some currencies should appreciate significantly against the US dollar, such as those of Chile, Nigeria, Brazil and China. On the other hand, a significant depreciation in real terms is expected for India.

Inflation projections are based on the private consumption expenditure (PCE) deflator from the *IMF World Economic Outlook* (April 2022). In OECD countries, inflation is projected to be significantly higher than in the previous decade, at 5.2% p.a., with a very high annual inflation rate of 15.8% p.a. in Türkiye, and an average rate of 2.1% p.a. for the United States, 2% p.a. for Canada, and 2.1% p.a. for the Euro zone. Among emerging economies, consumer price inflation is expected to remain high at 9% p.a. in Argentina, despite a strong decrease compared to the previous decade. Inflation should ease in India from 4.9% p.a. to 3.9% p.a. and in Brazil, from 6% p.a. to 3% p.a. By contrast, China should experience the same rate of consumer price inflation (2% p.a.) as over the last decade. Inflation is projected to remain high in Sub-Saharan Africa (Ethiopia 13.4% p.a., Nigeria 10.7% p.a. and Ghana 6.3% p.a.). High inflation is also expected in Egypt (7.2% p.a.) and Pakistan (6.5% p.a.).

1.1.5. Input costs

Production projections in the *Outlook* incorporate a composite cost index, which covers seed, energy and fertiliser, as well as various other tradable and non-tradable inputs. It is constructed on the basis of historical cost shares for each country and commodity, which are held constant for the duration of the outlook period. Energy costs are represented by the international crude oil price expressed in domestic currency. The progression of costs of tradable inputs such as machinery and chemicals is approximated by the evolution of the real exchange rate, while the costs of non-tradable inputs (mainly labour) are approximated by changes in the GDP deflator. Seed prices follow the respective crop prices, while an aggregate fertiliser price is approximated by a formula that takes both crop and crude oil prices into account.

Historical data for world oil prices are based on Brent crude oil prices in 2020 from the short-term update of the *OECD Economic Outlook* N°110 (December 2021). For 2021, the annual average daily spot price in 2021 was used. For 2022, an estimate based on the situation in April 2022 is used. For the remainder of the projection period, the reference oil price used in the projections is assumed to follow the growth rate of the World Bank average oil price, which implies an increase from USD 71/barrel in 2021 to USD 89/barrel in nominal terms in 2031, and decrease in real terms to USD 56/barrel in 2031.

1.1.6. Policy assumptions

Policies play a significant role in agricultural, biofuel and fisheries markets such that policy reforms may trigger changes in market structures. The *Outlook* projections are made under the assumption that policies currently in place will remain unchanged throughout the projection period, thus providing a useful benchmark for the evaluation and analysis of future policy changes.

The projections of the *Outlook* do not take into account the planned reform of the European Union (EU) Common Agricultural Policy (CAP), as the European Commission is still reviewing Members States' strategic plans, which describe how the CAP and Green Deal objectives will be achieved. As National Strategic plans will enter into force at the beginning of 2023, for this *Outlook* a continuation of current agricultural and trade policies in the European Union is assumed over the projection period.

The relationship between the EU-27 and the United Kingdom (UK) is based on the EU-UK Trade and Cooperation Agreement provisionally applied from 1 January 2021. A duty-free/quota-free trade relationship between the European Union and the United Kingdom is assumed, with some short-term trade disruptions due to additional border checks and logistical issues considered only for the 2022 projections.

The free trade agreements considered in the *Outlook* are those ratified by the end of December 2021 (e.g. Association of Southeast Asian Nations, United States-Mexico-Canada Agreement, African Continental Free Trade Area) while others (e.g. Regional Comprehensive Economic Partnership, EU-Mercosur) are considered as pending.

The COVID-19 pandemic has added a significant additional element of uncertainty to the macroeconomic assumptions underlying the projections of the *Outlook*. Although the assumptions suggest a continuation of the global economic recovery in the coming period, the actual pace will largely depend on the evolution of coronavirus outbreaks (e.g. spread of new variants) and vaccination rates, as well as policies that support the recovery of businesses and consumer demand. The *Outlook* assumes that the restrictive measures to contain the spread of the COVID-19 pandemic will not be permanent and will be lifted as part of the economic recovery in 2022.

1.2. Consumption

The OECD-FAO Agricultural Outlook projects future trends in the use of the main crop commodities (cereals, oilseeds, roots and tubers, pulses, sugar cane and sugar beet, palm oil and cotton), livestock products (meat, dairy, eggs and fish),[2] and their by-products[3] as food, animal feed, raw materials for biofuels and other industrial uses. For most commodities, food is the main component of overall use. However, non-food uses, mainly feed and fuel, are also important for several commodities (Figure 1.5).

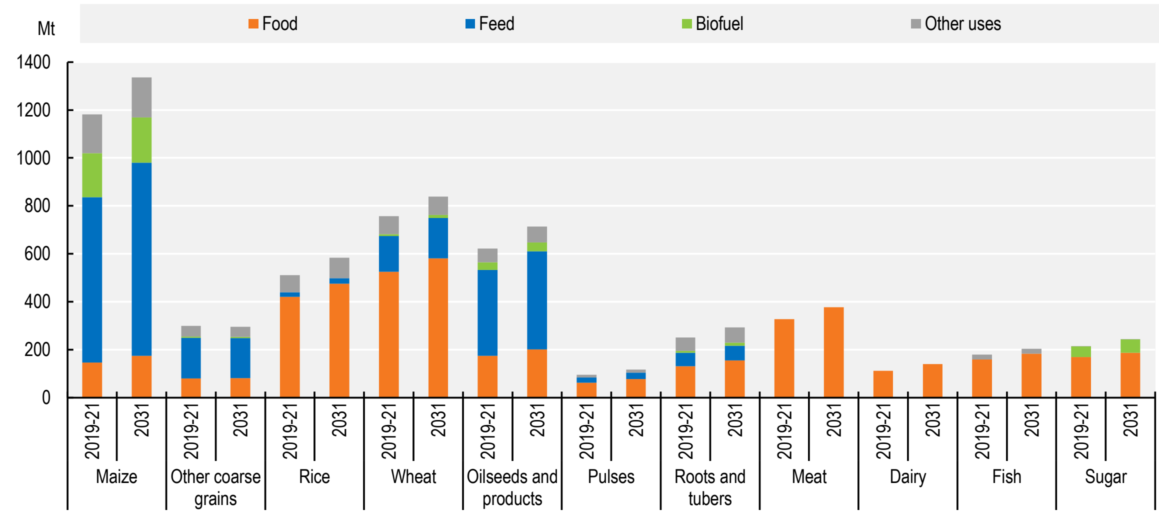
Future demand for food is directly influenced by population and demographic changes, by income growth and distribution, and by food prices. Food demand will also be shaped by socio-cultural and lifestyles changes, including urbanisation and rising female participation in the workforce, as well as increasing consumer awareness of health and sustainability issues. Policies altering the price of agricultural products (e.g. fiscal measures, border measures) and, as far as possible, policies influencing consumption patterns (e.g. food labelling, regulations) are also considered. Taken together, these factors will determine the level and structure of food demand over the next decade.

Demand for non-food uses of agricultural commodities is also shaped by a number of specific factors. Feed demand has two main drivers. First, the overall demand for animal products, which determines the production level of the livestock and aquaculture sectors. Second, the structure and efficiency of the production systems, which determine the amount of feed needed to produce a given output of livestock and aquaculture products.

Industrial uses of agricultural commodities – mostly for biofuel production and as input in the chemical industry – are largely influenced by general economic conditions, regulatory policies, and technological change. In the case of biofuels, consumption is highly sensitive to changes in policies, as well as overall demand for transport fuel, which in turn depends on the crude oil price.

The macroeconomic assumptions underlying the projections suggest a widespread economic recovery following the COVID-19 pandemic. However, the actual pace of this recovery will depend on several factors that cannot easily be anticipated, which introduces uncertainty into the projections of demand for agricultural commodities. The *Outlook* projections also account for reduced export availability from both Ukraine and Russia in the marketing year 2022/23 (Section 1.3.7).

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

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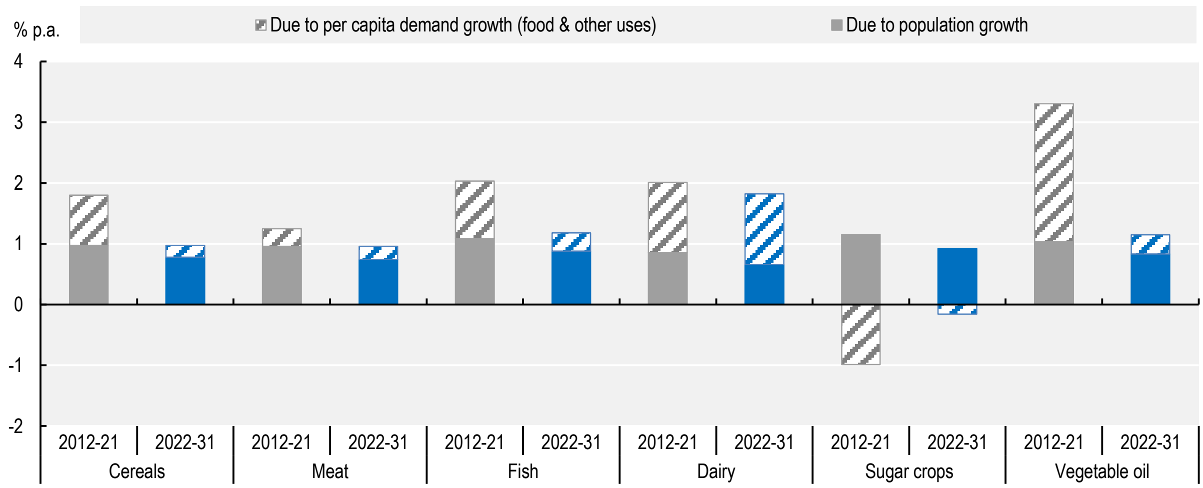
1.2.1. Demand growth is slowing and mostly driven by population

Global demand for agricultural commodities (including for non-food uses) is projected to grow at 1.1% p.a. over the coming decade, well below the growth experienced over the last decade (2% p.a.). This is mainly due to an expected slowdown in demand growth in China (0.6% p.a. compared to 2.3% p.a. over the last decade) and other middle-income countries, and in global demand for biofuels.

For most commodities (except dairy), per capita demand growth will be limited over the next ten years (Figure 1.6). Population growth will thus be the main determinant of demand growth, with the bulk of additional demand originating in regions with high population growth, namely Sub-Saharan Africa, South Asia, Near East, and North Africa.

For cereals and fish, global demand will grow at about half the rate of the past decade, while for vegetable oil only a third of last decade's growth is expected (Figure 1.6). Vegetable oil was the fastest-growing commodity over the last ten years, partly driven by biofuel policies. Over the next decade, demand growth for vegetable oil will be constrained by stagnant to declining biodiesel consumption in the two main markets, the United States and the European Union (Section 1.3.5). Growth in food demand for vegetable oil is also projected to slow down as high-income countries and some middle-income countries, including China, are approaching saturation levels.

Figure 1.6. 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 (2022), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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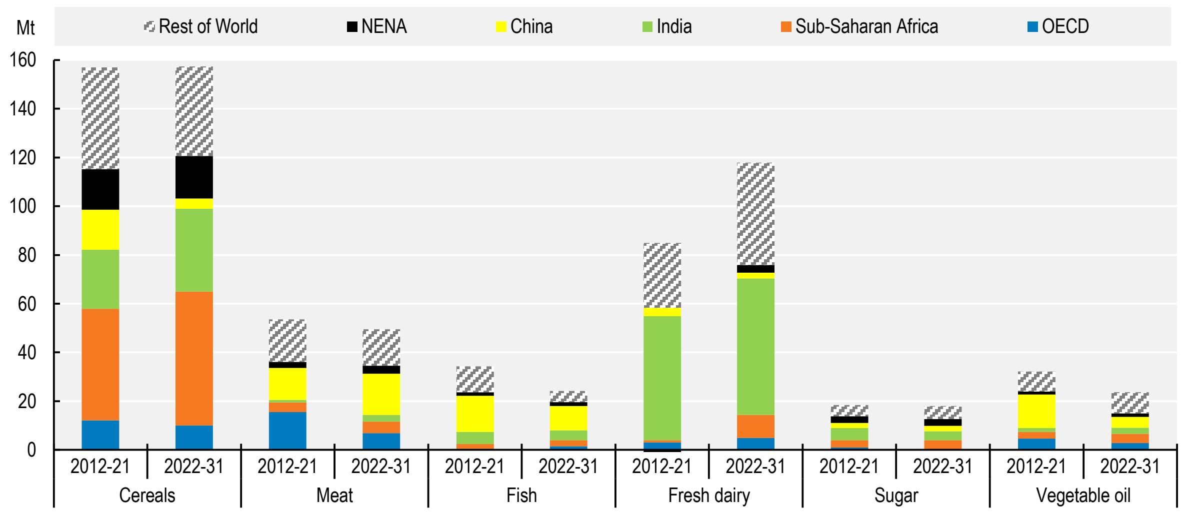
1.2.2. Low- and middle-income countries are driving food demand growth

Global food demand is projected to increase by 1.4% p.a. over the next decade, driven by population and per capita income growth. Most additional demand for food will continue to come from low and middle-income countries, while in high-income countries it will be constrained by slow population growth, and a saturation in the per capita consumption of several commodities (Section 1.3.3).

World population is projected to grow from 7.8 billion in 2021 to 8.6 billion in 2031. Two-thirds of this increase is expected to occur in Sub-Saharan Africa, India and Near East and North Africa (Section 1.2.2). Consequently, these regions will generate a large share of additional demand for food, in particular cereals (two-thirds of additional demand), and other staples (i.e. roots and tubers, and pulses) (Figure 1.7).

Continuing income growth and urbanisation in China, India, and Southeast Asia will also drive food demand growth for several commodities. China is expected to account for 41% and 34% of additional global food demand for fish and meat, respectively, while half of additional global demand for fresh dairy products will be sourced in India (Figure 1.7).

Figure 1.7. Regional contributions to food demand growth, 2012-21 and 2022-31



Note: Each column shows the increase in global demand over a ten-year period, split by region, for food uses only. NENA stands for Near East and North Africa, and is defined as in Chapter 2.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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1.2.3. Convergence in diets expected to be limited over the coming decade

UN Sustainable Development Goal of Zero Hunger by 2030 will be a challenge

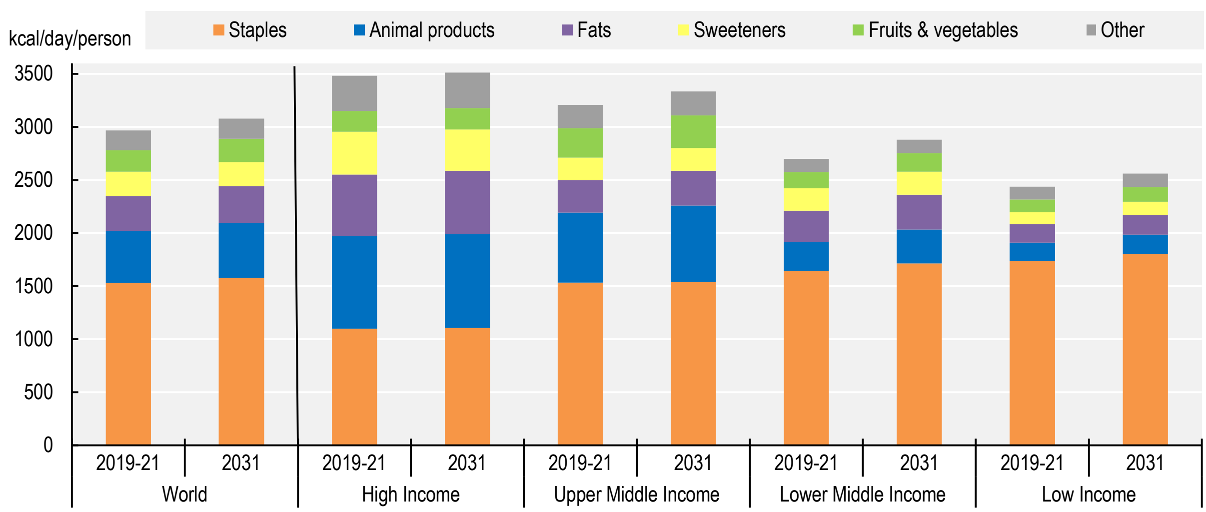
Globally, average food availability per person is projected to grow by 4% to reach over 3 070 kcal/person/day in 2031. Staples and animal products will account for 70% of additional calories (Figure 1.8). Food availability is the closest indicator to food consumption available in the Aglink-Cosimo model. It is higher than actual consumption because some of the food that is potentially available to consumers is lost or wasted along the supply chain. The term food consumption is used for food availability for ease of interpretation.

Global average food consumption per person masks important differences between regions and countries. While consumers in middle-income countries are expected to increase their food consumption and diversify their diets in the coming decade, diets in low-income countries will remain largely unchanged. Therefore, the projections suggest that it will be challenging to meet the Sustainable Development Goal (SDG) 2 on Zero Hunger by 2030 (United Nations, n.d.[6]). In Section 1.7, an illustrative scenario assesses the level of productivity growth that would be required to achieve SDG2 as well as a considerable reduction in agricultural greenhouse gases (GHG) emissions by 2030.

Per capita food consumption will level off in high-income countries over the next decade as it is already at high levels for the different food groups, and an ageing population and more sedentary lifestyles limit additional calorie requirements (Figure 1.8). However, income growth and changing consumer preferences will increase the substitution away from staples and sweeteners, towards nutritious foods, including fruits and vegetables, and to a lesser extent, animal products. The projected decline in per capita consumption of sweeteners reflects growing consumer concerns about the negative health effects of excessive sugar consumption. Several countries (e.g. France, United Kingdom, and Norway) have implemented measures to discourage the consumption of caloric sweeteners over the last decade, which are assumed to remain in effect over the projection period and reduce demand for these products.

In upper-middle income countries, per capita food consumption is expected to increase by 4% by 2031 (Figure 1.8). Given the expected high-income growth and the strong preference to consume more meat in several of these countries, including China, 45% of additional calories will be provided by animal products and 20% by fats. Per capita food consumption is projected to increase by almost 7% in lower-middle income countries over the next decade, the largest gain of all income groups. Staples and animal products will account for two-thirds of this increase, and fats for 18%. The projected increase in fats consumption in middle-income countries is underpinned by ongoing urbanisation and changing lifestyles (e.g. increasing tendency to eat outside the home), which favour higher consumption of processed and convenience foods.

Figure 1.8. Per capita calorie availability of the main food groups, by country income group



Note: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets database, which are extended with the *Outlook* database. Products not covered in the *Outlook* are extended by trends. 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 tubers and pulses. Animal products include meat, dairy products (excluding butter), eggs and fish. Fats include butter and vegetable oil. Sweeteners include sugar and HFCS. The category others include other crop and animal products.
Source: FAO (2022). FAOSTAT Food Balances Database, http://www.fao.org/faostat/en/#data/FBS; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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In low-income countries, average food consumption is projected to increase by 5% to reach 2 560 kcal/person/day in 2031 (Figure 1.8). Average diets in low income-countries will remain heavily based on staples, which are projected to account for more than half of additional calories and will continue to provide 70% of calories by 2031. Strong growth in per capita consumption of sweeteners (11% of additional calories) is driven by ongoing urbanisation, which favours higher consumption of sugar-rich confectionery products and soft drinks. However, given the low base level, per capita consumption of sweeteners in these countries will remain well below those of middle and high-income countries by 2031. Growth in the consumption of animal products and other nutritious foods (e.g. fruits and vegetables) will be limited due to income constraints, exacerbated by the COVID-19 pandemic. Given the higher cost of these food items, consumers in low-income countries will only slightly increase the diversity of their diets.

Aligning global diets with the World Health Organization (WHO) guidelines on the intake of sugar and fat would improve food security and nutrition, and environmental sustainability, but could negatively affect farmer livelihoods, as explained in Box 1.2.

Box 1.2. Potential impact of dietary changes on the triple challenge facing food systems

Global dietary patterns have changed substantially over the past 50 years, with people increasingly consuming resource-intensive and energy-dense foods. Changes in dietary patterns have contributed to a double burden of malnutrition, with more than 1.9 billion people overweight in 2016 and, of these, over 650 million were obese (WHO, 2021[7]) and nearly 768 million people undernourished in 2020 (FAO et al., 2021[8]). Growing population and per capita food consumption have also increased environmental resource pressure and degradation and led to a rise in GHG emissions from the agriculture, forestry and other land use sector. Current dietary and population growth trends will exacerbate risks to both people and the planet. A dietary shift toward healthy diets and more sustainable food systems could contribute to achieving many of the 17 UN SDGs by 2030, and countries' commitments under the 2015 Paris Agreement (COP21).

Using the Aglink-Cosimo model and indicators of the triple challenge – namely food security and nutrition, livelihoods, and environmental sustainability (Tallard et al., 2022[9]) – look at the potential impacts on food systems of aligning global diets with the WHO guidelines on the intake of sugar and fat. Specifically, this scenario assesses the impact of reducing the consumption of free sugars and fat to a maximum of 10% and 30% of an appropriate caloric intake, respectively.[1] These changes in diets are simulated to be implemented over ten years across all of the population in each country, excluding undernourished individuals.

Following implementation of this dietary change, the model estimates that global per capita calories consumed from sugar fall by 8%, calories from HFCS fall by 16%, and calories from fat fall by 11% in 2030, compared to the baseline of the 2020-29 *Outlook* (OECD/FAO, 2021[10]).

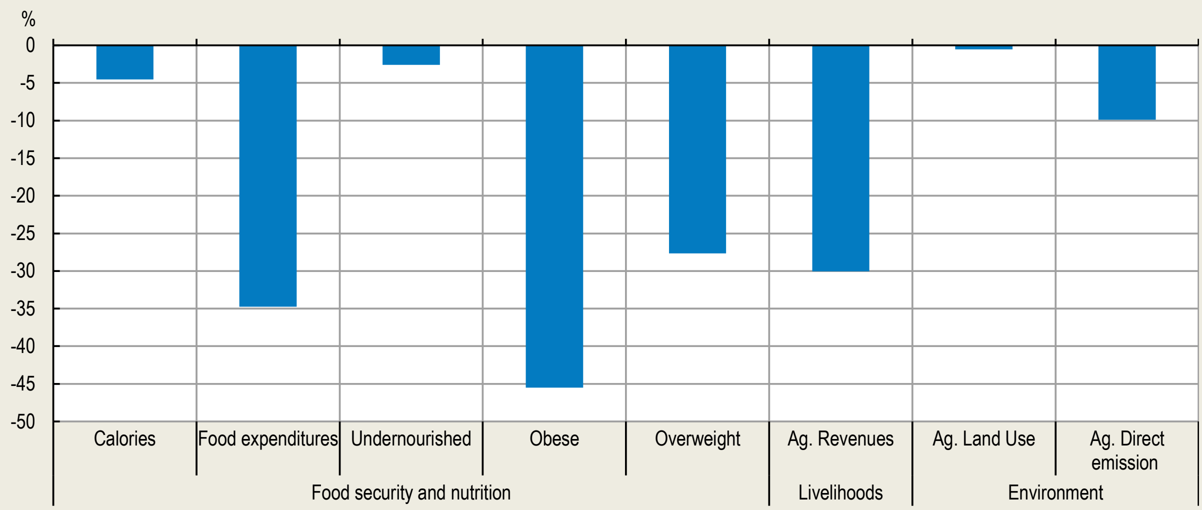
Such a change in diets has a large impact on food security and nutritional outcomes, with the prevalence of obesity and overweight declining by 46% (638 million people) and 28% (1 billion people), respectively, compared to the baseline. Moreover, as prices fall for most commodities, global food expenditure decreases by 35%, resulting in a 3% decline in the prevalence of undernourishment at the global level (20 million people) (Figure 1.9).

This dietary change also has significant impact on farmer livelihoods and environmental sustainability. Strong price declines for sugar (-28%), poultry (-44%), pork (-62%), beef (-63%), butter (-73%), and cheese (-53%), result in a 30% drop in agricultural revenues relative to the baseline. Lower production of several commodities, including emission-intensive products such as meats and dairy, result in a 10% decline in GHG emissions from agriculture (-532 MtCO2-eq). The impact on global land use, however, is small (-0.5%) (Figure 1.9).

The analysis indicates that it is the reduction in fat consumption that drives most of the impacts on the triple challenge indicators, given the size of the vegetable oil and livestock sectors, the importance of these products in diets, and the substantial gap between current levels of fat consumption and the WHO recommendations (Tallard et al., 2022[9]).

Figure 1.9. Global change in Indicators of the triple challenge: Sugar and fat scenario

% change relative to the baseline



Source: Tallard et al. (2022[9]).

https://stat.link/q6pets

Overall, achieving WHO's targets on the intake of sugar and fat would have a positive impact on food security and nutrition, leading to a decline in both over-nourishment and undernourishment, as well as on environmental sustainability. However, the reduction in food prices and global production resulting from this change in diets negatively affects farmers' livelihood. This suggests that when designing food policies, potential synergies and trade-offs need to be taken into account in order to develop a coherent mix of policies that benefit agriculture, human health and the environment.

Note: [1] To translate WHO recommendations into specific values, this scenario rely on the Average Daily Energy Requirement, which captures the average calorie intake requirements of an average individual, taking into account a range of factors such as demographics and levels of physical activity.
Source: Tallard et al. (2022[9]).

Continuing differences in the main sources of protein between countries

Average per capita consumption of protein is projected to increase by 4% to reach 87g/person/day in 2031. Income-related and cultural differences in the composition of protein consumption are expected to persist, with lower middle- and low-income countries remaining heavily dependent on proteins from plant sources. Populations in high-income countries will continue to derive the majority of their proteins from animal sources.

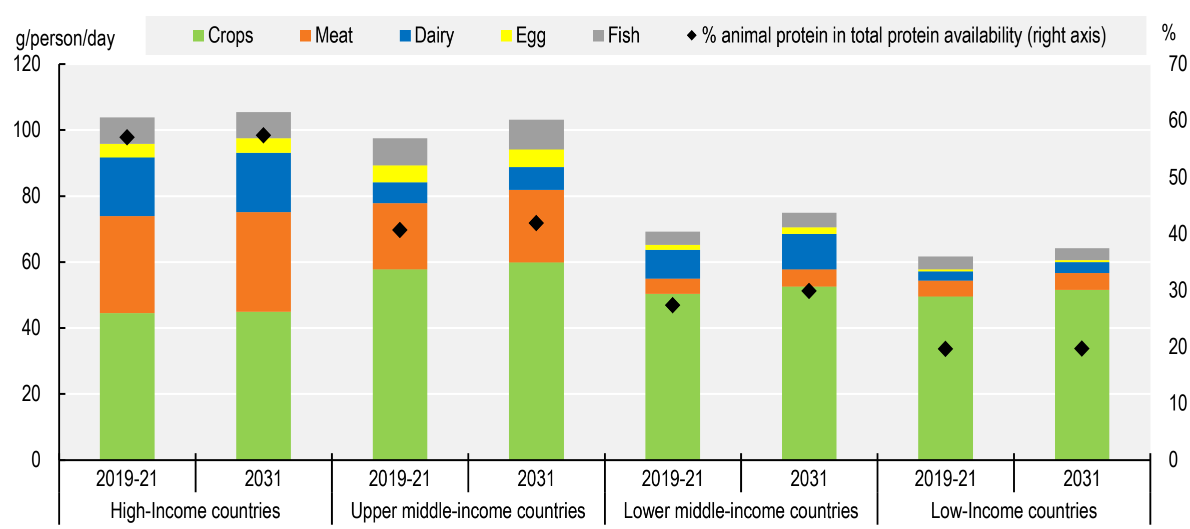
In high-income countries, average per capita consumption of proteins is not expected to expand much over the next decade, due to near saturation in consumption, and heightened concerns about health and the environment (Figure 1.10). These concerns, together with ethical considerations regarding the welfare and eating of animals, could also boost demand for plant-based proteins and alternative protein sources (e.g. insects, cultured meat), as discussed in Section 1.3.7.

Strong growth in per capita consumption of proteins is expected in upper and lower middle-income countries, by 6% and 8%, respectively; with about 60% of additional proteins being provided by animal products (Figure 1.10). This will bring average per capita consumption of proteins in upper-middle income countries close to the levels of high-income countries by 2031. Much of this convergence is driven by a strong growth in per capita consumption of animal protein (mainly meat) in China.

Despite significant growth in per capita consumption of animal protein (mainly dairy) in lower middle-income countries, their consumption levels will remain well below those of upper middle and high-income countries given their low base level. India's traditionally low consumption of animal protein, especially of meat, is the main contributor to this trend.

Per capita consumption of proteins is projected to increase by 4% in low-income countries (Figure 1.10). Additional proteins will come almost entirely from plants, which will continue to provide more than 80% of available proteins by 2031. Per capita consumption of animal protein is low and is expected to grow slowly over the coming decade, mainly due to relatively low growth in per capita incomes following the COVID-19 pandemic. Supply chain problems (e.g. lack of a cold chain infrastructure) also remain a constraint in some areas, whereas dietary preferences for non-animal protein sources continue to limit demand growth in others. Per capita consumption of fish protein is even projected to decline over the next decade, as population growth in Africa is projected to outpace the expansion in supply.

Figure 1.10. Per capita protein availability, by country income group



Note: Crops include cereals, pulses, and roots and tubers.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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1.2.4. Feed use efficiency gains and intensification

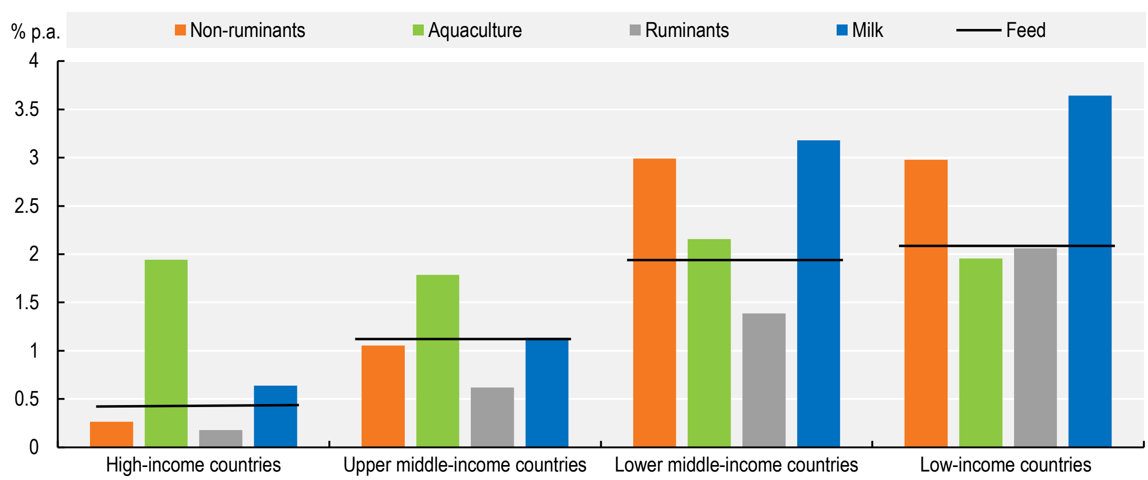
Low- and middle-income countries drive growth in feed use

The evolution of global consumption patterns towards more animal products in diets requires growing crops and other agricultural products as feed. In 2019-21, about 1.7 billion tonnes of cereals, protein meals and processing by products (e.g. cereals bran) were used as animal feed. Global feed use is projected to increase by 1% p.a. over the coming decade, reaching 2 billion tonnes in 2031.[4]

In lower middle and low-income countries, feed use is projected to grow faster, at about 2% p.a. over the next ten years, reflecting the rapid expansion in non-ruminant and aquaculture production, as well as intensification in feed use due to the shift away from backyard production to more commercialised production systems. Developments in ruminants and milk production in these countries are less closely linked to commercial feed use, as most production is pasture-based (Figure 1.11).

In upper-middle income countries, feed use is projected to grow at 1.1% p.a. over the next decade, in line with growth in livestock and aquaculture production. Developments in feed use are highly influenced by China, the world's largest feed consumer. However, China's feed use growth is projected to significantly decelerate compared to the last decade (1% p.a. vs 3.7% p.a.), due to slower growth in livestock production (except for pigmeat), and improvements in feeding efficiency. These feed efficiency gains, owing to better management practices and animal genetics, will enable a reduction in feed use per unit of livestock output (Figure 1.11).

Figure 1.11. Annual change in feed use and livestock production, 2022-2031



Note: Ruminants include beef and veal and sheepmeat. Non-ruminants include poultry and pigmeat. The bars show annual changes in production volumes for the different livestock products. The black line shows annual changes in feed use.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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In high-income countries, feed use is projected to grow slowly, at only 0.4% p.a., reflecting slow growth in livestock production but also feed efficiency gains, stemming from improvements in animal genetics, feed technology, and herd management (Figure 1.11).

Despite slower growth in feed use in upper middle and high-income countries, these countries will remain the largest feed consumers, overall accounting for 80% of global feed use by 2031 (Figure 1.12). Together, China, the United States, and the European Union will continue to account for half of total feed use by the end of the decade.

Changes in the structure of feed use in low- and middle-income countries

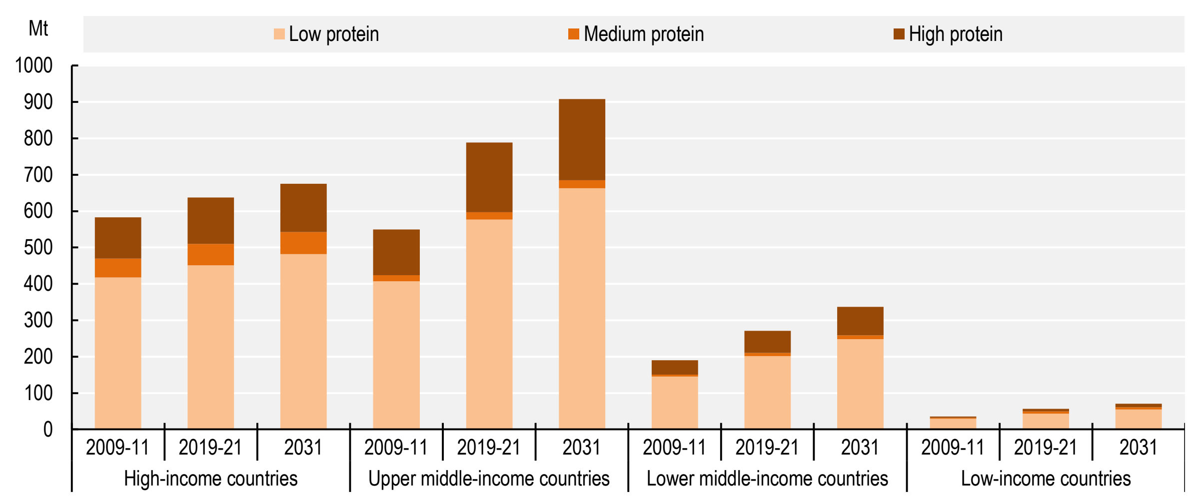
The composition of feed use, shown in Figure 1.12 as the share of high, medium and low protein feed in total feed use, varies significantly between countries due to differences in production technologies. Over the next decade, intensification in livestock production in lower-middle- and low-income countries is expected to increase their use of high-protein feed, albeit starting from a low base.

Livestock farming in low-income countries is largely reliant on small-scale, locally produced feed systems. Commercial feed use is low and dominated by low protein feed (i.e. cereals, roots and tubers). However, the share of high protein feed (i.e. mainly oilseed meals) in total feed use is projected to slightly increase from 13% in 2019-21 to 14% in 2031, as these countries adopt more commercialised and feed intensive production systems. Lower-middle income countries use a higher share of high protein feed but this will only marginally increase from 2019-21 to reach a projected 23% by 2031.

Upper middle-income countries have the highest consumption and share of high protein feed, which has surged over the last decade (from 22% to over 24%), with a shift to compound feed production systems, but is expected to remain stable over the next decade. China's use share of high protein feed is already high, exceeding those of both the European Union and the United States. Moreover, the liberalisation of the grain market in China since 2016 has led to a drop in feed grain prices, which favours the use of maize (relative to protein meal) in the feed mix. However, rebuilding pig herds from ASF, which is characterised by the installation of modern, feed-intensive production facilities, could result in additional demand for high protein feed (see Chapter 4 on oilseeds).

High-income countries rely on intensive livestock production systems and use substantial amounts of high and medium protein feed. Over the next decade, the structure of feed demand is not expected to change significantly. Demand for high protein feed is projected to increase slowly due to sluggish growth in livestock production and ongoing improvements in feed conversion ratios, whereby less high protein feed is used per unit of livestock product. This slow growth also reflects the ongoing shift to organic and non-genetically modified (GM) based livestock production in the European Union, which is projected to lead to a reduction in its demand for high protein feed in favour of other sources (e.g. grass, pulses).

Figure 1.12. Structure of feed use, by country income group



Note: Low protein feed includes maize, wheat, other coarse grains, rice, cereal brans, beet pulp, molasses, roots and tubers. Medium protein feed includes dried distilled grains, pulses, whey powder. High protein feed includes protein meal, fish meal, and skim milk powder.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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1.2.5. Sharp slowdown in demand for biofuels

Sugarcane will dominate feedstock for biofuels, with smaller share from maize

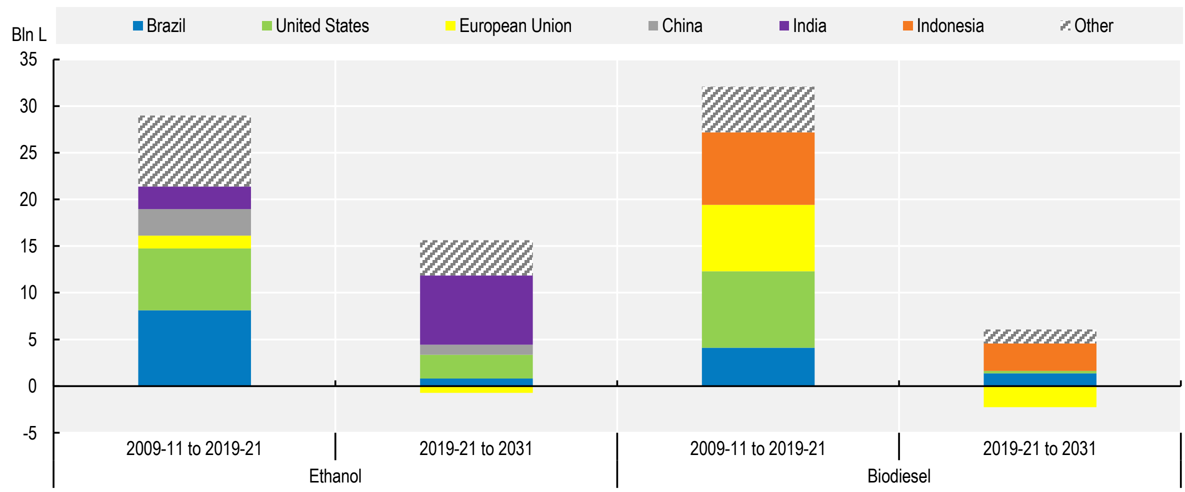
Since the early 2000s, demand for biofuels (ethanol and biodiesel) increased significantly following the implementation of policies to: (i) support national commitments to reduce carbon dioxide (CO_2) emissions, (ii) reduce the dependency on imported fossil fuels, and (iii) create additional demand for feedstock crops to support domestic producers.

Over the next decade, biofuel demand is projected to increase by 0.6% p.a., significantly below that experienced over the last decade (4% p.a.), mainly due to declining fuel use and weaker policy incentives in high-income countries. Most additional demand will originate in middle-income countries, driven by higher blending rates and subsidies supporting domestic production.

Ethanol consumption is projected to increase by 12% between 2019-21 and 2031, with India accounting for half of additional consumption (Figure 1.13). India's ethanol blending rate is assumed to reach 11% by 2025 and 20% by 2031, supported by increasing domestic production of sugarcane-based ethanol. However, for this *Outlook* it is assumed that India will not reach the E20 target set by the government for 2025, due to limited supply of feedstock. Ethanol consumption will also continue increasing in Brazil, although at a considerably lower rate than over the last decade, driven by a high blend rate and growing fuel consumption. Growing global ethanol consumption will result in an increase in the use of sugarcane for biofuel production; biofuel increasing its share of total sugar cane use to 23% by 2031 (Figure 1.14). Biofuel use of molasses, a by-product of sugarcane production and the main feedstock for ethanol production in India and other Asian countries, is also projected to increase, with the biofuel sector increasing its share of total molasses use to 51% by 2031 (Figure 1.14).

In China and the United States, growth prospects for ethanol consumption are limited (Figure 1.13). In China, ethanol consumption will increase with higher fuel use but the growth rate will decrease significantly compared to the last decade. The government of China is not expected to implement a nationwide E10 mandate, as proposed in 2017, as this depends on maize stocks, which have decreased since 2017. Therefore, for this *Outlook* it is assumed that China will maintain a lower 2% blending rate over the projection period. In the United States, declining gasoline use, together with the 10% ethanol blend wall[5], will constrain the growth in ethanol consumption. Biofuel use of maize – the main feedstock for ethanol production in China and the United States – will grow slowly over the coming decade, with the biofuel share of maize dropping from 15.5% in 2019-21 to 14% in 2031 (Figure 1.14).

Figure 1.13. Changes in biofuel consumption in key regions



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

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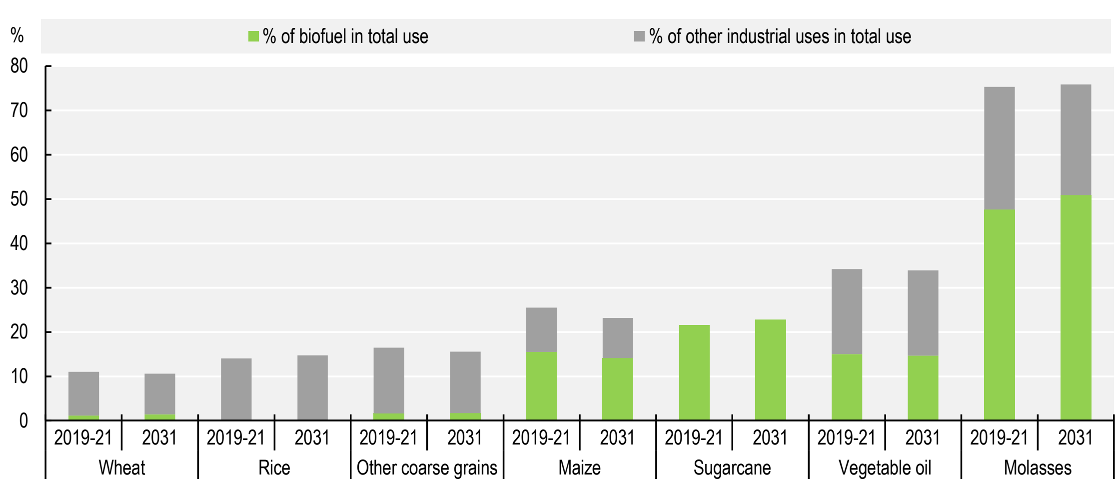
Biodiesel consumption is projected to increase by 7% between 2019-21 and 2031, with Indonesia accounting for 77% of additional consumption (Figure 1.13). As the blending rate in Indonesia is assumed to remain at 30% over the projection period – the target of the 2020 B30 programme – biodiesel demand is expected to increase along with overall fuel consumption. In the United States and the European Union, however, declining diesel use will constrain the growth in biodiesel consumption. In the European Union, biodiesel consumption will be further dampened by the Renewable Energy Directive II, which sets limits on the use of biofuel feedstock (mostly palm oil) grown in carbon-capturing ecosystems such as forests, wetland and peatland. Based on projected developments in biodiesel consumption, the use of vegetable oils feedstock is expected to increase by 14% to 2031, maintaining its biofuel share at around 15% (Figure 1.14).

Figure 1.14. Share of biofuel and other industrial uses in total use of agricultural commodities



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

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1.2.6. Other uses for agricultural commodities

Buoyant prospects for rice and vegetable oil used for non-food products

Agricultural commodities covered in the *Outlook* are also used for a broad range of products and processes. The *Outlook* combines seed, postharvest losses, waste and all industrial applications, except biofuel, into the category "other uses''. Over the next decade, demand for other uses is projected to increase annually by 0.7%. Agricultural commodities and their by-products used as industrial feedstock contribute to reduce dependence on fossil fuels and enhance bio-resource value, including by recycling waste.

Cotton fibre for yarn is used for the production of garments and other textile products. Over the next decade, demand for cotton is projected to increase at a higher rate than global population (at 1.6% p.a.), underpinned by ongoing income growth. However, strong competition from synthetic fibres, mainly polyester, will continue to constrain demand for cotton. This trend could be partly offset by growing consumer interest in more sustainable fabrics, provided that cotton is produced sustainably (see Chapter 10 on cotton). Wool – a by-product of some sheepmeat production – is also used in the textile industry but is not considered in the *Outlook* projections.

Molasses are used as industrial raw products in the production of yeast, vinegar, citric acid, vitamins, amino and lactic acid and their use is projected to grow by 1.5% over the next ten years. This is far lower than the projected growth in biofuel use of molasses. As a result, the "other uses" share of molasses is projected to drop from 28% in 2019-21 to 25% in 2031 (Figure 1.14).

Industrial uses of cereals include the production of industrial starch and spirituous liquors, and applications in the paper, textile, pharmaceutical, and cosmetic industries. Rice, for instance, is increasingly used as an ingredient in the production of face washes, shower soaps and hair products, especially in Asia. Over the coming decade, other uses of rice are projected to increase by 19%, and their share in total use of rice is expected to slightly expand to 15% in 2031. Maize, on the other hand, has a growing importance in the production of bioplastic – a substitute for petroleum-based product. Other uses of maize, other coarse grains and wheat are expected to grow at a slower pace than other uses of rice; and their shares in total use of agricultural commodities are projected to decline over the outlook period (Figure 1.14).

Vegetable oils are also used as ingredients in cosmetics and personal care products, lipid-based excipients in pharmaceutical products, and in pet feed additives. Other uses of vegetable oils are projected to expand by 17% over the next ten years, maintaining its share at about 19% by 2031 (Figure 1.14).

1.2.7. The next decade could see unprecedented shifts in food consumption patterns

A key source of uncertainty in the short term relates to Russia's war against Ukraine. Reduced export availability from these countries is pushing up international food and feed prices. Larger price increases can be expected if the war keeps energy and fertilisers prices at high levels and prolongs the two countries' reduced global export availabilities (FAO, 2022[1]). Higher agricultural commodity prices would have negative consequences for global food security and nutrition, particularly for poor households (Box 1.1).

The macroeconomic assumptions underlying the projections suggest a continuation of the global economic recovery following the COVID-19 pandemic (Section 1.2). The actual pace of this recovery will, however, depend on several factors that cannot easily be anticipated. These include the evolution of COVID-19 outbreaks (e.g. spread of new variants), vaccination rates and other public health measures, and of policies that support the recovery of business and consumer demand. Moreover, the shift away from food services and restaurants to home eating induced by the pandemic is assumed to be reversed as the economy recovers and control measures are lifted. However, alternative pathways, could alter the projections of food demand, particularly for products that are mainly consumed outside the home such as fish and some meat cuts.

Another source of uncertainty on the demand side relates to evolving consumer preferences. Consumers' purchasing decisions are increasingly driven by factors beyond prices, culture and taste, such as health and environmental concerns, and ethical considerations regarding the welfare and eating animals and their products. This trend is reflected by the increase in vegetarian, vegan or "flexitarian" lifestyles in high-income countries, particularly among young consumers. Meat and dairy markets would be most affected by a shift to plant-based proteins, or alternative protein sources (e.g. insects, cultured meat). Feed markets could also be impacted as lower quantities of arable crops are needed to produce these alternative sources of protein (Oonincx, Van Broekhoven and Van Huis, 2019[11]) (Kearney, n.d.[12]). However, as the consumption shares of these products are expected to remain very small over the next decade, the *Outlook* does not explicitly take them into account, which nevertheless introduces some uncertainties in the demand projections.[6]

Policy developments also constitute a continuing source of uncertainty. Several countries have introduced (or are planning to) policies to reduce overall calorie consumption or to foster a shift towards healthy diets. These measures include fiscal policies (e.g. tax on sugar or saturated fat, subsidies for nutritious food products), labelling schemes, product reformulation in collaboration with the industry, updated dietary guidelines and educational programmes (e.g. for school meals). These policies could affect both the overall demand for food as well as the relative demand for different food products in ways that are difficult to foresee.

Biofuel policies are a significant source of uncertainty. Changes in blending mandates, enforcement mechanisms, tax exemptions and subsidies for biofuels and fossil fuels could alter demand for biofuel and feedstock crops. Policies and technologies emerging in the transport sector will also influence biofuel demand. Over the last decade, a variety of policies to support electric vehicles and charging infrastructure have been introduced in major markets (i.e. China, Europe and the United States), and helped to stimulate strong growth in electric car sales (IEA, 2021[13]).[7] Faster deployment of electric vehicles than assumed in this *Outlook* could affect biofuel demand. Increasing production and use of sustainable aviation fuel (SAF), on the other hand, could underpin demand for biofuels and feedstock crops over the next decade and beyond. Several European countries and the United States have already introduced policies supporting SAF as a mean of reducing CO_2 emissions from the aviation sector (see Chapter 9 on biofuels).

1.3. Production

1.3.1. Introduction

The projections in the *Outlook* cover the crops and livestock products listed in Section 1.3. The *Outlook* explains the impact of future trends in yield, land use intensity, and agricultural land use on crop production and links changes in herd size and output per animal to livestock production trends.

The projections are based on the assumption that the measures on social distancing to contain the COVID-19 pandemic will have mostly ended by the beginning of 2022 and will not affect agricultural production as from 2022. Furthermore, the *Outlook* projections account for reduced production prospects in Ukraine in the marketing year 2022/23.

1.3.2. Low and middle-income countries drive global production growth

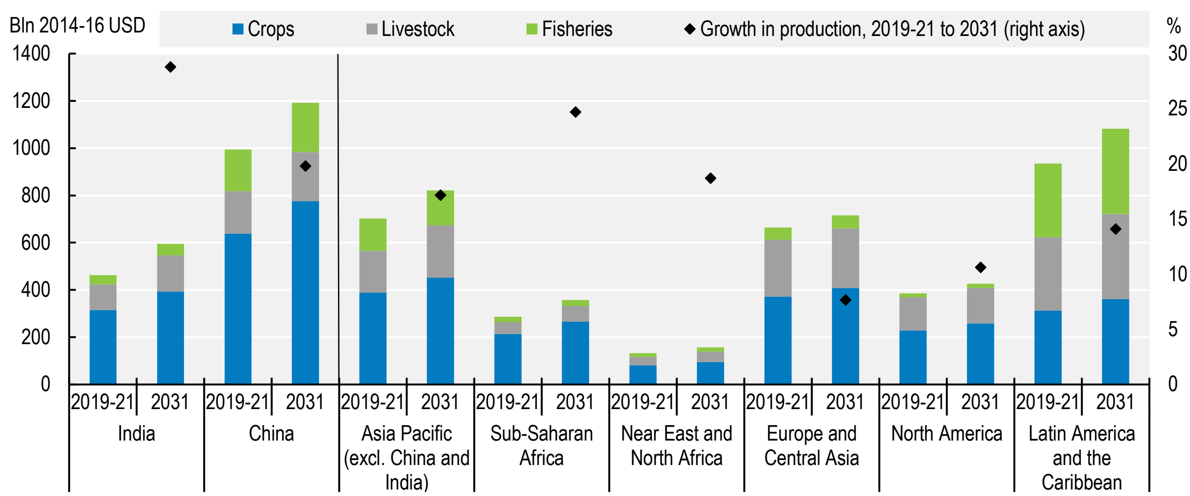
Over the coming decade, global agricultural production[8] (measured in constant prices) is projected to increase by 17%. That growth will be predominantly located in middle- and low-income countries including

India, China and other Asian countries (Figure 1.15). It will be driven by productivity-increasing investments in agricultural infrastructure and research and development; the mobilisation of production resources (e.g. agricultural land and irrigation water); more intense use of agricultural inputs; and improved management skills.

Production in Sub-Saharan Africa is expected to grow significantly, although from a low base. It will be underpinned by a combination of area expansion, changing crop mix, and productivity gains from investments in locally adapted, improved crop varieties, better management practices, and expansion and intensification of poultry flocks. The strong production growth in Near East and North Africa is expected to be driven by higher crop intensity, substantial crop yield gains and growth in poultry meat production.

Production growth in North America and in Western Europe is expected to be limited, largely due to tighter regulations related to environmental sustainability and animal welfare.

Figure 1.15. Trends in global agricultural production



Note: Estimates are based on historical time series from the FAOSTAT Value of Agricultural Production domain which are extended with the *Outlook* database. Remaining products are trend-extended. The Net Value of Production uses own estimates for internal seed and feed use. Values are measured at constant USD of the period 2014-2016.
Source: FAO (2022). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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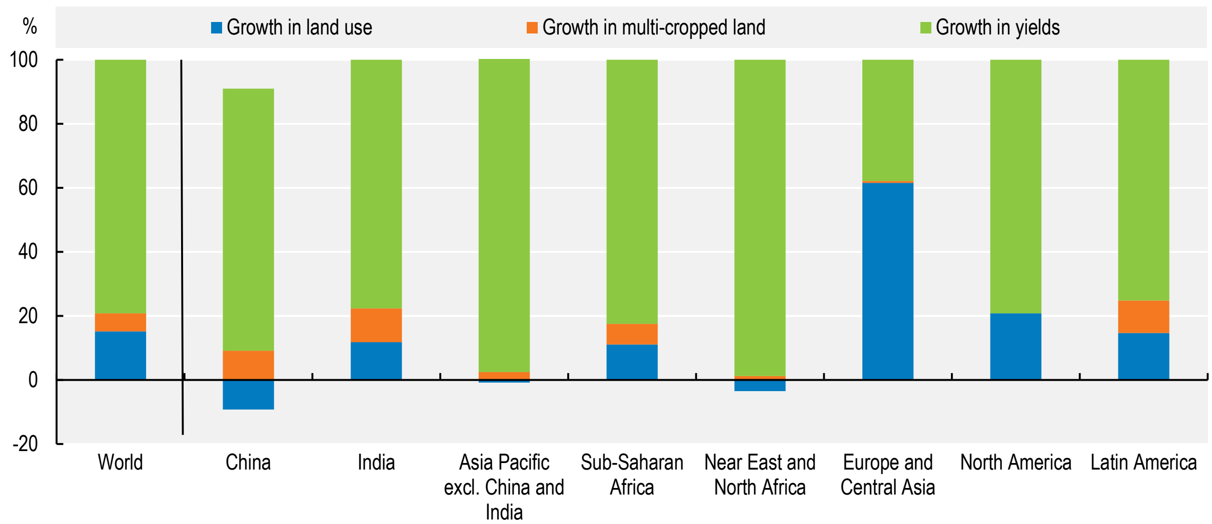
1.3.3. Crop production growth mainly due to yield increases

Global crop production is expected to grow by 18% over the coming decade,[9] mainly sourced in China (30%), India (17%) and the rest of the Asia and Pacific region (14%). Sub-Saharan Africa is expected to contribute 12% of the additional output, followed by Latin America (11%), and Europe and Central Asia combined (8%). The contribution of North America is projected to be around 7%, and the Near East and North Africa region to add only about 3% of the global growth in crop production.

The projected trends in crop production are mainly due to increasing crop yields, with some contribution from land use intensity (i.e. multi-cropping) and cropland use, as depicted in Figure 1.16.

Figure 1.16. Sources of growth in crop production, 2022 to 2031



Note: Figure shows the decomposition of total production growth (2012-21 and 2022-31) 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 (2022), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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Crop yields

Yield improvements will account for 80% of the projected production growth in the crops covered in the *Outlook* over the next decade. Growth in the Near East and North Africa, in China and in the Asia Pacific region (excluding India and China), is entirely based on yield growth, because of the foreseen decline in the harvested area of cereals, oil crops, sugar crops, pulses, cotton, and roots and tubers.

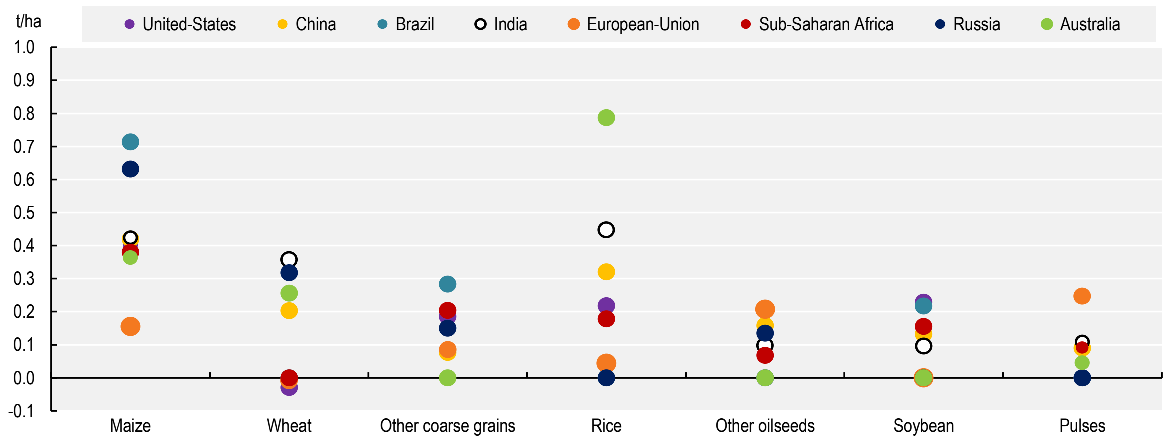
Projected yield growth rates differ between regions and countries, due to differences in production technologies and agro-climatic conditions (Figure 1.17). Notable increases in yields are expected in Brazil, in India and in China for most of the commodities covered in the *Outlook*, with yields in 2031 reaching or exceeding yields in high-income countries. Convergence, however, in yields between Sub-Saharan Africa and other regions is expected to be slow.

The *Outlook* projections are made under the assumption that yield growth in high-income countries will be based on better farm management practices as well as the adoption of precision farming technology (namely optimization in the use of agricultural inputs such as fertiliser and chemicals) and improvements in cultivated varieties. Nevertheless, yield growth will be limited, as yields in these countries are already at high levels and further options are subject to stricter environmental and food safety policies.

In Sub-Saharan Africa, as well as in other low-income and lower middle-income countries, yield growth is expected to come from the use of improved crop varieties, increased use of fertiliser and pesticides, as well as better farm management due to mechanization and improved agronomic skills acquired by farmers through education and extension services.

It should be noted that all the projected yield increases are subject to the input cost trends over the coming decade. Higher than expected energy and fertiliser prices would limit input use and subsequently depress yield growth. Box 1.3 discusses the impact of increased input prices on agricultural production and food markets.

Figure 1.17. Change in projected yields for selected crops and countries, 2022 to 2031



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

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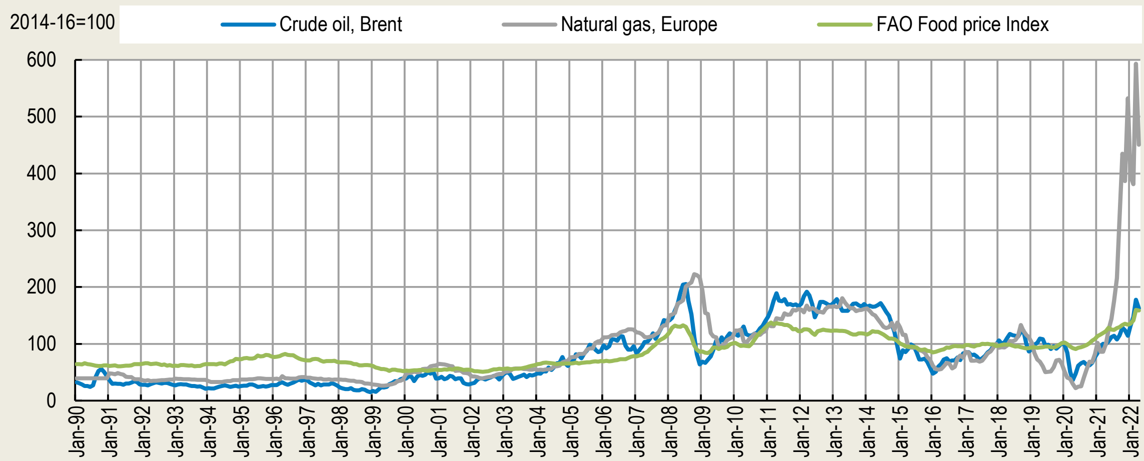
Box 1.3. Rising input prices are raising concern for global food security

The agri-food sector is energy-intensive, by using high amounts of energy directly through on-farm fuel, natural gas and electricity, or indirectly by using agrichemicals such as fertilisers, pesticides and lubricants. The recent surge in agricultural input prices is raising concerns about rising costs of food production. Rapidly increasing input prices, especially those of energy derived from fossil fuels, has put upward pressure on food prices, with negative consequences for global food security. The impacts on prices are apparent in the rising FAO Food Price Index (FFPI), which in March 2022 reached its highest level on record since 1990. This appears to be substantially underpinned by trends in input prices (Figure 1.18 and Figure 1.19).

Figures 1.18 and 1.19 suggest that the rapid rise and the current all-time high in international agricultural commodity prices are coincidental with an equally rapid rise and a multiyear high in (variable) production costs. The closely synchronized change in revenues and costs keeps overall farm profitability in check. This coincidental trend between agricultural product prices and input prices is a general feature that has characterized international markets for past decades. However, the difference between the food prices and input prices should not be construed as absolute (gross) margins as it can only capture changes in gross margins. As such, its evolution over time suggests that all other things being equal, producer gains from rising farm and food prices are swiftly offset by rapidly rising input costs. While changes in production costs generally trigger changes in output prices, a closer inspection of the two series suggests that input costs can also follow output prices. Moreover, the overall global picture is likely to mask large regional and sector-specific differences within the agri-food sector. For instance, most soybean producers are presently operating at relatively large positive gross margins, with lower need for currently expensive (nitrogen) N-fertiliser and, at the same time, enjoying high product prices. Pig producers, by contrast, face low meat prices and high feed costs, often resulting in low gross margins and even negative net margins.

Figure 1.18. Natural gas price vs. crude oil price, 2014-16=100



Source: FAO (2022), "FAO Food Price Index"; https://www.fao.org/worldfoodsituation/foodpricesindex/en/; World Bank (2022), "World Bank Commodities Price Data (The Pink Sheet)", https://www.worldbank.org/en/research/commodity-markets.

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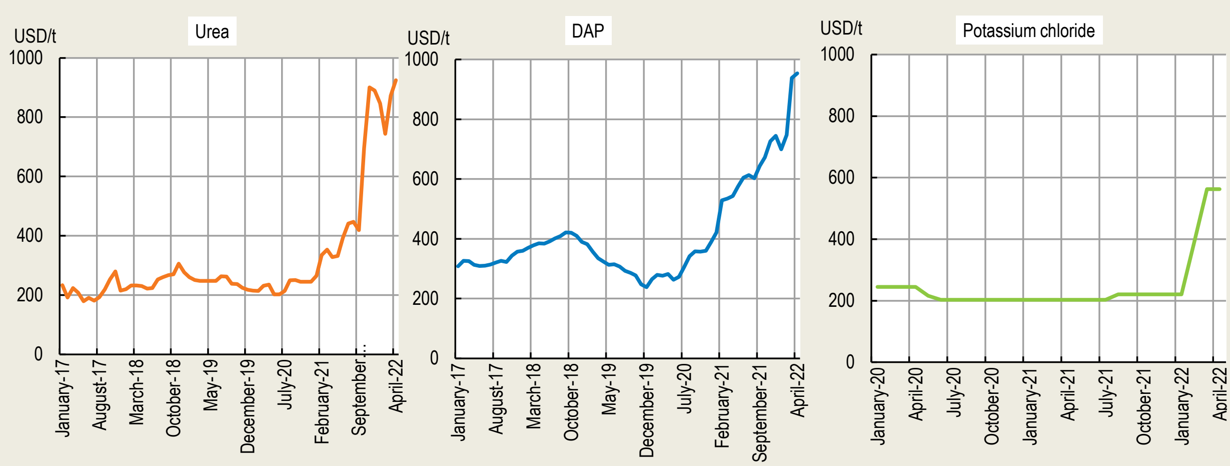
Figure 1.19. Recent trends in fertiliser prices



Note: DAP (diammonium phosphate), spot, f.o.b. US Gulf ,Urea, (Ukraine), f.o.b. Black Sea, Potassium chloride (muriate of potash), f.o.b. Vancouver.
Source: World Bank (2022), "World Bank Commodities Price Data (The Pink Sheet)", https://www.worldbank.org/en/research/commodity-markets.

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Just as many parts of the world have reopened their economies in the aftermath of the COVID-19 pandemic to stimulate economic growth, the current rise in food and fuel prices is highly regressive, compounding economic stress and negatively impacting on producers and consumers. Changes in production costs readily translate into changes in product prices, and hence food prices. For producers, it means that potentially larger profit margins are generally eroded by higher production costs. While this is to be expected as a concept, it is remarkable to see how much this is confirmed by empirical evidence, including during the current price hikes (FAO, 2021[14]).

For consumers, it means that food prices will inevitably rise with higher production costs, and to do so rapidly. This is also the case in the current period of price rises, particularly impacting on those consumers who already spend high shares of their household budgets on food and fuel. For policymakers, it means that rising costs for agricultural inputs, notably energy, will inevitably translate into higher food prices, unless new models of production can be found to make agriculture less energy-intensive and, importantly, less energy-dependent on fossil fuels.

Source: FAO (2021[14]).

Land use intensity

Globally, the more intense use of arable land, through multiple harvests per year, would account for only 6% of the expected crop production growth (Figure 1.16). The increase in cropping intensity will be facilitated by innovative crop rotations, more widespread adoption of short season varieties, and no-till farming techniques.

In Latin America, the increase in cropping intensity over the next decade is expected to be based on expanded double cropping of soybeans with maize or wheat. In Asian countries, it will be due to the expansion of double cropping of paddy rice with other cereals, pulses, and vegetables as a second crop. In Sub-Saharan Africa, expanding irrigation will extend the growing season to allow for multiple crops, as well as the adoption of mixed cropping practices (for example, maize and cassava or millet and pulses). In North America, Europe and Northern Asia, the potential to further increase land use intensity will remain limited due to weather conditions.

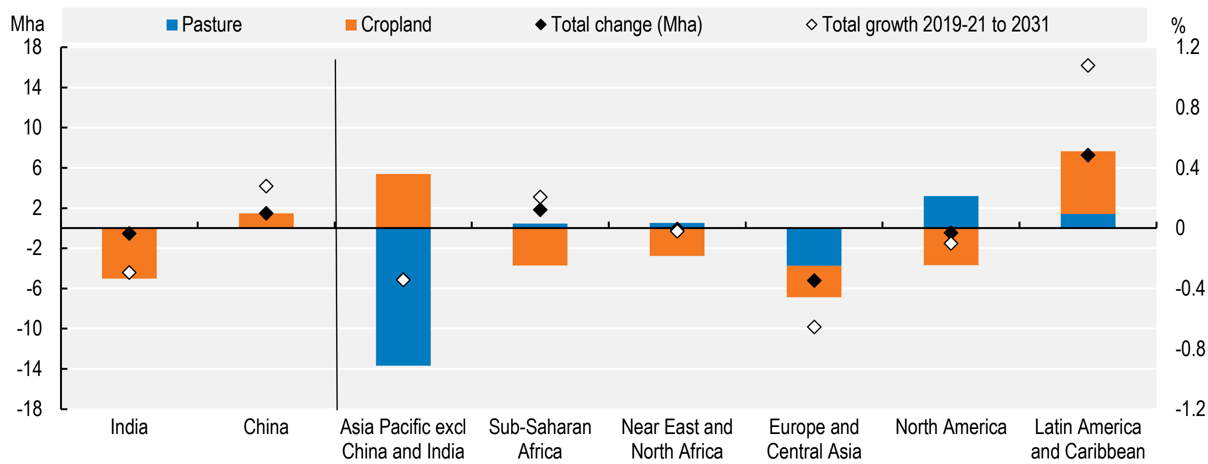
Land use

The expansion of cropland is projected to account for 15% of the projected crop production growth. Figure 1.20 shows the changes in total crop land over the coming decade. Cropland is expected to expand mainly in Asian countries (by 9 Mha), apart from China and India, and in Latin America (6.2 Mha). In Asia and the Pacific, pasture is expected to be converted into cropland, whereas in Latin America and in Sub-Saharan Africa, mainly non-agricultural land will be brought into use.

In the Near East and North Africa, the expansion of cropland will be constrained by natural conditions. Low rainfall is a barrier to rain fed agriculture and the cost of irrigation is prohibitive in most places. In North America and Western Europe, cropland is projected to decrease, since any increase in crop production is tightly regulated by policies on environmental sustainability, and as land use for fruits, vegetables and other crops that are not covered in the *Outlook* is expected to decline.

Pastureland is expected to decrease in Asia and Pacific, excluding China and India, by 14 Mha, due to the expected transition from pasture-based beef, sheep, and goat production to more intensive production systems for pigs and poultry. The ruminant production is also assumed to shift to more feed-intensive production systems, which require less pastureland. Pasture land is projected to increase slightly in North America, due to the projected expansion of the cattle herd.

Figure 1.20. Change in agricultural land use 2019-21 to 2031



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

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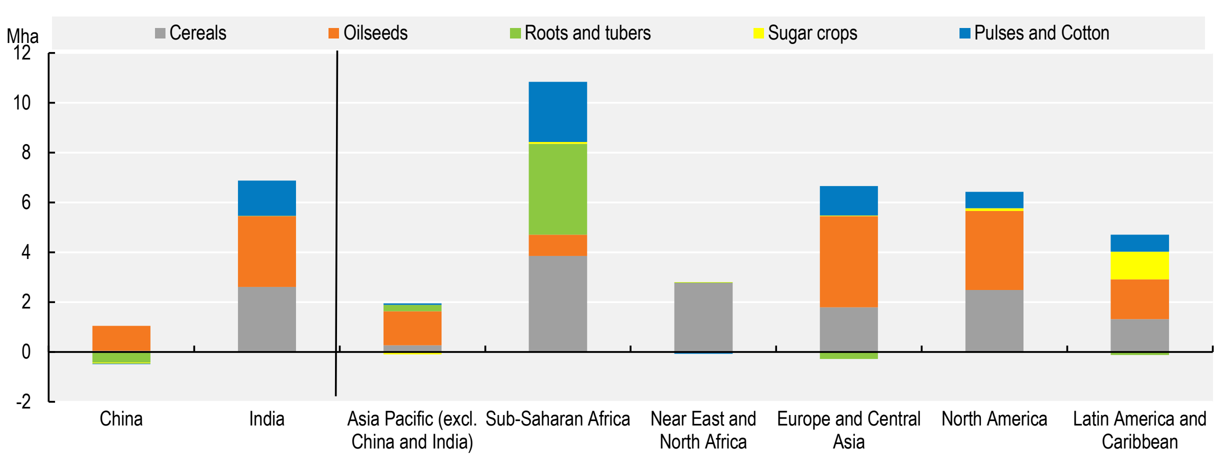
Most of the expansion of cropland will involve the cultivation of cereals and oilseeds, as shown in Figure 1.21.

Figure 1.21. Change in cropland use, main crops, 2019-21 to 2031



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

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1.3.4. Livestock and fish production concentrated in a few countries

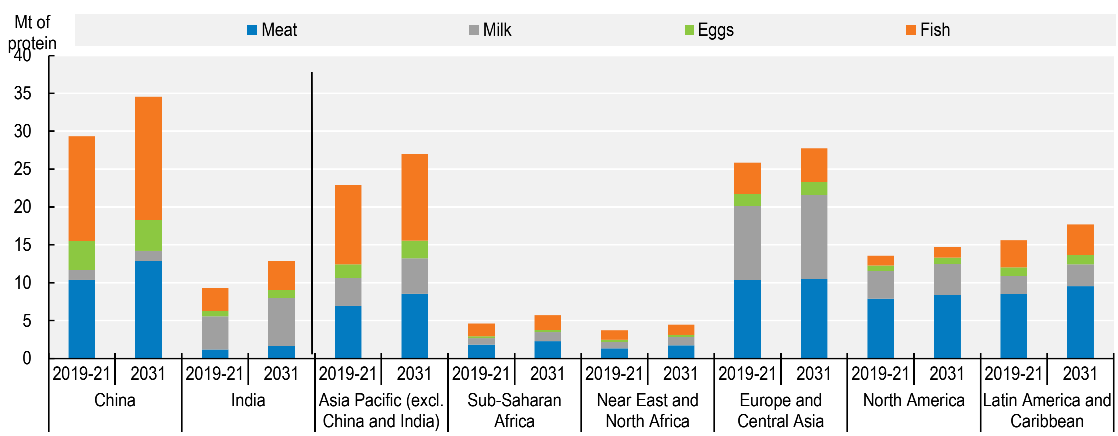
Global livestock and fish production is expected to expand by 16% over the next decade, with most of this growth (85%) originating in middle- and low-income countries (Figure 1.22). However, a few countries or regions will continue to dominate global livestock and fish production, producing almost 60% of the global animal output, namely China, India, Brazil, the United States, and the European Union. Their share in global livestock and fish is expected to remain unchanged over the next decade.

China is projected to expand its livestock and fish production by 17% and India by 37%, respectively, together accounting for about half of global growth. In China, the expansion will be underpinned by the recovery from the African Swine Fever (ASF) and in India by the strong growth in dairy production.

In Latin America, livestock and fish output is projected to increase by 12%, which accounts for 11% of global output growth, mainly arising from Brazil's export-oriented livestock sector.

Livestock and fish production in Sub-Saharan Africa is expected to increase by 24%, albeit from a low base, in particular from growth in poultry and milk. The global output share of Sub-Saharan Africa will remain at 4% by 2031. In the Near East and North Africa, livestock and fish production is expected to increase by 20%, due to fast growth in poultry meat, but as this is from a low base, the region will only account for about 3% of global animal output by 2031 (Figure 1.22).

Figure 1.22. Global livestock and fish production on a protein basis



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

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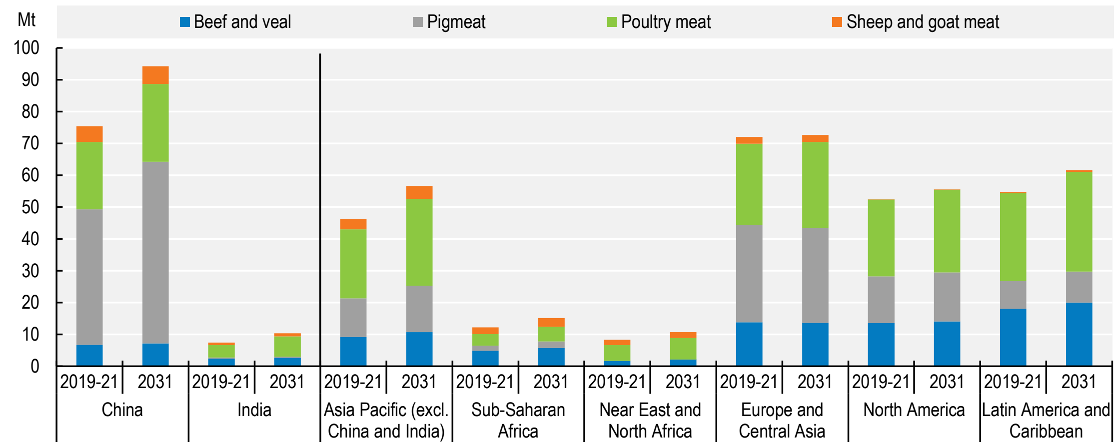
1.3.5. Poultry to account for more than half of the global growth in meat production

Over the coming decade, global meat production is expected to increase by 15%, due to an increase in the number of animals and improved productivity per animal. Higher fertility rates and a faster, more efficient weight gain are assumed to be achieved through more intense feeding, improved genetics, and better herd management.

Poultry meat is projected to increase by 16% (21 Mt) over the next ten years, accounting for 45% of global growth in meat production, given expected sustained profitability as a result of growing demand and favourable meat-to-feed price ratios compared to other non-ruminants and to ruminants (Figure 1.23). The Asia and Pacific region is expected to account for about half of the global poultry meat production growth, with China contributing 15%. The United States will account for 8% of the global poultry meat production growth, due to intensification of production, whereas Brazil will account for 5%, from flock expansions and increased output per animal. In Europe, poultry meat production is expected to grow by only 4% as no expansion of the flock is foreseen, and output per animal will remain high.

Figure 1.23. Global meat production in carcass weight equivalent



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

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Global pork production is projected to increase by 17% (18 Mt) by 2031, relative to the ASF affected base period 2019-21 (Figure 1.23). Pork will account for 38% of global meat production growth. The sector is assumed to recover from ASF by 2023, so that almost all of the projected growth will come early in the next decade. Most additional pigmeat production is expected to originate in China by 2023, as well as in the Philippines and Viet Nam, where production is expected to recover from the losses of the ASF outbreak in the next two to three years. Production in the European Union is expected to decline over the next decade because tighter environmental and animal welfare regulations are expected to increase production costs, whereas public health and sustainability concerns will limit demand.

Beef production is expected to expand by 8% (6 Mt) and to contribute 12% to global meat production growth (Figure 1.23). Latin America is projected to expand production by 11%, accounting for 33% of the additional global output. North American production is expected to expand by only 4%, because of low profitability expectations due to sluggish demand, as consumers shift to white meat, which will depress investment in new production and result in modest herd expansion. In Europe, beef production is expected to decrease over the next decade (by 8%) on the account of a smaller herd size, in response to reduced export opportunities and high costs from stricter GHG emission reducing measures.

Global sheep and goat meat production is expected to increase by 16% (2 Mt) over the next decade, which accounts for only 5% of global meat production growth (Figure 1.23). Production will increase by 29% in Sub-Saharan Africa, contributing 26% to global growth, mainly achieved by herd expansion, since production is based on semi-nomadic production systems, which is non-intensive. Production in New Zealand – the world's main sheep meat exporter – will remain constant, because of ongoing competition for pastureland from the beef and dairy sectors.

1.3.6. Dairy will be the fastest growing livestock sector

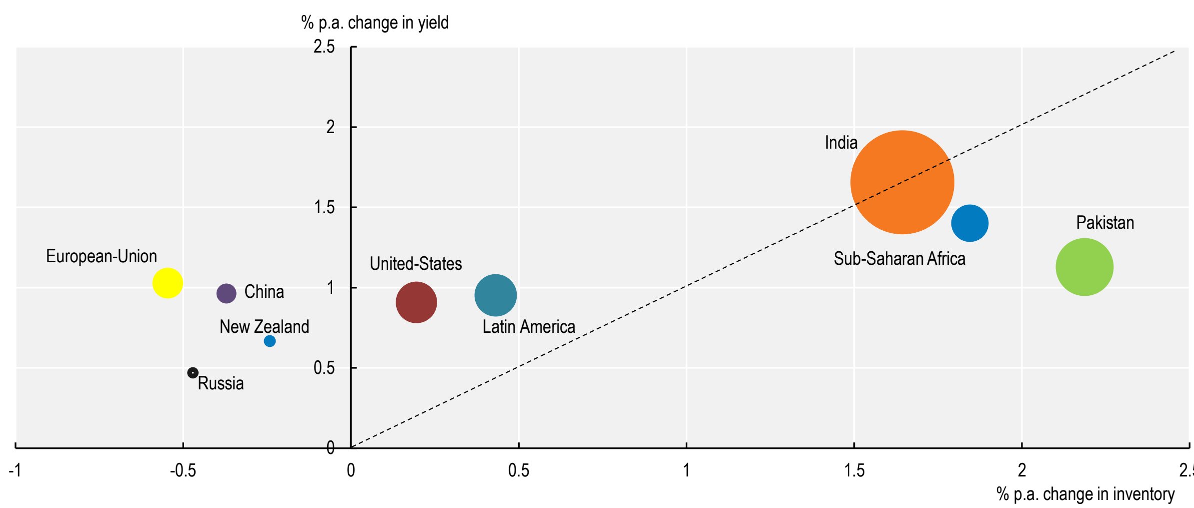
Dairy is expected to be the fastest expanding livestock sector over the next decade, with global milk supply projected to increase by 23%. The number of milk cows is projected to increase by 14%, especially in regions with low yields such as Sub-Saharan Africa, and in major milk producing countries such as India and Pakistan. Milk yields are assumed to grow steadily during the next decade, especially in Near East and North Africa, and in Southeast Asia.

About half of the growth in milk production will originate in India and in Pakistan, which together will account for 33% of the global milk output in 2031. This growth will be due to herd expansion and, to a lesser extent, higher yields (Figure 1.24). Raw milk will be only lightly processed into fresh dairy products for the fast-growing domestic market in these countries.

Growth in the European Union, the second largest milk producer globally, is expected to remain limited, constrained by policies on sustainable production, and the lower-yielding expansion of organic and pasture-based production systems. Herds are expected to decline, limiting growth to 5% by 2031. Growth in the United States, the third largest milk producer, is expected to be stronger than in the European Union, as a result of yield increases. Milk production growth rates in New Zealand, a key dairy exporter, are expected to be similar to the European Union, with herds expected to decline by around 5%. Yield growth in these high intensity production systems are due to optimisation of milk production management systems, improved animal health, feeding, grass management, and genetics (Figure 1.24).

Substantial milk production growth (39%) is expected in Sub-Saharan Africa, mainly through herd expansion. Production will continue to be based mainly on small ruminants and pastoralist production systems resulting in low milk yields, and thus the region will contribute only 6% to the global increase of milk production (Figure 1.24).

Figure 1.24. Changes in inventories of dairy herds and yields, 2022 to 2031



Note: The size of the bubble reflects absolute growth in dairy production between 2019-21 and 2031.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Globally, most milk is consumed in the form or fresh dairy products, fresh or fermented milk, such as yoghurt. Only a small proportion is industrially processed into butter, cheese, skim or whole milk powder.

Production of butter is expected to grow by 21% by 2031, and to mainly come from ghee production in India and in Pakistan. The European Union will maintain its dominance in global butter production, although it is expected to grow by only 4%, with its share in global butter production falling from about 20% in 2019-21 to 15% by 2031.

Global production of skimmed and whole milk powder are each projected to grow by 20% and 15%, respectively. The European Union and the United States are expected to continue to dominate the global production for skimmed milk powder. New Zealand, China, and the European Union produce the bulk of whole milk powder. Global cheese production is projected to grow by 13% with the European Union and the United States expected to each account for about 30% of additional production by 2031.

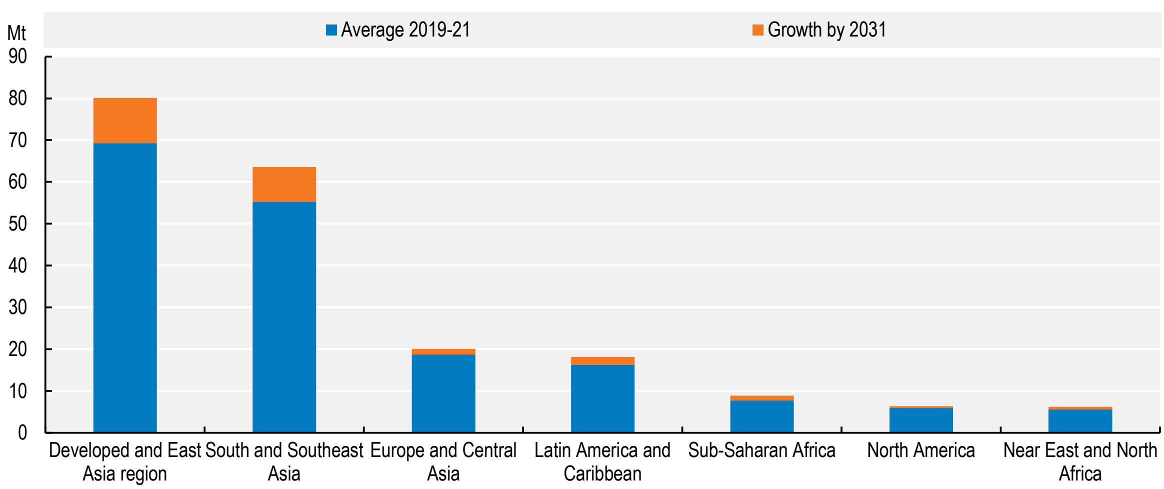
1.3.7. Higher feed prices and environmental regulations slow growth in aquaculture

World fish production is projected to grow by 14% over the next ten years, to reach 203 Mt in 2031. This rise is mainly driven by the continuing growth in aquaculture production, by 23% over the outlook period, while modest growth is expected for capture fisheries (5%).

However, growth in aquaculture production is projected to be lower than the previous decade (56%), reflecting large increases in the cost of feed at the beginning of the outlook period, and more stringent environmental regulations in China. Aquaculture is expected to overtake capture fisheries by 2023, to account for 53% of global fish production by 2031.

Fish production is projected to expand in all regions, with most of the growth occurring in Asia Pacific (Figure 1.25). The Developed and East Asia, and South and Southeast Asia regions will consolidate their position as the main global producer, accounting for 44% and 34% of additional fish produced, respectively. Within Asia Pacific, the largest contributors to output growth are expected to be China, the fish largest producer, followed by India, Indonesia, and Viet Nam.

Figure 1.25. Regional fish production



Note: The regions Developed and East Asia, and South and Southeast Asia are defined as in Chapter 2.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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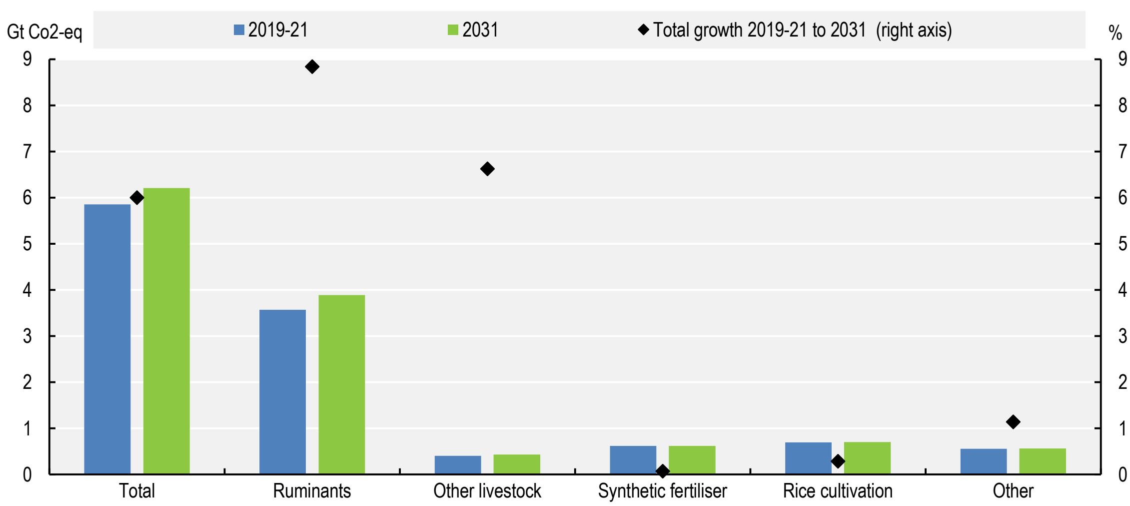
1.3.8. The carbon intensity of agricultural production is on track to decrease

Direct emissions from agriculture accounted for about 11% of global GHG emissions in 2019 (IPCC, 2022[15]). Direct agricultural GHG emissions are projected to grow by 6% over the next decade, assuming no change in current policies and on-trend technological progress (Figure 1. 26).[10] Livestock will account for 90% of this increase.

GHG emissions from agriculture are set to increase but growth will be lower than of production, suggesting a decline of the carbon intensity of agriculture over the next decade (Figure 1.27). This is expected to be the case in all regions. Yield improvements together with a declining share of ruminant production in total agricultural output will contribute to this outcome. Most of the projected increase in direct GHG emissions are expected to occur in middle- and low-income countries in Asia and the Pacific and in Sub-Saharan Africa due to the higher output growth in production systems that are emission-intensive. Sub-Saharan Africa, in particular, is expected to account for 17% of global direct GHG emissions in 2031 but only for 7% of global production. Asia and Pacific is expected to account for about 44% of direct GHG emissions from agriculture in 2031 and more than half of global crop and livestock production.

In Europe and Central Asia, on the other hand, emissions are projected to decrease by 5%, while agricultural output is expected to increase by 4%. Further reductions in the carbon intensity of agricultural production could be achieved by large-scale adoption of emission reducing technologies and agricultural practices.

Figure 1. 26. Direct GHG emission from crop and livestock production, by activity



Note: Estimates are based on historical time series from the FAOSTAT Emissions Agriculture databases which are extended with the *Outlook* database. Emission types that are not related to any *Outlook* variable (organic soil cultivation and burning Savannahs) are kept constant at their latest available value. The category "other" includes direct GHG emissions from burning crop residues, burning savannah, crop residues, and cultivation of organic soils.
Source: FAO (2022). FAOSTAT Emissions-Agriculture Database, http://www.fao.org/faostat/en/#data/GT ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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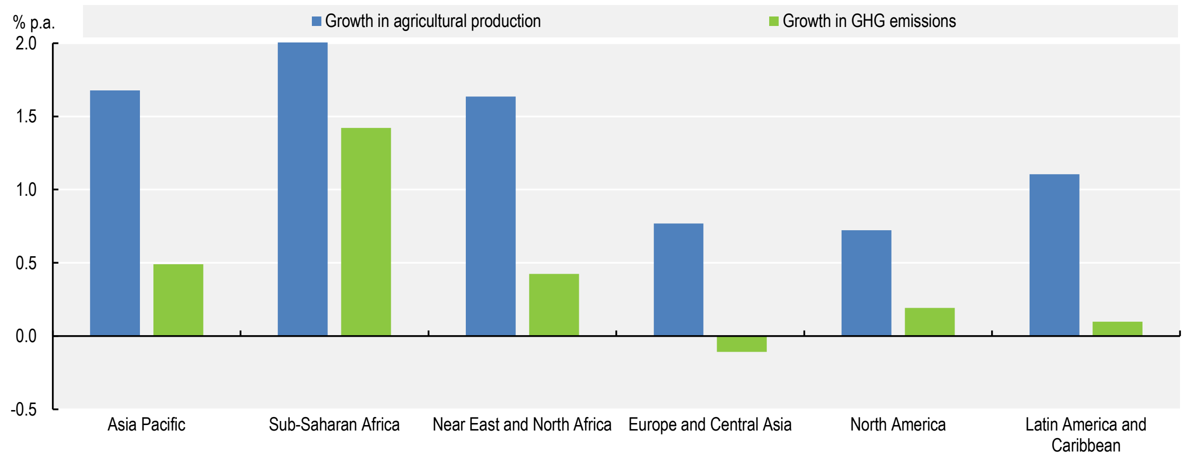
Figure 1.27. Annual change in agricultural production and direct GHG emissions, 2022 to 2031



Note: This 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* (measured in constant USD 2014-16 prices). Estimates are based on historical time series from the FAOSTAT Emissions Agriculture databases, which are extended with the *Outlook* database. Emission types that are not related to any *Outlook* variable (organic soil cultivation and burning Savannahs) are kept constant at their latest available value. The category "other" includes direct GHG emissions from burning crop residues, burning savannah, crop residues, and cultivation of organic soils. The Net Value of Production uses own estimates for internal seed and feed use

Source: FAO (2022). FAOSTAT Emissions-Agriculture Database, http://www.fao.org/faostat/en/#data/GT; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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1.3.9. Weather variability, crop and livestock diseases likely to be main sources of uncertainty in the medium term

The most significant short-term uncertainties relate to the impact of Russia's war against Ukraine on agricultural production in Ukraine as well as on fertiliser markets. Expectations for production could be lower than published in the *Outlook*, depending on the duration and severity of the crisis. Given the importance of both countries for cereals, oilseeds and fertilisers globally, lower production levels could affect global availability (Box 1.1).

The direct and indirect impact of the COVID-19 pandemic on agricultural production also remain uncertain. The projections are based on the assumption that the measures on social distancing to contain the COVID-19 pandemic will not affect the *Outlook*, as they will not be extended beyond 2021. However, it remains unclear if measures to contain the spread of COVID-19 will have to be reinstated locally, which may limit the availability of agricultural labour and other inputs.

The production of agricultural commodities remains vulnerable to plant and animal diseases. The recent ASF outbreak lead to significant losses in pork production in East Asia and a desert locust infestation caused significant production losses in East Africa in 2020. The *Outlook* does not assume a recurrence of these or similar events, but the success of measures to combat diseases and pests remains a concern.

Weather events have a significant impact on agriculture, which are the foremost source of uncertainty in crop production. The projections assume that weather conditions will not disrupt or favour production in any given location or year. But actual weather patterns do deviate from this assumption leading to yield fluctuations. Although climate change may shift established weather patterns, thus causing higher variability, the *Outlook* projections are made under the assumption that this will be mitigated by adaptive measures. However, as these variability effects cannot be reliably quantified, no specific quantitative assumptions can be made.

Productivity developments are based on the assumption that technological progress and structural change are going to follow established trends and patterns over the coming decade. However, any changes, for example, in government regulations, public spending or private investments in agriculture affecting the pace of these trends, would impact on agricultural productivity and overall output of the sector. Section 1.7 presents the results of a simulation scenario, which assesses the level of productivity growth required to achieve SDG2 on Zero Hunger as well as a considerable reduction in agricultural GHG emissions by 2030.

1.4. Trade

International agricultural trade plays a critical role in improving the efficiency of food systems by enabling the flow of products from countries that are relatively well-endowed in natural and other resources to processors and consumers in less well-endowed countries. Agricultural trade is therefore essential to ensure food security in some regions, and an important source of income in others.

Over the coming decade, some countries are projected to experience large population and/or income-driven increases in food demand but without sufficient resources to supply that demand. Moreover, socio-cultural and lifestyle-driven changes are transforming consumption patterns in most regions.

Divergent productivity growth, climate change, and the prevalence of crop and animal diseases will affect production. Trade will help smooth food supply fluctuations and share production risks across countries, acting as a buffer in case of shocks to domestic or international markets.

In this context, a well-functioning, transparent and predictable international trading system will be essential to mitigate emerging regional imbalances and support sustainable global development, particularly to achieve SDG2 on Zero Hunger.

1.4.1. Growth in agriculture and fish trade is slowing

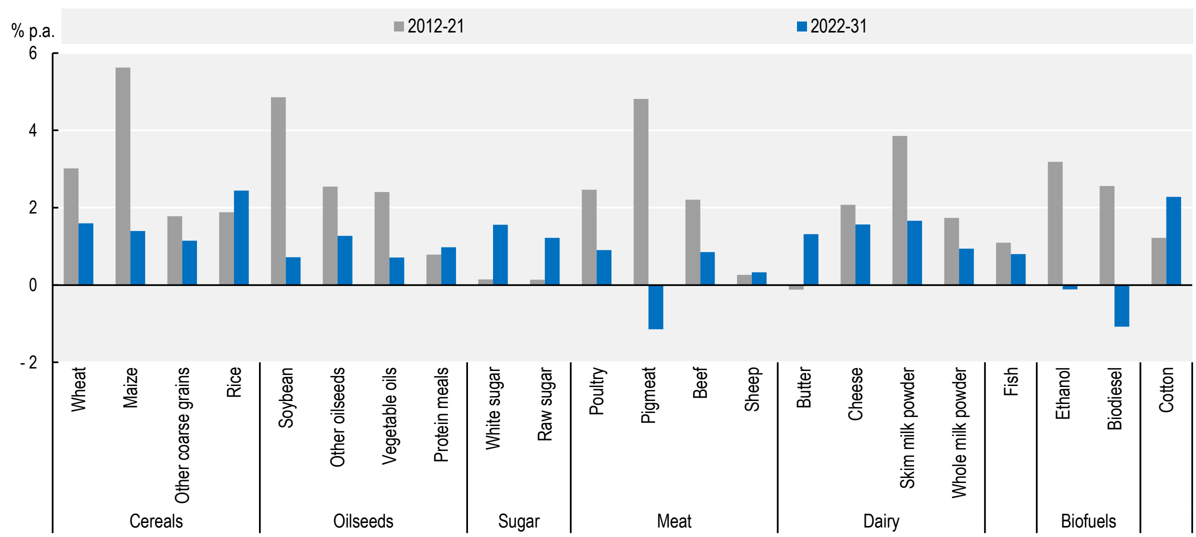
Agricultural trade is projected to continue expanding over the next decade, but in line with slower growth in demand and production, it will grow at a significantly slower pace than the last ten years.

Trade had grown rapidly since the early 2000s, facilitated by a lowering of agro-food tariffs, some reform to trade-distorting producer support in the wake of the Uruguay Round, and the signing of multiple trade agreements. Agricultural trade has also been supported by strong economic growth in China and other middle-income countries, and by the rapid growth of the biofuel sector. This strong growth in import demand for agricultural commodities was largely met by additional export supplies from Latin America, North America, and Eastern Europe.

The expected slowdown in growth in agricultural trade is due to slower growth in import demand from China and other middle-income countries, and limited growth in global import demand for biofuels given declining fuel use and weaker policy incentives in some regions. Moreover, the *Outlook* projections are made under the assumption of a diminishing impact of previous trade liberalisation that boosted agricultural trade, as efforts to reduce multilateral tariffs and reforms to trade-distorting producer support have largely stalled.

Figure 1.28 shows the average annual growth in trade volumes for commodities covered in the *Outlook*. For some commodities, including soybean, maize, and pigmeat, trade volumes grew strongly over the last decade, at about 5% p.a. Over the next decade, the highest projected growth rate is 2.5% p.a. (for rice), while several commodities will register trade growth below 1% p.a. (e.g. soybean, vegetable oil, sheep meat, poultry meat, fish, WMP) or a decline in trade volumes (e.g. biofuels, pigmeat).

Figure 1.28. Growth in trade volumes, by commodity



Note: Annual growth rate of trade volumes as calculated from 2014-16 reference prices.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/e5ih7q

Over the next decade, the growth in the global rice trade will be supported by production surpluses in India, as output is expected to grow at a higher rate than domestic demand. India's rice surplus will be mainly directed to Sub-Saharan Africa, where rice imports are projected to increase by 5% p.a. Trade in cotton is also expected to expand faster than over the last decade reflecting the growing demand for raw cotton by the textile industry, which is mostly located in countries with limited production potential (e.g. Bangladesh, Viet Nam). High import demand for raw cotton will be largely met by growing exports from the United States, Brazil, and Sub-Saharan Africa.

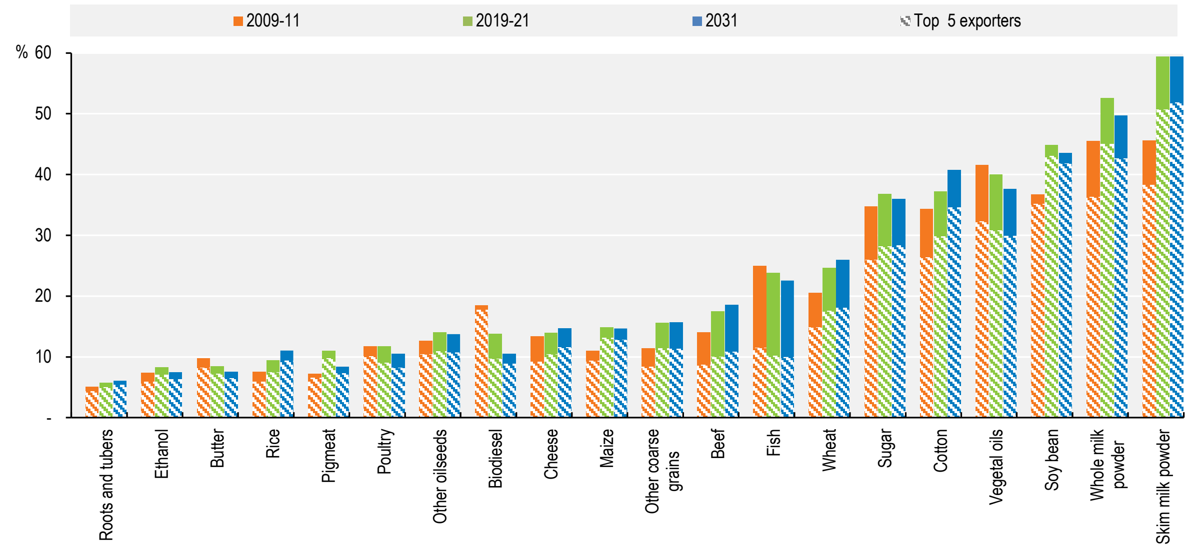
1.4.2. Trade share of production is stabilising

The share of production traded for the commodities covered in the *Outlook* has been gradually increasing over time, rising from an average of 15% in 2000, to 23% in 2019-21, and reflects a trade sector that has been growing at a faster pace than agricultural production. Assuming a diminishing impact of previous trade liberalisation that boosted global agricultural trade and no major changes in policies, the trade share of production is projected to stabilise over the next decade, with growth in trade and production being more closely aligned.

However, there are major differences in the importance of trade by commodity (Figure 1.29). For many commodities, most production is used domestically. Only for some does trade represent at least one-third of global production. This is the case for cotton, sugar, soybean, vegetable oils and milk powders, which are imported for further processing.

Over the coming decade, the share of production that is traded will not change significantly for the commodities covered in the *Outlook*, as no major shifts in trading patterns are expected. The trade share of some commodities is projected to decline marginally, reflecting weakness in import demand, or increasing domestic use or, in the case of biodiesel, both tendencies. On the other hand, for cotton, wheat and rice, trade is expected to expand at a higher pace than global output, resulting in an increase in the share of their production that is traded (Section 1.5.1).

Figure 1.29. Share of production traded, by commodity



Note: The solid bar in the graph is computed as global exports over global production (in volume). The hatched bar is computed as exports of the top five exporters over global exports (in volume).
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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1.4.3. Agricultural exports remain concentrated among a few players

For commodities covered in the *Outlook*, the five largest exporting countries generally account for 70% or more of global export volume, a trend that is expected to continue over the next decade. For soybean this share exceeded 95% in 2019-21. Even for commodities with relatively less concentrated exports, such as fish and beef, the five leading exporters accounted for 43% and 57% of global exports in 2019-21, respectively. The export share of the top five exporters is shown in Figure 1.29.

For several commodities, export concentration is expected to increase over the coming decade. The five-country export concentration ratio of rice is projected to rise from 78% in 2019-21 to 85% in 2031, mainly due to strong export growth in India and Thailand. The export share of the top five biodiesel exporters is also projected to increase, from 70% in 2019-21 to 85% in 2031, due to growing exports of biodiesel from recycled cooking oil from Singapore and soybean-oil based biodiesel from the United States. The export share of China's biodiesel, on the other hand, is expected to drop due to limited growth in its production from recycled cooking oil.

Dairy exports are also expected to become more concentrated, with growing dominance from key suppliers in high-income countries. For cheese and butter, the export share of the top five exporters is projected to rise from 74% to 79%, and from 85% to 87%, respectively, mainly driven by strong export growth in the European Union. The five-country export concentration ratio of SMP is also projected to increase, mainly due to strong growth in exports from the United States. The latter is projected to account for 35% of global SMP exports in 2031, up from 32% in 2019-21. The five-country export concentration ratio of WMP is projected to stabilise at 86%.

Cereal exports (excluding rice), on the other hand, are projected to become less concentrated. The export share of the top five wheat exporters is projected to drop from 71% in 2019-21 to 69% in 2031, mainly due to lower exports from the European Union, as its domestic production is not expected expand over the next decade. The five-country export concentration ratio of maize is projected to drop by one percentage point, due to the United States exports staying below their peak of 2019-21. The maize export share of Ukraine is also projected to be lower in 2031 than in the base period, while Russia's wheat and maize export shares will continue increasing, although at a slower pace than in the last decade.

This high concentration creates a risk of significant impacts on global markets if exports are interrupted due to adverse production shocks (e.g. poor harvests), policy changes in the major exporting countries or armed conflict, as discussed in Section 1.5.6. Such interruptions could affect prices and availability of agricultural commodities, with serious implications for global food security. Such risks are large for highly traded commodities (Figure 1.29).

Compared to exports, agricultural imports are more dispersed with agricultural trade typically flowing from a small number of exporters to a large(r) number of importers. For most commodities covered in the *Outlook*, the top five importers account for less than 60% of global import volume.

1.4.4. Increasing differentiation between net exporting and net importing regions

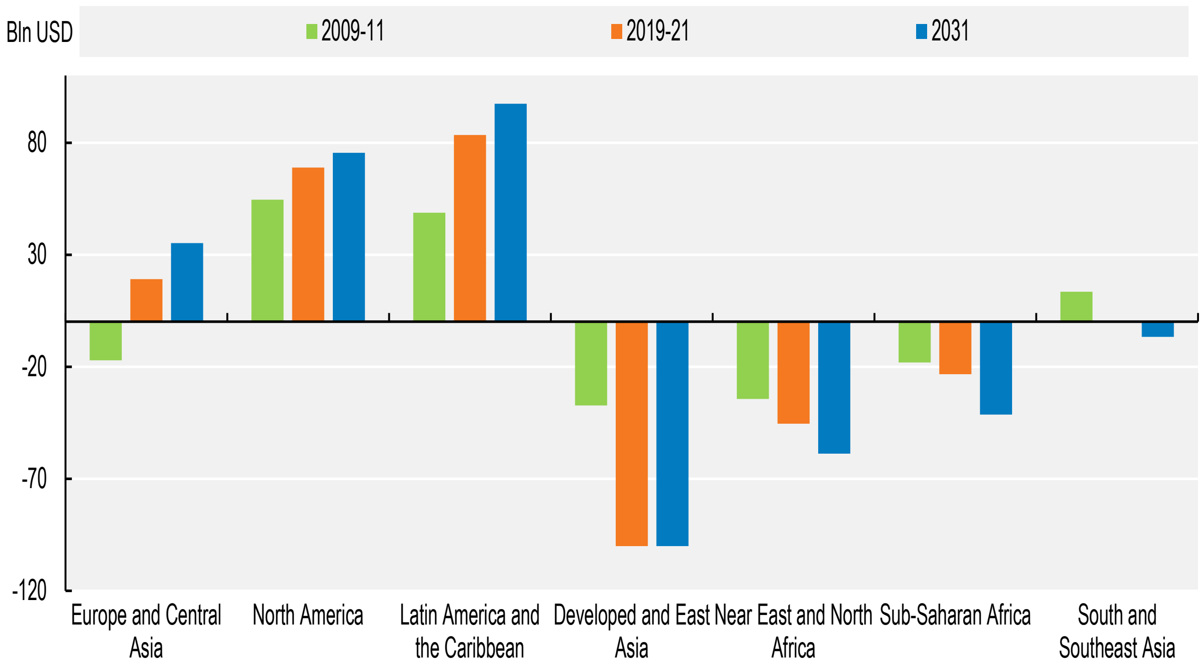
Agricultural trade is projected to continue growing over the next decade (Section 1.5.1). A large share of this increase will occur within regions, supported by regional trade agreements, which will enhance regional integration. However, inter-regional trade is also expected to expand, with increasing differentiation between net exporting and net importing regions. Established net exporters of agricultural commodities are expected to see larger trade surpluses while net imports could increase in regions with significant population growth or natural resources constraints (Figure 1.30).

Traditional exporters increase trade surpluses

Latin America and the Caribbean is expected to reinforce its position as the world's prime exporter of agricultural commodities. Exports from the region are projected to continue increasing at a higher rate than imports, facilitated by growing production of maize, soybean, sugar, poultry, and beef. As a result, net exports are projected to increase by 17% between 2019-21 and 2031. Net exports from North America, the second leading exporter of agricultural commodities to world markets, are expected to expand at a slower pace (by 10% between 2019-21 and 2031), due to lower growth in output. Maize and soybean exports from North America, which have been growing strongly over the last decade, are expected to stagnate over the next ten years.

Europe and Central Asia moved over time from being net importers of agricultural commodities to net exporters in 2014. This is mainly due to strong productivity and production growth in Ukraine and Russia which, in the span of a few years, have become competitive exporters of wheat and maize. Limited domestic demand, due to stagnating population and flat per capita consumption for several commodities, were also contributory factors. Over the coming decade, net exports from Europe and Central Asia are projected to almost double, largely due to higher exports from Russia and Ukraine. However, the war could result in lower than projected growth in their production and exports, as discussed in Section 1.5.6.

Figure 1.30. Net trade by region, in constant value



Note: Net trade (exports minus imports) of commodities covered in the *Agricultural Outlook*, measured in constant 2014-16 USD. Net trade figures include intra-regional trade but exclude intra-EU trade. The regions Developed and East Asia, and South and Southeast Asia are defined as in Chapter 2.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Rising import demand among countries with rapid population growth and/or natural resource constraints

Net imports by the largest net importing region, Developed and East Asia, are projected to stabilise over the coming decade. China is the region's main importer. China's imports of agricultural commodities (as measured in constant 2014-16 USD) more than doubled over the last ten years, peaking in 2020 as an ASF outbreak caused a surge in imports, while exports have been broadly stable. Over the next decade, China's imports and exports are projected to broadly grow in tandem, due to slow population growth, near saturation in food consumption for some commodities, and growth in domestic production. Australia and New Zealand are traditional net exporters of agricultural commodities from the Developed and East Asia region but their net exports are expected to grow slowly over the next ten years, due to reduced production growth.

The South and Southeast Asia region is a significant trader but its net trade is low as imports and exports in and from the region are almost balanced. In the coming decade, imports are projected to grow at a higher rate than exports due to strong demand growth. Net importers such as Pakistan, Iran and Asian least developed countries are expected to increase their net imports mainly due to population growth. In Southeast Asia, a traditional net exporter of agricultural commodities, growth in imports (mainly of cereals and meat) is also expected to outpace growth in exports (rice, palm oil), due to strong growth in domestic demand, stemming from population and income growth. In India, on the other hand, domestic production is expected to keep pace with growing population and incomes, with little change in its overall net trade position. For instance, India's strong growth in both consumption and production of dairy products is expected to have little effect on global trade (see Chapter 7 on dairy).

Sub-Saharan Africa and Near East and North Africa are large importers of agricultural commodities, in particular cereals, which contribute to food security both directly and through their use as animal feed. In Sub-Saharan Africa, intra-regional trade is expected to increase over the next decade, supported by the implementation of the African Continental Free Trade Agreement. However, imports into the region (mainly of cereals and soybean) are projected to grow more strongly than exports to the rest of the world, as population growth is expected to outpace output growth, resulting in an increase in net imports (+77% by 2031). While Sub-Saharan Africa is a large net importer of commodities covered in the *Outlook*, it is a net exporter of cocoa, coffee, tea, fruits, and vegetables.

In Near East and North Africa, imports into the region are projected to keep expanding over the next decade, while exports are expected to decline. Strong growth in population and limited growth in domestic production due to natural resources constraints underpin this rising trend in net imports (+30% by 2031), deepening the region's dependence on international markets.

1.4.5. Trade plays a key role in ensuring food security and farmer livelihoods

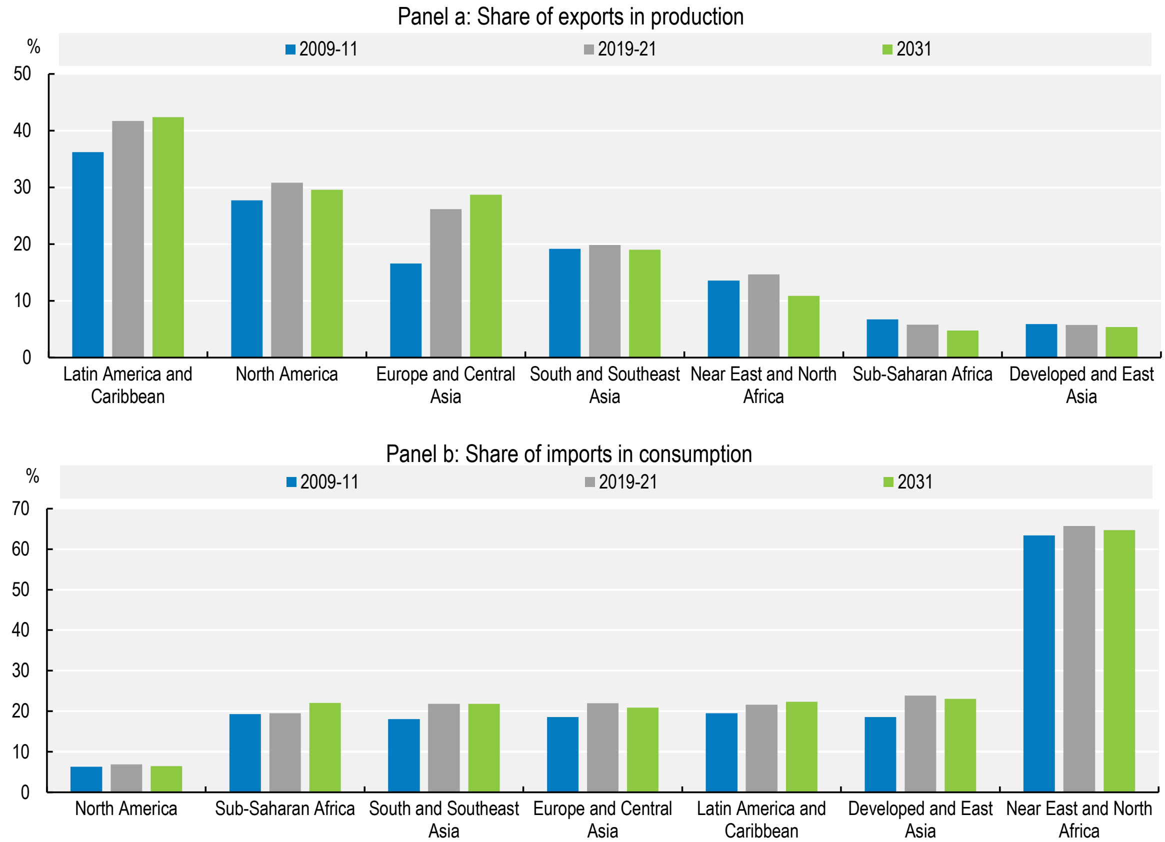
Trade can improve the availability and affordability of food offering diversity and wider choice for consumers. In particular, resource-constrained countries are highly dependent on imports of agricultural commodities. In several other countries, exports of agricultural commodities account for a large share of domestic production and are an important source of income.

Figure 1.31 shows the share of imports in total consumption, and the share of exports in total production for selected regions, measured in calorie equivalents. At the global level, these shares rose from 19% in 2009-11 to 22% in 2019-21 but are projected to remain broadly stable over the next decade. However, these averages mask important differences in the role of trade between regions and individual countries.

Large producing regions such as North America, and Latin America and the Caribbean, exported 31% and 42% of their domestic production, respectively, in 2019-21. In Latin America and the Caribbean, this share is projected to reach nearly 43% in 2031. A substantial increase in the share of exports in domestic production is also projected in Europe and Central Asia, from 26% in 2019-21 to 29% in 2031 (Figure 1.31, panel a). However, even large net exporting regions import a share of domestic consumption. In Latin America and the Caribbean, for instance, imports account for about 22% of total consumption for commodities covered in the *Outlook* (Figure 1.31, panel b). This estimate includes intra-regional trade, which is significant in the region.

In Near East and North Africa, where population is growing strongly and water resource constraints limit production response, imports play a significant role in complementing domestic food and feed production. Imports accounted for 66% of total consumption of agricultural commodities in 2019-21, a share that is expected to remain stable over the next decade. In Sub-Saharan Africa, the share of imports in total consumption is lower, at 19% in 2019-21, but is expected to reach 22% by 2031, as growth in domestic production will not keep up with rising population (Figure 1.31, panel b).

Figure 1.31. Trade as a share of total production and consumption by region, in calorie equivalents



Note: Calculations using average calorie content of commodities included in the *Outlook*. Note that exports/imports include feed and availability includes processing of commodities which may be re-exported. Exports include intra-regional trade but exclude intra-EU trade. The regions Developed and East Asia, and South and Southeast Asia are defined as in Chapter 2.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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1.4.6. International trade will be under strain in responding to the evolution of Russia's war against Ukraine

Russia's war against Ukraine is a major source of risk and uncertainty for agricultural trade, given the importance of these countries in global agricultural and input markets. In 2021, Russia and Ukraine were the 1st and 5th largest wheat exporters, together accounting for 27% of global wheat exports. The two countries also accounted for a combined share of 12.5% of global maize exports in 2021, and are large exporters of barley, rapeseed, sunflower seed and oil. Moreover, Russia ranked as the top exporter of nitrogen fertilisers in 2021, and the second leading supplier of both potassic and phosphorous fertilisers (FAO, 2022[1]) (Box 1.1).

Given this high export concentration, disruptions to production and exports from Ukraine and Russia is already having a significant impact on global markets. The *Outlook* has taken into account reduced export availability from these two countries in the marketing year 2022/23, in line with the Agricultural Market Information System (AMIS) market data. However, with a continuation or escalation of the war this would result in lower production and exports from these countries than projected in this *Outlook*, both in 2022 and in subsequent years. Some redirection in trade flows can also be expected, as other countries will try to expand their production and exports to fill the gap in global cereals and oilseeds supplies.

Rising oil prices and rerouting efforts as a result of the war could also lead to additional increase in maritime transportation costs, further adding to prices paid by consumers for imports. Transportation costs, which are an important component of trade costs, have been increasing since mid-2020, due to rising oil prices and trade disruptions linked to the COVID-19 pandemic. Although for this *Outlook* it is assumed that trade facilitation costs will return to their pre-crisis values from 2022 onwards, the evolution of trade costs remains subject to a high degree of uncertainty. For context, Box 1.4 looks at the dispersion and evolution of maritime transportation costs in the grains and oilseeds sector between 2007 and 2021, and at the importance of these costs in the final price paid by consumers.

The impacts of the COVID-19 pandemic and the war on international markets is also leading to renewed discussions about food self-sufficiency and reshoring. More localised production is perceived by some governments as a way of providing greater security against disruptions to domestic supply. Consumer concerns about environmental sustainability could also support growing preference for ‘’zero mile’’ or ‘’short supply chain’’ products, which can be seen as a way of reducing the environmental footprint of food transportation, obtaining seasonal and fresh products, and supporting the local economy. These trends could potentially result in slower growth in agricultural trade than projected in this *Outlook*.

Digital technologies have the potential to boost agricultural trade over the coming decade, by improving the efficiency, transparency and traceability of trading systems. The adoption of electronic certificates (e-certificates), for instance, can facilitate trade by replacing paper documentation, enabling faster border procedures, and reducing the risk of trade fraud, all which reduce costs. E-certificates can also make trade systems more accessible for businesses, including small businesses in developing countries. Empirical analysis using a gravity model shows that digital technologies such as sanitary and phytosanitary (SPS) e-certificates have positive effects on trade volumes, notably for plant-based, vegetables, and processed food products (OECD, 2021[16]). Countries have been increasingly using e-certificates within their SPS systems and the disruptions caused by the COVID-19 pandemic have accelerated their adoption.[11] E-certification systems have helped countries minimise the negative effects of social distancing measures on trade by reducing the need for personal contact and handling of paper documents. While the pandemic presents an opportunity to increase the uptake of e-certification and other digital technologies, several challenges to their adoption need to be overcome. These include improving digital and physical infrastructure, building capacity to improve digital skills, establishing clear and enabling regulatory frameworks, and promoting the interoperability and equivalence between legacy systems and new technologies.

Finally, major developments in trade policies that will be negotiated and implemented over the coming decade could have important impact on agricultural trade. The *Outlook* only includes policies and trade agreements currently in place, unchanged over the medium term. This constitutes a source of uncertainty, as policy changes occurring over the next decade will alter the projections. New trade agreements (e.g. Regional Comprehensive Economic Partnership, EU-Mercosur) could increase intra-regional and inter-regional trade. Trade restrictive policies (e.g. an import/export tax or ban) would hinder trade and have a negative impact on global food security and livelihoods not only in the short term, but also in the longer term by undermining supply capacity.

Box 1.4. Maritime transportation costs in the grains and oilseeds sector

More than 80% of global trade in grains and oilseeds is by maritime transport. A detailed analysis of maritime transportation costs, by commodity and country over time, is now possible thanks to a database on ocean freight rates developed by the International Grains Council (IGC). The dataset selected for the OECD study covers over 300 bilateral routes at the port level and captures around 70% of global trade flows of soybeans, wheat, sorghum, maize and barley.

Figure 1.32 uses boxplots to show the dispersion of freight rates by exporter for barley and HSS (heavy grains (wheat, durum), sorghum and soybeans) between 2007 and 2021. Freight rates for barley and HSS averaged at USD 33/t and USD 35/t, respectively, over this period. However, there is considerable variation around the average, even for a single exporting country, freight rates for HSS originating from Canada ranging between USD 7/t and USD 135/t, for instance (Figure 1.32). Freight rates are influenced by several factors and the empirical analysis in the study shows that distance is the most important determinant of freight rates; a 10% increase in the distance between two ports is estimated to lead to a 2.5% increase in freight rates. Thus, the war could lead to an increase in freight rates, as importers might have to import from more distant suppliers.

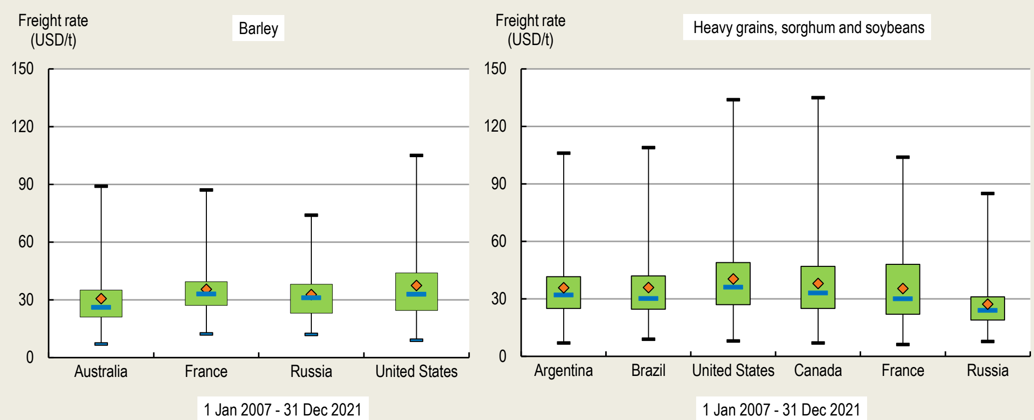
For most exporters, the maximum value for freight rates was reached during the food price crisis of 2007-08. Average freight rates for HSS and barley[1], across all trade routes, more than doubled between January 2007 and June 2008 (from USD 42/t to USD 86/t) and then plummeted to USD 20/t in January 2009. Freight rates recovered after January 2009, but never returned to their previous peaks. Freight rates for HSS and barley increased strongly in the second half of 2020, and peaked at USD 57/t, on average, in October 2021, the record value for the last decade. However, this is only two-thirds of the value reached in June 2008. Volatility in freight rates - as measured by the coefficient of variation – was also at its highest during the food price crisis. Freight rates declined after October 2021, but started increasing again from February 2022, partly due to the increase in the crude oil price. In March 2022, fuel costs were estimated to account for 30% of the total freight costs for grains and oilseeds.

To gain insights into the importance of maritime freight rates in the final price of grains and oilseeds, the share of freight rate in the cost and freight price (C&F) was computed.[2] Maritime transportation costs accounted for 11% of the C&F price during the period 2007-2021, on average. However, this average hides large variations between trade routes and commodities over time, the share ranging between 2% and 43%, demonstrating the potentially large impact of freight rates on final prices.

Figure 1.33 shows the evolution of this share by commodity between 2007 and 2021. For all commodities except barley, the share of freight rates in C&F prices peaked between mid-2007 and the end of 2008. This share then dropped between late 2008 and early 2009 for all commodities but rose again between mid-2009 and mid-2010. Between the end of 2010 and June 2021, the share of freight rate in C&F prices remained between 5% and 15% for all commodities, reaching a low point in May 2020, at 8%, on average, across all commodities. From May 2020 onwards, however, this share has once again been increasing, reaching ten-year record values in the second half of 2021.

Figure 1.33 also illustrates the differences in the share of freight rate in C&F price between commodities. This share is lower for soybean than for sorghum and wheat, for instance, because although these commodities have the same freight rate (i.e. the freight rate for HSS cargoes), soybean has a higher free on board (fob) price than sorghum and wheat.

Figure 1.32. Dispersion of freight rates by cargo and exporter over the long term (January 2007 – December 2021)



Note: These boxplots have several components. The green box indicates the range where 50% of the observations are situated; the lower bar of the box is the first quartile (Q1/25th percentile), the middle bar is the median (Q2/50th percentile), and the top bar is the third quartile (Q3/75th percentile). The triangle is the mean. The maximum (minimum) value is situated at the end of the top (bottom) whisker.
Source: Authors' calculations based on IGC (2022[17]).

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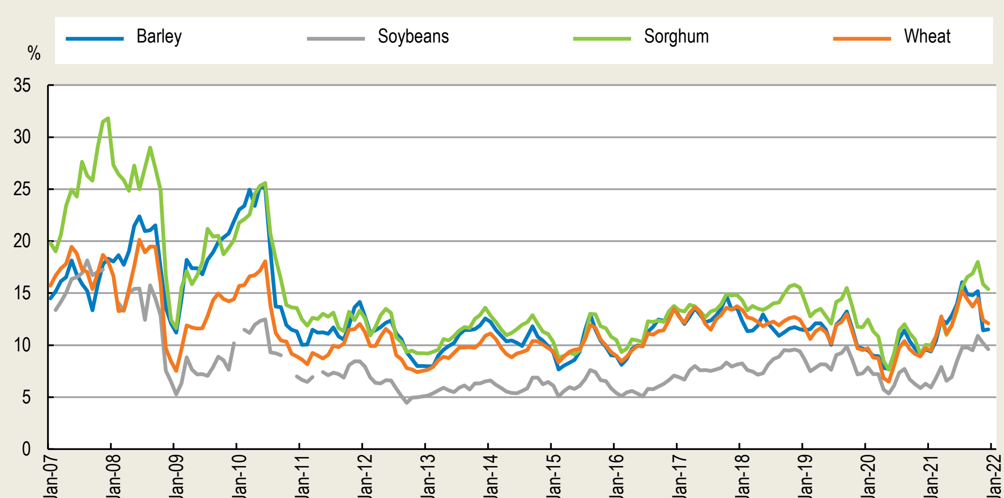
Figure 1.33. Share of freight rate in the cost and freight price, by commodity (January 2007 – December 2021)



Notes: 1. The average freight rate is a simple average calculated using the set of triplets (exporter/importer/cargo combinations) for which the IGC database has complete data series over the long term (January 2007-December 2021); it therefore only considers HSS and barley and a selected set of exporters and importers.
2. The share of freight rate in the cost and freight price is defined as the freight rate divided by the sum of the freight rate and the free on board price (for a given date and trade route).
Source: Authors' calculations based (IGC, 2022[17]).

StatLink https://stat.link/5uya1x

Source: Deuss, Maggi and Frezal (2022[18]).

1.5. Prices

1.5.1. Introduction

The *OECD-FAO Agricultural Outlook* uses prices in major commodity markets as international reference prices. These observed market prices reflect both fundamental supply and demand conditions during the base period 2019-21 as well as short-term demand or supply shocks causing temporary price movements. Shocks range from normal weather fluctuations to extreme weather events, pests and animal diseases, and natural disasters, and include the impact of economic and political events (e.g. armed conflicts, and the COVID-19 pandemic). Furthermore, as these prices are observed at trade exchanges, speculation can influence current prices, since agricultural commodities form part of investment portfolios. As the effects of these shocks are largely unpredictable and cannot be incorporated into the projections, prices in the *Outlook* are assumed to converge to a path determined by demand and supply fundamentals.

1.5.2. Agricultural price trends and the main drivers

Production expected to continue to supply demand at lower real prices

Over the coming decade, real agricultural prices (i.e. adjusted for inflation) of the commodities covered in the *Outlook* are projected to remain broadly flat or decline slightly (Figure 1.34).

Agricultural prices in real terms have been on a declining trend since the 1960s as the result of productivity improvements in agriculture and related industries, lowering the marginal production costs of food commodities. The “green revolution” during the 1960s and the emergence of new technologies during the 1990s resulted in substantial yield increases in major producing countries. Marginal production costs have been significantly reduced, resulting in a reduction in prices despite rising food demand growth induced by global population and per capita income growth. While there have been deviations from this general trend, such as the price spike in the 1970s or several price peaks during 2007-14, these have been temporary and did not alter the long-term declining trend.

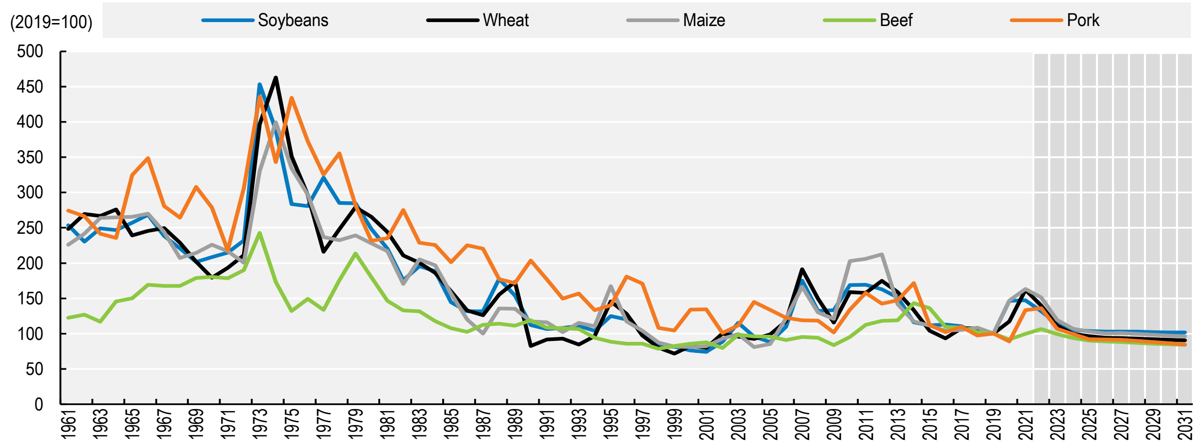
Agricultural prices in real terms increased through much of 2020 and 2021. This was due to tight global supplies and increased production costs (in particular due to COVID-19-related supply chain disruptions which raised energy prices and labour costs), poor harvests in important producing countries, and demand shifts due to the pandemic and slowdown in economic growth, as well as trade policy uncertainties, which all occurred during this period.

The *Outlook* projections are made under the assumption that the current price rally will be temporary. While prices of the commodities covered in the *Outlook* may remain high in the 2022/23 marketing year, they are expected to subsequently resume their long-term declining trend.

The agricultural price projections are thus consistent with the supply and demand fundamentals expected over the next decade. These take into account income and population growth combined with prevailing consumer trends influencing demand, and continued productivity-increasing supply. Over the *Outlook’s* medium term, it is assumed that, at the global level, mobilising natural resources will continue at declining real prices, while the expansion and intensification of production capacity will not be constrained from meeting the upper limits of projected demand. Of importance, the supply and demand projections assume an efficient and sustainable global trading system.

The FAO Food Price Index (FPI) summarizes developments in the international reference prices of major traded food commodities in a single indicator (Figure 1.35).

Figure 1.34. 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 (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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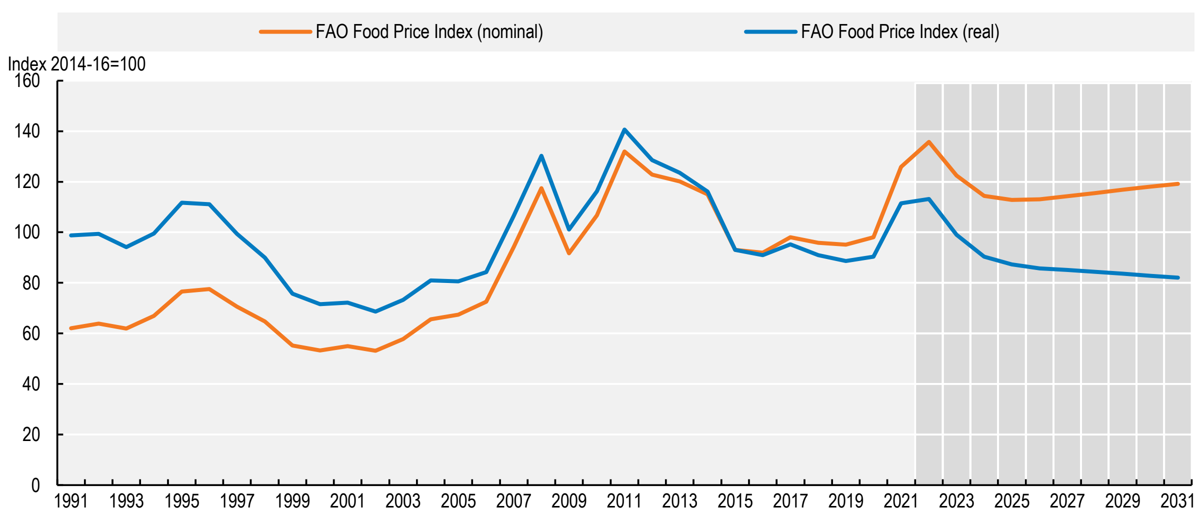
Figure 1.35. FAO Food Price Index



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 deflating the FAO Food Price Index by the US GDP deflator (2014-16=1).
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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1.5.3. Commodity price trends

Commodity prices in real terms are expected to resume long-term downward trends after current market disruptions. Prices of wheat, maize and coarse grains increased in 2021 and reached their highest levels of the last nine years. On the other hand, prices for rice were below their levels of 2020 as ample exportable supplies intensified competition among exporters. Prices for all cereals are expected to remain high in 2022 before gradually resuming their long-term declining trend (Figure 1.36).

With cereal prices reverting to their long-term declining trend, the co-movement of wheat and maize prices; other coarse grains and maize prices; and wheat and rice prices, will maintain or return to their established ratios (Figure 1.37). However, as cereals prices revert back to their long-term declining trend at different speeds, the established price ratios will only be restored in the medium term. Market disruptions in the early years of the outlook period, such as export quotas on wheat and tight wheat and maize exports from the Black Sea region, are assumed to be temporary and will gradually cease as prices are determined by underlying supply and demand conditions.

Oilseed prices increased rapidly in 2021 due to strong import demand, especially for soybeans in China due to the rebuilding of hog herds following the ASF outbreak and limited domestic supply growth. Oilseed prices are expected to start declining already during the first years of the *Outlook*, as production is expected to start outpacing demand. Production prospects are enhanced due to the incentives of current high prices. Subsequently, they are expected to continue their long-term declining trend as the assumed real price of crude oil and economic growth following the recovery from the COVID-19 pandemic will underpin oilseed and oilseed product prices (Figure 1.36).

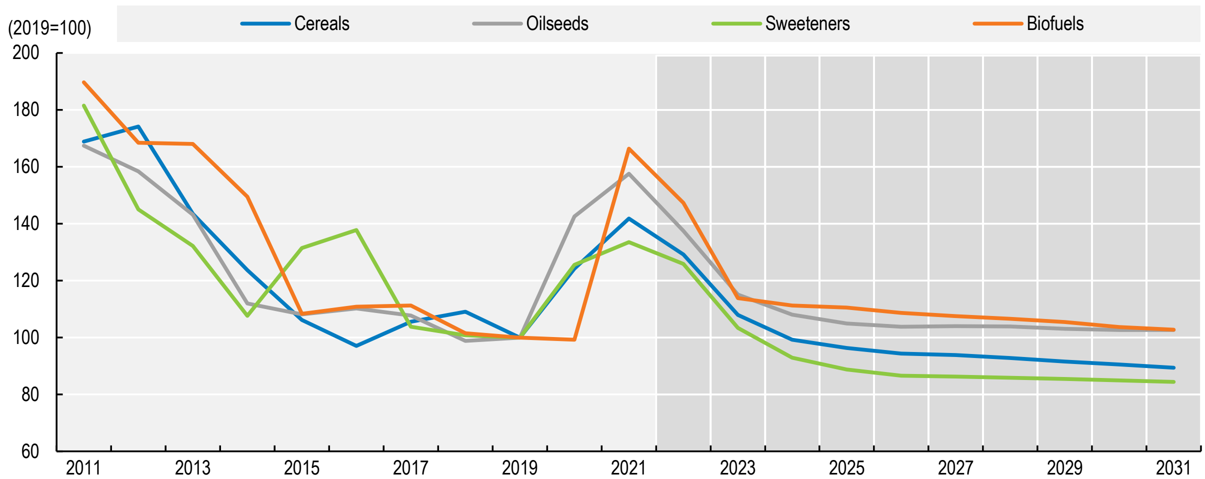
Real sugar prices also peaked in 2021, due to reduced export availabilities from Brazil combined with strong global demand. They are expected to trend downwards over the next decade as productivity gains will increase production while the growth in demand is expected to slow down (Figure 1.36).

In spite of stagnant global demand for biofuels, real prices peaked in 2021. This reflects high feedstock prices, and increasing labour and input costs. However, real feedstock prices – namely sugarcane, molasses, maize and vegetable oil – are expected to return to their long-term declining trend over the projection period, with real biofuel prices following the same path (Figure 1.36). Notwithstanding, biofuels prices will remain heavily influenced and shaped by policies, such as domestic support, consumer tax credits, and blending mandates that combine fossil fuels and biofuel consumption.

Historically high biofuel prices in 2021 reflected a delayed reaction to the increasing feedstock prices witnessed in 2020. Biodiesel was the most affected, with vegetable oil prices nearly doubling from 2019 to 2020. Owing to the 2020 increasing feedstock prices, the ratio of feedstock to biofuel prices increased significantly, although falling back in 2021. Over the projection period, these price ratios are projected to stabilise, although the ratio of “vegetable oil to biodiesel” prices will remain above the historical trend, reflecting the pressure on global markets for vegetable oil and the increasing demand for biodiesel (Figure 1.38).

In 2020 and 2021, the high biofuels to fossil fuel (crude oil) price ratio reflects high feedstock prices combined with relatively low oil prices. However, over the projection period, as feedstock prices decline, biofuel prices should re-establish their historical relation with fossil fuels (Figure 1.38). In this regard, the assumption in the *Outlook* of mandates that bind the demand for biofuels with fossil fuels, will contribute to the stability of their relative prices.

Figure 1.36. Medium-term evolution of crop-based commodity prices, in real terms



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

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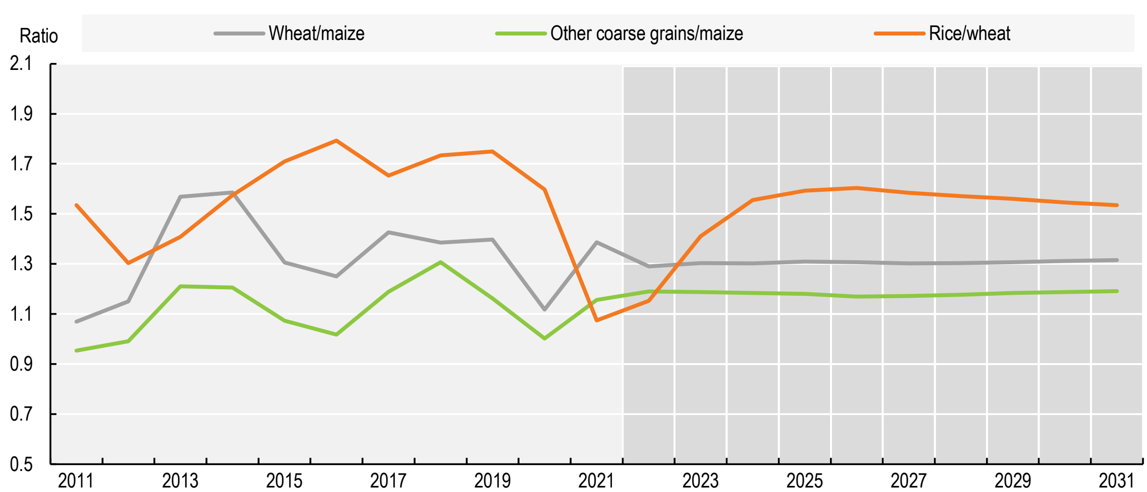
Figure 1.37. Cereals' price ratios



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

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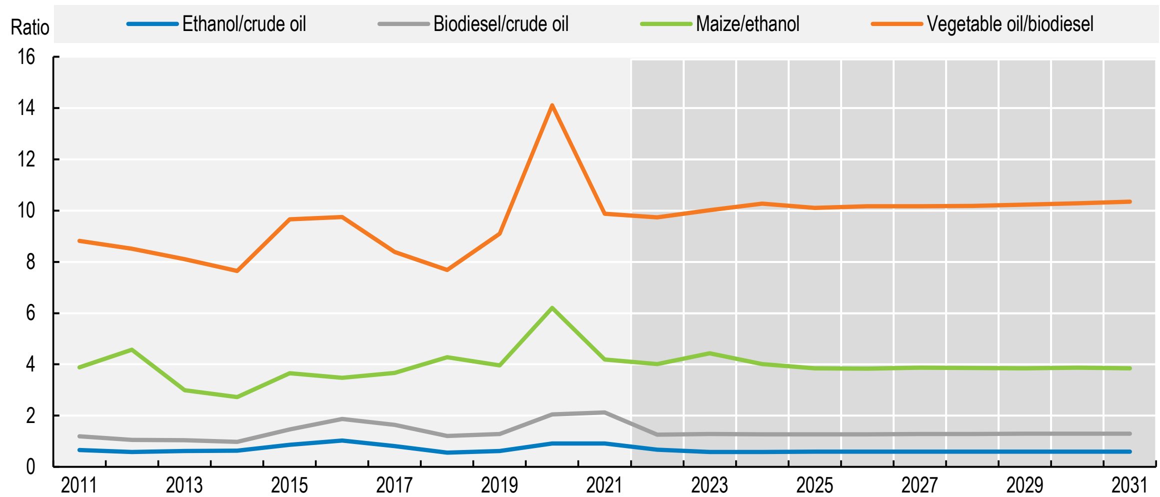
Figure 1.38. Biofuel price ratios



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

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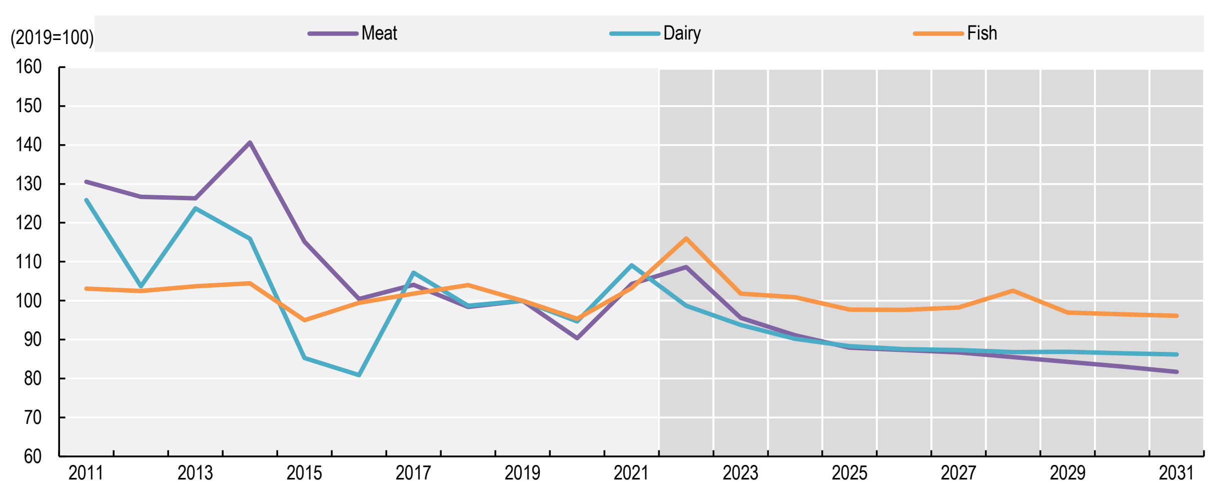
Real meat prices rebounded in 2021, not only reflecting higher demand following the economic recovery from the COVID-19 pandemic but also increased transportation and marketing costs. They are expected to remain high in the first years of the *Outlook* as higher feed costs will limit the scope for expanding supply, whereas high packaging and transportation costs will impact on meat supply chains. Meat prices are projected to decrease once supply chains stabilise and feed costs decrease (Figure 1.39). Pig meat prices are expected to decline more than for other meats due to the recovery of production following the ASF outbreak, especially in China, Viet Nam, and the Philippines.

Figure 1.39. Medium-term evolution of animal-based commodity prices, in real terms



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

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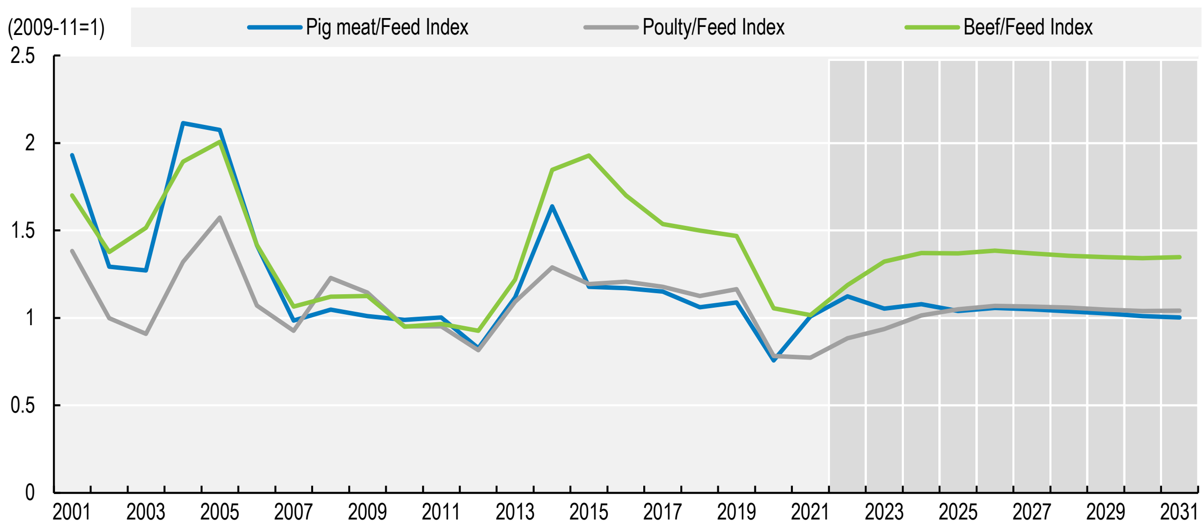
The ratio of meat prices to a feed price index is expected to stabilise and to resume a slight downward trend (Figure 1.40). Beef prices, however, are less affected by feed costs, since most of the global beef production is pasture-based. Pork and poultry prices show a strong link to feed costs, as their production uses more grain- and protein meal-based feed. The tendency is for the ratio of meat to feed prices to remain within a relatively narrow band.

Figure 1.40. Meat to feed price ratios



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

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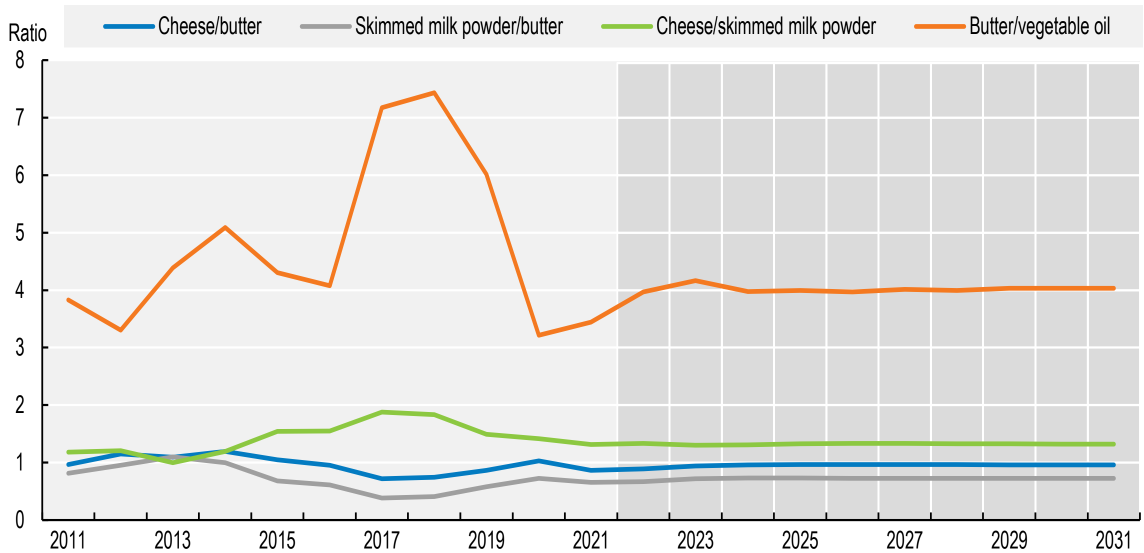
Approximately only 7% of global milk production is traded internationally, most milk being consumed domestically in the form of fresh, unprocessed or lightly processed (e.g. pasteurized or fermented) dairy products. As such, producers and consumers are mainly affected by developments in domestic dairy markets, so that international dairy price trends are less important. Local prices of fresh dairy products are assumed to follow overall price trends of slightly falling real marginal production costs of milk. However, prices are subject to high variability caused by seasonal weather effects and local market conditions.

Global price developments in the dairy sector are mainly determined by trends in the international prices of butter and SMP, which set the value of milk fat and non-fat milk solids, respectively (Figure 1.39). Both SMP and butter prices peaked in 2021 due to robust demand and limited supply. They are expected to remain high in 2022 mainly due to high production costs and strong demand, the latter also affected by high vegetable oil prices, with prices of butter increasing more than vegetable oils through 2022 (Figure 1.41). SMP and butter prices are expected to start decreasing thereafter and to resume their long-term declining trend as supplies respond to current price signals. Real prices of cheese and WMP also track developments of butter and SMP prices, respectively.

Figure 1.41. Dairy price ratios



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

StatLink https://stat.link/3iyrhq

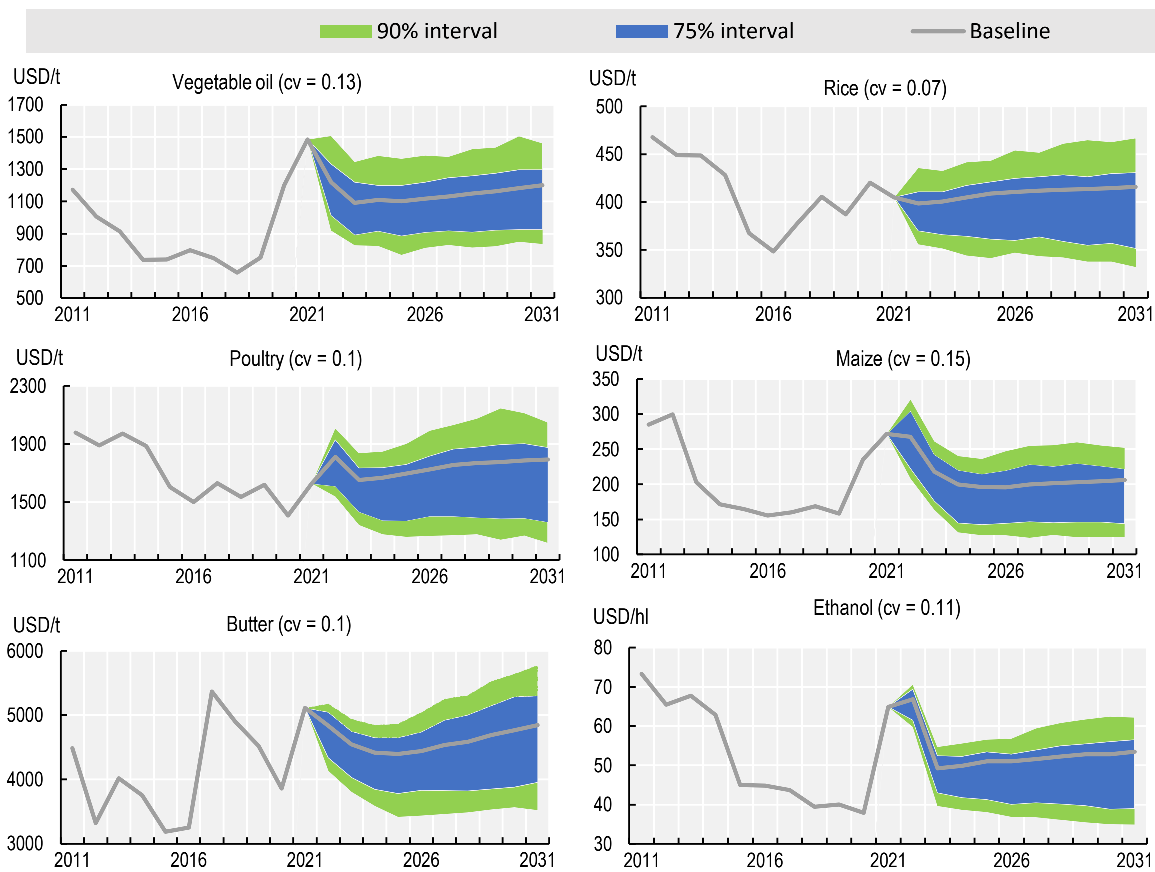
Real fish prices rose in 2021 due to high demand at both household and food service levels, following the economic recovery from the COVID-19 pandemic, and the modest increase in supply. They are, however, subsequently expected to decline with increasing supply as a response to growing demand. After 2024, real fish prices are projected to decline as policy changes in China, globally the largest capture fisheries and aquaculture producer, will limit the growth of production worldwide up to 2023, followed by faster growth until 2031. These policy changes focus on environmental protection and diversification of production, with an increased emphasis on producing species for the domestic market. Despite the longer term declining real prices fish, fluctuations over the next decade will be due to the effects of *El Niño* (Figure 1.39).

1.5.4. Many uncertainties in the next decade mean price projections need to be interpreted with caution

Price projections presented in this *Outlook* result from the interplay of fundamental supply and demand factors under normal weather, macroeconomic and policy assumptions. The *Outlook* is based on the best information available, but there is unavoidably a degree of uncertainty attached to the projections and to the underlying assumptions. The impacts of Russia's war against Ukraine on agricultural production in Ukraine and on agricultural trade, of climate change on agricultural productivity, of a higher incidence of animal and crop diseases and of weather variability on agricultural production, of changing consumer preferences and macroeconomic developments on demand, as well as the influence of domestic and trade policies, all heighten risks and create uncertainty. These factors are elaborated in Sections 1.3.7, 1.4.9 and 1.5.6.

The assumption of 'normality' in this *Outlook* results in a smooth trajectory for most projected variables, deviations from the assumed trends causing price volatility. To assess the impact of such deviations, a partial stochastic analysis (PSA) was performed on the baseline projections. The PSA simulates the potential future variability of main price determinants using observed past variability. The analysis includes global macroeconomic drivers and specific agricultural crop yields. Variability related to animal diseases or policy changes is not considered. The aggregated results of multiple PSA simulations indicate the sensitivity of the baseline price paths (Figure 1.42). With a likelihood of 75%, prices will remain within the blue range in any given year, while they are expected to remain with a probability of 90% within the green range. An extreme event that would cause a price to fall entirely outside these ranges occurs with a probability of 40% at least once during the projection period.

Figure 1.42. Baseline and stochastic intervals for selected international reference prices



Note: Expected evolution of nominal prices under the baseline scenario of the Outlook (solid line) in relation to the stochastic outcomes shown in the blue 75% and green 90% confidence intervals.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Overall, the price variability range tends to be larger around crops than livestock products, given the susceptibility of crop yields to weather conditions. The price of rice varies the least among the *Outlook* crops, as it is typically less prone to weather shocks than other crops. Crops that are grown in crop rotation systems, such as maize and soybeans in the Americas, show similar levels of variation. In general, prices of livestock products are less susceptible to weather shocks because feed price variability is not fully transmitted, mainly due to substitutability between different feeds. The variability in ethanol and biodiesel prices is in addition to variability of feedstock prices also closely related to that of the crude oil price, because of the complementary consumption relationship.

It should be noted that international reference prices that characterize global markets rarely have a direct impact on actual production or consumption decisions, which are mainly driven by domestic producer and consumer prices. While each individual producer or consumer cannot influence prices, their aggregate behaviour in home markets determine the domestic reference prices and, in turn, at the global level aggregated production and consumption decisions drive international reference prices.

The relationship between global reference prices and actual producer and consumer prices depends on a number of transmission processes that are at the source of uncertainty. The *Outlook* projections are made under the assumption that transmission of price signals between the global and domestic markets depends on the level of integration of a domestic market into the global trading system. Policies, such as minimum producer prices or administered consumer prices can distort the transmission. Furthermore, the simplification of using one representative producer and consumer price for each commodity in each country, and changes in the domestic price transmission, can influence international reference price, which leads to some caution in the calculation and interpretation of the price projections.

Besides uncertainties coming from geographical price transmission, shifts in the price transmission along food value chains are another source of uncertainty. The *Outlook* projections are made under the assumption that consumption is formed on the basis of a representative consumer price, which is based on a given level of product processing at the retail level, and income of a representative consumer. Shifts in income distribution, retail structures or food safety regulations may alter these factors. For example, as consumers reach higher income levels, they may prefer to consume more processed food products or with added services, such as home delivery and eating out. Considering these factors would influence the price transmission from producers to consumers and thus alter the projections.

1.6. Can Zero Hunger be achieved sustainably?

Eliminating hunger is a significant ongoing challenge. Increasing agricultural production that is available to feed an increasing global population can help to reduce global hunger. At the same time, agriculture is a significant source of global GHG emissions and other environmental impacts. Agricultural productivity growth is thus an important strategy for reconciling the need to produce more food while lowering the sector's environmental footprint.

The *Outlook* projections suggest that, without additional efforts, the 2015 UN SDG 2.1 on Zero Hunger will not be achieved by 2030, and agricultural GHG emissions will continue to increase. This scenario quantifies the level of agricultural productivity growth required at the global level to eliminate hunger, while also putting the sector on track to contribute to limit global warming to below 2 degrees by 2050 as agreed in the 2015 Paris Agreement.

Current estimates suggest that in 2020 nearly 768 million people were chronically undernourished, equivalent to 9.9% of the world population. At the same time, some 2 billion people are estimated to be malnourished through excess consumption (WHO, 2021[7]). But, crucially, the world is not on track to achieve the SDG 2.1 on Zero Hunger, with projections suggesting that the number of chronically undernourished people will decline to only about 660 million by 2030 (FAO et al., 2021[8]).

Direct greenhouse gas (GHG) emissions from agriculture account for 11% of global emissions (IPCC, 2022[15]). Assuming no change in policies and 'on-trend' technological progress, the *Outlook* projects a continuing increase in direct GHG emissions from the sector over the next decade (Section 1.4.8).

The path breaking scenario analysis in the *Outlook* defines two targets, namely Zero Hunger and a 6% reduction in direct GHG emissions from agriculture by 2030, and then assesses the level of productivity growth required to simultaneously achieve these targets.

Target 1: Zero Hunger – Prevalence of undernourishment below 2.5%

The SDG 2.1 on Zero Hunger targets to "end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round by 2030''.

The two indicators used to monitor progress towards SDG 2.1 are indicator 2.1.1 on the prevalence of undernourishment (PoU), and indicator 2.1.2 on the prevalence of moderate or severe food insecurity in the population. The scenario in the *Outlook* focuses on the PoU, which is an estimate of the proportion of the population whose habitual food consumption is insufficient to provide the dietary energy levels that are required to maintain a normal active and healthy life (Global SDG Indicator Platform, 2022[19]).

To threshold to achieve the SDG 2.1 Zero Hunger target is set at a PoU level of below 2.5% in each country. In 2020, global PoU was estimated at 9.9%, a strong indication that significant further efforts are needed to achieve the Zero Hunger goal (FAO et al., 2021[8]).

In this stylised scenario, the Zero Hunger target is reached by increasing average per capita availability of calories in all countries (mainly lower middle and low-income countries) where PoU is projected be above 2.5% in 2030 in the baseline, to bring it below 2.5%. Food is assumed to be affordable to all, and calorie distribution to remain stable in the next decade. Food consumption in food-secure countries remains as in the baseline.

In lower-middle income countries, the necessary increase in average calorie availability to reach the Zero

Figure 1.43. Average per capita availability of main food groups (calorie equivalent), by country income group

Note: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets database which are extended with the Outlook database. Products not covered in the Outlook are extended by trends. 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 tubers and pulses. Animal products include meat, dairy products (excluding butter), eggs and fish. Fats include butter and vegetable oil. Sweeteners include sugar and HFCS. The category others includes other crop and animal products.
Source: FAO (2022). FAOSTAT Food Balances Database, http://www.fao.org/faostat/en/#data/FBS; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/rsq7fc

Hunger target is estimated at 10% (283 kcal/person/day) between 2019-21 and 2030. In low-income countries, a 30% (720 kcal/person/day) rise in average calorie availability to 2030 is required. This ensures that at least 97.5% of the population consume more than the Minimum Dietary Energy Requirement (MDER) in 2030 (Figure 1.43).

In addition, the scenario assumes that the structure of diets in lower middle and low-income countries changes as food consumption increases, with a growing share of diverse nutritious foods (mainly animal source foods) in the diet.

Target 2: Reduction in direct GHG emissions from agriculture

Agriculture is a major driver of climate change via two main channels: 1) emissions from the sector itself, linked to production, and 2) emissions related to land use, land use change and forestry (LULUCF). Together, these elements – agriculture and LULUCF – are referred to as agriculture, forestry, and other land use (AFOLU).

In 2019, average annual net GHG emissions from AFOLU represented 22% of total global anthropogenic GHG emissions. Of this, on-farm emissions linked to agricultural production accounted for 11% of global GHG emissions, while emissions from LULUCF accounted for an additional 11% (IPCC, 2022[15]).

Given its important share of global GHG emissions, the AFOLU sector needs to contribute to global efforts to reduce GHG emissions to limit global warming to below the 2 degrees – and preferably to 1.5 degrees Celsius - by 2050, as agreed in the 2015 Paris Agreement.[12] Several countries have recently set emission reduction targets within their AFOLU sector, either as part of their Nationally Determined Contribution (NDC) or, more typically, in national climate mitigation strategies to support their NDCs (Henderson, Frezal and Flynn, 2020[20])

In this *Outlook* scenario, a 6% decline in direct GHG emissions from agriculture by 2030 is the target. This is half of the 12% reduction in direct GHG emissions the agricultural sector could deliver by 2030, at carbon prices consistent with economy-wide efforts to achieve the 2 degree goal of the Paris Agreement (Henderson et al., 2021[21]).

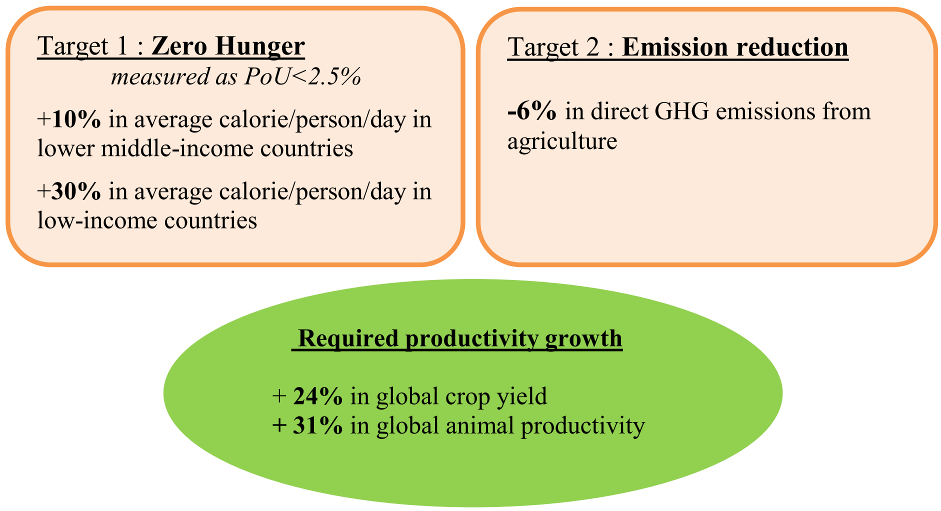
1.6.1. Productivity growth required at the global level

The scenario thus quantifies the level of productivity growth required at the global level to support the necessary increase in food consumption to achieve SDG 2.1 on Zero Hunger by 2030 (target 1), while also substantially reducing agricultural GHG emissions (target 2). Figure 1.44 summarizes the two targets considered in this analysis, along with the level of productivity growth required to achieve them.

This scenario assumes a similar level of productivity growth across the different crops and livestock products, along with a catch-up in the productivity of middle and low-income countries with high-income countries. Moreover, most food production growth required to reach the Zero Hunger target in countries where PoU is currently above 2.5%, is assumed to come from productivity increases within each of those countries. In other words, the assumed convergence in productivity between countries causes most of the increases in food availability to be sourced from domestic agricultural productivity gains, rather than from food imports.

It should be noted that the investments in R&D and innovation that would be necessary to support technological change and other drivers of productivity improvements are not specified in this scenario analysis. The potential increase in non-land resources that may be needed to increase production (such as water) are also not taken into account.

Figure 1.44. Key results of the scenario analysis



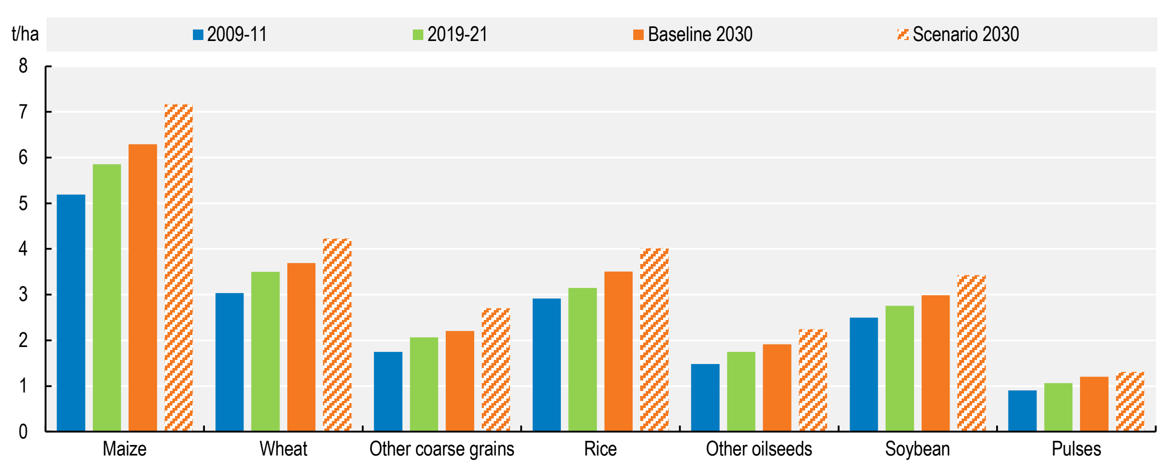
Note: Reported % are absolute growth between 2019-21 and 2030 in the scenario. Average crop and animal productivity are calculated as the calorie output per ha and per animal, respectively.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Crop productivity

The average global growth in crop yields necessary to achieve Zero Hunger and a 6% reduction in direct GHG emissions is estimated to be 24%. This is more than double the growth than the world is currently set to achieve in absence of additional measures. For comparison, the *Outlook* projects a global yield growth of only 10% over the next decade. Achieving both targets would also require an acceleration of productivity growth compared to the last decade, where crop yields grew by 13%.

The required growth in global crop yields ranges between 21% for wheat and 31% for other coarse grains between 2019-21 and 2030, always exceeding last decade's observation (Figure 1.45).

Figure 1.45. Average yields for selected crops



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

StatLink https://stat.link/6ipgle

Growth in crop yields enables the decoupling of crop production growth and land use change. In this scenario, a similar absolute increase in yields is assumed in all countries to enable a reduction in the relative yield gap between middle and low-income countries and high-income countries. This translates into higher percentage increase in yields in middle and low-income countries where absolute yields tend to be lower.

Global yield growth in the scenario would be associated with a 20% increase in crop production over the next decade, together with a 5% decline in crop area. This reduction in crop area could slow deforestation and/or accelerate afforestation implying that LULUCF GHG emissions would fall, which would mean additional emission reductions.

To be sustainable, yield improvement should ideally come from more efficient use of all inputs (i.e. growth in total factor productivity (TFP)) or from a substitution away from emission intensive inputs, rather than rely on potentially unsustainable increase in the use of synthetic inputs (e.g. fertilisers, pesticides). In practice, TFP growth can be achieved through the adoption of more efficient farm management practices, new crop varieties and breeds, as well as digital innovations (e.g. precision farming).

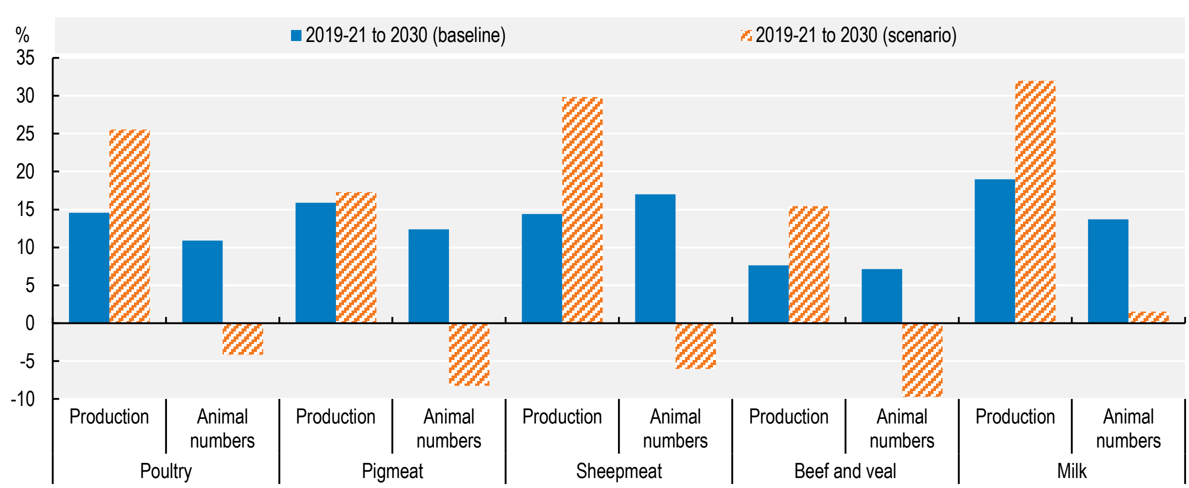
Animal productivity

As for crops, the scenario assumes an increase in livestock productivity to meet targets 1 and 2. This productivity growth is modelled by an increase in annual production per animal stock. In practice, growth in animal productivity growth can be achieved through improved feeding practices, animal genetics, and herd management.

To achieve targets 1 and 2, global animal productivity would have to increase by 31%, on average, between 2019-21 and 2030. This is significantly higher than the growth projected in the baseline – at 5% on average – or zero growth recorded over the last decade.

As shown in Figure 1.46, to achieve such growth in animal productivity, production would have to increase at a higher rate than in the baseline for all livestock products, while animal numbers would need to decline, compared to continuing growth in the baseline.

Figure 1.46. Growth in global livestock production and animal numbers



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

StatLink https://stat.link/qdgvby

1.6.2. Conclusion and limitations

The scenario results suggest that a substantial acceleration in productivity growth would be required to simultaneously eliminate global hunger and put agriculture on track to contribute to reach the Paris Agreement reduction in GHGs. To simultaneously achieve these targets, average global agricultural productivity would need to increase by 28% over the next decade. For crops, the necessary 24% increase in average global yields – which acts as a proxy for crop productivity – is close to double the increase achieved over the past decade (13%). Global animal productivity would have to increase by 31%, on average, vastly exceeding the growth recorded during the last decade. The required productivity growth, in particular for livestock, is significantly higher than either that experienced over the last decade or projected in the *Outlook*.

Thus, achieving both targets in less than ten years only through productivity improvement would be very challenging, suggesting that other actions need to be taken in parallel. These include direct policy measures to mitigate GHG emissions from the sector, reduce food loss and waste, and limit excess calorie and protein intake in higher income countries (particularly from animal sources). Improving food access through the provision of social safety nets and food distribution programmes for undernourished people, especially the most vulnerable, would also be key to reduce global hunger.

Nevertheless, it is evident that actions to boost agricultural productivity should be taken, including public and private investments in innovation, R&D, and infrastructure as well as policies to foster the adoption of sustainable new technologies, and enable the transfer of knowledge, technology, and skills. Redirecting market-distorting payments towards investments in public goods – in particular innovation systems – would underpin more productivity-enhancing investments.[13]

It should be noted that the impact of the assumed supply and demand shocks on agricultural commodity prices is not analysed, because the scenario does not demonstrate how consumers are able to afford the increase in food consumption, nor does it provide estimates of investments or public spending needed to raise productivity, as poverty reduction, investment and fiscal cost considerations are outside the scope of Aglink-Cosimo.

References

Deuss, A., C. Frezal and F. Maggi (2022), "Maritime Transportation Costs in the Grains and Oilseeds Sector: Trends, Determinants and Network Analysis", *OECD Food, Agriculture and Fisheries Papers*, No. 179, OECD Publishing, Paris, https://doi.org/10.1787/b1cdf6b7-en. [18]

FAO (2022), *In Focus: FAO responds to the Ukraine crisis*, https://www.fao.org/in-focus/en/. [5]

FAO (2022), *Information Note: The importance of Ukraine and the Russian Federation for global agricultural markets and the risks associated with the current conflict; 25 March 2022 Update*, https://www.fao.org/3/cb9236en/cb9236en.pdf. [1]

FAO (2021), *Food Outlook - Biannual Report on Global Food Markets*, Food Outlook, November 2021. Rome, https://doi.org/10.4060/cb7491en. [14]

FAO et al. (2021), *2021 State of Food Security and Nutrition in the World*, https://docs.wfp.org/api/documents/WFP-0000130141/download/?_ga=2.154581233.899495763.1652097841-333767505.1650548299. [8]

Global SDG Indicator Platform (2022), *2.1.1 Prevalence of Undernourishment*, https://sdg.tracking-progress.org/indicator/2-1-1-prevalence-of-undernourishment/. [19]

Good Food Institute (2022), *2021 U.S. Retail market insights - Plant-based foods*, https://gfi.org/wp-content/uploads/2022/03/2021-U.S.-retail-market-insights_Plant-based-foods-GFI.pdf. [23]

Henderson, B. et al. (2021), "Policy strategies and challenges for climate change mitigation in the Agriculture, Forestry and Other Land Use (AFOLU) sector", *OECD Food, Agriculture and Fisheries Papers, No. 149, OECD Publishing, Paris*, https://doi.org/10.1787/47b3493b-en. [21]

Henderson, B., C. Frezal and E. Flynn (2020), "A survey of GHG mitigation policies for the agriculture, forestry and other land use sector", *OECD Food, Agriculture and Fisheries Papers*, No. 145, OECD Publishing, Paris, https://doi.org/10.1787/59ff2738-en. [20]

IEA (2021), *Global EV Outlook 2021*, IEA, Paris, https://www.iea.org/reports/global-ev-outlook-2021. [13]

IGC (2022), *International Grains Council Market Data*, https://www.igc.int. [17]

ING (2020), *Growth of meat and dairy alternatives is stirring up the European food industry*, https://think.ing.com/reports/growth-of-meat-and-dairy-alternatives-is-stirring-up-the-european-food-industry/. [22]

IPCC (2022), *Chapter 7: Agriculture, Forestry and Other Land Uses (AFOLU), Working Group III contribution to the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC)*, https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_Chapter07.pdf. [15]

Kearney (n.d.), *When consumers go vegan, how much meat will be left on the table for agribusiness?*, https://www.es.kearney.com/en/consumer-retail/article/?/a/when-consumers-go-vegan-how-much-meat-will-be-left-on-the-table-for-agribusiness-. [12]

OECD (2021), *Agricultural Policy Monitoring and Evaluation 2021: Addressing the Challenges Facing Food Systems*, OECD Publishing, Paris, https://doi.org/10.1787/2d810e01-en. [24]

OECD (2021), "Digital opportunities for Sanitary and Phytosanitary (SPS) Systems and the trade facilitation effects of SPS Electronic Certification", *OECD Food, Agriculture and Fisheries Papers*, No. 152, OECD Publishing, Paris, https://doi.org/10.1787/cbb7d0f6-en. [16]

OECD/FAO (2021), *OECD-FAO Agricultural Outlook 2021-2030*, OECD Publishing, Paris, https://doi.org/10.1787/19428846-en. [10]

Oonincx, D., S. Van Broekhoven and A. Van Huis (2019), "Feed Conversion, Survival and Development, and Composition of Four Insect Species on Diets Composed of Food By-Products", *PLOS ONE*, https://doi.org/10.1371/journal.pone.0222043. [11]

Tallard, G. et al. (2022), "Potential impact of dietary changes on the triple challenge facing food systems: Three stylised scenarios", *OECD Food, Agriculture and Fisheries Papers*, No. 173, OECD Publishing, Paris, https://doi.org/10.1787/d7a18023-en. [9]

UNHCR (2022), *Ukraine Refugee Situation*, https://data2.unhcr.org/en/situations/ukraine. [3]

United Nations (n.d.), *SDG Goal 2*, https://sdgs.un.org/goals/goal2. [6]

UNTAD (2022), *Global impact of war in Ukraine on food, energy and finance systems*, https://news.un.org/pages/wp-content/uploads/2022/04/UN-GCRG-Brief-1.pdf. [2]

USDA (2022), *World Agricultural Supply and Demand Estimates, May 2022*, https://www.usda.gov/oce/commodity/wasde/wasde0522.pdf. [4]

WHO (2021), *Obesity and overweight factsheet*, https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight. [7]

Notes

[1] Relevant reference documents are for OECD: OECD 24.02.2022 Statement of OECD Council on the Russian aggression against Ukraine; and for the UN: UN General Assembly 1.03.2022 Resolution on Aggression against Ukraine https://digitallibrary.un.org/record/3958976/files/A_ES-11_L.1-EN.pdf.

[2] Meat includes beef and veal, poultry, pigmeat and sheepmeat. Dairy products include butter, cheese, fresh dairy products, skimmed and whole milk powder. Fish includes both fish from capture fisheries and aquaculture.

[3] By-products of crop production include cereal bran, beet pulp, dried distilled grains, and molasses. By-products of livestock production mainly include meat and bone meals.

[4] Feed use includes commercial feed use and direct feeding of crops.

[5] The blend wall is the maximum ethanol blend that will not damage the engines and fuel systems of vehicles.

[6] In 2019, plant-based alternatives represented only 0.7% of the meat market and 2.5% of the dairy market in the European Union and the United Kingdom. The market share for meat and dairy alternatives is set to increase to 1.3% and 4.1%, respectively, by 2025 (ING, 2020[22]). In 2021, plant-based meat accounted for 1.4% of the retail meat market in the United States (Good Food Institute, 2022[23]). Cultured is only commercialised in one restaurant in Singapore since December 2020. High production costs and low consumer acceptance remain a challenge for its commercialisation and adoption.

[7] Between 2010 and 2020, the global stock of electric vehicles has increased a thousand-fold, from 10,000 to over 10 million (IEA, 2021[13]).

[8] Hereafter agricultural production refers to crop, livestock and fish production.

[9] This figure refers to the growth of the net value of crop commodities covered in the *Outlook*, whereby the net value is expressed in billion USD, measured at constant 2014-16 prices.

[10] Global land use change emissions are not projected in the *Outlook*.

[11] Reports from the ePhyto Hub, the International Plant Protection Convention (IPPC) system for the centralised exchange of phytosanitary e-certificates, demonstrate a significant increase in countries exchange of e-certificates for plant products in early 2020.

[12] 196 countries have signed the Paris agreement, a legally binding international treaty on climate change. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial age levels.

[13] In 2018-20, 54 OECD and non-OECD countries provided USD 720 billion annually to support their agricultural sectors. Only 17% of total budgetary support was directed to research and innovation, public investment in infrastructure and biosecurity. This share could be almost doubled by a redirection of market distorting payments towards investments in public goods – in particular innovation systems (OECD, 2021[24]).

2 Regional briefs

This chapter describes key trends and emerging issues facing the agricultural sector in the six FAO regions, i.e. Asia Pacific, which is split into Developed and East Asia and South and Southeast Asia, Sub-Saharan Africa, Near East and North Africa, Europe and Central Asia, North America, and Latin America and the Caribbean. It highlights the regional aspects of production, consumption, and trade projections for the period 2022-31 and provides background information on key regional issues.

2.1. Introduction

The *Outlook's* regional briefs highlight broad trends for the regions defined by the FAO in the implementation of its global work plan. Recognising the regional diversity, the intention is not to compare results across regions. Instead, these briefs illustrate some of the latest regional developments, highlighting responses to global challenges and emerging trends within them and relating these to the main messages of the *Outlook*. The assessments generally compare the end point of the *Outlook's* projection (2031) to the base period of 2019-21. This year, the large and diverse Asia Pacific region has been disaggregated into two separate briefs: Developed and East Asia, and South and Southeast Asia.

The impact of the COVID-19 pandemic, which is still playing out globally, and the response to it, differs across regions. While the briefs do not contain a specific quantitative assessment of the pandemic's impact, they reflect the latest available macro-economic projections and the extent to which the actions imposed to curb the spread of COVID-19 influenced this environment. Similarly, the impact of Russia's war against Ukraine may affect the various regions in the short term, but the briefs do not provide any quantitative analysis as to this impact. Consequently, the trends and issues presented in this chapter are those which are expected to underpin the *Outlook* as economies re-emerge from these recent unexpected shocks and assume that the effects on food, feed and fuel production, consumption and trade will gradually moderate.

This chapter is presented in seven sections, with text, tabular and graphic information for each region following a similar template. 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. Each regional brief contains an annex providing common charts and tables outlining the key aspects of the projection for the region.[1]

2.2. Regional Outlook: Developed and East Asia

2.2.1. Background

Urbanisation a key driver in an economically diverse region

The Developed and East Asia region[2] comprises a diverse range of countries with central roles in global markets. This includes The People's Republic of China (hereafter "China") and Japan, the world's second and third largest economies. With its 1.6 billion people, the region is the second most populous of those covered in this chapter, but its population growth of 0.1% p.a. is amongst the slowest over the coming decade. On a per capita basis, income levels range from USD 8 340 in China to USD 61 653 in Australia. Urbanisation has advanced rapidly across the region and by 2031, it is estimated that 74% of people will reside in urban settings, up from just 42% in 2000. Such urbanisation contributes to dietary change, underpinning rising consumption of higher value, as well as more processed and conveniently packaged food, and consequently rapid transformation of food systems. The region's agricultural resource base is severely constrained in China, Korea and Japan but abundant in both Australia and New Zealand.

At the regional level, per capita GDP declined by 0.7% in 2020, with decreases in the developed countries offset by continued growth in China of 1.9%. From an economic perspective, this makes it one of the regions least affected by COVID-19. Its recovery was also one of the fastest. Regional growth rebounded by 5.4% in 2021, with broad recovery amongst all countries of the region – to the extent that average per capita income in 2021 was already 4.7% higher than in 2019. Over the next decade, per capita incomes are projected to grow by 3.4% per year implying incomes in 2031 that are 45% higher than the average of the base period. Rising income will be a key driver of demand in China, while consumer preferences may be more important in the high-income developed nations.

The share of primary agriculture and fish value added in the economy has declined to about 5.5% and is expected to fall to 4.5% by 2031. As economies have grown, the average share of food in total household expenditures were around 13% in the base period, but it ranged in the region from 17% in China to just 8% in Australia. Where the shares of food expenditures are high, price and income shocks may have a notable impact on food security within the region, but global shocks may be muted to some degree by domestic protection in some countries.[3]

The region encompasses a range of important exporters and importers of agricultural and food products. China and Japan are the world's largest and second largest net food commodity importers, and Korea is the sixth largest.[4] All these countries have a notable impact on global agricultural markets and value chains. Conversely, New Zealand and Australia are among the top 10 global net exporters of food commodities in value terms, particularly for livestock and dairy products. On the basis of specialisation in the region, there is extensive and growing interregional trade.

The region faces numerous and diverse challenges. Natural resources are constrained in China, Korea and Japan, and consequently, purchased inputs are often applied too intensively, raising issues of sustainability. Water resources in some areas have reached critically low levels. In Australia, droughts have become more frequent and severe, a phenomenon that is likely to continue in the face of climate change. In these contexts, continued investments in productivity growth in the region will be critical to future sustainability. Total factor productivity growth in the region in the last decade is estimated at 1.6% p.a., down from 2% p.a. in the preceding decade.[5] While output grew by 19% from 2010 to 2019, quality adjusted inputs grew by just 3%, as a labour input decline of 28% was more than offset by a substantial increase of 62% in capital, and 5% and 2% gains in materials and land use, respectively.

Animal diseases such as ASF and Avian Influenza continue as ongoing threats to meat production in the region and improved measures are required to manage these threats. With the exceptions of Australia and New Zealand, interventionist government policies play a critical role in domestic markets and given the significance of these countries in global markets, changes in their domestic policies have the potential for considerable impact on the world market.

2.2.2. Production

China's dominance in the region will continue to grow

Comprising just five countries, the region is the largest global producer of agriculture and fish commodities and, by 2031, is expected to account for 27% of the value of global output. China accounts for the bulk of this value – on average over the 2019-21 base period, its share in total agriculture and fish production in the Developed and East Asia region approached 90%. China is the only major driver of growth in the region, with its agriculture and fish output expected to expand by 20%, while in the rest of the region, modest gains in Australia and New Zealand are offset by reductions in Japan and Korea. Aside from recovery in the livestock sector following African Swine Fever (ASF), growth in the region as a whole has slowed with maturing domestic markets, evolving policies, open markets, and strengthened trade competition.

Given resource constraints, productivity gains are critical and the expected growth in agriculture and fish production value of 17.7% over the coming decade comes despite a 1% reduction in land used for agriculture. An expected reduction of 1.8% in pastureland, across most of the region, is not fully offset by a 2.2% increase in land used for crops, mainly in Australia and New Zealand. The value generated per hectare of cropland is already higher in the Developed and East Asia region than any other region, but further gains of 1.3% p.a. are expected, due to shifts in the crop mix and yield gains attributed to progress in new seed varieties, improved production practices and expanded irrigation. The value of crop production is expected to rise by 1.6% p.a., increasing its share in total agriculture and fish production value from 61% currently to 63% by 2031. However, with water scarcity, and synthetic fertiliser use being the highest amongst all regions on a per hectare basis, there are mounting environmental and food safety concerns.

The region is a notable contributor to global output for several crops, including rice, maize and wheat. It also contributes a substantial share of protein meal and vegetable oil produced in the world, largely as a result of processing imported oilseeds. China is almost exclusively responsible for the region's maize production and further contributes more than 90% of its rice and 80% of its wheat output. China is expected to expand its area under maize production by 5% over the coming decade which, combined with yield gains of almost 7% by 2031, leads to production growth of 12%. Conversely, the area cultivated to rice and wheat is expected to contract by 2.5% and 2.4%, respectively. In the case of rice, yield gains of almost 9% and production growth of 6%, is sufficient to raise its share in the region's total production to 94% by 2031. Wheat yields are also expected to improve, but a 3.6% yield gain supports production growth of only 1.1%, resulting in a minor decline in China's share of regional production. Australia, where yield gains in excess of 11% on a fairly stable area contribute to an 8% increase in production by 2031, is expected to account for almost 60% of additional wheat produced in the region.

Livestock production only accounts for 21% of total agricultural and fish value in the region in the 2019-21 base period and this share is expected to decline further due to growth of only 14% by 2031, well below the 20% observed in crop production on a contracting land base. China is the largest contributor to livestock production, mainly from pork and poultry, which constitutes 56% and 28% of its total meat production, respectively. The Chinese pig meat sector accounts for 77% of the countries meat production growth in the coming decade. Having been severely affected by the African Swine Fever (ASF) outbreak, which reduced its pig inventory by 21% in 2019 and a further 3.3% in 2020, this growth occurs from a much-reduced base and largely reflects a recovery. China's pig herd is only expected to exceed 2018 levels by 2025. Nevertheless, production by2031 will be 5% above that of 2018. This is due to large-scale intensification in the sector as it recovered from ASF, with large numbers of smaller producers replaced by large, commercial production units that prioritise biosecurity. With its short production cycle, poultry production in China expanded rapidly from 2019-21, as the deficit in pork production left meat prices in the region at record highs. While this growth rate consolidates over the medium term, the region as a whole is set to increase production by 14% over the ten-year projection period. Despite its much smaller share in total meat production from the Developed and East Asian region, Australia's resource base is more conducive to bovines, which account for almost half of its total meat production. In turn, Australia contributes almost a quarter of bovine meat production from the region as a whole and, at 1.5% per annum, is the major driver of expanding bovine meat production in the region.

Nearly 40% of global fish production occurs in the region – 90% of which is sourced from China. Measured in real terms, the value of fish production from the region is projected to be 16% above current levels by 2031, constrained by the efficiency and sustainability changes set out in China's 14th Five Year Plan. At the regional level, a minor decline of -0.1% p.a. in captured fisheries contrasts to growth of 1.8% p.a. in aquaculture, which could account for more than three quarters of total fish production from the region by 2031.

Total agricultural GHG emissions by the region are projected to increase by 4.0% by 2031. Emissions from animal sources are projected to rise by 7.8%, reflecting a 5% and 8% rise in bovine herds and sheep flocks, respectively. However, emissions from crops are expected to fall by -0.2% over the ten-year period. Nevertheless, when considered relative to the value generated from agriculture and fisheries, the historic decline in GHG emissions per unit value produced is expected to continue, albeit at a slower rate.

2.2.3. Consumption

Notable shift to livestock products in diets

The modest decline in per capita GDP, combined with income support measures in developed countries implies that the impacts of COVID-19 on food security in 2020 were smaller than in most other regions. While the pandemic undoubtedly influenced consumer behaviour and agriculture supply chains, the prevalence of moderate to severe food insecurity increased only marginally in East Asia but declined in Oceania. Total calorie availability in the region declined by only 0.14%. By 2031, total calorie availability in the region is expected to increase by about 200 kcal/person/day to exceed 3460 kcal, 13% above the world average and the second highest amongst all regions.

Populations in many parts of the region are aging, with dependency ratios[6] in Japan and Korea set to increase to 53.2% and 38.2% by 2030, respectively. It is generally assumed that the aging population trend will have a dampening effect on growth rates of overall food consumption in these countries. Within the broader region, and China in particular, urbanised lifestyles will lead to growth in consumption of meats, fats and sugars, which will outpace most other food groups. Vegetable oil consumption is set to surpass 29kg per capita by 2031, exceeding the global average by more than 50%. Given the level of development and maturity in most countries in the region, the greatest dietary shift will occur in China, where consumption of animal products is expected to rise at the expense of basic cereals, such as rice.

Protein availability in the region is expected to rise by almost 9g/person/year by 2031, to exceed 115g/person/year by 2031. The major driver underpinning this gain is growth of 16% in average meat consumption in the region, adding 8kg/capita to current levels by 2031. This growth in meat consumption ranges from 18% in China, to less than 3% in higher income countries such as Japan, Australia and New Zealand. At regional level, fish consumption is also expected to grow by 13% or 5kg per capita by 2031 relative to the base period, which includes strong growth of 15% in China, along with an offsetting decline of 7% in Japan and 2% in New Zealand.

The region accounts for roughly a quarter of animal feed used globally and this share is expected to remain almost unchanged by 2031. Feed use is determined by a number of factors, including intensity of feed use in various production systems, and efficiency of feed conversion amongst different species. By 2031, feed use in the region is expected to expand by 14%, which includes a 16% increase in China due to rising demand from increasingly intensive pork and poultry operations. While these large scale, fully commercial systems use feed more intensively than smaller, more traditional producers, the combination of controlled environment and improved genetics also yields much improved feed conversion. Taking all these factors into account, total animal feed use in China is expected to grow marginally slower than animal feed production. In Australia and New Zealand, where production systems for dairy, beef and sheep are more flexible in terms of feed use intensity and more reliant on pasture, growth in feed use is lower, at 9% in New Zealand and 5% in Australia. In feed-intensive production systems, maize and protein meal remain the core ingredients in most pre-mixed feed rations and their use in animal feed across the region is expected to grow by 13% and 16%, respectively, over the coming decade.

This *Outlook* assumes that China does not fully implement the ambitious nationwide E10 mandate by 2031. Initially announced in 2017 with targeted implementation across most of the country by 2020, the mandate was aimed at eliminating excessive maize stocks. Stocks have declined and on average at the base period were around 20% below the 2015 peak. By 2031, stocks are only projected to rise by 2%, compared to a 15% rise in feed use and a 6% increase in total use. This provides limited incentive to expand ethanol production, hence the blend rate is maintained at 2% over the projection period. China produces almost all the ethanol in the region and, by 2031, is expected to account for around 8% of global ethanol production.

2.2.4. Trade

The region will remain the largest net importer of food

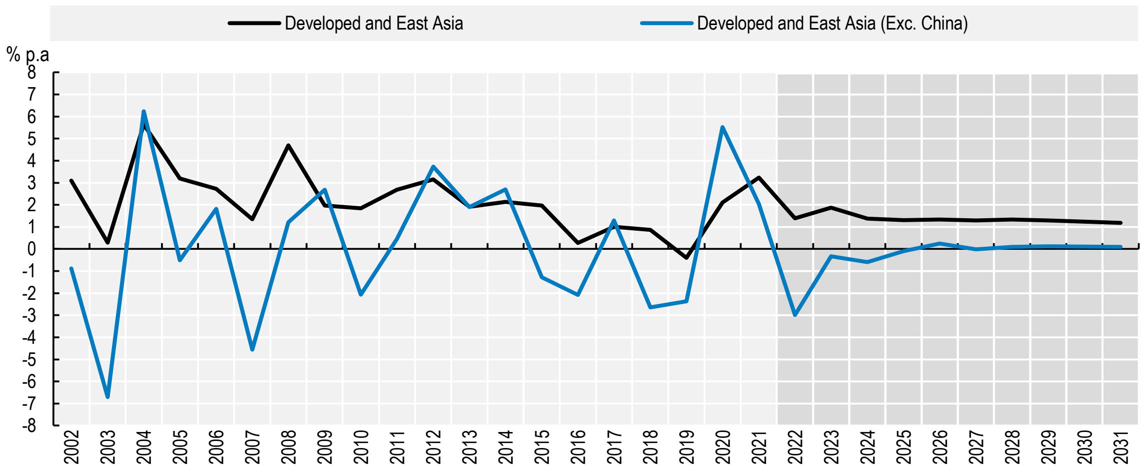
The region is the biggest net importer amongst those covered in the Outlook and its deficit is expected to grow by a further 9% by 2031. This position mainly emanates from imports into East Asia, particularly China and Japan, and masks net exports from the Oceanic region. The East Asian region is a major net importer of soybeans, maize, wheat, and livestock products, whereas the Oceanic region is a significant net exporter of wheat, barley, canola, sugar, meat and dairy products.

The net value of imports into the region is expected to rise 13% by 2031 relative to the 2019-21 base period. More than 80% of the additional imports accrue to China, the largest soybean importer in the world. Having declined in 2018 and 2019, due to a combination of trade actions and reduced demand from its diminished pig herd, Chinese soybean imports recovered to record levels in 2020, despite the logistical challenges and constraints associated with the ongoing COVID-19 pandemic. Core drivers were the rapid expansion of its poultry sector, as well as the recovery of its pig herd. These demand factors are expected to persist and with the trading environment generally less restrictive, soybean imports into China are set to rise by a further 16% by 2031. Consequently, China will account for 63% of global soybean trade. The animal feed sector is also driving additional demand for maize, but here China is less reliant on imports and accounts for only 11% of the world's imports. On the back of strong domestic production growth, maize imports are set to decline by 2031, bringing China's share of its global trade below 5%.

At the height of China's ASF outbreak, meat imports increased sharply, but these are set to decline by 25% over the coming decade as its own production continues to expand. Despite rising import demand into Korea over the same period, meat imports into the region are set to decline by 14%. A significant share of imports into East Asia will likely be met by rising exports from Oceania, where Australia's meat exports are set to rise by 27% – a gain of 516Kt. Around 80% of this rise is attributed to bovine meat.

The Oceanic region is a major exporter of numerous other products and most of these are expected to expand over the coming decade. By 2031, Australia's wheat exports are set to expand by 8%. This implies that its share in global wheat exports will decline to just below 10%, but in the short term, it may be an important supplier should exports from the Black Sea region be constrained by the war. Despite its small land area, New Zealand accounts for more than 30% of global sheep meat exports and for 23% of the world's dairy exports. With land used for pasture increasingly constrained and set to decline further by 2031, export growth is projected to slow for both dairy and sheep meat over the coming decade but remain sufficient to sustain New Zealand's share in global export at near current levels.

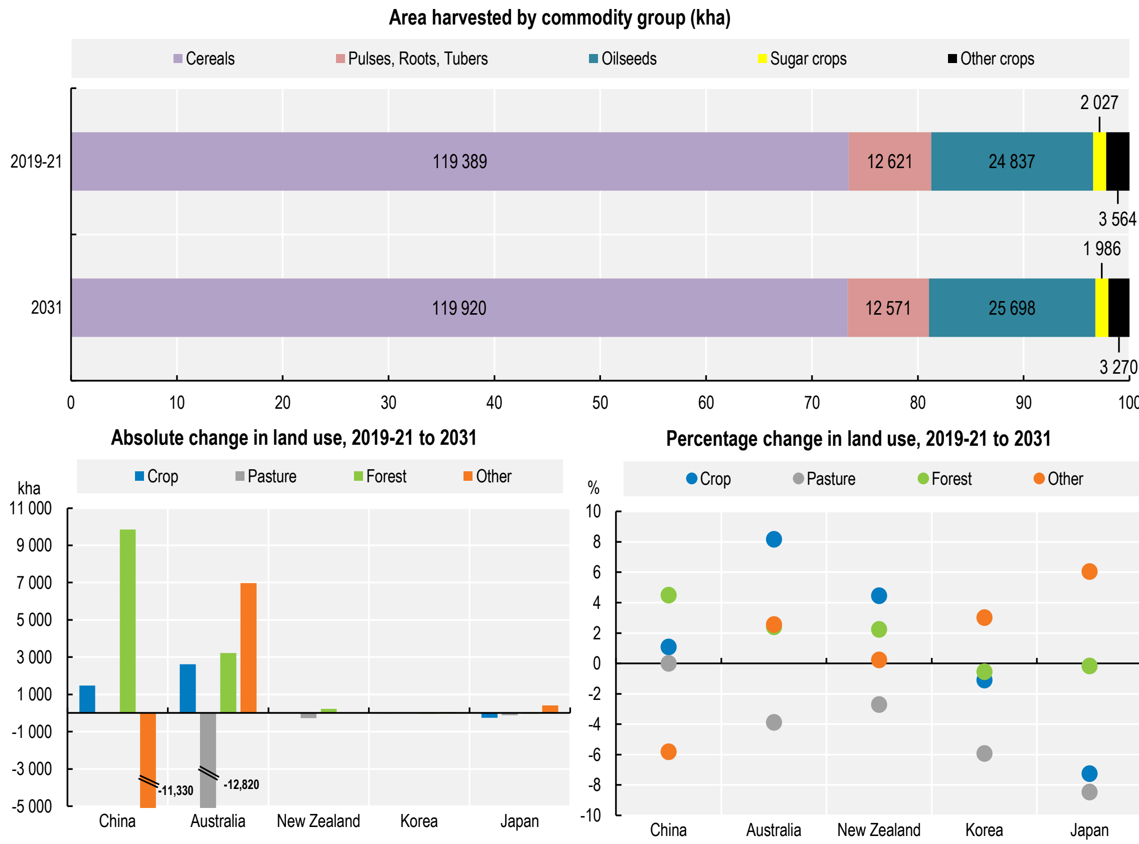
Figure 2.1. China a major driver of growth in agriculture and fish output in the Developed and East Asia region



Note: Estimates are based on historical time series from the FAOSTAT Value of Agricultural Production domain, which are extended with the *Outlook* database. Remaining products are trend-extended. The Net Value of Production uses own estimates for internal seed and feed use. Values are measured in constant 2014-2016 USD.
Source: FAO (2022). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/1yv9en

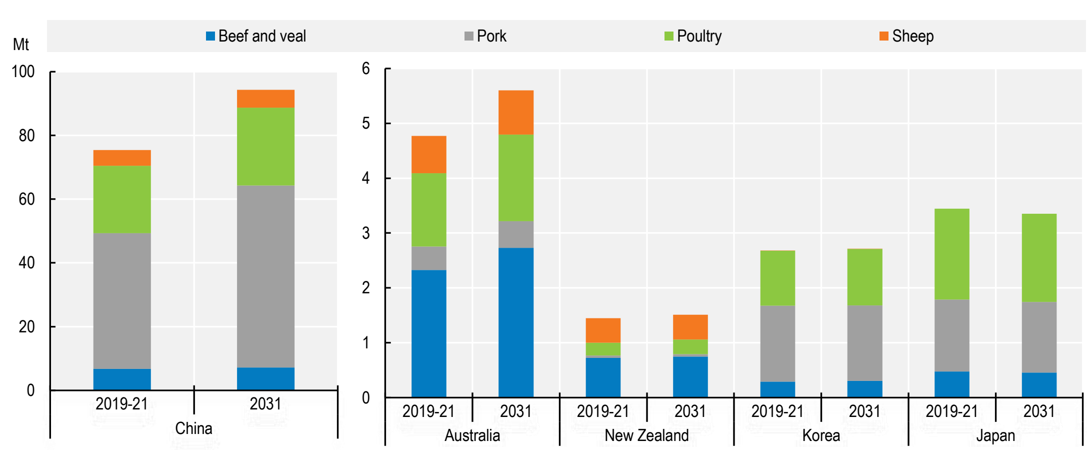
Figure 2.2. Change in area harvested and land use in Developed and East Asia



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

StatLink https://stat.link/2il81z

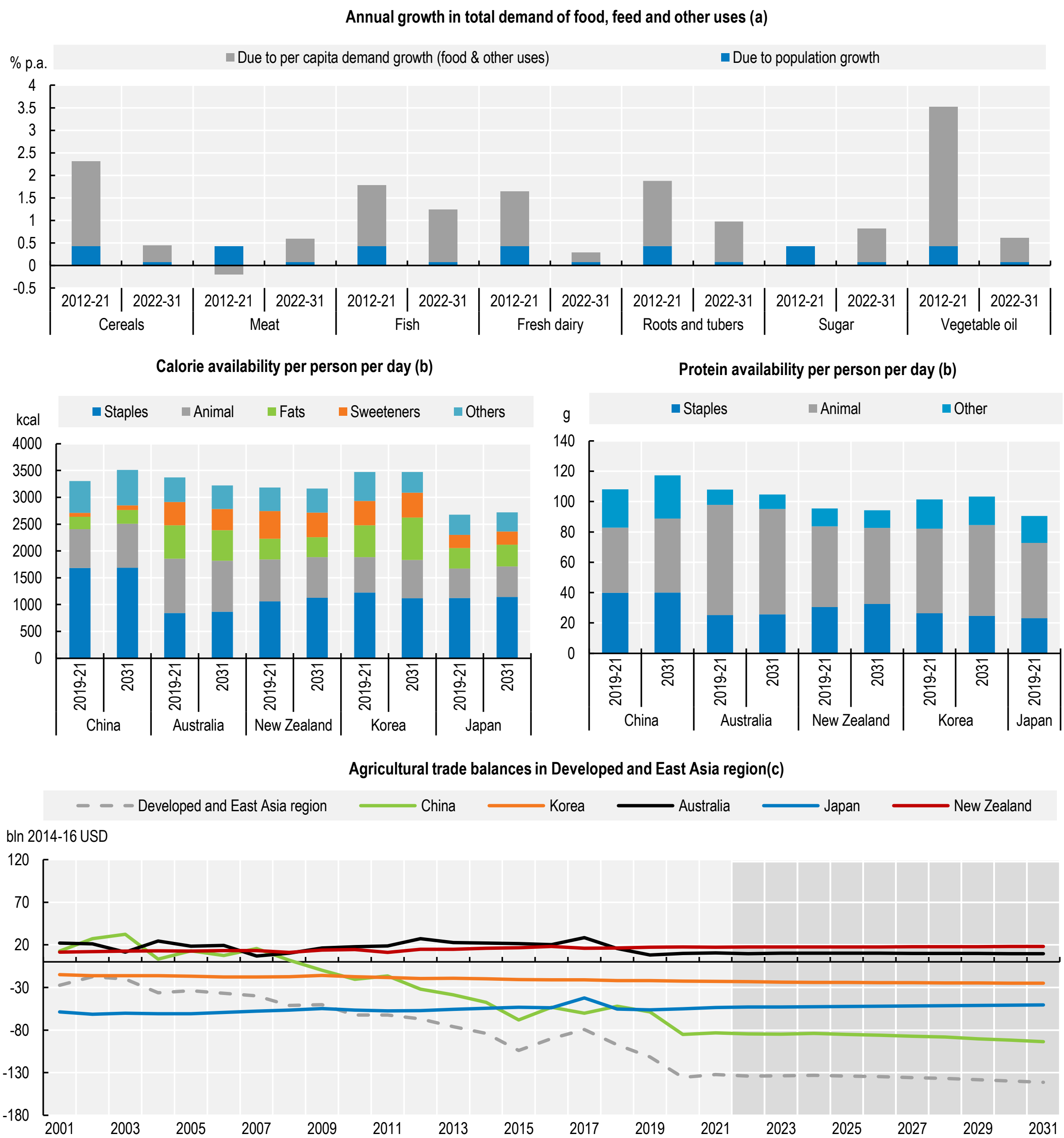
Figure 2.3. Livestock production in Developed and East Asia



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

StatLink https://stat.link/rkaoux

Figure 2.4. Demand for key commodities, food availability and agricultural trade balances in Developed and East Asia



Notes: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets and trade indices databases and include products not covered by the *Outlook*. a) Population growth is calculated by assuming per capita demand constant at the level of the year preceding the decade. b) Fats: butter and oils; Animal: egg, fish, meat and dairy except for butter; Staples: cereals, oilseeds, pulses and roots. c) Include processed products, fisheries (not covered in the FAOSTAT trade index) based on outlook data.

Source: FAO (2022). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/5yuf3l

Table 2.1. Regional Indicators: Developed and East Asia

	Average			%	Growth[2]	
	2009-11	2019-21 (base)	2031	Base to 2031	2012-21	2022-31
Macro assumptions						
Population (‘000)	1 573 436	1 647 156	1 669 198	1.34	0.43	0.08
Per capita GDP[1] (kUSD)	9.09	12.97	18.85	45.31	3.37	3.44
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	948.9	1109.4	1306.2	17.74	1.21	1.34
Net value of crop production[3]	540.8	681.2	816.1	19.80	2.07	1.63
Net value of livestock production[3]	244.7	233.3	265.0	13.57	-1.14	0.48
Net value of fish production[3]	163.4	194.9	225.1	15.52	1.39	1.34
Quantity produced (kt)						
Cereals	506 675	612 650	655 650	7.02	0.99	0.65
Pulses	6 782	8 363	9 809	17.28	3.04	0.91
Roots and tubers	38 912	45 614	49 031	7.49	1.59	0.56
Oilseeds[4]	28 019	33 622	35 634	5.98	1.17	0.49
Meat	88 091	87 759	107 469	22.46	-0.98	0.86
Dairy[5]	9 244	10 156	10 633	4.69	0.57	0.32
Fish	58 066	69 322	80 084	15.52	1.40	1.34
Sugar	15 355	15 033	15 605	3.80	-2.10	0.26
Vegetable oil	21 363	30 297	35 645	17.65	3.23	1.15
Biofuel production (mln L)						
Biodiesel	1 046	2 141	1 880	-12.20	4.01	-4.07
Ethanol	8 606	10 971	11 540	5.19	2.02	0.24
Land use (kha)						
Total agricultural land use	932 744	908 435	899 087	-1.03	-0.20	-0.10
Total land use for crop production6	171 872	173 481	177 333	2.22	-0.14	0.37
Total pasture land use[7]	760 872	734 954	721 754	-1.80	-0.21	-0.21
GHG Emissions (Mt CO2-eq)						
Total	936	886	922	4.04	-0.88	0.15
Crop	423	398	398	-0.15	-1.46	0.00
Animal	496	472	509	7.80	-0.35	0.29
Demand and food security						
Daily per capita caloric availability[8] (kcal)	3 045	3 259	3 464	6.27	0.63	0.39
Daily per capita protein availability[8](g)	94.0	106.4	115.3	8.34	0.94	0.52
Per capita food availability (kg/year)						
Staples[9]	162.2	164.0	164.8	0.47	0.11	0.03
Meat	46.4	47.4	55.1	16.20	0.16	0.48
Dairy[5]	4.8	5.4	5.5	3.37	1.34	0.25
Fish	30.7	35.9	40.5	12.69	1.13	1.20
Sugar	11.9	12.5	13.6	8.99	-0.07	0.73
Vegetable oil	20.3	26.5	29.1	9.78	2.99	0.54
Trade (bln 2014-16 USD)						
Net trade[3]	- 58	- 126	- 141	11.79	..	..
Value of exports[3]	102	118	134	13.26	0.37	1.20
Value of imports[3]	161	245	275	12.50	3.37	0.91
Self-sufficiency ratio10						
Cereals	96.2	91.3	93.3	2.27	-0.51	0.12
Meat	98.9	90.3	93.8	3.90	-1.22	0.27
Sugar	86.3	73.9	68.8	-6.94	-0.83	-0.81
Vegetable oil	66.9	69.3	72.6	4.82	0.12	0.53

Notes: 1 Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. Projections for not included crops have been made on the basis of longer-term trends. 4. Oilseeds represent 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/protein represent availability per capita per day, not intake. 9. Staples represent cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports)*100.
Sources: FAO (2022). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

2.3. Regional outlook: South and Southeast Asia

2.3.1. Background

The South and Southeast Asia region[7] comprises the largest population of those covered in this chapter. Of its 2.7 billion people, 34% of the global population, almost half live in India. Economically, there has been a wide range of performance within the region over the last several decades. Income per capita ranges from 1 157 USD in the least developed countries of Asia, to 56 900 USD in Singapore, but the overall average is just over 3 000 USD per capita.

Economic activity rebounded in 2021, with per capita GDP rising 4.5% after its COVID induced decline in 2020 of 5.2%. India was hardest hit with a decline of over 8% in 2020 but will recover above pre-pandemic levels in 2022. Economic growth is projected to be the strongest of any region over the next decade, but growth rates have mostly been marked down given weaker global economic prospects. Exceptions from this trend relate to countries endowed with energy or commodity reserves, which will benefit from high primary commodity prices. With such growth, the share of primary agriculture, fish and forestry is anticipated to continue its longer-term decline from a share of about 14%, in the base period to around 10% by 2031.

With economic growth the average share of food in household expenditures in the region has fallen to below 17%. However, for least developed countries this share is 30% [8] and consequently the rise in food prices will have considerable impact on the food security of many in these countries in the early years of the Outlook period. With some 580 Mil ha of agricultural land, resources are relatively stretched with just 0.2ha/person compared to the world average of around 0.6ha/person. Nevertheless, the region has maintained a positive trade surplus in agricultural goods.

Resource pressures will intensify as population growth remains near 1% p.a. Total factor productivity growth, at 2% p.a., exceeded the global average of 1.4% p.a. in the last decade, which has facilitated economic growth.[9] In the decade to 2019, output growth of near 3% p.a. was achieved by only 0.5% p.a. growth in inputs, primarily materials such as fertilisers, and to a lesser extent capital, as labour declined. But domestic demand for agricultural commodities is mounting. Urbanisation is rising across the region, the share of population residing in urban areas is expected to surpass 45% by 2031, from an average of 40% from 2019-21. With large parts of the region either vegetarian, averse to pig meat consumption or lactose intolerant, the evolution of consumer preferences as incomes grow, particularly with respect to animal product consumption, remains somewhat uncertain.

The region encompasses a range of important exporters and importers of various agricultural and food products. Historically, the region has a relatively small positive trade balance. Almost a quarter of the total value of agriculture and fish production has been exported in recent years. Exports are dominated by plant-based products, particularly rice and vegetable oil, where the region has a 79% and 61% share in global exports, respectively. The Southeast Asia region is considered a major player in Global Value Chains, specifically those involving vegetable oils and their further processed products.[10]

The main challenges facing the region relate to its ability to increase productivity and innovation, particularly in the face of climate change risks and the need to address food insecurity. Food insecurity remains high, with the region accounting for about one-third of the world's undernourished population. Achieving continued economic growth in a time of global uncertainty with respect to international markets is critical. Significant pressure has been exerted on its natural resource base – its natural capital – during periods of past development, particularly in countries of Southeast Asia, and innovative solutions are required. Key policy challenges concern the nature and extent of market intervention schemes and how they affect interactions with global markets.

2.3.2. Production

The South and Southeast Asian region is the second largest contributor to the total global output in value terms from agriculture and fisheries. Crop production accounts for the largest share, but livestock production is growing faster. An expansion of 25% in agricultural production projected by 2031 exceeds population growth, implying that agricultural output is set to rise in per capita terms.

Relative to 2019-21, crop production is expected to expand by 22%, accounting for 62% of total agricultural and fish output by 2031. Productivity gains are key to this expansion, as land used for crop production is only expected to increase by 1.3% over the ten-year period. In fact, growth in value per hectare of cropland accelerates over the projection period, to 1.6% p.a., reflecting intensification and enhanced productivity. The region counts amongst the leading contributors to global output for several products, including rice, vegetable oil, pulses and sugar. Apart from vegetable oil, where it remains stable, the regions share in global production is expected to rise for all the aforementioned products.

Cereal production is concentrated in India, Indonesia, Pakistan and LDC's such as Bangladesh, Cambodia and Myanmar. India alone accounts for around 70% of wheat and 40% of rice production and is expected to contribute 48% of additional rice production by 2031. Growth in rice production stems from productivity gains, with area expansion of around 2.5% in India and Least Developed Asia by 2031, compared to yield gains of 16.5%.

The region is the leading contributor to vegetable oil production globally, attributed to palm oil output in Malaysia and Indonesia. Particularly in Malaysia, this sector relies strongly on foreign labour and over the past two years, it has been challenged by the spread of COVID-19 and the associated restrictions on movement of people, exacerbating structural constraints that had already limited supply prior to the pandemic. While some recovery was evident in Indonesia, weather conditions in Malaysia further contributed to a 15-year low in production in 2021. Despite some recovery in 2022, the slowdown in the expansion of the mature oil palm area implies that production growth in both Indonesia and Malaysia will remain slower in the coming decade, but will still retain a combined share of 33% in global vegetable oil production.

Livestock products currently account for 22% of the value of agriculture and fish output and growth of 2.9% p.a. will lead to an expansion of this share to 25% by 2031. India and Pakistan are the biggest contributors to this growth, which emanates mainly from dairy products. Milk production growth of 41% by 2031 stems from a 21% expansion in the cow herd, despite a minor contraction in pastureland use, and a 17% improvement in milk yield per cow. Meat production is dominated by poultry, which will also account for more than 60% of additional meat production by 2031. Growth in this sector is largely a result of increased feed intensity and breeding improvements. Pork production in the region is limited and concentrated mainly in Viet Nam and Thailand. Following sharp reductions in 2019 and 2020 because of African Swine Fever (ASF), pork production in Viet Nam rebounded and increased by 5% in 2021. As production is dominated by small-scale producers, the recovery will take many years, such that production is not expected to surpass 2018 levels until 2024.

Fish production is an important contributor to agricultural production in the region at 15% of total value. However, growth of 15% by 2031 is the slowest amongst the three subsectors, eroding its contribution over time. Whilst captured fisheries is expected to remain stable, reflecting resource limitations, growth of 2.1% p.a. in aquaculture implies that it will surpass captured fisheries by 2027, accounting for 52% of total production by 2031.

Total direct GHG emissions from agriculture are set to rise by 8.8% by 2031 relative to 2019-21, driven predominantly by the livestock sector. While crop related emissions will remain stable, livestock related emissions, which reflect ruminant herd expansion, will increase at a rate consistent with the past decade at 1.1% p.a. By 2031, 29% of agriculture related GHG emissions globally will be attributable to the region.

2.3.3. Consumption

Years of positive progress in reducing food insecurity and undernourishment in the South and Southeast Asian region halted in 2020, largely due to the impact of the COVID-19 pandemic on income and food affordability. Particularly in Southern Asia, the prevalence of undernourishment rose above 15% for the first time in a decade and the number of undernourished people exceeded 300 million in 2020. The strong economic recovery in the Southern and Southeast Asia region, with income growth of 4.5% in 2021 and a further 4.7% expected in 2022 should help in overcoming short-term food insecurity, but the current spike in commodity prices may forestall much improvement. In the medium term, the combination of modest declines in population growth, accelerated income growth and consistent, albeit slow urbanisation, will support the continued evolution of dietary patterns, thus supporting demand for calorie and nutrient dense foods (Kelly, 2016[1]) (Reardon et al., 2014[2]). By 2031, average calorie availability in the region is projected to increase by almost 200 kcal/person/day to average just over 2 850 kcal, just 6.5% below the world average. Gains will be mainly driven by increased consumption of dairy products, meat and vegetable oils.

Cereals, particularly rice, remain the major source of calorie availability in the region. By 2031, 53% of total calories will come from cereals (of which almost 30% from rice). This compares to 55% from cereals and 31% from rice in 2019-21 and follows a modest expansion of 3.5% in per capita consumption of rice over the 10-year period, mainly in India. In Viet Nam and Indonesia, rice consumption is expected to decline, replaced with wheat.

Average protein intake remains well below the global average but will rise by 7 g/person/day to 75 g/person/day by 2031. This is underpinned by growing consumption of meat and dairy products. Meat consumption will grow from a small base to reach 15.5kg per capita by 2031 – still more than 20kg below the global average, reflecting limited meat consumption in India in particular. Poultry will account for more than half of additional consumption. Dairy product consumption is already well above the world level and growth of almost 30% in per capita consumption by 2031 will see it rise to 32% above the world average level. Fresh dairy consumption is expected to grow fastest, reflecting considerable growth in both India and Pakistan.

As livestock and dairy production grow, the combination of herd expansion, rising feed use intensity and efficiency gains will support growth of 26% in feed use by 2031. Maize constitutes the bulk of animal feed, but its share is smaller than in many other regions, with a further significant contribution from protein meal. Maize and protein meal used in animal feed are both expected to rise by 2.2% p.a., sufficient to keep the share of both products in total feed use fairly stable.

Increasing mandates, mainly in India, sees the region almost double its share in global ethanol use from 6.5% in 2019-21 to 11% by 2031. The region's share in global biodiesel use is currently much larger at 21% but is also expected to rise to 30% by 2031 – mainly as a result of gains in Indonesia and to a much lesser extent Malaysia and Thailand.

In Indonesia, the blending mandate is expected to direct domestic palm oil supplies to the biodiesel market. Together with strong short term price support for vegetable oil on the back of current supply limitations, this could help catalyse investment in the sector. However, land availability remains a constraint and a key contributing factor to the replanting delays in oil palm in recent years. This also underpins slower growth in the region's vegetable oil production over the outlook period, with production set to expand 17% by 2031, compared to 43% over the last decade.

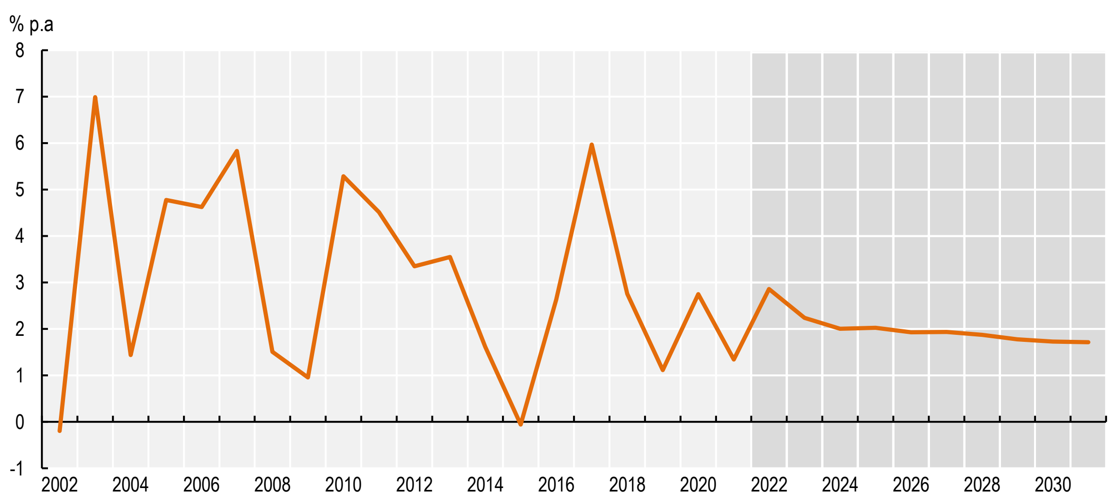
2.3.4. Trade

The region is currently still a small net exporter of agricultural commodities but is expected to record a minor deficit by 2031. This aggregate figure masks vast differences within the region. Both India and Southeast Asia are expected to remain net exporters, although India's trade surplus is expected to decline. By contrast, net imports from the LDC's and other developing countries of the region continue to rise.

The region is a major net exporter of rice, vegetable oil, fish and fresh fruit. Rice exports are expected to grow substantially, by an annual average of 3%, thereby increasing the region's share in global exports to 86% by 2031. This largely arises from India, accounting for 51% of additional exports, but strong growth is also projected in Thailand, Viet Nam and LDC's such as Myanmar. While Indonesia and Malaysia will remain leading vegetable oil exporters, the region's share in global exports will continue to decline. This is mainly the result of declining market share in Malaysia, whose palm oil exports are projected to rise by merely 0.6% p.a. Fish exports from the region are expected to decline over the next ten years, as consumption growth in the region outpaces production. A significant share of fish trade will occur within the region.

The region's dependence on imports of wheat, maize, oilseeds, protein meal and sugar are all set to rise by 2031. However, the share of total meat consumption supplied through imports is set to decline, with livestock production increasingly dependent on imported feed products. Viet Nam is the major driver of this trend, as pork imports fall precipitously from base period levels, which had increased sharply as a result of the ASF outbreak.

Figure 2.5. Slowing growth of agriculture and fish output in South and Southeast Asia region



Note: Estimates are based on historical time series from the FAOSTAT Value of Agricultural Production domain, which are extended with the *Outlook* database. Remaining products are trend-extended. The Net Value of Production uses own estimates for internal seed and feed use. Values are measured in constant 2014-2016 USD.

Source: FAO (2022). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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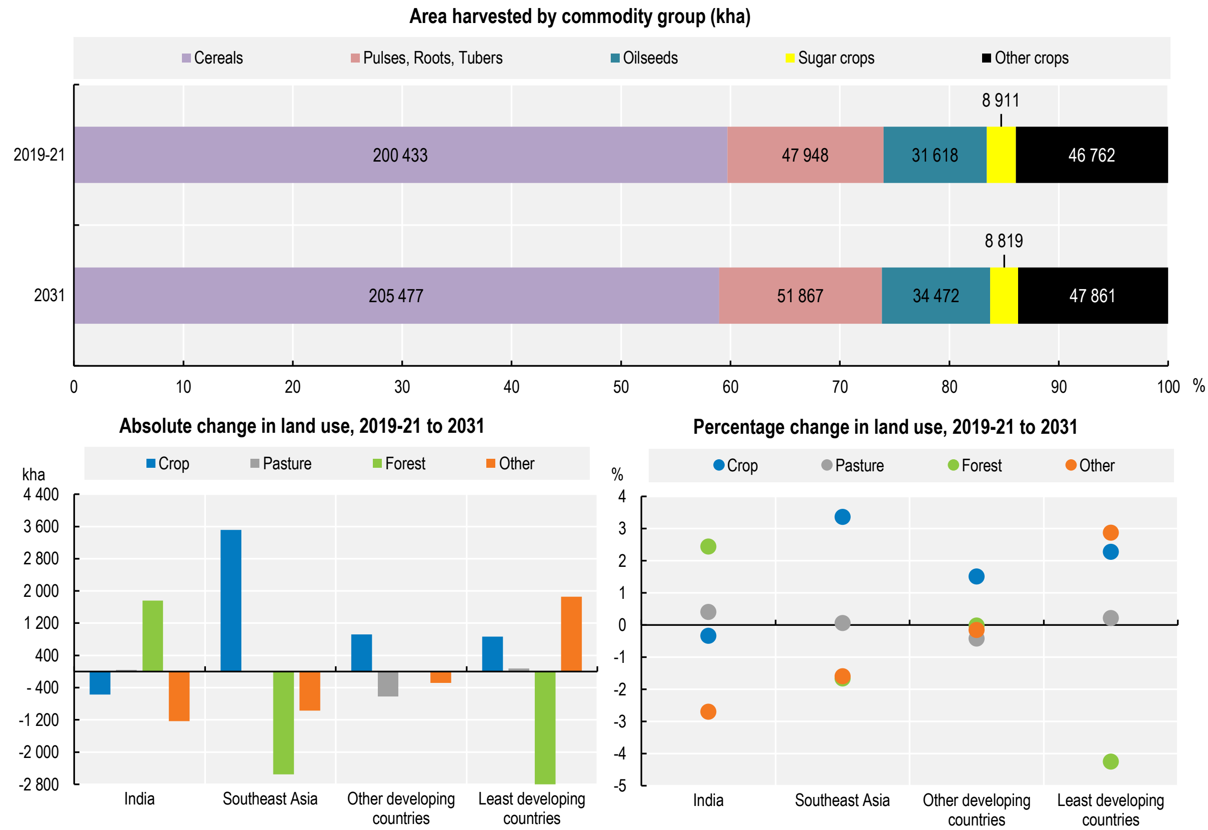
Figure 2.6. Change in area harvested and land use in South and Southeast Asia



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

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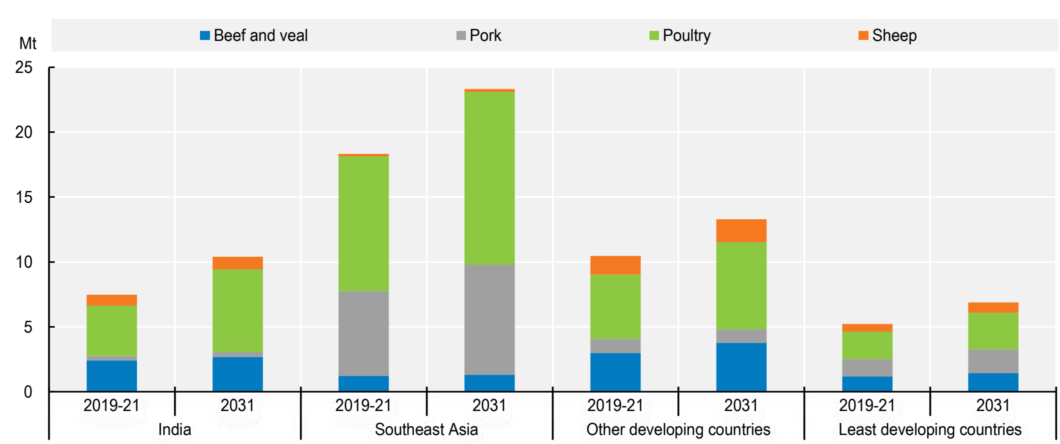
Figure 2.7. Livestock production in South and Southeast Asia



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

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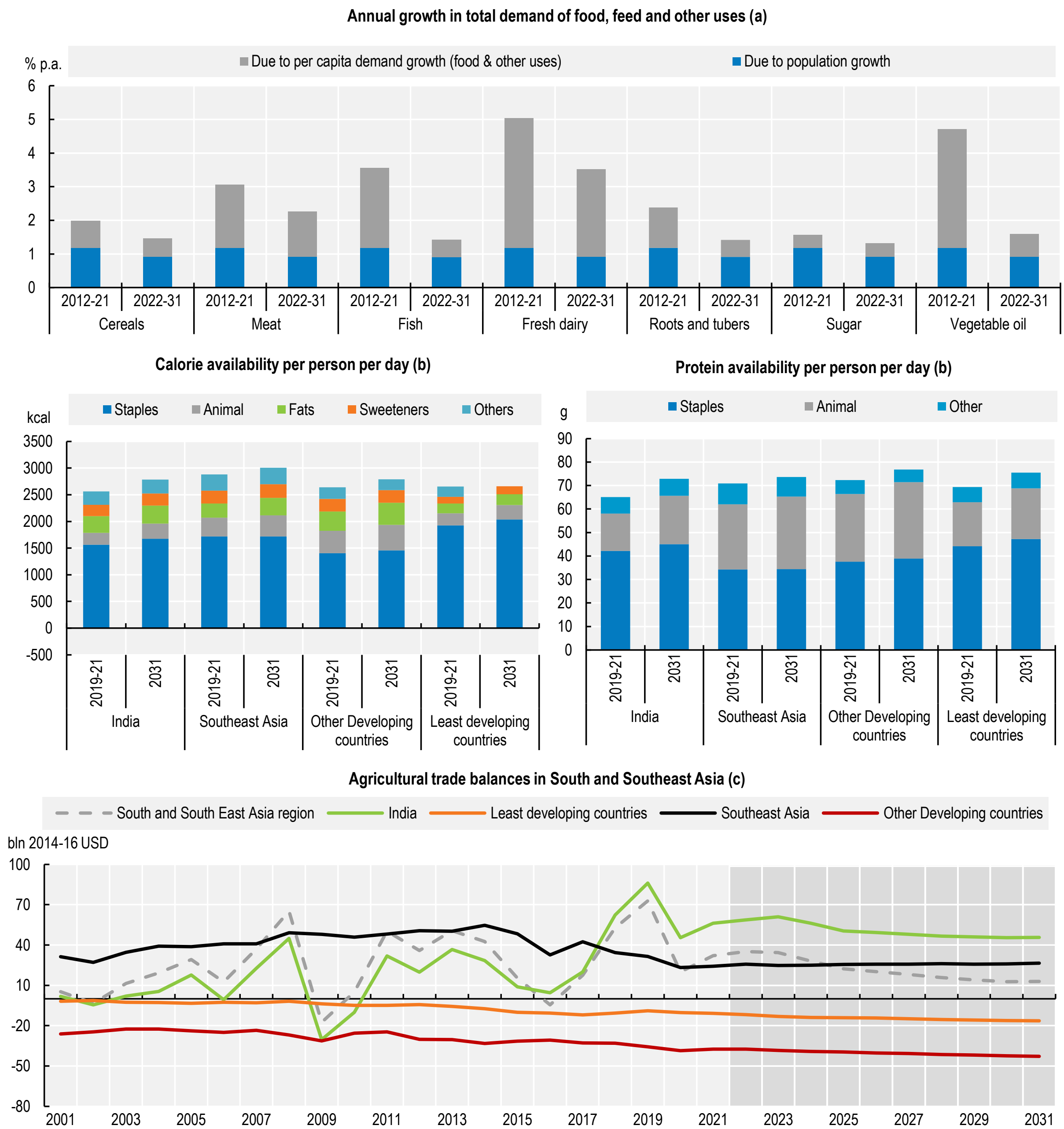
Figure 2.8. Demand for key commodities, food availability and agricultural trade balances in South and Southeast Asia



Notes: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets and trade indices databases and include products not covered by the *Outlook*. a) Population growth is calculated by assuming per capita demand constant at the level of the year preceding the decade. b) Fats: butter and oils; Animal: egg, fish, meat and dairy except for butter; Staples: cereals, oilseeds, pulses and roots. c) Include processed products, fisheries (not covered in the FAOSTAT trade index) based on outlook data.

Source: FAO (2022). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Table 2.2. Regional Indicators: South and Southeast Asia

	Average			%	Growth[2]	
	2009-11	2019-21 (base)	2031	Base to 2031	2012-21	2022-31
Macro assumptions						
Population ('000)	2 352 335	2 655 571	2 943 680	10.85	1.18	0.91
Per capita GDP[1] (kUSD)	2.25	3.06	4.60	50.19	2.90	3.98
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	798.0	1049.6	1303.5	24.19	2.50	1.91
Net value of crop production[3]	527.4	659.4	803.6	21.88	1.85	1.70
Net value of livestock production[3]	159.9	233.1	318.8	36.76	3.91	2.87
Net value of fish production[3]	110.6	157.1	181.0	15.25	3.32	1.24
Quantity produced (kt)						
Cereals	489 824	574 421	677 519	17.95	1.42	1.41
Pulses	24 831	36 298	45 798	26.17	4.47	1.77
Roots and tubers	36 890	51 325	62 559	21.89	2.87	1.70
Oilseeds[4]	15 655	19 277	22 945	19.03	3.23	1.28
Meat	30 084	41 478	53 873	29.88	3.01	2.36
Dairy[5]	27 913	42 951	60 829	41.62	4.66	3.28
Fish	39 278	55 184	63 596	15.24	3.19	1.24
Sugar	43 487	51 836	60 341	16.41	1.12	0.71
Vegetable oil	65 796	94 119	109 679	16.53	3.39	1.05
Biofuel production (mln L)						
Biodiesel	1926.03	12652.03	16824.01	32.97	15.04	1.31
Ethanol	3 644	7 456	15 977	114.29	6.17	5.87
Land use (kha)						
Total agricultural land use	566 906	579 933	584 168	0.73	0.25	0.05
Total land use for crop production[6]	358 290	372 427	377 151	1.27	0.42	0.08
Total pasture land use[7]	208 616	207 506	207 016	-0.24	-0.05	-0.02
GHG Emissions (Mt CO2-eq)						
Total	1 576	1 680	1 828	8.81	0.70	0.67
Crop	693	720	720	0.07	0.42	0.02
Animal	869	944	1 090	15.49	0.91	1.12
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2 497	2 653	2 857	7.71	0.68	0.70
Daily per capita protein availability[8](g)	61.6	67.9	74.5	9.74	0.9	0.9
Per capita food availability (kg/year)						
Staples[9]	176.8	181.6	190.1	4.68	0.34	0.32
Meat	11.3	13.3	15.5	16.60	1.70	1.29
Dairy[5]	12.7	16.7	21.3	27.21	3.11	2.29
Fish	12.4	15.0	16.1	7.48	1.69	0.60
Sugar	19.3	20.9	21.9	4.65	0.17	0.40
Vegetable oil	10.4	12.9	14.6	12.66	2.05	0.97
Trade (bln 2014-16 USD)						
Net trade[3]	13	42	13	-69.01	..	..
Value of exports[3]	165	239	259	8.48	3.10	0.65
Value of imports[3]	153	197	246	24.81	3.76	1.92
Self-sufficiency ratio[10]						
Cereals	96.1	92.2	92.6	0.37	-0.67	-0.04
Meat	93.6	96.5	97.4	0.97	-0.05	0.10
Sugar	94.9	96.4	93.4	-3.15	0.37	-0.62
Vegetable oil	146.5	131.3	123.5	-5.94	-1.27	-0.50

Notes: 1 Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseed 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/protein represent availability per capita per day, not intake. 9. Staples represent cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports)*100.
Sources: FAO (2022). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.4. Regional outlook: Sub Saharan Africa

2.4.1. Background

Raising agricultural productivity is a major challenge

Sub-Saharan Africa is large and diverse, home to 14% of the world's population. Among the seven regions[11] in this chapter, its economic growth trends and demographic profile are striking. Population growth is the highest amongst the regions and despite rapid progress, urbanisation remains by far the slowest. By 2031, it is expected that the region will add some 334 million people compared to 2019-21, a growth rate of 2.5% p.a. The share of global population living in the region will increase to 16.5%. Although almost two-thirds of the additional people in SSA will reside in urban areas, 52% of the population will still live in rural areas by 2031. This makes it the only region with more than half of the population residing in rural areas by 2031 and one of only two (along with Near East and North Africa) where the absolute size of the rural population is still expected to increase over the coming decade.

Economies in the region typically have a high dependency on resource-based commodities, such as agriculture, oil and metals. Agriculture, fish and forestry account for about 17% of GDP, and this is expected to decline to 15% by 2031. Economic growth, in per capita terms, is expected to be less robust than other emerging developing regions, rising by 1.3% p.a. Having contracted by 5% in 2020 during the COVID-19 pandemic, per capita GDP rebounded by only 1.1% in 2021, with a further 1% expected in 2022. The limited recovery, despite support from strong commodity prices globally, reflects the prolonged impact of economic restrictions to curb the spread of the pandemic, limited resources to support a recovery and persistent travel constraints that reduced the contribution from the tourism sector. At the projected rate of recovery, per capita GDP will only exceed pre-pandemic levels by 2025. 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, at USD 1 719, and are projected to rise to USD 1 920 by 2031 in 2010 dollars. In least developed countries (LDC) in the region, average per capita incomes are only expected to reach USD 1 000 p.a.

Households in the region spend on average about 23% of their incomes on food, the highest amongst all regions. This share varies considerably by country, with the LDCs in the region spending on average 33%.[12] The high share of total income spent on food makes the region particularly vulnerable to the high food prices projected in the short term and this will have a significant impact on economic welfare, food security and nutritional diversity. Per capita calorie availability is already significantly lower than most other regions, which further magnifies the impact of the COVID-19 pandemic on food affordability and food security. The FAO's State of Food Security and Nutrition (2021) notes that the prevalence of undernourishment increased from 20.6% in 2019 to 24.1% in a single year in 2020, while the number of undernourished people in the region increased by 44 million. While the prevalence of undernourishment in the region had been increasing since 2018, the pandemic induced a rapid acceleration and the current high food price environment could slow progress further.

Sub Saharan Africa is an agro-ecologically diverse, land abundant region that accounts for 15% of global cropland and 20% of pasture. In many countries however, high population density in rural areas has resulted in the agricultural sector facing pressure from land shortages and declining plot sizes. Much of the land still available in the region is concentrated in few countries and/or is largely under forest cover. As a result, the region produced only 7% of the global value of agricultural and fish production in 2019-21. By contrast, the large population with its high consumption requirement and unique, staple dependant dietary composition resulted in the region accounting for 41% of the consumption of global roots and tuber and 13% of cereals, compared to only 7% of global sugar, and 6% of global vegetable oil and fish. The comparatively small share in global meat (4%) and fresh dairy (5%) consumption further reflects weaker purchasing power and low protein inclusion in diets across most of the region. Overall, Sub-Saharan Africa's self-sufficiency for major food commodities is decreasing, as the region's population is expanding beyond the pace of domestic supply growth.

Improving food security and reducing hunger in a low-income environment will remain one of the greatest challenges facing the region over the coming decade. Despite improvements and success stories in selected countries, productivity in most of the region remains low. Estimates indicate that total factor productivity in the region fell 2% over the decade to 2019, as extensive growth in inputs, primarily capital (including livestock) were not matched by growth in output[13]. Concentration of land abundance in a few countries implies that significant opportunities may arise to expand intra-regional trade, but costs need to be reduced to improve trade competitiveness. Over the outlook period, imports into the region are therefore expected to rise further. In an increasingly volatile global market, reducing the costs of trade and closing the productivity gap provides a significant opportunity for the region to supply more affordable food products to its growing population.

2.4.2. Production

Increased productivity is the key to growth

In net value-added terms, agricultural and fish production in SSA is expected to grow by an annual average of 2%. Given rapid population growth, this means that per capita production will continue to decline, a trend that has been evident since 2015 (Figure 2.9). Crop production is projected to account for 75% of total output by 2031, while the share of livestock products will remain fairly constant at 18%, and the share of fish production will decline marginally to 7%. Food and feed staples, such as cereals, pulses, roots, and tubers, will be the main sources of growth. In the case of cereals and roots and tubers, the region's global market share will rise over the outlook period. By 2031, the region may account for more than 40% of global roots and tubers output, 21% of pulses and 6.5% of cereals. Cotton production is set to expand by 1.5% p.a., increasing its share in the global market to 8% by 2031. About 70% of the region's cotton will be produced by LDCs of which a substantial share will come from West Africa where Burkina Faso and Benin are major contributors.

Growth of 25% in crop production over the coming decade will be underpinned by a combination of area expansion, changing crop mix and productivity gains. Expressed per unit of land used in agriculture, the real value of crop production will continue to grow by 1.9% p.a., reflecting some crop intensification. Intercropping with beans and cereals and occurs in many countries. Double cropping is also prevalent in tropical regions with bi-modal rainfall, as well as irrigated systems in Southern Africa, where soybeans and wheat are often produced consecutively in a single year. The expansion of rice cultivation in the region, notably in Nigeria, is also expected to be based upon multiple annual harvests.

While the region is considered land abundant, this is concentrated in a few countries, with Sudan, Madagascar, DRC, Mozambique, Angola, Congo Republic, CAR, Ethiopia and Zambia accounting for around 65% of land available for expansion (Chamberlain et al., 2014). Elsewhere, the ongoing expansion of agricultural land use is constrained by land fragmentation, conflict in some land abundant countries, and the presence of other competing uses such as mining and urban sprawl. This accentuates the heightened importance of achieving productivity gains in the region.

Average cereal yields are projected to grow 22% over the outlook period, a similar rate to the past decade. Continued yields gains for most major crops stem from investments in locally adapted, improved crop varieties, and better management practices. While yield growth for most crops exceeds the rates projected at a global level, this occurs from a base which is often less than half the global average. Consequently, although the region's substantial gap relative to yields achieved in the rest of the world will narrow it will still remain substantial by 2031. Efforts to fully close the yield gap are constrained by the limited use of inputs, irrigation and infrastructure. Despite widespread implementation of fertiliser subsidy programs in many countries, fertiliser use is the lowest of all regions and, as a net importer of fertilisers, sharp cost increases in the short term could dampen purchases and use even further (Figure 2.10). With a strong reliance on dryland production and in the face of mounting ecological challenges, the region could be one of the most severely affected by climate change, suggesting that yield growth will have to be achieved in an increasingly volatile environment.

The net value of livestock production is projected to expand by 28% over the next ten years, with the fastest increases coming from milk and poultry. The region will add 10.5 Mt of milk and 2.9 Mt of meat by 2031, comprising 1.0 Mt of poultry, 894 Kt of bovine meat, 629 Kt of ovine meat and 362 Kt of pig meat.

Bovine and ovine production systems in the region are typically extensive and growth in the coming decade is fuelled by herd expansion more than productivity gains. In 2019-2021, the region accounted for only 7% of global bovine meat output yet almost 17% of the global bovine herd. The region's share in the global bovine herd is projected to expand to more than 19% by 2031, yet its share in global beef production will only increase by half a percent. Similarly, the region constitutes 14% of global ovine meat output, with 25% of the global ovine flock. Ovine meat production is expected to increase by 29% in the coming decade, with the region increasing its global share to 15%, but the region will still graze 28% of the global flock. However, the expansion of herds by 2031 will occur on an area of almost unchanged pastureland.

While extensive poultry production systems are still common in the region, a greater degree of intensification has been evident, particularly in countries such as South Africa that produce surplus feed grains. Albeit from a small base, feed intensity is expected to continue increasing in the region as supply chains modernise in countries such as Zambia and Tanzania, but many smaller producers continue to use non-grain, often informally procured feed inputs. In countries that already use feed more intensively, genetic improvements and better feed conversion over time will reduce the amount of feed required per animal. Overall in the region, the net effect results in feed use growing at a marginally faster rate than meat production. Some feed is used in fish production, which is expected to increase 14% by 2031. An expansion of 32% in the aquaculture sector compared to 13% for captured fisheries is from a small base and by 2031 aquaculture will still represent only 9% of the fish production, compared to 8% in the base period.

Based on these production projections, the region's direct greenhouse gas (GHG) emissions from agriculture are expected to grow by 14% by 2031 compared to the base period. Sub-Saharan Africa will account for 40% of the global increase in direct emissions from agriculture and as a result will account for 16% of global direct agriculture emissions by 2031. However, agricultural emissions per USD value of production in the region are expected to continue a declining trend.

2.4.3. Consumption

Slow but insufficient improvement in nutritional status

Most of the world's poor are concentrated in the region. The prevalence of undernourished individuals in the region is also the highest in the world. Poor food security was further exacerbated by the ongoing

COVID-19 pandemic. Supply chain disruptions, particularly in informal sectors, curbed accessibility, while income and employment shocks weakened affordability. The slow economic recovery will prolong affordability constraints, particularly in the high price environment projected in the short term. Food security and undernourishment will likely remain a challenge and even as income levels start to recover, a sustained recovery will require improvements in the availability, accessibility, affordability and utilisation of food supplies in the future.

The slow recovery in average income levels following the economic contraction in 2020 suggests that population growth remains the biggest driver of rising food consumption (Figure 2.13). This combination of rapid population growth and potential gains in per capita calorie availability, make the region one of the largest sources of additional demand for the global agricultural sector in the coming decade. The region's share in global food calorie consumption is anticipated to rise from 11.5% in the base period to 13.5% by 2031.

The contribution of staples to total calorie availability is higher in SSA than any other region. While per capita consumption of food staples is set to increase further by 2031, the share of food staples in total calorie availability remains fairly constant. For most other commodity groups, including meat, dairy, fish, sugar and vegetable oils, per capita consumption levels are currently the lowest in the world. While per capita consumption of dairy and vegetable oils is set to increase over the coming decade, for meat, fish and sugar it is set to decline due to the slow post pandemic recovery in income growth. This implies that dietary diversification will remain slow, but total food consumption will increase substantially for all commodities, due to rapid population growth.

Gains of 79 kcal/day over the outlook period will enable average calorie availability in the region to exceed 2 500 kcal/capita per day by 2031. This is well below the global average of 3 040 kcal/day and calorie intake in the region will still be the lowest in the world by 2031. Protein consumption is only expected to increase by 1.2g per person per day, predominantly from plant-based sources. While dairy consumption is expected to increase, this is more than offset by the decline in per capita meat and fish consumption over the next decade, limiting improvements in intake of vital nutrients and micronutrients.

Cereals are set to overtake roots and tubers over the coming decade as the main source of feed to the livestock sector. However, total feed use in the region is low, and will account for less than 4% of total animal feed consumed in the world by 2031, despite being home to 16% of the world's population.

2.4.4. Trade

Increasingly import dependant with slow progress in regional trade agreements

The region is expected to become increasingly reliant on imports to close the gap between domestic production and consumption. With few exceptions, most basic food commodities in the region are produced for domestic consumption rather than exports. However, many countries benefit from counter seasonality in the northern hemisphere and competitive labour costs, enabling net exports of high value fresh produce.

The trade deficit in major food items is anticipated to widen over the coming decade. Evaluated at constant (2014-16) global reference prices, the deficit is projected to grow significantly from about USD 9 billion to USD 26 billion by 2031.

Amidst the pandemic related challenges in 2020, cereal imports increased, while they decreased for meat, fish, vegetable oil and sugar. At the height of the pandemic's first wave, intraregional trade faced many logistical challenges, causing long delays at land border posts (Njiwa and Marwusi, 2020[3]). With restrictions easing through latter waves of the pandemic as strategies adapted, imports also increased for meat, fish and cereals, but significant price increases dampened sugar and vegetable oil imports into the region. The region also continues to be affected by global problems such as container shortages, high freight rates and rising local fuel costs, adding to the cost of trade in a region which already scores poorly in trade efficiency indicators such as the World Bank's logistics performance index.

Over the course of the next decade, imports of cereals, meat, fish, sugar and oils will rise substantially, at a faster rate than production. Wheat comprises almost half of the region's cereal imports and historically the Russian Federation (hereafter "Russia") has been the biggest supplier, with notable volumes also from Ukraine. Consequently, the evolution of Russia' war against Ukraine will heighten concerns on the availability and costs of imported wheat. Across most major commodities, exports will tend to decrease over time. The region is not self-sufficient in basic food staples and its import dependence is expected to deepen over the next decade. However, in the case of fresh fruit and vegetables, the real value of exports is expected to expand by 31% and 48%, respectively, by 2031. Consequently, the total value of agricultural exports in real (2014-16) terms could increase 23% by 2031.

In contrast to basic food crops, the bulk of cotton production is sold on global markets and more than 90% of cotton from the region will be exported by 2031. Most of this comes from the least-developed countries and the region's share in global exports is expected to increase marginally over the outlook period.

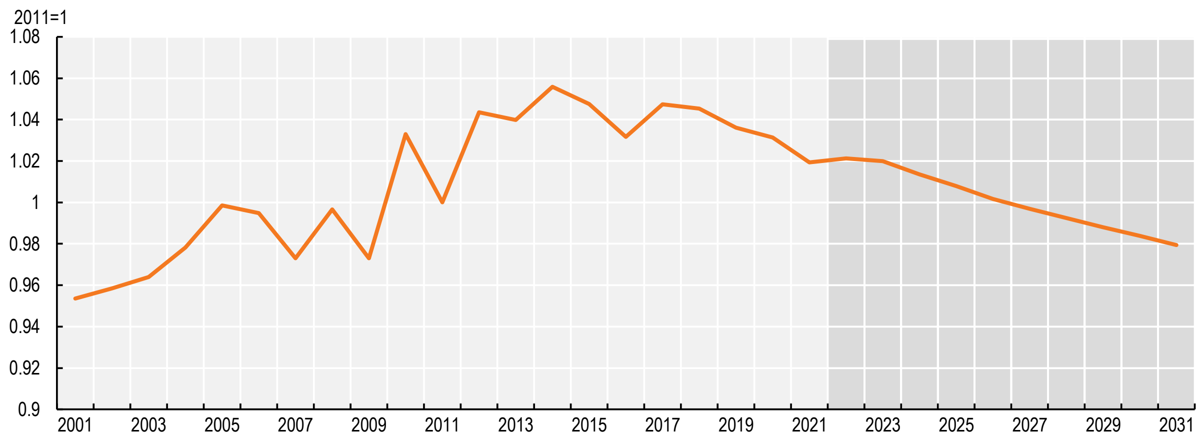
It has been a little more than a year since trading under the preferential arrangements of the African Continental Free Trade Area (AfCFTA) started. Its goal of improving internal trade is critical for the region's economic development, particularly in light of rising global uncertainties. The COVID-19 pandemic has resulted in delayed implementation and in 2020 intra-Africa trade declined to 16%, compared to a five-year average of 18%. Agricultural products constitute about a quarter of intra-Africa trade and supply chain disruptions because of the pandemic clearly diminished trade.

The ambition of the AfCFTA is to achieve a zero tariff rate on 90% of tariff lines, through a phased approach over a period of ten years for LDC's and five years for others. However, by January 2022, rules of origin agreements had only been reached on 88% of tariff lines. Other delays in progress emanate from some customs union members not ratifying the agreement. Botswana, South Sudan, Benin, Guinea-Bissau and Liberia have not yet ratified, which prevents several regional trade unions from fully trading under preferential terms, unless concessions can be made to allow the agreement to be implemented on an individual basis. Despite the slow start, some progress has been made and as many as 76% of the countries have deposited instruments of ratification. This essentially represents commitment to implement the agreement. While further engagements regarding rules of origin need to be concluded, the agreement will ultimately only exclude 3% of tariff lines and therefore has significant potential to increase intra-Africa trade in the medium term.

Over 50 countries have made market access commitments on trade in services that often complement and support trade in goods, while negotiations on the protocols covering investment, competition policy, intellectual property rights, digital trade and women and youth in trade are still ongoing to maximise the gains of the AfCFTA.[14] A key enabling initiative is the recently launched Pan-African Payment and Settlement System (PAPSS) by the African Export-Import Bank (Afreximbank) and the AfCFTA Secretariat. PAPSS enables instant cross-border payments in respective local African currencies and effectively eliminates Africa's financial borders and formalises and integrates Africa's payment systems.

Apart from tariffs, a major factor constraining trade within the region is high non-tariff barriers. Although the agreement includes a mutual recognition of standards and licences, as well as the harmonisation of sanitary and phytosanitary (SPS) measures, many non-tariff barriers are more difficult to remove or reduce. The non-tariff costs of trade on the continent, as estimated from the ESCAP-World Bank trade cost data, are estimated at an *ad valorem* equivalent of around 283%. Moreover, these are over 300% for agricultural products[15] and more than 100% higher compared to non-agricultural manufacturing. 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. This is supported by the presence of only six SSA countries in the top half of the World Bank's logistical performance index ranking, which covers 160 countries in total. Based on the regulations implemented to date, and the need to finalise tariff reduction schedules and sensitive product lists, no discernible impact was included in the baseline projection this year.

Figure 2.9. Per capita net value of agriculture and fish production in Sub Saharan Africa



Note: Estimates are based on historical time series from the FAOSTAT Value of Agricultural Production domain, which are extended with the *Outlook* database. Remaining products are trend-extended. The Net Value of Production uses own estimates for internal seed and feed use. Values are measured in constant 2014-2016 USD.
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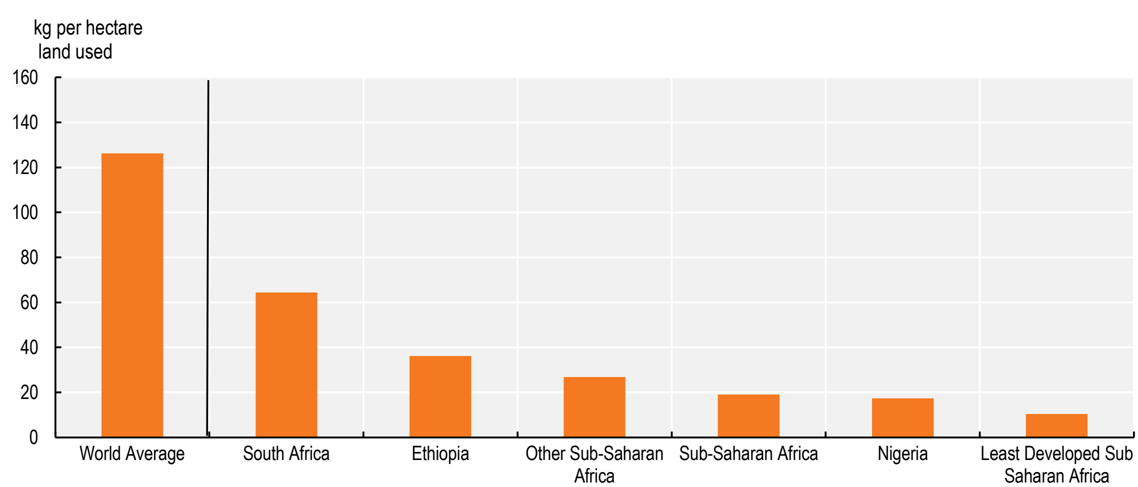
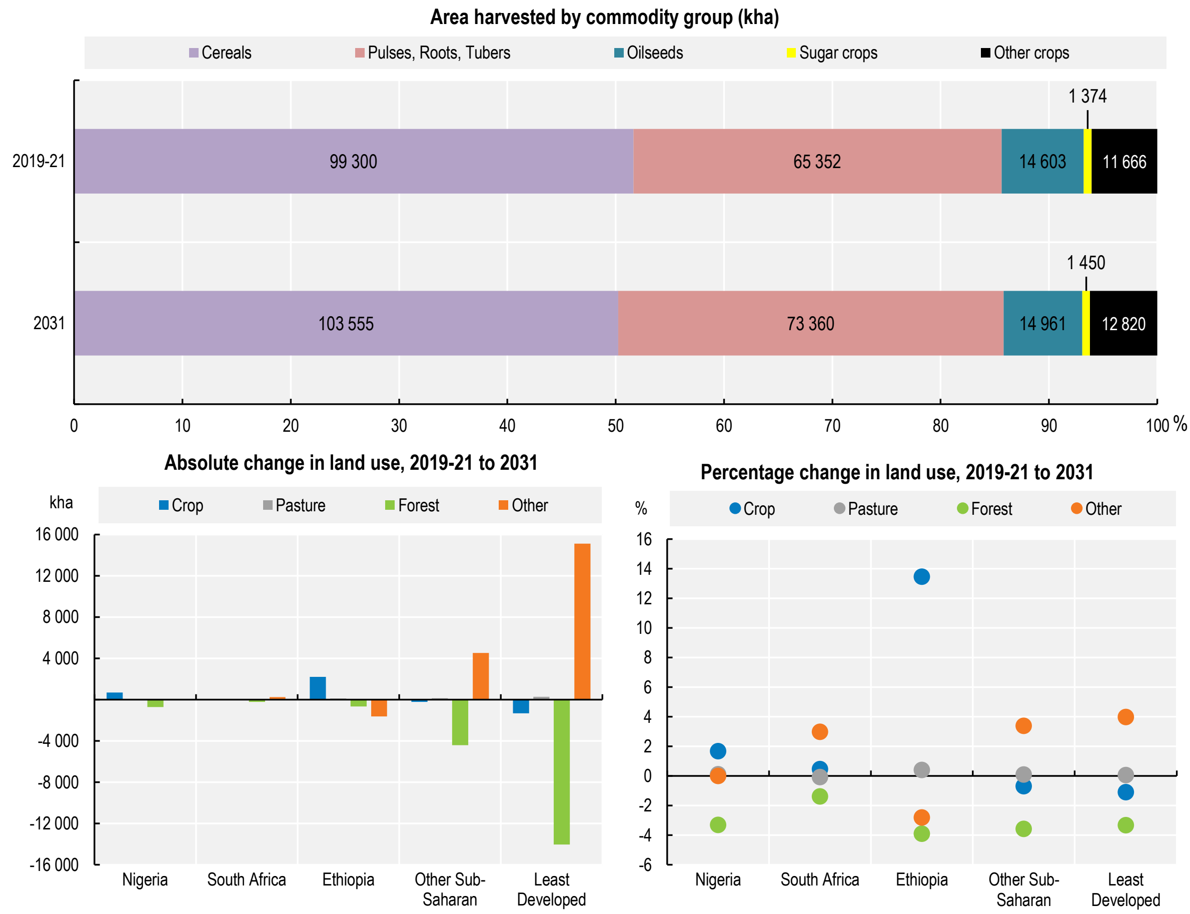
Figure 2.10. Fertiliser application per hectare of land used for crop production is low in Sub Saharan Africa, 2017-19 average



Source: FAOSTAT.

StatLink https://stat.link/zk4vwm

Figure 2.11. Change in area harvested and land use in Sub Saharan Africa



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

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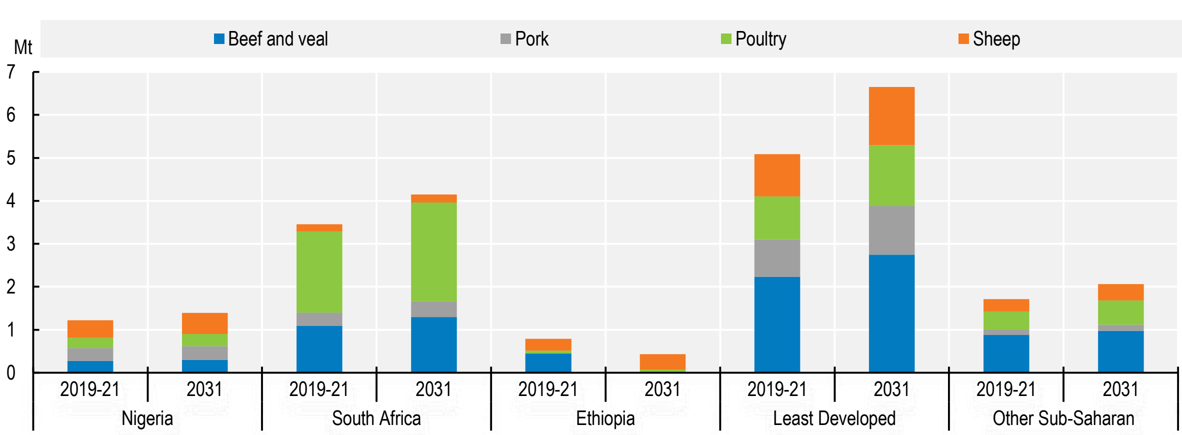
Figure 2.12. Livestock production in Sub Saharan Africa



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

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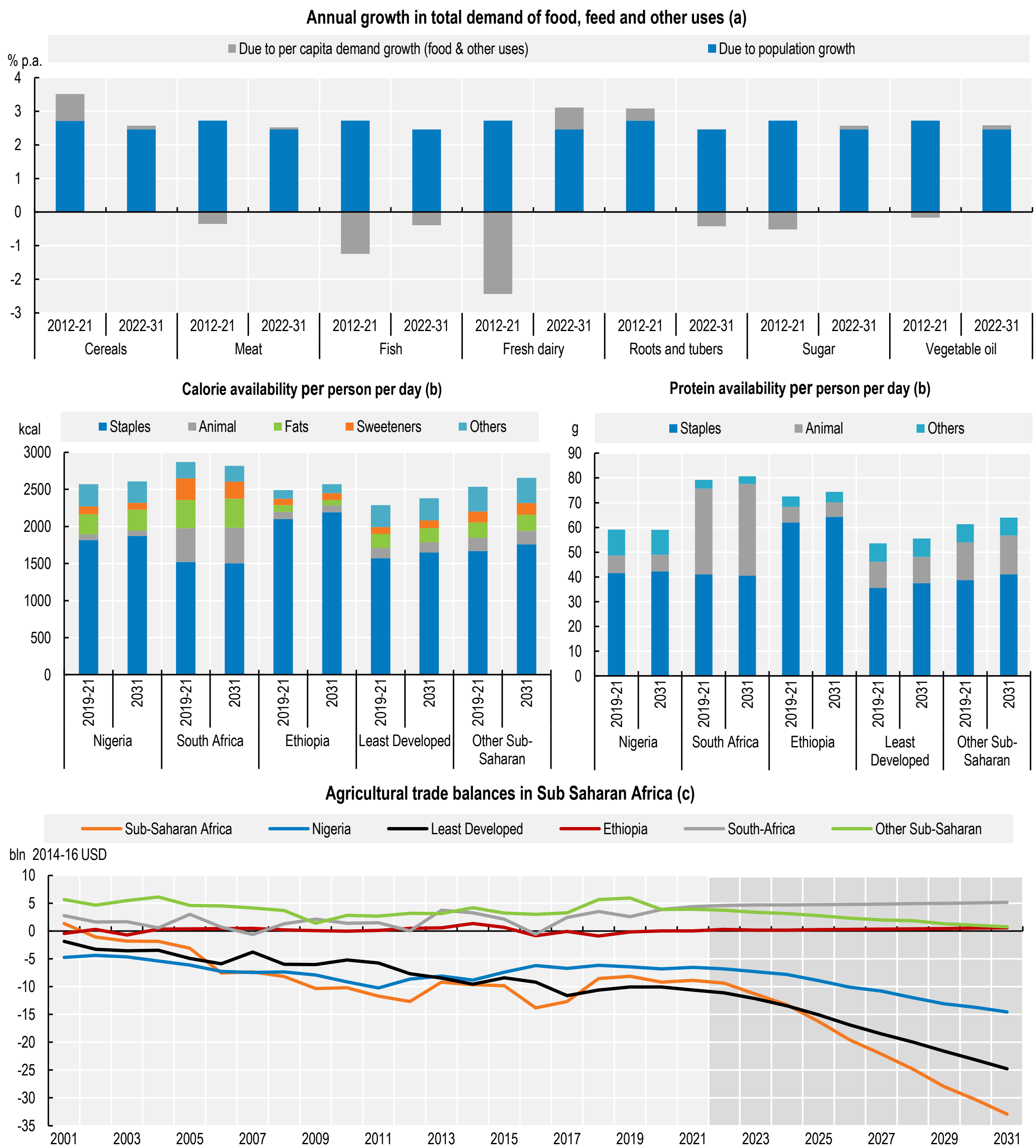
Figure 2.13. Demand for key commodities, food availability and agricultural trade balance in Sub Saharan Africa



Notes: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets and trade indices databases and include products not covered by the *Outlook*. a) Population growth is calculated by assuming per capita demand constant at the level of the year preceding the decade. b) Fats: butter and oils; Animal: egg, fish, meat and dairy except for butter; Staples: cereals, oilseeds, pulses and roots. c) Include processed products, fisheries (not covered in the FAOSTAT trade index) based on outlook data.

Source: FAO (2022). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/3ymodv

Table 2.3. Regional indicators: Sub Saharan Africa

	Average			%	Growth [2]	
	2009-11	2019-21 (base)	2031	Base to 2031	2012-21	2022-31
Macro assumptions						
Population ('000)	823 015	1 078 061	1 412 143	30.99	2.72	2.46
Per capita GDP[1] (kUSD)	1.67	1.72	1.92	11.49	-0.43	1.26
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	213	286	357	24.71	2.50	1.96
Net value of crop production[3]	151	213	267	24.92	2.89	1.92
Net value of livestock production[3]	44	50	65	28.46	1.14	2.47
Net value of fish production[3]	17	22	25	14.03	2.08	1.12
Quantity produced (kt)						
Cereals	116 434	160 064	202 852	26.73	3.38	2.07
Pulses	13 634	20 468	25 909	26.58	3.77	1.86
Roots and tubers	61 857	94 412	117 858	24.83	2.92	1.94
Oilseeds[4]	7 325	8 474	9 687	14.31	1.02	1.13
Meat	9 423	12 268	15 194	23.85	2.59	2.13
Dairy[5]	3 392	3 619	5 015	38.61	0.47	3.27
Fish	5 980	7 803	8 903	14.09	2.08	1.12
Sugar	6 556	7 600	8 898	17.08	1.00	0.89
Vegetable oil	5 328	7 513	8 958	19.23	3.03	1.24
Biofuel production (mln L)						
Biodiesel	0	0	0	148.75	0.00	2.25
Ethanol	732	994	970	-2.44	4.83	2.72
Land use (kha)						
Total agricultural land use	860 717	883 817	885 653	0.21	0.14	0.01
Total land use for crop production[6]	207 172	223 930	225 314	0.62	0.23	0.00
Total pasture land use[7]	653 545	659 887	660 339	0.07	0.11	0.01
GHG Emissions (Mt CO2-eq)						
Total	709	842	988	17.28	1.68	1.42
Crop	215	196	198	0.75	-0.86	0.04
Animal	493	645	789	22.33	2.57	1.80
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2 433	2 433	2 512	3.25	0.01	0.38
Daily per capita protein availability[8](g)	61.7	59.3	60.5	2.02	-0.32	0.27
Per capita food availability (kg/year)						
Staples[9]	178.1	196.4	203.7	3.71	0.38	0.24
Meat	10.3	10.7	10.9	1.94	-0.07	0.07
Dairy[5]	4.5	3.7	4.0	6.65	-1.70	0.82
Fish	8.2	7.7	7.5	-3.24	-1.23	-0.34
Sugar	10.4	10.5	10.7	1.84	-0.36	0.30
Vegetable oil	7.7	8.4	9.1	8.49	-0.67	0.87
Trade (bln 2014-16 USD)						
Net trade[3]	-11	-9	-26	199.51	..	..
Value of exports[3]	30	48	59	22.88	3.91	1.65
Value of imports[3]	41	57	86	50.13	2.58	3.87
Self-sufficiency ratio[10]						
Cereals	84.2	82.3	78.1	-5.03	0.11	-0.45
Meat	88.7	85.3	79.4	-6.89	-0.35	-0.37
Sugar	75.8	66.3	58.4	-11.85	-0.61	-1.98
Vegetable oil	58.9	57.4	50.4	-12.25	1.13	-1.52

Notes: 1 Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represent 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/protein represent availability per capita per day, not intake. 9. Staples represent cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports)*100.
Sources: FAO (2022). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.5. Regional outlook: Near East and North Africa

2.5.1. Background

Rising demand amid supply constraints drives rising import dependence

The Near East and North Africa[16] region encompasses a range of countries with diverse income profiles that often face similar challenges related to the agricultural production environment. Land and water resource endowments are limited and less than 5% of total land in the region is classed as arable. All countries in the region, except for Iraq and Mauritania, face water scarcity, and for some countries this is extreme, at less than one quarter of sustainable levels on a per capita basis. Its already limited water resources make it particularly vulnerable to climate change.

Across the spectrum of least developed, middle- and high-income economies, the region includes many oil exporting nations in the Gulf. With oil as a major source of revenue, energy markets are highly important to economic activity and can impact significantly on demand prospects. In this respect, volatility in energy markets over the past two years, as well as the high oil prices projected in the short term, if sustained, will affect income levels more than any other region covered in this Outlook.

The challenging agricultural production environment has made the region one of the largest net food importing regions and self-sufficiency rates for most commodities are low, particularly so for cereals, vegetable oils and sugar (Figure 2.15). Its dependence on imports makes it particularly vulnerable to trade-related uncertainties, such as those exposed in the global trade system by the COVID-19 pandemic, persistent logistical challenges as the pandemic continues to evolve and possible supply constraints from the Black Sea region where the ongoing war may affect export supplies of major commodities including wheat, maize and oilseed products. Russia and Ukraine have traditionally been the two biggest suppliers of wheat to the region, but even when sourced elsewhere, the sharp increase in imported cereal prices raises concern on affordability of basic foods in lower income regions. With average food expenditures around 15% of total household expenditures, and least developed countries at 33%, income and price shocks can have a significant impact on welfare.[17]

Historically, the region's limited resources have been stretched by policies that sought to stimulate production and reduce the reliance on trade in basic cereals. Such actions are designed to reduce trade dependence but may constrain growth as these cereals compete with higher value crops for limited water resources and result in reduced availability of fresh produce that could otherwise aid in improving dietary diversity. Geopolitical conflict in the region has further reduced investment and displaced populations, further hindering production.

Gross domestic product in the agriculture, forestry and fishery sector is currently about 5% of total GDP in the region, which is expected to decline to 4% by 2031. Egypt produces almost 30% of the net value of agriculture and fish production in the region, with a further 48% attributed to the rest of North Africa (14% from LDC's and 34% from other North African countries). These shares are expected to increase in the coming decade, such that North Africa will constitute almost 80% of net agricultural output value in the region by 2031.

Population growth is an important factor determining demand and is expected to slow only marginally from almost 23% over the past decade to 20% over the next ten years. This growth rate is second only to the SSA region and will see the region's population exceed 500 million people by 2031. Almost two thirds of the population is expected to reside in urban areas, which may encourage consumption of higher value products, including meat and dairy products, but also convenience products that often contain vegetable oil and sugar. Affordability will also be important, however, and the strong reliance on export revenue implies that economies in the region were amongst the worst affected by the COVID-19 pandemic in 2020, with per capita income contracting by over 7% and rebounding only modestly in 2021 by 1.3%. Even amid rising oil prices, economic activity is only expected to increase to 3.3% in 2022 and in the medium term will average 1.6% p.a. Consequently, it is unlikely to constitute a major driver of demand over the next decade. This is a concern in a region where healthy diets are unaffordable to more than half of the population (FAO et al., 2021[4]).

Some of the greatest challenges for the region over the *Outlook* period relate to ensuring access to affordable food products to a growing population in a low-income growth environment. Import dependence is inevitable given limitations to production and natural resource endowment, but in an increasingly volatile global market, nimble policies and procurement practices will be required to ensure food security as during the coming decade, self-sufficiency rates for most major commodities are expected to decline further.

2.5.2. Production

Higher productivity needed to confront severe resource constraints

Agricultural and fish production in the region is projected to expand by 1.6% p.a. over the next ten years, similar to that of population growth. The region's dependence on global markets will continue to increase (Figure 2.14). Crop production constitutes the bulk of total value and average growth of 1.4% p.a. is sufficient to sustain its share in total value at 60% by 2031. Livestock production growth is stronger at 2.1% p.a., with its share in total net value increasing to 28% by 2031.

Fish production is an important contributor to total production value, but growth of just under 1% p.a. will see its share decline marginally to 11.2% by 2031. In the recent past, growth has been driven by capture in coastal areas, but fish stocks are under pressure, resulting in a significant slowdown over the Outlook period. The contribution of aquaculture to total fish production is growing, with Egypt the major contributor.

Total agricultural land use is expected to remain fairly stable, but a small decline is expected in cropland use by 2031. This occurs mainly in Saudi Arabia, where conditions are not conducive to large scale cropping, and the least developed countries of North Africa. By 2031, almost 38% of total cropland may be allocated to cereal production, up from 34% in the base period. This increase comes primarily from coarse grains and wheat, which is expected to contribute 59% and 38%, respectively, to total land used for cereals by 2031.

Productivity gains are imperative in a region constrained by arable land and water availability. Total factor productivity grew by a modest 1.2% p.a. in the decade to 2019, driven largely by increased capital inputs.[18] The value generated per hectare land used for crop production has increased consistently by 1.4% p.a. over the past decade and this is expected to accelerate over the next ten years to 1.6% p.a. This trend encapsulates multiple factors, including higher crop intensity, as reflected in the maintenance of crop area harvested, despite a reduction of 2.8 Mha in cropland use, together with considerable yield gains. Yield improvements are expected across all major crops, with wheat rising by 0.8% p.a., maize 0.5% p.a., other coarse grains 1.5% p.a., rice 1.5% p.a. and pulses 1.0% p.a. on average over the next ten years. This will leave wheat yields at roughly 78% of the global average, while other coarse grains will only reach 47% of the global average.

Growth in meat production will largely be derived from poultry, which far outpaces all other meat types with growth of 3.1% p.a. over the coming decade, but significantly slower compared to the past. Some progress is also expected in bovine meat production, with growth of 1.6% p.a., following a contraction in the past. Ovine meat production will remain largely unchanged by 2031.

Direct GHG emissions from livestock activities in the region will expand by 3.8% by 2031 compared to 2019-21, which contrasts with the growth of 28.6% and 24.2% for meat and dairy production, respectively, reflecting the importance of productivity gains in containing emissions. With crop emissions expected to rise by 2.2%, total direct emissions from agriculture are projected to expand 3.4% by 2031. The historic decline in emissions produced per unit value of agricultural output is set to continue.

2.5.3. Consumption

Achieving a shift to healthier and more diverse diets is a challenge

Food policies in the region have traditionally focused on food security by supporting consumption of basic foodstuffs, primarily cereals, thus entrenching staple-based diets. In recent years, policies have been expanded to include animal products. Nevertheless, the prevalence of malnourishment and the absolute number of undernourished people has increased in recent years, even prior to the COVID-19 pandemic, which accelerated this trend in 2020. Total calorie availability in the region is expected to increase somewhat to 3020 kcal/person/day by 2031- slightly below the global average. This reflects both the prolonged nature of the economic recovery, which only foresees per capita income exceeding pre-pandemic levels by 2025, and increasing awareness of healthy eating, underscored by reduced calories from products like vegetable oil and sweeteners. There is, however, great diversity within the region – for instance calorie availability in LDCs remains low and will only reach 2 594 kcal/person/day, roughly 15% below the global average.

The projections for the average diet in the region indicate about 54% of calories will come from cereals by 2031, well above the global average of 44%. A similar phenomenon applies to sugar, where the region’s share of total calorie consumption derived from sugar will be 9% compared to a global average of 7%. The diet, which relies on starchy foods and sugar, is calorie dense but nutrient poor and often associated with a rising incidence of over-weight and obesity, and various chronic diseases such as diabetes. At the same time, the prevalence of undernourishment, as well as stunting and wasting in young children is high in some countries, particularly those affected by conflict. This suggests that the “triple burden” of malnutrition will be a policy challenge that will need to be addressed over the medium term. However, affordability remains a major constraint to the adoption of healthier diets.

The average level of protein availability in the region is projected to reach 85 g/day in 2031, barely higher than the base period. A fall in protein from plant-based foods is expected to be more than offset by higher quality meat and fish protein sources.

The growth of the livestock sector, particularly poultry, will increase feed use by 20% over the coming decade. Commodities such as maize, barley and protein meals are expected to account for over 75% of the total feed use. The bulk of feed materials will continue to be imported, with maize imports, for example, reaching 34 Mt by 2031 compared to 27 Mt in the base period. This trend reflects policies that prioritise the production of food crops over feed crops in an environment that has very limited production potential.

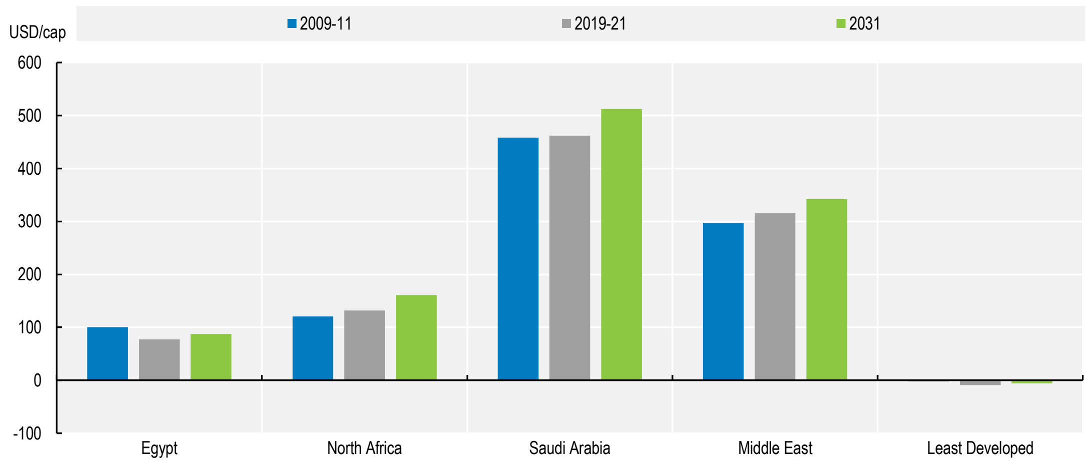
2.5.4. Trade

Food and feed imports will continue to rise

The region's strong population growth together with limited production capacity will continue to drive higher food imports over the next decade. The region is expected to be the second largest net importer of food by 2031, following the Developed and East Asia region, but on a per capita basis will be the largest. Within the region, food imports per person are highest in Saudi Arabia and the Other Near East area which include the Gulf States (Figure 2.14).

Amidst the logistical and economic challenges of the pandemic, the region's total import bill, expressed in real terms, declined in 2020 relative to 2019. Following a modest increase in 2021, it is expected to rise sharply in 2022 in line with economic recovery. By 2031, the region's import bill is expected to increase by 29% relative to the base period. Imports are expected to rise for almost all commodities, albeit at a slower rate relative to the past decade. Imports by the region will maintain high shares of global markets for many commodities by 2031, including wheat (26%), sugar (22%) and maize (17%). The region will also account for high shares in global trade for sheep meat (33%), cheese (19%) and poultry (18%) by 2031. In most instances, these shares are unchanged at their current high levels. Given the region's important role in global markets, and the important role of imports in domestic markets, developments in either markets have broad food security implications.

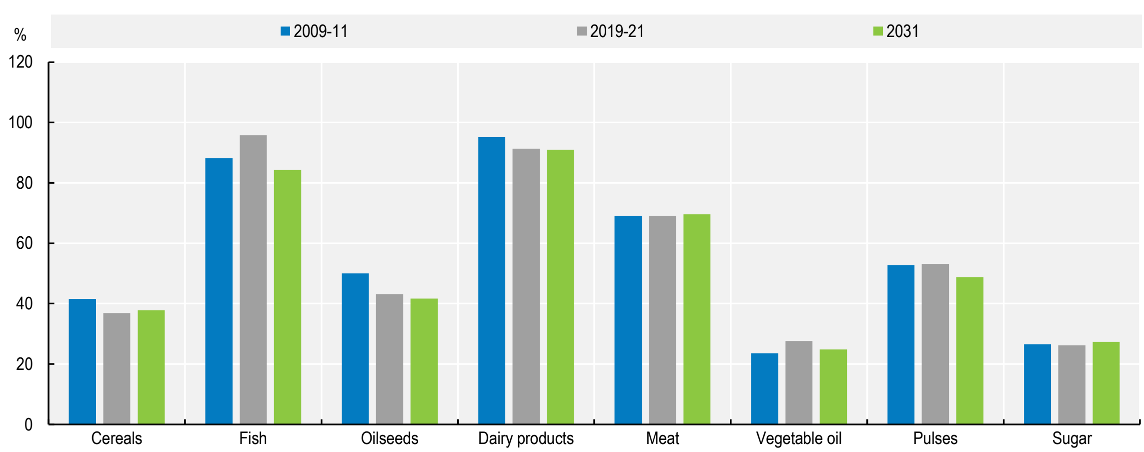
Figure 2.14. Value of net food imports per capita in Near East and North Africa (including processed products)



Note: Estimates are based on historical time series from the FAOSTAT Trade indices domain, which are extended with the *Outlook* database. Products not covered by the *Outlook* are extended by trends. Total trade values include also processed products, usually not covered by the Outlook variables. Trade values are measured in constant 2014-2016 USD and trade values for fisheries (not available in the FAOSTAT trade index) have been added based on Outlook data.
Source: FAO (2022). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/h3s8uk

Figure 2.15. Self-sufficiency ratios for selected commodities in Near East and North Africa



Note: Self-sufficiency ratio calculated as (Production / (Production + Imports - Exports))*100
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

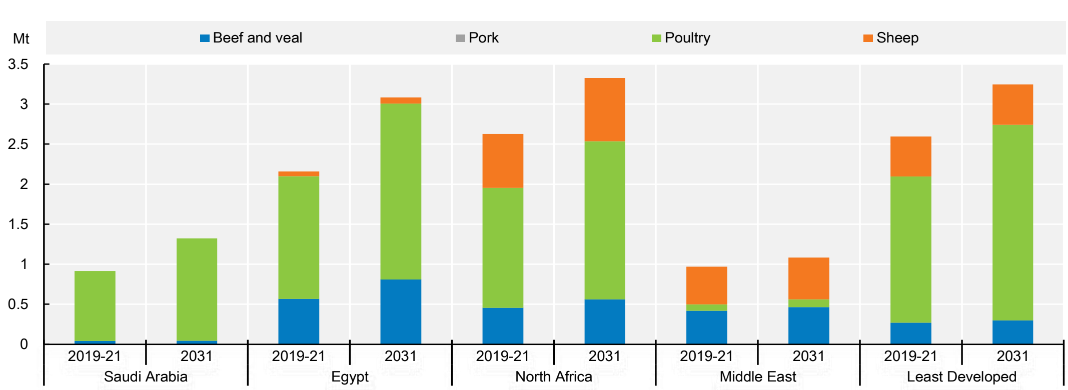
StatLink https://stat.link/lvc1m0

Figure 2.16. Change in area harvested and land use in Near East and North Africa

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

StatLink https://stat.link/m0bnaw

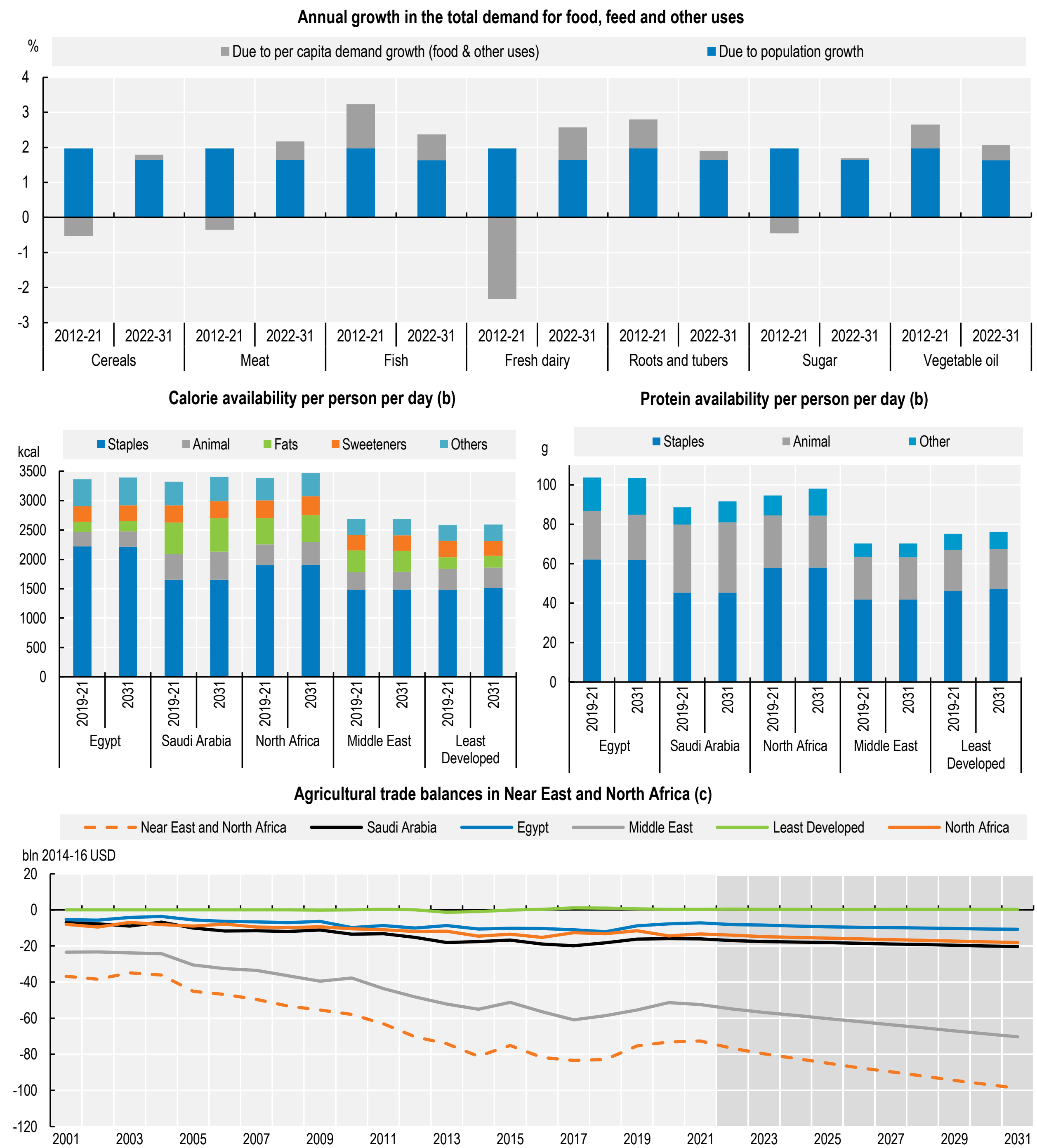
Figure 2.17. Livestock production in Near East and North Africa



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

StatLink https://stat.link/f41ea9

Figure 2.18. Demand for key commodities, food availability and agricultural trade balance in Near East and North Africa



Notes: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets and trade indices databases and include products not covered by the *Outlook*. a) Population growth is calculated by assuming per capita demand constant at the level of the year preceding the decade. b) Fats: butter and oils; Animal: egg, fish, meat and dairy except for butter; Staples: cereals, oilseeds, pulses and roots. c) Include processed products, fisheries (not covered in the FAOSTAT trade index) based on outlook data.

Source: FAO (2022). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/pwsm6i

Table 2.4. Regional indicators: Near East and Northern Africa

	Average			%	Growth [2]	
	2009-11	2019-21 (base)	2031	Base to 2031	2012-21	2022-31
Macro assumptions						
Population ('000)	341 456	418 698	503 315	20.21	1.97	1.64
Per capita GDP[1] (kUSD)	6.16	6.27	7.36	17.40	-0.39	1.64
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	107.8	132.4	157.1	18.71	1.89	1.56
Net value of crop production[3]	66.7	80.7	95.0	17.77	1.93	1.44
Net value of livestock production[3]	31.0	35.7	44.5	24.75	0.65	2.07
Net value of fish production[3]	10.0	16.0	17.6	9.96	4.86	0.95
Quantity produced (kt)						
Cereals	50 494	52 882	66 234	25.25	-0.39	1.09
Pulses	1 520	1 804	2 116	17.33	2.32	1.25
Roots and tubers	2 723	3 902	4 857	24.47	2.62	2.09
Oilseeds[4]	1 011	1 046	1 136	8.63	-0.36	1.14
Meat	6 755	8 350	10 740	28.61	2.40	2.38
Dairy[5]	3 550	3 232	4 017	24.29	-0.63	2.13
Fish	3 544	5 655	6 219	9.98	4.86	0.95
Sugar	2 970	3 540	4 439	25.41	1.10	1.59
Vegetable oil	1 467	2 377	2 621	10.25	6.50	1.05
Biofuel production (mln L)						
Biodiesel	0.02	0.02	0.04	115.85	0.00	0.69
Ethanol	626	614	771	25.47	1.92	1.87
Land use (kha)						
Total agricultural land use	461 914	430 551	430 464	-0.02	0.00	0.00
Total land use for crop production[6]	59 411	62 799	62 199	-0.96	0.03	-0.11
Total pasture land use[7]	402 503	367 752	368 266	0.14	-0.01	0.02
GHG Emissions (Mt CO2-eq)						
Total	217	242	250	3.44	0.80	0.42
Crop	47	57	58	2.15	2.55	0.12
Animal	171	185	192	3.84	0.31	0.52
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2 988	3 005	3 020	0.50	-0.29	0.18
Daily per capita protein availability[8](g)	84.3	84.7	85.3	0.72	0.0	0.0
Per capita food availability (kg/year)						
Staples[9]	220.4	218.6	219.5	0.44	-0.25	0.06
Meat	24.1	24.2	25.7	6.08	-0.31	0.51
Dairy[5]	12.8	10.8	11.4	5.44	-2.07	0.53
Fish	9.7	10.7	11.8	10.46	0.43	0.84
Sugar	32.6	32.1	32.1	-0.07	-0.35	0.06
Vegetable oil	11.7	12.5	13.7	9.20	-0.51	0.85
Trade (bln 2014-16 USD)						
Net trade[3]	-59	-74	-99	34.01	..	..
Value of exports[3]	22	33	39	17.12	5.54	1.26
Value of imports[3]	81	107	138	28.76	1.55	2.35
Self-sufficiency ratio[10]						
Cereals	40.6	38.2	37.7	-1.29	-1.34	-0.67
Meat	68.0	68.8	69.6	1.18	0.76	0.21
Sugar	26.6	27.6	27.3	-0.80	-0.15	-0.08
Vegetable oil	23.2	27.6	24.8	-10.01	3.8	-1.0

Notes: 1 Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. Projections for not included crops have been made on the basis of longer-term trends. 4. Oilseed 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/protein represent availability per capita per day, not intake. 9. Staples represent cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports)*100.
Sources: FAO (2022). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

2.6. Regional outlook: Europe and Central Asia

2.6.1. Background

A highly diverse region where Russia's war against Ukraine will dominate developments

The Europe and Central Asian[19] region spans two continents and includes a range of countries at various stages of development, which exhibit significant differences in terms of demographics, agricultural resources and public policies. Major agricultural producers in the region include the European Union, United Kingdom, Russia, Ukraine, Türkiye, and Kazakhstan. The region is home to 12% of the world's population, but the evolution of population dynamics differs across the spectrum of countries. Overall, the region's population is expected to remain fairly stable, only increasing by 1% over the next decade. This reflects stability in Western Europe, a decline in Eastern Europe and growth of 1% p.a. in Central Asia. The region is highly urbanised and by 2031 75% of its population will live in urban environments.

Average income in the region is over USD 26 000 per capita per year, but there are substantial differences across countries. Income levels range from just over USD 38 000 per capita per year in the highly developed economies of Western Europe to USD 12 250 per capita in the resource dependant eastern regions to merely USD 5 000 per capita per year in central Asia. In 2020, the COVID-19 pandemic and the restrictions imposed to curb its spread led to an average decline of 5.6% in real per capita GDP in the region, though some countries were affected more than others due to differences in approaches to managing the virus. After a firm rebound in 2021, which saw growth of 5%, the region is facing a renewed slowdown in 2022 as the ongoing war continues to unfold. While the magnitude and reach of the impact will depend on its duration and the outcome of the aggression, it has already unleashed a humanitarian crisis and will certainly influence growth prospects within and beyond the region. Apart from direct impacts of the war, the region's dependence on Russia for energy, fertilisers and cereals will increase its vulnerability to disruptions. Remittances from Russia to Central Asia may also be affected. The ongoing war will dampen the medium term projections that, under baseline assumptions, could expect to record growth in real per capita income in the region of 1.8% p.a.

At the height of the COVID-19 pandemic, agriculture in the region already faced many challenges, including logistical bottlenecks, workforce shortages and changes to the quantity and composition of demand. Having successfully navigated many of them, the Russian aggression against Ukraine adds another layer of complexity and significant uncertainty in 2022 and beyond. Russia is a major supplier of inputs to agricultural production to the rest of Europe and Central Asia, and to many other countries outside the region. Both Russia and Ukraine are also significant contributors to agricultural exports and prolonged constraints to production and exports will have a substantial impact on the sector. At the same time, the two countries are also key importers of several agri-food products from other countries in the region which will find it difficult to locate alternative markets at short notice.

The share of primary agriculture, forestry and fish production in total GDP ranges from just 1.6% in the European Union, to 12% in Ukraine. It is estimated that the share of food in household expenditures averaged about 10% in the region in 2019-2021, from around 6% for United Kingdom to around 17% in

Ukraine.[20] A wide disparity is also present in terms of growth in total factor productivity within the region: in Western Europe TFP growth was just 6% in the decade up to 2019, while it was almost 50% in Eastern Europe, marked by a large increase in the productivity of labour.

The region produces 16% of the global value of agricultural and fish production, a share which could decline to 15% by 2031, largely due to stagnation in Western Europe. Crop production averages around 56% of the net value of total production, fish 8% and livestock 36%. Whereas the region accounted for 11% of the total growth in the global net value of agriculture and fish in the last decade, it constituted 38% of growth in global exports. This growing export orientation was largely driven by Eastern Europe, where productivity levels in both the crop and livestock sectors have improved, but with a fairly static population and relatively mature consumption levels demand growth has been weak. At least in the short term, the war will likely reverse this trend, as doubts are already apparent on the ability to plant, harvest and process agricultural products in Ukraine in 2022. Infrastructure destroyed as a result of the war may take years to rebuild, raising challenges with market connectivity and doubts as to when full productive capacity would be restored. The extent to which such changes may persist in the medium term remains unclear and will ultimately depend on what resolution emerges from the war. The duration of sanctions imposed on Russia will be an important factor affecting trade in the region – as will Russian embargoes on imports from the European Union, which have been renewed constantly since 2014 as well as the future trade arrangements between the United Kingdom and the European Union

Relative to other regions, livestock and animal products contribute significantly, both from production and consumption perspectives. They constitute more than one third of the net value of agriculture and fish production and comprise 26% and 53%, respectively, of total calorie and protein availability. The European Union is a major producer, consumer and trader of milk and dairy products, and while its share of global milk production continues to decline, production and trade of high value products such as cheese and butter are growing. Per capita cheese and butter consumption is six times and three times higher than the world average, respectively.

Within the European Union, environmental sustainability is increasingly prioritised, both from a consumer and policy perspective. For instance, the Farm to Fork Strategy, as part of the European Green Deal, is an inclusive growth strategy seeking to promote fair, healthy, environmentally friendly and sustainable food systems. In future, this may influence demand, trade flows, as well as the rate of productivity and production growth in the region. Technological progress and its adoption, including digital technology, will be critical to achieve this aim.

Amongst the regions included in this *Outlook*, Europe and Central Asia faces the most uncertainty because of the ongoing war. The magnitude and duration of the impact will only become clear in due course. The *Outlook* assumes implicitly that productive capacity is fully restored in the medium term, resulting in further growth of the region's positive trade balance by 2031. However, prolonged war in the Black Sea region could result in a very different outcome, given its contribution to production and exports within Europe and Central Asia. Moreover, the extensive destruction of infrastructure, the loss of lives and displacement of labour, will require considerable investments to restore agro-food chain capacity. This could take many years, perhaps even decades, to return to normality and might well result in a marked change in the structure of the sector.

2.6.2. Production

Productivity the key to growth in the medium term

The net value of agriculture and fish production (net of feed and seed inputs) is projected to grow 8% by 2031 compared to the average for 2019-21, with Western Europe remaining largely unchanged, growth in Eastern Europe of 13% and Central Asia of almost 28%. Eastern Europe's strong growth, which is highly uncertain given that it does not fully account for a prolonged impact from the current war, will be led by Ukraine, Türkiye and Russia at 5%, 20% and 11%, respectively. In both Ukraine and Russia, growth is led by the crop sectors. In Türkiye, however, both crop and animal production growth are strong, but the value of animal production is expected to grow faster at than that of crops (24% and 20%, respectively) by 2031.

The long-term reduction in agricultural land use is expected to continue in the future, albeit slowly, suggesting that further growth in the sector will be underpinned by productivity gains. While total land use is trending downward, some reallocation is expected between pasture and crop land. Land used as pasture is expected to contract by 0.8% by 2031, double the rate of contraction expected for land used for crop production.

The value of crop production in the region is expected to expand by 10% over the next ten years, accounting for more than 71% of the region's growth in agricultural and fish production. While additional land will be used for crop production, productivity gains will also contribute significantly to this growth. The net value of production per hectare of cropland is expected to rise by an annual average of 1.1%, reflecting a combination of land intensification and yield gains. The crop area harvested is expected to expand by nearly 8.8 Mha, compared to a reduction of 1.5Mha in cropland use. Intensification results in additional area harvested across Western and Eastern Europe. Yield gains are also expected for all major crops, ranging from 3% for wheat, to around 5.9% for maize and oilseeds.

The bulk of crop production growth from the region is underpinned by rising cereal and oilseed output in the Black Sea region. Given the *Outlook's* assumption that productive capacity is restored in the medium term, Russia and Ukraine are projected to sustain robust growth in maize, wheat, soybean and other oilseeds, increasing their combined share to 41% for maize, 39% for wheat and 54% for all oilseeds. Maize production will grow most among all crops in both Russia and Ukraine, with significant expansion also expected in wheat and other oilseeds. Despite area expansion in both countries, yield improvements will drive the bulk of production gains by 2031. Their combined share of 82% in additional production of both maize and wheat projected for the total region by 2031 underscores the extent of risk and uncertainty associated with a prolonged war.

Livestock production is projected to grow at a slower rate than crops, at only 0.4% p.a. over the next decade. Western Europe still accounts for the bulk of livestock in the region, but as the transition to environmental sustainability continues, a modest contraction over the coming decade will see its share diminish from 62% in 2019-21, to 60% by 2031. Stronger growth in the rest of the region will lead to an expansion in the total value of livestock production by 3% over the next decade, with Eastern Europe's contribution growing to 29% and central Asia's to 12% of the region's total. With the exception of central Asia, where livestock inventories are still expanding, animal production growth will be based predominantly on intensification resulting in higher carcass weights. Growth in the total volume of poultry production is expected to be robust across the region, increasing by 6% by 2031. Fish production is expected to grow by 7% over the coming decade. Growth of 12% in aquaculture production, compared to 6% for capture fisheries, will result in the share of aquaculture in total fish production in the region rising to 21% by 2031.

Production of dairy products is expected to remain strong. Growth from Central Asia and Eastern Europe is expected to accelerate to 39% and 12%, respectively, by 2031. By contrast, production of dairy products in Western Europe is expected to expand by only 3%. However, expansion in dairy output will increasingly feed international demand, as an increasing share of the region's butter, cheese and milk powders is expected to be exported over the next decade. The region will account for 43% of global dairy product exports by 2031. The bulk of exports will be from the European Union, with its share in total regional exports of dairy products rising to 71% by 2031. Shaped by the transition towards environmental sustainability, the European Union's share of global milk production will, however, decline from 18% in 2019-21 to 15% by 2031.

Direct agricultural GHG emissions are projected to decline modestly by 1.3% by 2031. However, due to increased productivity, GHG emissions expressed relative to agricultural production is projected to decline by 8.3% compared to its level in the 2019-2021 base period. The decline in emissions relative to output is higher in Central and Eastern Asia at 12% and 14%, respectively, while in Western Europe the decline is just 5%.

2.6.3. Consumption

Slow growth in animal sourced foods in Western Europe, but better prospects in Central Asia

Most of the region constitutes a fairly mature market, but consumers were not spared the impact of the COVID-19 pandemic (De Vet et al., 2021[5]) (FAO, 2020[6]) (OECD, 2020[7]). Effects on food consumption were most severe in 2020 and mainly driven by short term affordability constraints, particularly in countries where consumers spend a larger share of total income on food and where income support measures were less comprehensive. In addition, changes to product mix and procurement channels related to COVID-19 impacts affected overall consumption. Retail sales increased and more food was consumed at home, while consumers tended towards online shopping, more local products, as well as products with a longer shelf life. The pandemic further accentuated consumer trends that had been evident earlier, such as rising awareness of healthy eating habits, which will continue to influence demand in the medium term. While many of the effects of the pandemic have eased, new food security concerns have arisen in Eastern Europe, as a result of the ongoing war, which as of mid-April, 2022, has seen almost 5 million refugees flee from and over 7 million people displaced within Ukraine since Russia's invasion began in February 2022.

Average daily calorie availability per capita in the region is well above the global average and is projected to increase by a further 35 kcal/day to exceed 3 440 kcal/day. The increase is concentrated in Eastern Europe and Central Asia and is mainly attributed to increased consumption of dairy products, cereals, and pulses. Though sugar consumption in Central Asia continues to rise, demand for sugar in the region as a whole is projected to continue to contract due to heightened health consciousness of European consumers. Sugar consumption per capita in Western Europe is projected to fall by 1.3 kg per year by 2031, but will remain almost 60% higher than the world average.

Protein availability per capita in the region is projected to increase by 2 g/day to 105 g/day by 2031, which is roughly 20% higher than the world average of 87 g/day. Protein availability from plant-based sources is growing, with per capita consumption of pulses rising by 20% thanks to its association with positive health outcomes, to exceed 5kg per capita per year by 2031. However, the biggest gain in protein availability will still be sourced from animal products, in particular rising dairy consumption. Across the region, domestic food demand for dairy products will remain strong, contributing 12% of daily calorie intake by 2031 and 20% towards daily protein availability. Consumption trends mirror those of production, with a reduction in per capita consumption in Western Europe, contrasting sharp gains in Eastern Europe and Central Asia. Meat consumption is growing at a slower rate but is still expected to approach 59kg per capita per year by 2031, being 2.2% above the base period level. The bulk of this growth will be from poultry, where consumption rises by 1.4kg to an average consumption of 24 kg/capita per year. By contrast, pork and bovine meat consumption is anticipated to each decrease by an annual average of 0.1% per annum over the coming decade. Fish consumption is also expected to decline slightly by 2031, but in Western Europe, per capita consumption levels will remain 1kg per capita above the global average of 18.8 kg by 2031. By contrast, fish consumption in central Asia will only reach 3kg per capita or roughly 16% of the global average level.

Owing largely to the importance of animal products, the region consumes almost a quarter of global protein feed. Slower growth in the livestock sector, along with improvements in feed use efficiency will result in slower growth of 3%, compared to 10% over the past decade. By 2031, the region's share in global feed use could decline to almost 22%. Like livestock production, the bulk of growth in feed use is in Eastern Europe and Central Asia, which contrasts a minor reduction in Western Europe. Maize feed use is expected to expand faster than wheat, reflecting stronger meat production growth in Eastern Europe and a small decline in Western Europe.

2.6.4. Trade

Russia's war against Ukraine constraints growth in crop exports

Trade patterns within the European and Central Asian region have shifted substantially over the past decade. Traditionally one of the biggest net importers, its trade deficit in agricultural products has shrunk to less than half the level of a decade ago. The change has been driven by rising exports from Eastern Europe, which has transitioned to become a net exporter (Figure 2.19). The shift was underpinned by Ukraine and Russia, where the combination of rising productivity and slow domestic demand growth has resulted in an ever-increasing exportable surplus, but where the current war will also affect prospects significantly. With a large land base, both Eastern Europe and Central Asia have a comparative advantage in cereal and oilseed production. In conjunction with already high consumption levels and limited population growth, this should enable export growth to further improve the region's net trade balance, assuming that the following the war productive capacity is restored. Under baseline assumptions, the region is expected to be the second largest net exporter behind Latin America and the Caribbean by 2031, but prolonged war may prevent this from materialising.

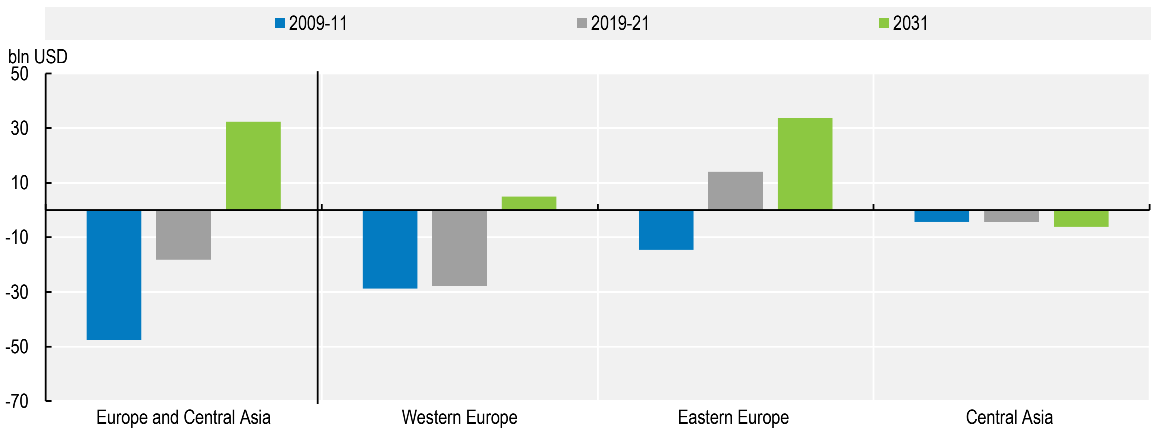
The total volume of exports from the region may expand 23% by 2031 relative to the base period, underpinned by a 28% expansion in crop exports, but a more subdued 10% expansion in livestock sourced exports. The region's cereal exports are projected to grow from 161 Mt in the base period to 190 Mt in 2031, an increase of 18%, with the Near East and North Africa region as a major importer. This will see its global market share increase to 36% by 2031. While wheat remains the major contributor to cereal exports from the region, the importance of maize is growing. Wheat exports are expected to rise by 18%, accounting for 55% of global exports, while maize exports are expected to grow by 17%, to constitute 22% of the global market by 2031.

The region is a major exporter of meat and dairy products, but growth in meat and dairy exports is slower than that of crop products. The region accounts for 44% of global pig meat and 29% of global poultry export. This comes mainly from the European Union, which constitutes 90% of pig meat, 59% of bovine meat and 53% of poultry exports from the region. The EU contribution makes the region the most important dairy product exporter in the world. The region provides 41% of global dairy exports, of which 70% comes from the European Union. For cheese, the region constitutes 59% of the global market, of which the European Union contributes 40%. For all dairy products, both the European Union's and the region's share in global trade is set to rise. By 2031, the European Union will contribute 44%, 31%, 34% and 11%, respectively, of global exports for cheese, butter, SMP and WMP.

Led by Russia and Norway, the region is also one of the most important exporters of fish. Russian exports could rise by 31% over the ten-year projection period, supporting growth of 14% in the Europe and Central Asian region.

Despite slower growth, the region remains a major importer. Much of this trade occurs within the region, with Central Asia being a net importer of livestock products. Considering the importance of intra-regional trade, the future status of the Russia's import embargo and the war will affect trade within and outside the region. Apart from livestock, the Europe and Central Asia region is a major importer of protein meal, where its share in global imports is expected to decline from 34% in the base period to 29% by 2031. The region also imports significant amounts of sugar and ethanol, but this is projected to decline over the projection period and may be affected by sanctions in the energy sector as a result of the war.

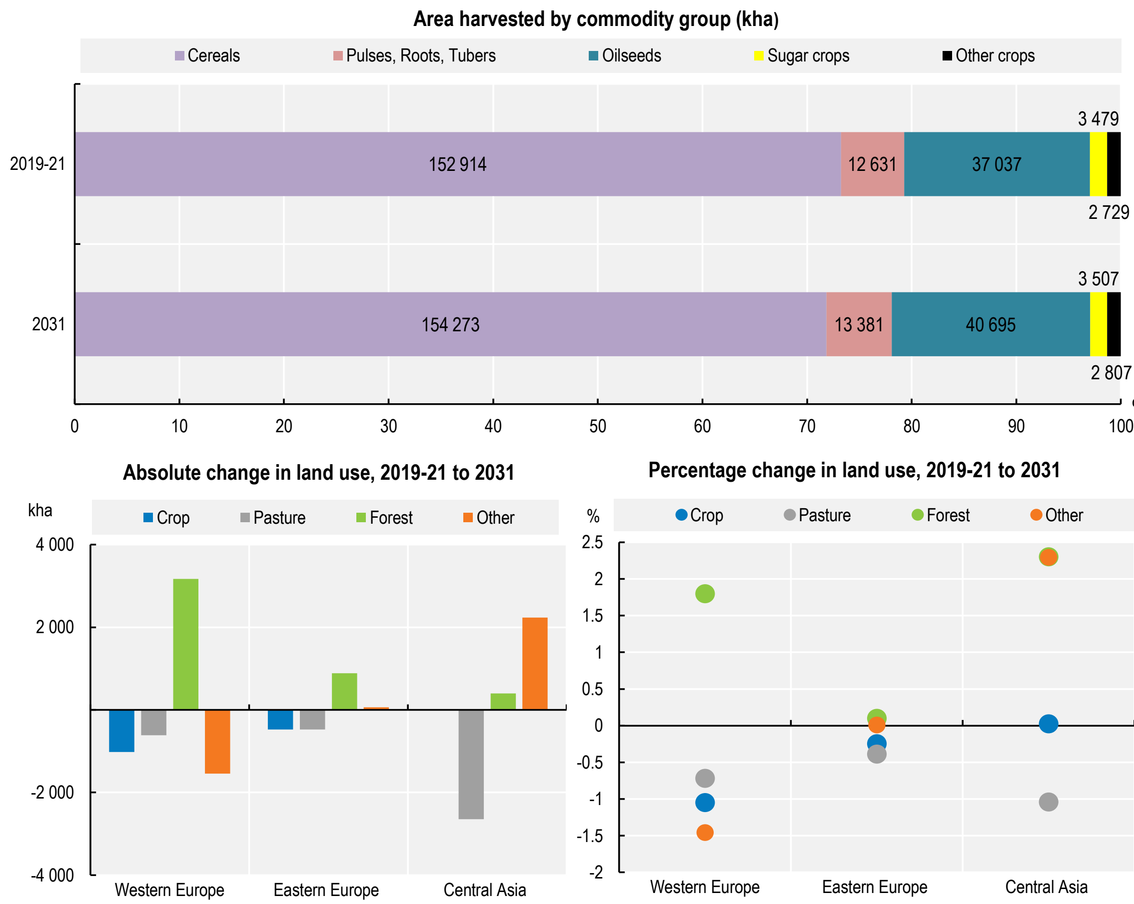
Figure 2.19. Net exports of agriculture and fish products from Europe and Central Asia (including processed products)



Note: Estimates are based on historical time series from the FAOSTAT Trade indices domain, which are extended with the *Outlook* database. Products not covered by the *Outlook* are extended by trends. Total trade values include also processed products, usually not covered by the Outlook variables. Trade values are measured in constant 2014-2016 USD.
Source: FAO (2022). FAOSTAT Trade Indices Database, http://www.fao.org/faostat/en/#data/TI ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/7yrjob

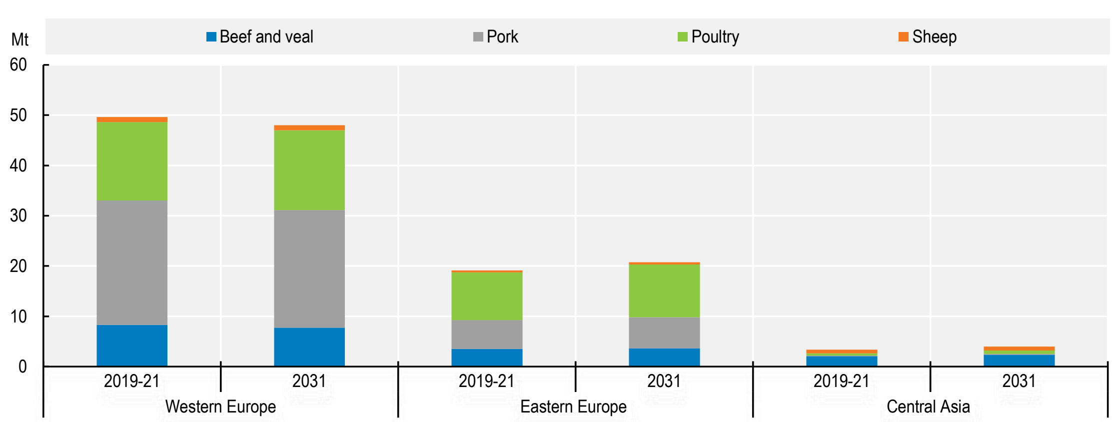
Figure 2.20. Change in area harvested and land use in Europe and Central Asia



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

StatLink https://stat.link/4nip8j

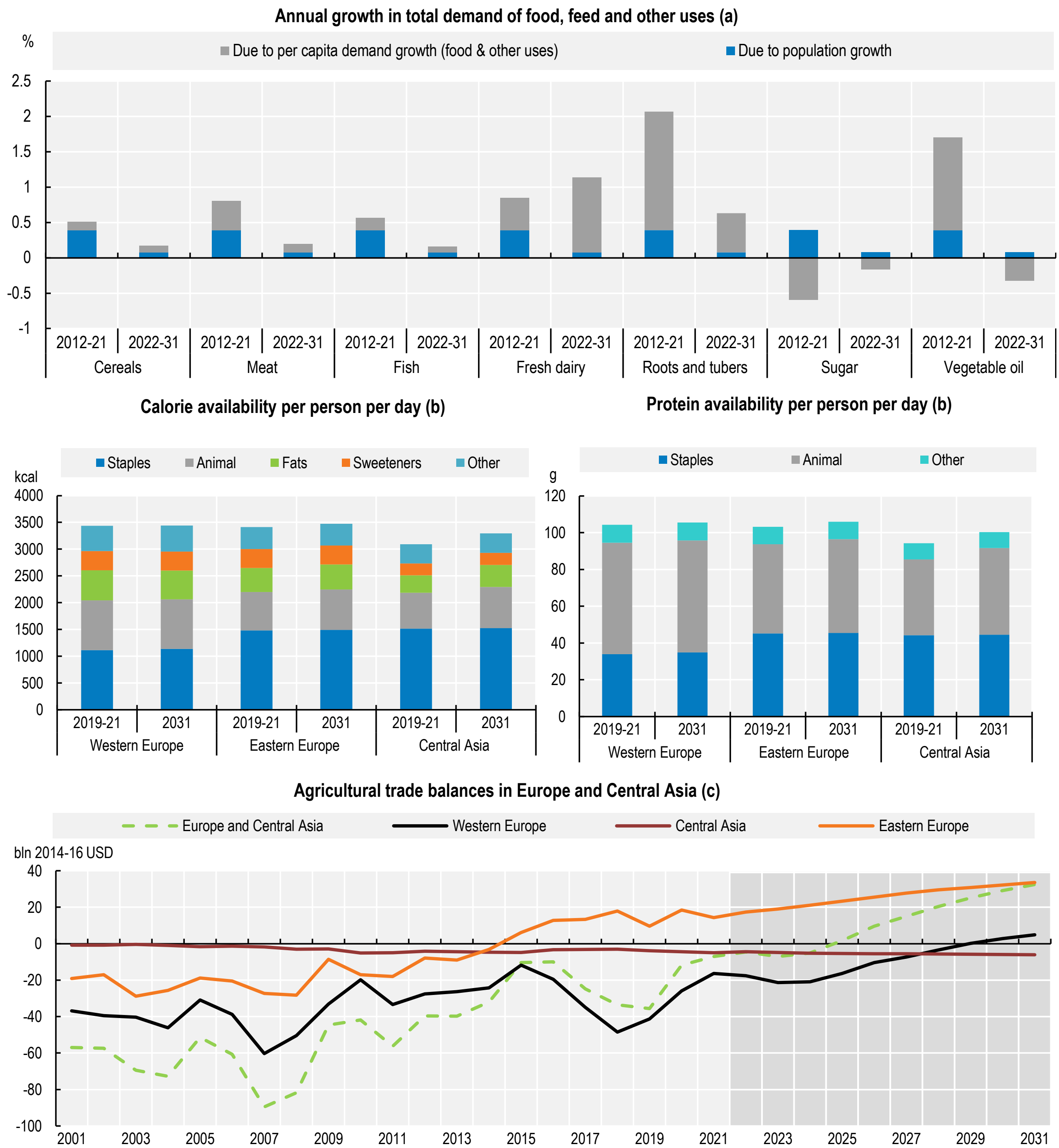
Figure 2.21. Livestock production in Europe and Central Asia



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

StatLink https://stat.link/c5y7r0

Figure 2.22. Demand for key commodities, food availability and agricultural trade balance in Europe and Central Asia



Notes: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets and trade indices databases and include products not covered by the *Outlook*. a) Population growth is calculated by assuming per capita demand constant at the level of the year preceding the decade. b) Fats: butter and oils; Animal: egg, fish, meat and dairy except for butter; Staples: cereals, oilseeds, pulses and roots. c) Include processed products, fisheries (not covered in the FAOSTAT trade index) based on outlook data.
Source: FAO (2022). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/alm0yg

Table 2.5. Regional indicators: Europe and Central Asia

	Average			%	Growth [2]	
	2009-11	2019-21 (base)	2031	Base to 2031	2012-21	2022-31
Macro assumptions						
Population ('000)	895 571	932 572	943 026	1.12	0.39	0.08
Per capita GDP[1] (kUSD)	23.79	26.40	31.94	20.99	1.10	1.76
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	584.4	664.8	715.7	7.65	1.32	0.77
Net value of crop production[3]	330.1	372.4	408.5	9.70	1.28	1.01
Net value of livestock production[3]	206.3	240.3	251.1	4.50	1.44	0.38
Net value of fish production[3]	48.1	52.2	56.1	7.51	1.12	0.80
Quantity produced (kt)						
Cereals	508 768	601 972	628 511	4.41	1.75	0.95
Pulses	8 194	13 082	16 498	26.11	6.58	2.41
Roots and tubers	28 715	31 843	33 047	3.78	2.00	0.75
Oilseeds[4]	49 054	69 654	84 094	20.73	3.29	1.51
Meat	60 224	72 098	72 725	0.87	1.87	0.00
Dairy[5]	24 902	29 365	32 698	11.35	1.61	1.09
Fish	17 150	18 720	20 088	7.31	1.20	0.79
Sugar	26 628	27 456	28 522	3.88	0.66	0.33
Vegetable oil	24 019	34 441	40 669	18.08	3.30	1.22
Biofuel production (mln L)						
Biodiesel	10600.38	15449.29	16220.30	4.99	2.81	-0.98
Ethanol	6 792	7 842	8 517	8.60	1.10	0.81
Land use (kha)						
Total agricultural land use	802 188	796 355	791 139	-0.65	-0.09	-0.05
Total land use for crop production[6]	335 722	333 679	332 198	-0.44	-0.09	-0.07
Total pasture land use[7]	466 467	462 675	458 942	-0.81	-0.10	-0.04
GHG Emissions (Mt CO2-eq)						
Total	719	745	735	-1.28	0.30	-0.11
Crop	172	188	187	-0.72	0.77	0.06
Animal	528	538	531	-1.28	0.15	-0.16
Demand and food security						
Daily per capita caloric availability[8] (kcal)	3 344	3 394	3 443	1.46	0.13	0.26
Daily per capita protein availability[8](g)	100.9	103.0	105.4	2.4	0.2	0.3
Per capita food availability (kg/year)						
Staples[9]	167.2	167.8	171.2	2.03	0.02	0.19
Meat	55.1	57.5	58.8	2.23	0.43	0.15
Dairy[5]	26.7	29.4	31.8	8.14	0.89	0.90
Fish	16.3	15.7	15.6	-0.80	-0.23	0.06
Sugar	36.6	34.6	33.8	-2.29	-0.48	-0.13
Vegetable oil	18.9	22.4	23.9	6.90	0.87	0.34
Trade (bln 2014-16 USD)						
Net trade[3]	- 48	- 18	32	-278.84	..	..
Value of exports[3]	421	561	693	23.37	2.72	1.84
Value of imports[3]	468	580	660	13.91	2.14	1.09
Self-sufficiency ratio[10]						
Cereals	109.4	119.2	125.0	4.84	0.65	0.56
Meat	99.0	108.4	105.5	-2.67	1.06	-0.20
Sugar	79.8	84.4	89.7	6.23	1.00	0.55
Vegetable oil	81.8	95.7	110.3	15.22	1.6	1.4

Notes: 1. Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data 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 represent 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/protein represent availability per capita per day, not intake. 9. Staples represent cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports) * 100.
Sources: FAO (2022). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

2.7. Regional outlook: North America

2.7.1. Background

High performing and resilient agro-food sector

North America is more homogeneous than other regions covered in this chapter. The United States and Canada are two highly developed countries with mature and diverse economies. Its 369 million people comprises less than 5% of the global population, a share that is expected to decline over the coming decade with population growth of only 0.6%. The share of agriculture, forestry and fisheries in total regional GDP is only 1.1%, but the region is a major contributor to global agriculture.

Comprising 10% of the land used for agriculture globally, the region has the most agricultural land per person. It contributes 9% of global agriculture and fish output and provides the highest value of agricultural and fish production per capita. Over the 2019-21 period, the region had the third largest trade surplus for agricultural commodities (after Latin America and South and Southeast Asia) and accounts for 13% of global exports. Nevertheless, the share of North America in global agriculture is slowly diminishing over time, as the output and exports from other regions are growing faster. By 2031, North America is expected to constitute 12% of global agriculture and fish exports. While it is still expected to have the third largest trade surplus by 2031, this will be less than 60% of the base period value by 2031.

Agriculture in North America is characterised by high input intensity, but in the decade up to 2019, estimated total factor productivity actually declined by 1%, after strong growth in the preceding decade due largely to capital investments.[21] Fertiliser use is high compared to most other regions, suggesting that rising fertiliser costs in the short term will reduce margins substantially. Production also tends to be capital intensive, as it occurs predominantly on large commercial units. Accordingly, the region records very high productivity of land and livestock, as measured by crop yields, milk yields and livestock/meat off-take ratios. The long-term decline in agricultural land use and land in crop production has slowed in recent years, reflecting only a modest contraction over the past decade. Yields have improved to the extent that crop production increased by 12% over the same period. This trend is expected to continue, with a 13% gain in crop production despite a projected 2% decline in cropland use by 2031. Livestock production is a significant contributor with its share in the total value of agricultural output rising over the past decade to an average of 36% between 2019 and 2021. This compares to the global average share of livestock of 30%. However, the livestock inventory is proportionately lower given its high productivity. For example, bovine meat production per animal is triple the global average level. The region is a small producer of fish compared to other regions, and its share in global production is set to decline further to 3% by 2031.

Food consumption per capita in the region is the highest of all. This is enabled by the highest per capita income (USD 54 588) and the highest urbanisation rate (83%), which affects both the level and composition of food intake. The COVID-19 pandemic and the measures imposed to curb its spread reduced per capita GDP in the region by 4.2% in 2020. Despite the first year-on-year increase in 2020 in the prevalence of food insecurity since 2014, the mature consumer base, combined with income support measures and subsequent stimulus packages meant the shock from the pandemic had a greater influence on the composition and distribution of food sales than on quantity consumed. With restaurant closures and reduced hospitality, food eaten away from home declined, while retail grocery sales increased, driving significant changes in the food supply chain. Pre-pandemic, half of American and 35% of Canadian food dollars were spent on food away from home (Saksena et al., 2018[8]) (Canning, Weersink and Kelly, 2016[9]). The shift in retail sales also included changes to the type of food and packaging sizes demanded. Adaptations to the food supply chain took time, resulting in increased waste in the short term, but it was able to return to near normal levels within a few months and is likely to be more resilient to future shocks as a result of this adaptation (Weersink et al., 2021[10]).

The recovery from the pandemic induced recession in 2020 was strong and per capita GDP increased by almost 5% 2021, sufficient for absolute levels to exceed that of 2019. After a further 3% growth in 2022, real per capita income is projected to grow at an average of 1.1% p.a. over the coming decade. With income levels already high and population growth at 0.6% p.a., possible changes in dietary preferences could be important in influencing food demand over the outlook period. Further to its influence on spending power, the pandemic may also have lasting impacts on such preferences, providing a renewed focus on the benefits of healthy diets.

While estimates include considerable food waste, calorie and protein availabilities in the region already averaged 3 808 kcal/capita per day and 114 g/capita per day in 2019-21, these are some 29% and 36% higher, respectively, than the global average. Food consumption is proportionately high in animal products, with calorie and protein shares of 29% and 64%, respectively, compared to global averages of 18% and 40%. North American diets are also high in vegetable oil and sweeteners, with caloric shares of 19% and 15% compared to the global averages of 10% and 8%, respectively. The diets and lifestyles have led to a higher incidence of obesity and food related chronic diseases such as diabetes. However, despite this level of aggregate consumption, food insecurity was estimated to be experienced by 10-13% of the region’s population prior to pandemic related impacts given the wide disparity of incomes (Tarasuk and Mitchell, 2020[11]).

North America (specifically the United States) is the largest biofuel producing region, with a production share of global output and exports exceeding 40% and 35%, respectively. It comprises primarily ethanol derived from maize feedstocks and, to a lesser extent, biodiesel derived from soybean oil. Production has been mainly policy driven, with mandates largely filled at blending rates near the blend wall for transportation fuels, but persistence of high crude oil prices may provide renewed impetus. Trade within the region is important, with Canada relying strongly on ethanol imports from the United States to fulfil its own blending mandate.

The North American region is a major producer and exporter of agricultural products and if current high prices persist as a result of supply constraints from the Black Sea region due to the war, its ability to respond with increased supply will be critical to the availability and affordability of food globally. Declining cropland use in the past suggests that some expansion would be possible. However, some evidence suggests that productivity growth slowed in the last decade (Fuglie, 2015[12]) and, with rising environmental costs, competitiveness may be eroded in the future.

2.7.2. Production

Rising productivity driving higher output, on less land

Agricultural and fish production in North America is projected to continue expanding, albeit at a slower rate of 11% over the coming decade, relative to the past. Although prices are high in the short term, stable and in some cases declining real prices in the medium term, together with a strong US dollar, remain core drivers of slower expansion. Contrary to the past decade, growth is expected to be stronger in crop sectors, which will grow 13% by 2031 relative to 2019-21, whereas livestock and fish production are both projected to expand by only 7%.

Growth in crop output, despite a continuation of the historic decline in cropland use, which declines by a further 2% by 2031, implies that crop production per hectare will continue to rise. Land use in cereals is projected to increase by 3.6%, thereby increasing its share in total cropland to 42% by 2031. Oilseed area is expected rise by 7% over the next ten years, supported by high prices in the beginning of the outlook period, feed demand from livestock production growth and rising biofuel production. The share of oilseeds in total crop area will thus rise to 29% by 2031. From a much smaller base, the land used for pulses will also expand by 9% over the next ten years, while land for roots and tubers continues to decline. Total area harvested in the region is expected to contract by only 1.5% – less than the total land use due to some intensification. This entails a decline of 2% in the United States of America, while the area harvested in Canada may grow by almost 1%. In the United States, total crop output is set to rise by 12% relative to the base period, whereas in Canada this growth will be much stronger at 21%. In the case of Canada, this growth is influenced to some degree by a weak base period, due to sharply reduced crop output in 2021, when cereals and oilseed production declined by 29% and 25%, respectively. Over the medium term, production growth in both countries emanate mostly from yield gains ranging from 8% for cereals and 12% for oilseeds.

The impact of the pandemic related recession resulted in downward pressure on meat prices in 2020, because of reduced consumer spending power, as well as the influence of COVID-19 and the measures imposed to contain its spread on processing facility capacity. The combination of demand recovery, and supply constraints due to high feed costs will drive a short-term recovery, after which real prices trend downwards. Consequently, meat production growth in North America is expected to slow, but production in the region is still expected to rise to 56 Mt by 2031, a 6% increase relative to the base period. Of the 3.1 Mt gain, 2.8 Mt (90%), is sourced in the United States. Poultry meat production is expected to grow fastest amongst the major meats, at 0.7% p.a. and will account for 59% of additional meat produced by 2031. Consequently, its share in total meat output rises to 47% by 2031. Pig meat production growth is only slightly slower that of poultry, whereas bovine meat production is expected to increase at a slower annual rate of just 0.3%.

Improvements in dairy cow milk yields is the main contributor to milk production expanding by 13%. By 2031, the dairy cow herd is expected to expand by 3% from the base period, while milk yields rise by 9%. Given consumer preferences, an increasing share of milk will go for processed dairy products and a decreasing share to fluid milk.

Fish production in North America remains dominated by capture fisheries, which contribute 89% of total production. Total fish production is expected to rise to 6.4 Mt by 2031, adding 7% to the 6 Mt produced in the base period. More than 65% of the additional production will come from the United States. Aquaculture continues to develop, albeit from a lower base, and is expected to contribute 12.4% of total production by 2031.

The increase total GHG emissions from agriculture is expected to slow relative to the past decade and expressed on a per capita basis, will decline. Total emissions from agriculture will be 1.4% higher in 2031 than in the base period. Emissions from livestock activities are the major contributor, growing by 1.5% linked to minor ruminant stock expansion. Emissions from the crop sector, however, are projected to decline by 0.5%.

2.7.3. Consumption

Consumer preferences likely to drive demand in the coming decade

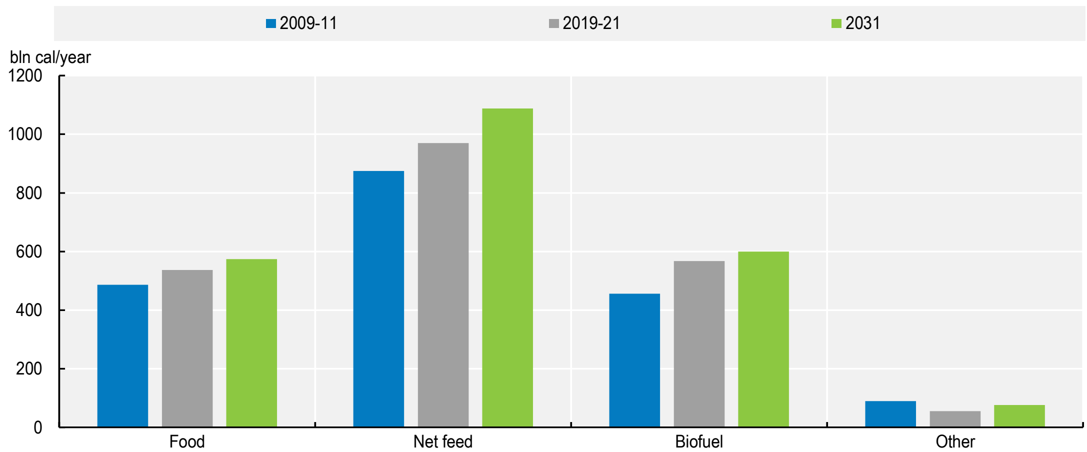
In the developed economies of Canada and the United States, changes in per capita food consumption are largely determined by changes in preferences, but these are projected to be minor. The effects of the pandemic may have induced a greater focus on healthy diets, which would have a marked influence on fresh produce but these products are not directly covered in this *Outlook*. For some individual product categories such as sweeteners and vegetable oils, a downward trend appears to be emerging. As measured by caloric availability, food consumption in North America is set to rise marginally by 14 kcal/capita/day by 2031; it will remain 25% above the global average and still the highest of any region covered in the *Outlook*. Regionally, the greatest decline is expected to come from sweeteners (-55 kcal) and cereals (-13 kcal). These trends are partly offset by rising consumption of animal products, including meat (+8 kcal) and dairy (+19 kcal). The rise in total caloric availability will be greater in Canada (24 kcal) than in the United States (13 kcal), but the absolute levels of caloric availability will still be much higher in the United States than in Canada by 2031.

Protein intake in the region will increase only marginally from 114 g/day in the base period, to 116g/day by 2031. The split between animal and plant based sources is expected to remain fairly constant, with the share of protein obtained from animals rising by less than 1% to 65% of total protein availability by 2031. An increase is expected in the consumption of meat (0.7 kg/capita), with poultry and pig meat increasing by 1.3 and 0.3 kg/capita, respectively, while a 0.9 kg/capita decrease is anticipated for bovine meat. On a dry matter basis, consumption of dairy products is projected to decline 4% by 2031. However, protein availability from dairy products is expected to rise, largely due to growth in cheese consumption of 1.3 kg/ capita per year. Fish consumption is projected to increase 5% by 2031 relative to the base period. Due to the long-term decline in cereal consumption, protein availability from plant-based sources is set to decline marginally, despite a 14% increase in pulse consumption by 2031.

Feed use in the region is significant, consuming more energy/calories than final food use (Figure 2.23). Following increased livestock production, total feed use is projected to rise by 12% to 304 Mt by 2031, with the feed use share from maize (including distiller dried grains) rising slowly over time to 69%, while protein meal falls to 16%.

Biofuel production is an important market for feed grains in the region. Ethanol production is projected to rise by 5.9% to almost 64 billion litres by 2031, supported by decarbonisation programmes. Amid ever-increasing emphasis on sustainability, biodiesel production is expected to expand by 4% over the coming decade. The outlook for biofuel is heavily contingent on developments in the energy sector and biofuel policies. The United States has indicated that it may approve the use of 15% ethanol blends for use in the summer of 2022. If such approval were granted, and particularly if such a blend were extended, the impacts on global markets could be significant.

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



Note: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets database, which are extended with the *Outlook* database. Products not covered in the *Outlook* are extended by trends.
Source: FAO (2022). FAOSTAT Food Balances Database, http://www.fao.org/faostat/en/#data/FBS; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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2.7.4. Trade

Both exports and imports are set to increase

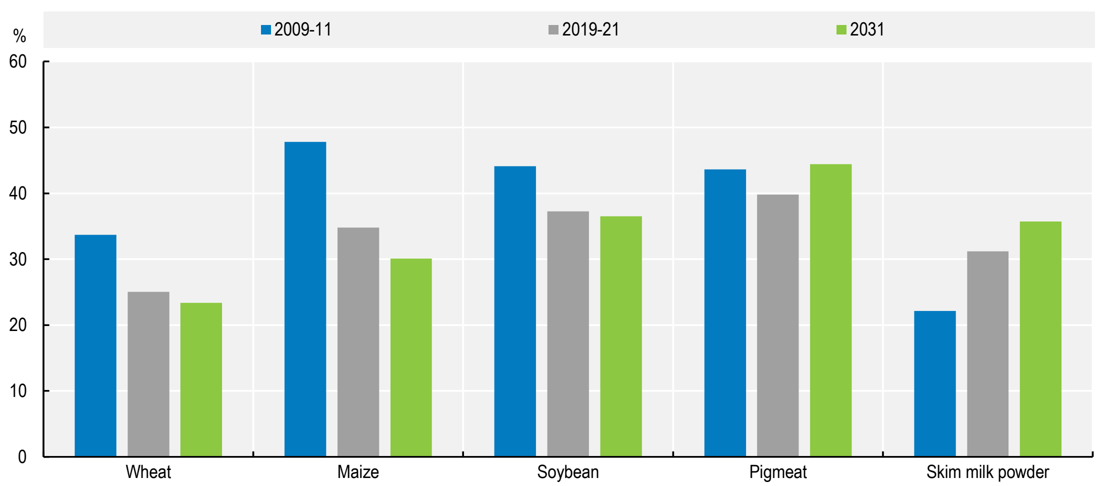
North America's agricultural trade surplus has declined by 27% over the past decade. This trend is set to prevail over the outlook period, with net imports into the region growing faster, at 1.6% p.a., than that of exports (1.0% p.a.). Both growth in imports and export are set to decelerate, reflecting weakening domestic and foreign demand, and the subsequent slowdown in production growth. Trade relations, particularly between the United States and China, have been an important factor affecting the region, due to significant volumes of bilateral trade. After a turbulent period, these relations have improved and in 2021 China was the top market for US agricultural exports. This points to resumed and potentially expanded trade opportunities and reflects additional demand for feed products from China following expansions in poultry production and rapid rebuilding of its pig herd post ASF. The United States-Mexico-Canada (USMCA) Agreement, which was implemented on 1 July 2020 to replace the North American Free Trade Agreement (NAFTA), has also influenced intra-regional trade, with significant additional exports from the United States to both Canada and Mexico in 2021.

The value of exports, measured at international commodity prices in 2014-16, is, projected to rise 12% by 2031 relative to the 2019-21 base period. This compares to an increase of 20% the past decade. The slower growth relates largely to decreasing soybean exports (despite improvements in trade relations with China), maize and ethanol exports.

The region has lost considerable trade share in recent times for maize, wheat and soybeans. In the case of maize, this trend is expected to continue, albeit at a slower rate, due to growing competition from Latin America and prior to the war, the Black Sea region. North America's share in global soybean exports is set to stabilise over the latter half of the outlook at around 37%. North America's share in the global ethanol trade is expected to stabilise at around 50%, whereas its share of global trade of both pig meat and Skim Milk Powder is set to rise (Figure 2.24).

Although recording a trade surplus, the region is also a major importer of agricultural produce. The net value of imports, measured in constant 2014-16 prices, is expected to increase 20% by 2031. The region was previously a large net importer of bovine meat, and while it still has a large share of world imports (18%), domestic exports have increased to the extent that it has become a net exporter in the last decade. This trend is expected to persist, with the region's share in global bovine meat exports expected to remain around 18% in 2031, while its share of global imports continues to decline. The region remains a relatively large importer of fish, with a 15% share of global markets and imports are set to grow by 11% by 2031. The region is also a major importer of fresh fruit and vegetables, which is expected to continue over the outlook period.

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



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

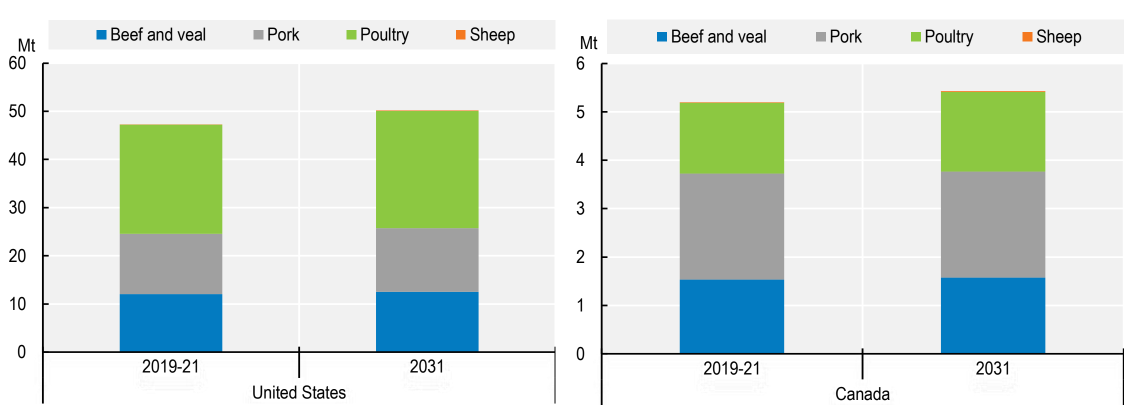
StatLink https://stat.link/af679p

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

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

StatLink https://stat.link/8v4mcg

Figure 2.26. Livestock production in North America



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

StatLink https://stat.link/2bfg34

Figure 2.27. Demand for key commodities, food availability and agricultural trade balances in North America

Notes: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets and trade indices databases and include products not covered by the *Outlook*. a) Population growth is calculated by assuming per capita demand constant at the level of the year preceding the decade. b) Fats: butter and oils; Animal: egg, fish, meat and dairy except for butter; Staples: cereals, oilseeds, pulses and roots. c) Include processed products, fisheries (not covered in the FAOSTAT trade index) based on outlook data.

Source: FAO (2022). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/tdp1y2

Table 2.6. Regional indicators: North America

	Average			%	Growth [2]	
	2009-11	2019-21 (base)	2031	Base to 2031	2012-21	2022-31
Macro assumptions						
Population ('000)	343 112	368 735	392 615	6.48	0.68	0.56
Per capita GDP[1] (kUSD)	48.41	54.59	63.54	16.40	1.18	1.13
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	339.9	385.4	426.3	10.61	1.35	0.71
Net value of crop production[3]	204.8	228.5	258.6	13.17	0.96	0.72
Net value of livestock production[3]	117.9	140.2	149.9	6.89	2.38	0.73
Net value of fish production[3]	17.2	16.7	17.8	6.82	-1.23	0.52
Quantity produced (kt)						
Cereals	447 068	489 441	545 459	11.45	1.01	0.53
Pulses	7 415	9 620	11 491	19.45	1.40	1.52
Roots and tubers	4 995	5 636	5 897	4.65	0.88	0.28
Oilseeds[4]	16 806	21 508	27 191	26.42	0.47	0.99
Meat	45 565	52 514	55 591	5.86	1.99	0.65
Dairy[5]	11 859	14 227	16 108	13.23	1.80	1.14
Fish	6 139	5 961	6 362	6.73	-1.16	0.51
Sugar	6 950	7 609	8 616	13.23	0.89	0.44
Vegetable oil	13 564	18 243	19 959	9.41	3.10	1.11
Biofuel production (mln L)						
Biodiesel	2469.68	9283.36	9631.41	3.75	9.40	-1.28
Ethanol	50 338	60 172	63 721	5.90	1.34	0.21
Land use (kha)						
Total agricultural land use	465 270	463 768	463 304	-0.10	0.07	-0.01
Total land use for crop production[6]	174 130	172 362	168 694	-2.13	0.13	-0.19
Total pasture land use[7]	291 140	291 407	294 610	1.10	0.03	0.10
GHG Emissions (Mt CO2-eq)						
Total	426	440	446	1.37	0.50	0.19
Crop	123	128	128	-0.53	-0.02	-0.09
Animal	278	280	285	1.51	0.57	0.29
Demand and food security						
Daily per capita caloric availability[8] (kcal)	3 680	3 808	3 822	0.35	0.55	0.07
Daily per capita protein availability[8](g)	112.0	114.1	115.8	1.5	0.7	0.2
Per capita food availability (kg/year)						
Staples[9]	134.5	133.4	132.1	-0.99	0.09	-0.07
Meat	92.5	98.5	99.2	0.71	1.23	0.12
Dairy[5]	32.1	34.9	36.3	3.94	0.92	0.45
Fish	19.2	19.7	20.7	5.00	0.55	0.12
Sugar	31.9	30.6	30.0	-1.97	0.31	-0.31
Vegetable oil	35.4	39.4	41.6	5.63	1.14	0.63
Trade (bln 2014-16 USD)						
Net trade[3]	33	24	14	-41.41	..	..
Value of exports[3]	148	177	198	12.06	1.81	0.97
Value of imports[3]	115	153	184	20.44	2.05	1.63
Self-sufficiency ratio[10]						
Cereals	125.3	130.6	126.5	-3.15	0.22	-0.07
Meat	115.8	115.9	114.8	-0.93	0.11	0.01
Sugar	62.1	68.5	71.5	4.29	0.83	0.01
Vegetable oil	102.1	94.9	97.1	2.41	-0.40	0.42

Notes: 1 Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseed 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/protein represent availability per capita per day, not intake. 9. Staples represent cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports)*100.
Sources: FAO (2022). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

2.8. Regional outlook: Latin America and the Caribbean

2.8.1. Background

Strong potential to expand production but poverty is a brake on food consumption

The Latin America and Caribbean[22] region is home to about 8.5% of the global population, growing at 0.7% p.a., which will add another 57 million people by 2031. As the most urbanised amongst developing regions, 84% of the population is expected to reside in urban settings by 2031. While this also implies that most of the region's poor dwell in urban locations, the incidence of poverty in rural areas remains persistently high. Highly diverse farm structures range from large, commercial export-oriented farms dominating agriculture in the Southern Cone, particularly in Argentina and Brazil, to some 15 million smallholder and family farms responsible for much of the region's food production (OECD/FAO, 2019[13]).

For some time the region has been affected by considerable economic uncertainty, which has been heightened further by the COVID-19 pandemic.[23] On a per capita basis, incomes contracted by 1.8% per annum over the past decade. Given pre-existing structural challenges, the effects of COVID-19 were particularly severe in the region and per capita GDP declined by 7.3% in 2020. Despite a strong rebound of 5.3% in 2021, absolute income per capita is only projected to surpass pre-pandemic levels by 2023. Given the extent of differing pre-existing challenges within the region, the pandemic induced recession was also greater in some countries. For instance, in Argentina, the exchange rate had already been on a steep depreciating trend prior to 2020, but the depreciation accelerated through the pandemic and real GDP per capita contracted by almost 11%. The recovery in Argentina is also more prolonged, and while per capita income will surpass 2019 levels by 2022, it remains lower than that of a decade earlier.

Following good initial progress to reduce it, the prevalence of undernourishment in the region started to increase again post 2014. The combined impact of economic recession, deteriorating financial conditions and value chain disruptions accelerated this trend and 2020 represented the biggest year-on-year increase in undernourishment and food insecurity since the initiation of the upward trend. Between 2014 and 2020, the number of hungry people increased by 79%, and in 2020 those in moderate or severe food insecurity constituted 41% of the population. The Economic Commission for Latin America and the Caribbean suggests that the pandemic pushed the extreme poverty rate in the region to 13.8% in 2021, having increased to 13.1% in 2020. Compared to 2019, this has left 13 million additional people in extreme poverty over a two-year period, significantly exacerbating food insecurity.

In the medium term, per capita GDP in the region is expected to rise by an annual average of 1.6% to reach USD 10 190 per capita by 2031, which is 23% below the global average and only 3% higher than its level in 2014. The share of food in household expenditures is estimated to be around 14% on average for 2019-2021. Macroeconomic instability and food prices may have considerable impact on food security in the region in the coming decade.[24]

Abundant in land and water, the region accounts for 13% of the global production of agricultural and fish commodities and 17% of the net export value of these products. This share is set to increase further over the coming decade, underscoring the importance to the region of trade openness at a global level. Export demand will be the critical source of growth over the medium term. Export growth has been aided by increased competitiveness, with total factor productivity growing by 40% from 2000 to 2019.[25] Despite falling labour input, output growth has been underpinned by rising material inputs, notably fertiliser which doubled over the period 2000 to 2019. These inputs will face challenges of higher costs early in the *Outlook* period, and may constrain growth. Despite the region's significant export orientation, intra-regional trade is low and there are some countries in the region such as Panama and El Salvador which are net importers

Despite the importance of exports, the agriculture and fish sectors account for about 10% of GDP. This share increased in 2020 due to agriculture's resilience and exemption from lockdown restrictions. It could rise further in the short-term if supply constraints from Russia's war against Ukraine result in prolonged higher prices in export markets, which would induce higher production. However, this share of agriculture and fish in GDP is anticipated to decline marginally in Latin America and Caribbean over the medium term. The agricultural and fish sectors also face some challenges, having been increasingly affected by adverse climate events and recently high transport, energy and fertiliser costs.

Despite being the biggest net exporter amongst the regions in the *Outlook*, the Latin America and Caribbean region still faces major challenges in reducing food insecurity. Much of this emanates from income distributional issues and resultant affordability constraints, and not the availability of food in the region. Export led growth has made the sector less vulnerable to macro-economic instability within the region, but implies that volatility in the global market and a renewed focus on domestic supply chains in many parts of the world following the pandemic could affect its growth prospects. Export growth from the region is projected to slow relative to the recent past, in line with slower production growth, but also weakening global import demand. The region also faces challenges associated with increased concentration of exports by destination, exposing export demand to higher market risks.

2.8.2. Production

Good prospects for higher productivity for crops and livestock

Agricultural and fish production in the region is projected to expand by 14% over the next ten years. Around 64% of this growth emanates from crop production, about 28% from the livestock sector and the remaining 8% originates from fish.

Intensification is expected to play an important role in expanded crop production, despite the region's land abundance. With more double cropping, the harvested area is set to expand by 6.7%, with a concomitant increase in cropland use of only 3.4% by 2031. Among the 12.4 Mha growth in harvested area by 2031, nearly 3.2 Mt and 2.6 Mt, respectively, are attributable to additional cultivation of soybeans and maize. The region will remain the largest producer of soybeans in the world, accounting for 53% of global production by 2031. This implies that any weather related supply reductions from the region, can impact significantly on world prices. Assuming more favourable weather conditions, the region has ample potential to increase production to fill possible supply constraints with a prolonged war. The region's contribution to global cereal production is smaller, but its share of maize production is set to rise to almost 18% by 2031.

Productivity gains have contributed greatly to crop production growth in the past. For major crops such as maize and soybeans, yields improved by 23% and 13%, respectively, over the past decade. This trend is expected to continue, with average yield gains of around 10% projected by 2031 for most major crop commodities. This enables continued improvement in the net value of crop production per hectare of land, which is already the second highest amongst the regions in this *Outlook* and set to rise by a further 1.2% p.a. over the coming decade. The region is an intensive user of fertiliser, second only to the Developed and East Asia region, and imports large quantities, suggesting that sharp increases in fertiliser costs, exacerbated by the war could potentially constrain yield growth and output in the short term.

Livestock production growth will also benefit from productivity gains and further intensification, with increased use of feed grains. Poultry production will account for more than 55% of growth in meat production by 2031, with bovine and pork production accounting for 29% and 16%, respectively. Despite short-term pressure in the early years of the *Outlook*, meat to feed grain price ratios will be favourable over the medium-term, boosting the expansion of poultry and pork production, both of which rely on intensive use of feed in production. Bovine meat expansion will result from productivity gains, increased carcass weights, and 3% expansion of herd numbers by 2031 to yield growth of 10.8%.

Fish production will recover from a modest contraction over the past ten years to register growth of 12% by 2031. The development of aquaculture in several countries across the region is the predominant driver of fish output, contributing more than 60% of additional production by 2031. Captured fisheries are expected to be volatile over the projection period, influenced by *El Niño* effects, which tend to affect fish (mainly anchoveta) used for the production fishmeal and fish oil.

GHG emissions are projected to grow marginally by 0.1% p.a. over the next decade. The bulk of this increase accrues from crop production, where emissions will increase by 3.2% over the ten-year period, compared to an increase of 2.3% from livestock production. However, relative to the net value of agricultural production, emissions per unit value of output are set to decline albeit at a slower rate than in the past.

2.8.3. Consumption

Consumers are slowly changing dietary patterns

Following a short-term decline, influenced by the impact of the pandemic on purchasing power and the prolonged recovery, average per capita calorie intake is projected to rise in the medium term to reach 3077 kcal/day by 2031. This means an increase of 60 kcal/day from 2019-21 levels and is mainly attributed to animal products. The rise in calories obtained from plant-based foods is limited by a large decline of sweeteners (-28kcal) and possibly pointing to increasing health awareness amongst consumers. Despite the decline, Latin America and the Caribbean will remain the largest sugar-consuming region in the world on a per capita basis. Initiatives such as improved school feeding programs and front-of-package labelling legislation have been imposed across the region in an effort to address the double challenge of rising prevalence of overweight and obesity, but also persistent challenges of food insecurity and nutritional quality. Food quality amongst low-income segments of the population tends to be affected by persistent poverty challenges.

Per capita protein intake is expected to rise to 89 g/day by 2031, an increase over the period of 3.1g/day. Animal products will contribute the bulk of the increase at over 70%, with higher consumption of dairy products contributing the majority. For its middle-income demographic profile, the region’s meat consumption is already high at almost 61 kg/year, almost double the average world level. However, per capita meat consumption is projected to rise by only 3.3% over the next decade, as consumers increase their intake of protein from other sources. Consumption of fish, which on a per capita basis is only about half the world average, will rise by only 1 kg/capita to 10kg, comparable to the past decade.

Increasing intensification of the livestock sector is expected to support a 15% increase in feed use by 2031. Two thirds of that increase will come from maize, whose feed use will expand by 18%, but protein meal is also projected to expand by 13%, which will account for 19% of additional feed use by 2031. As such, maize and protein meal together will contribute over 75% of additional feed use.

Despite a fairly constant share of sugarcane use, ethanol production from the region is set to increase 6% by 2031 relative to the base period, contributing 15% of global growth in ethanol production. Brazil, with its Renovabio programme, is the biggest ethanol producer in the region and will remain an important supplier to the global market. While high crude oil prices should boost demand for biofuels in the short-term, the evolution of global energy and transportation sectors in the medium-term will remain a major uncertainty facing the region's biofuel sector.

2.8.4. Trade

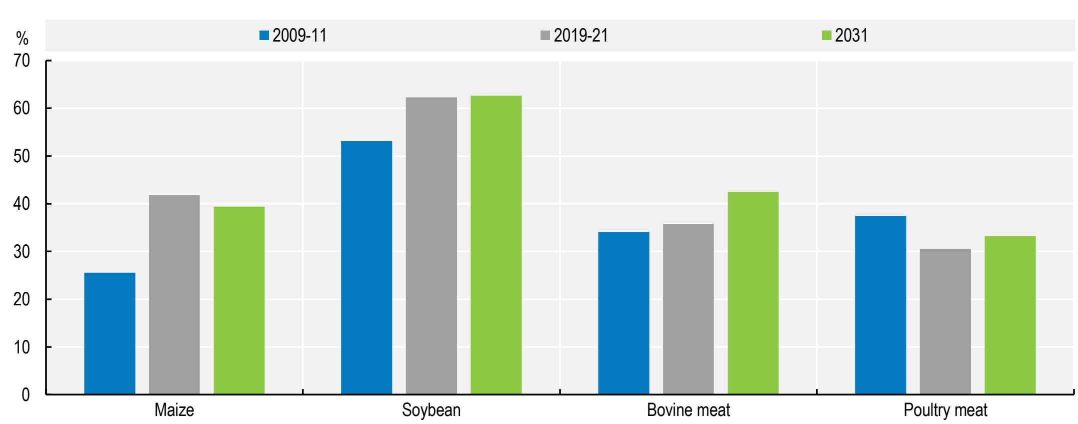
Open trade orientation is crucial for the region's agri-food sector

As a major agricultural surplus producer, exports have been a key component driving agricultural growth, reducing the sector's vulnerability to exogenous shocks and economic risks within the region. The rate of export growth has enabled the share of exports in total agricultural production to increase consistently, along with the region's contribution to global trade. Over the past decade its trade surplus almost doubled and its share in global exports grew to 17%. By 2031, the region is expected to increase its trade surplus by a further 28% to account for 18% of global exports. The deceleration in export growth reflects a slowdown in Brazil, which contributes more than half of the region's exports. Nevertheless, while slower than the 6% p.a. achieved over the past decade, Brazil's export growth is still expected to remain above 2% p.a. and, combined with strong growth in fruit and vegetable exports from Mexico, Costa Rica and Ecuador, the share of net export value in the region's agriculture and fish production should approach 50% by 2031.

Robust supply growth will enable the region to consolidate its position as a major exporter of maize, soybean, beef, poultry, fish meal, fish oil, sugar and ethanol. With the exception of fishmeal, ethanol, and sugar, the region will increase its share in the global market for all of the aforementioned commodities. By 2031, it will account for 61% of global exports of soybeans, 59% of sugar, 45% of fish meal, 43% of maize, 40% of beef and fish oils, 32% of poultry and 25% of ethanol.

Given the importance of the region in the global market, the extent of openness to trade will have significant consequences for the sector. The pandemic and associated restrictions resulted in multiple bottlenecks in global trade systems, adding costs and highlighting risks in global supply chains. The extent to which this influences trade will be crucial for the region. At the same time, the ability to respond to supply constraints from the Black Sea region while the war persists could enable it to increase market share in the short-term. The EU-Mercosur Free Trade agreement and the Regional Comprehensive Economic Partnership could further expand trade opportunities, but trade relations outside of the region, such as those between China and the United States can also play a role. While the benefits to the region of a trade orientated global market are clear, improved internal market integration and functioning of SMEs, cooperatives and family farms would expand trade within the region, thus diversifying market opportunities and bolstering the sector's resilience.

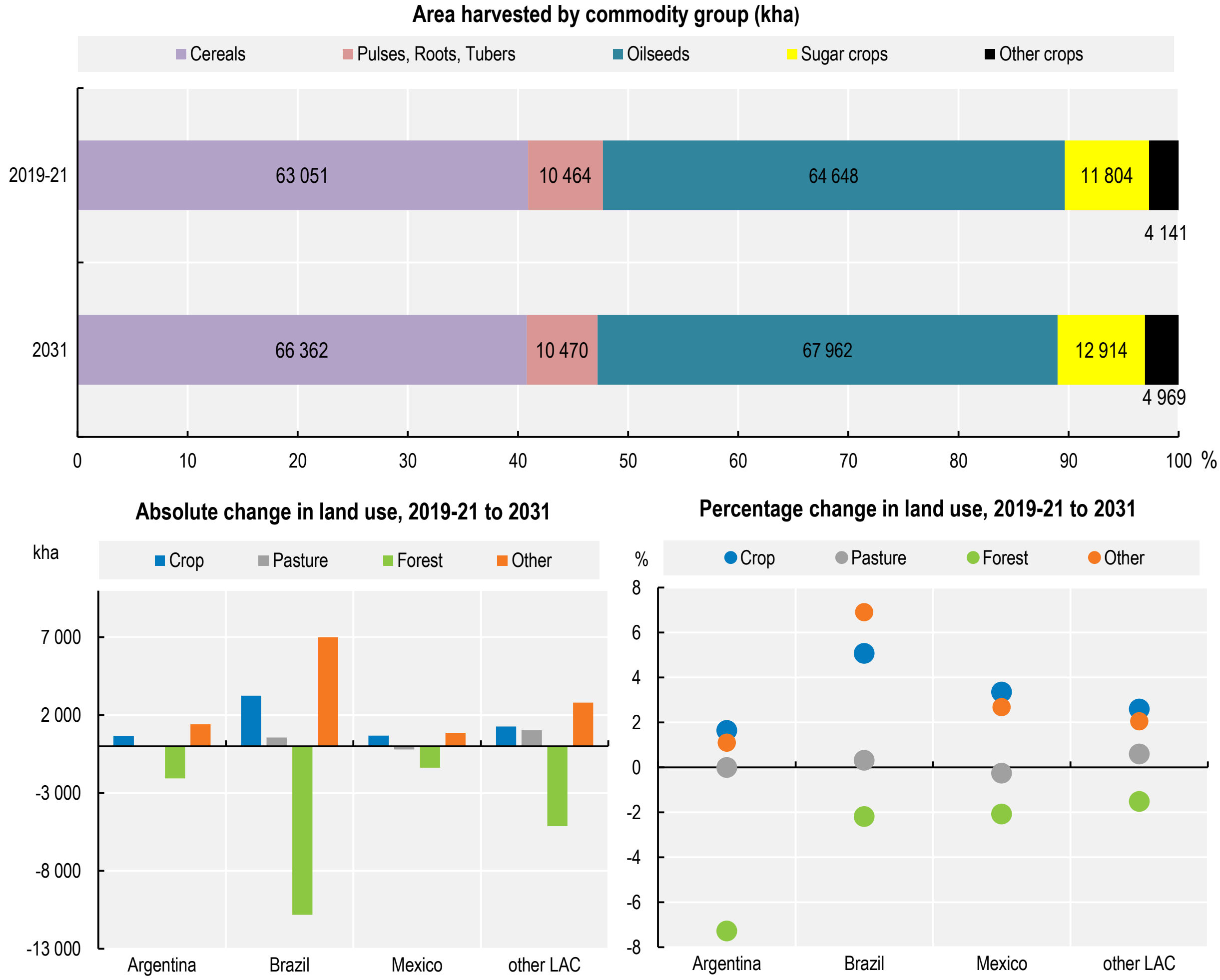
Figure 2.28. Trends in export market shares of the Latin America and the Caribbean



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

StatLink https://stat.link/eaqlnx

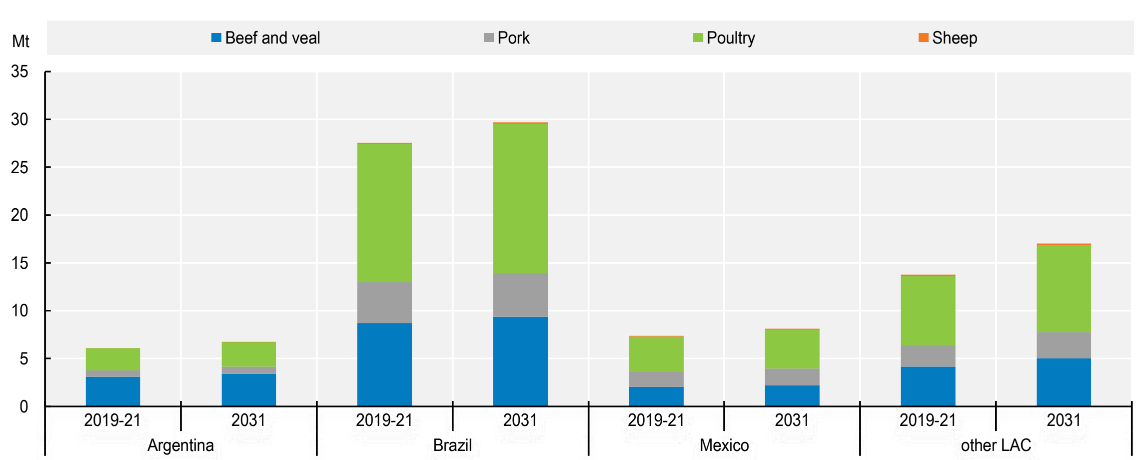
Figure 2.29. Change in area harvested and land use in Latin America and the Caribbean



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

StatLink https://stat.link/pqcvto

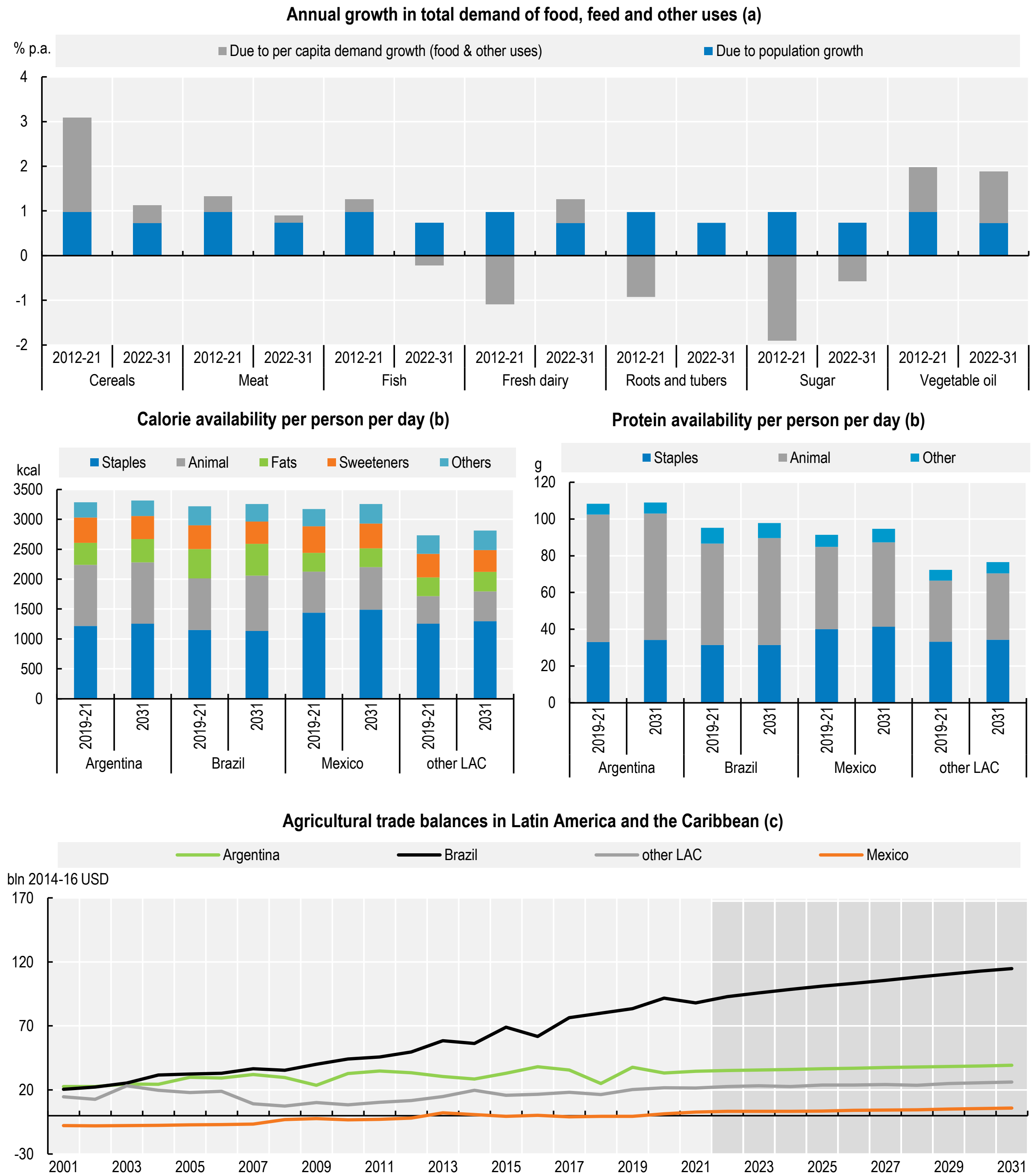
Figure 2.30. Livestock production in Latin America and the Caribbean



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

StatLink https://stat.link/mpj34t

Figure 2.31. Demand for key commodities and food availability in Latin America and the Caribbean



Notes: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets and trade indices databases and include products not covered by the *Outlook*. a) Population growth is calculated by assuming per capita demand constant at the level of the year preceding the decade. b) Fats: butter and oils; Animal: egg, fish, meat and dairy except for butter; Staples: cereals, oilseeds, pulses and roots. c) Include processed products, fisheries (not covered in the FAOSTAT trade index) based on outlook data.

Source: FAO (2022). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/bo36q1

Table 2.7. Regional Indicators: Latin America and Caribbean Region

	Average			%	Growth [2]	
	2009-11	2019-21 (base)	2031	Base to 2031	2012-21	2022-31
Macro assumptions						
Population ('000)	589 712	652 217	708 787	8.67	0.97	0.73
Per capita GDP[1] (kUSD)	9.32	8.66	10.19	17.66	-1.81	1.58
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	435.9	538.5	614.3	14.08	2.23	1.08
Net value of crop production[3]	240.1	311.8	360.7	15.70	2.38	1.30
Net value of livestock production[3]	148.8	180.9	202.4	11.92	2.03	0.77
Net value of fish production[3]	47.0	45.9	51.2	11.62	2.09	0.80
Quantity produced (kt)						
Cereals	186 644	274 962	318 628	15.88	3.34	1.19
Pulses	6 748	7 640	8 431	10.35	1.20	1.00
Roots and tubers	14 623	14 050	15 013	6.86	-0.03	0.63
Oilseeds[4]	5 097	6 181	6 933	12.16	2.94	0.80
Meat	46 101	54 816	61 613	12.40	1.60	0.91
Dairy[5]	8 938	9 994	11 706	17.13	0.00	1.42
Fish	16 674	16 255	18 151	11.66	2.10	0.80
Sugar	54 971	56 905	63 649	11.85	-0.98	1.65
Vegetable oil	20 879	27 337	31 421	14.94	2.36	1.30
Biofuel production (mln L)						
Biodiesel	4673.03	8896.96	10834.98	21.78	5.28	1.65
Ethanol	27 592	36 656	38 948	6.25	3.29	0.91
Land use (kha)						
Total agricultural land use	672 957	672 201	679 465	1.08	0.01	0.09
Total land use for crop production[6]	160 482	172 019	177 866	3.40	0.80	0.28
Total pasture land use[7]	512 475	500 182	501 599	0.28	-0.25	0.03
GHG Emissions (Mt CO2-eq)						
Total	1 009	1 069	1 095	2.37	0.66	0.10
Crop	100	117	121	3.18	1.58	0.23
Animal	886	923	944	2.26	0.58	0.07
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2 946	3 017	3 077	2.00	-0.04	0.33
Daily per capita protein availability[8](g)	81.7	86.0	89.1	3.6	0.2	0.3
Per capita food availability (kg/year)						
Staples[9]	159.5	157.5	161.5	2.54	-0.19	0.25
Meat	57.6	61.4	63.4	3.30	0.48	0.22
Dairy[5]	15.8	15.9	17.2	8.26	-0.75	0.69
Fish	8	9	10	5.74	-0.01	0.34
Sugar	45	38	36	-5.41	-1.68	-0.56
Vegetable oil	18	18	20	14.55	-1.18	1.31
Trade (bln 2014-16 USD)						
Net trade[3]	81	145	186	27.89	..	..
Value of exports[3]	151	240	298	24.30	4.26	1.88
Value of imports[3]	71	94	112	18.75	3.20	1.52
Self-sufficiency ratio[10]						
Cereals	102.1	107.3	108.9	1.42	0.57	0.09
Meat	110.2	111.8	111.2	-0.57	0.28	0.01
Sugar	215.7	227.9	248.6	9.09	-0.02	1.39
Vegetable oil	127.7	131.5	124.2	-5.57	0.29	-0.52

Notes: 1. Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data 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 represent 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/protein represent availability per capita per day, not intake. 9. Staples represent cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports) * 100.
Sources: FAO (2022). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

References

Canning, P., A. Weersink and J. Kelly (2016), "Farm share of the food dollar: an IO approach for the United States and Canada", *Agricultural Economics*, Vol. 47/5, pp. 505-512, https://doi.org/10.1111/agec.12250. [9]

De Vet, J. et al. (2021), *Impacts of the COVID-19 pandemic on EU industries*, https://www.europarl.europa.eu/RegData/etudes/STUD/2021/662903/IPOL_STU(2021)662903_EN.pdf. [5]

FAO (2020), "The impact of COVID-19 on food and agriculture in Europe and Central Asia and FAO's reponse", *FAO Regional Conference for Europe*, http://www.fao.org/3/ne001en/ne001en.pdf. [6]

FAO et al. (2021), *2021 State of Food Security and Nutrition in the World*, https://docs.wfp.org/api/documents/WFP-0000130141/download/?_ga=2.154581233.899495763.1652097841-333767505.1650548299. [4]

Fuglie, K. (2015), "Accounting for growth in global agriculture", *Bio-Based and Applied Economics*, pp. 201-234, https://doi.org/10.13128/BAE-17151. [12]

Kelly, M. (2016), "The Nutrition Transition in Developing Asia: Dietary Change, Drivers and Health Impacts", *Drivers and Health Impacts. In: Jackson P., Spiess W., Sultana F. (eds) Eating, Drinking: Surviving. SpringerBriefs in Global Understanding. Springer, Cham*, pp. 83-90, https://doi.org/10.1007/978-3-319-42468-2_9. [1]

Njiwa, D. and K. Marwusi (2020), *Improving the Functioning of Regional Food Supply Chains and Trade amidst the COVID-19 pandemicin East and Southern Africa*, https://agra.org/wp-content/uploads/2020/08/Improving-Functioning-of-Regional-Food-Supply-Chains.pdf. [3]

OECD (2020), "Supporting livelihoods during the COVID-19crisis: closing the gaps in safety nets", *OECD Policy Responses to Coronavirus (COVID-19)*, https://www.oecd.org/coronavirus/policy-responses/supporting-livelihoods-during-the-covid-19-crisis-closing-the-gaps-in-safety-nets-17cbb92d/. [7]

OECD/FAO (2019), *OECD-FAO Agricultural Outlook 2019-2028*, OECD Publishing, Paris, https://doi.org/10.1787/agr_outlook-2019-en. [13]

Reardon, T. et al. (2014), *Urbanization, Diet Change, and Transformation of Food Supply Chains in Asia*, Michigan State University, http://www.fao.org/fileadmin/templates/ags/docs/MUFN/DOCUMENTS/MUS_Reardon_2014.pdf. [2]

Saksena, M. et al. (2018), *America's Eating Habits: Food Away From Home*, U.S. Department of Agriculture, Economic Research Service, https://www.ers.usda.gov/webdocs/publications/90228/eib-196.pdf?v=6386.4. [8]

Tarasuk, V. and A. Mitchell (2020), *Household food insecurity in*, Toronto: Research to identify policy options to reduce food insecurity (PROOF), https://proof.utoronto.ca/wp-content/uploads/2020/03/Household-Food-Insecurity-in-Canada-2017-2018-Full-Reportpdf.pdf. [11]

Weersink, A. et al. (2021), "COVID-19 and the agri-food system in the United States and Canada", *Agricultural Systems*, Vol. 188, https://doi.org/10.1016/j.agsy.2020.103039. [10]

Notes

[1] Unless otherwise specified, the data used in describing the historical and current situation in each region are aggregated from the underlying database used in the projections. These data are from a variety of sources including questionnaires from OECD countries and databases from AMIS, FAOSTAT, UN (Population) and IMF (Macro), with manipulations by the OECD and FAO Secretariats.

[2] Australia, China, Japan, Korea, New Zealand.

[3] Source OECD-FAO interpolated for 2019-21 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this *Outlook*.

[4] This analysis assumes the EU-27 as one integral region.

[5] (Fuglie, 2015[12]). Estimates are based on the International Agricultural Productivity dataset produced by the USDA. See https://www.ers.usda.gov/data-products/international-agricultural-productivity.

[6] The old age dependency ratio is calculated that the over 65 population divided by 15-64 population.

[7] India, Indonesia, Iran (Islamic Republic of), Malaysia, Pakistan, Philippines, Thailand, Viet Nam, Asia Least Developed, Other Developing Asia and Oceania. For mentioned regions, see Summary table for regional grouping of countries.

[8] Source OECD-FAO interpolated for 2019-21 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this *Outlook*.

[9] (Fuglie, 2015[12]) (updated to 2019, USDA).

[10] See "Southeast Asia, Prospects and Challenges" in the *OECD-FAO Agricultural Outlook 2017-2026*.

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

[12] Source OECD-FAO interpolated for 2019-21 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this *Outlook*.

[13] (Fuglie, 2015[12]) (updated to 2019, USDA).

[14] FAO informal consultation with African ministers of agriculture held on 4 April 2022 leading up to the 32nd FAO Regional Conference for Africa.

[15] ESCAP-World Bank trade cost database. https://www.unescap.org/resources/escap-world-bank-trade-cost-database

Summerised in Tralac report: https://www.tralac.org/resources/infographics/15537-intra-africa-non-tariff-trade-costs-for-the-period-2015-2019.html

[16] Near 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.

[17] Source OECD-FAO interpolated for 2019-21 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this Outlook

[18] (Fuglie, 2015[12]) (updated to 2019, USDA, regional aggregation of countries).

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

[20] Source OECD-FAO interpolated for 2019-21 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this *Outlook*.

[21] (Fuglie, 2015[12])(updated to 2019, USDA)

[22] 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.

[23] See also "The Outlook for Agriculture and Rural Development in the Americas: A Perspective on Latin America and the Caribbean 2021-2022". ECLAC, FAO, IICA. https://repositorio.cepal.org/bitstream/handle/11362/47209/1/ECLAC-FAO21-22_en.pdf

[24] Source OECD-FAO interpolated for 2019-21 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this *Outlook*.

[25] (Fuglie, 2015[12])(updated to 2019, USDA).

3 Cereals

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

3.1. Projection highlights

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

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

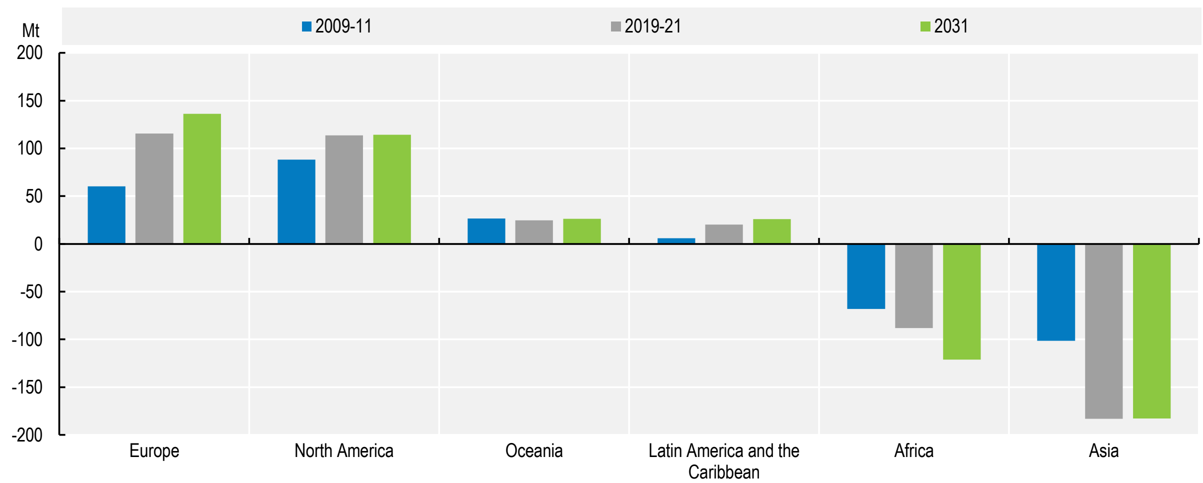
Over the next ten years, more global cereal production will originate from yield growth and area intensification given limits on available arable land. Yield improvements are assumed to result from improved and more widely accessible seed varieties, greater efficiency in the use of inputs, and better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

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

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

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

Figure 3.1. Cereal net trade by continent



Note: Europe includes the Russian Federation, Ukraine and Kazakhstan
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/641eta

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

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

3.2. Current market trends

Steep rise in wheat and maize prices

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

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

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

3.3. Market projections

3.3.1. Consumption

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

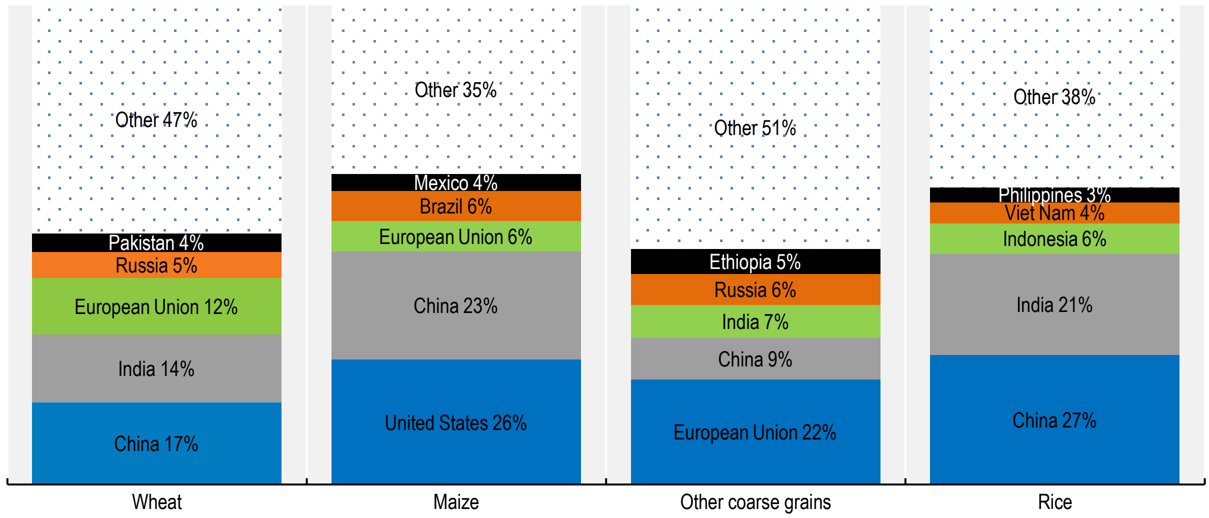
Between 49% and 65% of global *cereal* consumption occurs in the top 5 consumer countries of each commodity, which is less concentrated than production (Figure 3.2). Global use of cereals is projected to increase slightly from 2.8 bln t in the base period to 3.1 bln t by 2031, driven mainly by higher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

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

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

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

Figure 3.2. Global cereal demand concentration in 2031

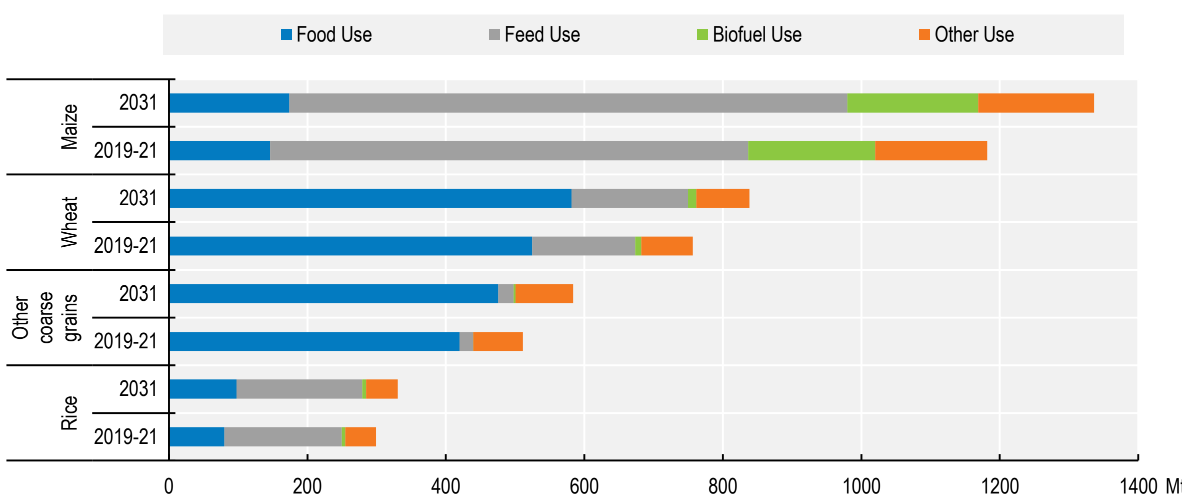


Note: Presented numbers refer to shares in world totals of the respective variable

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

StatLink https://stat.link/1fnst5

Figure 3.3. Global cereal use



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

StatLink https://stat.link/w9a6fr

Global *maize* consumption is projected to increase by 1% p.a., a much slower pace compared to 2.9% p.a. in the previous decade. This increase is principally driven by higher incomes that translate into higher feed demand, which accounts for the largest share of total utilisation, rising from 58% in the base period to around 60% by 2031. Thirty-three per cent of the increase in feed consumption will be in Asian countries due to fast expanding livestock and poultry sectors. Feed demand globally is expected to rise by 116 Mt to 806 Mt, mainly in China (+27 Mt), the United States (+26 Mt), Brazil (+9 Mt), India and Viet Nam (+5 Mt each), and Egypt (+4.5 Mt). Consumption in Southeast Asia in particular will increase due to its fast-expanding poultry industry.

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

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

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

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

Table 3.1. Rice per capita consumption

kg/person/year

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

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

3.3.2. Production

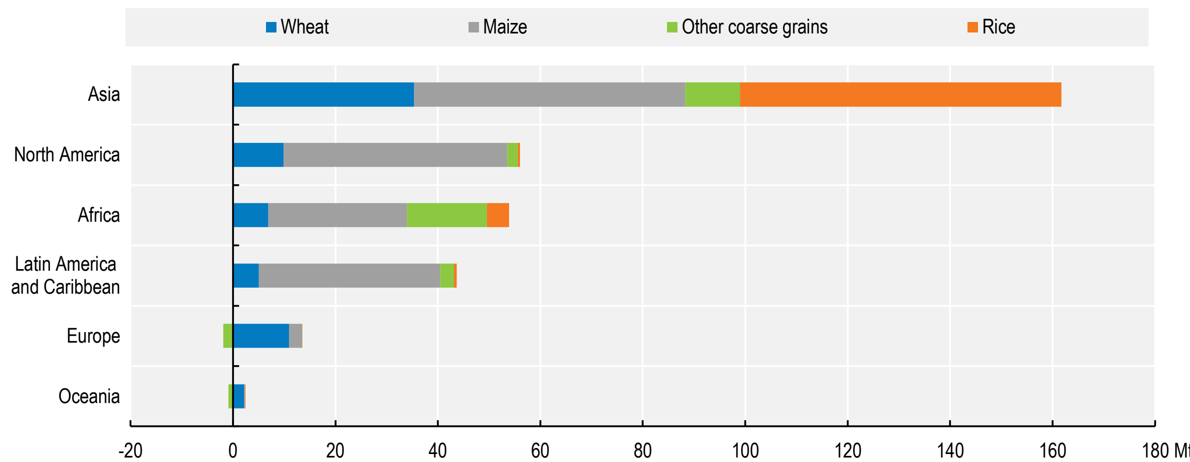
Improved technology and cultivation practices sustain yield and production increases

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

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

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

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



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

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

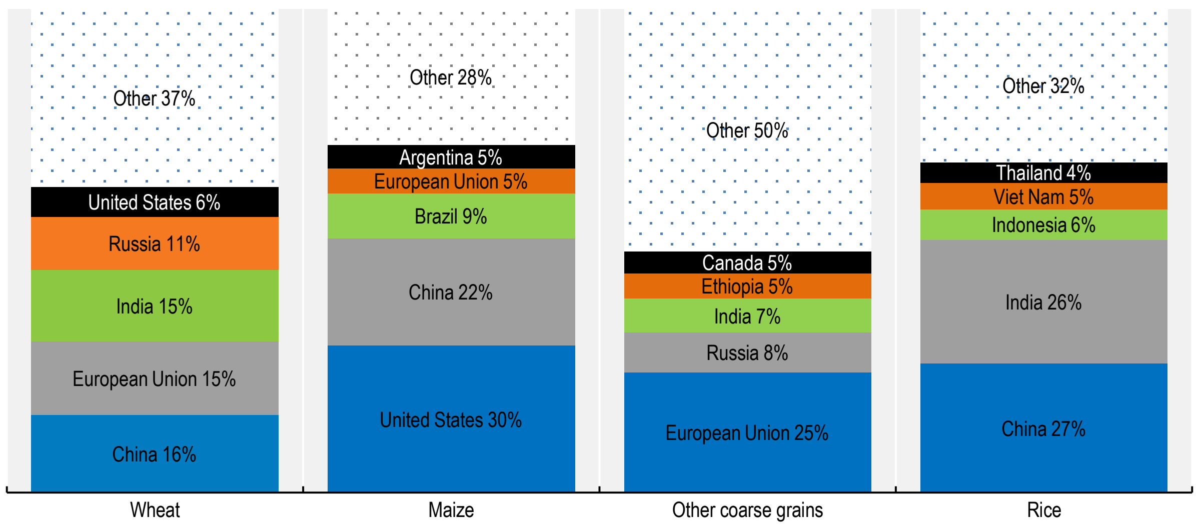
Global maize production is expected to grow by 161 Mt to 1.33 Bnt by 2031, with the largest increases in the United States (50 Mt), followed by China (32 Mt), Brazil (24 Mt), and Argentina (6 Mt). Increased production in Brazil will be driven by higher second-cropped maize following the soybean harvest.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

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

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

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

Figure 3.5. Global cereal production concentration in 2031



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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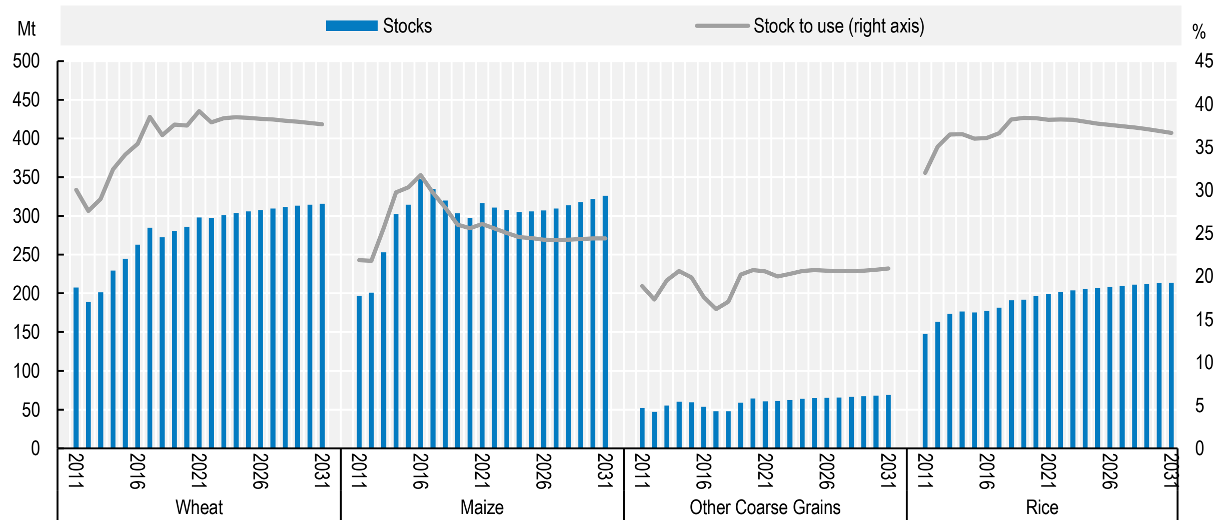
Global production of other coarse grains – sorghum, barley, millets, rye, and oats – is projected to reach 335 Mt by 2031, up 28 Mt from the base period. African countries will contribute the most (16 Mt). Africa has the fastest growing population and relies on grains such as millet and sorghum, mainly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

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

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



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

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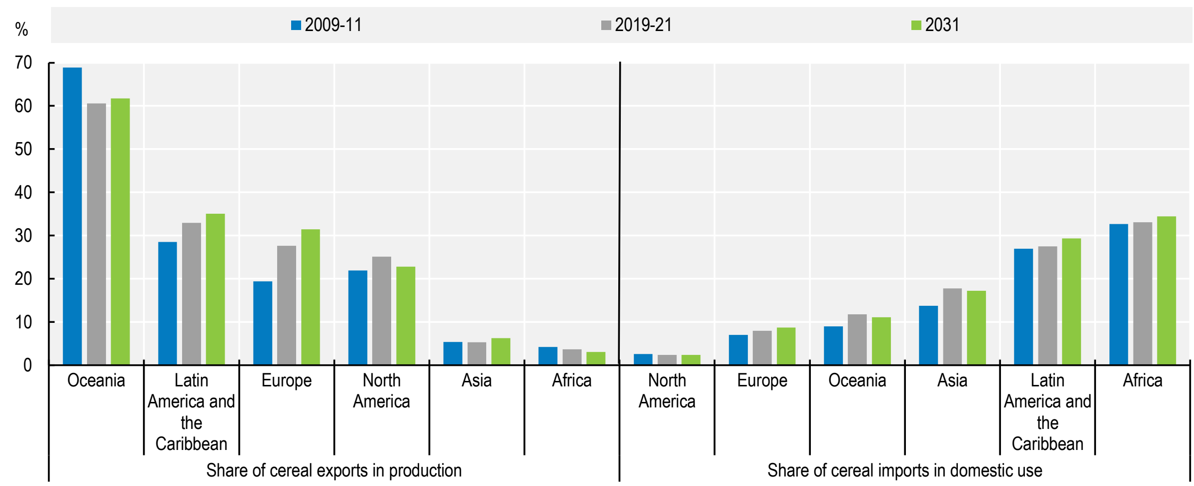
3.3.3. Trade

Global cereals trade will remain buoyant but with changing country shares

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

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

Figure 3.7. Trade as a percentage of production and consumption



Note: These estimates include intra-regional trade except for the European Union.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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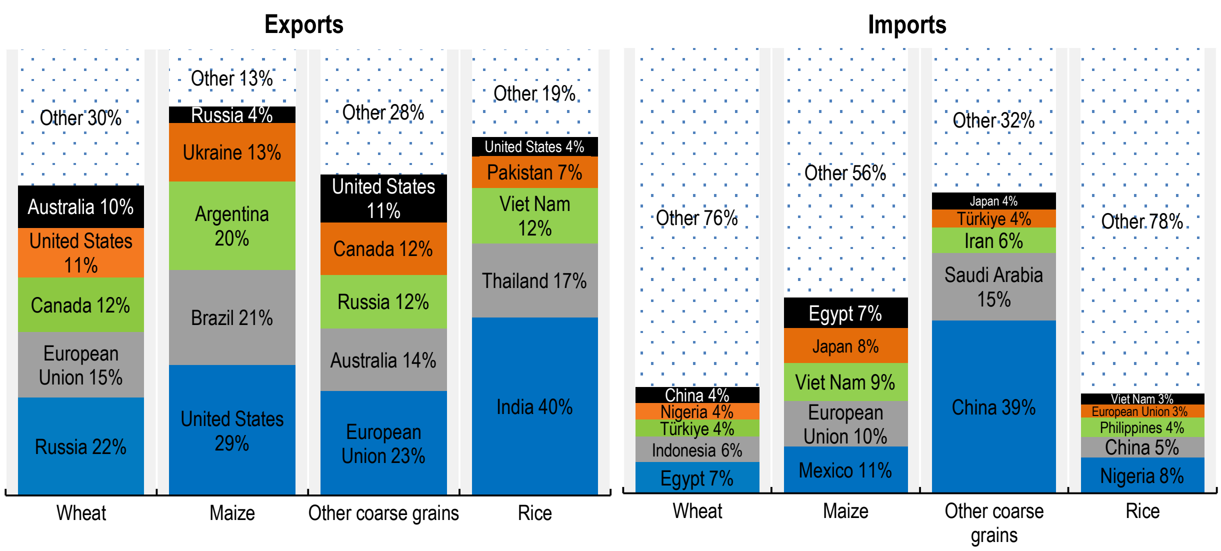
By 2031, the European Union, the second largest wheat exporter, will account for 14% of global trade, although exports are projected to stay below the record volumes of 2019. Compared to the base period, the European Union is losing international market shares mainly because domestic production is anticipated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

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

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

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

Figure 3.8. Global cereal trade concentration in 2031



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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

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

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

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

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

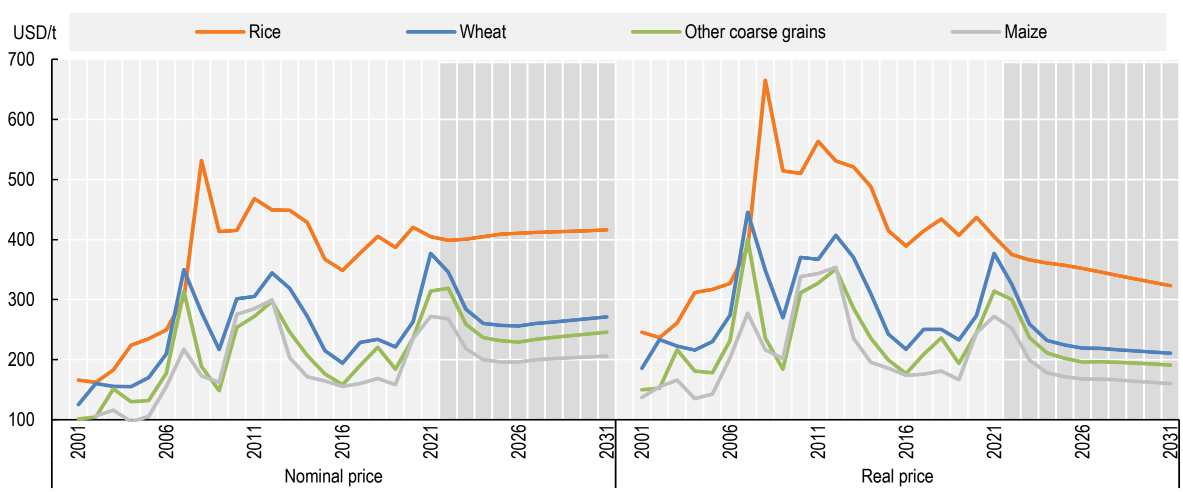
3.3.4. Prices

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

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

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

Figure 3.9. World cereal prices



Note: Wheat: US wheat, No.2 Hard Red Winter, fob Gulf; maize: US Maize, No.2 Yellow, fob Gulf; other coarse grains: France, feed barley, fob Rouen; rice: FAO all rice price index normalised to India, indica high quality 5% broken average 2014-2016 . Real prices are nominal world prices deflated by the US GDP deflator (2021=1). Rice on secondary axis. Prices refer to marketing years.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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

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

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

3.4. Risks and uncertainties

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

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

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

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

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

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

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

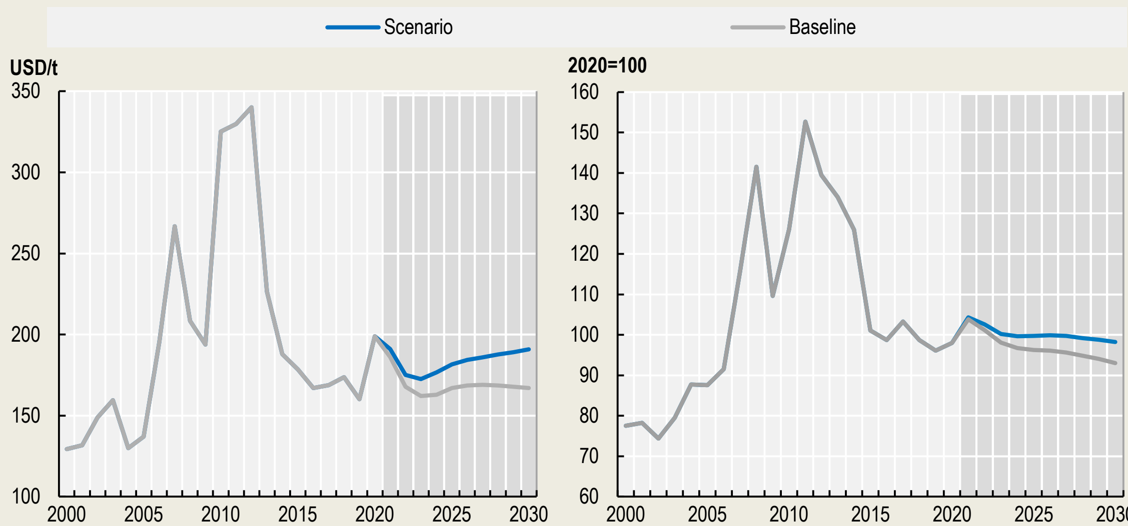
In last year's edition of the *OECD-FAO Agricultural Outlook*, it was assumed that these large trade flows were a short-term phenomenon and imports return to more normal levels. And indeed, grain import levels in 2021 were still elevated but well below the peak in 2020.

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

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

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

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



Source: Aglink-Cosimo simulations based on OECD-FAO Agricultural Outlook 2021-2030 projections.
Source: Adenäuer, M. (2022), "The role of China's feed deficit in international grain markets", OECD Food, Agriculture and Fisheries Papers, No. 172, OECD Publishing, Paris, 2138cc7f-en.

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4 Oilseeds and oilseed products

This chapter describes market developments and medium-term projections for world oilseed markets for the period 2022-31. Projections cover consumption, production, trade and prices for soybean, other oilseeds, protein meal, and vegetable oil. The chapter concludes with a discussion of key risks and uncertainties which could have implications for world oilseed markets over the next decade.

4.1. Projection highlights

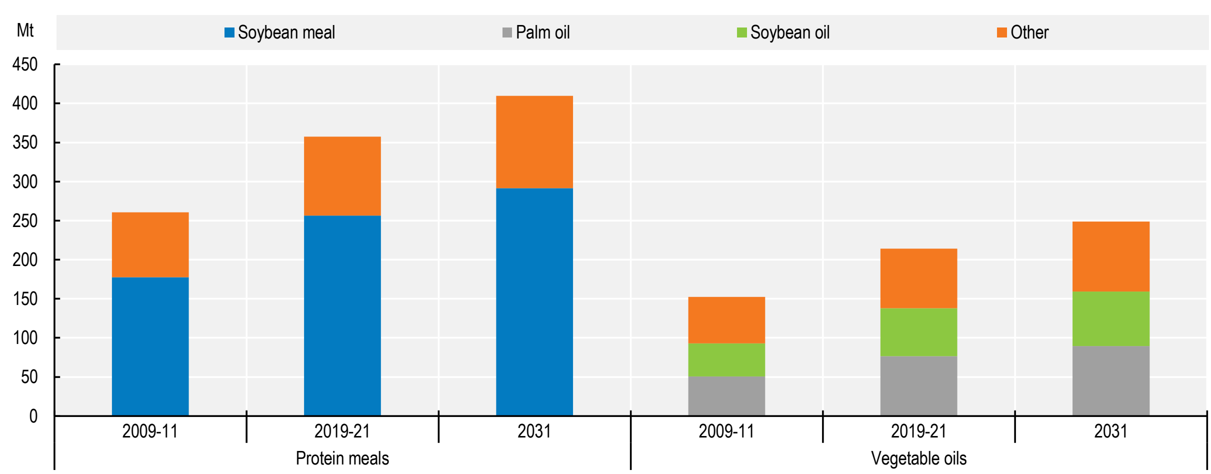
Buoyant markets for oilseeds are driving price rises

Global market conditions of *oilseeds and oilseed products* resulted in rapid price increases in 2021. Strong demand, especially for imported soybeans by the People's Republic of China (hereafter "China") and limited supply growth, especially of palm oil and of Canadian rapeseed, lead to this price increase.

The consumption of vegetable oils is projected to reach 249 Mt by 2031. Food use should account for 66% of total consumption, driven by population growth but also by the increased per capita use of vegetable oil in low – and middle-income countries. The vegetable oil aggregate in this *Outlook* includes oil obtained from the crushing of oilseeds (about 55% of world vegetable oil production) and palm oil (36%), as well as palm kernel, coconut, and cottonseed oils. The use of vegetable oil for biodiesel, currently about 15% of global vegetable oil use, is projected to grow in emerging markets like Indonesia and Brazil but also in the United States, in contrast to stable use for biodiesel in the European Union, still the largest producer of biodiesel.

Protein meal utilisation will be constrained by slower growth in global poultry and livestock production as protein meal is almost entirely used as animal feed. Soybean meal accounts for about three-quarters of the global protein meal sector (Figure 4.1). Demand growth in China is expected to slow down considerably (1.2% p.a. compared to 5.2% p.a. in the last decade), driven by improved feed efficiency combined with efforts to achieve lower protein meal shares in livestock feed rations. Nevertheless, a strong rebound is expected in pork production (around 14 Mt increase in the next decade). In the European Union, the second-largest user of protein meal, consumption is expected to decline as growth in animal production slows and other protein sources are increasingly used in feed. By contrast, in Southeast Asia increasing animal production is projected to raise demand for imports of protein meal.

Figure 4.1. Protein meal and vegetable oil production by type



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

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In view of a slowdown in the expansion of the mature *oil palm* area, palm oil production growth in Indonesia and Malaysia is projected to be limited. Nevertheless, by 2031 Indonesia and Malaysia are projected to account for 82% of global palm oil production.

Soybean production is projected to increase by 1% p.a. during the outlook period. Yield improvements are assumed to account for about three-quarters of the global growth in production while the expansion of the harvested area, including increased double-cropping in Latin America, accounts for the remaining quarter. Soybean production is expected to reach 411 Mt by 2031, more than double the combined output of other oilseeds at 188 Mt. Brazil and the United States are expected to account for about two-thirds of world soybean production and more than 80% of global soybean exports. Brazil is expected to be the world's largest producer by 2031, with domestic output projected to reach 147 Mt.

Production of *other oilseeds* is projected to increase by 1.2% p.a. over the next decade, a slower growth rate relative to the last decade. This is mainly due to the stagnating demand for rapeseed oil as a feedstock in European biodiesel production and the increasing competition by cereals for limited arable land in China and the European Union. In general, the cultivation of other oilseeds such as rapeseed or sunflower seed is much less concentrated than that of soybeans. China, the European Union, Canada, and Ukraine each produce between 20 Mt to 32 Mt of these oilseeds. In Ukraine, the war in 2022 causes several disruptions in sunflower seed production, processing and trade.

The world's leading suppliers of *palm oil*, Indonesia and Malaysia, will continue to dominate the vegetable oil trade, exporting around 65% of their combined production and jointly accounting for nearly 60% of global exports. India, the world's biggest importer of vegetable oil, is projected to maintain its high import growth of 1.8% p.a. due to growing domestic demand and limited production growth opportunities. Growth in world exports of soybeans, another product with a high trade share dominated by the Americas, is expected to slow considerably over the next decade due to the projected slower growth in soybean imports by China.

While in the 2021 marketing year prices in the oilseed sector are at or close to record highs, a downward adjustment is expected during the first years of the outlook period. Thereafter, prices are expected to increase slightly in nominal terms, while declining in real terms following the long-term trend of agricultural commodity prices.

The scope to increase palm oil output in Indonesia and Malaysia will increasingly depend on oil palm replanting activities and accompanying yield improvements (as opposed to area expansion) creating new challenges. Sustainability concerns (i.e. deforestation and the use of sustainability certifications for vegetable oil) also influence the expansion of palm oil output both for producer and consumer countries. The use of vegetable oil as biodiesel feedstock is mostly determined by biofuel policies, which determine countries' mandated blending ratios. The future demand for protein meal in China depends on the balance between feed intensity and efficiency especially in the rebuilding pig meat sector, following African Swine Fever (ASF) starting in 2018. Nevertheless, the overall per capita meat demand in China is expected to grow compared to the last decade (0.5% p.a in comparison to a decline by 0.6% p.a).

4.2. Current market trends

*Nominal prices are at record level***s** *due to limited supply*

Prices of oilseeds and oilseed products continued to increase during 2021 and into 2022 reaching new record highs in nominal terms, especially for vegetable oils, due to strong demand and a slight production decline, especially of rapeseed and soybeans. The surge in prices contributed to food price inflation in numerous countries, aggravating food access problems from pandemic-driven income losses.

During the first half of 2021, the COVID-19 pandemic led to temporary slowdowns in demand and short-term disruption of supply chains, resulting in price declines. In South America, soybean production suffered from severe weather conditions that impacted the crush and yields. In Malaysia, labour shortages, exacerbated by measures to restrict the movement of people to contain the spread of COVID-19, impacted the palm oil harvest in 2021, curbing overall production and exports. Canadian rapeseed production decreased, resulting in a fall of its exports too.

With tighter global production of oilseeds and palm oil resulting in higher prices, the expectations of growing global demand have been reduced for the 2021/2022 marketing year. In Indonesia, the new Domestic Market Obligation policy set by the government led to a reduction of palm oil exports to India, China, and the European Union.

4.3. Market projections

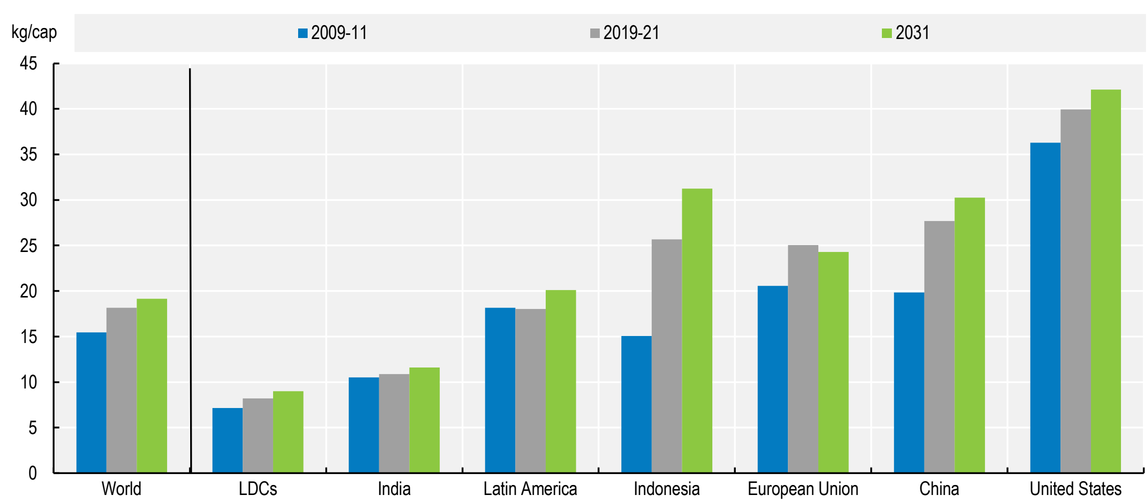
4.3.1. Vegetable oil consumption

Demand for vegetable oil for food is slowing down

The two dominant uses of vegetable oil are for human consumption (65%) and as feedstock for the production of biodiesel (15%). In addition, vegetable oils are also used for cosmetics, varnishes, and increasingly in animal feed preparations, especially for aquaculture.

Per capita consumption of vegetable oil for food is projected to grow by 0.5% p.a., considerably less than the 1.7% p.a. increase observed during 2012-21 due to near-saturated food demand in developed countries and emerging markets. In China (30 kg/capita) and Brazil (27 kg/capita), the consumption of vegetable oil for food is set to reach levels comparable to those of developed countries, where it is projected to level off at 28 kg/capita, growing at 0.6% p.a. (Figure 4.2).

Figure 4.2. Per capita food availability of vegetable oil in selected countries



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

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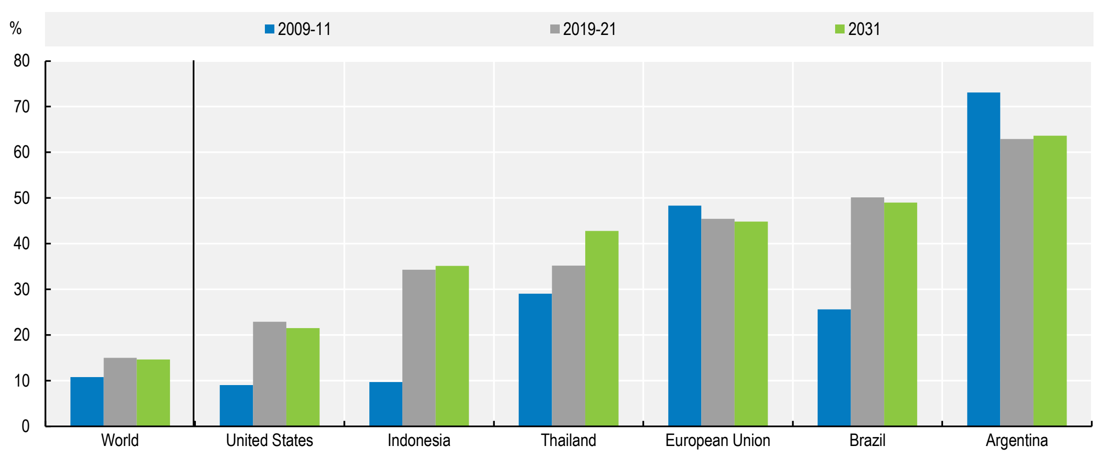
India, the world's second largest consumer and number one importer of vegetable oil, is projected to sustain a per capita consumption growth of 1.1% p.a., reaching 12 kg/capita by 2031. This substantial increase will be the result of both increases in its domestic production, crushing of increased domestic oilseed production, and imports of mainly palm oil from Indonesia and Malaysia. As urbanisation increases in developing countries, dietary habits and traditional meal patterns are expected to shift towards processed foods that have a high content of vegetable oil. 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 2031 due to low per capita income.

The uptake of vegetable oil as feedstock for biodiesel (about 10-15% of global vegetable oil use) is projected to remain stable over the next ten years, compared to the 6.3% p.a. increase recorded over the previous decade when biofuel support policies took effect (Figure 4.3). The use of vegetable oil as feedstock for biodiesel depends on the policy setting (Chapter 9) and the relative price development of vegetable oil and crude oil (see below). 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, especially in the European Union and the United States, largely due to specific policies. Vegetable oil uptake by Argentina's export-oriented biodiesel industry is projected to be 1.6 Mt by 2031, equivalent to 56% of domestic vegetable oil consumption. In Indonesia, the growth in the use of vegetable oil to produce biodiesel is projected to remain strong and reach 8.9 Mt by 2031 due to supportive domestic policies. However, Indonesia is the main driver in the world for the increasing use of vegetable oil as feedstock for biodiesel.

Figure 4.3. Share of vegetable oil used for biodiesel production



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

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4.3.2. Protein meal consumption

Feed demand is slowing and is shaped by developments in China

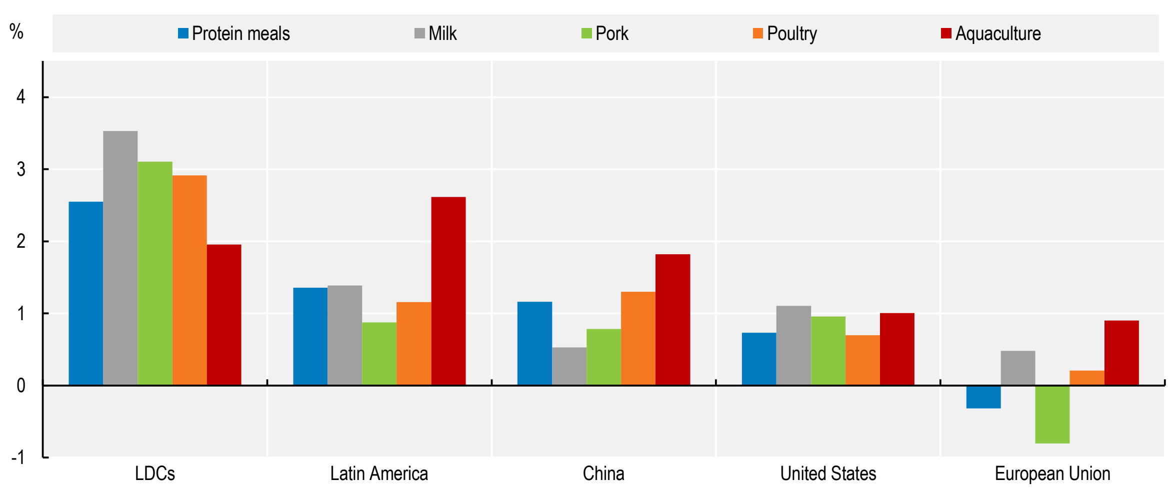
Protein meal is exclusively used as feed and its consumption is projected to continue to grow at 1.2% p.a., considerably below the last decade's rate of 3.4% p.a. The link between feed use of protein meal and animal production is related to the intensification of animal production, which increases demand for protein meal, whereas feeding efficiencies lead to a reduction of protein feed per animal. Moreover, the composition of animal husbandry and herd sizes are additional factors.

The link between animal production and protein meal consumption is associated with a country's level of economic development (Figure 4.4). Lower income countries, which rely on backyard production, consume less protein meal, whereas higher income economies which employ intensive production systems use higher amounts of protein meal. 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 growing 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.

China accounts for more than a quarter of global protein meal demand and is therefore shaping global demand development. Growth in China's demand for compound feed is expected to be slower than in the previous decade due to declining growth rates for animal production and the existing large share of compound feed-based production. The protein meal content in China's compound feed is expected to remain stable after it surged in the last decade but should exceed present levels in the United States and European Union. As pig herds are being rebuilt in China following the outbreak of ASF, larger scale feed-based intensive production systems have been installed, leading to an expected additional increase in demand for protein meal.

In the United States and the European Union, where compound feed satisfies most protein requirements of animal production, protein meal consumption is expected to grow at a slower rate than animal production due to improving feeding efficiencies. In addition, animal products, primarily poultry and dairy, are increasingly marketed in the European Union as produced without feed use from genetically modified crops, driven by large retail chains that reduces demand for soybean meal.

Figure 4.4. Average annual growth in protein meal consumption and animal production (2022-31)



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

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

Slowing global oilseed crush and limited growth in palm oil production

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 (including for meat and dairy replacements), groundnuts and sunflower seeds, as well as direct feeding of soybeans. The crush location depends on many factors, including transport costs, trade policies (e.g. different tariffs for oilseeds and products), acceptance of genetically modified crops, processing costs (e.g. labour and energy), and infrastructure (e.g. crushing facilities, ports and roads).

In absolute terms, soybean crush is projected to expand by 45 Mt over the outlook period, less than half of the 100 Mt in the previous decade. Chinese soybean crush is projected to increase by 18 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 as the country's demand for compound feed is expected to slow down due to lower animal production growth rates. In addition, the protein meal content in China's compound feed has reached a relatively high level, leaving little scope to further increase the incorporation rate. Global crush of other oilseeds as compared to soybeans is expected to grow in line with production by 28 Mt over the outlook period and to occur more often in the producing country.

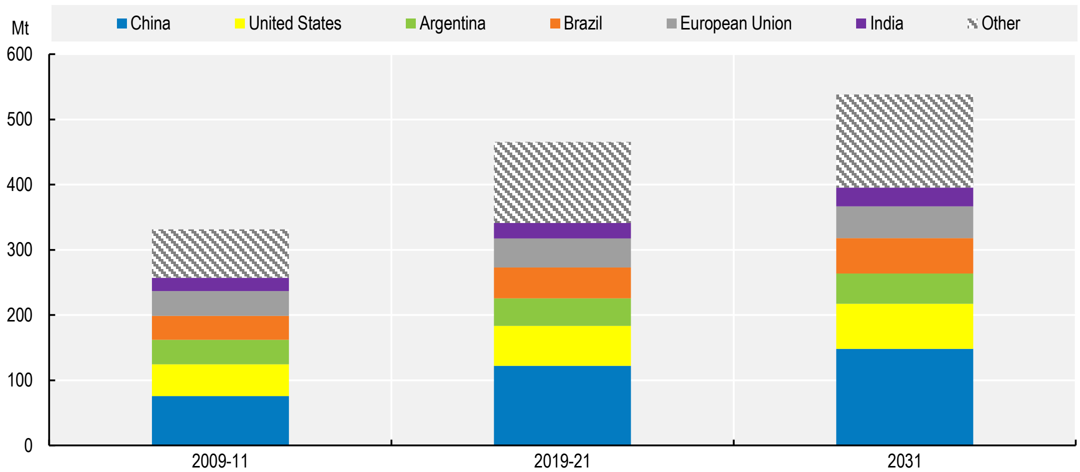
Global vegetable oil production depends on both the crush of oilseeds and the production of perennial tropical oil plants, especially palm oil. Global palm oil output has outpaced the production of other vegetable oils over the past decade. However, growth in the production of palm oil is expected to weaken due to increasing attention to sustainability concerns and the aging of oil palm trees in Indonesia and Malaysia. These two countries account for more than one-third of the world's vegetable oil production and for more than 80% of global palm oil production.

At the global level, palm oil supplies are projected to expand at an annual rate of 1.0%. Increasingly stringent environmental policies from the major importers of palm oil and sustainable agricultural norms (e.g. in line with the 2030 UN Agenda for Sustainable Development) are expected to slow the expansion of the oil palm area in Indonesia and Malaysia. This implies that growth in production comes increasingly from productivity improvements, including an acceleration of replanting. 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 2031, Colombia 2.1 Mt, and Nigeria 1.8 Mt. In several Central American countries, niche palm oil production is developing with global sustainability certifications in place from the outset, positioning the region to eventually reach broader export markets.

The vegetable oil complex includes palm kernel, coconut and cottonseed oil, as well as palm oil and oil extracted from the crush of oilseeds as noted 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 with 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 1.1% p.a., driven mainly by food demand in developing countries resulting from population and income growth.

Global protein meal output is projected to increase by 1.1% p.a., reaching 410 Mt by 2031. World production of protein meals is dominated by soybean meal, which accounts for more than two-thirds of world protein meal production. Production is concentrated in a small group of countries (Figure 4.5). In China and the European Union, most protein meal production comes from the crushing of imported oilseeds, primarily soybeans from Brazil and the United States. In the other important producing countries – Argentina, Brazil, India, and the United States – domestically-produced soybeans and other oilseeds dominate.

Figure 4.5. Oilseed crush by country or region



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

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4.3.4. Oilseed production

Production growth is slowing while soybeans continue to shift to Latin America

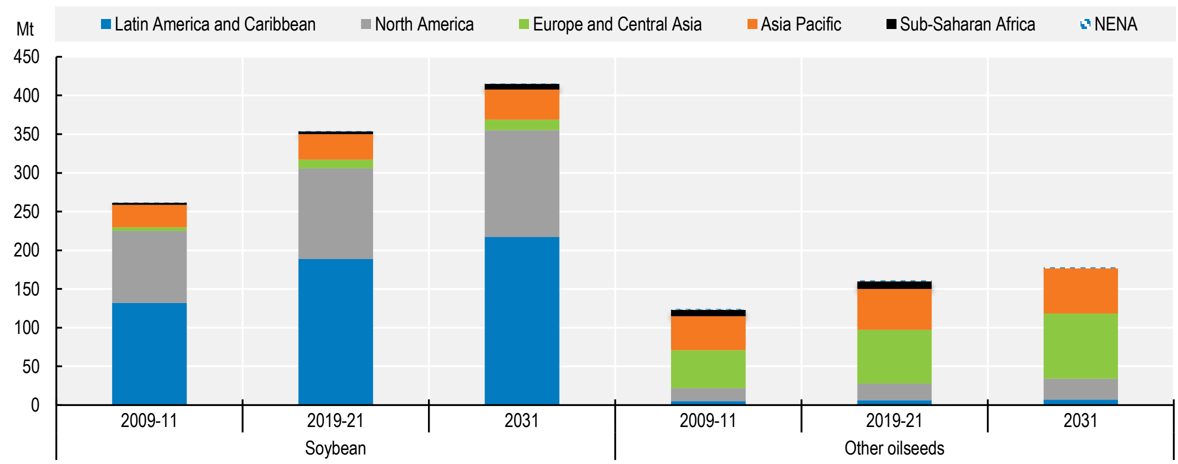
The production of soybeans is projected to grow by 1.0% p.a., compared to 2.9% p.a. over the last decade. The production of other oilseeds (rapeseed, sunflower seed, and groundnuts) will grow at a slower pace, at 1.2% p.a. compared to 2.3% p.a. over the previous ten years (2012-2021). Growth will be dominated by yield increases, accounting for three-quarters of production growth. Soybeans benefit from their fast-growth, which allows for double-cropping, especially in Latin America. Consequently, a considerable share of additional harvested area increase will result from double-cropping soybean following maize in Brazil and wheat in Argentina.

Brazil has in recent years been the largest producer of soybeans and is expected to grow at 0.9% p.a. over the next decade – slightly stronger than the United States, the second largest producer, at 0.7% p.a., due to double cropping soybeans with maize. The production of soybeans is projected to grow strongly elsewhere in Latin America, with Argentina and Paraguay producing 53 Mt and 11 Mt, respectively, by 2031 (Figure 4.6). In China, soybean production is expected to continue to increase in response to reduced policy support for the cultivation of cereals. Soybean production is also expected to increase in India, the Russian Federation, Ukraine, and Canada.

China (a major producer of rapeseed and groundnuts) and the European Union (which mainly produces rapeseed and sunflower seeds) are the most important producers of other oilseeds, with a projected annual output of 32 Mt and 31 Mt, respectively, by 2031. However, limited growth in output is projected for both regions (0.8% p.a. for China and 1.0% p.a. for the European Union) as relatively higher prices for cereals are expected to generate strong competition for limited arable land. Canada, another major producer and the largest exporter of rapeseed, is projected to increase its production of other oilseeds by 1.1% p.a., to reach 22 Mt by 2031.

Soybean stocks are projected to reach a stock-to-use ratio of 11.9% by 2031. Overall, the stock-to-use ratio remains low compared to the past two decades, which means harvest failures could quickly lead to market shortages.

Figure 4.6. Oilseed production by region



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

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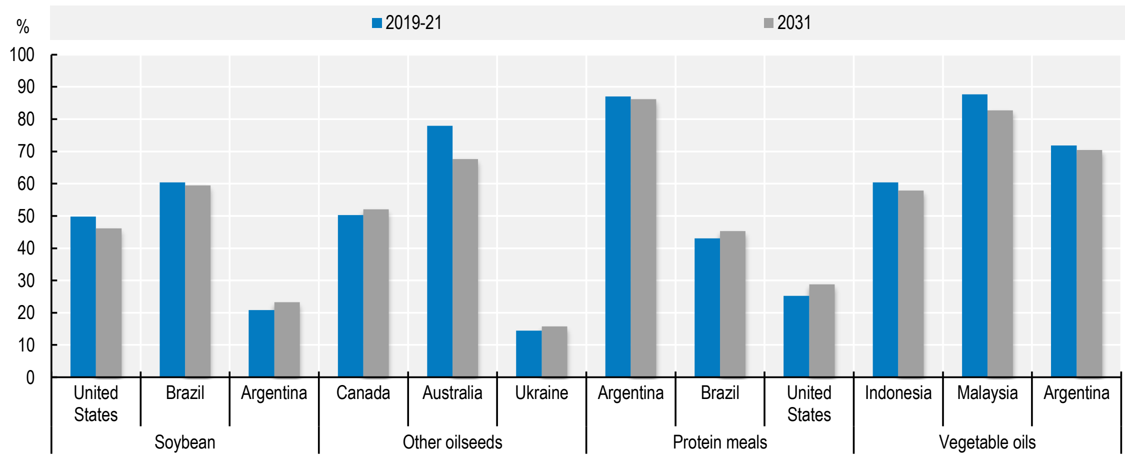
4.3.5. Trade

Trade is significant for oilseeds and products, but slowing down

Over 42% of world soybean production is traded internationally, a high share compared to other agricultural commodities. The expansion in world soybean trade is directly linked to projected slower growth of the soybean crush in China and imports, which are projected to grow by 0.9% p.a. to about 112 Mt by 2031 (down from 5.9% p.a. in 2012-2021), accounting for about two-thirds of world soybean imports. Exports of soybeans originate predominately from Brazil and the United States. 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 and is projected to account for 50% of total global exports of soybean over the projection period.

For other oilseeds, the internationally traded share of global production traded remains much lower at about 14% of world production as the two largest producers, China and the European Union, are net-importers. The main exporters are Canada, Australia, and Ukraine, which are projected to account for more than 67% of world exports by 2031. In Canada and Australia, more than half of the other oilseed production (primarily rapeseed) is exported (Figure 4.7). Additional oilseed production is crushed domestically and exported in the form of vegetable oil or protein meal.

Figure 4.7. 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 (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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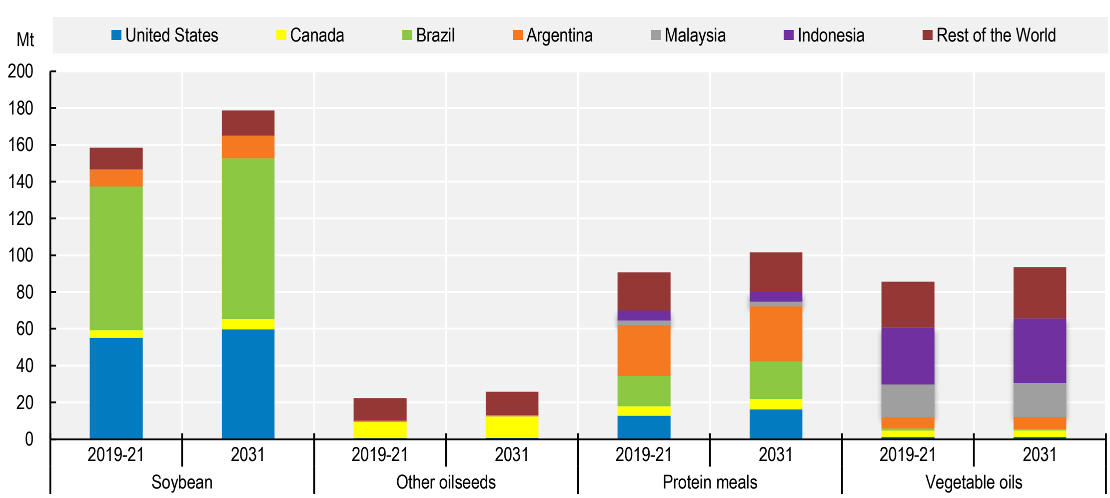
Vegetable oil exports, which amount to 40% of global vegetable oil production, continue to be dominated by a few players. Indonesia and Malaysia are expected to continue to account for 60% of total vegetable oil exports during the outlook period (Figure 4.8). However, the share of exports in production is projected to contract slightly in these countries 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 1.8% p.a., reaching 16 Mt by 2031, or 17% of world vegetable oil imports, in order to meet increasing demand driven by population growth, urbanisation, and rising disposable income.

Figure 4.8. Exports of oilseeds and oilseed products by region



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

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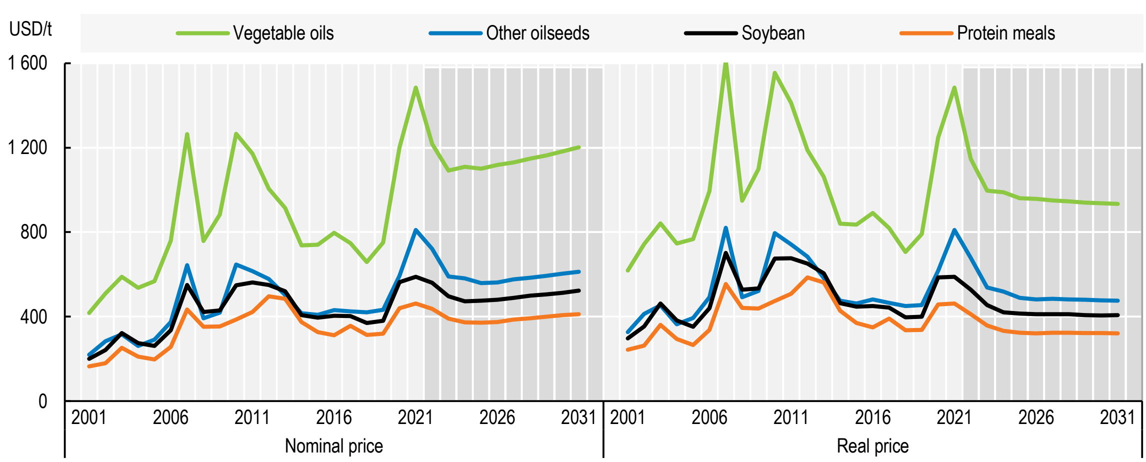
The projected growth in world trade of protein meal is 1.0% p.a. over the outlook period, down from 1.4% p.a. over the last decade. Argentina is expected to remain the largest meal exporter because it is the only major protein meal producer with a clear export orientation. The largest importer is the European Union, with imports expected to decline due to reduced domestic demand for protein meal. Almost all of the 10 Mt global import growth in protein meal is projected to occur in Asia, in particular in Viet Nam, where additional growth will come with the recovery from the ASF outbreak. As the domestic crushing capacity in Asian countries is not expected to keep pace with protein meal demand, expansion of the livestock sector is expected to require imported feed to meet production requirements.

4.3.6. Prices

Current high prices will weaken over the next decade

The price raise of oilseeds and oilseed products continued through 2021 and closed at record nominal levels as global demand increased faster than supply. A downward adjustment is expected during the first years of the outlook period, reflecting expectations of better production prospects, partly fuelled by improved production incentives of current high prices. Thereafter, prices are expected to increase slightly in nominal terms, while declining in real terms following the long-term trend of agricultural commodity prices (Figure 4.9). Sustained economic growth following the recovery from COVID-19 should support the price of oilseed and oilseed products over the outlook period, whereas continued productivity improvements will put downward pressure on real prices.

Figure 4.9. 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 (2021=1).
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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4.4. Risks and uncertainties

Environmental concerns will influence global oilseed supply chains

The scope for increasing palm oil output in Indonesia and especially in Malaysia will increasingly depend on replanting and yield improvements rather than 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. Regarding the yield developments during the last ten years, average yields in Malaysia declined by 2.3% p.a. and in Indonesia by 1.6% p.a. In addition to the slowdown in yields, sustainability concerns will also influence the expansion of palm oil output as demand in developed countries favours deforestation-free oils and seeks sustainability certification for vegetable oil used as biodiesel feedstock and, increasingly, for vegetable oils entering the food chain. However, competing certification schemes are widely used in Malaysia and Indonesia.

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 15% of global vegetable oil supplies go to biodiesel production. In Indonesia, attaining the recently proposed 30% biodiesel mandate is questionable as – in addition to requiring government subsidies – they may impose medium-term supply constraints. In the European Union, policy reforms and the emergence of second-generation biofuel technologies will likely prompt a shift away from crop-based feedstocks. The development of crude oil prices, which affects the competivity and profitability of biodiesel production, remains a major source of uncertainty.

The pace of recovery of the Chinese pig meat industry from ASF combined with restructuring of the pig meat industry will have a large influence on feed demand, especially for protein meal for feeding. Protein meals compete in part with other feed components in the production of compound feed and are thus reacting to any change in cereal prices. Any adjustment of feed mixtures will influence protein meal use.

Consumer concerns regarding soybeans stem from the high share of production derived from genetically modified seeds. In the European Union in particular, retailer 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 than soybean meal. This may further reduce protein meal demand as the European Union accounted for 13% of global demand in 2019-21. Heightened environmental concerns are especially related 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 expansion to avoid further deforestation. If successful, these voluntary initiatives should discourage clearing of land by soybean producers.

Russia’s war against Ukraine poses large uncertainty around the sunflower complex as both countries are the largest producers of sunflower seed (each accounting for more than a quarter of global production) and exporters of sunflower products. Especially, Ukraine is also an important regional exporter of rapeseed and soybeans. Thus, any production shortfall reduces available oilseeds and products on the global market but more importantly can lead to shortfall of vegetable oil and protein meal for feed in Ukraine.

The long-term implications of the COVID-19 pandemic could be significant and will depend on the speed of the economic recovery as vegetable oil consumption tends to grow strongly with economic growth while protein meal is closely dependent on trends in animal production, which itself is closely correlated with income growth.

New investment in research and development in the sugar for alternative lower calorie sugar substitutes is strong given the increasing health concerns and could well result in disrupting the dynamics of the market. Similarly, on the supply side, new breeding techniques for sugar crops (gene editing) and new diversification opportunities for the sugar industry would open new opportunities for the sector (e.g. bioethanol, bioplastics and biogas).

5 Sugar

This chapter describes market developments and medium-term projections for world sugar markets for the period 2022-31. Projections cover consumption, production, trade and prices for sugar beet, sugar cane, sugar, molasses, and high-fructose corn syrup. The chapter concludes with a discussion of key risks and uncertainties which could have implications for world sugar markets over the next decade.

5.1. Projection highlights

Higher per capita consumption in lower income countries against a continued decline in high income countries

Global sugar[1] consumption is set to rebound for the second consecutive season (October 2021-September 2022, which is still estimated at the time we produce this Outlook), mainly underpinned by an economic recovery.

Over the coming decade, increased global sugar consumption is projected to continue thanks in particular to population growth in low-income countries, which is expected to drive growth (Figure 5.1). Urbanization and income gains, particularly in Asian and African countries, two regions where the per capita consumption level is comparatively lower, are likely to remain the key drivers of world sugar consumption from stronger demand for sugar-rich confectionery products and soft drinks. However, slowing global population growth over the next decade is expected to moderate increases in sugar consumption. In addition, in countries with a high level of per capita consumption, policies, public behaviour and business practices will likely continue to discourage sugar consumption because of health concerns. This will be most noticeable in high-income countries, mainly in North and Latin America, Europe and Oceania, where per capita consumption of caloric-rich sweeteners is expected to decline.

Overall, sugar is projected to remain the most consumed sweetener, accounting for around 80% of the global sweetener utilisation. Similarly, high fructose sweetener, mainly high fructose corn syrup[2] (HFCS) is anticipated to maintain its position as the main alternative caloric sweetener after sugar, representing less than 10% share of total consumption, while the remaining proportion is represented by High Intensive Sweeteners (HIS), including saccharin, sucralose and aspartame, which are low-calorie or calorie-free.

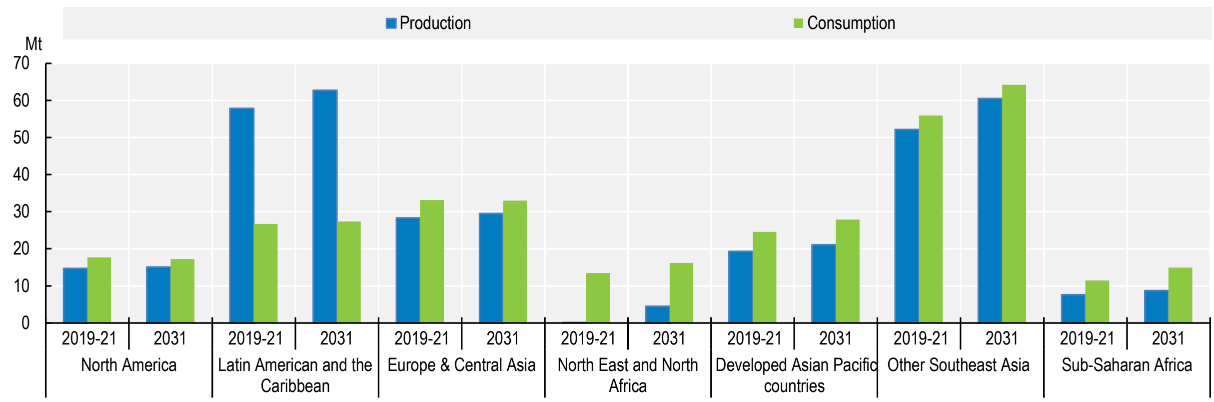
World sugar production in 2021/22 is forecast to rebound after three years of decline, mainly as a result of favourable production prospects in India and Thailand, while in Brazil, the world's largest producer, output is forecast to decline for the second consecutive season. Despite the year-on-year increase, world production is nevertheless expected to fall short of global consumption. As a result, global sugar inventories are anticipated to decline in 2021/22.

Assuming normal weather conditions, the production of sugar crops is foreseen to expand in the key producing countries. Sugarcane, which grows mainly in tropical and sub-tropical regions, will remain the main sugar crop, accounting for 87% of the aggregate output, with sugar beet making up the remainder. Productivity gains, including varietal improvement of crop plants, are expected to be the main drivers of production growth in India, Thailand and the European Union, as production area in these countries is projected to remain relatively stable. In Brazil, the increase is expected to come from both area expansion, due to remunerative prices, and yield improvements. In Africa, attractive policies determine procurement prices and increasing industrial demand are expected to boost plantings of sugar beet in Egypt, where efforts are also being made for the adoption of improved seed varieties. In South Africa, the second largest sugar producer in Africa, and Ethiopia, government support measures to the sector are expected to contribute to the increase in sugar production over the outlook period.

Over the next decade, an improvement in the sugar extraction rate is expected to increase sugar output, which will continue to compete with sugar crops used as feedstock for ethanol production. Brazil, whose processors are able to switch easily between sugar and ethanol production is foreseen to continue to allocate more sugarcane to ethanol production over time, but the projected fall in crude oil prices, in real terms, as well as the assumed expected depreciation of the Brazilian real will sustain higher production of sugar over the next decade. In India, the government continues to promote a national ethanol blending programme,[3] which would reduce the availability of sugarcane for sugar production.

In 2031, Brazil and India are foreseen to account for about 23% and 17% of the world's total sugar output, respectively, with 44 Mt and 32 Mt produced. Elsewhere, the largest increases in production, in absolute terms and compared to the base period,[4] are anticipated in Thailand (+ 4.1 Mt) and Pakistan (+ 1.7 Mt).

Figure 5.1. Supply and demand of caloric sweeteners in main regions



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

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World trade in sugar is anticipated to increase by 1.3% p. a. over the next decade with shipments representing about 35% of global sugar production. Over 60% of the sugar traded globally will continue to be in the form of raw sugar from sugarcane, the remainder in the form of white (refined) sugar from sugarcane and sugar beet. Brazil will retain its position as the leading sugar exporter (up to 49% of world trade), followed by Thailand, Australia, and India. Imports are anticipated to remain less concentrated with the main increases, compared to the base period, projected in Asia and Africa, while the strongest declines in imports are foreseen in the European Union and the United States, reflecting a decline in domestic demand.

International sugar prices reached a four-year highs in 2021 underpinned by concerns over reduced sugar export availabilities in Brazil, amid a strengthening of global demand for sugar. However, in real terms, they are foreseen to trend downwards over the projection period, on account of productivity gains, slowing demand growth and declining crude oil prices[5] making ethanol less competitive. The white sugar premium (the difference between white and raw sugar prices), which averaged USD 82/t during the base period, is projected to increase slightly in nominal terms to USD 87/t by 2031.

The impact of Russia's war against Ukraine, the emergence of new COVID-19 variants and subsequent potential supply chain disruptions would alter the projections, especially in the first years. Over the outlook period, weather related production shortfalls (also related to climate change), crude oil price volatility, or increased crop competition would also cause variability or alternative trends in the supply and demand for sugar crops. The policy environment also creates some uncertainty as sugar remains a fairly regulated sector despite the efforts of some countries, including the European Union and Thailand, to deregulate it. Conversely, investments on research and development could create opportunities on the supply side.

5.2. Current market trends

After some declines in late 2021 and early 2022, international sugar prices rebounded sharply in March 2022, mainly reflecting expectations of a higher diversion of sugarcane to ethanol in Brazil due to higher international crude oil prices.

Early indications for 2021/22 point to a likely second consecutive season of a tight supply-demand balance in the sugar market. Although world sugar production is forecast to rebound after three years of decline, it is nevertheless expected to fall short of global consumption. The recovery in world sugar production in 2021/22 is largely based on expectations of production rebounds in the European Union and Thailand, coupled with favourable prospects in India. By contrast, production is expected to decline in the People's Republic of China (hereafter "China") and in Brazil, the world's largest producer. Global economic growth is expected to bolster world consumption of sugar, which is set to increase for the second consecutive year after the COVID-19 related downturn in 2019/20. The forecast for world sugar trade in 2021/22 is around 60 million tonnes, slightly down from the estimated volume in 2020/21. This mainly reflects lower exports by Brazil and India, compared with their record sales in 2020/21. Global import demand is also anticipated lower in 2021/22 mainly on account of high import costs, with China and Indonesia continuing to lead as the largest buyers.

5.3. Market projections

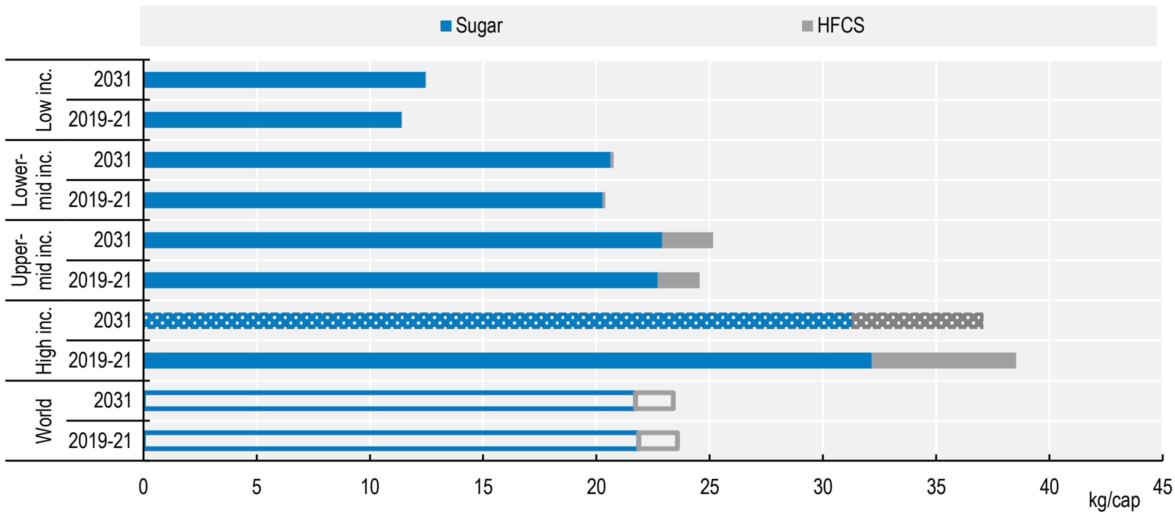
5.3.1. Consumption

Global sugar consumption growth driven by middle and low-income economies

Global sugar consumption is projected to continue growing at around 0.9% p.a. over the next ten years, reaching 188 Mt by 2031, driven by population and income growth. However, average per capita consumption at the global level should not change much, and remain close to 21.9 kg/cap. This reflects considerable variations between regions and countries, which are expected to persist over the next decade, with an increase in per capita consumption in middle and low-income economies expected to offset a decline in high-income countries (Figure 5.2). In general, in middle and low-income economies, the foreseen increase in caloric sweetener consumption is proportionately higher when incomes are lower. By contrast in high-income countries, where per capita sugar consumption has trended downwards in the past, intake is projected to decline further over the next decade reflecting consumers' shift toward food with low sugar content. However, high income countries still record the highest level of per capita sugar consumption whose continuing decline is expected to be reflected at the global level by 2031.

The largest contributions to additional demand relative to the base period will be in Asia (71%) and Africa (31%). In these two sugar deficit regions, despite the continuous expansion over the past years, per capita consumption levels remain generally low compared to other regions, and the prospects for growth are high, given increasing urbanization, a growing middle class and young demographic. In Asia, a key driver of the growth rate is the higher indirect consumption for industrial purposes, including sugar-rich confectionery products and soft drinks, while in Africa the increase will be mainly underpinned by higher direct consumption, particularly in urban areas.

Figure 5.2. Per capita consumption of caloric sweeteners



Note: data are expressed on a tel quel basis (tq).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 (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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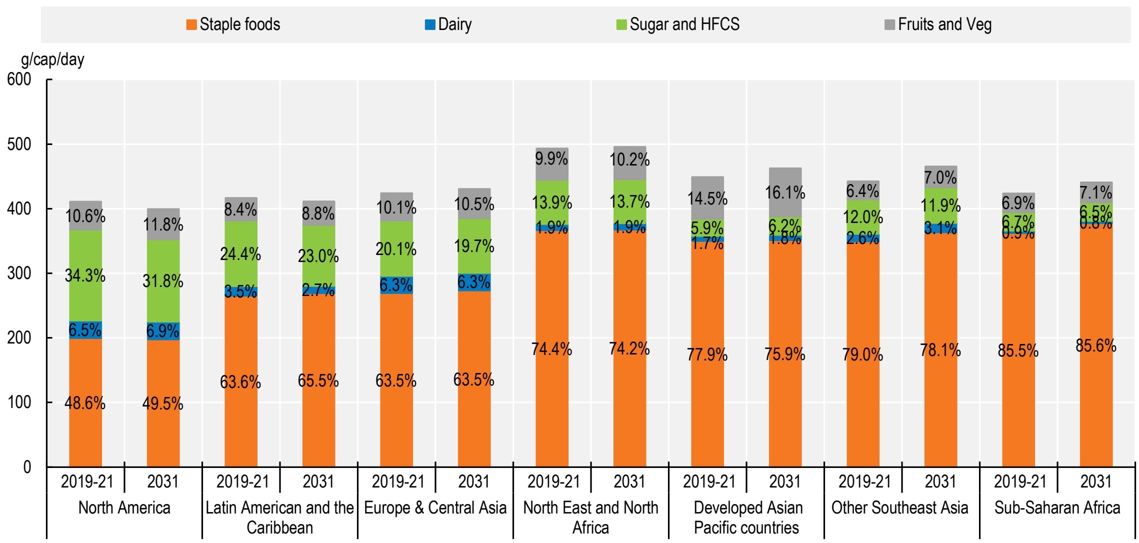
In Asia, it is expected that India will provide the largest contribution to the overall increase in the level of sugar consumption, followed by China and Indonesia. This is based on population and income growth, and the expansion of the food and beverage industry. Per capita consumption in Asia is expected to grow by 0.6% p.a. over the next decade compared with 0.4% in the last decade. In Africa, the highest increases in total consumption are projected for Least Developed Sub-Saharan countries, which are foreseen to record the highest growth rate in per capita consumption over the next decade among African countries. By contrast, in South Africa, where sugar consumption has recorded significant declines in recent years amid government measures to discourage its use, per capita intake is projected to weaken further in the next decade. Despite the overall increase, both in Asia and Africa, average per capita consumption is projected to remain below the global average.

Over the coming decade, even if total daily carbohydrate intake in Asia and Africa remains higher than in the rest of the world (particularly Northeast and North Africa), simple carbohydrates (glucose and fructose from sugar, high fructose sweeteners, fruits and vegetables and lactose) will remain a small part of daily carbohydrate intake (Figure 5.3). In these two regions, in terms of carbohydrate intake, the increase in sugar consumption will not greatly affect the composition of the diet, as three quarters of carbohydrate consumption is from staple foods.

Figure 5.3. Carbohydrate consumption per capita and by type, in the different regions



Note: Staple foods include cereals, roots and tubers, and pulses.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Downward trends will continue in high sugar consuming countries

In Latin America, the world's largest supplier region, per capita sugar consumption has reached levels that raise concerns about the potential negative health effects. Some have introduced a sugar tax during the last decade (Chile, Ecuador, Mexico, Peru) to try to fight obesity. This has contributed to the relatively low regional growth, only 5% over the outlook period. Downward trends that have taken place will continue, albeit at a slower pace than in the past decade. In carbohydrates, this will result in a reduction of simple sugars in favour of starch-based sweeteners.

During the last decade, taxes on caloric sugary products were introduced in in some countries in an attempt to reduce sugar consumption. In addition, measures to limit the sale and/or the promotion of sugary drinks or sweet products to children under 18 years were taken, while some food companies have reduced portion sizes and the amount of caloric sweeteners in products. The overall intakes of caloric sweeteners from this regional aggregate is expected to decline further over the next ten years.

The United States is the country where the consumption of caloric sweeteners, including HFCS, is very high; caloric sweeteners represent the highest share of carbohydrates consumed per capita. It is also the country where, over the projection period, this share is projected to decrease the most in favour of greater consumption of fruit and vegetables. New Zealand, Australia, followed by Canada and countries in Western Europe are also expected to see a continued decline in their per capita sugar consumption, albeit at a slower pace than in the previous decade. In Russia, even if the level of per capita consumption is already high, it is not projected to change much as sugar is considered a staple food.

The High Fructose Corn Syrup market will remain dominated by a few players

HFCS is used primarily in beverages. Unlike sugar, it is a liquid product and less easily traded. Global consumption, will remain the domain of a limited group of countries; it is projected to grow by 0.6% p.a. or 1 Mt (dry weight) by 2031.

The biggest increase will occur in China, one of the few countries with low per capita sweetener consumption. As the world's largest starch producer, China is projected to increase its supply of HFCS to meet growing domestic demand (3.1 kg/cap in 2031), although a lack of profitability is likely to dampen this growth. No much increase is foreseen in Japan and Korea with a consumption of about 6kg/cap. In the European Union, high fructose sweetener will still face competition from other sweeteners and will represent only 1.8 kg/cap in 2031 (compared to 1.2 kg/cap during the base period).

The United States and Mexico will remain the main consumers with respectively 14.4 and 10.1 kg per person. In the United States, the leading HFCS producer, a decline is foreseen as the potential greater health hazard of HFCS over sugar continues to be debated; the share of HFCS in total caloric sweetener consumption is expected to continue to decrease from 36% during the base period to 32% by 2031. In Mexico, government makes efforts to reduce caloric sweetener consumption and per capita HFCS consumption is expected to flatten over the next ten years. As a result of the weak demand, the United States is foreseen to record a production decline (-10%) of HFCS over the outlook period, reaching 6 Mt by 2031.

Globally, little change is expected in the distribution of the demand for sweeteners. 80% of the overall amount consumed will remain sugar and a bit less than 10% high fructose sweetener, the leading alternative product. The remainder will come from high-intensity (low-calorie) sweeteners, which are not covered in the *Outlook*.

5.3.2. Production

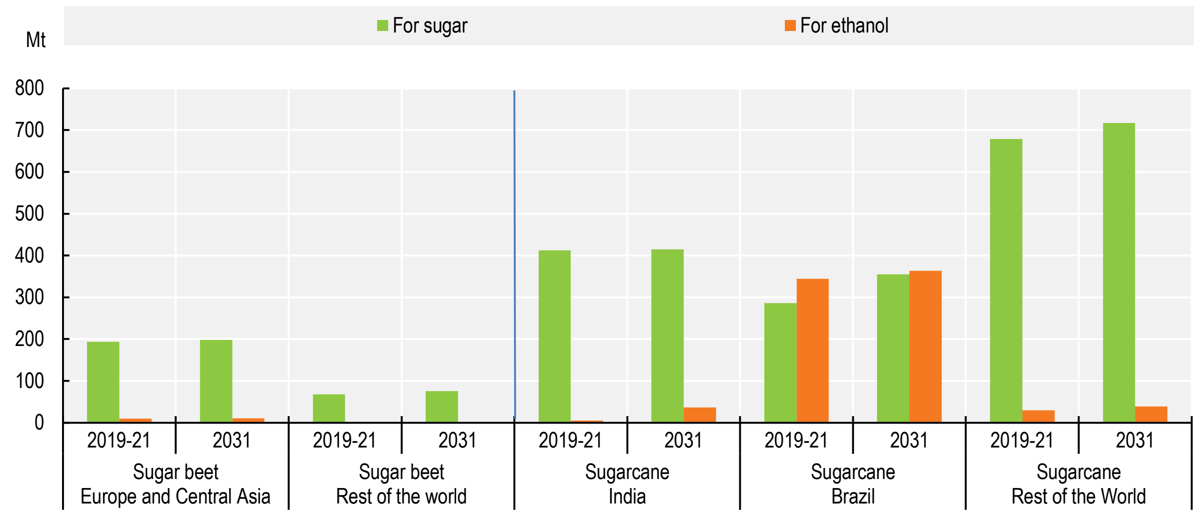
Given normal weather conditions, sugar production is foreseen to increase slightly over the outlook period, but a surge in input costs is likely to moderate the magnitude of the increase. Remunerative prices are nevertheless foreseen to be high enough to support investments and developments in the sector.

Sugarcane is the main (86%) sugar crop, used mainly to produce sugar but also as feedstock for ethanol production. In addition to sugar and ethanol, sugarcane can produce molasses, a thick juice. The residue from milling cane (bagasse) is used to supply energy (cogeneration feedstock for electricity). The sugar beet crop, which has two derivative products beet pulp and molasses, is used to produce a wide range of products, including food (sugar), feed, bio-based products for industry (pharmaceuticals, plastics, textiles and chemicals) and ethanol. Over the next ten years, the profitability of the two main sub-products of the sugar crops, sugar and ethanol, are projected to expand slightly, which will drive an increase in sugar crop production (Figure 5.4).

Increasing yields is the main driver of higher sugar production

Over the outlook period, global sugarcane production is projected to grow by 0.8% p.a. and reach 1 924 Mt by 2031 (+168 Mt), with Brazil and India anticipated to contribute 58% of the increase in global output volume (52% and 19%, respectively). This mainly reflects relative higher crop yields notably in Thailand, Australia, Pakistan, Mexico and India, while area expansion is only expected in Brazil. Prospects are less robust for sugar beet, where only the improvement in yields (+2.3%) will contribute to an increase in production globally. Sugar beet production is projected to reach 284 Mt by 2031, with a slower annual growth rate (0.2% p.a.) than during the past decade (0.9% p.a.) (Figure 5.4). Compared to the base period, an increase in production is expected in the United States (+5 Mt), Russia (+2.9 Mt), the European Union and Egypt (+1.2 Mt), Iran (+0.7 Mt), while contractions are projected in Ukraine (-1.6 Mt). Research and development of improved sugar varieties, with a focus on drought-resistant varieties, is ongoing and is expected to benefit overall productivity.

Figure 5.4. World production of sugar crops classified according to their sub-product



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

StatLink https://stat.link/ibduz3

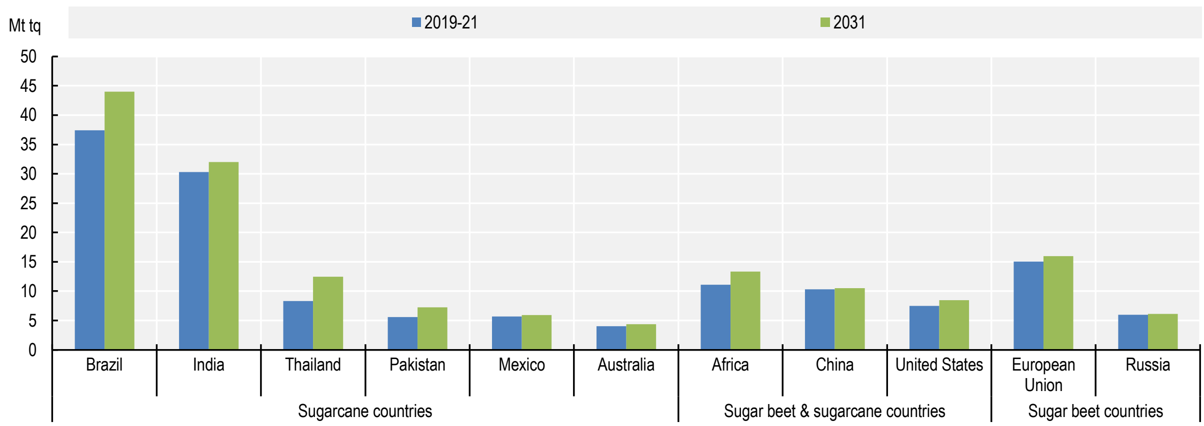
Brazil is the biggest sugarcane producing country, more than half of which is used to produce ethanol. Over the next ten years, some area expansion is foreseen, but considering the competition with other crops for land, the share of sugarcane in arable land (13%) will increase only slightly (+7%). A return to wetter climatic conditions should help to improve the yields, notably in the first years of the projections. In India, the growth in sugarcane production is projected to stem entirely from higher crop yields, as acreage is not expected to expand given competition from other agricultural crops. In Thailand, sugarcane production over the next decade is also expected to come mainly from higher yields. In recent years, lower returns compared to alternative crops, stricter government measures limiting burning practices during harvest and adverse weather conditions contributed to a decline in area, but over the next decade, area is therefore not projected to expand significantly. In China, despite the still recent wish of the authorities to support sugar production, increases in sugar crops production will be small as it will continue to face competition from other crops and increasing land and input costs.

Globally, given rising input costs, the expansion foreseen in sugar beet production over the outlook period will be low. Sugar beet area is expected to decline, because of higher fertiliser prices, but higher yields mean the crop will keep market share. This should notably be the case in the United States, where both sugar crops are cultivated with about 55% of sugar continuing to be produced from sugar beet. In the European Union, production growth is projected to be weak, due notably to a lack of alternatives to neonicotinoid insecticides and high input costs compare to other crops. In Egypt, remunerative procurement prices are expected to boost plantings of sugar beet, while efforts are also made for the adoption of improved seed varieties.

Over the outlook period, about 80% of the sugar crops will be used to produce sugar (78% in the case of sugarcane and 96% in the case of sugar beet) and 20% for ethanol. Brazil will continue to be the main producer of sugar and sugarcane-based ethanol, producing 37% of the world's sugarcane by 2031. Its sugarcane will be used for 24% of global sugar production and 83% of global sugarcane-based ethanol production (compared to 21% and 91% during the base period).

Global sugar production is expected to increase to 190 Mt by 2031. Most production increases are expected to occur in Asia and Latin America as well as Africa (Figure 5.5); those regions are projected to represent 73% of global sugar production by 2031 (compared to 72% in the base period) with the result that OECD countries will continue to lose market shares.

Figure 5.5. Sugar production classified by traditional crops



Note: data are expressed on a tel quel basis (tq)
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Asia, the leading region, is projected to expand its share in global production from 38.6% during the base period to 39.2% by 2031. Thailand, the world's third largest sugar producer, is foreseen to provide the largest share of the sugar supply after Brazil, increasing its sugar production by +4.1 Mt by 2031 compared to the base period. This significant production increase is in line with higher sugarcane production and with sugar extraction rates projected to remain at the high level of the past few years. In India, the world's second largest sugar producer, the growth rate in sugar production is expected to be lower than in the past decade, reflecting a slower growth in sugarcane production and greater diversion to ethanol. In Latin America, Brazil which is also the world's largest producer, has an industry that easily switches producing sugar for exports and producing ethanol for domestic use.[6] Supported by profitable sugar export prices and rising oil prices at the start of the projection period, Brazil is expected to recover from a long financial crisis and some episodes of drought; compared to the base period, its sugar production is expected to increase by 6.6 Mt and the share of its cane production devoted to sugar production is expected to increase, but still remain slightly lower than that used for ethanol production (49% in 2031). Africa is expected to improve its share in the global market thanks to Egypt (+0.7 Mt) on account of the increasing industrial demand, but also in South Africa (+0.2 Mt) and other Sub-Saharan African countries, where government support measures are expected to contribute to the increase in sugar production over the next years.

Compared to the base period, production in OECD countries is foreseen to account for only 13% of the global increase. In 2031, the region will represent 22% of the global market, compared to 23% in the base period. Relative to the base period, the United States and the European Union are foreseen to increase the most with respectively +1 Mt and +0.9 Mt. Production in the United States will continue to benefit from several government policies that support the domestic industry including the Sugar Loan Program that supports prices paid to farmers; the Sugar Marketing Allotments that aim for domestic production to cover up to 85% of domestic consumption; the Feedstock Flexibility Program that diverts any sugar surplus to ethanol production, rather than sugar loan forfeitures to the USDA's Commodity Credit Corporation; and trade barriers that limit imports to meet only domestic needs (through tariff rate quotas, regional agreements, and the Suspension Agreements on Sugar with Mexico). The European Union will maintain its position as the world's third largest producer, taking advantage of improved techniques and a stagnation of sugar beet-based ethanol production.

Global sugar stocks, which increased during the COVID-19 pandemic, reached an all-time high stock-to-use ratio level, but are expected to decline in the early years of the projection period, before increasing such that the global stock-to-use ratio is foreseen to slowly return to its long-term level (45%).

5.3.3. Trade

Sugar to remain highly traded over the outlook period

Sugar will remain a highly traded product, with imports representing 35% of global consumption. Asia and Africa are expected to remain net-importing regions. However, in Africa, efforts to boost domestic production capacities will reduce its share of dependence on imports, which will still represent 67% of consumption in 2031, but down from 72% during the base period. Asia should not see big changes in terms of dependence and imports will continue to represent 41% of consumption. By 2031, Africa and Asia will account respectively for 26% and 59% of global imports.

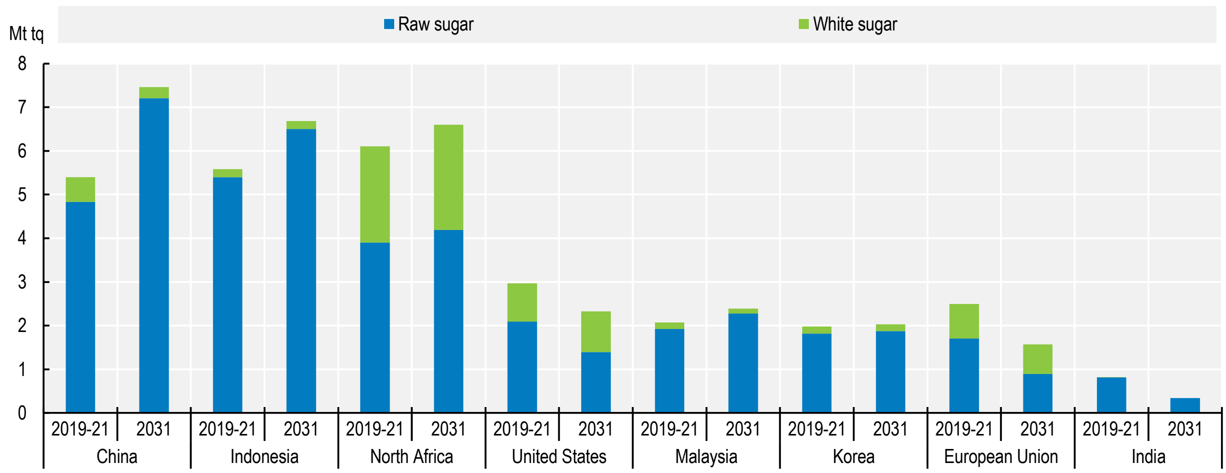
No major change is expected in the distribution of sugar imports between raw and refined. Most will continue to be raw sugar (63%) even though the share of white sugar imports that includes a premium will increase (Figure 5.6). In Asia, the share of imported white sugar will decline slightly compared to the base period, when unusually high imports were reported in some countries, while in Africa, it is expected to increase, mainly driven by LDC countries in Sub-Saharan Africa.

During the base period, North Africa, Indonesia and China were the leading importers (at 6.1 Mt, 5.6 Mt and 5.4 Mt), followed by the United States (3.0 Mt), the European Union (2.5 Mt), Malaysia (2.1 Mt) and Korea (2.0 Mt). Over the next decade, with a strong growth in consumption, China is projected to consolidate its position as the leading sugar importer by 2031 (7.5 Mt), followed by Indonesia (6.7 Mt), North Africa (6.6 Mt), the United States (2.3 Mt), Malaysia (2.4 Mt), and Korea (2.0 Mt). Although from a lower base, strong growth is expected in LDC Africa and Asia.

Sugar imports are expected to decline mainly in the European Union, the United States, India, Iran and South Africa, due to reduced demand. In the United States, traditionally a sugar-deficit country, policies will continue to foster domestic production and limit 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 United States needs. Mexico is expected to continue resorting to US HFCS to meet national demand for sweeteners. In the European Union, the region used to import raw sugar from countries with which it had preferential agreements, but the opportunities have become less attractive for exporting partner countries since 2017, when the abolition of quotas led to lower prices. EU sugar imports are projected to meet lower demand and decrease to 1.6 Mt by 2031.

On the export side, sugar markets are projected to remain highly concentrated (Figure 5.7). Four main countries will continue to account for more than 84% of the market share for raw sugar by 2031: Brazil (64%), Thailand (10%), Australia (8%) and India (3%). For white sugar, Brazil (25%), Thailand (23%), India (6%) and the European Union (6%) will supply about 60% of the market.

Figure 5.6. Raw and white sugar imports for major countries and regions



Note: data are expressed on a tel quel basis (tq)
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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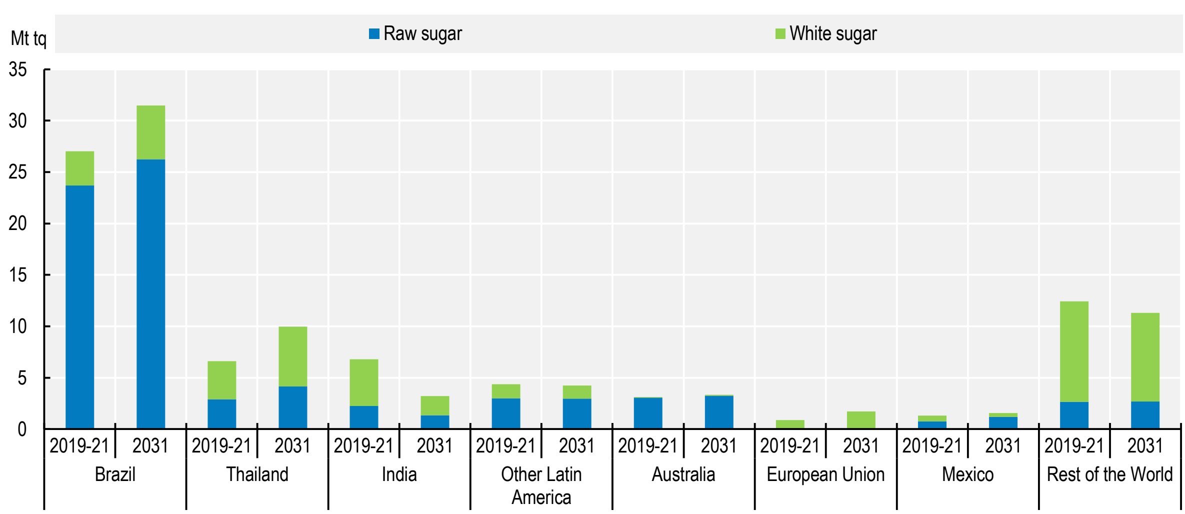
Figure 5.7. Raw and white sugar exports for major countries and regions



Note: data are expressed on a tel quel basis (tq)
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/t2birh

Brazil will remain by far the leading exporter (49% in 2031) (Figure 5.7). Millers should benefit from attractive incentives to produce sugar for exports, while any continuing weakness of the country's currency against the US dollar will improve sugar's competitiveness. Favourable returns for sugarcane-based ethanol production will continue to play a key role, but the expected growth in sugarcane production for sugar is higher than for ethanol which frees up more sugar for exports. Brazilian sugar exports are expected to reach 33.5 Mt in 203, +6.4 Mt over the outlook period, mainly under the form of raw sugar as relatively little refined sugar is exported.

In Thailand, the world's second largest sugar exporter, very little ethanol is produced directly from sugarcane (less than 2%) where molasses or cassava are used. By 2031, the share of sugar exports is expected to increase to 15% and reach nearly 10 Mt. This compares to a share of 11% and a volume of 6.6 Mt during the base period, which is due to the drop in production in 2019 and 2020. In India, the government's continued efforts to promote ethanol is projected to contribute to a decline in sugar exports from the current record volumes. In Australia, another export-oriented producing country, sugar production is foreseen to be sustained by favourable prices and return to a slight upward trend for a few years but sugarcane production will be constrained by the availability of irrigated land with sugar exports continuing to account for about three quarters of production.

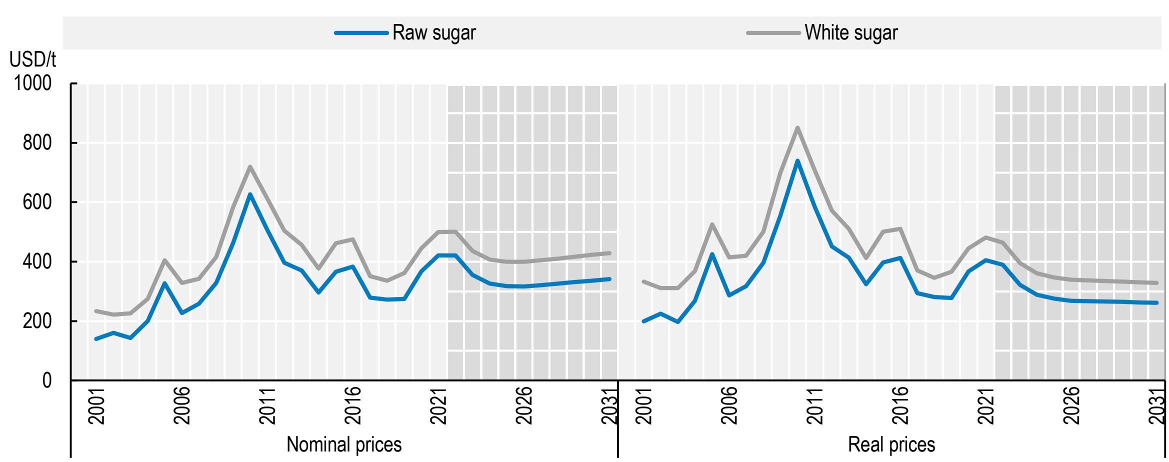
5.3.4. Prices

Prices expected to fall in real terms

With indications of a second consecutive season of a tight supply-demand balance, international sugar prices are expected to remain relatively high in the current season, following the surge in crude oil in the first quarter of 2022. Higher crude oil prices prompted mills in Brazil to increase the volume of sugarcane crushed for ethanol at the expense of sugar, providing upward pressure on sugar prices.

International sugar prices are expected to remain high in the short term, but to fall subsequently, driven improved production prospects (Figure 5.**8**). Nominal prices are projected to follow a moderate upward trend, as demand is foreseen to return to pre-COVID-19 pandemic levels while supply should easily meet demand, assuming little change in relative ethanol and sugar prices. However, price volatility may result from domestic policies and the dominance of few exporters over the next ten years.

Figure 5.8. Evolution of world sugar prices



Note: Raw sugar world price, Intercontinental Exchange contract No.11 nearby futures price; Refined sugar world price, Euronext Liffe, Futures Contract No. 407, London. Real sugar prices are nominal world prices deflated by the US GDP deflator (2021=1).
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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Real prices are projected to fall from the current high levels and resume their long-term decline due to productivity gains from better yields and slower demand growth (Figure 5.2). Overall, real prices should fall below the average level of the last 20 years, when prices were under upward pressure due to competition from biofuels (ethanol).

The white sugar premium is projected to increase slightly in absolute nominal terms, with a slight increase of the share of white sugar exports in total trade.

5.4. Risks and uncertainties

Health concerns and developments in energy markets likely to predominate

In the short term, international sugar markets remain dependent on the developments of Russia's aggression against Ukraine. While sugar markets are not directly impacted, Petrobras, the state-owned Brazilian petroleum industry, reacted to the changes in crude oil prices by raising its price of gasoline, which provide an incentive for millers to divert more cane to ethanol production and less for sugar. Global supply could also be impacted by a reduction in the supply of fertilisers, Russia and Belarus being two big exporters, which would have consequences on the expected growth in sugar crop yields. Changes in crude oil prices, a key element for the profitability of sugar crop-based ethanol production, remain a major source of uncertainty for the sector. In Brazil, and also increasingly in India, millers can easily prioritise sugar production over that of ethanol or vice versa.

On the demand side, the COVID-19 pandemic is still ongoing and new variants could disrupt the supply chain again. With currently volatile markets, the expected recovery in growth could be postponed, with some significant consequences on low-income countries where strongest growth is expected.

The Outlook assumes normal climatic conditions which gives favourable prospect for sugar crop production. But unfavourable weather events, such as from climate change, could have a marked impact on output and prices, considering the relatively high market concentration for export. Episodes of droughts could lead sugar cane growers to switch to alternative drought-resistant crops, given that sugar cane is water intensive. A change in the price ratio between crops could also influence planting decisions in favour of more profitable crops.

Significant government intervention persists in many countries, with the aim of protecting domestic production. There have been efforts to liberalise sugar markets, notably in the last decade (European Union, Thailand). In India, the recurrent use of export subsidies to free the market from excess sugar could have an impact on markets.

New investment in research and development in the sugar for alternative lower calorie sugar substitutes is strong given the increasing health concerns and could well result in disrupting the dynamics of the market. Similarly, on the supply side, new breeding techniques for sugar crops (gene editing) and new diversification opportunities for the sugar industry would open new opportunities for the sector (e.g. bioethanol, bioplastics and biogas).

Notes

[1] See glossary for definition.

[2] See glossary for definition.

[3] For more information, see the chapter on biofuels.

[4] The base period refers to the period October 2019 to September 2022, and therefore includes estimated numbers.

[5] See https://openknowledge.worldbank.org/bitstream/handle/10986/36350/CMO-October-2021.pdf.

[6] Brazil has a large fleet of hybrid vehicles running on E25.

6 Meat

This chapter describes market developments and medium-term projections for world meat markets for the period 2022-31. Projections cover consumption, production, trade and prices for beef and veal, pigmeat, poultry, and sheepmeat. The chapter concludes with a discussion of key risks and uncertainties which have implications for world meat markets over the next decade.

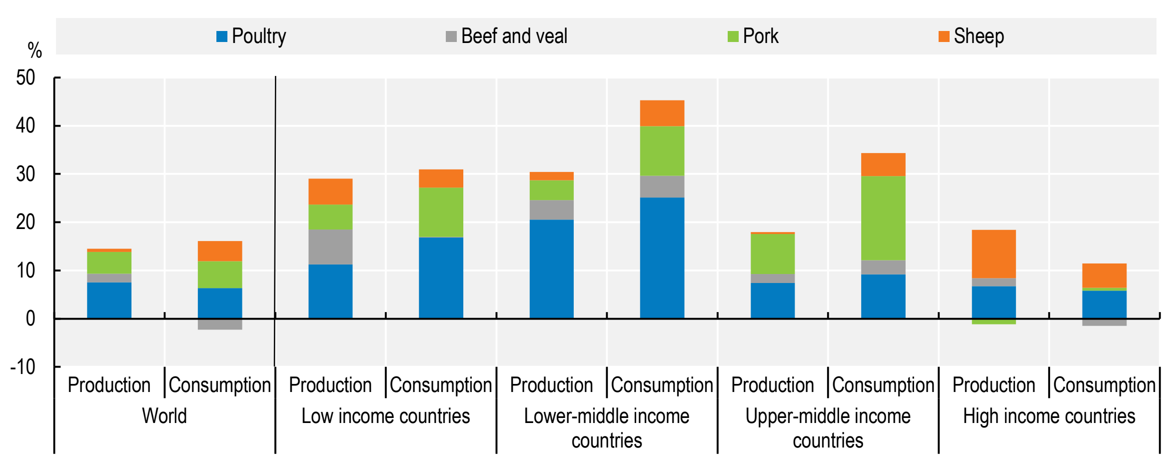
6.1. Projection highlights

Slowing down globally but better prospects in low and middle income countries

The shift in meat consumption from foodservice to home cooking that occurred during the COVID pandemic is expected to be short term and will revert to prior expenditure patterns as restrictions are lifted. In high income countries, however, where per capita consumption is already high, demand is anticipated to level off or trend lower given ageing populations and greater dietary concerns that seek more diversity in protein sources. In lower income countries, both population and income growth will spur higher overall consumption, albeit from a much lower per capita base level. Recovery in meat consumption in the People's Republic of China (hereafter "China"), which fell in per capita terms by over 11% in 2020 from its historical peak in 2018, is projected to return to its longer-term trend by 2023, as the impact on domestic pig meat prices of African Swine Fever (ASF) abates. Per capita global meat consumption, once China pork consumption recovers, is expected to stabilise around 35.6 kg/year in r.w.e. by 2031.

The long-term shift in meat consumption toward poultry continues to strengthen. In high-income countries this trend is due to a rising preference for white meats that are more convenient to prepare, and which are perceived as a better food choice. In low- and middle-income countries, the upward trend is additionally due to the lower price of poultry compared to other meats. Globally, protein availability from poultry, pork, beef, and sheep meat is projected to grow 16%, 17%, 8%, and 16%, respectively, by 2031 (Figure 6.1). Poultry meat is projected to constitute 47% of the protein consumed from meat sources, followed by pig, sheep and bovine.

Figure 6.1. Growth in meat production and per capita consumption on a protein basis, 2019-2021 to 2031



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

StatLink https://stat.link/q6c7tu

Global meat supply will expand to meet rising demand over the projection period reaching 377Mt by 2031 but growing slower than the last decade. Global herd and flock expansion, especially in China, combined with continuous improvement in animal breeding, management, and technology will increase productivity, particularly in low- and middle-income countries, which will drive the growth in production. Higher prices for meat early in the projection period will induce a supply response, albeit restrained by higher costs for inputs, particularly for feed, energy, and transport. Bottlenecks in processing capacity witnessed during the height of the pandemic are expected to ease. China is projected to account for most of the total increase in meat production, followed by the United States, Brazil and India. By contrast, in the European Union meat production will decrease over the outlook period due to increasing domestic and environmental costs, and reduced export opportunities due to greater competition on global markets.

The increase in global meat production is influenced mainly by growth in poultry meat. Global growth in pig meat production will remain limited in the first years of the Outlook due to the ongoing recovery from the outbreaks of ASF in China, the Philippines and Viet Nam. The recovery process is assumed to be completed in China and Viet Nam by 2023 and in the Philippines by 2024. Government strategies in the latter two are based on the development of a commercially available vaccine to control the spread of ASF, which will be critical in reducing the risks of future ASF outbreaks.

The current projection foresees a global increase in livestock inventories with cattle, pigs, poultry and sheep rising to 1.8, 1.0, 31.0 and 2.9 billion head, respectively. As a result, greenhouse gas (GHG) emissions by the meat sector are projected to increase by 9% by 2031. This increase is considerably less than the 15% increase in meat production given the rising share of poultry, and productivity increases that yield higher production of meat per animal, and thus a lower ratio of GHG emissions per unit of meat output (Figure 6.5). An important exception is in Africa where emissions will rise by 24% largely in parallel with its rise in production.

International meat trade will expand in response to growing demand from high per-capita income growth in Asian countries and by high population growth in Sub-Saharan Africa. Import demand in middle and high-income Asian countries has been steadily increasing in recent years due to a shift toward diets that include higher shares of animal products. The expected decline in China's pork imports will put pressure on global pork markets as they re-adjust to a post-ASF situation. Trade in other meats will continue to grow, albeit at a slower pace than in the last decade.

This *Outlook* projects that nominal meat prices are anticipated to remain high in 2022, as demand in some middle- and high-income countries continue to recover from the COVID-19 pandemic and underpin market demand, while supplies remain tight. Real prices of all meats are foreseen to return to their long-term downward trend levels over the *Outlook* period as supplies respond to price incentives, and productivity gains are realised.

The projections assume that aside from demographic, income, and price factors, evolving consumer preferences will shape diets. Meat consumption patterns of consumers in some high-income countries have reached a turning point at which overall demand has started to stagnate and shifts will occur based on the type and the quality of the meat consumed. Dietary recommendations advising limited red meat consumption as well the changing consumer's preferences towards alternatives to conventional meat proteins over the past years are having a greater impact on consumer purchases.

6.2. Current market trends

6.2.1. Market prices rise despite higher supplies

World meat production rose 5% in 2021 to an estimated 339 Mt, led by a large 34% increase in pig meat production in China following two years of precipitous decline induced by an outbreak of ASF. Supplies of poultry, bovine and sheep meat rose only marginally as high feed prices reduced profitability. Bovine meat output in some countries was restrained by a variety of factors such as COVID–19 related disruptions, labour shortages, the on-going shrinkage of the dairy herd in the European Union, and the implementation of an export tax in Argentina. On the other hand, beef output increased 12% in India as slaughter numbers increased following the gradual reopening from the COVID-19 pandemic lockdown and in response to improving demand from overseas markets in the Middle East and Southeast Asia.

World meat imports in 2021 are estimated to have reached 40 MT, led by poultry imports. Leading meat exporters – including Brazil, the European Union and the United States – supplied much of this higher import demand.

International meat prices quoted in the *Outlook* trended upward in 2021, reflecting higher demand from economic recovery and higher marketing and transport costs. However, meat to feed price ratios fell significantly, putting pressure on sectoral profitability in intensive feed-grain livestock operations. This will cause markets to tighten further inducing higher prices early in the *Outlook* period.

6.3. Market projections

6.3.1. Consumption

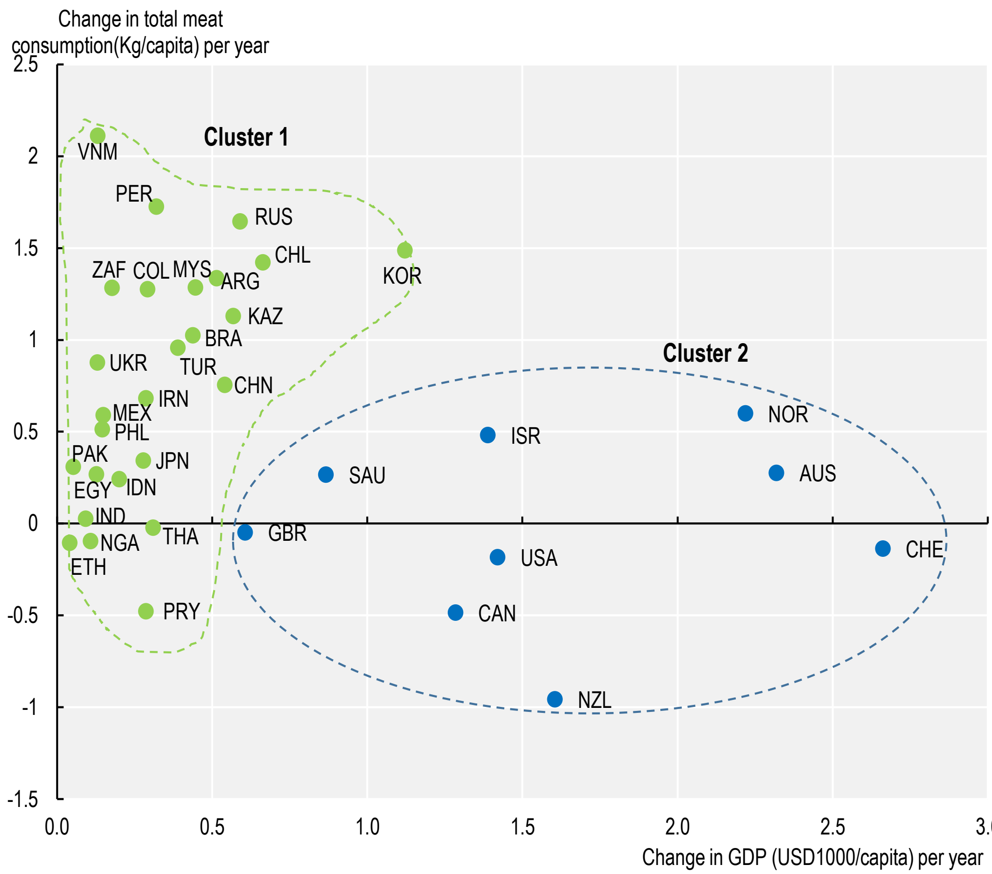
Meat demand is weakening in high income countries, with a shift to white meat

Population growth is a major driver of increased demand, and its projected global increase of 11% will underpin an estimated growth of 15% in global meat consumption by 2031, compared to the base period of this Outlook. As well as population growth, determinants of meat consumption are complex including income, prices, demographics, urbanisation, traditions and religious beliefs, as well as environmental, ethical/animal welfare and health concerns. The past several decades have witnessed considerable changes in the impact of each of these factors across a broad array of countries and regions.

Economic growth is an important driver of meat consumption as it enables the purchase of meat, which is typically a more expensive source of calories and proteins. It is also accompanied by other structural changes such as greater urbanisation, higher labour participation, and away-from-home food service expenditures that additionally encourage higher meat purchases. However, the response of consumption to income growth is demonstrably higher at lower incomes, and less so at higher incomes where consumption is largely saturated, and consumers may be more sensitive to environmental, and ethical/animal welfare and health concerns. Recent analysis suggests that at a GDP per capita exceeding about USD 40 000, growth of GDP is no longer a driver of growth in meat consumption (Whitton et al., 2021[1]). Countries appear to be grouped into two clusters: one in which increases in GDP per capita matches increases in meat consumption (cluster 1); and a second one of nine countries (cluster 2) in which there is no association between per capita change in GDP and meat consumption (Figure 6.2).

The empirical evidence on consumer behaviour suggests that increases in income in low-income countries, where the share of food expenditure represent a high share of all expenditure, stimulate a higher consumption of lower valued foods, particularly carbohydrates. Beyond a certain threshold, higher valued foods such as animal proteins are preferred. For meat proteins the evidence suggests that the shift towards higher shares of meat protein in the diet have increased the most for upper middle-income countries, particularly China. However, after 2015 it appears that the dietary shift towards increasing amount of meat proteins as a share of total protein intake has slowed. These trends are not anticipated to change much over the next decade. Higher incomes may induce higher per capita protein consumption (including eating away from home), but not necessarily a higher share of meat protein in diets.

Figure 6.2. Change in Gross Domestic Product (GDP) and change in meat consumption.

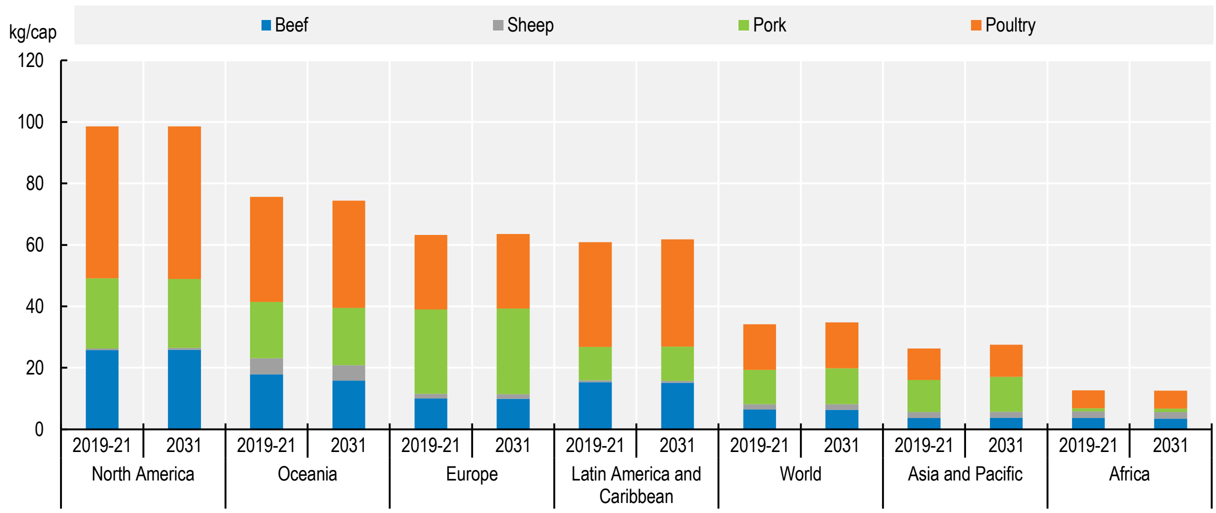


Note: Scatter plot of change in nominal GDP per capita per year and change in meat consumption per capita per year. Circles indicate country clusters.
Source: Whitton, C.; Bogueva, D.;Marinova, D.; Phillips, C.J.C. Are We Approaching Peak Meat Consumption? Analysis of Meat Consumption from 2000 to 2019 in 35 Countries and Its Relationship to Gross Domestic Product. Animals 2021, 11, 3466. https://doi.org/10.3390/ani11123466

StatLink https://stat.link/xsi5ru

Research has found that the main motivations prompting consumers in higher income countries to shift towards a diet that excludes or reduces meat products and re-allocates among meat products (e.g. red vs white meat) are those relating to animal welfare and health. Consumer research has also examined attitudes and behaviour towards meat consumption in relation to environmental concerns. The results show that the number of consumers willing to stop or significantly reduce meat consumption for environmental reasons or who have already changed their meat intake for ecological concerns still represent a small minority of global consumers, which is however of growing significance among young Europeans who are adopting environmentally motivated meat curtailment strategies (Sanchez-Sabate and Sabaté, 2019[2]).

Figure 6.3. Meat consumption per capita: Continued rise of poultry, pig meat and fall of beef



Note: Per capita consumption is expressed in retail weight.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/pqkuye

Poultry meat consumption has risen in virtually all countries and regions (Figure 6.3). Consumers are attracted to poultry due to lower prices, product consistency and adaptability, and higher protein/lower fat content. Consumption of poultry meat is projected to increase globally to 154 Mt over the projection period, accounting for nearly half of the additional meat consumed. On a per capita basis, these robust growth rates in poultry consumption reflect the significant role it plays in the national diets of several populous developing countries, including China, India, Indonesia, Malaysia, Pakistan, Peru (which will surpass the United States to become the second largest per capita consumer), the Philippines and Viet Nam.

Global *pig meat* consumption is projected to increase to 129 Mt over the next ten years and to account for a third of the total increase in meat consumption. However, on a per capita basis, global consumption is expected to stagnate over the outlook period. Pork will remain the meat most eaten in the European Union over the coming decade, even though it will remain stable in per capita terms as changes in diets will favour poultry as a cheaper and perceived better food choice. In most of Latin America favourable relative prices have positioned pork and poultry as the favoured meats to meet rising demand from the middle class. Several Asian countries which traditionally consume pork such as Korea and Viet Nam, are also projected to increase consumption on a per capita basis.

Global *beef* consumption is projected to increase to 76 Mt over the next ten years. However, per capita consumption has declined since 2007 and is projected to fall by a further 2% by 2031. Asia and the Pacific is the only region where per capita beef consumption is projected to increase over the outlook period, albeit from a low base. In China, the world's second largest consumer of beef in absolute terms, per capita consumption is projected to rise a further 10% by 2031, after having risen 50% in the last decade. But most countries that have high beef per capita consumption will see the level decline in favour of poultry meat. For example, in the Americas and Oceania, which is where preference for beef are among the highest in the world, per capita consumption will fall in Argentina(-5%) and Canada (-2%), Brazil (-2%), the United States (-4%), and, significantly (-15%), in Oceania.

Global *sheep meat* consumption, a niche market in some countries and considered a premium component of diets in many others, is projected to increase to 18 Mt over the outlook period and to account for 5% of the additional meat consumed. Sheep meat consumption worldwide, on a per capita basis, is comparable in both developing and developed countries. In some Near Eastern and North African (NENA) countries, where sheep meat is traditionally consumed, per capita consumption is projected to continue its long-term decline despite increasing disposable income.

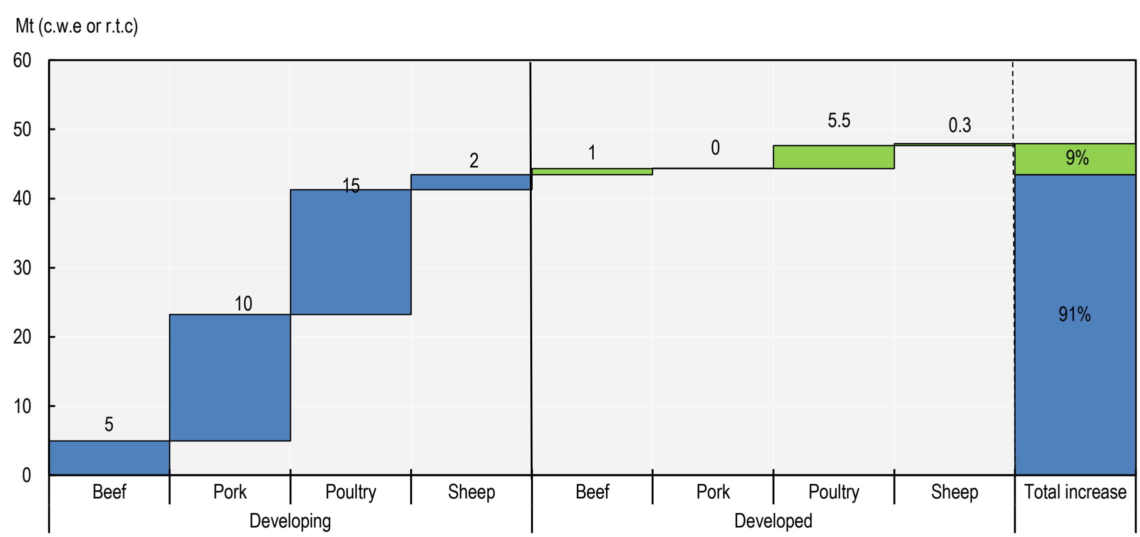
6.3.2. Production

Poultry meat remains the primary driver of growth in meat production

Global meat production is projected to reach 377 Mt based on increasing profitability in the early years of the outlook period as meat prices rebound post-COVID-19 and feed costs decline. Overall, most meat production growth will occur in developing regions. The market share of the Asia and Pacific regions will return to its historical level, after dipping during the ASF crisis, mainly due to developments in China which is the world's largest meat producer. The production share of the world's top five meat producers – China, the United States, the European Union, Brazil, and the Russian Federation (hereafter "Russia") – will gradually trend downwards from its current level. This downward trend reflects a decline in production from the European Union and an emerging broader base of global production. Globally, livestock expansion will be facilitated by the increasing size and consolidation of production units towards a more integrated systems, especially in emerging developing countries (Figure 6.4).

Figure 6.4. Growth of meat production by region and meat type

2031 vs 2019-21



Note: c.w.e. is carcass weight equivalent, r.t.c. is ready to cook equivalent.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/sjawtk

Poultry meat will continue to be the primary driver of meat production growth increasing 16% by 2031. With favourable meat-to-feed price ratios compared to other ruminants, together with a short production cycle, poultry producers can respond quickly to market signals while taking on board rapid improvements in genetics, animal health, and feeding practices. Production will expand from sustained productivity gains in Brazil, China, India, Indonesia, and the United States. Expansion is also foreseen in Asia as the shift away from pig meat triggered by several ASF outbreaks will benefit poultry in the medium term.

Pig meat output is projected to rise by 17% by 2031, up from an ASF-reduced base level 2019-2021 and benefiting from increasing specialisation of the sector and biosecurity measures. The ASF outbreak across Asia, starting in late 2018, will continue to affect many countries in the early years of the outlook period, with China, the Philippines and Viet Nam experiencing the greatest impact. It is projected that ASF outbreaks will continue to keep global pig meat output below previous peak levels until 2022, after which it is expected to steadily increase to 2031.

Pig meat production in China is expected to continue to increase and attain pre-ASF (2017) levels by 2023. Most of the pig meat production increase in ASF-affected regions will be due to conversion from largely small-scale backyard holdings to large-scale commercial enterprises. Viet Nam, which has suffered from ASF-reduced output since 2019, is projected to become the sixth largest pig meat producer just below Brazil and Russia. Its *domestic* policy rests on vaccination to control the spread of ASF, and trials have proved to be safe and efficient. As a result, Vietnamese production is projected to recover to 2019 levels by 2023 and to grow further over the projection period.

Pig meat production in the European Union is projected to decline as environmental and animal welfare concerns are expected to limit domestic demand while the decline in imports by China also weigh negatively on trade prospects. Brazil and US production are also expected to fall at the start of the *Outlook* in the face of the expected decline of Chinese import demand and high feed costs. On the other hand, their production will remain high given their strong competitive position in *global* markets.

Beef production will grow to 76 Mt by 2031, with slow growth attributable to weak beef demand as consumers continue to shift preferences to poultry meat. In North America, the largest producing region, a modest herd expansion, is projected to increase beef production by 4% by 2031. Production in the European Union is projected to fall as inventories of dairy cows, responsible for approximately two-thirds of the beef supply, 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, steep competition in export markets, and declining domestic demand. The beef sector is the main beneficiary of the European Union’s voluntary coupled support programme, and a relatively good price outlook will dampen the downward trend of production in the European Union.

Beef and carabeef[1] production in India rebounded in 2021 after recording a large decline in 2020 in part due to COVID-19 lockdown and regulations on animal welfare in several Indian states. The largest historical increase in beef supply was recorded in 2021 as the Indian government implemented measures to facilitate processing and slaughtering of bovine and water buffaloes in particular. India’s cattle production is expected continue to grow over the projection period with improvement in breeding, nutrition, and animal health. Pakistan is projected to have the strongest growth rate of any country at 26%, as calf and milk-producing cows are being slaughtered to meet the high demand of meat protein from the Middle East.

In Australia, which has faced a COVID-related shortage of labour, production is projected to increase due to greater cattle availability and the return of labour to processing plants. Overall, beef producers have greater ability to increase slaughter in the short term but have less flexibility to increase carcass weights with high feed prices. Therefore, in the early years of the *Outlook* beef production will be higher due to more slaughtering of lower weight animals.

Growth in *sheep meat* production will mostly originate in Asia, led by China, India, and Pakistan but significant increases are also projected 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 are well adapted to the region with their extensive production systems.

In Oceania, New Zealand sheep meat production is expected to remain stable due to competition for pastureland from the beef and dairy sectors and forestry. The larger availability of sheep meat in Australia will enable it to respond to growing global demand despite being constrained by its currently small sheep flock.

Sheep meat production in the European Union is expected to increase slightly, underpinned by voluntary coupled producer support offered in the main sheep-producing Member States.

Box 6.1. Productivity change in the meat sector

Meat production has grown about 110% in the past 30 years and, as noted in this *Outlook*, is anticipated to grow an additional 8% over the next ten years, due largely to growing demand of populations and incomes in developing economies. At the same time, the "off-take", or the quantity of meat produced per animal, has also increased substantially over time. This means that fewer animals are required to produce a given level of meat. This partial productivity measure captures several changing characteristics in the meat sector including the number of offspring per breeding animal, length of feeding period, the quantity of feed needed per kg of meat produced and thus the yield of meat for each animal slaughtered. Ultimately, higher off-take ratios imply a lower inventory of animals or capital which is required to produce meat, while a decreasing feed conversion ratio implies, in the case of industrial operations, a lower need for feed grain.

Both indicators have considerable resource implications. Table 6.1 and Table 6.2 provide selected country examples of off-take and feed conversion ratios for different meats, recent trends, and projected future growth rates over the next decade. Off-take ratios and feed conversion ratios by country and by animal type may vary for several reasons. Meat production characteristics vary by animal and by country depending on genetics, livestock management, climate, pasture and arable land availability, social norms and the state of economic development. Large differences in off-take ratios can be observed between intensive operations with normally higher off-take ratios, and less intensive ones. Grain fed operations typically show higher off-take ratios, as animals may be slaughtered at a younger age and at higher weights.

Table 6.1. Trends in meat off-take ratios in selected countries

	Bovine meat			Pigmeat			Poultry meat			Sheepmeat		
	Offtake ratio	Growth	Projected	Offtake ratio	Growth	Projected	Offtake ratio	Growth	Projected	Offtake ratio	Growth	Projected
	2019-21	2000-19	2020-31	2019-21	2000-19	2020-31	2019-21	2000-19	2020-31	2019-21	2000-19	2020-31
	kg/hd	%/yr	%/yr	kg/hd	%/yr	%/yr	kg/hd	%/yr	%/yr	kg/hd	%/yr	%/yr
Argentina	57	0.2	0.5	120	0.1	0.2	18	1.0	0.3	3	-1.5	1.1
Australia	86	1.1	1.8	185	1.1	0.2	12	2.7	1.4	10	3.5	0.8
Brazil	39	-0.1	0.6	103	0.9	0.4	10	1.4	0.2	4	0.0	0.2
Canada	122	0.6	0.9	145	1.4	0.2	2	0.5	0.5	19	1.6	0.7
China	62	2.2	0.0	115	1.5	0.7	3	2.1	0.7	11	0.9	0.4
Ethiopia	7	-1.8	-1.1	60	0.2	0.1	1	-0.3	-0.2	3	0.0	0.1
European Union	90	-0.1	0.0	164	1.0	0.2	8	1.2	0.1	8	-1.6	0.7
India	8	0.4	0.2	37	0.3	0.1	5	4.4	1.9	4	0.4	0.3
South Africa	74	3.2	1.7	148	4.2	1.1	8	1.5	1.1	7	4.1	1.9
Thailand	27	1.1	1.7	121	0.5	0.5	6	1.5	-0.4	4	-0.6	-0.2
United States	133	0.2	0.1	165	0.7	0.2	9	1.0	0.3	9	-1.2	0.3

Note: Off-take ratios are computed as gross indigenous meat production divided by all animal inventories at a fix time of the year. Trend growth rates are computed from trend regression over the period indicated. Countries selected to represent all inhabited continents.
Source : OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Table 6.2. Trends in non-ruminant Feed Conversion Ratios in selected countries

Country	Commodity	Average 2019-21	2012-21	2022-31
		kg of feed/kg of meat live weight	%/yr	%/yr
Argentina	Poultry	1.75	-0.20	-0.05
	Pork	3.56	-0.41	-0.15
Australia	Poultry	1.75	-0.20	-0.05
	Pork	3.56	-0.41	-0.15
Brazil	Poultry	1.73	-0.20	-0.05
	Pork	3.45	-0.41	-0.15
Canada	Poultry	1.73	-0.20	-0.05
	Pork	3.45	-0.41	-0.15
China	Poultry	1.37	2.37	0.19
	Pork	3.20	5.69	0.18
Ethiopia	Poultry	2.15	0.00	0.00
	Pork	4.55	0.00	0.00
European Union	Poultry	1.77	-0.17	-0.10
	Pork	3.54	-0.40	-0.14
India	Poultry	2.15	-0.01	-0.03
	Pork	4.54	-0.01	-0.03
South Africa	Poultry	2.10	0.04	-0.01
	Pork	4.44	0.04	-0.01
Thailand	Poultry	2.11	-0.05	-0.14
	Pork	4.46	-0.05	-0.14
United States	Poultry	1.73	-0.20	-0.05
	Pork	3.45	-0.41	-0.15

Note: Trend growth rates are computed from trend regression over the period indicated.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

In general, off-take ratios appear much lower in developing countries, particularly for bovine meat. Ratios appear very low for African countries, where growth rates are also much lower due to poor disease resistance, limited veterinary care and inefficient feeding practices. In addition, smallholders are often isolated from markets and abattoirs by limited infrastructure and, as a result, many animals fail to yield their potential economic value. Often, animals are kept for other reasons than simply meat production, such as for providing a source of wealth or, in the case of sheep, wool. Historical growth in off-take ratios has been high for several emerging countries, such as Chile, China, South Africa, Thailand, as well as in Australia. As emerging countries increase their share of meat production from specialised units, higher off-take ratios will be important in regulating the size of their animal inventories while lower feed conversion ratios lower the pressure on natural resources and environmental damage.

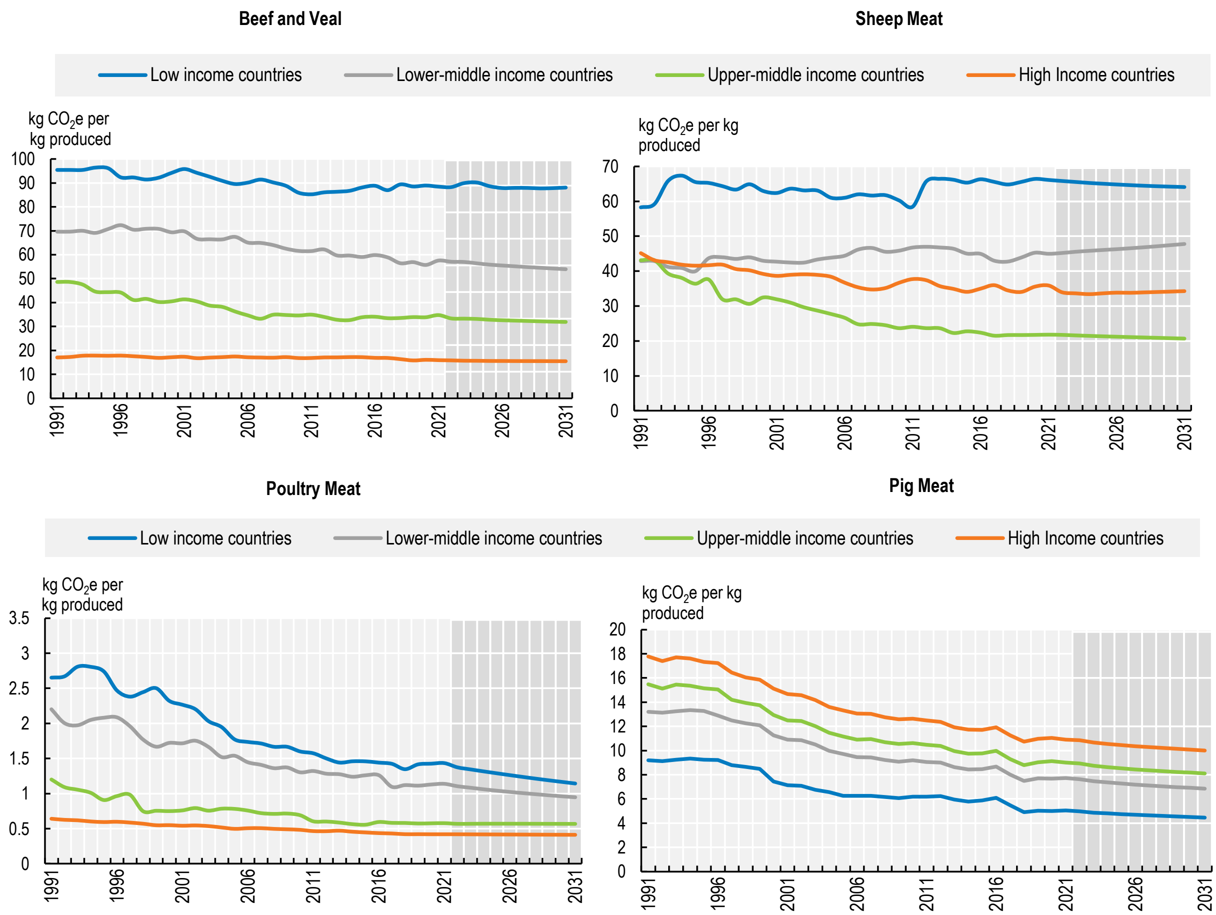
Trend projections in Tables 6.1 and 6.2 generally indicate that the rate of partial productivity growth is slowing in most countries. It should be noted that this lower growth is often from a high base. In general, except for many African countries, the gaps in off-take ratios have been converging to some degree, although not rapidly. There would appear to be substantial scope for increasing productivity in many countries, offering the potential to limit the growth of animal numbers over the long term and minimise resource and environmental costs otherwise associated with a larger number of animals and more feed.

Greenhouse gas emissions will rise at a slower rate than production

Greenhouse gas (GHG) emissions from the meat sector are projected to rise by 9% by 2031. This growth is considerably less than the rise in meat production due primarily to shifts towards poultry production, national low carbon emission initiatives, and increased productivity which yields higher meat output from a given stock of animals (Box 6.1). The strongest growth in meat-related greenhouse gas emissions will be in Africa, and in particular Sub-Saharan Africa, which will be 24% higher in 2031. A renewed effort to reduce GHG emissions could include policies such as carbon taxes and specific regulations combined with incentives to adopt technologies and production systems, such as the integration-crop-livestock-forest promoted by the Low Carbon Emission in Agriculture Plan in Brazil,[2] that reduce the sector's GHG footprint (Figure 6.5). In some cases, additional policies to ensure food security should be introduced because a carbon tax might have a higher negative influence on food security than climate change itself (Hasegawa et al., 2018[3]).

The CO2 produced by the livestock sector is only part of the warming process and methane (CH_4) emitted by the livestock sector, while declining, also contributes considerably to global warming in the short term (Figure 6.6) as methane has a much shorter atmospheric lifetime than CO_2, at around 12 years, while those from the CO_2 may remain for centuries. Nevertheless, methane is much more potent than carbon dioxide. The Intergovernmental Panel on Climate Change (IPCC) estimated that one tonne of methane is considered to be equivalent to 28 to 36 tonnes of CO_2 if assessing its impact over 100 years. A reduction in methane emissions would therefore have a big impact in reducing GHG emissions in the short term. The largest source of anthropogenic methane emissions is agriculture, responsible for around a quarter of the total including from livestock, manure, food waste and paddy rice. In November 2021 over 100 countries representing 70% of the global economy joined the Global Methane Pledge (Gidden et al., 2019[4]) and are committed to a global goal of reducing global methane emissions by at least 30 percent from 2020 levels by 2030. The potential of reduction of methane emissions from the livestock sector could increase the sector's adoption of targeted measures. Livestock producers in many countries have already initiated methane reduction actions, aside from policy measures, for example, following guidelines from FAO's LEAP project.[3] These actions would include improving animal health husbandry and manure management, the adoption of new technology such as processing feed grain to enhanced digestibility and the use of feed supplements and seaweed. It is estimated that such measures could potentially reduce methane emissions by the 30% target (Ocko et al., 2021[5]).

Figure 6.5. Meat GHG emissions intensity per regions



Note: Estimates are based on historical time series from the FAOSTAT Emissions Agriculture databases which are extended with the Agricultural *Outlook* projections. CO2 equivalents are calculated using the global warming potential of each gas as reported in the IPCC Sixth Assessment Report (AR6).
Source: OECD calculations based on FAOSTAT-Emissions Totals, Statistical Division of the UN Food and Agriculture Organization (accessed January 2021).

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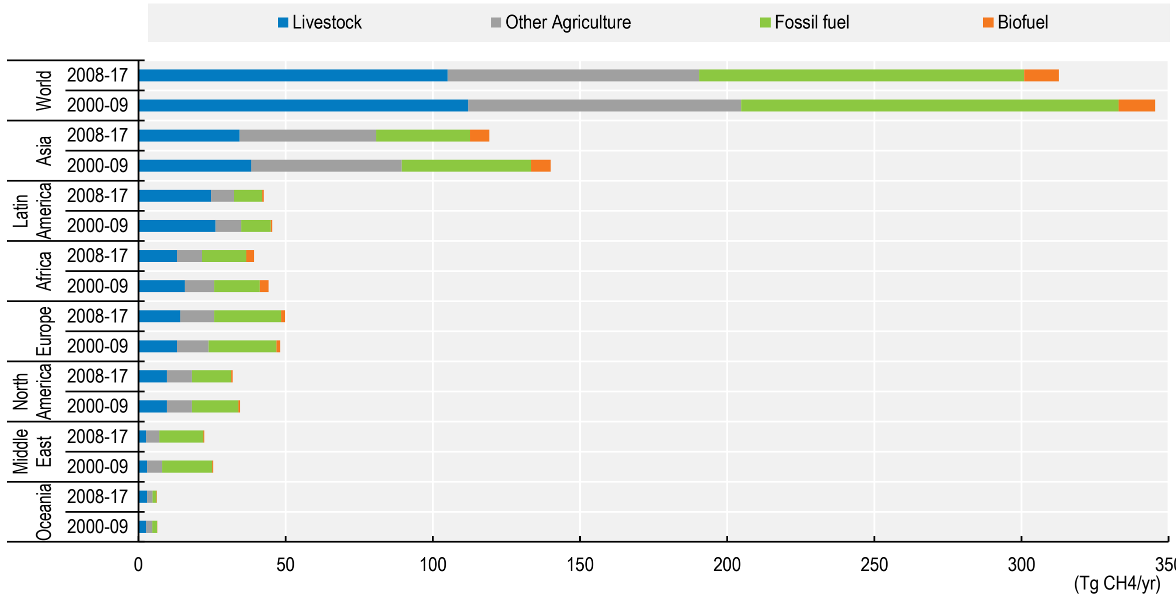
Figure 6.6. Major sources of methane average 2008-17 vs average 2000-09



Source: Chevallier, F., Le Quéré, C., Saunois, M., GCP, 2020. Data supplement of Global Methane Budget 2000-2017, https://hdl.handle.net/11676/4mKODq6pdGLSebFBueFFvkxW.

StatLink https://stat.link/do2aev

6.3.3. Trade

Global meat supplies will continue to be concentrated in very few countries

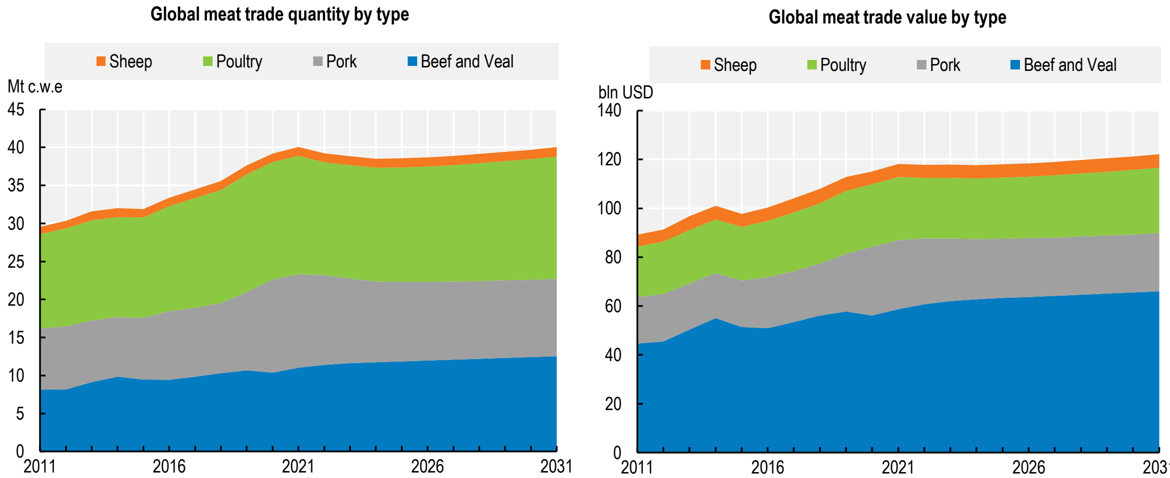
Global meat exports are projected to be 3% higher by 2031 than in the base period, reaching 40 Mt. This measured slow-down in the growth of trade compared to the previous decade is largely the result of high pig meat trade during the ASF crisis in Asia during the base period, particularly by China. By 2031, as ASF-induced trade declines, the proportion of meat output traded should remain stable at around 11%.

Rising imports over the next decade will mainly comprise of poultry and projected to account for two third of the additional meat imports into Africa where consumption growth will outpace the expansion of domestic production.

Meat exports are highly concentrated with the share of the two largest meat exporting countries, Brazil and the United States, expected to increase to around 40%, contributing two thirds of the expected increase in global meat exports over the projection period. The European Union has improved its access to Asian markets in recent years, but the projected decline in meat imports by China as well as competition from North and South America will limit export opportunities, with exports declining over the period to 2031. Other traditional exporting countries; such as Argentina, Australia, Paraguay, Thailand and Türkiye are expected to contribute considerably to the increase in the global meat trade.

Brazil is expected to record by far the largest increase in world meat exports, benefiting from a favourable exchange rate and ample feed grain availability. Its dominance as the largest exporter of poultry meat and beef will continue to increase over the outlook period. Indian buffalo meat exports, despite the government reforms concerning animal welfare, are expected to increase as import demand from the Middle East and Indonesia rises over the next decade. The meat trade in value is dominated by beef and veal, but increasingly dominated by poultry in quantity terms (Figure 6.7)

Figure 6.7. Meat trade in value is dominated by beef and veal, but increasingly by poultry in quantity



Note: c.w.e. is carcass weight equivalent. Exports measured in constant 2014-16 USD.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/4fw8t5

Import demand is expected to increase most quickly in terms of quantities in Africa, with a 2 Mt increase from the base period. The Asian region will account for 51% of global trade by 2031. The largest increases in imports will occur in Korea, Indonesia and the Philippines, and the latter for poultry meat. While Chinese meat imports remain high in the early part of the projection period, a gradual decline is projected in the second half of the projection period as pig meat production recovers from the ASF outbreak. While Chinese beef imports will continue to increase over the projection period.

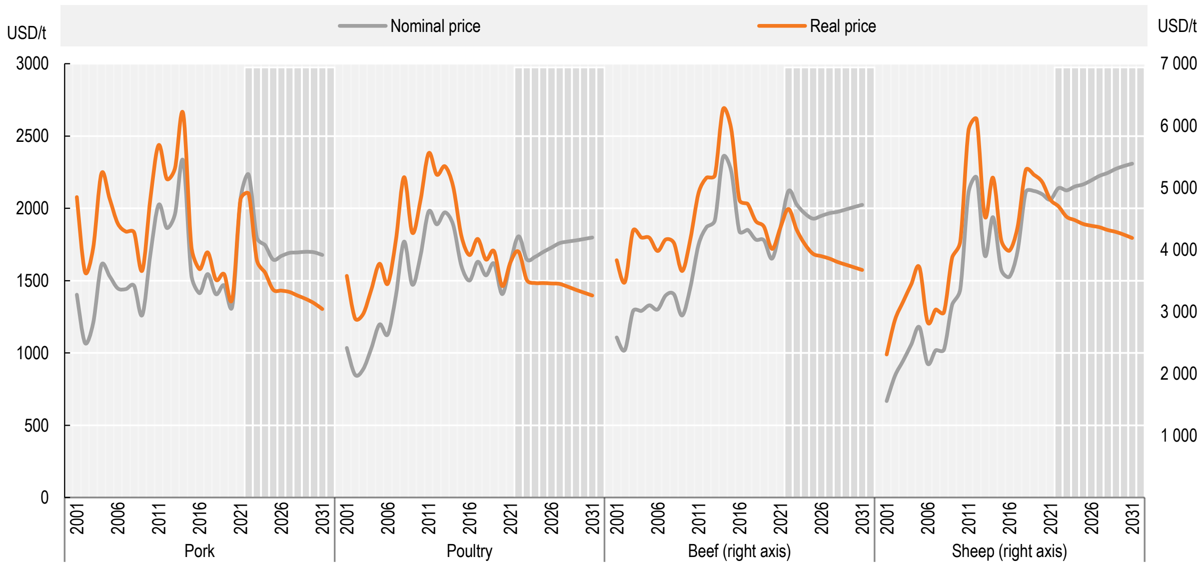
Sheep meat imports by the Near East region are projected to increase in alignment with rising demand and as a result Australia is expected to continue to increase its lamb production at the expense of mutton. In New Zealand, export growth for sheep meat is projected to be marginal with land use shifting from sheep farming to dairy.

6.3.4. Prices

Prices in real terms are expected to fluctuate around its long-term declining trend

Meat prices have rebounded from COVID-19 induced lows in 2020 and are expected to rise as higher feed costs are passed through the livestock value chain. However, they should remain well below their peaks of a decade ago (Figure 6.8). The projected rise in nominal prices for all meats will be uneven as each livestock species displays different dynamics due to the respective biological supply responses to recent shocks. In addition to higher feed costs, other inputs along the meat supply chain, such as packaging and transport, have become more expensive. The projections assume prices for meat to settle down as the supply chain begins to stabilise and feed costs return to trend levels. As a result, the ratio of nominal meat prices to feed prices will increase compared to recent years (Figure 6.9), returning to profitable levels before resuming the longer term downward trend as feed productivity gains are realised, such that less feed is required to produce a unit of meat.

Figure 6.8. World reference prices for meat -rising in nominal, but falling in real terms

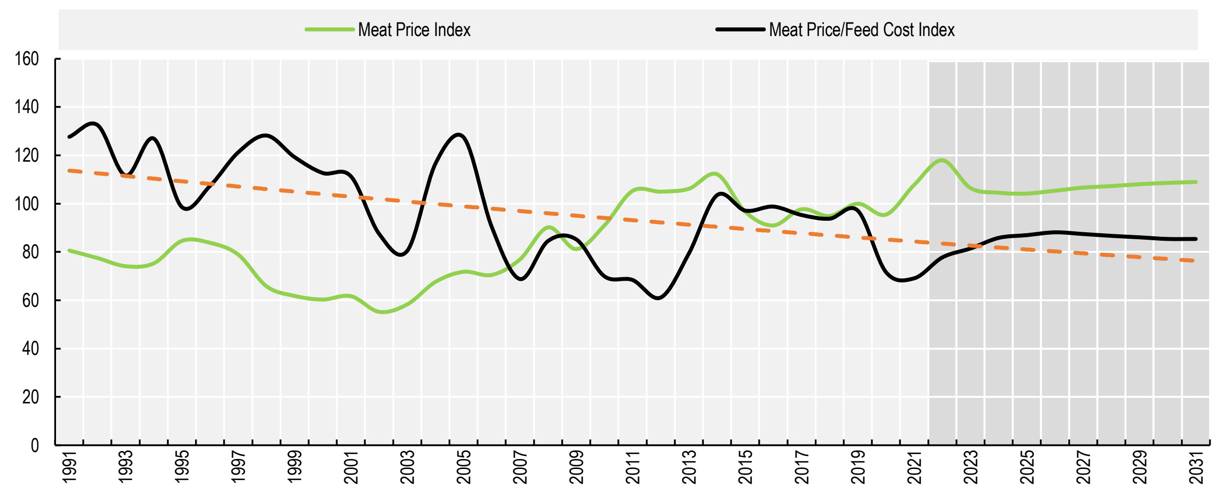


Note: Real prices are nominal world prices deflated by the US GDP deflator (2020=1). US Barrows and gilts, National base 51-52% lean c.w.e. Brazil: Export unit value for chicken (f.o.b.) product weight. US Choice steers, 5-area Direct c.w.e., Total all grades. New Zealand lamb price c.w.e., all grade average.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/alucr8

All meat prices are projected to initially remain high as demand in high income countries recover from the COVID-19 pandemic before returning to longer term trends that are declining in real terms. The exception is *sheep meat*, the prices of which have displayed an upward trend as exports from New Zealand have been increasingly constrained by rising costs of pasture due to the profitability of forestry and competition from the beef and dairy sectors. The reference price for *pig meat* in heavily traded Pacific markets (US national base price) will remain high early in the projection period to meet strong demand, particularly from Southeast Asia, but supply responses and higher export supplies will exert downward pressure on prices. *Poultry* prices (Brazil fresh, chilled or frozen export prices) are expected to follow grain prices closely given the high share of feed costs in their production and the swift response of production to global rising demand. *Beef* prices (US choice steer prices) are projected to reflect higher processing (labour) and feed costs. Uncertainty on price developments have led farmers to scale back production initially, but prices are expected to remain higher as higher cattle inventories are retaining supplies in key exporting countries, including Argentina, Australia, Brazil and the United States.

Figure 6.9. FAO Food Price Index for meat and its ratio to feed prices



Note: Index average 2014-2016=100. Meat price Index: computed from average prices of four types of meat.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/f5ye4m

6.4. Risks and uncertainties

Animal disease outbreaks remain the most significant risks in the meat sector

In the short term, the *Outlook* assumes that the impacts of COVID-19 on economic growth and on restrictions in the movement of people and goods will end and that recovery will start in 2022. But, together with the impacts of Russia's war against Ukraine, a delay to the end of the pandemic, a possible economic downturn and government policy responses, prospects for the meat sector may well deteriorate.

The livestock and meat sector regularly experience serious economic repercussions from disease outbreaks despite advances in public health and veterinary measures. Outbreaks which shock markets can occur quickly and can take years to fully resolve. The socio-economic costs of these disruptions vary by countries and situations depending on the importance of the loss of export markets, imports from an affected country, or when consumers reduce purchases because of health concerns. Costs on the global market may be significant but can be mitigated somewhat by supplies from alternative disease-free markets, or by following OIE protocols that localise disease impacts on trade. Animal diseases, even though they may not directly infect humans, can cause significant disruptions in livelihoods of rural communities and smallholders, impacting livestock productivity, food security and nutrition of the most vulnerable populations. On the other hand, some infectious animal diseases are also contagious to humans (zoonosis) or compromise food safety, posing direct public health concerns[4]. Additionally, the environment can also be impacted by disease outbreaks since animal morbidity and mortality generated by infections may raise livestock's emission of greenhouse gases, thus contributing to climate change. Maintaining the herd during and after the outbreaks would need more energy, thus resulting in rising emission rates from digestive processes (FAO, 2021[6]).[5] ASF, highly pathogenic avian influenza (HPAI), and foot and mouth disease (FMD) pose significant ongoing risks for meat markets. The *Outlook* assumes that recovery from ASF in East and Southeast Asia will be completed by 2031, but there is risk that this is not the case or that ASF emerges elsewhere. Investments to restructure and modernise production and processing facilities in the pig meat sector, and the successful development of a vaccine would have significant implications for future production and trade. Bovine Spongiform Encephalopathy (BSE), which had previously impacted livestock markets for decades re-emerged at the end of 2021 in Brazil, temporarily halting exports to China, its main export market. It is assumed that this BSE outbreak will be contained and not affect Brazil's markets beyond 2022. If it is not contained the impact on Brazil's meat sector and on world markets would be significant.

Assumptions regarding productivity improvements and climate change policies will affect the meat sector's contribution to climate change. Since meat is a significant user of resources – of land, feed and water – lower demand along with productivity improvements would imply lower need for these inputs. Specifically, this means lower animal inventories and fewer feed inputs (meat production in 2019-21 used around 38% of the calories produced by the crops covered in this *Outlook*). Lower production would also imply lower GHG emissions from meat production compared to past decades. The role of the meat sector is critical in discussions on climate change, and future policies addressing environmental change may have important consequences for production and trade.

The *Outlook* assumes that consumer preferences will evolve slowly. Consequently, dietary preferences for lower (particularly red and processed) meat consumption are assumed to be adopted by a small but growing part of the population concentrated mainly in high income countries, and therefore will not significantly affect global meat consumption over the next decade. But preferences may change more than assumed, and more quickly, partly depending on relative prices. The development of novel alternative proteins as substitutes for traditional animal-based foods (meat and milk) may be attractive to meet the nutritional needs and food demands of an increasing population, which some consumers may consider to be more healthy and sustainable. Advocates for novel alternative proteins foresee benefits that include better nutrition and health, and a reduction in greenhouse-gas emissions. However, scientific evidence on such benefits is not conclusive. In any case, these products are unlikely to fit significantly into the *Outlook's* ten-year horizon. Central questions yet to be fully addressed concern the role of government regulations required to ensure safety while encouraging the emergence and development of innovations. Several aspects need to be explored such as growth opportunities, potential barriers to competition and trade, impact on the conventional livestock and meat processing sector, implications for the supply chain, environmental impacts, and consumer acceptance. A key element on the prospects of alternative proteins will be their price relative to conventional protein sources from livestock.

Finally, consumers are expressing concerns about meat production systems, in particular animal welfare including traceability and the growing preference for antimicrobial-free meat due to the global risks associated with antimicrobial resistance. Antimicrobial-free and, more broadly organic, meat production systems are being adopted by an increasing number of producers and will affect global meat markets to the extent to which consumers are willing to pay a premium for such meat.

Notes

[1] Asian domestic water buffalo use in dairy production

[2] Crop-Livestock-Forest Integration (ILPF) is a sustainable production strategy that integrates agricultural, livestock and forestry activities in the same area, whether in consortium, succession or rotation. https://www.gov.br/agricultura/pt-br/assuntos/sustentabilidade/plano-abc/arquivo-publicacoes-plano-abc/abc-english.pdf

[3] See, for example, https://www.fao.org/partnerships/leap/en.

[4] Over 70% of human diseases originate in animals, and our expanding human population is inhabiting more wilderness while becoming ever more reliant on animals for food. FAO. 2013. World Livestock 2013 – Changing disease landscapes. Rome.

[5] FAO (2021), *The Impact of Disasters and Crises on Agriculture and Food Security: 2021*, Rome. https://doi.org/10.4060/cb3673en.

7 Dairy and dairy products

This chapter describes market developments and medium-term projections for world dairy markets for the period 2022-31. Projections cover consumption, production, trade and prices for milk, fresh dairy products, butter, cheese, skim milk powder and whole milk powder. The chapter concludes with a discussion of key risks and uncertainties which could have implications for world dairy markets over the next decade.

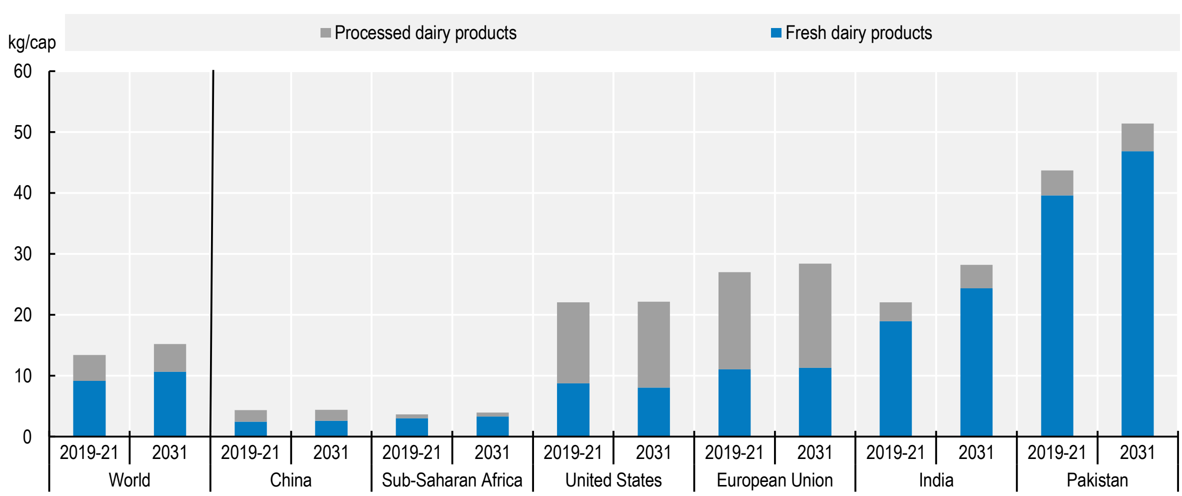
7.1. Projection highlights

Buoyant prospects for dairy sector, but challenges to adapt to changing consumer preferences

Milk and dairy products are vital sources of nutrition and provide livelihoods for millions of people in the dairy value chain across the world. World milk production (roughly 81% cow milk, 15% buffalo milk, and 4% for goat, sheep and camel milk combined) increased by 1.1% to about 887 Mt in 2021, primarily driven by an expansion in output in India and Pakistan due to a continued increase in dairy herd numbers and fodder availability helped by favourable monsoon rains. Milk production in the three major dairy exporters, New Zealand, the United States, and the European Union varied from a marginal to modest increase to a slight decline, respectively. Increases in dairy world trade were mainly driven by strong demand in the People's Republic of China (hereafter "China"), the world's largest importer of dairy products.

As incomes and population increase, more dairy products are expected to be consumed over the medium term. Overall, per capita consumption is expected to increase 0.4% p.a. to 21.9 kg (milk solids equivalent) by 2031 in high-income countries compared to 2.0% p.a. (21.2 kg) and 1.5% p.a. (5.4 kg) in low-middle income and low-income countries, respectively. Most dairy production is consumed in the form of fresh dairy products,[1] which are unprocessed or only slightly processed (i.e. pasteurised or fermented) and their share in world consumption is expected to increase over the next decade. The key drivers for this are strong demand growth in India, Pakistan and Africa. In low and middle-income countries, fresh dairy products comprise over two-thirds of the average per capita dairy consumption (milk solids), while consumers in high income countries tend toward processed products (Figure 7.1).

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

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There is substantial regional variation in the *consumption* of processed dairy products. Cheese is the second most important dairy product (after fresh dairy products) consumed in terms of milk solids. Consumption of cheese primarily occurs in Europe and North America, exhibiting a growing trend in both regions. In Asia, butter is not only the most consumed processed dairy product, accounting for almost half of all processed dairy consumption in terms of milk solids, but it also has the strongest projected growth in consumption. In Africa, cheese and whole milk powder (WMP) account for the majority of processed dairy consumption. Over the coming decade, however, skim milk powder (SMP) is expected to record the highest consumption growth, although from a lower base.

World milk *production* is projected to grow at 1.8% p.a. over the next decade (to 1 060 Mt in 2031), faster than most other main agricultural commodities. The projected growth in the number of milk-producing animals is expected to be strong (1.1% p.a.), especially in regions with low yields such as Sub-Saharan Africa and in major milk-producing countries such as India and Pakistan. Over the projection period, yields across the world are expected to grow steadily with the strongest growth expected in Southeast Asia and North Africa where average yield growth is around 2% p.a. Over half of the increase in total milk production is anticipated to come from India and Pakistan, which will jointly account for over 30% of world production in 2031. Production in the second largest global milk producer, the European Union, is expected to grow at a slightly higher rate than Oceania but more slowly than in North America as a result of EU policies targeted to sustainable production, the expansion of organic production, and pasture-based production systems.

Milk is *traded* internationally mainly in the form of processed dairy products. China is expected to remain the most important importer of milk products despite a slight increase in domestic milk production relative to the past decade. The projected increase in import demand for dairy products in Asian countries will be driven by economic and population growth and a shift towards livestock products. However, per capita consumption is projected to remain low relative to traditional dairy consumer markets. The Russian Federation (hereafter “Russia”), Mexico, the Near East and North Africa (NENA) will also continue to be important net importers of dairy products. Over the medium term, the European Union, New Zealand and the United States will remain the key exporters of processed dairy product and are projected to jointly account for around 65% of cheese, 71% of WMP, 74% of butter, and 80% of SMP exports in 2031.

Dairy trade flows could be substantially altered by changes in the trade policy environment. International trade agreements (e.g. Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and Comprehensive Economic and Trade Agreement (CETA)) create opportunities for further trade growth for dairy products. While the EU-UK Trade and Cooperation Agreement stabilised bilateral trade between the two countries, some frictions and uncertainties regarding future border controls remain. Elsewhere, Argentina could have the potential to become a competitor in the global WMP market due to rising milk production and below-average domestic demand growth, though it currently accounts for a relatively small share of trade. To date, the big milk consuming countries, India and Pakistan, are largely self-sufficient with production growing in parallel with domestic consumption. However, a potential increase in the consumption of processed dairy products like cheese and milk powders may drive an expansion of processed dairy imports during the coming decade.

Since 2015, the price of butter has been considerably higher than for SMP. This development is attributed to stronger demand for milk fat compared to other milk solids on the international market. Although the gap between the price of butter and SMP is assumed to remain a defining feature over the coming decade, it is expected to narrow over the period. Demand for SMP, particularly in middle- and low-income countries, will outpace demand for milk fat on the international market, narrowing the price gap.

Sustainable production policies and consumer concerns expressed in the market could alter the projections for the dairy sector. In some countries, dairy production accounts for a substantial share of overall greenhouse gas emissions (GHG), resulting in discussions on how adjustments to dairy production could contribute to reducing such emissions. Policies to address GHGs could have a significant effect on dairy farming in regions with high stocking densities, notably in the Netherlands, Denmark, and Germany. On the other hand, these pressures could lead to innovative solutions improving productivity and competitiveness in the long term. The global level of GHG emissions will largely depend on efficiency gains in India and other countries with high cattle population and extensive production.

Continued consumer interest in vegan diets and concerns about the environmental effects of dairy production and animal welfare are expected to bolster the consumption of plant-based dairy replacements in the liquid market especially in East Asia, Europe, Oceania and North America, albeit from low volumes. Although the growth rate of plant-based replacements is strong in certain regions, contested views regarding their environmental impact and health benefits lead to uncertainties about their long-term impact on dairy demand.

7.2. Current market trends

The dairy market is robust and resilient

The effect of the COVID-19 pandemic on the dairy sector was relatively modest, in contrast to the initial concerns that it was particularly vulnerable. Among dairy products, the pandemic had the largest effect on world butter prices due to the loss of demand for milk fat from the hospitality sector. Butter prices fell the most sharply in 2020 but have registered increases since mid-2020. In 2021 the FAO Dairy Price Index value increased by 17% with increases across all dairy products, with butter, SMP and WMP rising by 30%, 22% and 27%, respectively, while cheese recorded an 8.8% rise. Strong global demand, especially from Asia and, to a lesser extent from the Middle East, drove those price increases.

Global exports and imports had been growing steadily in previous years but slowed down in 2020. Transportation slowdowns, disruptions in the value chain, and decreased demand all contributed to the change in export and import growth. Global exportable supplies were constrained, reflecting lower milk deliveries in Europe and less-than-expected growth in output. Overall, however, the sector adapted quickly and mitigated many of the severe effects seen in the earlier months of the pandemic, while exports rebounded in 2021.

World milk production grew by 1.1% in 2021 to about 887 Mt. In India, the world's largest milk producer, production increased by 2.2% to 195 Mt. India, however, has little impact on the world dairy market as they trade only marginal quantities of milk and dairy products. Moreover, Indian production was relatively unaffected by the pandemic, with any excess milk being processed into milk powder.

World dairy imports in 2021 are expected to have reached 10 Mt, led by cheese, milk powders and whey powder, underpinned by demand from China in particular. Leading exporters, New Zealand, the European Union, and the United States, supplied much of the higher import demand, while exports from the United States were further supported by a rebound in exports to Mexico.

7.3. Market projections

7.3.1. Consumption

Strong demand in India and Pakistan is leading the rise in global dairy consumption

Although milk is a highly perishable product which must be processed shortly after collection, most milk is consumed in the form of fresh dairy products, including those fermented and pasteurised. The share of fresh dairy products in global consumption is expected to increase over the coming decade due to stronger demand growth in India and Pakistan, which in turn is driven by income and population growth. World per capita consumption of fresh dairy products is projected to increase by 1.4% p.a. over the coming decade, slightly faster than over the past ten years, primarily driven by higher per-capita income growth.

The level of milk consumption per capita (in terms of milk solids) will vary largely worldwide (Figure 7.1). Country income per capita and the impact of regional preferences will be important factors driving this variation. In high-income countries, per capita consumption is expected to increase 0.4% p.a. to 21.9 kg (milk solids) with the majority of consumption consumed in the form of processed products and of which stronger growth is expected. Conversely, in low-, and lower-middle income countries the majority of production is consumed in the form of fresh dairy products, where per capita consumption is expected to increase 1.5% p.a. (5.4 kg) and 2.0% p.a. (21.2 kg), respectively. The consumption of fresh dairy products is expected to be high in India and Pakistan, but low in China. The share of processed dairy products, especially cheese, in overall consumption of milk solids is expected to be closely related to incomes, with variations due to local preferences, dietary constraints, 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 recent years towards dairy fat such as 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, contrary to the messaging of the 1990s and 2000s. In addition, this shift may reflect increasing consumer preference for foods that are less processed, and possibly increased interest in home cooking.

The largest share of total cheese consumption, the second most consumed dairy product, occurs in Europe and North America, where per capita consumption is expected to continue to increase over the projection period. Consumption of cheese will also increase in regions where it was not traditionally part of the national diet. In Southeast Asian countries, urbanisation and income increases have resulted in more away-from-home eating, including fast food such as burgers and pizzas. It is worth noting that the pandemic has not only increased usage of e-groceries and take-away foods in these regions, but also consumer focus on foods they consider to be healthier or more wholesome. These changes in consumer consumption behaviour have been of benefit to the dairy sector.

While some regions are self-sufficient, such as India and Pakistan, total dairy consumption in Africa, Southeast Asian countries, and the NENA is expected to grow faster than production, leading to an increase in dairy imports. As liquid milk is expensive to trade (high volume/value ratio), this additional demand growth is expected to be met with milk powders, where water is added for final consumption or further processing.

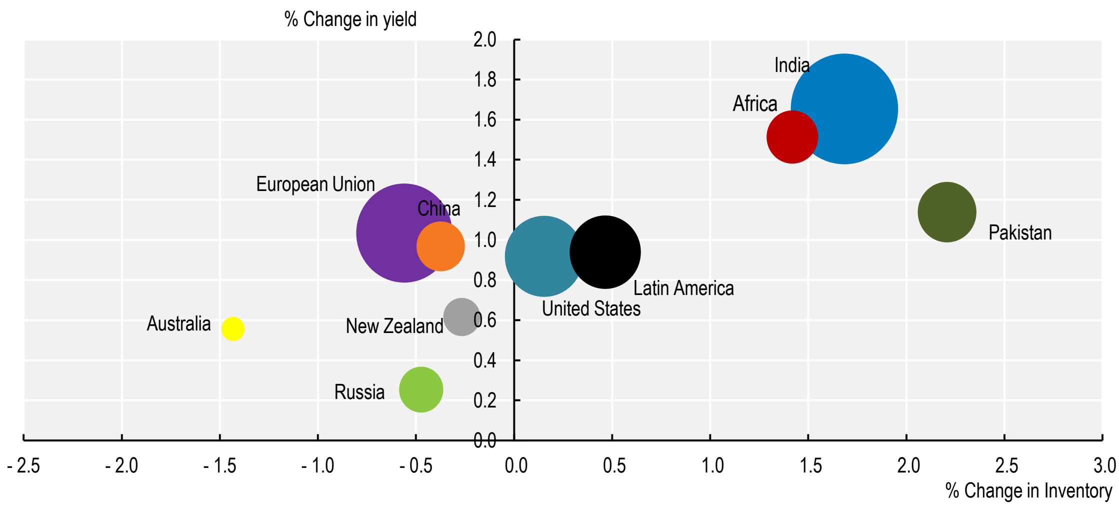
The dominant use of SMP and WMP will continue to be in the manufacturing sector, notably in confectionery, infant formulae, and bakery products. A small share of dairy products, especially SMP and whey powder, are used in animal feed. China imports both products for feeding, but the African Swine Fever (ASF) outbreak reduced 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. Whey powders are gaining prominence globally as a result of its use in the processing of nutritional products, especially in clinical, infant and elderly nutrition.

7.3.2. Production

Greater efficiency in milk production sustaining yield and production increases

World milk production is projected to grow at 1.8% p.a. (to 1060 Mt by 2031) over the next decade, faster than most other main agricultural commodities. The projected growth in the number of milk-producing animals is expected to be strong (1.2% p.a.), especially in regions such as Sub-Saharan Africa and in major milk-producing countries such as India and Pakistan – where yields are low. While yields across the world are expected to grow steadily over the next decade, there is considerable regional variation of growth rates. The strongest growth expected in Southeast Asia and North Africa where average yield growth is around 1% p.a., whereas yields in high income countries are expected to increase by only 0.5% p.a.. In almost all regions of the world, yield growth is expected to contribute more to production increases than herd growth (Figure 7.2), the drivers of which include optimising milk production systems, improved animal health and feed efficiencies, and improved genetics.

Figure 7.2. Annual changes in inventories of dairy herd and yields between 2021 and 2031



Note: The size of the bubbles refer to the total milk production in the base period 2019-21.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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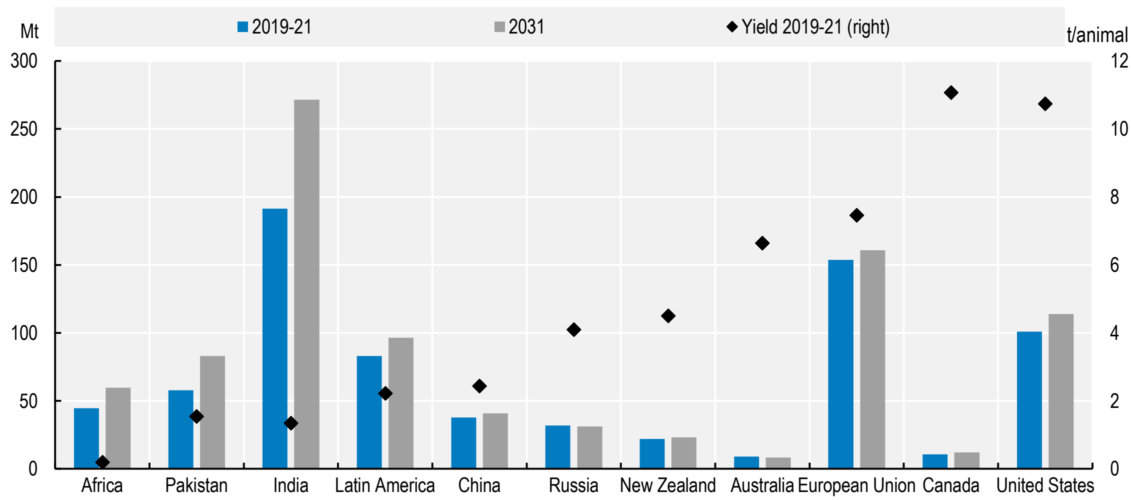
Production in the European Union is projected to grow more slowly than the world average at 0.5% p.a., stemming from milk yields, growing at 1% p.a., while dairy herds are declining (-0.5% p.a.). Production in the European Union originates from a mix of grass- and feed-based production systems. In addition, a growing share of milk produced is expected to be organic or in other non-conventional production systems. At present, more than 10% of dairy cows are within, but not limited to, organic systems located in Austria, Denmark, Greece, Latvia, and Sweden. Germany and France have also seen an increase in organic dairy production. However, these organic farms have about a quarter lower yield than conventional production, and higher production costs, but they constitute over 3% of European Union milk production, commanding a considerable price premium. In general, domestic demand (cheese, butter, cream, and other dairy products) is expected to grow only slightly, with most additional production destined for export.

North America has some of the highest average yields per cow, as the share of grass-based production is low, and feeding is focused on high yields from specialised dairy herds (Figure 7.3). Dairy herds in the United States and Canada are expected to remain largely unchanged and production growth to originate from further yield increases. As domestic demand is projected to remain stronger for milk fats, the United States will mostly export SMP, while Canadian exports of SMP are capped under the United States-Mexico-Canada Agreement (USMCA). The United States will also export a sizable amount of cheese, whey, and lactose.

Figure 7.3. 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 (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Although the share of New Zealand in world milk production is currently only 2.5%, it is the most export-orientated country. Milk output growth has been very modest in recent years, and it is projected to grow at 0.4% p.a. over the next decade. Milk production is mainly grass-based, and yields are considerably lower than in North America and Europe. The efficiency of grass management, however, allows New Zealand to be competitive. The main constraining factors for growth are land availability and increasing environmental restrictions, but a shift to a more feed-based production is not likely.

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 such as meat production, traction, and as capital assets (savings). Additional grazing occurs on the same pasture, leading to a more intensive use which may 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 over 5.6% of world milk production.

Globally, around 30% of milk will be further processed into products such as butter, cheese, SMP, WMP, or whey powder in the coming decade. However, there is notable regional dispersion. In high-income countries, most of the milk production is transformed into dairy products. Given the considerable direct food demand for butter and, especially, cheese, these products 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 confectionery, infant formulae, and bakery products. In low-, and lower-middle-income countries, most of the milk production goes to fresh dairy products. Over the next decade, milk production is projected to increase by 43% and 40%, respectively, with over 85% of the increase going to fresh dairy products.

Only butter production is projected to grow at a slightly faster rate relative to overall milk production, at 1.9% p.a., reflecting strong demand for butter in some parts of Asia, the European Union and the United States. All other dairy products are projected to grow at slower rates, with SMP at 1.8% p.a., WMP at 1.5% p.a. and cheese at 1.1% p.a..The slower growth rate of WMP reflects the decreased growth in demand in

China and in Sub-Saharan Africa. The slower growth rate for cheese is due to the important share of slow-growing food markets in Europe and North America.

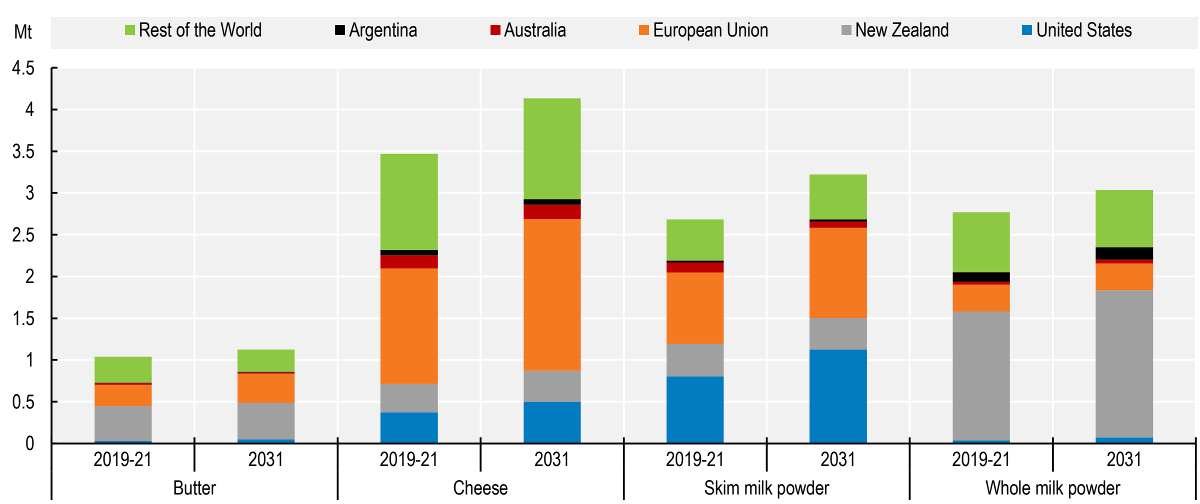
7.3.3. Trade

Dairy trade will expand from few major exporting to many dispersed importing countries

Only around 7% of world milk production is traded internationally, primarily due to its perishability and high-water content (more than 85%). The notable exceptions are the small amounts of fermented milk products traded between neighbouring dairy producers (i.e. Canada and the United States, the European Union and Switzerland) and imports of liquid milk by China. Chinese imports of liquid milk are primarily supplied by the European Union and New Zealand and have increased considerably in recent years. Trade of liquid milk is made possible primarily by the ability of Ultra-High Temperature milk and cream products to be shipped long distances, but also favourable Chinese freight rates in some cases. China's net imports of fresh dairy products over the base period reached 1.3 Mt, and this is not projected to increase much over the next decade. Over 50% of world production of WMP and SMP is traded since these products are often produced only to store and trade milk over a longer time period or distance.

World dairy trade is projected to expand over the next decade to reach 14.2 Mt in 2031, 15% higher than during the base period. The growth rates vary across dairy products with the strongest growth at 1.7% p.a. for SMP, 1.6% p.a. for cheese, 1.5% p.a. for whey powder, 1.3% p.a. for butter and 0.9% p.a. for WMP. Most of this growth will be met by increased exports from the United States, the European Union and New Zealand. These three countries are projected to jointly account for around 65% of cheese, 71% of WMP, 74% of butter, and 80% of SMP exports in 2031 (Figure 7.4). 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 2031. In recent years, Belarus has become an important exporter, orienting its exports primarily to the Russian market due to the Russian embargo on several major dairy exporters.

Figure 7.4. Exports of dairy products by region



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

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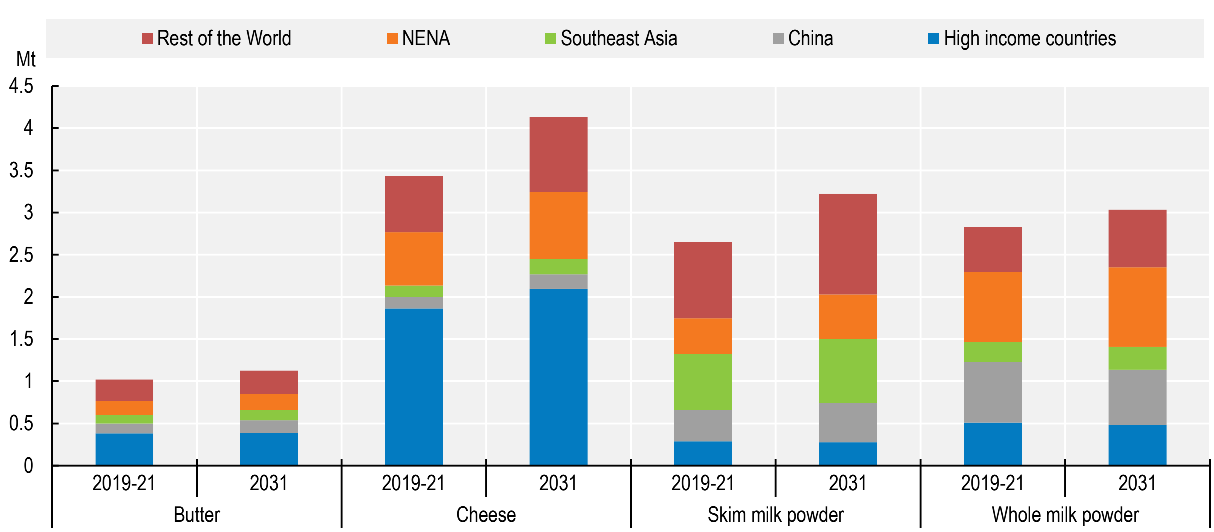
The European Union will continue to be the main world cheese exporter, followed by the United States and New Zealand. It is projected that the European Union's share in world cheese exports will be around 44% by 2031, sustained by increased cheese exports to Canada via the CETA agreement and to Japan following the ratification of the bilateral trade agreement in 2019. The United Kingdom, Japan, Russia, the European Union, and Saudi Arabia are projected to be the top five cheese importers in 2031. These countries are often also exporters of cheese and international trade is expected to increase the choice of cheeses for consumers. In addition to the exports of final products such as cheese, recent trends point to increasing demand for value-added products intended for further processing. While exports of infant formula from the European Union to China and other destinations fell recently, exports of whey powder, which is often used as an ingredient for processing infant formula, increased.

New Zealand remains the primary source for butter and WMP on the international market, and its market shares are projected to be around 39% and 58%, respectively, by 2031. China is the principal importer of WMP from New Zealand, but trade between the two countries is projected to be less dynamic over the projection period. The expected growth in domestic milk production in China will limit 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 NENA, high-income countries, Southeast Asia, and China (Figure 7.5). China is expected to continue to be the world's major dairy importer, especially for WMP with imports from China projected to represent 21.6% of global imports in 2031. Per capita consumption of dairy products in China is relatively low compared to traditional markets, but there have been significant increases in demand over the past decade, with growth projected to continue. Most of its dairy imports are sourced from Oceania, although in recent years the European Union has increased its exports of butter and SMP to China. Imports by NENA 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 Southeast Asia. Collectively, high-income countries import the largest share of cheese and butter, at around 54% and 38%, respectively, of world imports in 2019- 21, but these shares are expected to decline slightly by 2031.

Figure 7.5. Imports of dairy products by region



Note: NENA stands for Near East and North Africa, and is defined as in Chapter 2. Southeast Asia contains Indonesia, Malaysia, Philippines, Thailand and Viet Nam.

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

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With the effects of the pandemic subsiding, it will nevertheless have a longer lasting effect on GDP in many non-OECD nations, with per capita income growth being lower than pre-pandemic projected growth. It is likely that the income shock will disproportionately affect poorer households and reduce their consumption, especially in Central Asia, Indonesia, and the least developed African countries. Since dairy product demand, specifically processed dairy products like butter and cheese, is closely tied to rising incomes, it is projected there will be less import demand for butter from these regions.

7.3.4. Prices

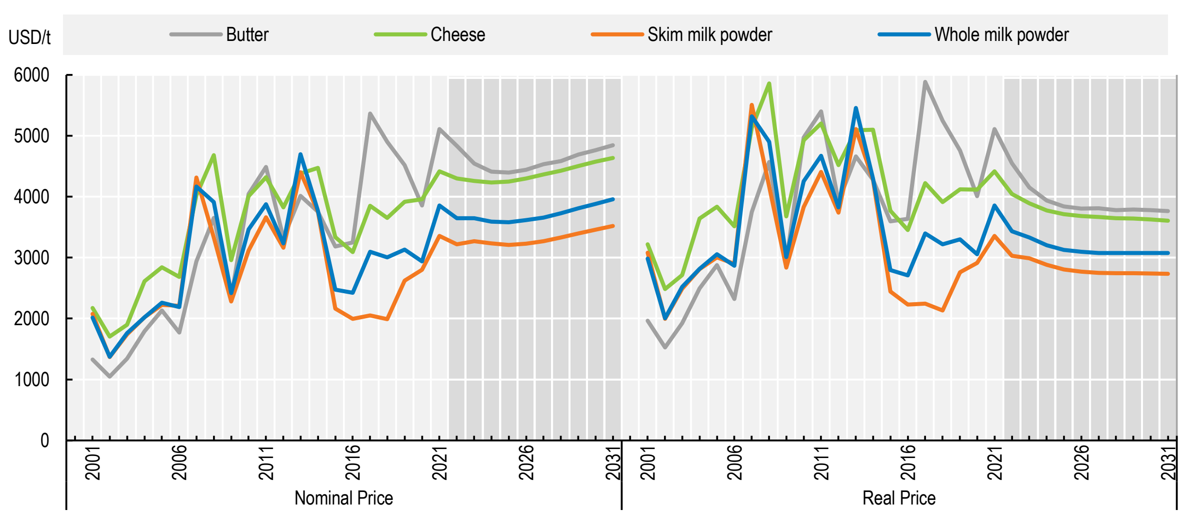
Despite current highs, international dairy prices will trend downward over the long-term

International dairy prices refer to the prices of processed products of the main exporters in Oceania and Europe. The two main reference prices for dairy are butter and SMP, where 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 overall weight of milk, with the remainder being water.

The strong volatility of international dairy prices stems from its small trade share, the dominance of a few exporters, and a widely 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.

Since 2015, the price of butter has increased considerably more than SMP. Increased demand for milk fat resulted in a price gap emerging between the two products and the price of butter will continue to be supported by stronger demand for milk fat compared to other milk solids on the international market. Therefore, the gap between the price of butter and SMP is assumed to remain a defining feature over the coming decade; although, it is expected to narrow over the period (Figure 7.6).

Figure 7.6. Dairy product prices, 2001-2031



Note: Butter, FOB export price, 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 (2021=1).
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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In the short term, this *Outlook* projects nominal butter and SMP prices remaining high in 2022 mainly due to high production costs and vegetable oil prices; however, prices are foreseen to return to their long-term levels and decline over the projection period as supplies respond to current price incentives. 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.

7.4. Risks and uncertainties

Environmental and health concerns and alternatives to milk are becoming more significant

In the short term, projections may be affected by Russia's war against Ukraine which have significantly heightened the uncertainty of agricultural supply and demand conditions and may slow down economic growth. Market impacts could be felt in related sectors such as dairy through increased input costs such as fertiliser and feed. Disruptions in global fertiliser trade could lead to higher input costs across the world. It could also increase the interest in circular agriculture with focus on less external inputs.

In addition, the emergence of new COVID-19 variants and subsequent policy measures may further impact economic recovery. While the dairy sector was relatively stable in the wake of the pandemic and has shown resilience, there may be structural changes that will have long-term effects. The pandemic has also lowered the projected overall GDP level in many countries. This has implications for the dairy sector, as increased dairy consumption is closely linked to per capita income growth in many regions. The effects of a staggered global recovery are also unclear, as there may be longer lasting implications for supply chains that span diverse regions.

The role of *plant-based replacements* for dairy (e.g. soya, almond, rice and oat drinks) in the fluid milk sector has increased in many regions, especially in North America, Europe and East Asia. Available replacements have continued to expand beyond the more traditional options, branching into various nuts, legumes and other crops. Key drivers of the expansion include health and consumer concerns regarding the environmental impact of dairy production, and lactose intolerance. The growth rates of plant-based replacements for dairy products are strong, albeit from a low base, although the evidence regarding their environmental impact and relative health benefits is contested. The sustainability of popular substitutes such as almond and soya drinks have been questioned as more consumers consider other environmental issues in addition to GHG emissions, such as water usage and deforestation. Similarly, lactose intolerance is a concern for some consumers with a range of lactose-free dairy products becoming available for those who do not prefer plant-based replacements. Overall, there is uncertainty surrounding the long-term impact of plant-based replacements on the dairy sector.

Environmental legislation could 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 and Ireland) and more stringent environmental policies and initiatives such as the Pathways to Dairy Net Zero launched in September 2021 by the dairy industry could affect the level and nature of dairy production in order to curb such emissions. The increasing trend towards sustainable practices such as water access and manure management are associated areas where policy changes could impact. Nevertheless, stricter environmental legislation could also lead to innovative solutions that improve the long-term competitiveness of the sector. Overall, the global level of GHG emissions will largely depend on efficiency gains in India and other countries with high cattle populations and extensive production. In addition, climate change and extreme weather events, already experienced in some countries and regions, could aggravate the viability of milk production in the affected countries.

Animal diseases and their spread could impact milk production, especially low-, and middle-income countries. 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 improvements in awareness, identification, and treatment of this disease could lead to significant increases in milk production through smaller losses. Treatments to control many diseases, including mastitis, are based on commonly used antimicrobials. This has raised increasing concerns on their overuse and the risk of antimicrobial resistance, which would reduce the effectiveness of existing treatments, impact on yields and milk supply, and depend on the development of new treatments and herd management practices. However, the evolution of this process is currently uncertain.

Dairy trade flows could be substantially altered by *changes in the trade environment*. Modifications to existing, or the creation of new trade agreements would affect dairy demand and trade flows. While the Russian import ban on several dairy products from major exporting countries was partially lifted in 2020, specifically for whey powder, the ban was subsequently extended until the end of 2022. The embargo was one of the drivers of increased Russian milk production over the last decade (0.7% p.a.) which not only reduced its import dependency, but has altered the sources of imports from the European Union to Belarus following the sanctions from 2014 onwards. USMCA is expected to influence dairy trade flows in North America, with members gaining increased access to each other's dairy markets. The United Kingdom's trade policy after its exit from the European Union is likely to impact dairy trade flows. Historically, large amounts of cheese and other dairy products have been traded between the two regions, but there have been increased trade frictions as importers and exporters navigate the new and changing trade environment. Moreover, the country's new agreements with Australia and New Zealand, which, after a transitional quota, allow tariff-free imports of butter and cheese could impact the dairy trade and the competitiveness of the dairy sector in the United Kingdom. To date, India and Pakistan, the big dairy consuming countries, have not been integrated into the international dairy market as domestic production is projected to expand fast to respond to growing internal demand. Future investment in cold chain infrastructure in these regions will increase their degree of self-sufficiency in dairy.

Changes in domestic polices remain an uncertainty. In particular, under USMCA, Canada has capped SMP exports, allowed increased market access, and eliminated their Class 7 designation, which was initially introduced to comply with the World Trade Organization Nairobi Decision on the removal of export subsidies. In the European Union, intervention buying of SMP and butter at fixed prices remains possible under certain circumstances, and this has already had a considerable market impact in recent years.

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 market developments and medium-term projections for world fish markets for the period 2022-31. Projections cover consumption, production, trade and prices for fish from catch and aquaculture. The chapter concludes with a discussion of key risks and uncertainties which could have implications for world fish markets over the next decade.

8.1. Projections highlights

Steady growth and movement towards aquaculture

After decades of steady growth, fish[1] consumption was affected by the impact of COVID-19, with a slight decline in 2020 followed by a marginal increase (0.1 kg per capita) in 2021. The low growth of total food fish consumption is expected to continue for the next decade at 1.4% p.a., compared to the 2.0% p.a. rate witnessed over the previous decade. This weaker trend in consumption reflects a slowdown in demand caused by sluggish income and population growth and increased competition from lower world poultry prices compared to the first half of the previous decade. Despite this weaker trend, fish consumption is projected to keep rising at a faster rate than meat consumption over the next decade (1.4% p.a. for fish vs 1.0% p.a. for meat). Apparent[2] food fish consumption globally is projected to reach 21.4 kg per capita in 2031, up from 20.5 kg per capita in the base period (average 2019-2021). Per-capita fish consumption will increase in all continents except Africa, the region with the fastest growing population. Most fish production is projected to be consumed as food (183 Mt in 2031), with only 10% going to non-food uses (mainly as fishmeal and fish oil). Asian countries will consume about 72% of the total fish for food consumption. In 2031, aquaculture is expected to provide 59% of the fish destined to human consumption, compared with 55% in the base period.

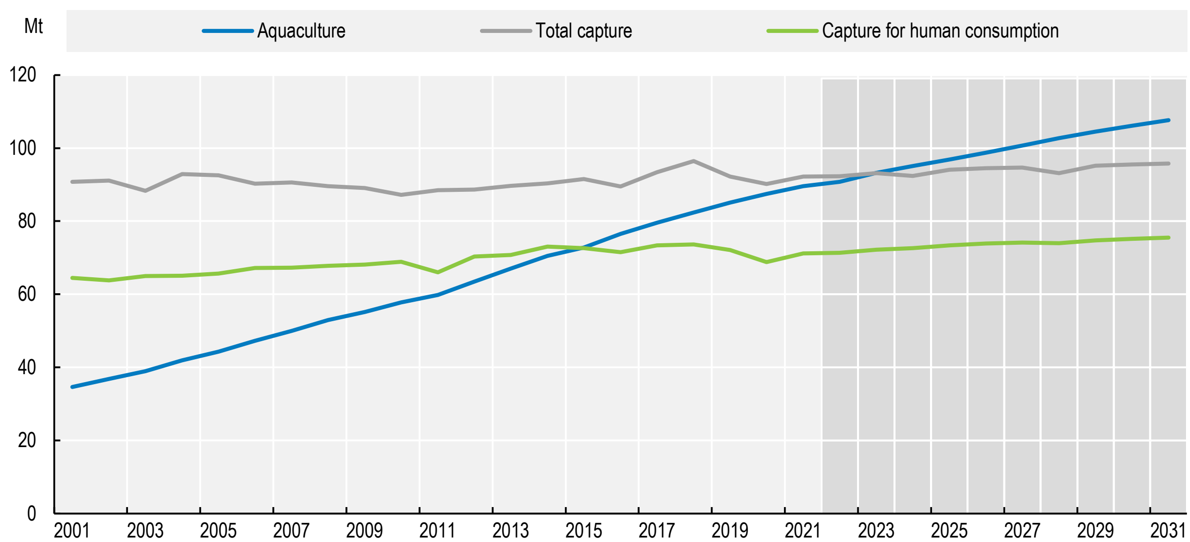
Average nominal fish prices will increase at a rate of 0.8% p.a. over the 2022-2031 period, starting from a high level in 2022, reflecting a strong price recovery in 2022 from COVID driven declines in 2020 and 2021. In real terms, aquaculture prices are projected to remain unchanged by 2031 while decreases are projected for capture by 9.9%, fishmeal by 15.6% and fish oil by 17.5%.

World fish production is projected to grow at 1.2% p.a. during the outlook period, a relative slowdown compared to the 2.0% p.a. growth of the previous decade. Production is expected to reach 203 Mt by 2031, an overall increase of 25 Mt (+14%) from the base period (2019-2021 average). Most of the growth will be in Asia. Aquaculture is expected to drive production growth over the outlook period, increasing 23% (20 Mt) by 2031 (at +1.9% p.a.). Despite slowing when compared to the previous decade (+1.9% p.a. vs. 3.8% p.a.), growth in aquaculture production will be significantly larger than in capture production (4.6% by 2031 at +0.4% p.a.). Consequently, aquaculture is expected to overtake capture fisheries production in 2023. Lower growth rates in aquaculture production are the consequence of large increases in the cost of feed at the beginning of the outlook period and the impact of policy changes in The People's Republic of China (hereafter "China") slowing the expansion of aquaculture. These changes are focused on environmental protection and diversification of production, with an increased emphasis on producing species for the domestic market. By 2031, global aquaculture production is expected to reach 108 Mt, 12 Mt more than the capture sector.

Despite the increasing prominence of aquaculture in total fish supply (53% in 2031 vs 49% in the base period) (Figure 8.1), the capture fisheries sector is expected to remain dominant for several species and vital for domestic and international food security. Capture fisheries production should increase by 4.6% by 2031 and reach 96 Mt due to improved catches in some fishing areas and better management. Some fluctuations will occur in the years of the *El Niño* (assumed in 2024 and 2028), which will also negatively affect production of fishmeal and fish oil. In 2031, world production of fishmeal is expected to reach 5.6 Mt, increasing 1.3% p.a. over the 2022-2031 period, while fish oil production should grow by 1.2% p.a. and reach 1.3 Mt during the same period. By 2031, approximately 29% of fishmeal and 47% of fish oil will be obtained from fish waste.

Exports of fisheries and aquaculture products are expected to be buoyant in various forms for food and non-food purposes. About 35% of total fish production (31% excluding intra-EU trade) is expected to be exported in 2031. After contracting in 2020 (- 3.9%), and with only a slight recovery in 2021, world trade of fish for food is projected to increase, at 0.8% p.a. over the 2022-2031 period. This rate is lower than was observed in the past decade (1.1% p.a.), reflecting the slowdown in production growth, and the diversification of aquaculture production in China. Asian countries will continue to be the main exporters of fish for food, with their share of all exports remaining stable at 47%. Europe and North America will remain the main importers, accounting for 25% and 15% of all imports in 2031.

Figure 8.1. Aquaculture to continue leading the growth in production



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

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Many factors influence the evolution and dynamics of world fish markets and, therefore, a range of uncertainties exist in the future. These include climate change, which impacts the distribution and the level of fish stocks, policies to reduce GHG emissions from the sector, fisheries management and governance, trade policies and policies against illegal, unreported and unregulated fishing (IUU). The emergence of new COVID-19 variants and potential supply chain disruptions may alter the projections, especially in the first years of the projections. Two years after the start of the pandemic, the situation, while improved, is still unstable. The pandemic has impacted both supply and demand, which could lead to long-term transformations of the sector. Furthermore, given the importance of the Russian Federation (hereafter “Russia”) as one of the top fish producers and exporters, the current Russian war against Ukraine and the reduced export availability from Russia creates major uncertainty. In addition, the significant change in the inflation rates in most countries partly resulting from the war creates additional uncertainty.

8.2. Current market trends

Responses to the pandemic may have lasting structural effects on the sector

The consequences of the COVID-19 pandemic on the fisheries and aquaculture sector had varying effects on individual countries and products. The efforts to mitigate the spread of COVID-19 have resulted in reduced demand for aquatic foods, and disruptions to production, supply chains and markets. In some countries, the decline in demand led to lower prices. Consequently, many fishing fleets stopped operating or reduced their activities, as work became unprofitable during periods in 2020 and 2021. In some cases, quotas were not filled due to low demand and lack of storage for perishable products. Aquaculture production also faced reduced availability of necessary equipment and inputs (including feed, fingerlings, and ice), and issues with distribution and marketing, while sanitary measures also impacted the sector. Fish production relying on export markets faced more severe consequences than those serving domestic markets in particular in 2020, but in 2021 exports rebounded. Overall, large-scale vertically integrated supply chains have been less affected than the small-scale sector, due to their greater control over input and output delivery. The labour-intensive small-scale sector, very relevant for both fisheries and aquaculture, was more vulnerable to restrictions on movement affecting workers and to disruptions in input provisioning and transportation.

The last two years saw a major shift in consumer patterns. Habits and innovations developed during the lockdowns, such as a renewed interest in home cooking, a general pivoting towards retail, the proliferation of home delivery services, a strong focus on digital marketing and an increase in e-commerce sales, may have major long-term structural impacts on the sector. These new market features have not gone away post pandemic and have instead made a permanent contribution to the dynamics and opportunities for transforming the global fisheries and aquaculture sector. However, for some products, such as canned tuna which recorded a significant increase in consumption during periods of lockdown, the levels of demand they experienced are unlikely to be maintained as normality returns. In late 2021 and early 2022, fish prices started to increase with a negative impact on consumption in the context of an unstable economic and geopolitical situation. According to the FAO Fish Price Index,[3] international fish prices were 7.0% higher on average in 2021 compared to 2020. The key drivers influencing the current market situation in the fisheries and aquaculture sectors include a high and rising inflation, increasing energy costs and the rapid reopening of economies after lockdowns.

8.3. Market projections

8.3.1. Consumption

Buoyant prospects for consumption as fish are nutritious foods that contribute to healthy diets

Fisheries and aquaculture products will continue to play a crucial role in nutrition and global food security as they represent an important source of macronutrients and micronutrients. Even small quantities of fish and aquatic food can have a significant positive nutritional impact on plant-based diets. Consuming aquatic foods together with plants can help to improve the uptake of various nutrients from plants, which is the case in many low-income food-deficit countries (LIFDCs) and least-developed countries, in particular for coastal and inland communities highly dependent on fish for their diets.

By 2031, a growing share of fisheries and aquaculture production is expected to be directed to human consumption. Of the 203 Mt anticipated to be produced in 2031, about 90% will likely be consumed as food, 8% reduced into fishmeal and fish oil, and the remaining 2% as other non-food uses. World fish food consumption is projected to reach 183 Mt in 2031 representing an overall increase of 24 Mt (or +15%) compared to the base period (average 2019-2021). A growing share of fish available for human consumption is expected to originate from aquaculture, rising from 55% in the base period to 59% by 2031.

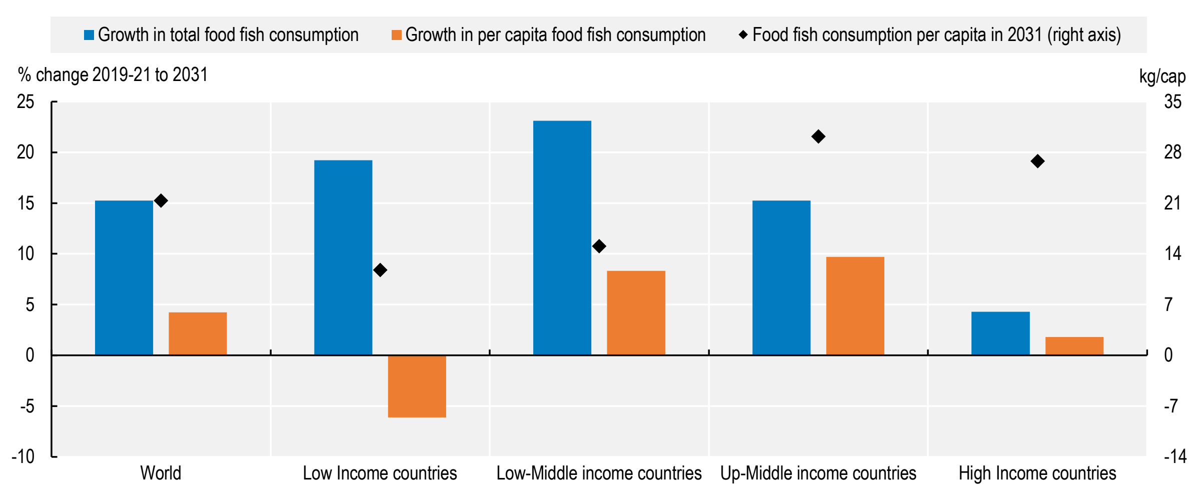
The driving force behind the growth in food fish consumption will be a combination of rising incomes and urbanisation, expansion of fish production, improved distribution channels, and product innovation. Together with a growing recognition that fish is a nutritious food. Demand is expected to grow in next decade. However, the pace of the increase of food fish consumption will slow, falling from 2.0% p.a. during 2012-2021 to 1.4% p.a. in 2022-2031. This slowdown is mainly due to lower production growth, rather high fish prices relative to some lower meats prices and a deceleration in population growth.

Total fish food consumption should rise in all continents, except Europe (-0.4%) where an initial decline in consumption in Ukraine and Russia due to the war is expected. Major growth is expected in Africa (+28%), Oceania (+19%), Asia (+16%) and America (+14%, with +15% in Latin America). Despite the overall increase in the availability of fish to most consumers, marked differences will continue to exist among countries and within countries and regions in terms of quantity and variety consumed and the subsequent contribution to nutritional intake. Availability and incomes are not the only factors boosting fish consumption. It is evident that socio-economic and cultural factors including food traditions, tastes, seasonality, and prices also strongly influence the level and the type of fish consumed.

As the most populous continent and major producer, Asia is anticipated to account for 76% of the additional fish consumed by 2031 as well as the largest share (72%) of the available total food fish in 2031. Africa, America and Europe will each account for 9% of total food fish consumed by 2031, while only 1% will be consumed in Oceania. Being the largest fish producer, China will also remain by far the world's largest fish consuming country, projected to account for 37% of the total food fish consumed in 2031.

In per capita terms, fish consumption is anticipated to reach 21.4 kg in 2031, slightly up from an average of 20.5 kg in 2019-2021, but its rate of growth will slow compared with the previous decade (0.5% p.a. against 0.9% p.a.). Fish consumption will continue to be higher in "upper-middle income" and high-income countries (30.2 kg and 26.8, respectively, in 2031) than in "low income" and "lower-middle income" countries (11.8 kg and 15.1 kg, respectively). Yet, growth rates during next decade, show major differences (Figure 8.2) with large increases experienced by middle-income countries, while a 6.1% decline is expected for low-income countries.

Figure 8.2. Growth in total and per capita food fish consumption



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

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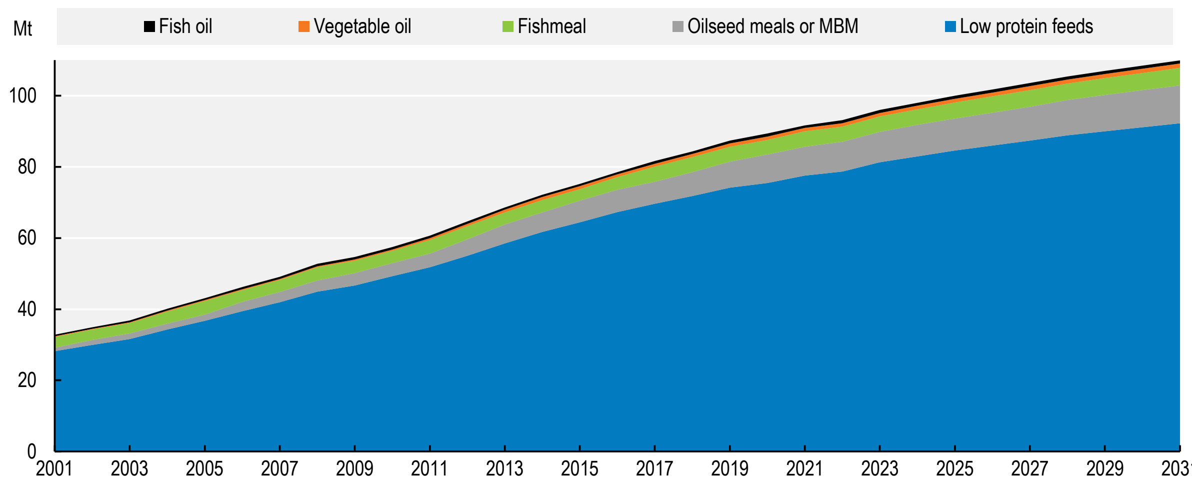
Per capita fish consumption will increase in all continents except Africa, where it is projected to decline from 10.0 kg in 2019-2021 to 9.9 kg in 2031, with a more substantial decrease in Sub-Saharan Africa (from 8.8 kg to 8.5 kg). This decrease is mainly caused by population growing faster than fish supply. Between 2022-2031, the population in Sub-Saharan Africa should grow by 2.4% p.a., while food fish supply by 2.0% p.a.

The decline in per capita fish consumption in Africa, with the subsequent reduction in the intake of fish proteins and micronutrients raises concern in terms of food security due to the high prevalence of undernourishment in Africa.[4] Fish play an important role in diets in the region representing about 22% of total animal-source protein intake on average and rising to more than 50% in some African countries, in particular in West Africa. Overall, the decline in fish consumption may thus weaken the ability of more fish-dependent countries to meet nutrition targets (2.1 and 2.2) of SDG 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture).

Fisheries and aquaculture production utilised for non-food purposes is either converted into fishmeal and fish oil or put to other non-food uses.[5] Consumption of fishmeal and fish oil is expected to continue to be characterised by the traditional competition between aquaculture and livestock for fishmeal, and between aquaculture and dietary supplements for direct human consumption for fish oil, but overall is constrained by stable production growth. Due to their high prices and major innovation efforts, the use of fishmeal and fish oil in aquaculture feeds is likely to decrease, with more frequent usage as strategic ingredients to enhance growth at specific stages of fish production. By 2031 it is expected that the share of fishmeal used in feeds for fish farming will decrease from 5% in 2019-21 to 4% in 2031. The reduction in fishmeal use will be accompanied by the expansion of the market for oilseed meals in aquaculture, where oilseed meal use is anticipated to reach about 10.6 Mt in 2031 (Figure 8.3), reaching 10% of the total feed used for fish farming (9% in 2019-21). China will be the country to utilise the highest quantity of fishmeal as feed with a share of 51% of the total in 2031. Concerning fish oil, aquaculture is expected to remain the major user. However, direct human consumption of processed fish oil will remain important as it is rich in omega-3 fatty acids, which are considered beneficial for a wide range of human biological functions. The European Union and Norway will remain the main consumers of global fish oil supplies.

Figure 8.3. Feed consumption by type in the aquaculture sector



Note: MBM refers to Meat and Bone Meal
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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8.4. Production

Aquaculture to overtake capture fisheries production in 2023

Global fish production (capture and aquaculture) is expected to grow from 179 Mt (2019-21 average) to 203 Mt by 2031, an increase of 14% (+1.2% p.a.). While this is an increase of 25 Mt in the projection period, this is smaller than the previous decade (2011-2021) when production grew by 33 Mt. The increase in fish production is driven primarily by the continued growth of aquaculture production, which will grow by 20 Mt (+23%) at 1.9% p.a. and is expected to reach 108 Mt p.a. by 2031. Despite this expected continued growth, it represents a significant slowing from the previous decade when aquaculture production grew by 30 Mt (+56%) at 3.8% p.a. Aquaculture production is expected to overtake capture production in 2023 and account for 53% of all fish production by 2031.

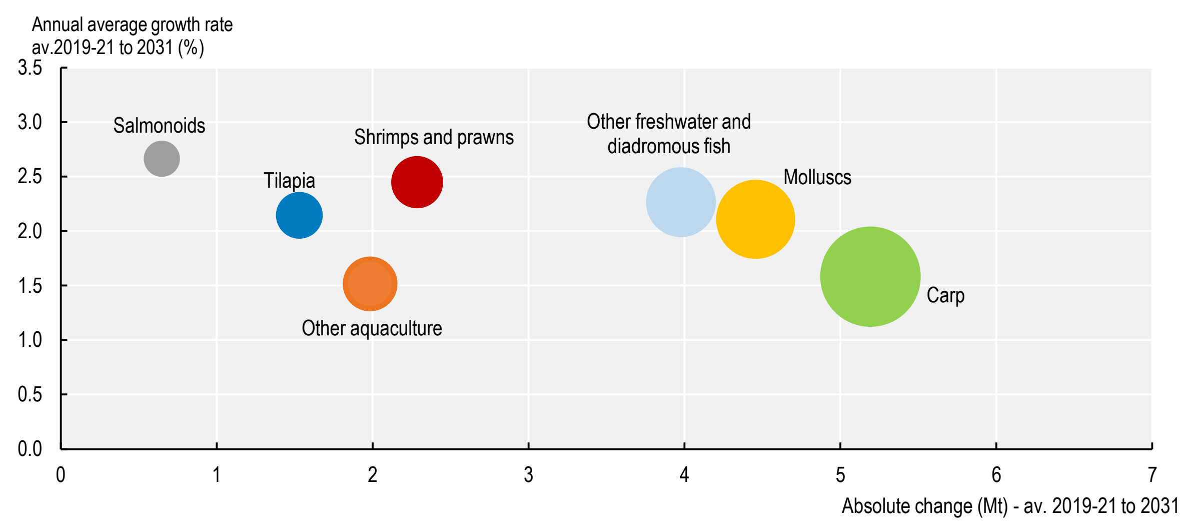
Several factors are driving the slower projected growth in aquaculture production. Firstly, the cost of feed was relatively low from 2013 to 2019 leading to higher profits for producers. Secondly, the aquaculture to feed price ratio will remain below 2019 levels until 2025 due to the high price of feed during the first half of this coming decade. From 2025 onwards, that feed price ratio is expected to remain at profitable levels for producers leading to a new period of growth for aquaculture production in the second half of the decade. There are several other factors contributing to the slower aquaculture production growth including slower gains in productivity; more stringent environmental regulations in the world's largest producers, most notably China; and challenges building new production facilities due to competition for land.

In China, regulations aimed at increasing the sustainability of the sector and targeting growth in species for domestic consumers are expected to limit production growth. Nevertheless, China's share of global aquaculture production is expected to decline slightly from 57% in the base year to 56% in 2031. Regionally, Asia is expected to maintain its position as the largest producer, with the share of global production from the region accounting for 88% in 2031. Strong production growth is expected in other major Asian producers: India (+39%), Thailand (+25%), Indonesia (+24%), Philippines (22%) and Viet Nam (+11%).

From a species perspective strong production growth is expected for shrimps and prawns (+31%) and tilapia (+25%) (Figure 8.4). However, for most species production growth is significantly slower than experienced during the previous decade. Carp will remain the most widely produced species, with 36 Mt expected to be produced in 2031. However, the projected 17% growth in carp production is modest, and lower than other species groups, reflecting policy changes in China, the primary producer of carp.

By comparison, continued improvements in fisheries management and improved technology reducing discards and waste are expected to drive a relatively modest growth of 4.2 Mt or 4.6% (+0.4% p.a.) in capture production over the projection period, reaching 96 Mt in 2031. The growth in capture fisheries production is expected to be similar to the previous decade. More specifically, while Africa is still expected to experience the strongest growth rate, +11% (+1.1 Mt), this is significantly slower growth than experienced in the previous decade (+32%). Capture fisheries production in Asia is expected to increase by 1.2 Mt, but this growth (+2.4%) will be slower than in Africa (+11%) and Europe (+6.3%). Consequently, the share of Asia in global capture production is projected to decline slightly to 51% in 2031 compared to 52% in the base period. After decreasing in the previous decade (-6.9%) capture fisheries production in America is projected to return to growth with an increase of 5.7% (+0.2% p.a.) over the outlook period. From a country perspective, the largest increases in capture production to 2031 are projected in Viet Nam (+0.6 Mt), Russia (+0.5 Mt), Peru (+0.4 Mt), the Philippines (+0.3 Mt) and India (+0.3 Mt). However, the extent to which growth in Russian production is impacted by the ongoing war remains to be seen.

Figure 8.4. Growth in world aquaculture production by species



Note: The size of the bubble represents the world total production (tonnes) in 2031.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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The popularity of fishmeal and fish oil for use in animal feed is expected to drive production. Production of fish oil and fishmeal is expected to increase during the outlook period reaching 1.3 Mt and 5.6 Mt, respectively, by 2031, compared to 1.1 Mt and 4.9 Mt in the base period. However, production growth will be faster than the previous decade for fishmeal (1.3% p.a. vs 1.1% p.a.), nevertheless total production will remain below pre-2005 levels. Both fishmeal and fish oil can be produced from whole fish or as a by-product of fish processing (so-called fish residue). The share of fishmeal and fish oil produced from fish residue is expected to remain broadly stable, at about 47% and 29%, respectively, by 2031.

8.4.1. Trade

Trade in fish and fish products will be sluggish

Trade plays a major role in the capture fisheries and aquaculture sectors, with supply chains operating at a global scale. Fish can be produced in a country, exported for processing in another country and reimported for consumption somewhere else. As a result, fish trade plays an important role in many economies as a source of nutrients, income, and employment. About 35% (31% excluding EU intra-trade) of production is projected to be exported in 2031 in different products forms and species. Aquaculture will contribute to a growing share of international trade in fishery commodities for human consumption.

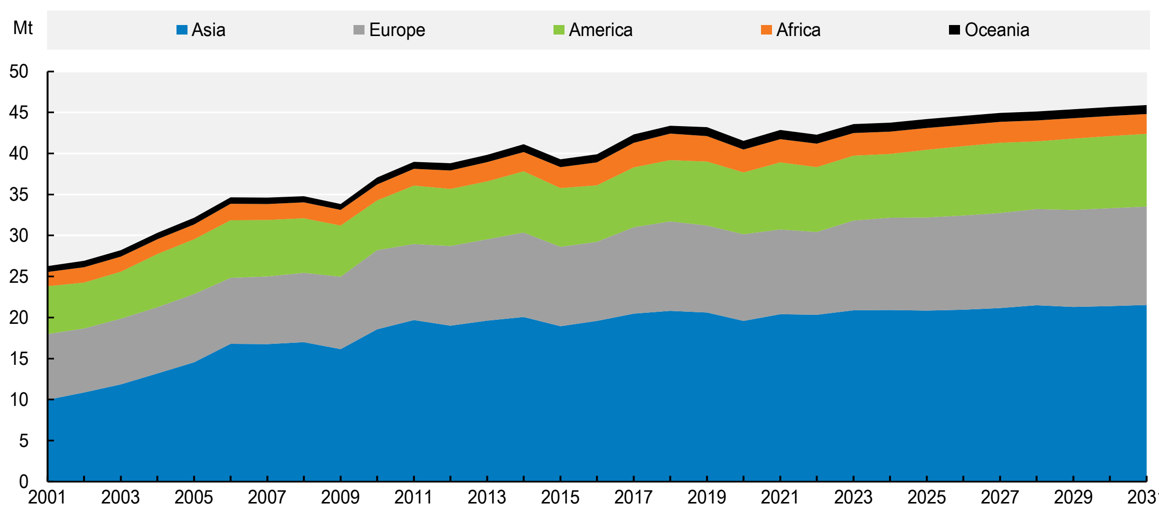
Global trade in fish and fish products was marginally down in 2019 due to lower production. In 2020, it contracted due to the COVID-19 pandemic. A decline in trade was recorded across all continents, reflecting the global nature of the pandemic. Fish trade was substantially disrupted with the implementation of control measures responding to uncertainty regarding the source of the disease and transmission paths and the overall deterioration of the market environment. However, there was a recovery in 2021, with players adapting to the new operational constraints and demand boosted by the reopening of the hospitality sector. Over the projection period, international fish trade is expected to expand but at a rate significantly lower than the one observed in the previous decade. This slowdown reflects relatively fewer opportunities for expansion into new markets and stronger domestic demand in some of the major producing countries who traditionally supplied affluent economies. World exports of fish for human consumption are projected to reach almost 46 Mt live weight in 2031, 3 Mt more (+0.8% p.a.) compared to the average 2019-21 level.

Asian countries are expected to remain the key suppliers to world markets (Figure 8.5). By 2031, they are expected to account for 47% of total trade of fish for human consumption, a share broadly unchanged since the base period. China alone will be the largest exporter with a share of 17% by 2031. Among non-Asian countries, Norway, the EU27 and Russia will remain significant fish exporters. However, with the numerous sanctions imposed on Russian products in response to the invasion of Ukraine, Russian exports might be much lower than projected if more countries impose sanctions in 2022 and if these sanctions are maintained after 2022. Despite the predominance of Asian countries in world fish exports, additional growth is mainly expected to originate from Europe over the next decade. This reflects the diversification of Chinese aquaculture, which increasingly focuses on the domestic market. The pandemic has accelerated this shift due to the numerous logistical difficulties associated with trade.

OECD countries will maintain their position as the leading importers of fish for human consumption, accounting for 52% of world imports by 2031. The EU27 will represent the largest single market with a share of 18%, followed by the United States (14%) and China (10%). Japan used to be the second largest importer until the early 2000s, but its imports have been on a downward trend for nearly 20 years reflecting changing diets and a declining population. By 2031, Japan is projected to account for only 6% of world fish imports, compared with a record share of 21% in 1992. While Africa only represents 14% of world imports of fish for human consumption, most of the growth in world imports is projected to originate from Africa. With much stronger growth projected in imports than in production, Africa is expected to become increasingly dependent on fish food imports, with an overall increase of 34% at 2.7% p.a. The share of imports in its fish food supply is projected to reach 37% by 2031, compared with 35% in the base period

Trade of fishmeal is projected to experience relatively modest growth of 7.1% (or +1.0% p.a.) to reach 3.5 Mt product weight in 2031. Fishmeal production and trade are subject to the *El Niño* weather phenomenon in Peru, which makes forecasting difficult. Peru is and is expected to remain the largest producer and exporter of fishmeal in the world, with domestic fishmeal consumption being insignificant. China will remain the leading fishmeal import market over the projection period, absorbing 54% of global imports by 2031, up from 46% in the base period. Chinese demand for fishmeal originates from the aquaculture sector, despite efforts to reduce the share of fishmeal in aquafeeds, and from the pig rearing industry, for which fishmeal is in demand as an ingredient in the feed for piglets. Other large importers include Japan, Norway, and Viet Nam. Fish oil exports are projected to increase by 8.5% over the period. Norway will remain the main fish oil importer, where it is used as an ingredient for feeding salmon. Followed by the EU27, where fish oil is a popular dietary supplement thanks to its rich content in omega-3 fatty acids. Norway and the EU27 are expected to absorb 25% and 24%, respectively, of global fish oil imports by 2031.

Figure 8.5. Exports of fish for human consumption



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

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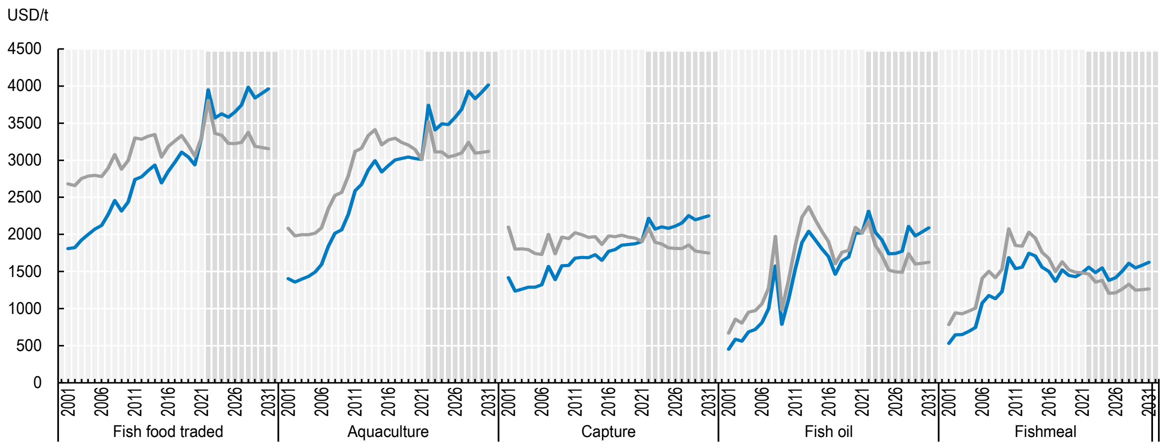
8.4.2. Prices

Prices expected to remain high during the coming decade

In 2021, fish prices rose in response to the increase in demand caused by the strong economic recovery from COVID-19 and the re-opening of restaurants and hotels, combined with only a small increase in production of fish. International fish prices were 7.0% higher in 2021 than 2020 according to the FAO Fish Price Index. More generally, fish prices are expected to grow in nominal terms over the projection period and remain high relative to historic levels. However, in real terms the prices of all categories are expected to decline except for aquaculture, where a stagnation is projected (Figure 8.6). The economic impacts of the COVID-19 pandemic are expected to cause some volatility in the prices of aquaculture, capture and fish food traded in real terms, as reduced prices from decreased demand are followed by a strong price growth (as demand increases following re-opening of the hospitality sector) and subsequent declines in 2023 onwards. Fishmeal and fish oil prices are expected to decline steadily over the period due to the expected evolution of the oilseed products prices, with fluctuations as *El Niño* influences supply.

Figure 8.6. 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 prices are nominal world prices deflated by the US GDP deflator (2021=1).
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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Prices of wild captured fish are expected to grow 19% (+0.7% p.a.) over the projection period in nominal terms. In real terms, however, this equates to an expected decline of 9.9% (-1.4% p.a.) over the projection period, similar to the trend experienced in the previous decade (+18% in nominal terms and -3.6% in real terms). The detailed trend in the prices of wild-capture fish in real terms shows a strong price recovery in 2022 from COVID driven declines in 2020 and 2021 and because of the impact of the war. This trend is then followed by a steady decline from 2023. As highlighted earlier, this decline reflects increasing competition from other protein sources, notably poultry meat, and the increased rate of growth in aquaculture production in China from 2023 onwards. It may also reflect a change in the production mix in favour of less valuable species. In the same period, aquaculture prices are projected to increase by 33% (+1.5% p.a.) in nominal terms, while in real terms they are expected to remain unchanged. P After an initial spike in 2022, prices of food fish traded are expected to remain almost the same over the projection period (in real terms), and despite some volatility, decline by a modest 3.4% (-1.3% p.a.).

Fishmeal will experience a decline in real prices of 16% (-1.2% p.a.). The price of oilseed meals, a direct competitor in the feed market, will decline more than fishmeal resulting in a small increase in the relative price of fishmeal when compared to 2021 but will remain significantly lower than in the previous decade. The price of fish oil is projected to decrease by 17% (-2.2% p.a.) in real terms. This decline stands in contrast to the previous decade when the price of fish oil grew by 44%, driven mostly by the huge increase in the price of vegetable oil, a direct substitute. Several factors are contributing to the expected decline in real prices of fish oil over the projection period including an expected decline in the vegetable oil price; slower aquaculture production growth; more efficient use of fish oil-based feeds in the production cycle; and a stabilisation of the Omega-3 demand (of which fish oil has a high content) as a dietary supplement from the food sector. In the case of aquaculture, the relatively high price of fish oil-based feeds has resulted in their use being restricted to specific stages of production cycle where high nutrient feeds are required (e.g. hatching and finishing). The price of fish oil relative to vegetable oil is expected to gradually return close to the average recorded since the arrival of the new plateau started in 2012. Overall, the real price of fish oil and fishmeal will remain high compared to pre-2005 levels.

8.5. Risks and uncertainties

Volatility in energy markets, management practices, and environmental policies could have significant impacts on the fisheries sector

Many factors will influence the evolution and dynamics of the world's fishery and aquaculture sectors. Some uncertainties, discussed in previous editions of the *Outlook* such as stock status, and domestic fisheries policies, remain relevant. However, in this *Outlook*, one of the major uncertainties is Russia’s war against Ukraine that impacts on global value chains and trade, which are still recovering from the COVID-19 pandemic. A major unknown factor for the projections is the magnitude of the rise in production and distribution costs over the next decade and their effect on overall inflation. Wars, shocks to oil prices, pandemics, trade sanctions, pollution and climate change and extreme weather events all point to higher production costs in the fisheries sector as a whole.

The cost of fuel and other energy sources has become increasingly volatile, as illustrated by the price variations observed since early 2020. The COVID-19 pandemic led to a historic plunge in global energy consumption in early 2020 driving the prices of many fuels to their lowest levels in decades. However, since then, prices have rebounded strongly, mainly reflecting a rapid global economic recovery, a weaker than expected increase in supply, and a cold winter in the Northern Hemisphere. The war has further pushed up prices for oil and natural gas in Europe. Expenditures on fuel represent the largest variable cost in modern capture fishing operations. While fuel use varies widely with gear type, the profitability of the capture fisheries sector and effort levels are highly sensitive to energy costs. Although aquaculture is less directly dependent on fuel, its energy demands are important for feed production but also for pumping, aeration, temperature control and wastewater treatment. Post-harvest and processing activities are also heavily dependent on fuel. The great increase in fish trade in recent decades, which enabled wider distribution of fish, more sophisticated value-added products and more geographically dispersed supply chains also contributed to increased energy needs. Considering all of this, the profitability of the fisheries and aquaculture sectors will be reduced by high oil prices in the short term, but volatile energy markets are likely to remain one of the main challenges the sector will need to deal with over the next decade.

From a trade perspective, unexpected policy decisions could also affect the projections. A trade war between China and the United States, or the sanctions imposed on Russian imports by a number of countries following the invasion of Ukraine are examples of the numerous cases of trade related uncertainty over the projection period. It remains unclear whether these sanctions will be relaxed, reinforced or maintained over the entire outlook period. In any case, these bans are likely to imply at least short-term changes in some trade relationships and flows.

Overall, the fisheries and aquaculture sectors are expected to continue to face many challenges including environmental change, resource availability, and concerns over ineffective governance. In particular, climate change presents a significant source of uncertainty which is difficult to capture in the projections. For capture fisheries, climate change can impact the location, abundance, and species composition of stocks, with uncertain consequences for both the fishers looking to exploit resources and policy makers aiming to manage them. Further, as a large consumer of fuel and energy more generally, capture fisheries and aquaculture potentially face new sources of regulatory risk as governments look to reduce greenhouse gas emissions that may further impact the costs of energy. Conversely, climate policies may favour aquaculture and capture production, given their relatively low emissions intensities when compared to other protein production systems. Given international and domestic commitments to reduce greenhouse gas emissions (e.g. net-zero pledges, International Maritime Organization (IMO) emissions regulations, and the Paris Agreement) it seems likely future regulations will impact both aquaculture and capture production in unpredictable ways.

Despite the progress made by several countries and regions, with fish stocks consistently above target levels of rebuilding when fisheries are properly managed, there are still many areas where good fisheries management is not in place or is ineffective and the status of fish stocks is poor and deteriorating. This unequal progress is expected to persist unless successful and adequate policies and measures are implemented. Aquaculture will be the main driver for the increase of fish production globally, but its growth is hampered by different constraints including equitable distribution, competition for land, rights to water, diversity of species produced, and access to credit, seeds, and expertise. Such constraints will need to be adequately addressed through responsive and effective governance, increased investment, improvements in technology, innovations and research, and more efficient production and profitability. Ensuring long term biosecurity will be crucial as well as the targeted support of environmentally friendly and sustainable production systems. On these aspects, one of the new priority areas of the Strategic Framework of FAO for 2022-2031 is the Blue Transformation, that focuses on more efficient, inclusive, resilient and sustainable blue food systems, from both capture fisheries and aquaculture, promoted through improved policies and programmes for integrated science-based management, technological innovation, and private-sector engagement. The Blue Transformation provides a pathway for hunger reduction and sustainable management of oceans, seas, and marine resources through reconciling environmental sustainability, food security and livelihood priorities to help vulnerable states mitigate the often-devastating effects of climate change.

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] 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.

[3] Calculated in nominal terms, and covering fish and fish products.

[4] FAO, IFAD, UNICEF, WFP and WHO (2021), *The State of Food Security and Nutrition in the World 2021*. Transforming food systems for food security, improved nutrition and affordable healthy diets for all. Rome, FAO. https://doi.org/10.4060/cb4474en.

[5] Other non-food uses include ornamental fish, culturing, fingerlings and fry, bait, pharmaceutical inputs, and as direct feed for aquaculture, livestock and other animals.

9 Biofuels

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

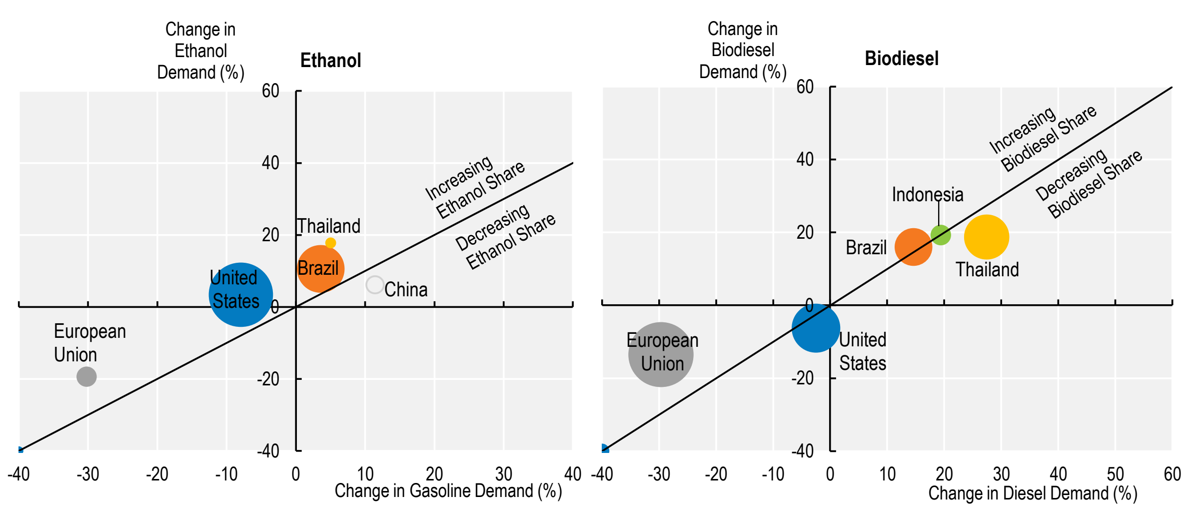
9.1. Projection highlights

Policies are key drivers in biofuel markets

The COVID-19 pandemic in 2020 caused a drop in global transport fuel use due to restrictions on people's movements and disruptions in trade logistics around the globe. Ethanol use fell most, whereas biodiesel use continued to increase but at a slower pace. Following the economic recovery in 2021 and the lifting of mobility restrictions, the fossil fuel and biofuel market recovered. However, consumption of ethanol has not yet returned to the 2019 level. The biodiesel market expanded, due to higher blending requirements, tax credits, direct subsidies and decarbonisation initiatives in the market. Higher feedstock prices (vegetable oil, maize, sugar cane, and molasses) and bottlenecks in domestic supply chains increased production costs and constrained biofuel production in most countries and regions. The *Outlook* foresees biofuel markets remaining largely driven by fossil fuel demand and significantly influenced by domestic support policies. Over the medium term, middle-income countries are foreseen to lead biofuel market expansion by implementing blending mandates and providing subsidies to support domestic production and the use of blended fuels. In high-income countries, biofuel expansion will be limited due to decreasing fossil fuel demand and reduced policy incentives.

Global biofuel use is expected to grow over the projection period (Figure 9.1). The IEA *World Energy Outlook* (on which the fossil fuel demand projections of this *Outlook* are based) foresees a reduction in the total transport fuel use in the European Union and the United States, suggesting limited growth potential for biofuel consumption. In the United States, biofuel demand is expected to be sustained by the post-Renewable Fuel Standard (RFS) regime and consumption will be almost constant during the projection period. In the European Union, the RED II (Renewable Energy Directive) classified palm oil-based biodiesel under a high ILUC (Indirect Land Use Change) risk category as potentially increasing greenhouse gas (GHG) emissions from deforestation or the conversion to cropland. It limits the use of palm oil by fulfilling certain rules and certification schemes. Consequently, the consumption of palm oil-based biodiesel is expected to decline rendering a negative impact on total biodiesel demand.

Figure 9.1. Biofuel demand trends 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 2021.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Fuel consumption trends and policy developments in emerging economies also play a significant role. In Brazil, Colombia and Paraguay, total fuel consumption should increase over the projection period, with both ethanol and biodiesel consumption projected to grow. In Indonesia, the blending rate is expected to slightly decrease around its current level remaining above 30% (B30), with diesel use and biodiesel consumption expected to increase in parallel. In Southeast Asian countries, the use of biodiesel is expected to increase due to increases in both transport fuel demand and industrial use. Due to high soybean oil prices and increasing production costs, the government of Argentina reduced the biodiesel blend rate to 5% in 2021. Although over the projection period fuel consumption and the blend rate are expected to increase, total biodiesel use will remain below pre-COVID-19 levels. In India, sugarcane-based ethanol should contribute significantly to reach an ethanol blend rate of about 20% by 2031, although still falling short of the E20 government target.

Globally, biofuel will continue to be produced predominantly from traditional feedstocks: maize and sugarcane for ethanol and vegetable oil for biodiesel production. COVID-19 reduced the availability of used cooking oil (UCO) in many countries, due to restaurant closures. However, UCO based biodiesel production is projected to recover and continue playing an important role in the European Union, United States and Singapore. In most countries, biofuel policies target domestic objectives aiming at reducing GHG emissions and dependency on fossil fuels while supporting domestic agricultural producers. Domestic production typically covers most of the demand, thus leaving a relatively low international trade share. By 2031, world biodiesel trade is projected to decrease to 10% of total production, but ethanol trade will remain at about 7.5%.

International biofuel prices are projected to remain constant over the outlook period in nominal terms, while decreasing in real terms. Biofuel prices only partially reflect their fundamental drivers, such as feedstock prices, crude oil price and distribution costs as well as customers' disposable income and consumption preferences. It is policies, such as domestic support, consumer tax credits and blending mandates tying biofuel consumption to fossil fuels, that also tend to shape the path of prices over time.

The policy environment, heavily influenced by energy and environmental issues, is the main source of uncertainty in the projections. This *Outlook* expects no substantial increase in advanced biofuels such as cellulose-based ethanol or hydrogenated vegetable oil (HVO) based biodiesel before the end of the outlook period. Sustainable aviation fuel (SAF) consumption and production could increase in the long term; however, its success relies on technological advancements, ambitious policies and securing sustainable feedstock. The number of global electric vehicles (EV) stock has been increasingly since the mid-2000s. More than 20 countries have announced the complete phasing out of internal combustion engine (ICE) vehicle sales over the next 10-30 years. Many countries and the European U have introduced EV deployment targets and other supporting programmes for increasing EV utilisation and promoting R&D for EV. Uncertainty in the projections arises from the assumptions about future developments in the transportation sector. Unforeseen advances in technology and potential changes in the regulatory framework may result in substantial deviations from current market projections for biofuels.

9.2. Current market trends

The global economic recovery and the easing of mobility restrictions favoured the recovery of global fossil fuel demand, which had a positive influence on the biofuels market. Moreover, increasing support with higher mandates accelerated biofuel demand in 2021. Global ethanol and biodiesel consumption increased to 126 bln L and 55 bln L, respectively, in 2021. Despite the recovery, production margins for biofuels were affected by higher feedstock and producing costs, which had a negative impact on biofuel production in some major producing countries. For instance, because of the higher vegetable oil prices and increasing production costs, Argentine reduced biodiesel blend rates in 2021. Nonetheless, several countries continue supporting biofuels production with higher mandates, tax credits and subsidies, such as India and

Indonesia. To some extent, the high fossil fuel prices have provided more leverage to the biofuels industry. Due to demand recovery and higher feedstock prices, ethanol and biodiesel nominal prices were historically high in 2021.

9.3. Market projections

9.3.1. Consumption and production

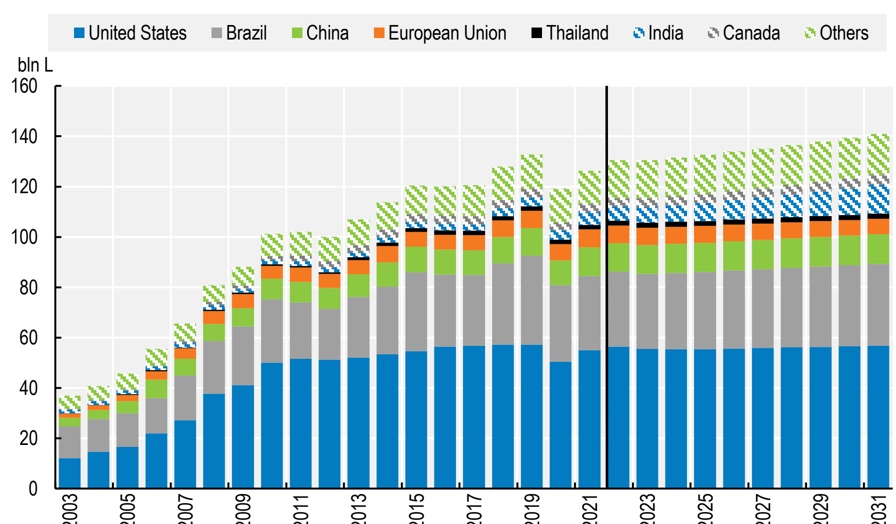
Asian countries are driving biofuel supply and demand

Globally, this *Outlook* expects biofuel consumption and production to increase at a much slower pace during the projection period than in previous decades primarily as result of reducing support policies in developed countries. Demand for biofuels is expected to increase due to developments in transportation fleets, domestic policies that favour higher blends, and greater demand from consumers.

Global ethanol and biodiesel production is projected to increase to 140 bln L and 55 bln L, respectively, by 2031, due to expansion in Asian countries which favours domestic production through subsidies, tax credits and low interest loans for investments. Feedstocks for biofuel products vary from country to country. Global biofuel production will continue to be dominated by traditional feedstocks despite the increasing sensitivity to the sustainability of biofuel production observed in many countries (Figure 9.3).

The share of energy that enters the transport sector through biofuels exceeds 10% only in Brazil. However, a goal of many biofuel policies, especially in developing countries, is to reduce energy dependency from fossil fuel sources.

Figure 9.2. Development of the world ethanol consumption



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

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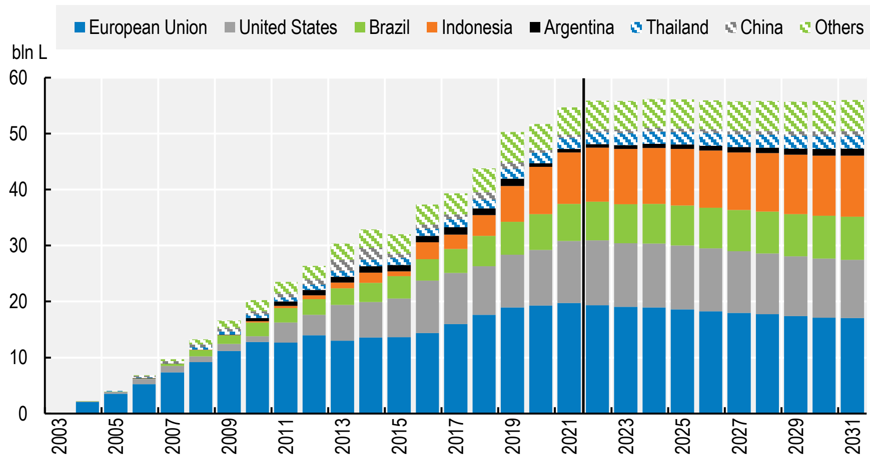
Figure 9.3. Development of the world biodiesel consumption



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

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Box 9.1. Biofuels at a glance

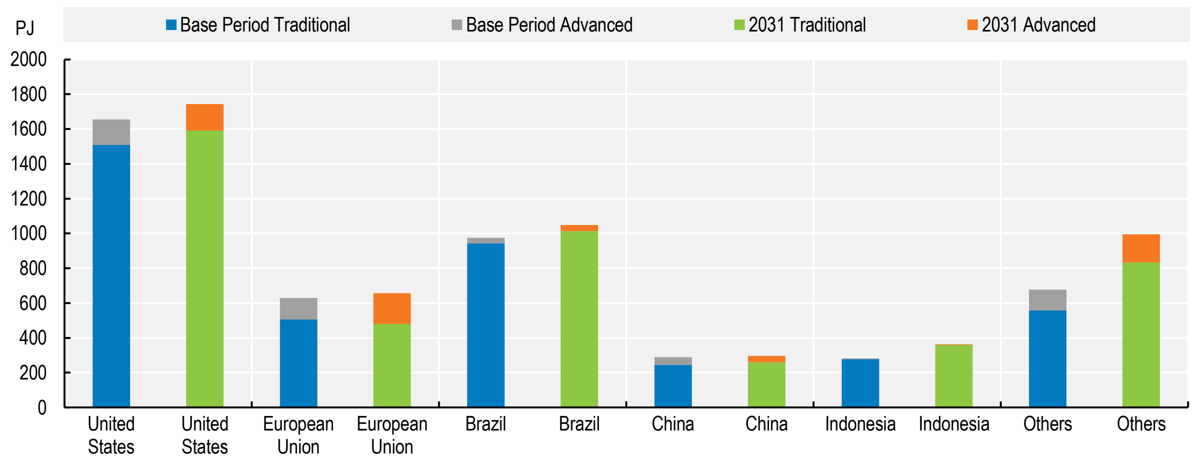
Biofuels (bioethanol and biodiesel[1]) are fuels produced from biomass. Currently, about 59% of ethanol is produced from maize, 22% from sugarcane, 2% from molasses, 2% from wheat, and the remainder from other grains, cassava or sugar beets. About 73% of biodiesel is based on vegetable oils (14% rapeseed oil, 24% soybean oil, and 31% palm oil) and used cooking oils (21%). More advanced technologies based on cellulosic feedstock (e.g. crop residues, dedicated energy crops, or woody biomass) do not account for large shares of total biofuel production. The international biofuel sectors are strongly influenced by national policies that have three major goals: farmer support, reduced GHG emissions, and/or increased energy supply and independence.

Table 9.1. Biofuel production ranking and major feedstock

	Production ranking (base period)		Major feedstock	
	Ethanol	Biodiesel	Ethanol	Biodiesel
United States	1 (46.7%)	2 (18.4%)	Maize	Soybean oil, used cooking oils
European Union	4 (4.9%)	1 (30.7%)	Sugar beet / wheat / maize	Rapeseed oil /Palm oil/ used cooking oils
Brazil	2 (26.3%)	4 (13.1%)	Sugarcane / maize	Soybean oil
China	3 (8.4%)	8 (2.8%)	Maize / cassava	Used cooking oils
India	5 (2.9%)	14 (0.4%)	Molasses / sugarcane / maize / wheat / rice	Used cooking oils
Canada	6 (1.6%)	13 (0.8%)	Maize / wheat	Canola oil / used cooking oil/soybean oil
Indonesia	20 (0.1%)	3 (17.5%)	Molasses	Palm oil
Argentina	8 (0.9%)	5 (3.6%)	Molasses / sugarcane/ maize	Soybean oil
Thailand	7 (1.4%)	7 (3.0%)	Molasses / cassava/ sugarcane	Palm oil
Colombia	14 (0.4%)	11 (1.3%)	Sugarcane	Palm oil
Paraguay	11 (0.5%)	18 (0.02%)	Maize/ sugarcane	Soybean oil

1. Numbers refer to country ranking in global production; percentages refer to the production share of countries in the base period.
2. In the *OECD-FAO Agricultural Outlook 2022-2031*, biodiesel includes renewable diesel (also known as Hydrotreated Vegetable Oil or HVO), although these are different products.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Figure 9.4. World biofuel production from traditional and advanced feedstocks



Note: Traditional feedstocks are here defined as food and feed crop based biofuels. Values in Petajoules = 1015 Joules.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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United States

In the United States, biofuels are expected to be sustained by the post-Renewable Fuel Standard (RFS) regime set by the EPA at recently announced levels in volume terms, with a projected decrease in the use of transportation fuel. Most of gasoline will continue to be used for 10% ethanol blend (E10). Some growth is projected in 15% ethanol blend (E15), but infrastructure and other constrain limit the growth over and expansion of mid-high level blending is not alone sufficient to prevent declining US domestic fuel use.[1] The ethanol blend rate will increase to 11% by 2031.

Both the production and consumption of ethanol are expected to increase by 0.2% p.a. (Figure 9.4) over the next decade. Corn (maize) is assumed to be the main feedstock for ethanol production, accounting for 98% of production in 2031. Cellulosic ethanol production capacity is assumed to remain constant over the projection period. Although the United States should maintain its position as the world's largest ethanol producer, its share of global production should decrease from 47% to 44%.For biodiesel production is projected to decrease by 1.4% p.a. (Figure 9.5), to account for 16% for global production in 2031.

The European Union

Since 2010, EU legislation related to biofuel support has been based on the 2009 Renewable Energy Directive (RED), which required that at least 10% of transport energy use in EU Member States should be based on renewables by 2020. In 2018, agreement was reached to increase the transport sector target to 14%, with national caps on food and feed crop-based biofuels at 1 percentage point above 2020 levels, but not exceeding 7%. A new framework was adopted under Directive 2018/2001. RED II entered into force in 2021 to be implemented by 2030.[2] RED II set a new overall renewable energy target of 32% by 2030. It classified palm oil-based biodiesel under a high ILUC risk category and thus consumption of this biodiesel source is expected to decline.

According to the International Energy Agency's (IEA) baseline, total energy use in the transport sector is projected to decrease for diesel and gasoline with ethanol and biodiesel consumption decreasing (-1 bln L and -2.6 bln L, respectively). Palm oil-based biodiesel constitutes a large share of this decrease in view of

EU sustainability concerns associated with palm oil production, while production from used cooking oils is projected to increase. Given the demand projections for the biodiesel sector, the European Union is expected to remain the world's largest biodiesel producing region in 2031, although global production shares are expected to decrease from 30.7% to 28%. Total EU biofuel consumption is projected to decrease by 1.5% p.a., but the share of advanced biofuel sources should increase from 24% at present to 37% by 2031 (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 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%. The current differentiated taxation system favours hydrous ethanol over blended gasohol in key Brazilian states. For biodiesel, the government is assumed to maintain biodiesel blend ratio at 11% through 2031.

Brazilian ethanol consumption is projected to increase by 1.0 % p.a., sustained by the RenovaBio programme.[3] This programme, signed in January 2018, is intended to reduce the emissions intensity of the Brazilian transport sector in line with the country's commitments under COP21. To create the necessary incentive structure, RenovaBio will introduce a system of tradeable carbon credits. Brazilian production is projected to increase by 0.9% p.a., with strong competition for sugarcane used for sugar production. By 2031, more than half of total Brazilian ethanol production is projected to be consumed by high blend flex-fuel vehicles, implying an increase in 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, underpinning the potential growth of blending biofuels to gasoline and diesel. Consequently, this *Outlook* projects that ethanol market volumes and biodiesel consumption will increase in Brazil, but the growth rates will lower than the past decade.

Indonesia

The implementation of B30 (Biodiesel 30% blend) aims at reducing the country's dependency on imported fossil fuels, stabilising palm oil price, reducing GHG emissions and sustaining the domestic economy as it accounts for nearly half a million jobs in the country. In recent years, biodiesel production has steadily increased due to a national biodiesel programme, which provides support to biodiesel producers, and it is financed by the crude palm oil (CPO) fund. The projected international reference prices for vegetable oil and exports, together with a levy projected on average at USD 85/t on exports in 2022 which decreases by USD 10/ton per year to reach USD 55/ton in 2025 remaining at that level until 2031[4], is assumed to be sufficient to maintain B30 over the period. The support to biodiesel producers covers the gap between biodiesel and diesel prices. The biodiesel price is calculated as the CPO price plus production costs, set at USD 80/t, plus freight and transports costs. In 2021, the average estimated subsidy to biodiesel production increased to about USD 0.22/L owing to high CPO and low diesel prices. However, this subsidy should decrease over the outlook period to about USD 0.16/L as oil prices are expected to recover, driving fossil fuel prices up. Based on these assumptions, biodiesel production in Indonesia is projected to increase to 10.9 bln L by 2031. In view of the EU environmental regulation and declining use of diesel in high-income countries, exports are projected to remain negligible over the outlook period.

India

India has accelerated ethanol production aiming to achieve the ambitious target of E20 (Ethanol 20% blend) by 2025 rather than 2030. However, the Outlook foresees limitations on the feedstock supply to increase biofuel production to reach the target levels over the outlook period. While the Outlook assumes a significant increase in the use of new feedstuffs such as sugarcane, maize, wheat and rice, molasses would remain as the primarily feedstuff, thus limiting domestic supply such that production will not be sufficient to meet increasing demand from the biofuels industry. Aided by soft loans, sugar mills are investing and developing the capacity to produce ethanol from sugarcane juice; in 2021, reports indicate that this source of ethanol could account for about 13% of the total ethanol production to reach nearly 25% in 2031. In spite of such developments, sugar export subsidies are expected to slow down the transition towards sugarcane-based ethanol. This, in combination with accelerating gasoline demand, would increase the blending rate to 11% in 2025 and 20% in 2031. Ethanol production is expected to be 11 bln L in 2031. The limited supply of vegetable oils, for which India is a net importer, in combination with high international prices will remain as the main constrains to significantly increase biodiesel production.

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 maize stocks have declined since 2017, the main incentive to step up ethanol use is disappearing. This *Outlook* nevertheless assumes that the blending rate of 2% will be maintained to 2031. 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 0.28% p.a. during the projection period. This *Outlook* assumes most of the ethanol demand will be produced from domestic feedstock.

Argentina

Due to the higher soybean oil prices and increasing production costs, the government reduced the biodiesel blend rate from 10% to 5% in 2021, which is expected to increase to 8.5% in 2031. Consumption and production will increase by 7.8% and 3.1%, respectively, during the projection period. However, these will remain lower than 2019 levels. Tax exemptions should continue to boost the development of the country's biodiesel industry, which exports almost half of its production. However, weak production and trade barriers by the United States, and the Argentinian export tax will lower its exports by 1.6% p.a.

Thailand

The domestic feedstock sources – molasses, cassava and palm oil – constrain biofuels production. Without increased production of these commodities or including a broader range of commodities in the feedstock basket, the projected production lags behind the targets set for 2036. In addition, the government will gradually reduce the current subsidy on ethanol by 2022, although higher blend (E85) is expected to be less affected than lower blend (E10); on average, blending is expected to reach 16% over the outlook period and production is projected to increase marginally to 2 bln L in 2031. Biodiesel demand is expected to be supported by the obligatory blending rates, with subsidies favouring B20 and B10 against B7. However, limited domestic palm oil supply and high vegetable oil prices will constrain domestic supply and demand will marginally increase to 2.3 bln L by 2031.

Colombia

Ethanol demand is projected to increase over the outlook period in line with the recovery of gasoline demand. Due to the local supply shortages, the government decreased the ethanol blend rate to 4% between April and September 2021, with the average blending rate in 2021 about 8%. Over the medium term, the blending rate is projected to return to 10%. This *Outlook* assumes sugarcane to continue as the main feedstock; moreover, in 2030 biofuels use will account for about 27% of the sugarcane production against 17% in the base period, thus consolidating ethanol as an important element in sustaining the

Colombian sugarcane industry. Biodiesel demand was subdued in 2019 and 2020 due to a decline in diesel demand, but the blending rate increased close to B12. This *Outlook* assumes this level will continue over the medium term and production is projected to reach 0.8 bln L by 2031.

Other countries

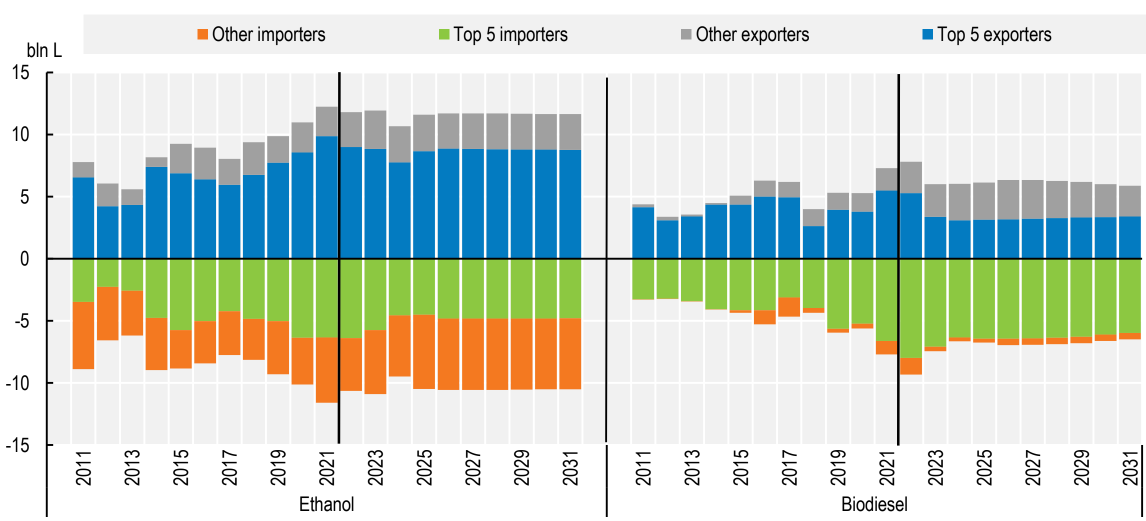
Other relatively important producers of ethanol include Paraguay, the Philippines, and Peru, where production could reach 0.9 bln L, 0.6 bln L and 0.3 bln L, respectively, by 2031; the blending rate in these three countries is assumed to remain stable at around 30%, 10% and 7%, respectively. Malaysia, the Philippines and Peru are also major biodiesel producers, where production could reach 1.6 bln L, 0.3 bln L and 0.2 bln L, respectively, by 2031. In Malaysia, blending is projected to remain around 10%, whereas in Peru and the Philippines around 6% and 3%, respectively. Other Asian countries, in particular Singapore, would increase production to reach around 1.4 bln L of biodiesel from UCO in 2031. Unlike most countries where biofuels are domestically used to reduce GHG emissions and to reduce national dependency on imported oil, production of biodiesel in Singapore is largely exported.

9.3.2. Trade

Global trade in biofuels will be slacken over the next decade

Global ethanol trade is projected to remain at about 7% by 2031. The United States and Brazil are expected to remain net exporters of maize- and sugarcane-based ethanol. However, US and Brazilian ethanol exports will decrease over the outlook period as the main importers, Colombia and India, continue expanding domestic production, thus becoming less dependent on trade.

Figure 9.5. Biofuel trade dominated by a few global players



Note: Top five ethanol exporters in 2031: United States, Brazil, European Union, Pakistan, United Kingdom. Top five ethanol importers in 2031: Brazil, United States, Japan, Canada, United Kingdom. Top five biodiesel exporters in 2031: Argentina, European Union, United States, Indonesia, Canada. Top five biodiesel importers in 2031: European Union, United States, United Kingdom, Canada, Peru. Classification of biofuels by domestic policies can result in simultaneous exports and imports of biofuels in several countries.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/ni5dt8

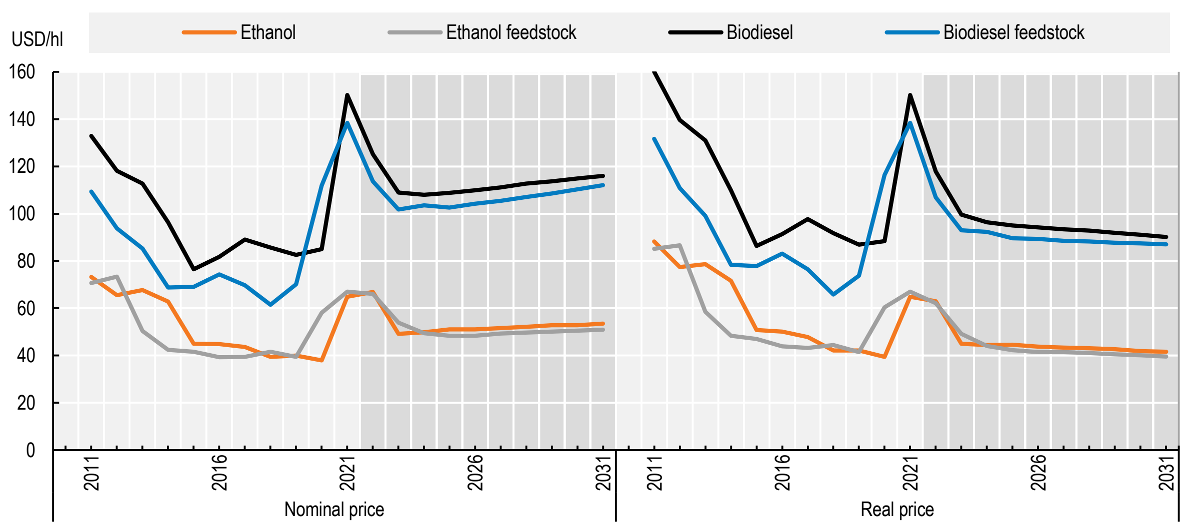
Global biodiesel trade is projected to decrease from 6.6 bln L to 5.8 bln L by 2031. Chinese and Indonesian biodiesel exports will decrease dramatically, reflecting weak production and high domestic demand, respectively. The European Union and the United States are assumed to remain the leading biodiesel exporter. Argentina exports are projected to decrease by 1.6% over the period due to weak production and trade barriers.

9.3.3. Prices

Prices in real terms are expected to decrease

Nominal biodiesel and ethanol prices reached historical high levels in 2021. Nominal and real ethanol and biodiesel prices will decrease in 2023, due to decreasing feedstock prices, but after 2024, nominal prices are projected to remain constant through to 2031. In real terms, a combination of policies, feedstock and crude oil prices, and distribution costs, will lead to a slow decrease in ethanol and biodiesel prices.

Figure 9.6. The evolution of biofuel prices and biofuel feedstock prices



Note: Ethanol: wholesale price, US, Omaha; Biodiesel: Producer price, Germany, net of biodiesel tariff and energy tax. Real prices are nominal world prices deflated by the US GDP deflator (2021=1). 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 (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

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9.4. Risks and uncertainties

Evolution of policies and relative prices are key

The major risks and uncertainties for the future development of the biofuels sector are largely related to the policy environment, feedstock and oil prices. Policy uncertainty concerns changes in mandate levels, enforcement mechanisms, investment in non-traditional biofuel feedstock, tax exemptions and subsidies for biofuels and fossil fuels, and policies promoting EV and SAF technology.

The policy environment will remain uncertain because it crucially depends on agricultural feedstock and oil prices developments. Fossil fuel prices affect biofuel competitiveness and are consequently linked to subsidies allocated to the biofuel sector. Russia's war against Ukraine causes to increase fossil fuel prices and can impact on biofuel market structure. Another uncertainty arises from feedstuff supply. Traditionally, countries sought to use commodities for biofuels for which they have a surplus so as not to reduce food availability and threaten food security. As biofuels compete with food use and may require extra, undesired land use, countries are cautious on expanding biofuel production at a faster pace. Nevertheless, blending mandates are expected to lead to more biofuel production in some emerging economies.

The global EV stock has been increasing since the mid-2000s. More than 20 countries have announced the complete phasing out of ICE vehicle sales and eight countries plus the European Union have announced net-zero emission vehicle pledges over the next 10-30 years.[6] Many countries and the European Union have introduced EV deployment targets, purchase incentives and other supporting programmes for increasing EV utilisation and promoting R&D for EV. SAF consumption and production could increase in the long term; however, its success relies on technological advancements, ambitious policies and securing sustainable feedstock (Box 9.2). Advances in technology and potential changes in the regulatory framework of the transport sector could result in substantial deviations from current market projections for biofuels. Countries are expected to adopt policies to advance the implementation of new technologies to cut greenhouse emissions, via blending mandates, subsidies, and tax reductions. All these measures transfer uncertainty in energy to agricultural markets. As a consequence, future biofuel demand is related to the response of the private sector to these measures. The industries currently investing in EV and SAF could, depending on the uptake of this technology and the policies supporting its adoption, add to either a decrease or increase in the use of biofuels over the next decade – and beyond.

Box 9.2. Sustainable Aviation fuel (SAF)

In 2019, the aviation sector emitted 915 million tonnes of carbon dioxide (CO_2), accounting for 2% of total emissions and 12% of all transport emissions.[1] As the aviation industry needs to reduce CO_2 emissions, it is committed to a 50% reduction of CO_2 by 2050 and targeting a sustainable aviation fuels (SAF) share of 2% by 2025. SAF is biofuel used for aviation fuels with lower carbon emissions than conventional fuels. Most of the SAF is produced from hydrotreatment of fats, oils and greases such as used cooking oils. These are known as hydrotreated esters and fatty acids (HEFA) and hydrated vegetable oils (HVO). Furthermore, it is produced from lignocellulose/biomass feedstocks (such as agricultural residuals and woody biomass).[2] SAF can reduce GHG emissions compared to conventional aviation fuel in life cycle base. The use of SAF is expected to reach the industry targets.

Global SAF production is estimated to increase from 7 million L in 2018 to 140 million L in 2019. Production has increased dramatically but it is less than 1% of fuels currently used for aviation.[3] While the technology of HEFA is at the commercial level, the industry has concerns for the higher cost of feedstock, and current and future restrictions on use of food-based feedstock.[4] Furthermore, the feedstocks used in HEFA can compete with those use on road vehicle and SAF. The main obstacle for introducing SAF is the high production cost. The current SAS amounts to 3-6 times the price for conventional jet fuel.[5] However, higher jet fuel prices from high crude oil prices can mitigate the cost differences between conventional aviation fuel and SAF. Furthermore, advanced R&D can be expected to reduce the production cost of SAS in the long-term. SAF is required to be safe, and credible, and the aviation industry's feedstocks need to be shown to be sustainable in a lifecycle assessment.

Some European countries have introduced SAF blending mandates. Norway and Sweden have introduced SAF blending mandates on fuel suppliers since 2020. Furthermore, France introduced SAF mandates for the aviation sector from 2022. The European Commission proposed minimum SAF blending volumes in aviation fuel, rising from 2% in 2025 to 5% in 2030 and 63% in 2050. The United States announced a new SAF goal to produce 3 billion gallons of SAF and reduce aviation emissions by 20% by 2030. IEA expects that SAF demand will range from 2 to 6 billion L by 2026, up from 0.1 billion L in 2021.[6] The low carbon fuel standard programme for jet fuels can encourage SAF markets. SAF consumption and production could increase in the long term; however, its success relies on technological advancements, appropriate policies, setting sustainable criteria and securing sustainable feedstock. Policies and financial support are required for R&D for SAF production, securing feedstocks, logistics, sustainability assessments, etc.

1. https://aviationbenefits.org/media/166152/beginnersguide-to-saf_web.pdf.
2. https://irena.org/publications/2021/Jul/Reaching-Zero-with-Renewables-Biojet-Fuels.
3. IRENA analysis based on Dickson, N. (2019), "Stocktaking results", ICAO Stocktaking Results (pp. 1–13), ICAO.
4. https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/659361/EPRS_BRI(2020)659361_EN.pdf.
5. https://irena.org/publications/2021/Jul/Reaching-Zero-with-Renewables-Biojet-Fuels.
6. https://www.iea.org/articles/are-conditions-right-for-biojet-to-take-flight-over-the next-five-years ?

Notes

[1] See https://www.usda.gov/oce/commodity-markets/baseline.

[2] See https://ec.europa.eu/jrc/en/jec/renewable-energy-recast-2030-red-ii.

[3] See http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2017/lei/L13576.htm.

[4] The assumptions related to the levy collection to sustain the CPO fund are based on information available in March 2022. Calculations for the subsidies are based on production costs in nominal terms accounting for domestic inflation and the nominal prices for vegetable oil and oil in the model.

[5] Eleven provinces accounted for 46.1% of China's total population in 2017.

[6] See http://www.iea.org/reports/global-ev-outlook-2021.

10 Cotton

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

10.1. Projection highlights

Buoyant market prospects but heightened competition

World consumption of raw cotton is set to increase for the second consecutive year in 2021/22 (August/July) after the COVID-19 related downturn in 2019/20. Production is anticipated to recover after a drop in 2020/21. In 2021, higher prices of grains and oilseeds coupled with the recovery in global consumption triggered a strong increase in cotton prices, which averaged 40% higher than in 2020.

The distribution of cotton use 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 build-up of cotton milling capacity in Asia, especially the People's Republic of China (hereafter "China"). Chinese cotton consumption peaked in 2007 but stabilised at a lower level after 2010, as stricter labour and environmental regulations and rising labour costs have stimulated a move of the industry to other Asian countries, notably Viet Nam and Bangladesh. These latter countries experienced strong growth of their textile industries in recent years and a further increase in their milling capacity is expected over the next decade. By contrast, Chinese cotton consumption has remained constant since 2016 and this year's *Outlook* assumes stability for the coming decade. In India, another major cotton consumer, the growing textile industry coupled with competitive labour cost, and government support to the sector are expected to result in continuous growth in cotton mill use.

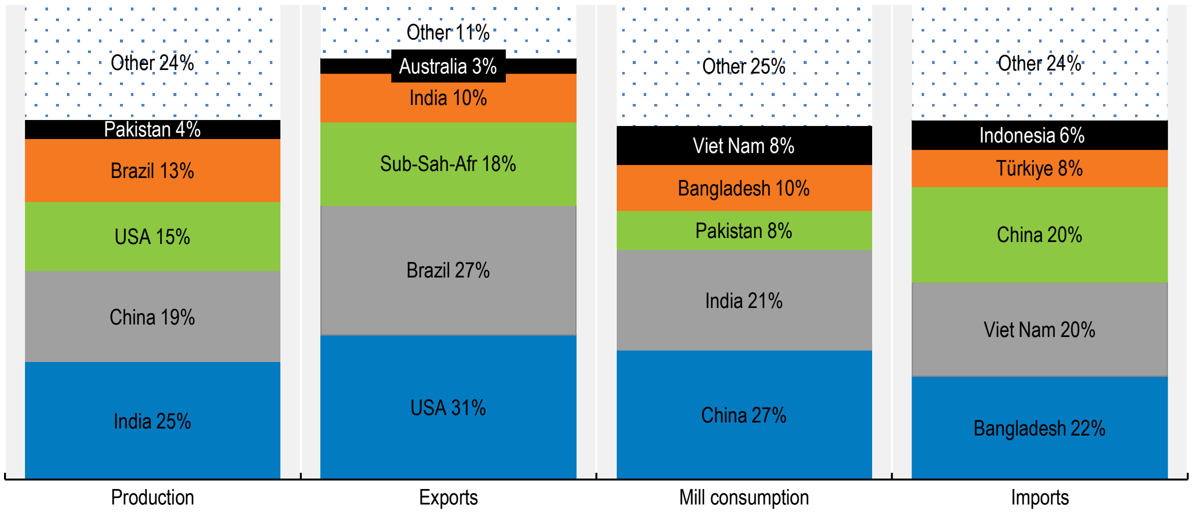
World cotton production is projected to grow 1.6% p.a. to reach 30.6 Mt in 2031. This growth will result from an expansion of the harvested area (0.3% p.a.), with increases in the United States and Brazil more than compensating declines in China and Pakistan. The growth in average global yields (1.3% p.a.) is also expected to contribute to the increase in world cotton production. Yields in major producing countries have been stagnating since 2004 because of pest problems and water scarcity. However, improvement in genetics and better agricultural practices are expected to improve yields in the next decade across most producing countries. India will continue to be the world's largest cotton producer, with the increase resulting from higher yields, while area expansion is expected to be limited in line with recent trends.

Cotton is mainly traded in bales of raw cotton fibres. The global trade in raw cotton is projected to surpass 12 Mt by 2031, 27% higher than during the base period. Global 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 where the projected increase in production is entirely destined for export. The structure of the global cotton market will not change significantly in the coming decade, with Sub-Saharan Africa as a region remaining the third largest exporter of raw cotton in 2031, after the United States (1) and Brazil (2) (Figure 10.1).

After the sharp increase in the past year, cotton prices are expected to remain elevated in 2022, supported by rising consumption and overall higher commodity prices. Over the projection period, however, prices are anticipated to adjust downwards to return to their long term decreasing trend in real term, due to productivity gains and continuing competition with synthetic fibres.

Several uncertainties could affect the outlook. The war, the emergence of new COVID-19 variants and subsequent potential supply chain disruptions could alter the projections of the first years. In addition, the extent to which interest rates will increase to contain inflation could alter the cost of borrowing and hence investment plans in the sector. In general, strong competition from synthetic fibres, notably polyester, is anticipated to continue to adversely affect cotton demand growth over the projection period. However, given the increased adoption of sustainability standards in supply chains, the growth in consumer preferences for more sustainable products is expected to partly offset the overall downward pressure on cotton demand growth. Like other crops, cotton production is sensitive to pests, weather conditions and climate change. Changing policy measures and trade tensions are also sources of uncertainty for cotton markets.

Figure 10.1. Global players in cotton markets in 2031



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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10.2. Current market trends

Increases in yields and areas are contributing to steady market growth

International prices of cotton generally increased in 2021, continuing the upward trend that began in May 2020. In early 2022, cotton prices averaged nearly 50% above their year-earlier levels. High prices are expected to prompt an increase in planted area in the current season and contribute to production gains in several countries, including Brazil and the United States. In India, the world's largest cotton producer, production is also forecast to increase, expected to stem from higher yields, which are projected to more than offset a decline in area. Overall, world cotton production in 2021/22 (August/July) is anticipated to recover from the sharply reduced level in 2020/21 on account of a larger harvested area and higher yields.

World consumption of raw cotton is set to increase for the second consecutive year in 2021/22 after the COVID-19 related downturn in 2019/20. The growth in consumption is forecast in most major consuming textile-producing countries, including in Bangladesh, Indonesia and Viet Nam. By contrast, in China, the world's largest consumer of cotton, a slight year-on-year decline is anticipated, mainly on account of higher cotton yarn imports.

World trade of raw cotton is expected to decrease from the 2020/21 record level but will still remain at one of its highest historical levels. Cotton exports from the main exporter, the United States, are expected to decline from the high volumes of the previous year mainly due to logistical constraints. Similarly, in Brazil, exports are anticipated to decrease from the record volumes in 2020/21. On the import side, in China imports in 2021/22 are foreseen to decline significantly from the multi-year highs of the previous year, reflecting lower consumption and ample availabilities from last year's imports. Purchases of cotton are expected to remain relatively stable in Bangladesh, while in Viet Nam imports should increase.

10.3. Market projections

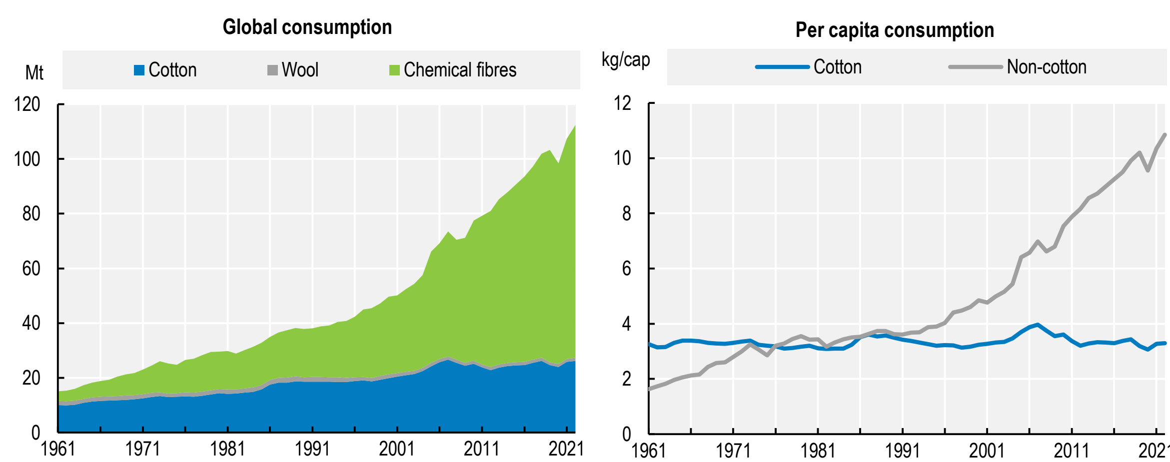
10.3.1. Consumption

Viet Nam and Bangladesh displacing China in leading growth in consumption

Cotton consumption refers to the use of cotton fibres by mills to produce yarn. Mill use of cotton depends on the global demand for textiles and on competition from substitutes such as polyester and other synthetic fibres. Over the past decades, global demand for textile fibres has grown strongly, driven by population and income growth, but most of this demand has been increasingly met by synthetic fibres (Figure 10.2). Per capita consumption of non-cotton fibres overtook that of cotton in the early 1990s and has continued to grow strongly ever since. By contrast, over time global per capita consumption of cotton fibres has increased marginally and has decreased in recent years. After the peak of nearly 27 Mt in 2007, global cotton consumption decreased to around 25 Mt in 2019-21, due to its deterioration in competitiveness relative to polyester.

The prospects for global cotton use depend on its evolution in developing and emerging economies. Demand from developing regions with lower absolute levels of consumption but higher income responsiveness is projected to exert upward pressure on global demand for cotton as the incomes and population of these countries are projected to increase. 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 1.6% p.a. over the next decade.

Figure 10.2. Historical trends in consumption of textile fibres



Source: ICAC World Textile Demand estimates, 2022

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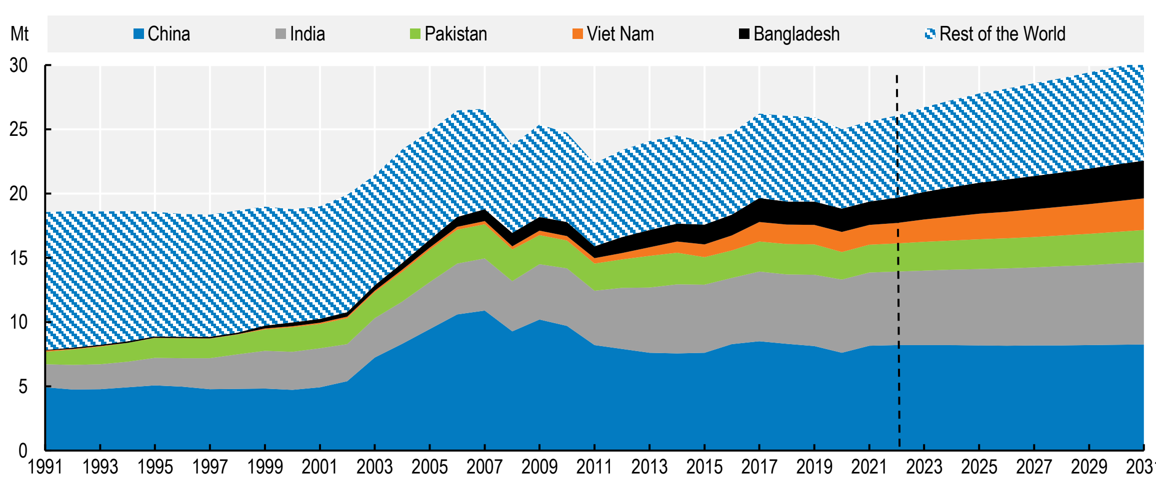
The distribution of demand for cotton fibres depends on the location of spinning mills, where cotton and synthetic fibres are spun into yarn. The greatest amount of yarn spinning occurs in countries where downstream industries are located, mostly in Asian countries with lower labour costs. China has 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.

China's cotton mill consumption has been decreasing since the support price system was abolished in 2014. The artificially higher prices had caused a shift in demand from cotton to synthetic fibres. The decline in cotton demand also reflects structural change as higher labour costs and more stringent labour and environmental regulations. This provoked a move to other Asian countries, notably Viet Nam and Bangladesh. In recent years, mill consumption has regained some lost ground in China, in part because domestic cotton prices have become more competitive when compared to polyester, which appears to have suffered a setback due to government measures to combat industrial pollution. Chinese spinning mill use should remain stable over the next decade if margins are remunerative at the mills.

In India, the growing textile industry coupled with competitive labour cost, and government support to the sector are expected to result in continuous growth in cotton mill use. Cotton plays an important role in the Indian economy as the country's textile industry is predominantly cotton based. The textile industry represents an important component of the country's industrial production and is one of the largest sources of employment. The industry, however, faces several challenges, including technological obsolescence, high input costs, and poor access to credit. Thus, the government has been implementing several measures to support industry development. In September 2021, it approved the Production Linked Incentive (PLI) scheme for textiles to boost the high value man-made fibres (MMF) fabric, garments, and technical textiles segments in the country.

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 of their textile industry based on an abundant labour force, low production costs, and government support measures. In addition, the escalation of the United States-China trade dispute has spurred additional mill use in Bangladesh and Viet Nam. In the case of Viet Nam, this was partly driven by its accession to the World Trade Organization in 2007 and by foreign direct investment (FDI) by Chinese entrepreneurs.

Figure 10.3. Cotton mill consumption by region



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

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The rapid growth in these countries is expected to continue over the outlook period, with Bangladesh and Viet Nam expanding their mill use by 60% and Indonesia by 33% relative to the base period. In Viet Nam, the ratification of the Free Trade Agreement (FTA) with the European Union in mid-2020 is expected to contribute to the growth in cotton mill use. In Bangladesh, growing demand for yarns is spurring investments in new spinning facilities or in expanding production capacity of existing mills. Further growth is also expected in Türkiye and Central Asia, where the textile industry is expanding thanks to new investments in yarn production facilities and to growing exports to the European Union and the Russian Federation. In Pakistan, government's efforts to attract foreign investments and improve its production capacity are expected to spur growth in the textile sector over the outlook period, with cotton consumption foreseen to grow by 14% relative to the base period.

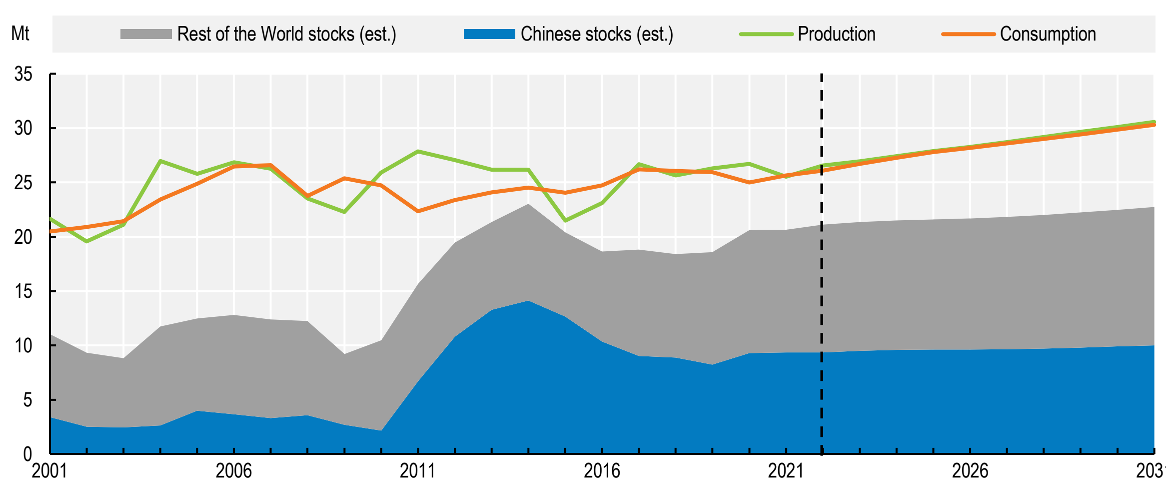
10.3.2. Production

Global production growth from improved yields in Asia, and more focus on sustainability

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, the United States, Brazil, and Pakistan. Together, these countries account for more than three-quarters of global production (Figure 10.1).

Global cotton production is expected to grow steadily to 30.6 Mt by 2031, 17% higher than in the base period (Figure 10.4). Most of this production growth in the coming decade is expected to come from the main producing countries, with India accounting for about 25% of the global increase. At the global level, gains in cotton production are projected to stem mainly from higher yields, which are expected to increase by 14% compared to the base period, reflecting improved genetics and better agricultural practices. In the last decade, global yields have been stagnant, reflecting static or decreasing yields for 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). Over the projection period, cotton area is projected to expand by 3% compared to the base period.

Figure 10.4. World cotton production, consumption, and stocks



Note: est. stands for estimate.
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

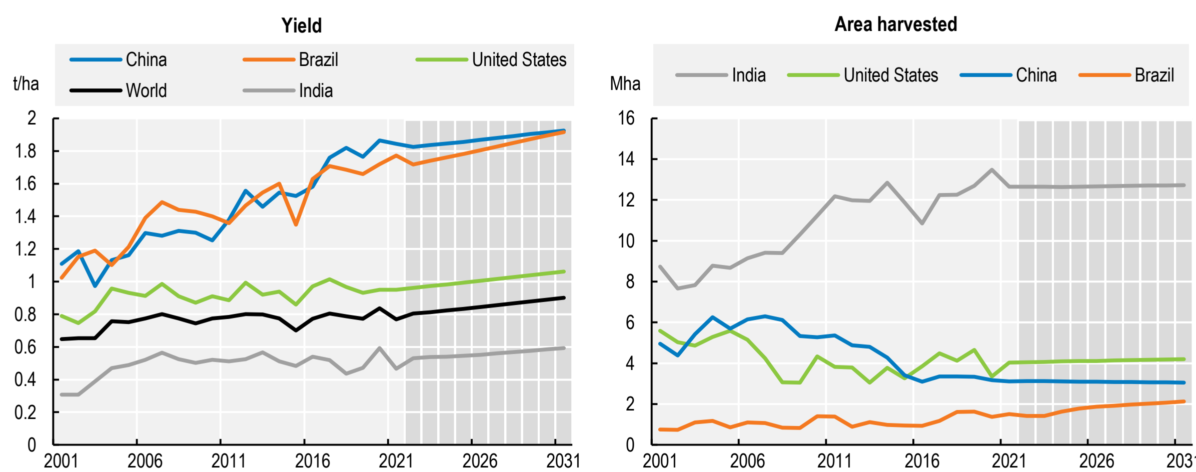
StatLink https://stat.link/od0znk

Production in India is projected to grow by around 1.3% p.a. over the outlook period, mainly on account of higher yields rather than area expansion, since cotton already competes for acreage with other crops. Raw cotton productivity has remained stagnant in recent years and is among the lowest globally, as producers struggle with adverse weather, pests and diseases. In addition, most cotton is grown on small farms, which limit the adoption of intensive farming technologies. However, growing demand from the domestic apparel industry continues to spur investments in the sector and this *Outlook* assumes a growth in yields that reflects increased use of smart mechanisation, varietal development, and pest management practices. Nonetheless, climate change, with most cotton grown under rain-fed conditions, may undermine the yield growth potential.

Chinese cotton producers currently achieve yields that are more than double the world average. Since further improvement may become more difficult, its yield growth is projected to slow down to 0.6% p.a. Although in general the cotton area in China has been declining over the past two decades, mostly due to changing government policies, this trend seems to have slowed down since 2016. The cotton area in China is expected to decrease by 0.3% p.a.

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 contributed to rising cotton yields and areas over recent years. These factors should support further strong production growth of 6% p.a.

Figure 10.5. Cotton yields and area harvested in major producing countries



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

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Sustainability considerations will continue to influence future demand and supply of cotton. As shown in Table 10.1, the share of cotton lint produced under special sustainability or organic standards has increased steadily since 2010. In 2018, it reached a share of 25%. Among the existing standards, the Better Cotton Initiative dominates globally, accounting for more than 45% of sustainable cotton supply in 2018, followed by the Responsible Brazilian Cotton initiative with 35%. Brazil, where about 80% of cotton production is certified under these two initiatives, plays a leading role in global sustainable cotton production. Sustainable and organic segment will likely continue to grow in the future with the implication that this will lead to an increased need for transparency and traceability along the supply chain.[1]

Table 10.1. Sustainable and organic cotton production

	Total production (1000t)	Sustainable and organic cotton production (1000t)	% share / total world production
2010	25 869	185	1%
2011	27 856	578	2%
2012	27 079	1 289	5%
2013	26 225	1 490	6%
2014	26 233	2 465	9%
2015	21 640	3 211	15%
2016	23 196	3 609	16%
2017	26 798	5 375	20%
2018	25 972	6 400	25%

Note: 2019 estimated from International Cotton Advisory Committee (ICAC).
Source: International Cotton Advisory Committee (ICAC), www.icac.org.

10.3.3. Trade

World cotton trade to expand mainly due to strong demand from Asian countries

World cotton trade is projected to expand steadily over the next decade and reach 12.4 Mt in 2031, 27% higher than in the base period. The increase mainly reflects the significant growth in mill use in Asian countries, particularly Viet Nam and Bangladesh, which source virtually all their cotton from imports. By 2031, imports in China are projected to increase by 8%, and in Bangladesh and Viet Nam by 60%, in line with mill consumption growth. These three countries will account for more than half of global cotton imports (Figure 10.1), with Bangladesh as the world leading raw cotton importer.

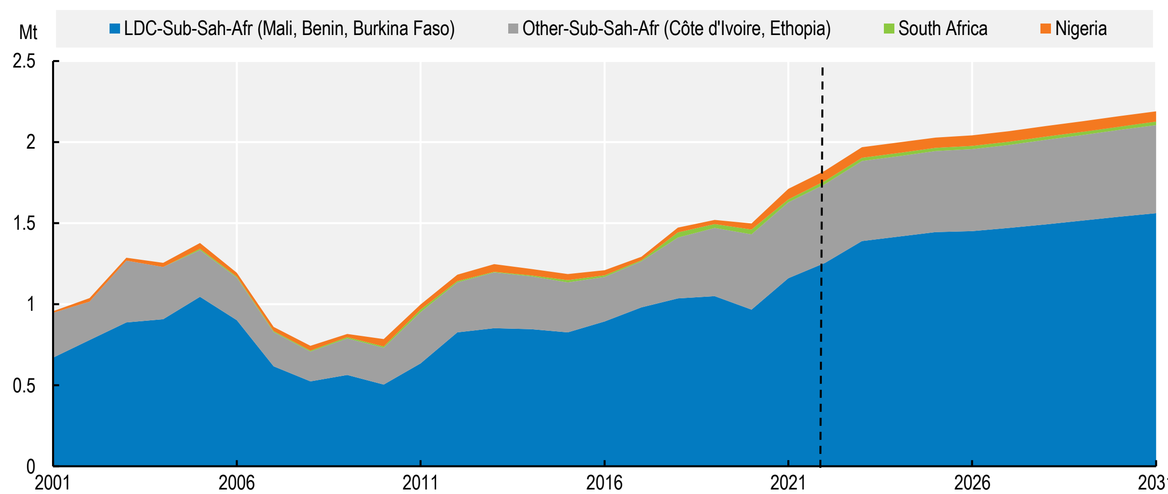
The United States will remain the world's largest exporter throughout the outlook period. Its exports have stabilised in recent years, recovering from the lows in 2016, and its share of world trade is projected at 31% in 2031, compared to a 34% in the base period. Recent trade tensions between the United States and China have placed some pressure on cotton shipments between the countries. Under the assumption of better trade relations in the future, the United States should regain its share in Chinese cotton imports.

Brazilian exports are expected to grow strongly over the next decade, consolidating its position as the second largest exporter by 2031. India will follow in third place with shipments projected at 1.3 Mt by 2031, 25% higher than in the base period.

Cotton is an important export crop for Sub-Saharan Africa, which currently accounts for 16% of global exports. Overall, cotton production in the region has increased in the past several years, because of both increased area and improved yields. In the current season, higher prices have led to a significant increase in area, which fully recovered from the drop in 2020. However, spinning mill consumption remains limited throughout Sub-Saharan Africa, as many countries export most of their produce.

Sub-Saharan African exports are projected to continue growing at around 1.7% p.a. in the coming decade, with the region's market share increasing by more than 1 percentage point to nearly 18% compared to the base period, with South and Southeast Asia the major export destinations. However, the textile and apparel industry is growing in some other countries, especially Ethiopia, where efforts are being made to enhance the processing capacities across the region. The expansion has been driven by favourable economic conditions, resulting in significant FDI in the sector. In the long run, this could imply an increase in mill use and affect the net export status of Sub-Saharan Africa.

Figure 10.6. Cotton exports in Sub-Saharan Africa



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

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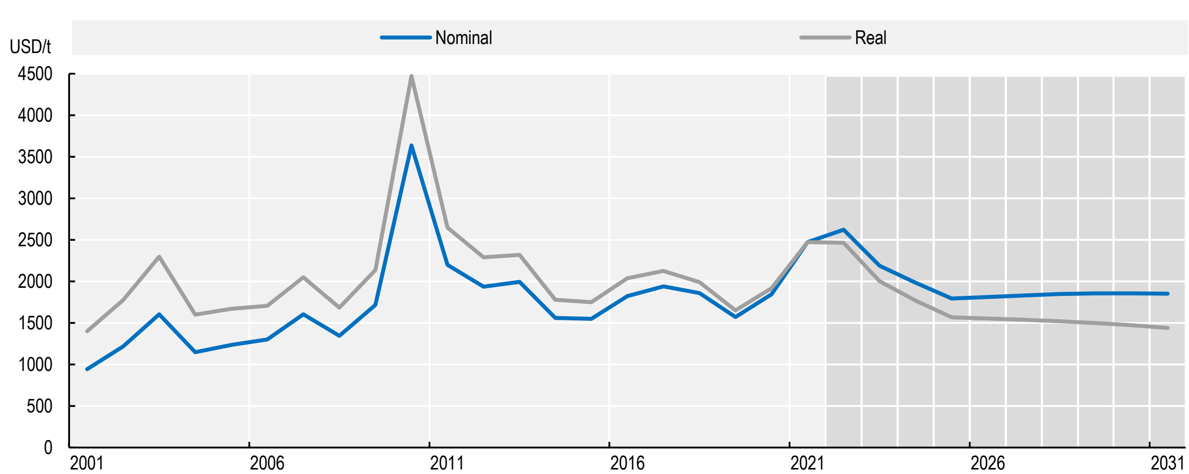
10.3.4. Prices

International cotton prices will adjust to competition from synthetic fibres

International cotton prices are expected to remain elevated in 2022 supported by rising consumption and overall higher commodity prices but then to decrease in real terms throughout the outlook period. Global cotton demand remains under pressure from synthetic fibres, notably polyester.

Figure 10.7. World cotton prices



Note: Real prices are nominal world prices deflated by the US GDP deflator (2021=1). The reference cotton price is the Cotlook price A index, Middling 1 1/8", CFR far Eastern ports. Data shown represent the marketing year average (August/July).
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en

StatLink https://stat.link/wgud81

From the early 1970s, when polyester became price-competitive, cotton prices tended to follow polyester prices. 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, in nominal terms. Over the past year, cotton prices have increased at a faster pace than those of polyester, resulting in a wider price differential. However, it is assumed that the relative competitiveness between these two types of fibre will not change drastically over the projection period.

10.4. Risks and uncertainties

Policies and practices concerning genetics could play a key role

Economic growth and urbanisation will continue to be the main factors affecting 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 cotton consumption, production, and trade projections.

In the short term, projections will likely be affected by rising energy prices coupled with the impact of Russia's war against Ukraine, which may slow the global economic growth. In addition, the emergence of new COVID-19 variants and subsequent movement restrictions may further hamper overall economic recovery. Moreover, rising energy prices and supply chain disruptions have resulted in higher inflation. The extent to which interest rates will be raised to contain inflation could also alter the cost of borrowing and hence investment plans in the sector.

Other demand trends could affect the projections. For example, recycling by the textile industry is creating a competitive secondary market that provides raw material to producers of lower-quality textiles and non-textile products. This trend could further reduce the demand for cotton and other fibres. On the other hand, greater adoption of sustainability standards in supply chains could provide additional stimulus to the demand for cotton.

Like other crops, cotton production is sensitive to pests and weather conditions. These projections are therefore sensitive to climate change, which could lead to increasing frequency of droughts and other adverse weather conditions. As noted above, yield growth has been slow in several countries over the past decade. Faster than expected improvements in genetics and gene editing (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 the projections 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 has evolved resistance 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 also play an important role in global cotton markets, notably stockholding measures. Other policy initiatives, such as support for domestic textile industries, input subsidies, may affect projections. Trade policies and tensions may also play a role in affecting the development of the raw cotton markets. In recent years, the cotton market has been impacted by the US-China trade dispute. In early 2021, the United States banned all products made in part or entirely from cotton produced in the Xinjiang region. Issues associated with social, economic, and environmental sustainability are becoming increasingly important for consumers, industry, and policy makers in many countries.

Policy measures that affect consumption include, for example, several East African countries that are increasingly discouraging second-hand clothing imports. This could bolster cotton consumption and encourage more added value in Africa. In West Africa, efforts from the government and the private sector are being made to increase cotton processing capacities across countries

Note

[1] FAO (2021), Recent trends and prospects in the world cotton market and policy developments. Rome. https://doi.org/10.4060/cb3269en.

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 (2022-31) projections for production, consumption and trade for these products and describes the main drivers of these projections.

11.1. Roots and tubers

11.1.1. Market overview

Roots and tubers are plants that yield starch derived from either 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, can also be used for animal feed or industrial processing, notably in the manufacturing of starch, alcohol, and fermented beverages. Unless they are processed, they are highly perishable once harvested, which limits the opportunities for trade and storage.

Within the roots and tubers family, potato dominates in worldwide production, with cassava a distant second. With respect to global dietary importance, potato ranks fourth after maize, wheat and rice. This crop provides more calories, grows more quickly, uses less land, and can be cultivated in a broad range of climates than cereals. However, potato production, which forms the bulk of the root and tuber sectors in developed countries, has been declining over several decades, with growth in production falling well below that of population.

Output of cassava is 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 over two decades. Once considered a subsistence crop, it is now seen as a commodity and key for value-addition, rural development and poverty alleviation, food security, energy security; and for bringing important macroeconomic benefits. These factors are driving rapid commercialisation of this crop and large-scale investments in upscaling the processing of cassava, both which have contributed significantly to its global expansion.

11.1.2. Current market situation

The largest producing regions of roots and tubers in the base period are Asia (103 Mt) and Africa (98 Mt). In Sub Saharan Africa, roots play a significant role as a staple crop. Globally, about 131 Mt are used as food, 56 Mt as feed, and 56 Mt for other uses, mostly biofuel and starch. As the perishable nature of these 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.

Global production of roots and tubers reached 247 Mt (dry matter) in the base period (2019-21); about 5 Mt has been added annually in the past years and consumed mainly as food. The prices of roots and tubers (measured by the Cassava (flour) wholesale price in Bangkok) increased in 2021 as demand was strong. Global quantities traded increased by 0.3 Mt.

11.1.3. Main drivers for projections

Producing cassava requires few inputs and affords farmers greater flexibility in terms of timing the harvest as the crop can be left on 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 to 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 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 reduce the volume of wheat imports, thereby 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 in the global arena, e.g. with maize-based starch and cereals for animal feeding applications.

Potatoes are generally confined to food use and are a substantial component of diets in developed regions, particularly in 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. Developing regions, however, provide some growth momentum to potato production at the world level.

Global sweet potato cultivation has declined in recent years, mostly due to a sharp decline in acreage (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.

11.1.4. Projection highlights

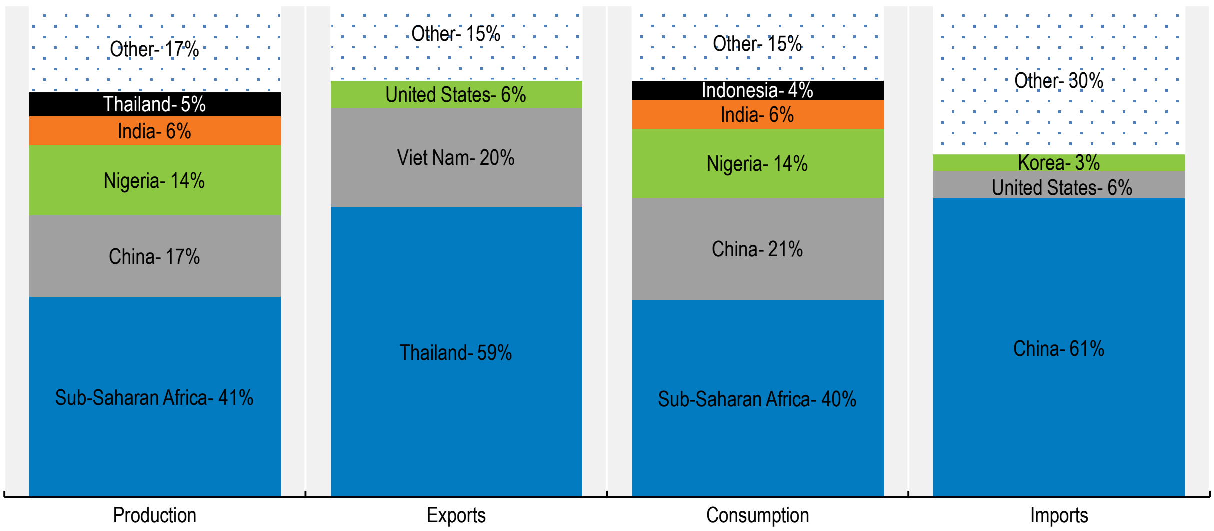
World production and utilisation of roots and tubers is projected to increase by about 17% over the next decade. Production growth in low-income regions could reach 2.2% p.a. while supply in high-income countries should grow at only 0.3% annually. Global land use is projected to increase by 5 Mha to 66 Mha, but there will be some regional shifts. African countries are expected to increase their cultivation area, while reductions are projected for Europe and America. Production growth is mainly attributed to investments in yield improvements in Africa and Asia, as well as an intensification of land use in these regions.

By 2031, an additional 1.7 kg/capita per year of root crops will enter diets at the global level, driven mostly by consumers in Africa where per capita intake of roots and tubers could surpass 42 kg per year. Biofuel use, albeit from a low basis (3% of use), is expected to grow by nearly 50% over the next ten years driven by the Chinese biofuel industry. Feed and other industrial use will remain significant, albeit with slower growth of about 10% and 13%, respectively, over the outlook period.

International trade in roots and tubers comprises about 6% of the global market production. 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 total of 14 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, prices of roots and tubers are projected to follow a similar path to cereal prices in the medium term; namely, an increase in nominal prices but a decline in real terms.

Figure 11.1. Global players in roots and tubers markets in 2031



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2022), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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11.2. Pulses

11.2.1. 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 help to improve digestion, reduce blood glucose, minimise inflammation, lower blood cholesterol, and prevent chronic health issues such as diabetes, heart disease, 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, also due to their function as nitrogen-fixing crop. Prior to 2000, global production of pulses stagnated due to the widespread disappearance of small farms in developing countries which led to a decline of traditional farming systems that included pulses in their crop rotation. Production was further hampered because of their weak resilience to diseases due to a lack of genetic diversity, limited access to high-yield varieties, and the lack of policy support to pulses growers. The sector began to recover in the early 2000s and has since seen an annual increase of about 3% globally, led by Asia and Africa. These two regions combined accounted for about 73% of the 25 Mt production increase in the past decade.

Global per capita consumption of pulses started to decline in the 1960s (Figure 11.2) due to slow growth in yields and resulting increases in price. 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 has increased to about 8 kg/year to date. This growth has been driven mainly by income gains in countries were pulses are an important source of protein; this particularly true of India where 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 have diverse applications in industries related to meat and snack food, bakery and beverages, and batter and breading.

11.2.2. Current market conditions

India is by far the largest producer of pulses, accounting for about 25% of global production in the past decade. Canada (8%), China (6%) and the European Union (4%) are the next largest producing countries. The Asian market accounts for 54% of all consumption, but only about 46% of production, making it the most significant import destination. About 18% of global production is traded internationally with Canada (31% of global trade) by far the largest exporter and India the largest importer (15% of global trade). Africa has further expanded its production and consumption in the past decade and has remained largely self-sufficient.

In 2021, the global pulses market reached a volume of 100 Mt, after an average annual growth of 3.8% p.a. during the previous decade; this growth was led by Asia and Africa. World trade volumes were registered at 19 Mt, 0.4 Mt higher than in 2020. Due to a tight supply situation, international prices for pulses, approximated by the Canadian field pea price, have jumped to USD 479/Mt, its highest value ever recorded as Canada was suffering from a very bad harvest.

11.2.3. Main drivers for projections

As pulses are associated with various health benefits, health-conscious consumers are increasingly integrating these in their daily diets, which in turn is propelling the growth of the global pulses market. Rapid urbanisation, changing lifestyles, and hectic work schedules are also making snack foods popular amongst the working population, and pulses are increasingly used in the processing of ready-to-eat (RTE) food products.

Health and environmental benefits are reasons why governments of pulses-producing countries are providing assistance to farmers, and thus supporting growth of this market. Support to the production of pulses production plays an important role in the Protein Strategy of the European Union and are a major ingredient in products such as meat substitutes. Depending on the future dynamics of demand for such products, this could significantly change the future importance of pulses in the agricultural production mix.

11.2.4. Projection highlights

Pulses are expected to regain importance in the diets in many regions of the world. This *Outlook* foresees the global trend in this area to continue and projects global average annual per capita food use to increase to 9 kg by 2031. Per capita consumption is projected to increase in nearly all regions over the coming decade, with the largest increase expected in Europe (+3% p.a.) (Figure 11.2)

Global supply is projected to increase by 23 Mt. Almost half of this increase is expected to come from Asia, particularly India, the world's largest producer. Sustained yield improvements are projected to raise India's domestic production by an additional 7.3 Mt by 2031. India has introduced high-yielding hybrid seeds, supported mechanisation, and implemented a minimum support price aimed at stabilising farmer's 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.

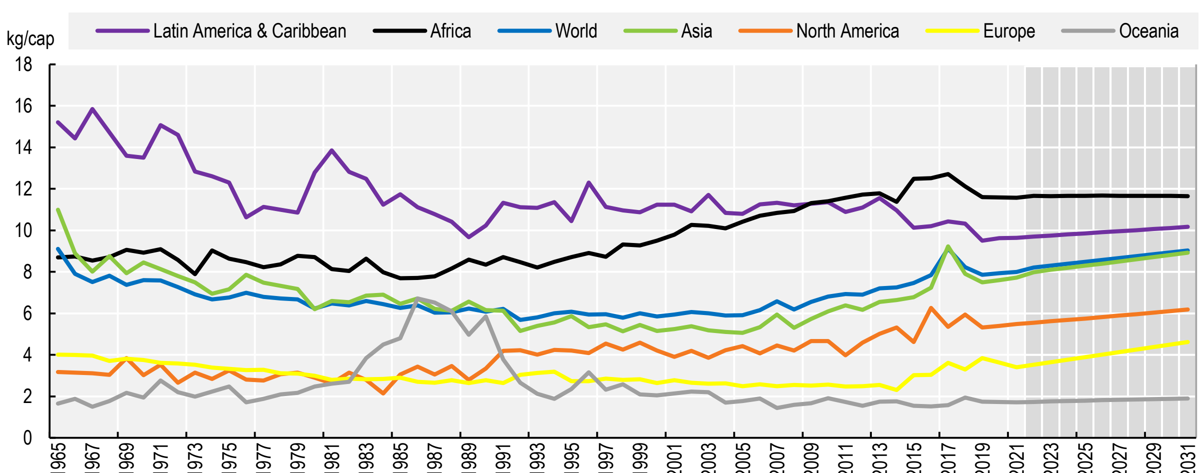
This expected production expansion is driven by the assumption of continued intensification of the pulses production systems due to improved yields and intensified land use. About 65% of production growth can be attributed to yield improvements during the projection period, and the remaining 35% to land use intensification, mainly in Asia, Africa and North America. Particularly in Africa, a combination of area expansion and yield growth is estimated to add about 0.6 Mt annually to the regional production.

This *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 continue to lag 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.

World trade of pulses grew from 13 Mt to 18 Mt over the past decade and is projected to reach 20 Mt by 2031. Canada remains the main exporter of pulses, with volumes expected to grow from 5.6 Mt at present to 6.7 Mt by 2031, followed by Australia with 2.1 Mt of exports by 2031.

International prices in nominal terms are expected to decrease until 2026 then increase over the coming decade, while real prices will decline.

Figure 11.2. Per capita food consumption of Pulses per continent



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

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11.3. Bananas and major tropical fruits

11.3.1. Introduction

Bananas and the four major fresh tropical fruits – mango, pineapple, avocado and papaya – play a vital role in securing the nutrition and livelihoods of smallholder producers in tropical countries. In recent decades, income growth and changing consumer preferences in both emerging and high-income markets, alongside improvements in transportation and supply chain management, have facilitated fast growth in international trade in these commodities.

Based on preliminary 2021 figures, the global banana and major tropical fruit export industries, respectively, generate around USD 11 billion and USD 12 billion per year. Although only approximately 15% of global banana production and 5% of global major tropical fruit production are traded in international markets, in exporting countries - which are mostly low-income economies - revenue from production and trade of these fruits can weigh significantly in agricultural GDP. For instance, in 2018 bananas represented about 42% of agricultural export revenue in Ecuador, and 17% in Guatemala.

11.3.2. Market situation

Bananas

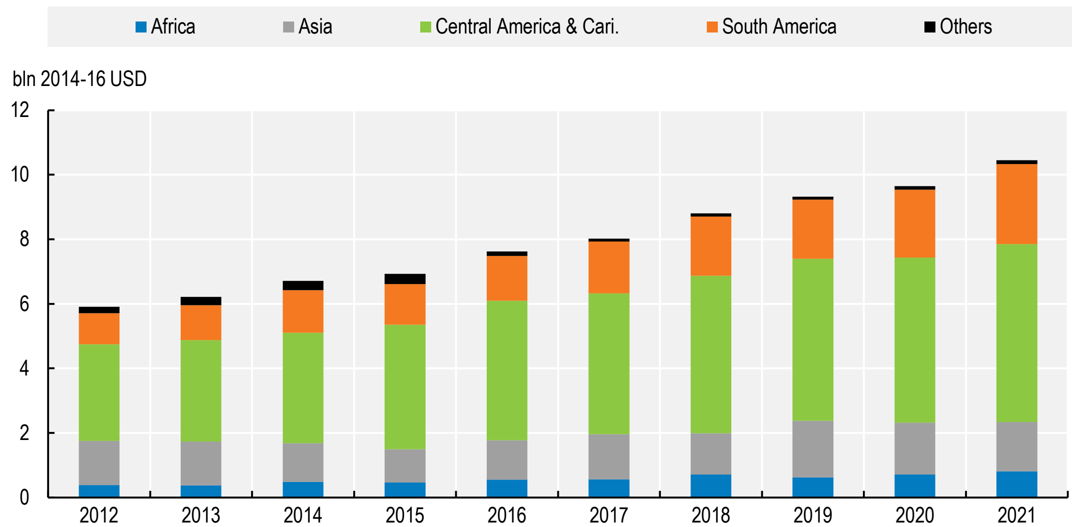
Global trade in bananas fell by an estimated 1.5 Mt in 2021, which would be among the largest annual drops in global banana shipments. Since the onset of the COVID-19 pandemic the impact of the disease, as well as the containment measures, have discernibly affected production, transportation, distribution, marketing and consumption of fresh bananas. In 2021, additional constraints included substantially higher fertiliser and packaging material costs, shortages in refrigerated containers, and significant rises in global transportation costs. Beyond the impact of COVID-19, production shortages caused by adverse weather conditions and concerns surrounding the spread of plant diseases caused further challenges to the industry.

Further key developments of concern in 2021 were the introduction of new maximum pesticide residue levels in importing markets, which led to higher export reject rates as produce not meeting these new requirements could not be imported, and the alarming discovery of the Banana Fusarium Wilt Tropical Race 4 (TR4) disease in Peru in April 2021. The plethora of simultaneous difficulties experienced by the sector in 2021 significantly impeded producers’ ability to remain operational and especially affected smallholder farmers. Like the situation observed in 2020, these pressures continued to hamper exports, in particular from Asia. Moreover, in 2021 shipments from Latin America were also affected.

Major tropical fruits

Provisional data indicate that, despite significant COVID-19 related bottlenecks in global supply chains and rising costs for inputs and transport, the volume of world trade in major tropical fruits in 2021 rose to a record of USD 10.5 billion in constant 2014 2016 dollars, marking an expansion of approximately 8% from 2020 (Figure 11.3Figure 11.1). Developments by commodity saw global exports of mango, guava and mangosteen rise to an estimated 2.3 Mt in 2021 (+3%); pineapple exports to 3.3 Mt (+7%); avocado exports to 2.5 Mt (+11%); and papaya exports to around 0.38 Mt (+8%). This overall positive performance was underpinned by abundant supplies from the major production zones, which had invested in strong production expansion in 2021 in response to burgeoning global demand and lucrative export opportunities in previous years. On the import side, the reopening of the hospitality sector supported demand growth, particularly for avocados and pineapples in both the United States and the European Union, the two main import markets. Consumers displayed a higher propensity to spend on nutrient-rich foods, encouraged by advertising campaigns in retail markets highlighting the purported health benefits of tropical fruits. This particularly underpinned rising demand for avocados, whose global exports continued to expand to their historical peak in 2021 despite rising costs of production, transportation and marketing along the value chain. Indicative average wholesale prices in the United States tended to increase for most major tropical fruits, with the exception of pineapples, whose average wholesale prices remained low due to strong pressure along the value chain.

Figure 11.3. Major Tropical Fruits: Global aggregate export volumes, 2012-21



Note: Data in this chart refer to global aggregate export volumes of the four major tropical fruits, namely the commodity cluster mango, mangosteen and guava, pineapples, avocados and papayas, aggregated in constant dollar terms (2014-16) as per customary FAOSTAT methodology.
Source: FAO data.

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11.3.3. Outlook and uncertainties

The difficult production and trade environment for bananas and tropical fruits has been further complicated by Russia's war against Ukraine, causing higher global energy and fertiliser prices. Expenditures on fertilisers and pesticides factor heavily in the production of bananas and some tropical fruits, because of their heavy use. Prior to the current crisis, expenditures on agrochemicals, other inputs and transport accounted for about 47% of production costs, more than the costs for direct and indirect labour. The input prices hikes will eventually translate into higher product prices for consumers. Data on price developments over the first four months of 2022 already point in this direction for all four of the major tropical fruits and bananas.

The war has also resulted in the discontinuation of important trade relations as a result of economic sanctions imposed on the Russian Federation (hereafter "Russia") and has caused severe disruptions to transport routes to Ukraine. The repercussions of these developments for global banana and tropical fruit markets have been immediate and drastic. Russia ranks as the fourth largest importer of bananas globally, procuring some 1.4 to 1.5 Mt from world markets annually. The country further imports some 0.16 Mt of tropical fruits annually, predominantly pineapples, avocados and mangoes, with supplies principally originating in Costa Rica and Peru. These quantities translate into some 6 to 7% of global banana shipments and some 2% of global tropical fruit shipments that are now facing considerable obstacles to reach their destination markets. This situation has had particularly dire consequences for Ecuador, from where some 98% of Russian banana imports originate. Prior to the war, Ecuador supplied some 20 to 25% of its yearly banana exports to Russia, and some 3% to Ukraine. In turn, Ecuador imported approximately one third of the fertiliser used in its agricultural production from Russia. This sudden loss of export markets has resulted in large quantities of bananas going to waste, prices plummeting from USD 6.25 to around USD 1.20 per box, and a dramatic number of bankruptcies among producers.

Beyond the impact of COVID-19 and the war, there are several significant threats to global production, trade and consumption of bananas and major tropical fruits. In the face of rising temperatures, more rapid and more severe spreads of plant pests and diseases are being observed. The effects of global warming are also resulting in a higher occurrence of droughts, floods, hurricanes and other natural disasters, which render the production of bananas and major tropical fruits increasingly difficult and costly. Given the perishable nature of tropical fruits in production, trade and distribution, environmental challenges and insufficient infrastructure continue to jeopardise production and supply to international markets. This is a particularly acute difficulty 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.

Note

[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)

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.
Bt cotton	A transgenic cotton variety that contains one or more foreign genes derived from the bacterium Bacillus thuringiensis. Bt cotton is resistant against some insect pests, but the fiber of BT cotton plants is shorter than that of traditional varieties.
Caloric sweeteners	Defined as sucrose and high fructose syrup.
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 for country grouping in the *Agricultural Outlook*.
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 feedstocks 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 Sweetener (HFS)	Starch-based sweetener extracted mainly from maize (high fructose corn syrup or HFCS).
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 market 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; 1 October in Australia • Cotton: 1 August • Maize: 1 September; 1 March in Australia • Other coarse grains : 1 September; 1 November in Australia • Sugar, soybeans, other oilseeds, protein meal, vegetable oils: 1 October; 1 November in Australia. Whenever the text refers to, for example, the marketing year 2021, this is short for 2021/22 for the above commodities. For all other commodities, the marketing year is equal to the calendar year except for meat and dairy products in New Zealand and beef and dairy products in Australia: year ending June 30.
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. This agreement entered into force on 1 July 2020.
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.
Sugar	Sucrose produced from sugar beet and sugarcane
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 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 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. 110 (December 2021). For other economies, historical macroeconomic data were obtained from the IMF, *World*

Economic Outlook (April 2022). Assumptions for 2022 to 2031 are based on the projections of the IMF *World Economic Outlook*, April 2022.

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 2020 is taken from the short-term update of the *OECD Economic Outlook* No. 110 (December 2021). For 2021, the annual average daily spot price is used and 2022 is based on estimates of the current situation, while the reference oil price used in the projections is assumed to follow the growth rate of the World Bank average oil price.

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 those variables 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.

The approach applied to determine the stochastic draws of these variables is based on a simple process which 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.[2] 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 2022-2031 projection period, one year of the historical period 1995-2021 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 Agink-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 98% successful simulations. The model does usually not solve all stochastic simulations as the complex system of equations and policies 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] 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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
WHEAT												
World												
Production	Mt	769.7	785.3	788.0	792.9	798.0	805.1	812.7	819.9	826.6	833.3	840.1
Area	Mha	219.8	224.6	223.8	223.7	223.6	224.0	224.5	225.0	225.3	225.6	225.9
Yield	t/ha	3.50	3.50	3.52	3.54	3.57	3.59	3.62	3.64	3.67	3.69	3.72
Consumption	Mt	756.6	785.8	784.5	790.0	796.3	803.3	810.6	818.0	824.9	832.0	838.7
Feed use	Mt	148.7	157.5	159.0	160.4	161.0	162.0	163.5	165.0	166.4	167.6	168.5
Food use	Mt	524.8	537.3	542.7	547.8	552.7	557.6	562.6	567.4	572.2	576.8	581.4
Biofuel use	Mt	8.7	9.3	9.4	9.5	9.8	10.2	10.5	10.8	11.2	11.6	12.0
Other use	Mt	74.4	81.7	73.5	72.3	72.7	73.5	74.0	74.8	75.2	75.9	76.7
Exports	Mt	189.8	187.2	193.4	197.9	201.2	204.4	207.2	210.0	212.7	215.2	217.9
Closing stocks	Mt	288.2	297.5	301.0	303.9	305.6	307.4	309.5	311.4	313.1	314.5	315.9
Price[1]	USD/t	287.1	345.7	284.1	260.4	256.7	256.0	260.0	262.7	265.2	268.2	271.0
Developed countries												
Production	Mt	396.5	398.6	399.0	401.2	403.8	407.6	411.7	415.2	418.5	421.9	425.2
Consumption	Mt	261.4	275.4	265.7	263.9	263.8	264.4	265.6	266.3	267.1	268.3	269.1
Net trade	Mt	133.9	126.2	131.9	136.5	139.8	142.9	145.5	148.2	150.8	153.2	155.7
Closing stocks	Mt	73.5	76.9	78.3	79.1	79.4	79.6	80.1	80.8	81.4	81.7	82.1
Developing countries												
Production	Mt	373.2	386.7	389.0	391.7	394.2	397.5	401.0	404.7	408.1	411.5	414.8
Consumption	Mt	495.3	510.4	518.8	526.1	532.5	538.8	545.0	551.7	557.8	563.7	569.6
Net trade	Mt	-129.5	-126.2	-131.9	-136.5	-139.8	-142.9	-145.5	-148.2	-150.8	-153.2	-155.7
Closing stocks	Mt	214.7	220.5	222.7	224.8	226.2	227.8	229.4	230.6	231.7	232.7	233.7
OECD[2]												
Production	Mt	280.6	286.6	286.1	286.1	286.0	286.7	288.2	289.1	290.0	290.9	292.0
Consumption	Mt	216.5	220.9	220.9	221.2	221.0	220.5	221.1	221.2	221.6	222.1	222.5
Net trade	Mt	67.3	63.3	64.7	64.3	64.7	65.7	66.6	67.5	68.1	68.6	69.2
Closing stocks	Mt	57.8	56.7	57.1	57.8	58.1	58.6	59.1	59.5	59.9	60.1	60.5
MAIZE												
World												
Production	Mt	1 173.3	1 206.6	1 221.8	1 235.2	1 248.2	1 262.4	1 276.6	1 292.0	1 306.2	1 320.9	1 335.0
Area	Mha	200.4	203.5	205.0	205.8	206.4	206.9	207.6	208.5	209.2	209.9	210.6
Yield	t/ha	5.85	5.93	5.96	6.00	6.05	6.10	6.15	6.20	6.24	6.29	6.34
Consumption	Mt	1 181.7	1 217.3	1 230.0	1 242.9	1 252.4	1 266.1	1 279.2	1 292.9	1 306.9	1 321.5	1 336.1
Feed use	Mt	690.2	714.9	728.5	737.5	746.5	756.0	765.7	775.8	785.9	796.2	806.3
Food use	Mt	146.3	151.3	154.1	156.6	159.1	161.5	163.9	166.4	168.8	171.3	173.7
Biofuel use	Mt	182.8	189.7	187.9	187.6	187.8	187.9	188.1	188.3	188.4	188.6	188.8
Other use	Mt	118.9	116.2	114.1	115.4	113.1	114.5	115.3	116.1	117.1	118.6	120.2
Exports	Mt	174.0	174.3	175.1	174.6	177.3	180.0	182.5	186.0	189.5	192.8	195.8
Closing stocks	Mt	305.8	310.7	307.5	304.9	305.7	307.0	309.3	313.4	317.8	322.1	326.0
Price[3]	USD/t	221.8	268.0	218.0	200.0	196.1	195.8	199.8	201.6	202.9	204.5	206.0
Developed countries												
Production	Mt	527.1	537.6	541.0	545.4	549.3	554.2	558.4	563.4	567.8	572.6	577.2
Consumption	Mt	466.6	484.0	487.3	493.0	496.3	499.5	502.0	505.2	508.3	511.5	514.8
Net trade	Mt	60.3	57.3	53.9	52.4	53.9	55.4	56.2	57.3	58.5	59.9	61.3
Closing stocks	Mt	90.3	95.4	95.2	95.2	94.3	93.7	93.9	94.8	95.7	96.9	97.9
Developing countries												
Production	Mt	646.2	669.1	680.8	689.8	698.9	708.1	718.1	728.7	738.5	748.2	757.8
Consumption	Mt	715.1	733.3	742.7	749.9	756.1	766.6	777.2	787.8	798.6	810.0	821.4
Net trade	Mt	-67.6	-62.3	-58.9	-57.4	-58.9	-60.4	-61.2	-62.3	-63.5	-64.9	-66.3
Closing stocks	Mt	215.5	215.3	212.3	209.7	211.4	213.3	215.5	218.7	222.1	225.2	228.0
OECD[2]												
Production	Mt	481.1	503.8	506.6	510.2	512.7	515.8	518.1	520.9	523.4	526.2	528.7
Consumption	Mt	500.7	516.4	520.5	526.7	530.2	533.7	536.6	540.2	543.9	547.6	551.3
Net trade	Mt	-11.5	-13.4	-15.6	-18.2	-18.4	-18.5	-19.2	-20.3	-21.4	-22.4	-23.6
Closing stocks	Mt	75.9	70.8	72.6	74.2	75.1	75.8	76.5	77.5	78.4	79.4	80.4

Table C.1. World cereal projections *(cont.)*

Marketing year

		Average 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
OTHER COARSE GRAINS												
World												
Production	Mt	307.1	308.8	312.5	315.0	317.0	320.3	322.8	326.2	329.1	332.4	335.4
Area	Mha	148.4	149.9	150.6	150.7	150.4	150.6	150.5	150.7	150.7	150.9	150.9
Yield	t/ha	2.07	2.06	2.08	2.09	2.11	2.13	2.14	2.16	2.18	2.20	2.22
Consumption	Mt	299.2	305.1	307.4	309.8	312.5	316.2	318.7	321.9	324.7	327.8	330.8
Feed use	Mt	169.6	171.3	170.3	171.7	172.9	174.9	176.1	177.6	178.9	180.3	181.6
Food use	Mt	80.3	84.7	86.1	87.8	89.1	90.7	92.0	93.5	94.8	96.3	97.6
Biofuel use	Mt	4.8	5.1	5.0	5.0	5.1	5.2	5.2	5.3	5.4	5.5	5.5
Other use	Mt	44.5	44.1	46.0	45.3	45.3	45.5	45.4	45.5	45.7	45.8	46.0
Exports	Mt	47.9	47.6	48.1	48.5	48.6	49.2	50.0	50.7	51.3	52.1	52.6
Closing stocks	Mt	61.3	60.9	62.3	63.8	64.7	65.2	65.6	66.3	67.0	68.0	69.0
Price[4]	USD/t	244.7	318.9	259.0	236.8	231.4	229.0	234.0	237.1	240.2	242.9	245.4
Developed countries												
Production	Mt	188.7	181.1	182.5	183.0	183.5	184.6	185.3	186.5	187.5	188.6	189.5
Consumption	Mt	149.7	148.0	148.3	147.5	147.5	148.1	148.0	148.3	148.6	148.9	149.2
Net trade	Mt	35.1	34.4	34.4	35.1	35.5	36.4	37.2	38.0	38.6	39.3	39.9
Closing stocks	Mt	32.9	33.6	33.4	33.8	34.4	34.5	34.6	34.8	35.1	35.4	35.8
Developing countries												
Production	Mt	118.4	127.7	130.0	131.9	133.4	135.7	137.5	139.7	141.6	143.9	146.0
Consumption	Mt	149.5	157.1	159.2	162.3	165.0	168.1	170.7	173.6	176.1	178.9	181.5
Net trade	Mt	-31.5	-30.7	-30.8	-31.5	-31.8	-32.7	-33.6	-34.3	-35.0	-35.7	-36.3
Closing stocks	Mt	28.4	27.3	28.9	30.0	30.3	30.7	31.0	31.5	31.9	32.6	33.3
OECD[2]												
Production	Mt	154.5	150.3	151.4	151.5	151.5	152.0	152.3	153.0	153.5	154.0	154.4
Consumption	Mt	129.2	128.3	128.6	127.9	127.8	128.5	128.5	128.8	129.2	129.6	130.0
Net trade	Mt	22.2	23.9	23.2	23.2	23.0	23.4	23.8	24.0	24.1	24.2	24.1
Closing stocks	Mt	24.1	23.3	23.0	23.4	24.1	24.3	24.3	24.5	24.7	25.0	25.3
RICE												
World												
Production	Mt	516.3	530.1	537.2	542.8	549.3	555.6	562.0	568.1	573.8	579.3	584.4
Area	Mha	164.0	165.4	166.0	165.7	165.6	165.5	165.4	165.4	165.3	165.2	165.1
Yield	t/ha	3.15	3.20	3.24	3.28	3.32	3.36	3.40	3.44	3.47	3.51	3.54
Consumption	Mt	511.4	527.7	534.8	541.5	548.0	554.2	560.5	566.7	572.6	578.4	583.7
Feed use	Mt	19.8	21.6	20.7	19.9	20.1	20.4	20.8	21.2	21.5	21.9	22.2
Food use	Mt	419.7	432.2	437.7	443.1	448.3	453.3	458.2	462.8	467.3	471.6	475.7
Exports	Mt	48.8	52.7	52.9	54.0	55.3	57.1	58.7	60.2	61.6	63.0	64.5
Closing stocks	Mt	195.9	201.7	204.0	205.4	206.7	208.2	209.7	211.1	212.3	213.1	213.8
Price[5]	USD/t	404.0	398.4	400.5	404.8	408.8	410.6	411.9	412.7	413.7	414.7	415.9
Developed countries												
Production	Mt	17.6	17.6	17.5	17.3	17.3	17.3	17.3	17.3	17.2	17.2	17.2
Consumption	Mt	19.6	19.6	19.6	19.7	19.8	19.9	19.9	20.0	20.1	20.1	20.2
Net trade	Mt	-2.6	-2.8	-2.8	-2.9	-2.9	-2.8	-2.9	-2.9	-2.9	-2.9	-3.0
Closing stocks	Mt	11.4	13.1	13.7	14.3	14.7	15.0	15.3	15.4	15.5	15.5	15.4
Developing countries												
Production	Mt	498.7	512.5	519.7	525.5	532.0	538.3	544.8	550.8	556.5	562.1	567.2
Consumption	Mt	491.8	508.1	515.2	521.8	528.2	534.3	540.6	546.7	552.5	558.3	563.5
Net trade	Mt	4.8	2.8	2.8	2.9	2.9	2.8	2.9	2.9	2.9	2.9	3.0
Closing stocks	Mt	184.4	188.6	190.3	191.1	192.0	193.1	194.4	195.7	196.8	197.6	198.4
OECD[2]												
Production	Mt	22.3	22.4	22.3	22.1	22.0	21.9	21.7	21.6	21.5	21.4	21.3
Consumption	Mt	24.5	24.8	24.9	24.9	24.8	24.8	24.9	24.9	25.0	25.0	25.0
Net trade	Mt	-3.1	-3.1	-3.1	-3.2	-3.3	-3.3	-3.4	-3.5	-3.5	-3.6	-3.7
Closing stocks	Mt	13.2	15.0	15.6	16.0	16.5	16.8	17.0	17.2	17.3	17.3	17.2

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica 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. FAO all rice price index normalised to India, indica high quality 5% broken average 2014-2016 (January/December).

Source: OECD/FAO (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
SOYBEAN												
World												
Production	Mt	353.0	376.6	381.1	383.9	388.3	391.8	396.5	400.2	404.2	407.5	411.1
Area	Mha	128.1	133.3	133.9	134.1	134.5	134.8	135.5	135.8	136.2	136.3	136.6
Yield	t/ha	2.76	2.82	2.85	2.86	2.89	2.91	2.93	2.95	2.97	2.99	3.01
Consumption	Mt	360.1	373.3	378.4	383.1	387.7	391.3	395.7	399.5	403.2	406.7	410.8
Crush	Mt	327.0	336.4	341.3	345.9	350.3	353.7	357.8	361.3	364.8	368.1	372.0
Closing stocks	Mt	38.5	40.5	43.3	44.1	44.7	45.2	46.0	46.7	47.7	48.5	48.8
Price[1]	USD/t	510.7	560.3	497.2	472.2	475.0	480.0	489.4	499.6	504.8	512.4	523.3
Developed countries												
Production	Mt	129.6	140.7	142.9	143.8	145.5	146.8	148.5	149.7	151.2	152.4	153.6
Consumption	Mt	96.8	97.5	99.3	100.4	101.2	102.1	102.9	103.5	104.3	105.2	105.8
Crush	Mt	88.6	88.8	90.6	91.7	92.4	93.3	94.1	94.6	95.4	96.3	96.8
Closing stocks	Mt	10.8	9.3	10.8	11.1	11.3	11.4	11.6	11.8	12.0	12.1	12.3
Developing countries												
Production	Mt	223.4	235.9	238.2	240.0	242.8	245.1	248.1	250.5	253.0	255.1	257.4
Consumption	Mt	263.3	275.8	279.1	282.7	286.5	289.3	292.8	296.0	298.9	301.5	305.0
Crush	Mt	238.4	247.6	250.7	254.2	257.8	260.4	263.7	266.7	269.4	271.8	275.2
Closing stocks	Mt	27.7	31.2	32.5	33.0	33.4	33.8	34.4	35.0	35.7	36.4	36.5
OECD[2]												
Production	Mt	120.5	131.8	133.8	134.7	136.2	137.2	138.7	139.8	141.0	142.0	143.1
Consumption	Mt	98.1	98.7	100.5	101.5	102.4	103.3	104.1	104.7	105.5	106.4	106.9
Crush	Mt	90.3	90.4	92.2	93.2	94.1	95.0	95.7	96.2	97.0	97.9	98.4
Closing stocks	Mt	11.1	9.6	11.2	11.7	11.9	12.0	12.2	12.4	12.6	12.7	12.9
OTHER OILSEEDS												
World												
Production	Mt	159.8	169.7	171.6	172.5	176.2	178.3	180.1	182.1	184.0	185.9	187.6
Area	Mha	91.5	95.3	95.3	95.4	96.3	96.5	96.6	96.7	96.9	97.1	97.2
Yield	t/ha	1.75	1.78	1.80	1.81	1.83	1.85	1.87	1.88	1.90	1.92	1.93
Consumption	Mt	159.9	167.4	171.7	173.0	176.1	178.4	180.2	182.2	184.0	185.9	187.6
Crush	Mt	138.3	145.5	149.8	151.3	154.4	156.8	158.7	160.7	162.5	164.5	166.2
Closing stocks	Mt	9.3	11.4	11.3	10.8	10.9	10.8	10.8	10.7	10.7	10.7	10.8
Price[3]	USD/t	612.1	720.5	589.9	581.7	559.5	562.1	577.5	585.0	593.7	602.9	612.4
Developed countries												
Production	Mt	94.7	102.2	103.2	103.5	106.3	107.8	108.9	110.1	111.3	112.4	113.4
Consumption	Mt	87.9	91.7	95.0	95.7	97.6	98.9	99.7	100.6	101.4	102.3	103.1
Crush	Mt	80.4	84.0	87.2	88.0	89.9	91.1	91.9	92.8	93.5	94.3	95.1
Closing stocks	Mt	7.0	8.9	8.8	8.3	8.4	8.3	8.2	8.1	8.1	8.0	8.0
Developing countries												
Production	Mt	65.1	67.5	68.4	69.0	69.9	70.5	71.3	72.0	72.8	73.5	74.2
Consumption	Mt	71.9	75.6	76.7	77.3	78.5	79.5	80.5	81.6	82.6	83.6	84.5
Crush	Mt	57.8	61.5	62.6	63.3	64.5	65.7	66.8	67.9	69.0	70.1	71.1
Closing stocks	Mt	2.3	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.7	2.7	2.7
OECD[2]												
Production	Mt	56.0	62.6	62.5	62.0	63.7	64.5	64.7	65.2	65.7	66.2	66.5
Consumption	Mt	57.2	59.0	61.5	61.9	63.0	63.6	63.9	64.2	64.4	64.6	64.8
Crush	Mt	51.6	53.6	56.0	56.4	57.5	58.1	58.3	58.7	58.8	59.0	59.1
Closing stocks	Mt	4.8	6.1	6.5	6.5	6.7	6.7	6.7	6.6	6.6	6.6	6.6
PROTEIN MEALS												
World												
Production	Mt	357.5	368.6	375.0	379.8	385.1	389.1	393.6	397.6	401.6	405.3	409.6
Consumption	Mt	358.5	368.2	374.5	379.7	385.1	389.2	393.6	397.6	401.5	405.2	409.4
Closing stocks	Mt	13.7	14.0	14.5	14.7	14.7	14.6	14.6	14.6	14.7	14.8	15.0
Price[4]	USD/t	407.5	437.5	391.5	373.2	371.4	375.2	385.7	392.7	399.5	406.9	412.3
Developed countries												
Production	Mt	113.3	115.3	118.3	119.5	121.0	122.3	123.4	124.3	125.3	126.4	127.2
Consumption	Mt	124.1	123.9	126.4	127.1	128.0	128.3	128.4	128.7	128.8	128.9	129.1
Closing stocks	Mt	2.4	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.4	2.4
Developing countries												
Production	Mt	244.2	253.3	256.7	260.3	264.1	266.8	270.2	273.4	276.3	278.9	282.3
Consumption	Mt	234.4	244.4	248.1	252.6	257.1	260.9	265.2	268.9	272.7	276.3	280.4
Closing stocks	Mt	11.3	11.7	12.2	12.3	12.3	12.2	12.2	12.3	12.4	12.5	12.6
OECD[2]												
Production	Mt	103.3	104.6	107.3	108.4	109.7	110.8	111.6	112.2	113.0	113.9	114.4
Consumption	Mt	130.3	129.9	132.3	133.1	134.1	134.6	134.8	135.2	135.5	135.7	136.0
Closing stocks	Mt	1.7	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6

Table C.2. World oilseed projections *(cont.)*

Marketing year

		Average 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
VEGETABLE OILS												
World												
Production	Mt	214.3	224.4	228.4	230.8	234.1	236.7	239.4	241.9	244.2	246.5	249.0
of which palm oil	Mt	76.6	81.9	82.9	83.6	84.6	85.4	86.4	87.3	88.1	88.8	89.6
Consumption	Mt	213.8	223.5	228.0	230.9	233.8	236.4	239.0	241.5	244.0	246.3	248.7
Food	Mt	140.7	144.1	147.5	149.7	152.2	154.4	156.6	158.5	160.5	162.4	164.3
Biofuel	Mt	32.1	36.4	36.2	36.4	36.3	36.2	36.2	36.3	36.2	36.3	36.4
Exports	Mt	85.6	87.5	88.7	89.4	90.2	90.9	91.5	92.1	92.5	93.0	93.5
Closing stocks	Mt	17.8	19.0	19.3	19.3	19.6	19.9	20.2	20.5	20.8	21.1	21.4
Price[5]	USD/t	1 145.1	1 218.5	1 091.3	1 109.3	1 100.2	1 117.5	1 129.9	1 147.5	1 163.0	1 181.8	1 200.8
Developed countries												
Production	Mt	53.0	54.4	56.1	56.6	57.6	58.3	58.8	59.3	59.8	60.3	60.8
Consumption	Mt	55.9	58.1	58.3	58.5	58.5	58.4	58.4	58.4	58.3	58.3	58.5
Closing stocks	Mt	4.3	4.3	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Developing countries												
Production	Mt	161.3	170.0	172.3	174.2	176.5	178.4	180.6	182.6	184.4	186.2	188.1
Consumption	Mt	157.9	165.4	169.7	172.4	175.4	177.9	180.6	183.2	185.6	187.9	190.2
Closing stocks	Mt	13.6	14.6	14.9	15.0	15.2	15.5	15.9	16.2	16.5	16.7	17.0
OECD[2]												
Production	Mt	43.2	44.0	45.4	45.8	46.4	46.9	47.2	47.5	47.8	48.0	48.3
Consumption	Mt	57.6	60.2	60.5	60.7	60.7	60.7	60.7	60.7	60.6	60.6	60.8
Closing stocks	Mt	4.0	3.9	3.9	3.9	3.9	3.9	4.0	4.0	4.0	4.0	4.0

Note: Average 2019-21est: Data for 2021 are estimated. Prices are in nominal terms.
1. Soybean, U.S., CIF Rotterdam (October/September).
2. Excludes Iceland and Costa Rica 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 (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
WORLD												
SUGARBEET												
Production	Mt	271.3	278.4	279.4	279.3	279.8	280.2	280.6	281.3	282.3	283.2	284.3
Area	Mha	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Yield	t/ha	59.13	60.29	60.39	60.46	60.58	60.74	60.89	61.05	61.19	61.33	61.47
Biofuel use	Mt	10.0	10.1	10.1	10.2	10.3	10.3	10.5	10.5	10.6	10.6	10.7
SUGARCANE												
Production	Mt	1 757.1	1 773.1	1 802.9	1 823.7	1 837.7	1 847.4	1 860.4	1 875.9	1 892.4	1 909.2	1 924.5
Area	Mha	24.3	24.3	24.5	24.7	24.8	24.8	24.9	25.0	25.1	25.3	25.4
Yield	t/ha	72.21	73.11	73.46	73.82	74.20	74.47	74.72	74.99	75.25	75.51	75.74
Biofuel use	Mt	379.5	380.0	383.5	391.7	395.9	402.2	408.3	415.5	422.6	430.1	438.1
SUGAR												
Production	Mt tq	170.0	173.8	177.0	179.0	180.4	181.4	183.0	184.7	186.6	188.4	190.1
Consumption	Mt tq	169.8	173.1	174.7	176.4	178.1	179.7	181.3	183.0	184.6	186.2	187.8
Closing stocks	Mt tq	87.3	83.6	84.1	84.9	85.4	85.3	85.2	85.1	85.2	85.6	86.1
Price, raw sugar[1]	USD/t	353.8	421.8	355.6	326.8	318.0	316.4	321.7	326.7	331.6	336.3	341.0
Price, white sugar[2]	USD/t	435.5	501.3	435.9	407.5	400.3	398.1	405.2	410.8	416.5	422.4	427.8
Price, HFCS[3]	USD/t	906.2	851.4	740.5	694.4	682.8	679.6	689.4	697.8	706.6	714.7	721.1
DEVELOPED COUNTRIES												
SUGARBEET												
Production	Mt	219.7	225.6	225.1	224.9	225.5	225.9	226.3	226.7	227.5	227.9	228.6
SUGARCANE												
Production	Mt	82.1	85.0	85.8	85.6	85.5	86.2	86.6	87.1	87.6	88.1	88.5
SUGAR												
Production	Mt tq	39.0	40.2	40.5	40.4	40.6	40.7	40.8	41.0	41.1	41.3	41.4
Consumption	Mt tq	46.1	45.7	45.6	45.6	45.5	45.5	45.4	45.4	45.4	45.4	45.3
Closing stocks	Mt tq	14.2	14.2	14.6	15.0	15.1	14.8	14.5	14.2	14.1	14.0	13.9
HFCS												
Production	Mt dw	8.7	8.5	8.4	8.4	8.4	8.3	8.3	8.3	8.2	8.2	8.2
Consumption	Mt dw	7.6	7.5	7.5	7.4	7.4	7.3	7.2	7.2	7.1	7.1	7.1
DEVELOPING COUNTRIES												
SUGARBEET												
Production	Mt	51.7	52.8	54.3	54.3	54.2	54.3	54.3	54.5	54.9	55.3	55.7
SUGARCANE												
Production	Mt	1 675.1	1 688.0	1 717.1	1 738.1	1 752.2	1 761.2	1 773.8	1 788.8	1 804.9	1 821.2	1 836.0
SUGAR												
Production	Mt tq	130.9	133.6	136.5	138.6	139.8	140.7	142.2	143.8	145.5	147.1	148.6
Consumption	Mt tq	123.7	127.4	129.1	130.8	132.5	134.2	135.9	137.6	139.2	140.8	142.4
Closing stocks	Mt tq	73.1	69.4	69.5	69.9	70.4	70.6	70.7	70.8	71.2	71.7	72.2
HFCS												
Production	Mt dw	4.9	5.2	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.2	6.3
Consumption	Mt dw	5.6	5.9	6.1	6.2	6.3	6.5	6.6	6.7	6.9	7.0	7.2
OECD[4]												
SUGARBEET												
Production	Mt	171.5	178.8	178.8	178.2	177.9	178.1	178.2	178.2	178.6	178.8	179.4
SUGARCANE												
Production	Mt	146.1	153.9	155.1	153.5	152.8	153.1	153.0	153.1	153.2	153.6	153.8
SUGAR												
Production	Mt tq	39.4	41.2	41.5	41.3	41.4	41.5	41.5	41.6	41.7	41.9	42.0
Consumption	Mt tq	45.4	45.6	45.5	45.5	45.4	45.4	45.4	45.5	45.5	45.5	45.5
Closing stocks	Mt tq	14.4	14.0	13.9	14.2	14.3	14.2	14.2	14.1	14.0	13.9	13.9
HFCS												
Production	Mt dw	9.4	9.3	9.3	9.2	9.2	9.1	9.1	9.1	9.0	9.0	9.0
Consumption	Mt dw	9.1	9.0	9.0	8.9	8.9	8.8	8.8	8.7	8.7	8.7	8.7

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
WORLD												
BEEF AND VEAL												
Production	kt cwe	70 556	72 217	72 937	73 339	73 784	74 220	74 690	75 139	75 539	75 956	76 384
Consumption	kt cwe	70 684	72 234	72 939	73 342	73 776	74 216	74 688	75 141	75 542	75 958	76 386
PIGMEAT												
Production	kt cwe	110 613	120 822	123 512	124 026	124 758	125 380	125 992	126 713	127 441	128 185	128 895
Consumption	kt cwe	110 471	120 819	123 440	124 024	124 757	125 378	125 988	126 710	127 435	128 184	128 893
POULTRY MEAT												
Production	kt rtc	132 476	135 929	137 777	139 715	141 848	143 808	145 748	147 725	149 733	151 788	153 850
Consumption	kt rtc	130 832	135 959	137 714	139 637	141 821	143 808	145 757	147 723	149 743	151 784	153 846
SHEEP MEAT												
Production	kt cwe	15 640	16 201	16 455	16 670	16 877	17 086	17 295	17 499	17 697	17 893	18 076
Consumption	kt cwe	15 695	16 209	16 463	16 678	16 884	17 093	17 302	17 505	17 704	17 899	18 081
TOTAL MEAT												
Per capita consumption[1]	kg rwt	34.1	35.2	35.4	35.4	35.5	35.5	35.5	35.5	35.5	35.6	35.6
DEVELOPED COUNTRIES												
BEEF AND VEAL												
Production	kt cwe	31 108	31 160	31 428	31 493	31 567	31 632	31 700	31 767	31 817	31 894	31 969
Consumption	kt cwe	30 033	30 063	30 071	30 022	30 050	30 074	30 100	30 125	30 122	30 145	30 163
PIGMEAT												
Production	kt cwe	47 338	47 819	47 642	47 080	46 945	46 969	47 034	47 125	47 202	47 285	47 343
Consumption	kt cwe	41 216	41 842	41 993	41 979	42 068	42 232	42 394	42 554	42 683	42 821	42 902
POULTRY MEAT												
Production	kt rtc	52 469	52 811	53 148	53 387	53 737	54 033	54 373	54 729	55 048	55 419	55 810
Consumption	kt rtc	49 184	50 073	50 460	50 806	51 271	51 587	51 885	52 176	52 483	52 801	53 140
SHEEP MEAT												
Production	kt cwe	3 417	3 467	3 486	3 508	3 533	3 557	3 580	3 603	3 625	3 646	3 666
Consumption	kt cwe	2 709	2 742	2 750	2 762	2 776	2 789	2 800	2 810	2 819	2 828	2 836
TOTAL MEAT												
Per capita consumption[1]	kg rwt	69.0	69.5	69.6	69.7	69.9	70.0	70.2	70.4	70.5	70.7	70.8
DEVELOPING COUNTRIES												
BEEF AND VEAL												
Production	kt cwe	39 449	41 057	41 509	41 846	42 217	42 587	42 990	43 372	43 722	44 062	44 415
Consumption	kt cwe	40 652	42 171	42 868	43 320	43 726	44 142	44 587	45 016	45 420	45 813	46 223
PIGMEAT												
Production	kt cwe	63 274	73 003	75 870	76 946	77 812	78 411	78 957	79 588	80 239	80 901	81 552
Consumption	kt cwe	69 256	78 977	81 447	82 045	82 689	83 146	83 594	84 156	84 752	85 363	85 991
POULTRY MEAT												
Production	kt rtc	80 006	83 118	84 629	86 329	88 111	89 774	91 375	92 996	94 685	96 369	98 040
Consumption	kt rtc	81 648	85 886	87 253	88 831	90 550	92 221	93 872	95 547	97 260	98 983	100 706
SHEEP MEAT												
Production	kt cwe	12 222	12 734	12 970	13 162	13 344	13 529	13 715	13 896	14 073	14 247	14 410
Consumption	kt cwe	12 986	13 467	13 713	13 915	14 109	14 304	14 503	14 695	14 885	15 071	15 245
TOTAL MEAT												
Per capita consumption[1]	kg rwt	26.2	27.6	27.9	27.9	28.0	28.0	28.1	28.1	28.2	28.3	28.3
OECD[2]												
BEEF AND VEAL												
Production	kt cwe	29 879	29 850	30 113	30 186	30 255	30 302	30 346	30 390	30 420	30 475	30 527
Consumption	kt cwe	29 055	29 108	29 080	29 052	29 089	29 128	29 167	29 205	29 215	29 252	29 283
PIGMEAT												
Production	kt cwe	45 191	45 516	45 350	44 783	44 624	44 643	44 703	44 788	44 860	44 937	44 990
Consumption	kt cwe	40 331	40 861	41 062	41 068	41 146	41 318	41 488	41 658	41 798	41 944	42 033
POULTRY MEAT												
Production	kt rtc	52 976	53 505	53 906	54 287	54 735	55 106	55 505	55 922	56 318	56 773	57 253
Consumption	kt rtc	49 658	50 935	51 343	51 748	52 265	52 641	53 008	53 364	53 734	54 114	54 512
SHEEP MEAT												
Production	kt cwe	2 442	2 498	2 513	2 526	2 538	2 552	2 565	2 577	2 589	2 600	2 610
Consumption	kt cwe	1 772	1 802	1 805	1 807	1 809	1 812	1 814	1 815	1 814	1 814	1 812
TOTAL MEAT												
Per capita consumption[1]	kg rwt	69.5	70.2	70.3	70.4	70.6	70.7	70.9	71.0	71.2	71.3	71.4

Note: Calendar Year; except year ending 30 June for New Zealand in aggregates. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
MILK												
World												
Production	kt pw	875 831	901 646	918 613	935 098	951 740	969 355	987 286	1 005 753	1 023 705	1 042 056	1 059 850
Inventory	000 hd	712 574	734 765	747 912	756 708	761 987	770 920	781 382	791 304	800 911	810 128	819 059
Yield	t/head	1.23	1.23	1.23	1.24	1.25	1.26	1.26	1.27	1.28	1.29	1.29
Developed countries												
Production	kt pw	407 063	410 437	412 515	414 750	417 472	420 574	423 760	427 495	430 658	434 175	437 198
Inventory	000 hd	74 309	74 313	74 312	74 091	73 853	73 808	73 854	73 898	73 923	73 938	73 891
Yield	t/head	5.48	5.52	5.55	5.60	5.65	5.70	5.74	5.78	5.83	5.87	5.92
Developing countries												
Production	kt pw	468 768	491 209	506 098	520 348	534 268	548 781	563 527	578 258	593 046	607 881	622 652
Inventory	000 hd	638 264	660 452	673 599	682 617	688 135	697 111	707 528	717 406	726 988	736 189	745 169
Yield	t/head	0.73	0.74	0.75	0.76	0.78	0.79	0.80	0.81	0.82	0.83	0.84
OECD[1]												
Production	kt pw	372 429	376 698	379 253	381 780	384 169	386 935	389 835	393 361	396 321	399 680	402 513
Inventory	000 hd	80 608	81 801	82 271	82 158	81 883	81 910	82 142	82 408	82 702	83 032	83 365
Yield	t/head	4.62	4.61	4.61	4.65	4.69	4.72	4.75	4.77	4.79	4.81	4.83
FRESH DAIRY PRODUCTS												
World												
Consumption	kt pw	438 137	453 492	465 967	477 778	488 813	499 803	511 274	522 557	533 865	545 125	555 998
Developed countries												
Consumption	kt pw	132 552	132 733	133 804	134 764	135 591	136 240	137 115	137 925	138 781	139 539	140 010
Developing countries												
Consumption	kt pw	305 585	320 759	332 163	343 015	353 222	363 563	374 159	384 632	395 084	405 586	415 987
OECD[1]												
Consumption	kt pw	105 337	105 649	106 360	106 971	107 541	107 914	108 445	108 977	109 542	110 048	110 256
BUTTER												
World												
Production	kt pw	12 318	12 715	12 977	13 223	13 472	13 739	14 000	14 255	14 519	14 780	15 043
Consumption	kt pw	12 262	12 727	12 971	13 223	13 473	13 739	13 998	14 253	14 517	14 778	15 041
Stock changes	kt pw	23	-11	7	-1	-1	1	2	3	2	3	3
Price[2]	USD/t	4 495	4 834	4 545	4 413	4 395	4 439	4 533	4 584	4 691	4 764	4 843
Developed countries												
Production	kt pw	4 877	4 832	4 879	4 889	4 922	4 955	4 987	5 013	5 043	5 071	5 099
Consumption	kt pw	4 345	4 379	4 397	4 400	4 409	4 425	4 441	4 457	4 479	4 497	4 516
Developing countries												
Production	kt pw	7 441	7 883	8 098	8 334	8 550	8 784	9 014	9 242	9 476	9 709	9 945
Consumption	kt pw	7 917	8 348	8 574	8 824	9 064	9 314	9 557	9 796	10 037	10 280	10 525
OECD[1]												
Production	kt pw	4 782	4 748	4 814	4 834	4 867	4 900	4 937	4 969	5 005	5 039	5 071
Consumption	kt pw	4 233	4 279	4 314	4 335	4 347	4 365	4 384	4 403	4 429	4 450	4 472
Stock changes	kt pw	25	-11	7	-1	-1	1	2	3	2	3	3
CHEESE												
World												
Production	kt pw	24 823	25 507	25 841	26 143	26 424	26 703	26 997	27 303	27 595	27 897	28 164
Consumption	kt pw	24 774	25 500	25 824	26 119	26 402	26 678	26 971	27 271	27 570	27 870	28 136
Stock changes	kt pw	13	6	16	24	22	26	27	33	25	27	28
Price[3]	USD/t	4 096	4 300	4 260	4 235	4 247	4 297	4 364	4 426	4 504	4 572	4 636
Developed countries												
Production	kt pw	20 407	20 945	21 178	21 401	21 610	21 816	22 037	22 273	22 496	22 728	22 926
Consumption	kt pw	19 364	19 806	19 976	20 137	20 304	20 468	20 652	20 844	21 037	21 228	21 393
Developing countries												
Production	kt pw	4 416	4 562	4 663	4 742	4 814	4 887	4 961	5 030	5 100	5 169	5 238
Consumption	kt pw	5 409	5 694	5 849	5 982	6 098	6 209	6 318	6 427	6 534	6 642	6 743
OECD[1]												
Production	kt pw	19 858	20 376	20 601	20 817	21 017	21 211	21 423	21 652	21 868	22 093	22 286
Consumption	kt pw	18 973	19 431	19 620	19 801	19 964	20 124	20 305	20 491	20 679	20 864	21 023
Stock changes	kt pw	13	6	16	24	22	26	27	33	25	27	28

Note: Calendar Year; except year ending 30 June for New Zealand in aggregates. Average 2019-21est: Data for 2021 are estimated. Prices are in nominal terms.

1. Excludes Iceland and Costa Rica 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 (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
SKIM MILK POWDER												
World												
Production	kt pw	4 527	4 610	4 674	4 877	4 960	5 037	5 120	5 199	5 272	5 351	5 426
Consumption	kt pw	4 576	4 609	4 675	4 877	4 960	5 036	5 119	5 200	5 273	5 351	5 426
Stock changes	kt pw	-79	0	-1	-1	0	0	0	0	0	0	0
Price[1]	USD/t	2 925	3 219	3 270	3 233	3 208	3 230	3 270	3 330	3 397	3 459	3 518
Developed countries												
Production	kt pw	3 854	3 907	3 950	4 120	4 178	4 235	4 293	4 348	4 400	4 455	4 508
Consumption	kt pw	1 734	1 669	1 662	1 775	1 783	1 790	1 801	1 810	1 818	1 826	1 830
Developing countries												
Production	kt pw	673	702	724	757	782	802	827	852	872	896	918
Consumption	kt pw	2 841	2 940	3 014	3 103	3 177	3 246	3 318	3 390	3 455	3 525	3 596
OECD[2]												
Production	kt pw	3 640	3 715	3 769	3 947	4 011	4 070	4 132	4 189	4 243	4 300	4 354
Consumption	kt pw	1 888	1 837	1 833	1 949	1 962	1 975	1 990	2 004	2 016	2 029	2 038
Stock changes	kt pw	-79	0	-1	-1	0	0	0	0	0	0	0
WHOLE MILK POWDER												
World												
Production	kt pw	5 272	5 349	5 431	5 512	5 605	5 692	5 765	5 851	5 935	6 020	6 108
Consumption	kt pw	5 323	5 345	5 429	5 513	5 605	5 693	5 766	5 851	5 936	6 021	6 109
Stock changes	kt pw	7	3	2	-1	-1	-1	-1	-1	-1	-1	-1
Price[3]	USD/t	3 308	3 647	3 647	3 591	3 580	3 613	3 658	3 729	3 808	3 882	3 956
Developed countries												
Production	kt pw	2 652	2 654	2 710	2 764	2 795	2 825	2 845	2 868	2 893	2 917	2 943
Consumption	kt pw	744	688	693	705	712	720	707	714	722	729	739
Developing countries												
Production	kt pw	2 620	2 695	2 721	2 748	2 810	2 868	2 920	2 983	3 043	3 103	3 165
Consumption	kt pw	4 579	4 658	4 736	4 808	4 894	4 973	5 059	5 137	5 215	5 292	5 369
OECD[2]												
Production	kt pw	2 835	2 841	2 900	2 956	2 986	3 015	3 035	3 057	3 081	3 104	3 130
Consumption	kt pw	980	942	961	989	999	1 009	999	1 010	1 020	1 030	1 044
Stock changes	kt pw	7	3	2	-1	-1	-1	-1	-1	-1	-1	-1
WHEY POWDER												
Price[4]	USD/t	1 006	1 061	1 053	1 032	1 023	1 031	1 043	1 060	1 077	1 095	1 113
CASEIN												
Price[5]	USD/t	7 426	8 253	8 340	8 206	8 134	8 201	8 297	8 437	8 581	8 727	8 871

Note: Calendar Year; except year ending 30 June for New Zealand in aggregates. Average 2019-21est: Data for 2021 are estimated. Prices are in nominal terms.

1. FOB export price, non-fat dry milk, 1.25% butterfat, Oceania.
2. Excludes Iceland and Costa Rica 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 (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
FISH[1]												
World												
Production	kt	178 900	183 046	186 400	187 440	190 940	193 198	195 304	195 821	199 653	201 646	203 403
of which aquaculture	kt	87 389	90 777	93 241	95 111	96 892	98 702	100 665	102 718	104 498	106 119	107 659
Consumption	kt	179 726	182 421	186 329	187 546	190 930	193 192	195 302	195 933	199 648	201 646	203 407
of which for food	kt	158 897	161 484	165 396	167 841	170 275	172 613	174 769	176 801	179 256	181 296	183 136
of which for reduction	kt	15 959	16 313	16 425	15 313	16 378	16 394	16 430	15 109	16 452	16 491	16 492
Price												
Aquaculture[2]	USD/t	3 026.0	3 740.8	3 407.6	3 490.3	3 481.9	3 577.0	3 689.3	3 932.5	3 829.7	3 919.9	4 012.7
Capture[3]	USD/t	1 881.7	2 216.4	2 072.7	2 099.9	2 082.4	2 112.4	2 153.5	2 254.0	2 197.1	2 221.7	2 248.4
Product traded[4]	USD/t	3 095.5	3 947.9	3 570.0	3 624.7	3 580.5	3 649.7	3 745.2	3 984.9	3 840.4	3 897.7	3 960.1
Developed countries												
Production	kt	28 909	28 864	29 192	29 671	29 656	29 895	29 907	30 232	30 284	30 404	30 473
of which aquaculture	kt	4 894	4 980	5 048	5 157	5 209	5 277	5 351	5 426	5 519	5 573	5 616
Consumption	kt	36 798	36 509	36 715	36 891	36 810	36 936	37 007	37 194	37 037	37 043	37 019
of which for food	kt	31 262	31 155	31 350	31 536	31 510	31 656	31 735	31 926	31 781	31 795	31 781
of which for reduction	kt	4 589	4 392	4 415	4 417	4 374	4 367	4 371	4 379	4 379	4 383	4 385
Developing countries												
Production	kt	149 991	154 182	157 209	157 769	161 284	163 303	165 397	165 589	169 369	171 242	172 930
of which aquaculture	kt	82 495	85 798	88 193	89 954	91 683	93 426	95 313	97 292	98 979	100 546	102 042
Consumption	kt	142 964	145 987	149 684	150 719	154 180	156 310	158 345	158 783	162 651	164 638	166 418
of which for food	kt	127 671	130 404	134 116	136 369	138 826	141 012	143 084	144 921	147 514	149 536	151 385
of which for reduction	kt	11 371	11 921	12 010	10 896	12 004	12 027	12 059	10 730	12 073	12 107	12 107
OECD[5]												
Production	kt	28 653	29 153	29 269	29 235	29 544	29 876	29 892	29 709	30 128	30 351	30 470
of which aquaculture	kt	7 198	7 361	7 459	7 639	7 767	7 892	8 027	8 177	8 323	8 452	8 566
Consumption	kt	38 419	38 412	39 001	38 958	39 076	39 241	39 323	39 279	39 297	39 369	39 392
of which for food	kt	32 179	32 304	32 923	33 132	33 116	33 310	33 426	33 664	33 490	33 586	33 647
of which for reduction	kt	5 058	4 964	4 952	4 717	4 868	4 856	4 839	4 574	4 784	4 778	4 757
FISHMEAL[6]												
World												
Production	kt	4 931.0	4 974.2	5 131.0	4 947.7	5 275.0	5 334.4	5 395.7	5 114.6	5 499.3	5 553.5	5 599.7
from whole fish	kt	3 516.8	3 553.8	3 685.5	3 475.5	3 773.7	3 807.5	3 845.5	3 543.8	3 904.5	3 936.5	3 960.6
Consumption	kt	4 997.4	5 001.8	5 122.7	5 081.8	5 183.2	5 286.8	5 401.3	5 252.2	5 410.4	5 495.2	5 595.6
Variation in stocks	kt	-75.2	-26.6	8.8	-134.1	91.4	46.5	-7.1	-139.6	86.3	55.3	0.6
Price[7]	USD/t	1 453.1	1 558.3	1 484.4	1 548.6	1 381.1	1 415.5	1 502.2	1 611.9	1 546.7	1 585.5	1 625.6
Developed countries												
Production	kt	1 558.7	1 472.9	1 523.4	1 555.6	1 563.5	1 579.1	1 597.3	1 616.5	1 627.0	1 638.5	1 649.3
from whole fish	kt	983.6	901.1	943.5	968.1	968.3	976.4	987.1	998.7	1 001.5	1 005.6	1 009.0
Consumption	kt	1 611.4	1 516.2	1 528.8	1 480.8	1 496.3	1 493.7	1 490.2	1 431.3	1 456.7	1 454.5	1 453.3
Variation in stocks	kt	21.5	-17.6	7.8	-26.1	30.9	3.0	-8.1	-32.6	24.8	10.8	-0.4
Developing countries												
Production	kt	3 372.3	3 501.2	3 607.6	3 392.2	3 711.5	3 755.2	3 798.4	3 498.1	3 872.3	3 915.0	3 950.4
from whole fish	kt	2 533.2	2 652.7	2 742.0	2 507.3	2 805.4	2 831.1	2 858.4	2 545.1	2 903.0	2 930.9	2 951.6
Consumption	kt	3 584.2	3 785.6	3 883.9	3 881.0	3 956.9	4 053.1	4 161.1	4 060.9	4 183.8	4 260.6	4 352.4
Variation in stocks	kt	-96.7	-9.0	1.0	-108.0	60.5	43.5	1.0	-107.0	61.5	44.5	1.0
OECD[5]												
Production	kt	1 515.0	1 457.9	1 508.9	1 483.5	1 534.6	1 546.2	1 556.5	1 511.1	1 568.7	1 576.8	1 581.7
from whole fish	kt	1 054.0	1 004.4	1 047.9	1 015.2	1 058.9	1 063.5	1 066.7	1 014.1	1 064.4	1 065.5	1 063.4
Consumption	kt	1 715.6	1 652.4	1 676.5	1 621.3	1 624.6	1 614.0	1 604.3	1 539.1	1 563.5	1 564.3	1 566.2
Variation in stocks	kt	-11.9	-18.6	6.8	-27.1	34.9	-3.0	-8.1	-32.6	29.8	5.8	-0.4

Table C.7. World fish and seafood projections *(cont.)*

Calendar year

		Average 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
FISH OIL[6]												
World												
Production	kt	1 091.8	1 169.1	1 214.3	1 187.7	1 244.0	1 260.7	1 270.7	1 227.5	1 299.2	1 308.0	1 315.8
from whole fish	kt	567.4	609.4	646.1	605.2	661.7	668.8	676.5	619.3	690.0	693.2	695.3
Consumption	kt	1 120.7	1 181.9	1 216.7	1 216.3	1 220.7	1 255.9	1 271.9	1 259.2	1 275.6	1 301.6	1 316.0
Variation in stocks	kt	-27.6	-2.8	2.6	-28.6	23.3	4.8	-1.2	-31.7	23.7	6.3	-0.1
Price[8]	USD/t	1 910.3	2 312.5	2 028.6	1 922.0	1 738.8	1 744.1	1 773.3	2 108.8	1 979.2	2 033.1	2 088.2
Developed countries												
Production	kt	439.1	435.8	454.7	466.7	462.7	469.0	468.4	479.7	477.6	480.2	483.1
from whole fish	kt	167.7	158.2	172.2	173.5	173.2	173.2	173.4	173.7	173.8	174.0	174.2
Consumption	kt	581.9	650.3	662.1	662.3	645.7	672.4	687.6	721.0	712.3	731.7	742.9
Variation in stocks	kt	-2.1	-2.8	2.6	-10.6	7.3	2.8	-1.2	-13.7	7.7	4.3	-0.1
Developing countries												
Production	kt	653.0	733.3	759.6	721.0	781.4	791.7	802.3	747.8	821.6	827.7	832.7
from whole fish	kt	400.1	451.2	473.9	431.8	488.4	495.7	503.1	445.6	516.3	519.2	521.1
Consumption	kt	479.9	481.6	509.6	514.0	540.0	553.5	559.3	518.2	548.3	559.9	568.0
Variation in stocks	kt	-25.5	0.0	0.0	-18.0	16.0	2.0	0.0	-18.0	16.0	2.0	0.0
OECD[5]												
Production	kt	593.8	613.0	636.8	639.3	643.1	649.2	647.8	647.5	654.6	656.9	658.9
from whole fish	kt	199.0	188.4	206.2	197.1	203.6	202.9	201.8	190.1	198.7	198.1	197.0
Consumption	kt	770.6	797.9	827.5	826.2	825.8	854.9	867.4	857.6	868.0	889.6	901.6
Variation in stocks	kt	-3.4	-2.3	2.6	-15.6	12.3	2.8	-1.2	-18.7	12.7	4.3	-0.1

Note: The term “fish” indicates fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, crocodiles, caimans, alligators and aquatic plants. Average 2019-21est: Data for 2021 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. Excludes Costa Rica.
6. Data are in product weight.
7. Fishmeal, 64-65% protein, Hamburg, Germany.
8. Fish oil, any origin, N.W. Europe.

Source: OECD/FAO (2022), “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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
ETHANOL												
World												
Production	Bln L	124.7	129.1	129.2	130.5	131.7	133.1	134.5	135.8	137.2	138.8	140.4
Consumption	Bln L	126.1	130.5	130.5	131.6	132.6	133.9	135.2	136.5	137.9	139.4	141.0
Exports	Bln L	10.3	10.5	10.6	10.6	10.5	10.5	10.5	10.5	10.5	10.4	10.4
Price[1]	USD/hl	47.6	66.9	49.2	49.9	51.1	51.0	51.6	52.2	52.8	52.8	53.5
Developed countries												
Production	bln L	68.6	71.5	71.0	71.0	71.3	71.6	72.0	72.1	72.3	72.5	72.8
Consumption	bln L	68.5	70.9	70.2	70.0	70.0	70.3	70.5	70.7	70.9	71.1	71.3
Net trade	bln L	0.2	0.8	0.9	0.9	1.1	1.1	1.0	1.0	1.0	0.9	0.9
Developing countries												
Production	bln L	56.1	57.6	58.3	59.6	60.4	61.5	62.5	63.7	64.9	66.2	67.7
Consumption	bln L	57.6	59.6	60.3	61.5	62.6	63.7	64.6	65.8	67.0	68.3	69.7
Net trade	bln L	-1.4	-2.0	-2.1	-2.0	-2.2	-2.2	-2.2	-2.1	-2.1	-2.1	-2.1
OECD[2]												
Production	bln L	68.3	71.5	70.9	70.9	71.3	71.6	71.9	72.1	72.3	72.5	72.7
Consumption	bln L	69.7	73.5	72.7	72.5	72.4	72.6	72.8	73.0	73.1	73.3	73.4
Net trade	bln L	-1.3	-1.8	-1.6	-1.6	-1.4	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3
BIODIESEL												
World												
Production	bln L	48.4	55.3	55.2	55.6	55.5	55.3	55.1	55.2	55.1	55.2	55.4
Consumption	bln L	52.2	55.9	55.8	56.2	56.1	55.9	55.8	55.8	55.7	55.8	56.0
Exports	bln L	6.6	6.1	6.3	6.3	6.3	6.2	6.0	5.9	5.8	5.8	5.8
Price[3]	USD/hl	105.9	125.2	109.0	108.0	108.8	109.9	111.1	112.7	113.7	114.8	116.0
Developed countries												
Production	bln L	24.8	28.6	28.1	28.0	27.7	27.3	27.0	26.8	26.4	26.1	25.9
Consumption	bln L	31.6	32.8	32.3	32.2	31.7	31.2	30.7	30.3	29.8	29.4	29.2
Net trade	bln L	-4.6	-4.2	-4.2	-4.1	-4.0	-3.9	-3.7	-3.5	-3.4	-3.3	-3.2
Developing countries												
Production	bln L	23.6	26.7	27.1	27.5	27.8	28.0	28.2	28.4	28.7	29.1	29.5
Consumption	bln L	20.6	23.1	23.6	24.0	24.4	24.7	25.1	25.5	26.0	26.4	26.8
Net trade	bln L	3.4	3.6	3.6	3.5	3.4	3.3	3.1	2.9	2.8	2.7	2.6
OECD[2]												
Production	bln L	26.1	30.0	29.4	29.4	29.1	28.7	28.4	28.2	27.8	27.6	27.4
Consumption	bln L	32.9	34.2	33.6	33.5	33.1	32.6	32.1	31.7	31.2	30.8	30.6
Net trade	bln L	-4.6	-4.2	-4.2	-4.1	-4.0	-3.9	-3.7	-3.5	-3.4	-3.2	-3.2

Note: Average 2019-21est: Data for 2021 are estimated. Prices are in nominal terms.

1. Wholesale price, United States, Omaha.
2. Excludes Iceland and Costa Rica but includes all EU member countries.
3. Producer price Germany net of biodiesel tariff and energy tax.

Source: OECD/FAO (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
WORLD												
Production	Mt	26.2	26.6	26.9	27.4	27.9	28.3	28.7	29.2	29.6	30.1	30.6
Area	Mha	33.1	33.0	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.8	33.9
Yield	t/ha	0.79	0.80	0.81	0.82	0.83	0.84	0.86	0.87	0.88	0.89	0.90
Consumption[1]	Mt	25.5	26.1	26.7	27.3	27.8	28.2	28.6	29.0	29.4	29.9	30.3
Exports	Mt	9.7	10.1	10.4	10.7	11.0	11.2	11.5	11.7	11.9	12.2	12.4
Closing stocks	Mt	20.0	21.1	21.3	21.5	21.6	21.7	21.8	22.0	22.2	22.5	22.7
Price[2]	USD/t	1 964.1	2 622.6	2 190.9	1 986.4	1 794.5	1 814.8	1 832.4	1 848.1	1 855.9	1 857.8	1 854.6
DEVELOPED COUNTRIES												
Production	Mt	6.1	6.4	6.4	6.3	6.3	6.4	6.5	6.6	6.7	6.8	6.9
Consumption	Mt	1.7	1.8	1.9	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.3
Exports	Mt	4.6	4.7	4.7	4.6	4.6	4.6	4.7	4.7	4.8	4.8	4.9
Imports	Mt	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Closing stocks	Mt	2.3	2.4	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.7
DEVELOPING COUNTRIES												
Production	Mt	20.1	20.2	20.6	21.1	21.5	21.9	22.2	22.6	22.9	23.3	23.6
Consumption	Mt	23.8	24.2	24.8	25.2	25.7	26.0	26.4	26.8	27.2	27.5	28.0
Exports	Mt	5.2	5.4	5.7	6.1	6.4	6.6	6.8	7.0	7.2	7.3	7.5
Imports	Mt	9.5	9.7	10.1	10.4	10.7	10.9	11.1	11.3	11.6	11.8	12.1
Closing stocks	Mt	17.7	18.7	18.9	19.0	19.0	19.1	19.3	19.4	19.6	19.9	20.1
OECD[3]												
Production	Mt	5.7	6.0	6.0	6.1	6.1	6.2	6.3	6.4	6.5	6.6	6.7
Consumption	Mt	2.8	3.0	3.0	3.1	3.2	3.2	3.3	3.3	3.4	3.4	3.5
Exports	Mt	4.4	4.5	4.5	4.5	4.5	4.6	4.6	4.7	4.7	4.8	4.9
Imports	Mt	1.6	1.7	1.5	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7
Closing stocks	Mt	3.0	3.3	3.4	3.4	3.4	3.4	3.4	3.5	3.5	3.5	3.6

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
REAL GDP[1]												
Australia	%	1.1	4.2	2.5	2.3	2.3	2.5	2.5	2.5	2.5	2.5	2.5
Canada	%	0.5	3.9	2.8	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.6
Chile	%	2.1	1.5	0.5	1.7	2.2	2.5	2.5	2.4	2.3	2.3	2.2
European Union	%	0.1	2.8	2.3	1.8	1.6	1.5	1.5	1.5	1.5	1.5	1.5
Japan	%	-0.9	2.4	2.3	0.8	0.7	0.5	0.5	0.5	0.5	0.5	0.5
Korea	%	1.8	2.5	2.9	2.6	2.5	2.4	2.4	2.4	2.4	2.4	2.4
Mexico	%	-0.9	2.0	2.5	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0
New Zealand	%	2.2	2.7	2.6	1.9	1.7	2.4	2.4	2.4	2.4	2.4	2.4
Norway	%	1.4	4.0	2.6	2.2	1.6	1.3	1.3	1.3	1.3	1.3	1.3
Switzerland	%	0.6	2.2	1.4	1.8	1.2	1.8	1.8	1.8	1.8	1.8	1.8
Türkiye	%	3.9	2.7	3.0	3.7	3.3	3.3	3.3	3.1	3.0	2.8	2.6
United Kingdom	%	-0.4	3.7	1.2	1.4	2.2	1.8	1.8	1.8	1.8	1.8	1.8
United States	%	1.5	3.7	2.3	1.4	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Brazil	%	0.7	0.8	1.4	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0
China	%	5.5	4.4	5.1	5.1	5.0	4.9	4.9	4.9	4.9	4.9	4.9
Egypt	%	4.2	5.9	5.0	5.5	5.8	5.8	5.9	5.6	5.3	5.0	4.8
India	%	2.1	8.2	6.9	7.0	7.0	6.5	6.2	5.8	5.5	5.2	4.9
Indonesia	%	2.0	5.4	6.0	5.8	5.4	5.3	5.2	4.9	4.7	4.5	4.3
Iran	%	-0.3	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Malaysia	%	0.8	5.6	5.5	4.9	4.4	4.4	3.9	3.8	3.7	3.5	3.4
Pakistan	%	1.9	4.0	4.2	4.6	4.8	5.0	5.0	4.8	4.5	4.3	4.2
Russia	%	1.1	-8.5	-2.3	1.5	1.0	0.8	0.8	0.8	0.8	0.8	0.8
Saudi Arabia	%	-0.3	7.6	3.6	2.7	2.7	2.7	2.8	2.7	2.6	2.5	2.5
South Africa	%	-0.4	1.9	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.3
Ukraine	%	0.9	3.6	3.4	3.8	4.0	4.0	3.8	3.7	3.6	3.4	3.3
OECD[2,3]	%	0.8	3.2	2.3	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7
PCE DEFLATOR[1]												
Australia	%	1.4	3.9	2.7	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Canada	%	1.6	5.6	2.4	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Chile	%	3.2	7.5	4.5	3.3	3.0	3.0	3.0	2.9	2.8	2.8	2.7
European Union	%	1.3	7.7	2.9	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Japan	%	0.1	1.0	0.8	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Korea	%	1.3	4.0	2.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Mexico	%	4.6	6.8	3.9	3.2	3.1	3.0	3.0	3.0	3.0	3.0	3.0
New Zealand	%	2.1	5.9	3.5	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1
Norway	%	2.2	3.5	1.8	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Switzerland	%	-0.1	2.5	1.6	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Türkiye	%	14.8	60.5	37.2	20.4	16.0	15.1	15.0	17.1	13.4	9.7	6.1
United Kingdom	%	1.9	7.4	5.3	2.6	1.9	2.0	2.0	2.0	2.0	2.0	2.0
United States	%	2.2	7.7	2.9	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Brazil	%	5.3	8.2	5.1	3.3	3.3	2.8	2.8	2.8	2.8	2.8	2.8
China	%	2.0	2.1	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Egypt	%	8.0	7.5	11.0	7.4	7.4	7.4	7.4	6.9	6.4	6.1	5.7
India	%	5.5	6.1	4.8	4.3	4.1	4.0	4.0	3.8	3.7	3.6	3.4
Indonesia	%	2.1	3.3	3.3	3.0	2.9	2.9	2.9	2.8	2.8	2.7	2.6
Iran	%	2.2	6.3	3.0	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0
Malaysia	%	0.7	3.0	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.3	2.2
Pakistan	%	8.8	11.2	10.5	7.4	6.5	6.5	6.5	6.1	5.8	5.4	5.2
Russia	%	4.8	21.3	14.3	9.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0
Saudi Arabia	%	1.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9
South Africa	%	3.9	5.7	4.6	4.5	4.5	4.5	4.5	4.3	4.1	4.0	3.8
Ukraine	%	6.7	7.1	5.8	5.2	5.0	5.0	4.7	4.5	4.3	4.2	4.0
OECD[2,3]	%	2.8	11.9	7.7	5.5	4.8	4.9	5.2	6.1	5.4	4.5	3.4

Table C.10. Economic assumptions *(cont.)*

Calendar year

		Average 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
GDP DEFLATOR[1]												
Australia	%	3.2	5.3	0.1	1.9	2.4	2.3	2.3	2.3	2.3	2.3	2.3
Canada	%	3.3	8.0	1.4	1.3	1.8	1.9	1.9	1.9	1.9	1.9	1.9
Chile	%	6.2	5.9	4.9	3.1	2.8	2.6	2.7	2.7	2.6	2.5	2.5
European Union	%	1.7	6.3	3.0	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0
Japan	%	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Korea	%	0.8	2.7	2.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9
Mexico	%	4.4	4.6	3.6	3.8	3.5	3.5	3.5	3.5	3.5	3.5	3.5
New Zealand	%	2.7	4.9	4.1	3.4	3.0	2.8	2.8	2.8	2.8	2.8	2.8
Norway	%	3.7	11.3	-2.1	-0.8	-0.2	0.5	0.5	0.5	0.5	0.5	0.5
Switzerland	%	0.2	2.0	1.3	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Türkiye	%	16.4	54.3	39.9	21.5	15.6	14.4	15.5	17.6	13.8	10.0	6.2
United Kingdom	%	2.9	4.8	5.1	2.6	2.1	2.1	2.1	2.1	2.1	2.1	2.1
United States	%	2.3	6.3	3.0	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0
Brazil	%	7.0	8.2	5.4	3.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7
China	%	1.9	3.5	3.3	2.4	2.1	2.0	2.0	2.0	2.0	2.0	2.0
Egypt	%	7.8	8.3	11.2	7.7	7.5	7.5	7.6	7.0	6.6	6.2	5.8
India	%	4.0	4.9	5.5	4.6	4.4	4.2	4.2	4.0	3.9	3.7	3.6
Indonesia	%	1.5	3.6	3.3	3.0	2.9	2.9	2.9	2.8	2.8	2.7	2.6
Iran	%	2.2	6.3	3.0	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0
Malaysia	%	0.7	4.0	2.5	2.2	2.7	2.5	2.6	2.6	2.5	2.4	2.4
Pakistan	%	9.3	11.5	11.3	7.3	5.7	6.4	6.4	6.0	5.7	5.4	5.1
Russia	%	5.3	25.1	8.9	6.9	5.5	3.3	3.3	3.3	3.3	3.3	3.3
Saudi Arabia	%	3.2	16.0	-5.2	-2.2	-0.9	-0.1	0.5	0.5	0.5	0.5	0.5
South Africa	%	5.3	3.8	3.2	4.3	4.5	4.6	4.6	4.4	4.2	4.0	3.9
Ukraine	%	11.0	8.2	6.7	5.6	5.3	5.0	4.8	4.5	4.3	4.2	4.0
OECD[3]	%	3.3	10.3	7.9	5.7	4.8	4.8	5.3	6.2	5.5	4.6	3.4
WORLD INPUT PRICES												
Brent crude oil[4]	USD/barrel	58.9	100.0	84.8	85.4	85.9	86.4	87.0	87.5	88.1	88.6	89.2
Fertiliser[5]	USD/t	95.6	138.4	96.2	98.5	98.7	97.7	95.2	94.9	95.2	95.7	96.3
EXCHANGE RATES												
Australia	AUD/USD	1.41	1.36	1.33	1.32	1.33	1.33	1.34	1.34	1.35	1.35	1.36
Canada	CAD/USD	1.31	1.26	1.23	1.21	1.20	1.20	1.19	1.18	1.17	1.17	1.16
Chile	CLP/USD	740.82	779.70	743.90	722.19	708.86	701.30	696.65	691.99	687.33	682.68	678.02
European Union	EUR/USD	0.87	0.88	0.87	0.86	0.85	0.85	0.84	0.83	0.83	0.82	0.81
Japan	JPY/USD	108.50	113.32	108.11	104.75	100.59	97.41	94.33	91.35	88.46	85.66	82.95
Korea	KRW/USD	1 163.33	1 200.69	1 195.68	1 190.22	1 186.81	1 185.39	1 183.97	1 182.56	1 181.14	1 179.73	1 178.32
Mexico	MXN/USD	20.25	21.04	21.41	21.61	21.83	22.06	22.29	22.52	22.75	22.98	23.22
New Zealand	NZD/USD	1.49	1.46	1.45	1.45	1.46	1.47	1.48	1.48	1.49	1.50	1.51
Brazil	BRL/USD	4.83	5.16	5.10	5.04	5.04	5.06	5.07	5.09	5.10	5.11	5.13
China	CNY/USD	6.76	6.11	6.04	6.02	6.01	6.00	6.00	5.99	5.99	5.98	5.97
Egypt	EGP/USD	16.49	16.74	18.92	19.79	20.53	21.40	22.34	23.29	24.23	25.17	26.11
India	INR/USD	73.79	79.91	82.76	85.29	87.70	90.10	92.58	95.07	97.56	100.05	102.54
Indonesia	'000 IDR/USD	14.34	14.37	14.39	14.56	14.73	14.89	15.06	15.23	15.40	15.56	15.73
Malaysia	MYR/USD	4.14	3.79	3.73	3.72	3.72	3.72	3.73	3.73	3.73	3.74	3.74
Pakistan	PKR/USD	119.68	134.35	145.19	152.07	157.45	164.33	171.49	178.30	184.79	190.95	196.81
Russia	RUB/USD	70.13	81.50	92.62	100.23	105.29	108.17	111.14	114.19	117.32	120.53	123.84
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	15.24	15.36	15.31	15.49	15.78	16.14	16.84	17.54	18.24	18.94	19.64
Ukraine	UAH/USD	26.78	27.41	27.66	27.80	27.80	27.80	27.80	27.80	27.80	27.80	27.80
United Kingdom	GBP/USD	0.76	0.74	0.73	0.71	0.70	0.70	0.69	0.68	0.67	0.67	0.66

Table C.10. Economic assumptions *(cont.)*

Calendar year

		2021est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
POPULATION[1]												
Australia	%	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9
Canada	%	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7
Chile	%	0.5	0.2	0.0	-0.1	0.0	0.1	0.2	0.2	0.3	0.3	0.4
European Union	%	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Japan	%	-0.3	-0.4	-0.4	-0.4	-0.5	-0.5	-0.5	-0.5	-0.5	-0.6	-0.6
Korea	%	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1
Mexico	%	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.7
New Zealand	%	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6
Norway	%	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7
Switzerland	%	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5
Türkiye	%	0.8	0.6	0.5	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.6
United Kingdom	%	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3
United States	%	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Argentina	%	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7
Brazil	%	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4
China	%	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0
Egypt	%	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.6	1.5	1.5
India	%	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7
Indonesia	%	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7
Iran	%	1.2	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7
Malaysia	%	1.3	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	0.9	0.9
Pakistan	%	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.5
Russia	%	0.0	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3
Saudi Arabia	%	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.0	1.0	1.0
South Africa	%	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9
Ukraine	%	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
OECD[3]	%	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2
World	%	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8

		Average 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
PER CAPITA GDP in constant 2010 US dollars[1]												
Australia	%	-0.1	3.0	1.4	1.2	1.3	1.5	1.5	1.5	1.5	1.6	1.6
Canada	%	-0.4	3.1	1.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Chile	%	1.2	1.3	0.5	1.7	2.2	2.4	2.3	2.2	2.0	2.0	1.8
European Union	%	-0.1	2.8	2.3	1.8	1.6	1.5	1.5	1.5	1.5	1.5	1.5
Japan	%	-0.6	2.8	2.7	1.2	1.1	0.9	1.0	1.0	1.0	1.0	1.0
Korea	%	1.7	2.5	2.9	2.6	2.5	2.4	2.4	2.4	2.5	2.5	2.5
Mexico	%	-1.9	1.0	1.5	0.9	1.0	1.1	1.2	1.2	1.2	1.2	1.3
New Zealand	%	1.3	1.9	1.9	1.2	0.9	1.7	1.7	1.8	1.8	1.8	1.8
Norway	%	0.6	3.1	1.7	1.4	0.8	0.5	0.5	0.5	0.5	0.5	0.5
Switzerland	%	-0.2	1.5	0.8	1.2	0.6	1.2	1.2	1.2	1.3	1.3	1.3
Türkiye	%	2.8	2.1	2.6	3.2	2.9	2.8	2.7	2.6	2.4	2.2	2.0
United Kingdom	%	-0.9	3.3	0.8	1.1	1.9	1.5	1.5	1.5	1.5	1.5	1.5
United States	%	0.9	3.1	1.7	0.9	1.1	1.1	1.2	1.2	1.2	1.2	1.2
Brazil	%	0.0	0.2	0.8	1.6	1.5	1.5	1.5	1.6	1.6	1.6	1.7
China	%	5.1	4.1	4.8	4.9	4.8	4.8	4.8	4.8	4.9	4.9	4.9
Egypt	%	2.2	4.0	3.2	3.7	4.0	4.1	4.2	3.9	3.7	3.4	3.2
India	%	1.1	7.1	5.9	6.0	6.1	5.6	5.3	5.0	4.7	4.4	4.2
Indonesia	%	1.0	4.4	5.0	4.8	4.5	4.3	4.3	4.1	3.9	3.7	3.5
Iran	%	-1.6	1.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.2	1.3
Malaysia	%	-0.5	4.3	4.3	3.7	3.3	3.3	2.9	2.8	2.7	2.6	2.5
Pakistan	%	-0.1	2.0	2.3	2.7	3.0	3.2	3.2	3.1	2.9	2.7	2.6
Russia	%	1.1	-8.5	-2.2	1.7	1.2	1.0	1.0	1.0	1.1	1.1	1.1
Saudi Arabia	%	-1.9	6.1	2.3	1.4	1.4	1.5	1.6	1.6	1.6	1.5	1.5
South Africa	%	-1.7	0.7	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4
Ukraine	%	1.5	4.3	4.1	4.5	4.7	4.7	4.6	4.4	4.3	4.2	4.1
OECD[3]	%	0.3	2.9	1.9	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3

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. 110, December 2021. For other economies, historical macroeconomic data were obtained from the IMF, World Economic Outlook, October 2021. Assumptions for the projection period draw on the historical 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 2019-21est and 2021est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Short-term update for crude oil price from the OECD Economic Outlook N°110 (December 2021). For 2021, the annual average daily spot price is used and 2022 is based on an estimates of the current situation. The oil prices follow the growth rate from the World bank crude oil average price during the projection period.
5. World Bank. Data for 2021 are estimated, projections by OECD and FAO Secretariats.

Source: OECD/FAO (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
CEREALS												
Wheat[1]	USD/t	287.1	345.7	284.1	260.4	256.7	256.0	260.0	262.7	265.2	268.2	271.0
Maize[2]	USD/t	221.8	268.0	218.0	200.0	196.1	195.8	199.8	201.6	202.9	204.5	206.0
Other coarse grains[3]	USD/t	244.7	318.9	259.0	236.8	231.4	229.0	234.0	237.1	240.2	242.9	245.4
Rice[4]	USD/t	404.0	398.4	400.5	404.8	408.8	410.6	411.9	412.7	413.7	414.7	415.9
Distiller's dry grains[5]	USD/t	186.5	182.7	176.9	174.3	170.1	168.9	171.7	173.5	175.2	176.5	177.2
OILSEEDS												
Soybean[6]	USD/t	510.7	560.3	497.2	472.2	475.0	480.0	489.4	499.6	504.8	512.4	523.3
Other oilseeds[7]	USD/t	612.1	720.5	589.9	581.7	559.5	562.1	577.5	585.0	593.7	602.9	612.4
Protein meals[8]	USD/t	407.5	437.5	391.5	373.2	371.4	375.2	385.7	392.7	399.5	406.9	412.3
Vegetable oils[9]	USD/t	1 145.1	1 218.5	1 091.3	1 109.3	1 100.2	1 117.5	1 129.9	1 147.5	1 163.0	1 181.8	1 200.8
SWEETENERS												
Raw sugar[10]	USD/t	353.8	421.8	355.6	326.8	318.0	316.4	321.7	326.7	331.6	336.3	341.0
Refined sugar[11]	USD/t	435.5	501.3	435.9	407.5	400.3	398.1	405.2	410.8	416.5	422.4	427.8
HFCS[12]	USD/t dw	906.2	851.4	740.5	694.4	682.8	679.6	689.4	697.8	706.6	714.7	721.1
Molasses[13]	USD/t	199.7	233.1	201.9	186.5	177.6	175.7	179.1	184.6	189.5	193.4	196.4
MEAT												
Beef and veal												
Price, EU[14]	USD/t dwt	4 215.6	5 182.2	4 603.1	4 256.0	4 284.7	4 313.6	4 355.4	4 382.9	4 424.6	4 462.8	4 493.2
Price, United States[15]	USD/t dwt	4 121.0	4 949.7	4 746.6	4 585.6	4 501.4	4 541.5	4 582.1	4 608.0	4 646.7	4 685.6	4 721.1
Price, Brazil[16]	USD/t dwt	4 497.0	5 570.1	4 917.2	4 545.7	4 585.6	4 624.7	4 666.7	4 693.8	4 740.1	4 783.4	4 817.0
Pigmeat												
Price, EU[17]	USD/t dwt	1 834.4	1 847.2	1 675.8	1 734.2	1 741.2	1 757.1	1 778.4	1 786.2	1 800.1	1 798.6	1 797.5
Price, United States[18]	USD/t dwt	1 616.9	2 236.4	1 806.6	1 721.0	1 632.6	1 656.9	1 678.2	1 683.5	1 688.8	1 685.5	1 677.8
Price, Brazil[19]	USD/t dwt	2 349.1	2 534.0	2 273.8	2 365.2	2 359.4	2 374.3	2 396.6	2 405.5	2 424.5	2 422.3	2 417.3
Poultry meat												
Price, EU[20]	USD/t rtc	2 162.1	2 447.4	2 354.4	2 389.5	2 438.3	2 481.3	2 526.2	2 546.2	2 559.2	2 574.6	2 590.3
Price, United States[21]	USD/t rtc	1 056.6	1 219.2	1 115.1	1 124.5	1 144.5	1 161.9	1 181.9	1 189.9	1 195.1	1 201.0	1 194.9
Price, Brazil[22]	USD/t rtc	1 550.8	1 809.9	1 652.9	1 667.0	1 696.9	1 723.9	1 754.7	1 768.4	1 776.3	1 785.6	1 794.1
Sheep meat												
Price, New Zealand[23]	USD/t dwt	4 884.8	4 964.7	4 926.2	4 964.3	5 006.1	5 066.1	5 136.4	5 181.4	5 252.5	5 306.1	5 341.4
FISH AND SEAFOOD												
Product traded[24]	USD/t	3 095.5	3 947.9	3 570.0	3 624.7	3 580.5	3 649.7	3 745.2	3 984.9	3 840.4	3 897.7	3 960.1
Aquaculture[25]	USD/t	3 026.0	3 740.8	3 407.6	3 490.3	3 481.9	3 577.0	3 689.3	3 932.5	3 829.7	3 919.9	4 012.7
Capture[26]	USD/t	1 881.7	2 216.4	2 072.7	2 099.9	2 082.4	2 112.4	2 153.5	2 254.0	2 197.1	2 221.7	2 248.4
Meal[27]	USD/t	1 453.1	1 558.3	1 484.4	1 548.6	1 381.1	1 415.5	1 502.2	1 611.9	1 546.7	1 585.5	1 625.6
Oil[28]	USD/t	1 910.3	2 312.5	2 028.6	1 922.0	1 738.8	1 744.1	1 773.3	2 108.8	1 979.2	2 033.1	2 088.2
DAIRY PRODUCTS												
Butter[29]	USD/t	4 495.2	4 833.9	4 544.7	4 412.7	4 395.1	4 438.8	4 532.5	4 583.7	4 690.6	4 764.5	4 843.4
Cheese[30]	USD/t	4 096.5	4 299.8	4 259.5	4 234.6	4 246.9	4 296.7	4 364.2	4 426.3	4 503.6	4 571.5	4 635.5
Skim milk powder[31]	USD/t	2 925.5	3 219.5	3 270.3	3 233.2	3 207.9	3 230.3	3 270.2	3 330.3	3 396.6	3 458.6	3 518.4
Whole milk powder[32]	USD/t	3 307.9	3 647.3	3 646.9	3 590.7	3 580.1	3 613.1	3 658.4	3 729.0	3 807.8	3 881.6	3 956.4
Whey powder[33]	USD/t	1 005.8	1 061.0	1 053.4	1 031.8	1 023.0	1 030.7	1 043.4	1 059.7	1 077.3	1 094.8	1 113.0
Casein[34]	USD/t	7 425.8	8 253.3	8 340.2	8 206.0	8 134.1	8 200.6	8 297.1	8 437.2	8 581.1	8 726.9	8 871.2
BIOFUEL												
Ethanol[35]	USD/hl	47.6	66.9	49.2	49.9	51.1	51.0	51.6	52.2	52.8	52.8	53.5
Biodiesel[36]	USD/hl	105.9	125.2	109.0	108.0	108.8	109.9	111.1	112.7	113.7	114.8	116.0
COTTON												
Cotton[37]	USD/t	1 964.1	2 622.6	2 190.9	1 986.4	1 794.5	1 814.8	1 832.4	1 848.1	1 855.9	1 857.8	1 854.6
ROOTS AND TUBERS												
Roots and tubers[38]	USD/t	436.4	450.9	463.0	459.6	469.8	474.0	484.1	487.6	493.2	501.7	504.4
USA GDP Deflator (2021=1)	**Index**	**0.971**	**1.063**	**1.095**	**1.122**	**1.145**	**1.167**	**1.190**	**1.214**	**1.237**	**1.262**	**1.287**

Table C.11. World prices *(cont.)*

Real price

		Average 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
CEREALS												
Wheat[1]	USD/t	294.4	325.2	259.5	232.1	224.3	219.4	218.5	216.5	214.4	212.6	210.6
Maize[2]	USD/t	227.7	252.1	199.2	178.3	171.3	167.8	167.9	166.1	164.0	162.1	160.2
Other coarse grains[3]	USD/t	251.0	300.0	236.6	211.2	202.2	196.2	196.7	195.4	194.1	192.5	190.8
Rice[4]	USD/t	416.4	374.9	365.9	360.9	357.2	351.8	346.1	340.1	334.3	328.7	323.2
Distiller's dry grains[5]	USD/t	192.1	172.0	161.6	155.4	148.6	144.7	144.2	143.0	141.6	139.9	137.7
OILSEEDS												
Soybean[6]	USD/t	524.8	527.3	454.2	421.0	415.0	411.3	411.3	411.7	408.0	406.1	406.8
Other oilseeds[7]	USD/t	627.6	678.0	538.9	518.6	488.8	481.6	485.2	482.1	479.8	477.9	476.1
Protein meals[8]	USD/t	418.9	411.7	357.6	332.8	324.5	321.5	324.1	323.6	322.9	322.5	320.5
Vegetable oils[9]	USD/t	1 174.2	1 146.5	997.0	989.1	961.2	957.5	949.4	945.7	939.9	936.7	933.4
SWEETENERS												
Raw sugar[10]	USD/t	363.5	396.9	324.8	291.4	277.8	271.1	270.4	269.2	268.0	266.5	265.1
Refined sugar[11]	USD/t	447.8	471.7	398.2	363.4	349.7	341.1	340.5	338.5	336.6	334.8	332.5
HFCS[12]	USD/t dw	934.9	801.1	676.5	619.1	596.6	582.3	579.3	575.1	571.1	566.5	560.5
Molasses[13]	USD/t	205.3	219.3	184.4	166.3	155.2	150.6	150.5	152.1	153.2	153.3	152.6
MEAT												
Beef and veal												
Price, EU[14]	USD/t dwt	4 339.4	4 876.3	4 205.1	3 794.6	3 743.5	3 696.0	3 659.9	3 611.9	3 575.9	3 537.2	3 492.6
Price, United States[15]	USD/t dwt	4 245.0	4 657.5	4 336.2	4 088.5	3 932.8	3 891.3	3 850.4	3 797.4	3 755.4	3 713.8	3 669.8
Price, Brazil[16]	USD/t dwt	4 626.7	5 241.3	4 492.0	4 052.9	4 006.4	3 962.6	3 921.4	3 868.1	3 830.9	3 791.3	3 744.3
Pigmeat												
Price, EU[17]	USD/t dwt	1 891.7	1 738.2	1 530.9	1 546.2	1 521.3	1 505.5	1 494.3	1 472.0	1 454.8	1 425.6	1 397.2
Price, United States[18]	USD/t dwt	1 660.2	2 104.4	1 650.4	1 534.4	1 426.3	1 419.7	1 410.2	1 387.4	1 364.9	1 335.9	1 304.1
Price, Brazil[19]	USD/t dwt	2 419.9	2 384.4	2 077.2	2 108.8	2 061.3	2 034.4	2 013.8	1 982.4	1 959.5	1 919.9	1 879.0
Poultry meat												
Price, EU[20]	USD/t rtc	2 228.3	2 302.9	2 150.8	2 130.5	2 130.3	2 126.0	2 122.8	2 098.3	2 068.3	2 040.7	2 013.4
Price, United States[21]	USD/t rtc	1 087.4	1 147.2	1 018.7	1 002.6	999.9	995.6	993.1	980.6	965.9	951.9	928.8
Price, Brazil[22]	USD/t rtc	1 597.8	1 703.1	1 510.0	1 486.3	1 482.5	1 477.0	1 474.5	1 457.3	1 435.6	1 415.3	1 394.6
Sheep meat												
Price, New Zealand[23]	USD/t dwt	5 036.5	4 671.6	4 500.2	4 426.1	4 373.7	4 340.7	4 316.1	4 269.9	4 245.0	4 205.6	4 151.9
FISH AND SEAFOOD												
Product traded[24]	USD/t	3 187.7	3 714.8	3 261.3	3 231.7	3 128.2	3 127.2	3 147.1	3 283.9	3 103.7	3 089.3	3 078.2
Aquaculture[25]	USD/t	3 119.5	3 520.0	3 113.0	3 111.9	3 042.0	3 064.9	3 100.1	3 240.7	3 095.1	3 106.9	3 119.1
Capture[26]	USD/t	1 939.2	2 085.5	1 893.5	1 872.2	1 819.4	1 810.0	1 809.6	1 857.5	1 775.7	1 760.9	1 747.7
Meal[27]	USD/t	1 497.4	1 466.3	1 356.1	1 380.7	1 206.6	1 212.8	1 262.3	1 328.3	1 250.0	1 256.6	1 263.6
Oil[28]	USD/t	1 966.7	2 176.0	1 853.2	1 713.6	1 519.2	1 494.4	1 490.1	1 737.8	1 599.6	1 611.4	1 623.2
DAIRY PRODUCTS												
Butter[29]	USD/t	4 625.5	4 548.5	4 151.8	3 934.3	3 839.9	3 803.3	3 808.7	3 777.3	3 790.9	3 776.3	3 764.8
Cheese[30]	USD/t	4 217.6	4 046.0	3 891.2	3 775.6	3 710.4	3 681.5	3 667.2	3 647.7	3 639.8	3 623.4	3 603.2
Skim milk powder[31]	USD/t	3 008.5	3 029.4	2 987.6	2 882.7	2 802.6	2 767.8	2 747.9	2 744.5	2 745.1	2 741.3	2 734.9
Whole milk powder[32]	USD/t	3 401.8	3 432.0	3 331.5	3 201.4	3 127.8	3 095.8	3 074.1	3 073.0	3 077.4	3 076.6	3 075.4
Whey powder[33]	USD/t	1 033.4	998.4	962.4	920.0	893.7	883.1	876.7	873.3	870.7	867.8	865.1
Casein[34]	USD/t	7 634.1	7 766.0	7 619.0	7 316.4	7 106.6	7 026.4	6 972.0	6 953.0	6 935.1	6 916.9	6 895.7
BIOFUEL												
Ethanol[35]	USD/hl	48.8	62.9	45.0	44.5	44.6	43.7	43.4	43.0	42.7	41.9	41.6
Biodiesel[36]	USD/hl	108.5	117.8	99.5	96.3	95.0	94.1	93.4	92.8	91.9	91.0	90.2
COTTON												
Cotton[37]	USD/t	2 016.1	2 467.8	2 001.4	1 771.1	1 567.8	1 555.0	1 539.7	1 523.0	1 499.9	1 472.5	1 441.6
ROOTS AND TUBERS												
Roots and tubers[38]	USD/t	449.8	424.3	422.9	409.8	410.5	406.2	406.8	401.8	398.6	397.6	392.1

ANNEX C

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 other products on calendar year basis. See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 are estimated. Real prices are deflated using USA GDP base year 2021=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. FAO all rice price index normalised to India, indica high quality 5% broken average 2014-2016 (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. US Choice steers, 5-area Direct c.w.e.
16. Brazil: frozen beef, export unit value, product weight.
17. EU average pigmeat producer price.
18. US Barrows and gilts, National base 51-52% lean c.w.e.
19. Brazil: frozen pigmeat, export unit value, product weight.
20. EU average producer price.
21. 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 (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Wheat												
World Trade	**kt**	**185 356**	**187 226**	**193 408**	**197 944**	**201 191**	**204 361**	**207 216**	**209 998**	**212 706**	**215 248**	**217 904**
OECD[1]	kt	39 292	37 707	39 432	40 256	40 759	40 965	41 116	41 200	41 358	41 468	41 653
Developing countries	kt	155 513	157 940	162 683	167 048	170 282	173 552	176 363	179 201	181 922	184 500	187 121
Least Developed Countries	kt	19 091	20 671	21 283	21 930	22 498	23 165	23 801	24 445	25 073	25 700	26 340
Maize												
World Trade	**kt**	**181 298**	**179 294**	**180 069**	**179 556**	**182 296**	**184 983**	**187 479**	**190 953**	**194 470**	**197 775**	**200 817**
OECD[1]	kt	78 031	80 441	81 346	81 271	81 916	82 376	83 069	84 254	85 616	86 899	88 066
Developing countries	kt	141 909	138 963	138 974	138 721	141 375	144 119	146 469	149 452	152 284	154 984	157 487
Least Developed Countries	kt	4 208	4 537	4 349	4 386	4 380	4 484	4 480	4 451	4 419	4 381	4 341
Other coarse grains												
World Trade	**kt**	**44 301**	**43 974**	**44 475**	**44 923**	**44 945**	**45 619**	**46 333**	**47 084**	**47 681**	**48 427**	**49 006**
OECD[1]	kt	9 317	8 700	8 855	9 045	9 030	9 033	9 036	9 093	9 179	9 287	9 355
Developing countries	kt	36 993	36 826	37 351	37 777	37 894	38 626	39 380	40 155	40 757	41 500	42 075
Least Developed Countries	kt	1 066	759	700	736	781	850	884	921	938	954	962
Rice												
World Trade	**kt**	**46 598**	**52 692**	**52 868**	**54 014**	**55 327**	**57 075**	**58 695**	**60 183**	**61 601**	**63 041**	**64 482**
OECD[1]	kt	6 728	6 709	6 731	6 816	6 922	7 029	7 135	7 236	7 328	7 416	7 506
Developing countries	kt	40 121	46 097	46 251	47 358	48 611	50 288	51 833	53 242	54 586	55 952	57 312
Least Developed Countries	kt	11 225	13 292	13 477	14 080	14 793	15 648	16 404	17 098	17 802	18 522	19 266
Soybean												
World Trade	**kt**	**160 482**	**167 018**	**169 637**	**170 910**	**171 976**	**173 114**	**174 711**	**175 313**	**176 715**	**177 985**	**178 801**
OECD[1]	kt	30 045	29 499	30 512	30 451	30 239	30 100	30 032	29 849	29 821	29 749	29 548
Developing countries	kt	138 051	144 778	146 537	147 924	149 325	150 713	152 532	153 447	155 049	156 519	157 659
Least Developed Countries	kt	1 617	1 684	1 728	1 769	1 804	1 842	1 883	1 919	1 961	2 003	2 039
Other oilseeds												
World Trade	**kt**	**21 330**	**22 530**	**24 005**	**23 829**	**24 269**	**24 650**	**24 825**	**25 122**	**25 338**	**25 577**	**25 799**
OECD[1]	kt	12 953	12 864	14 048	13 885	14 015	14 099	14 009	13 999	13 896	13 805	13 810
Developing countries	kt	9 929	11 388	11 664	11 651	11 998	12 331	12 622	12 942	13 247	13 566	13 763
Least Developed Countries	kt	347	386	440	480	507	537	545	554	563	570	574
Protein meals												
World Trade	**kt**	**91 072**	**92 880**	**94 007**	**94 956**	**96 411**	**97 160**	**97 886**	**99 011**	**99 764**	**100 424**	**101 540**
OECD[1]	kt	47 587	46 798	46 895	47 034	47 269	47 137	46 948	46 891	46 734	46 582	46 628
Developing countries	kt	51 738	54 306	55 392	56 238	57 550	58 519	59 544	60 883	61 922	62 878	64 123
Least Developed Countries	kt	1 363	1 553	1 567	1 612	1 671	1 767	1 872	1 983	2 085	2 192	2 308
Vegetable oils												
World Trade	**kt**	**84 280**	**87 528**	**88 681**	**89 360**	**90 247**	**90 853**	**91 455**	**92 065**	**92 546**	**92 953**	**93 536**
OECD[1]	kt	23 691	23 574	23 306	23 104	22 817	22 581	22 357	22 151	21 916	21 710	21 672
Developing countries	kt	62 035	65 325	66 776	67 654	68 842	69 671	70 496	71 319	72 039	72 654	73 270
Least Developed Countries	kt	7 058	7 573	7 839	8 086	8 329	8 558	8 810	9 053	9 286	9 502	9 711
Sugar												
World Trade	**kt**	**60 708**	**58 456**	**59 887**	**60 840**	**61 603**	**62 339**	**63 181**	**64 071**	**64 926**	**65 773**	**66 464**
OECD[1]	kt	13 056	11 917	11 830	11 984	11 943	11 875	11 790	11 722	11 675	11 643	11 552
Developing countries	kt	47 357	46 526	47 925	48 914	49 846	50 656	51 531	52 418	53 300	54 186	54 959
Least Developed Countries	kt	9 632	9 625	10 036	10 475	10 857	11 146	11 433	11 693	11 949	12 218	12 472
Beef[2]												
World Trade	**kt**	**11 011**	**11 581**	**11 896**	**12 070**	**12 180**	**12 278**	**12 379**	**12 478**	**12 580**	**12 678**	**12 782**
OECD[1]	kt	4 530	4 670	4 732	4 733	4 744	4 769	4 798	4 821	4 837	4 854	4 875
Developing countries	kt	6 935	7 455	7 689	7 878	7 994	8 095	8 195	8 296	8 406	8 512	8 620
Least Developed Countries	kt	89	128	166	211	231	248	263	278	297	317	340
Pigmeat[2]												
World Trade	**kt**	**11 617**	**11 936**	**11 304**	**10 824**	**10 674**	**10 571**	**10 509**	**10 471**	**10 456**	**10 447**	**10 470**
OECD[1]	kt	5 425	5 855	5 907	5 904	5 957	5 998	6 041	6 075	6 111	6 147	6 189
Developing countries	kt	7 773	7 864	7 249	6 799	6 615	6 489	6 404	6 352	6 321	6 297	6 295
Least Developed Countries	kt	146	167	209	220	236	252	268	284	300	316	334
Poultry meat												
World Trade	**kt**	**13 831**	**14 872**	**14 910**	**14 940**	**15 053**	**15 164**	**15 320**	**15 512**	**15 688**	**15 873**	**16 081**
OECD[1]	kt	4 074	4 300	4 387	4 439	4 468	4 490	4 504	4 519	4 526	4 535	4 552
Developing countries	kt	9 522	10 410	10 377	10 360	10 456	10 572	10 747	10 951	11 141	11 340	11 551
Least Developed Countries	kt	982	1 227	1 271	1 340	1 399	1 459	1 520	1 586	1 657	1 732	1 811
Sheep meat[2]												
World Trade	**kt**	**1 104**	**1 064**	**1 069**	**1 072**	**1 072**	**1 072**	**1 073**	**1 077**	**1 080**	**1 082**	**1 086**
OECD[1]	kt	446	444	437	432	426	421	415	410	405	400	396
Developing countries	kt	675	635	646	655	661	667	673	682	690	697	705
Least Developed Countries	kt	2	2	2	2	2	2	2	2	2	2	2

Table C.12.1. World trade projections, imports *(cont.)*

		Average 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Butter												
World Trade	**kt**	**1 022**	**994**	**1 028**	**1 026**	**1 038**	**1 053**	**1 070**	**1 086**	**1 097**	**1 113**	**1 126**
OECD[1]	kt	333	309	329	326	323	324	323	325	325	327	328
Developing countries	kt	582	565	581	590	606	621	638	651	662	675	688
Least Developed Countries	kt	10	9	11	13	16	22	32	38	42	47	51
Cheese												
World Trade	**kt**	**3 432**	**3 604**	**3 640**	**3 681**	**3 744**	**3 802**	**3 862**	**3 926**	**3 993**	**4 063**	**4 133**
OECD[1]	kt	1 737	1 777	1 787	1 811	1 836	1 860	1 885	1 910	1 936	1 964	1 996
Developing countries	kt	1 570	1 709	1 756	1 795	1 833	1 870	1 906	1 944	1 986	2 029	2 070
Least Developed Countries	kt	25	36	42	48	51	56	62	66	74	79	84
Whole milk powder												
World Trade	**kt**	**2 828**	**2 769**	**2 837**	**2 881**	**2 906**	**2 932**	**2 963**	**2 980**	**2 998**	**3 017**	**3 035**
OECD[1]	kt	162	138	165	177	177	178	179	178	178	178	178
Developing countries	kt	2 676	2 638	2 691	2 737	2 764	2 791	2 825	2 844	2 864	2 885	2 904
Least Developed Countries	kt	262	263	271	281	292	301	311	320	329	338	347
Skim milk powder												
World Trade	**kt**	**2 652**	**2 772**	**2 829**	**2 885**	**2 933**	**2 982**	**3 030**	**3 078**	**3 124**	**3 172**	**3 222**
OECD[1]	kt	538	544	550	555	559	564	567	571	574	578	582
Developing countries	kt	2 381	2 518	2 566	2 615	2 661	2 710	2 757	2 805	2 851	2 899	2 949
Least Developed Countries	kt	125	129	135	139	144	149	154	159	164	169	174
Fish												
World Trade	**kt**	**43 363**	**42 291**	**43 570**	**43 762**	**44 200**	**44 572**	**44 940**	**45 102**	**45 398**	**45 655**	**45 902**
OECD[1]	kt	22 839	22 865	23 296	23 383	23 492	23 544	23 713	23 821	23 702	23 701	23 723
Developing countries	kt	21 097	20 663	21 212	21 351	21 676	21 947	22 143	22 284	22 683	22 933	23 198
Least Developed Countries	kt	1 257	1 354	1 404	1 418	1 454	1 479	1 503	1 509	1 549	1 569	1 588
Fishmeal[3]												
World Trade	**kt**	**3 407**	**3 438**	**3 479**	**3 352**	**3 471**	**3 518**	**3 564**	**3 382**	**3 565**	**3 616**	**3 661**
OECD[1]	kt	1 148	1 046	1 058	989	1 007	987	970	897	939	933	929
Developing countries	kt	2 513	2 616	2 653	2 595	2 682	2 742	2 799	2 685	2 822	2 878	2 927
Least Developed Countries	kt	64	71	75	72	80	82	82	74	80	82	83
Fish oil[3]												
World Trade	**kt**	**908**	**921**	**936**	**926**	**947**	**975**	**987**	**982**	**1 014**	**1 034**	**1 045**
OECD[1]	kt	735	739	754	747	748	773	780	787	798	818	825
Developing countries	kt	313	282	292	292	315	318	321	297	322	325	330
Least Developed Countries	kt	5	5	5	5	5	5	5	5	5	5	5
Ethanol												
World Trade	**kt**	**11 475**	**11 610**	**11 712**	**11 705**	**11 690**	**11 673**	**11 658**	**11 640**	**11 606**	**11 578**	**11 569**
OECD[1]	kt	7 297	7 887	7 886	7 839	7 800	7 758	7 729	7 686	7 632	7 585	7 560
Developing countries	kt	5 354	6 005	5 987	5 970	5 944	5 924	5 896	5 880	5 858	5 837	5 826
Least Developed Countries	kt	316	277	296	304	308	310	311	312	313	313	314
Biodiesel												
World Trade	**kt**	**7 799**	**6 746**	**6 939**	**6 935**	**6 869**	**6 798**	**6 618**	**6 484**	**6 437**	**6 377**	**6 407**
OECD[1]	kt	7 246	6 489	6 509	6 482	6 427	6 362	6 189	6 059	6 016	5 961	5 992
Developing countries	kt	554	257	430	454	442	436	428	425	420	417	414
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Cotton												
World Trade	**kt**	**9 836**	**10 091**	**10 412**	**10 723**	**11 033**	**11 214**	**11 461**	**11 699**	**11 945**	**12 190**	**12 436**
OECD[1]	kt	1 626	1 696	1 540	1 556	1 580	1 605	1 629	1 653	1 670	1 686	1 698
Developing countries	kt	9 525	9 729	10 054	10 362	10 672	10 852	11 099	11 335	11 581	11 825	12 071
Least Developed Countries	kt	1 703	1 784	1 941	2 078	2 221	2 302	2 383	2 464	2 546	2 629	2 714
Roots and tubers												
World Trade	**kt**	**18 371**	**18 676**	**19 193**	**19 386**	**19 681**	**19 990**	**20 334**	**20 685**	**21 037**	**21 453**	**21 837**
OECD[1]	kt	3 673	3 830	3 797	3 886	3 885	3 924	3 945	3 967	3 991	3 999	4 017
Developing countries	kt	15 314	15 512	14 935	15 222	15 608	16 027	16 399	16 799	17 201	17 698	18 132
Least Developed Countries	kt	234	234	233	244	243	247	247	250	251	248	246

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 2019-21est: Data for 2021 are estimated.

1. Excludes Iceland (except for fish products) and Costa Rica but includes all EU member countries.
2. Excludes trade of live animals.
3. Data are in product weight.

Source: OECD/FAO (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Wheat												
OECD[1]	kt	106 588	100 987	104 169	104 540	105 455	106 708	107 749	108 671	109 477	110 041	110 808
Developing countries	kt	26 054	31 716	30 749	30 540	30 532	30 627	30 818	30 999	31 159	31 312	31 378
Least Developed Countries	kt	157	143	141	138	135	132	130	127	125	122	120
Maize												
OECD[1]	kt	66 513	67 019	65 705	63 105	63 525	63 838	63 821	63 963	64 205	64 502	64 498
Developing countries	kt	74 298	76 666	80 039	81 282	82 426	83 730	85 250	87 148	88 825	90 040	91 139
Least Developed Countries	kt	3 007	3 202	3 365	3 428	3 505	3 400	3 446	3 554	3 709	3 935	4 223
Other coarse grains												
OECD[1]	kt	31 532	32 630	32 007	32 205	32 045	32 430	32 813	33 100	33 249	33 460	33 492
Developing countries	kt	5 513	6 077	6 554	6 275	6 060	5 899	5 812	5 811	5 779	5 793	5 816
Least Developed Countries	kt	588	980	968	939	866	787	757	726	710	699	695
Rice												
OECD[1]	kt	3 668	3 608	3 636	3 568	3 623	3 721	3 746	3 774	3 802	3 835	3 842
Developing countries	kt	44 909	48 942	49 071	50 277	51 508	53 132	54 702	56 139	57 506	58 891	60 300
Least Developed Countries	kt	4 263	4 484	4 879	5 099	5 229	5 256	5 352	5 525	5 736	5 984	6 267
Soybean												
OECD[1]	kt	59 461	61 610	62 296	63 063	63 796	63 899	64 387	64 776	65 128	65 248	65 595
Developing countries	kt	95 932	102 483	104 364	104 838	105 129	106 125	107 193	107 363	108 373	109 485	109 910
Least Developed Countries	kt	20	18	18	18	18	18	18	17	17	17	17
Other oilseeds												
OECD[1]	kt	13 688	13 263	14 637	14 059	14 492	14 947	14 898	15 036	15 239	15 416	15 571
Developing countries	kt	3 041	3 197	3 267	3 397	3 377	3 293	3 346	3 371	3 376	3 387	3 403
Least Developed Countries	kt	315	342	383	396	399	367	375	375	372	371	370
Protein meals												
OECD[1]	kt	20 770	21 571	21 878	22 327	22 802	23 344	23 714	23 920	24 289	24 721	25 068
Developing countries	kt	62 135	62 884	63 512	63 830	64 543	64 491	64 597	65 296	65 439	65 407	65 954
Least Developed Countries	kt	356	346	356	339	325	298	275	254	239	225	213
Vegetable oils												
OECD[1]	kt	9 127	7 819	8 274	8 297	8 517	8 795	8 902	8 993	9 079	9 156	9 155
Developing countries	kt	66 453	68 687	69 020	69 432	69 733	69 822	70 105	70 390	70 543	70 622	70 966
Least Developed Countries	kt	566	578	563	541	518	497	477	458	440	425	410
Sugar												
OECD[1]	kt	6 936	8 191	7 968	7 562	7 736	7 972	7 890	7 980	8 023	8 050	8 087
Developing countries	kt	55 880	53 814	55 274	56 383	56 664	56 946	57 738	58 446	59 231	60 027	60 629
Least Developed Countries	kt	2 387	1 849	2 191	2 348	2 414	2 341	2 295	2 211	2 138	2 084	2 014
Beef[2]												
OECD[1]	kt	4 861	4 936	5 193	5 293	5 329	5 374	5 415	5 454	5 495	5 533	5 581
Developing countries	kt	5 770	6 415	6 387	6 422	6 507	6 570	6 632	6 690	6 752	6 811	6 868
Least Developed Countries	kt	13	11	10	9	8	7	6	6	5	5	5
Pigmeat[2]												
OECD[1]	kt	10 281	10 495	10 103	9 596	9 414	9 301	9 231	9 182	9 148	9 118	9 124
Developing countries	kt	1 665	1 750	1 511	1 518	1 539	1 548	1 553	1 561	1 576	1 593	1 606
Least Developed Countries	kt	1	1	1	1	1	1	1	1	1	1	1
Poultry meat												
OECD[1]	kt	7 414	6 897	6 893	6 901	6 911	6 954	7 010	7 076	7 122	7 189	7 290
Developing countries	kt	7 881	7 644	7 746	7 855	8 017	8 126	8 250	8 398	8 565	8 726	8 884
Least Developed Countries	kt	65	59	57	54	51	49	47	45	44	42	40
Sheep meat[2]												
OECD[1]	kt	1 051	1 076	1 084	1 091	1 098	1 104	1 109	1 116	1 123	1 131	1 138
Developing countries	kt	82	77	87	93	93	92	90	91	89	86	85
Least Developed Countries	kt	4	5	4	4	3	2	2	1	1	1	1
Butter												
OECD[1]	kt	841	789	823	826	844	858	874	889	899	913	925
Developing countries	kt	104	94	102	99	91	90	93	95	99	102	105
Least Developed Countries	kt	1	1	1	1	1	1	1	1	1	1	1
Cheese												
OECD[1]	kt	2 609	2 715	2 752	2 804	2 867	2 922	2 976	3 038	3 100	3 166	3 230
Developing countries	kt	577	576	570	555	549	547	548	548	551	556	565
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Whole milk powder												
OECD[1]	kt	2 010	2 034	2 102	2 144	2 165	2 184	2 215	2 226	2 240	2 253	2 265
Developing countries	kt	718	677	676	678	681	686	686	690	693	697	700
Least Developed Countries	kt	5	5	5	5	4	4	4	4	4	4	4
Skim milk powder												
OECD[1]	kt	2 372	2 422	2 487	2 553	2 607	2 659	2 709	2 757	2 801	2 848	2 899
Developing countries	kt	216	280	276	270	266	265	266	266	268	269	271
Least Developed Countries	kt	10	12	12	12	11	11	11	10	10	10	10

Table C.12.2. World trade projections, exports *(cont.)*

		Average 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Fish[3]												
OECD[1]	kt	13 076	13 566	13 554	13 662	13 963	14 182	14 285	14 254	14 536	14 686	14 804
Developing countries	kt	28 150	28 318	28 727	28 562	28 822	28 981	29 237	29 241	29 433	29 569	29 742
Least Developed Countries	kt	2 068	2 072	2 006	2 011	1 974	1 958	1 948	1 966	1 936	1 936	1 941
Fishmeal[4]												
OECD[1]	kt	960	870	883	879	882	922	930	902	914	940	945
Developing countries	kt	2 398	2 341	2 376	2 214	2 376	2 401	2 435	2 229	2 449	2 488	2 525
Least Developed Countries	kt	151	158	161	161	166	168	169	167	170	171	173
Fish oil[4]												
OECD[1]	kt	563	556	560	575	552	565	562	595	572	581	582
Developing countries	kt	512	534	542	517	541	554	564	544	579	591	595
Least Developed Countries	kt	40	31	33	35	37	39	41	41	41	41	41
Ethanol												
OECD[1]	kt	5 981	6 096	6 284	6 230	6 445	6 448	6 422	6 396	6 348	6 318	6 299
Developing countries	kt	3 984	4 015	3 929	3 974	3 743	3 722	3 734	3 743	3 757	3 759	3 770
Least Developed Countries	kt	36	31	31	31	31	31	31	31	31	31	31
Biodiesel												
OECD[1]	kt	2 647	2 311	2 353	2 397	2 441	2 488	2 537	2 603	2 661	2 723	2 774
Developing countries	kt	3 993	3 854	4 004	3 955	3 844	3 727	3 497	3 297	3 192	3 070	3 048
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Cotton												
OECD[1]	kt	4 375	4 481	4 469	4 501	4 528	4 570	4 632	4 680	4 742	4 806	4 875
Developing countries	kt	5 163	5 398	5 709	6 079	6 422	6 586	6 774	6 968	7 158	7 347	7 532
Least Developed Countries	kt	1 195	1 408	1 542	1 571	1 599	1 607	1 627	1 652	1 676	1 701	1 726
Roots and tubers												
OECD[1]	kt	1 761	1 819	1 832	1 840	1 859	1 872	1 888	1 897	1 909	1 933	1 945
Developing countries	kt	12 263	12 499	12 993	13 174	13 439	13 721	14 041	14 369	14 702	15 077	15 445
Least Developed Countries	kt	136	137	139	132	132	132	132	132	132	135	137

Note: Average 2019-21est: Data for 2021 are estimated.

1. Excludes Iceland (except for fish products) and Costa Rica 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 (2022), “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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**769 701**	**840 061**	**1.32**	**0.79**	**185 356**	**217 904**	**2.66**	**1.60**	**189 822**	**217 904**	**3.02**	**1.60**
NORTH AMERICA	78 878	88 735	-2.15	0.48	2 971	3 394	-3.36	0.87	47 568	50 909	-0.85	1.19
Canada	29 835	36 577	-0.96	1.07	204	148	13.36	2.26	22 294	26 706	-0.38	1.43
United States	49 043	52 159	-2.81	0.08	2 767	3 246	-3.98	0.81	25 275	24 203	-1.23	0.93
LATIN AMERICA	33 089	38 159	5.20	1.14	23 144	27 884	0.56	1.16	15 832	19 792	10.50	1.34
Argentina	19 817	23 436	10.80	1.41	3	3	0.00	-0.02	13 725	16 875	23.13	1.32
Brazil	6 400	7 457	1.55	1.52	6 164	6 712	-1.91	-0.31	571	589	-11.83	0.00
Chile	1 313	1 317	-1.36	-0.99	1 216	1 417	6.06	1.88	0	0	..	..
Colombia	5	4	-16.43	-1.17	1 932	2 131	3.36	0.61	20	18	30.72	-0.61
Mexico	3 172	3 217	-1.32	0.62	4 749	6 585	1.19	2.41	581	1 248	-6.08	7.40
Paraguay	992	1 133	-2.59	-0.50	1	1	-45.67	0.77	346	483	-6.83	-2.91
Peru	190	238	-2.25	1.21	2 169	2 696	3.10	1.35	3	3	-7.47	-0.32
EUROPE	262 827	273 761	2.49	0.80	8 288	8 075	-2.91	0.14	88 954	103 477	6.53	2.53
European Union[1]	133 907	126 677	0.28	-0.26	4 511	5 229	-3.04	1.47	33 832	32 046	0.87	0.78
United Kingdom	13 833	16 678	-0.37	1.02	1 516	734	-3.68	-5.65	751	1 185	-8.44	3.82
Russia	78 450	92 466	7.15	1.55	191	399	18.63	3.05	34 143	47 842	14.48	2.50
Ukraine	28 427	28 154	4.81	3.60	24	15	-12.82	-0.87	18 803	19 296	9.85	6.41
AFRICA	27 363	34 264	0.82	0.99	50 666	62 948	2.14	2.28	847	490	-0.59	-2.04
Egypt	9 000	10 416	-0.50	1.30	12 415	15 219	3.21	1.93	390	169	23.61	-1.62
Ethiopia	5 529	6 971	5.10	0.91	1 350	1 959	5.98	9.49	0	0	..	..
Nigeria	65	67	-4.03	0.40	5 722	8 158	4.31	2.86	1	1	-7.68	-0.64
South Africa	1 971	2 368	1.44	1.80	1 688	1 862	0.39	-0.23	87	47	-13.32	-4.69
ASIA	339 064	374 434	1.00	0.81	99 155	114 538	4.39	1.49	17 122	22 261	-0.76	-0.09
China[2]	134 307	135 740	0.98	0.15	8 599	7 916	12.94	-0.42	265	219	-2.14	1.48
India	107 017	124 602	1.95	1.30	3	5	-24.63	0.27	3 606	5 500	-9.73	-2.53
Indonesia	0	0	..	..	10 592	12 523	5.59	1.58	72	63	-3.24	-1.56
Iran	12 500	13 001	3.25	0.31	3 595	5 380	-15.36	3.24	50	51	4.92	-0.33
Japan	1 010	1 067	1.94	0.25	5 537	5 493	-1.27	-0.09	0	0	..	..
Kazakhstan	12 508	16 455	0.73	1.89	1 200	1 348	79.47	-1.87	7 187	10 792	1.06	1.91
Korea	21	23	-2.42	0.73	3 910	4 647	-1.53	0.92	50	55	0.09	0.70
Malaysia	0	0	..	..	1 452	1 699	0.43	1.10	94	88	1.29	-1.08
Pakistan	25 633	30 781	0.83	1.28	1 853	2 296	10.70	13.30	47	45	-29.76	-1.06
Philippines	0	0	..	..	6 125	7 588	6.82	1.76	47	41	388.49	-1.73
Saudi Arabia	402	377	-7.37	-0.12	3 142	3 975	1.80	1.25	0	0	..	..
Thailand	1	1	-2.28	0.22	3 218	3 812	3.47	1.10	20	11	5.78	-1.09
Türkiye	19 067	22 590	-1.19	1.05	9 557	8 447	11.01	0.68	4 167	4 256	4.15	-0.68
Viet Nam	0	0	..	..	3 693	4 781	8.82	1.99	46	37	-9.01	-1.95
OCEANIA	28 479	30 707	1.51	0.71	1 133	1 065	3.21	0.53	19 497	20 976	-0.38	0.57
Australia	28 054	30 220	1.53	0.70	258	28	23.60	-0.84	19 497	20 976	-0.38	0.57
New Zealand	425	487	-0.76	1.32	474	500	0.17	0.65	0	0	..	..
DEVELOPED COUNTRIES	**396 516**	**425 227**	**1.25**	**0.78**	**29 843**	**30 782**	**-0.15**	**0.26**	**163 767**	**186 525**	**2.85**	**1.87**
DEVELOPING COUNTRIES	**373 185**	**414 834**	**1.41**	**0.80**	**155 513**	**187 121**	**3.28**	**1.84**	**26 054**	**31 378**	**4.17**	**0.11**
LEAST DEVELOPED COUNTRIES (LDC)	9 092	10 191	-0.65	1.11	19 091	26 340	5.89	2.73	157	120	-2.30	-1.94
OECD[3]	**280 642**	**291 976**	**-0.37**	**0.24**	**39 292**	**41 653**	**1.00**	**0.86**	**106 588**	**110 808**	**0.11**	**0.94**
BRICS	**328 145**	**362 632**	**2.53**	**0.92**	**16 644**	**16 895**	**3.49**	**-0.29**	**38 673**	**54 196**	**8.57**	**1.81**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**756 649**	**838 667**	**1.20**	**0.79**	**524 843**	**581 412**	**1.21**	**0.88**	**67.7**	**67.8**	**0.09**	**-0.02**
NORTH AMERICA	39 236	41 056	-1.48	0.43	29 160	30 262	0.25	0.38	79.1	77.1	-0.43	-0.19
Canada	8 609	9 992	-0.12	1.30	2 996	3 198	1.27	0.71	79.4	77.8	0.30	-0.06
United States	30 627	31 065	-1.82	0.17	26 164	27 064	0.14	0.34	79.0	77.0	-0.51	-0.20
LATIN AMERICA	40 431	46 192	1.38	1.02	35 221	39 516	0.91	1.00	54.0	55.8	-0.07	0.27
Argentina	5 961	6 564	1.28	0.91	5 360	5 958	1.05	1.00	118.6	120.6	0.06	0.20
Brazil	12 376	13 564	1.51	0.94	11 460	12 674	1.10	0.96	53.9	56.4	0.29	0.49
Chile	2 546	2 732	1.60	0.40	2 068	2 129	1.32	0.19	108.3	109.0	0.13	0.03
Colombia	1 904	2 115	3.14	0.77	1 772	1 941	2.83	0.65	34.9	36.2	1.54	0.18
Mexico	7 240	8 544	0.79	0.97	6 549	7 434	1.52	1.14	50.8	52.4	0.34	0.29
Paraguay	519	635	1.30	1.55	368	415	1.39	1.05	51.6	51.7	0.07	0.01
Peru	2 340	2 927	2.42	1.38	1 975	2 214	1.56	1.00	59.9	61.0	0.12	0.15
EUROPE	176 763	178 216	0.10	-0.34	79 494	80 066	-0.01	0.02	106.2	108.1	-0.15	0.13
European Union[1]	103 568	99 875	-0.16	-0.59	49 198	50 131	0.12	0.18	110.5	113.6	0.01	0.27
United Kingdom	14 619	16 212	-0.01	0.61	6 076	6 856	-1.05	0.54	89.5	97.0	-1.67	0.19
Russia	41 911	44 947	2.05	-0.04	14 680	13 933	0.28	-0.49	100.6	97.5	0.12	-0.27
Ukraine	8 458	8 830	-4.33	-0.76	4 665	4 332	-0.96	-0.70	106.7	106.7	-0.46	-0.01
AFRICA	78 969	96 246	2.21	1.81	68 634	83 955	2.60	1.80	51.7	49.1	0.03	-0.49
Egypt	21 440	25 431	1.20	1.68	19 340	23 222	2.19	1.63	189.0	189.3	0.08	0.02
Ethiopia	6 895	8 890	5.36	2.25	5 712	7 355	5.52	2.21	49.7	49.7	2.74	-0.07
Nigeria	5 612	8 198	3.84	2.83	5 162	7 328	4.03	2.86	25.0	27.2	1.35	0.42
South Africa	3 575	4 171	1.63	0.94	3 319	3 696	1.09	0.97	56.0	55.5	-0.33	-0.05
ASIA	411 467	466 166	1.75	1.07	309 432	344 251	1.38	0.90	67.1	69.2	0.43	0.24
China[2]	136 469	144 112	1.50	0.31	93 900	96 206	0.66	0.11	65.2	65.7	0.18	-0.01
India	101 080	118 425	1.90	1.51	83 641	94 601	1.43	1.08	60.6	62.5	0.36	0.26
Indonesia	10 536	12 454	5.68	1.60	7 269	8 744	2.63	1.36	26.6	29.0	1.42	0.50
Iran	15 933	18 216	2.00	1.08	14 200	16 097	1.40	1.08	169.1	172.4	0.06	0.17
Japan	6 547	6 561	-0.96	-0.04	5 201	5 201	-0.33	-0.10	41.1	43.3	-0.12	0.40
Kazakhstan	6 255	6 990	-1.46	0.99	2 667	2 959	1.16	0.89	142.1	142.2	-0.25	0.01
Korea	3 893	4 609	-1.93	0.93	2 449	2 533	0.45	0.28	47.8	49.6	0.19	0.34
Malaysia	1 382	1 609	1.04	1.25	1 055	1 199	1.91	1.08	32.6	32.9	0.55	0.05
Pakistan	26 873	33 007	1.56	1.72	26 029	31 608	2.05	1.69	117.8	118.4	-0.03	-0.01
Philippines	6 245	7 540	6.60	1.79	2 706	3 369	2.67	1.82	24.7	26.9	1.17	0.64
Saudi Arabia	3 697	4 316	1.81	1.28	3 417	3 924	2.07	1.16	98.2	98.8	-0.06	0.02
Thailand	3 366	3 796	3.55	1.32	1 118	1 065	0.74	0.18	16.0	15.2	0.39	0.15
Türkiye	24 056	26 645	1.59	0.97	17 959	19 245	1.72	0.56	213.1	214.6	0.22	0.03
Viet Nam	3 531	4 738	5.89	2.03	1 684	2 141	3.19	1.73	17.3	20.5	2.16	1.10
OCEANIA	9 782	10 790	3.03	0.76	2 903	3 362	1.50	1.34	69.5	70.8	0.08	0.19
Australia	8 461	9 277	3.49	0.67	2 133	2 425	1.44	1.16	83.7	85.3	0.11	0.19
New Zealand	898	986	-0.79	0.96	426	503	1.28	1.49	88.4	96.6	0.34	0.81
DEVELOPED COUNTRIES	**261 367**	**269 114**	**-0.09**	**-0.03**	**134 278**	**138 528**	**0.22**	**0.25**	**93.7**	**94.5**	**-0.19**	**0.07**
DEVELOPING COUNTRIES	**495 281**	**569 552**	**1.94**	**1.21**	**390 565**	**442 884**	**1.58**	**1.08**	**61.8**	**62.3**	**0.28**	**0.03**
LEAST DEVELOPED COUNTRIES (LDC)	28 422	36 319	3.91	2.27	24 106	30 723	3.70	2.30	27.1	27.3	1.32	0.13
OECD[3]	**216 487**	**222 499**	**-0.09**	**0.07**	**125 254**	**131 180**	**0.46**	**0.38**	**89.7**	**91.1**	**-0.08**	**0.12**
BRICS	**295 411**	**325 219**	**1.72**	**0.70**	**207 000**	**221 110**	**0.97**	**0.54**	**64.0**	**64.8**	**0.22**	**0.09**

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**1 173 293**	**1 334 990**	**2.31**	**1.13**	**181 298**	**200 817**	**6.27**	**1.36**	**174 013**	**195 817**	**5.62**	**1.40**
NORTH AMERICA	376 442	420 118	1.85	0.58	3 160	3 474	2.35	0.94	60 693	58 893	8.18	-0.35
Canada	13 650	14 478	0.66	0.83	2 123	2 402	17.17	1.61	1 159	1 676	-0.77	1.61
United States	362 791	405 640	1.90	0.57	1 037	1 072	-7.76	-0.42	59 534	57 217	8.64	-0.40
LATIN AMERICA	203 149	238 523	3.97	1.33	40 709	51 056	6.96	1.95	67 133	84 297	5.46	2.10
Argentina	60 433	66 212	8.79	1.14	4	4	0.19	-0.03	38 216	38 903	10.67	0.76
Brazil	98 837	123 478	3.09	1.64	2 372	2 347	15.50	-0.80	26 359	41 927	1.04	3.46
Chile	719	694	-8.25	-1.80	2 720	2 801	11.24	1.63	20	20	-12.74	-0.89
Colombia	1 382	1 403	-3.54	0.10	6 018	8 343	6.94	2.51	1	1	-10.76	-0.19
Mexico	27 268	29 516	2.61	0.67	16 628	20 592	9.29	1.72	893	1 345	5.77	3.09
Paraguay	4 629	5 835	1.48	2.47	13	10	2.62	0.05	1 622	2 079	-6.42	2.96
Peru	1 541	1 739	-0.57	-0.02	3 805	5 459	7.38	3.44	10	10	3.55	-0.43
EUROPE	130 363	132 920	2.53	1.44	18 502	22 258	4.51	0.92	35 750	41 374	4.71	3.28
European Union[1]	68 052	68 270	0.75	0.09	15 820	20 052	5.17	1.05	4 421	3 907	2.25	0.89
United Kingdom	0	0	..	..	1 832	1 489	2.24	-0.12	0	0	..	..
Russia	14 387	18 273	4.48	2.22	45	125	-0.03	4.86	3 644	7 193	3.05	3.35
Ukraine	36 013	32 808	5.21	4.60	30	39	-5.14	-0.42	24 596	25 670	5.32	3.29
AFRICA	93 349	120 460	3.41	2.24	23 011	29 047	3.75	2.39	5 076	6 302	2.96	2.66
Egypt	6 730	7 947	-2.05	0.59	10 076	13 668	5.79	2.93	0	0	..	..
Ethiopia	10 071	11 730	6.15	2.04	0	0	-76.48	..	900	13	2.32	-32.12
Nigeria	12 482	14 622	4.80	1.30	104	441	-12.81	49.55	1	0	2.12	-20.46
South Africa	16 792	19 589	4.17	1.23	0	0	-81.36	..	3 145	3 781	8.79	1.53
ASIA	369 455	422 350	1.68	1.18	95 730	94 875	7.25	0.89	5 302	4 891	-0.47	-2.44
China[2]	264 813	297 199	1.22	1.09	19 869	6 804	25.54	-5.27	22	53	-4.21	13.32
India	30 947	37 020	4.23	1.42	171	40	24.92	-2.10	2 077	1 897	-6.38	-4.52
Indonesia	22 801	27 401	2.66	1.40	912	1 367	-14.84	7.60	15	15	-6.17	-0.73
Iran	1 225	1 284	-5.92	-0.14	9 461	10 935	9.95	1.34	0	0	..	..
Japan	0	0	..	..	15 575	15 151	0.79	0.04	0	0	..	..
Kazakhstan	994	1 602	7.95	3.24	5	4	51.78	0.41	67	571	29.30	5.93
Korea	76	71	-0.97	-0.65	11 467	11 179	2.71	-0.19	0	0	..	..
Malaysia	85	92	1.74	0.13	3 839	4 781	1.57	1.90	11	8	5.04	-1.86
Pakistan	8 016	9 185	7.77	1.24	25	794	13.81	50.38	63	1	-14.35	-32.72
Philippines	8 099	9 543	1.16	1.36	504	931	10.60	9.04	0	0	..	..
Saudi Arabia	87	92	-0.55	-0.31	3 739	4 773	5.54	3.05	0	0	..	..
Thailand	4 639	5 603	-0.32	1.17	1 684	1 969	41.93	3.08	28	24	-26.26	-0.37
Türkiye	6 433	7 787	2.34	1.88	2 605	2 646	6.80	1.37	382	229	19.89	-1.31
Viet Nam	4 582	4 625	-1.61	-0.11	11 498	16 848	19.73	3.18	447	196	44.11	-3.08
OCEANIA	536	619	-3.25	0.57	185	106	42.46	0.26	60	59	-5.72	-2.20
Australia	323	383	-4.66	0.66	4	4	255.58	0.00	57	56	-5.20	-2.44
New Zealand	200	220	-0.89	0.42	180	100	48.72	0.06	2	4	-14.31	3.10
DEVELOPED COUNTRIES	**527 083**	**577 173**	**2.07**	**0.80**	**39 389**	**43 330**	**2.31**	**0.69**	**99 715**	**104 678**	**6.85**	**1.03**
DEVELOPING COUNTRIES	**646 210**	**757 817**	**2.54**	**1.38**	**141 909**	**157 487**	**7.63**	**1.55**	**74 298**	**91 139**	**4.63**	**1.84**
LEAST DEVELOPED COUNTRIES (LDC)	46 021	64 794	3.53	2.95	4 208	4 341	13.25	-0.16	3 007	4 223	2.91	2.48
OECD[3]	**481 136**	**528 714**	**1.67**	**0.53**	**78 031**	**88 066**	**4.52**	**0.99**	**66 513**	**64 498**	**7.62**	**-0.22**
BRICS	**425 777**	**495 559**	**2.03**	**1.30**	**22 457**	**9 316**	**21.40**	**-4.27**	**35 247**	**54 851**	**1.29**	**2.89**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), “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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**1 181 733**	**1 336 113**	**2.85**	**1.03**	**690 227**	**806 294**	**3.37**	**1.31**	**18.9**	**20.3**	**0.64**	**0.63**
NORTH AMERICA	324 017	363 802	1.37	0.78	146 061	172 997	1.70	1.19	17.2	17.3	-0.40	-0.20
Canada	14 557	15 194	2.66	0.85	9 127	9 227	4.10	0.99	27.2	29.2	-2.61	-0.76
United States	309 459	348 608	1.31	0.77	136 934	163 770	1.55	1.21	16.1	15.9	-0.02	-0.10
LATIN AMERICA	177 671	204 805	4.55	1.22	117 036	137 699	4.69	1.49	50.4	52.3	0.05	0.34
Argentina	22 107	27 226	6.13	1.73	17 277	20 604	8.81	1.94	36.4	37.5	1.40	0.20
Brazil	74 711	83 630	4.55	0.87	49 293	57 832	2.57	1.30	24.5	24.7	0.12	0.12
Chile	3 454	3 473	4.07	0.90	2 987	3 010	4.86	0.99	21.3	21.3	0.34	-0.02
Colombia	7 502	9 734	4.50	2.20	6 531	8 680	5.08	2.41	18.1	18.5	0.32	0.10
Mexico	43 603	48 712	5.13	1.03	24 673	26 891	8.84	0.95	136.1	141.7	0.15	0.38
Paraguay	3 231	3 751	12.75	2.14	655	893	5.34	3.24	52.0	50.7	-1.10	0.02
Peru	5 388	7 181	4.84	2.57	4 732	6 523	5.55	2.75	15.5	15.8	1.13	0.06
EUROPE	108 944	113 709	1.12	0.33	86 350	89 924	1.30	0.67	8.5	8.7	0.19	0.27
European Union[1]	82 013	84 407	1.37	0.26	65 050	66 705	1.56	0.59	10.6	11.0	0.09	0.35
United Kingdom	1 860	1 489	4.71	-0.12	1 245	807	7.27	-1.40	5.7	5.4	2.00	-0.32
Russia	9 921	11 168	3.07	1.44	8 334	9 757	3.94	1.43	1.4	1.5	2.33	0.99
Ukraine	6 687	7 230	-3.69	-1.08	4 961	5 179	-4.18	0.18	10.8	11.1	-0.14	0.26
AFRICA	109 801	142 850	3.45	2.24	37 818	47 622	3.38	2.11	42.9	44.8	0.34	0.31
Egypt	16 773	21 577	1.99	1.99	11 956	16 234	2.04	2.32	41.5	39.7	-0.50	-0.39
Ethiopia	8 971	11 597	6.17	2.31	1 683	2 066	7.93	2.22	50.6	53.8	2.66	0.38
Nigeria	12 685	15 059	4.60	1.67	2 733	3 145	9.66	1.00	35.0	34.6	0.29	-0.13
South Africa	12 965	15 740	2.09	1.16	5 473	6 596	0.67	1.61	89.1	87.7	-0.08	-0.18
ASIA	460 638	510 281	3.67	0.99	302 466	357 566	4.41	1.37	9.5	9.4	0.42	-0.01
China[2]	286 332	302 187	3.55	0.62	181 333	207 940	3.86	1.05	10.0	10.0	0.43	0.01
India	28 656	35 011	5.60	1.86	14 359	18 953	7.41	2.52	6.1	5.7	-0.21	-0.53
Indonesia	23 679	28 741	0.96	1.62	12 120	15 960	7.51	2.34	29.3	29.6	0.09	0.12
Iran	10 519	12 205	7.10	1.17	10 294	11 949	7.29	1.17	0.9	0.9	-1.32	0.03
Japan	15 375	15 158	0.80	-0.17	12 438	12 614	1.81	-0.04	0.8	0.9	0.58	0.51
Kazakhstan	815	1 033	5.52	1.89	649	826	5.82	1.91	0.5	0.5	-1.06	-0.01
Korea	11 338	11 245	2.69	-0.32	9 100	8 925	3.20	-0.41	2.0	2.0	0.92	0.09
Malaysia	3 930	4 860	1.59	1.95	3 672	4 562	1.32	2.01	2.0	2.0	3.04	0.00
Pakistan	7 978	9 962	8.10	2.27	4 483	5 852	12.63	2.58	10.7	10.9	4.89	0.51
Philippines	8 676	10 469	1.64	1.84	5 733	7 283	0.98	2.34	18.8	18.0	0.76	-0.26
Saudi Arabia	3 792	4 846	5.44	3.15	3 586	4 559	5.25	3.20	0.2	0.2	-2.09	0.01
Thailand	6 311	7 544	5.05	1.62	5 939	7 154	5.45	1.72	1.2	1.2	-0.34	-0.23
Türkiye	8 723	10 177	3.99	1.70	6 783	8 263	5.14	2.13	15.9	15.8	-0.21	-0.05
Viet Nam	15 786	21 270	9.28	2.44	12 111	17 173	8.72	2.64	8.1	8.1	3.02	0.07
OCEANIA	662	666	0.64	0.80	497	486	2.87	0.96	2.3	2.0	-0.94	-1.06
Australia	270	332	-4.15	1.28	129	181	-3.71	2.22	3.1	2.7	-0.95	-1.19
New Zealand	378	316	5.82	0.28	365	302	6.41	0.27	1.5	1.5	-0.93	0.06
DEVELOPED COUNTRIES	**466 602**	**514 750**	**1.33**	**0.67**	**254 862**	**287 585**	**1.58**	**0.99**	**12.8**	**13.3**	**0.18**	**0.25**
DEVELOPING COUNTRIES	**715 131**	**821 362**	**3.95**	**1.27**	**435 365**	**518 709**	**4.54**	**1.49**	**20.2**	**21.7**	**0.65**	**0.63**
LEAST DEVELOPED COUNTRIES (LDC)	46 927	64 894	4.15	2.73	12 457	17 455	7.72	2.65	30.0	33.9	0.48	1.01
OECD[3]	**500 723**	**551 286**	**1.78**	**0.71**	**277 385**	**311 631**	**2.42**	**0.99**	**23.0**	**24.6**	**0.41**	**0.57**
BRICS	**412 584**	**447 736**	**3.80**	**0.79**	**258 791**	**301 077**	**3.69**	**1.21**	**10.3**	**10.2**	**0.22**	**-0.09**

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**307 094**	**335 422**	**0.67**	**0.91**	**44 301**	**49 006**	**2.49**	**1.23**	**47 927**	**52 632**	**1.78**	**1.14**
NORTH AMERICA	27 761	29 868	-0.03	0.08	1 501	1 707	-4.60	-0.99	11 632	11 884	2.20	-0.01
Canada	13 807	15 359	0.97	0.36	106	62	6.51	-0.19	5 472	6 182	1.99	1.31
United States	13 954	14 508	-0.91	-0.20	1 396	1 645	-5.08	-1.02	6 159	5 702	2.81	-1.26
LATIN AMERICA	20 129	22 829	-1.55	0.80	1 978	1 712	-6.28	1.90	4 123	4 450	-2.36	1.05
Argentina	7 357	8 385	-2.31	0.79	1	1	0.04	0.00	3 962	4 228	-2.33	1.40
Brazil	3 752	4 797	3.74	1.92	530	555	2.85	2.04	6	3	-18.72	-0.04
Chile	790	815	0.11	-0.46	64	56	-22.27	11.89	30	48	-9.03	-8.38
Colombia	21	19	-10.22	0.16	327	389	-8.46	1.37	0	0	..	..
Mexico	5 528	5 793	-4.65	0.37	790	448	-5.56	0.77	11	36	24.33	-0.39
Paraguay	108	129	-0.02	1.35	0	2	..	125.62	3	0	-2.89	..
Peru	264	313	-0.15	0.39	154	162	6.21	2.45	0	0	..	..
EUROPE	138 686	136 780	0.59	0.47	2 769	2 331	3.11	-0.17	22 428	26 106	3.29	2.28
European Union[1]	86 715	83 547	0.41	0.23	1 848	1 525	7.00	-0.04	10 649	12 338	0.63	1.48
United Kingdom	8 828	8 404	2.27	-0.22	158	205	-6.37	1.84	1 745	1 655	8.52	-0.59
Russia	26 615	27 531	1.38	0.52	109	131	-14.07	1.29	4 516	6 359	3.82	1.76
Ukraine	10 403	10 205	0.69	2.70	23	17	-1.86	-1.45	5 280	5 109	7.11	6.50
AFRICA	55 347	70 908	1.91	1.90	4 757	5 427	5.59	4.74	1 055	798	-1.23	-8.20
Egypt	982	1 188	0.35	1.70	76	46	-12.23	6.08	0	0	..	..
Ethiopia	13 690	17 713	3.03	2.06	0	0	-78.36	..	435	79	3.57	-21.57
Nigeria	8 656	10 732	2.54	1.85	10	293	0.00	56.31	6	0	0.00	-38.04
South Africa	659	688	3.66	0.98	80	35	-12.05	-6.10	6	8	-17.59	1.35
ASIA	49 861	60 600	0.27	1.35	33 188	37 694	3.48	0.98	1 301	2 025	2.13	5.00
China[2]	9 160	9 447	-0.10	0.39	16 198	19 059	11.64	0.79	73	83	-2.72	1.92
India	18 326	23 399	-0.24	1.48	121	91	47.00	2.53	188	324	-15.34	-3.33
Indonesia	0	0	..	..	73	78	-4.67	0.63	0	0	..	..
Iran	2 680	3 094	-1.82	1.35	2 542	2 812	10.90	0.00	0	0	..	..
Japan	228	210	0.49	-0.42	2 241	1 902	-3.72	-1.20	0	0	..	..
Kazakhstan	3 647	4 558	5.94	3.39	54	39	20.21	2.85	959	1 450	13.47	9.86
Korea	194	167	2.94	-0.59	110	111	-0.53	0.02	0	0	..	..
Malaysia	0	0	..	..	13	16	155.19	1.94	0	0	..	..
Pakistan	523	574	0.79	0.84	134	242	19.27	5.96	0	0	..	..
Philippines	1	1	-3.38	1.16	41	52	2.22	2.45	0	0	..	..
Saudi Arabia	205	207	4.18	-0.31	6 463	7 383	-4.94	1.82	0	0	..	..
Thailand	183	217	0.73	1.17	870	1 064	65.33	1.53	2	2	0.13	-0.27
Türkiye	8 028	10 095	-0.32	1.44	1 461	2 019	24.62	4.56	72	159	42.04	-0.77
Viet Nam	3	4	9.59	0.89	100	124	4.84	1.98	0	0	..	..
OCEANIA	15 310	14 436	2.81	0.62	107	135	1.06	1.03	7 389	7 368	0.45	0.14
Australia	14 929	14 100	2.98	0.63	0	0	..	..	7 389	7 368	0.46	0.14
New Zealand	379	336	-2.53	0.34	22	33	-1.64	0.92	0	0	..	..
DEVELOPED COUNTRIES	**188 698**	**189 457**	**0.81**	**0.49**	**7 308**	**6 931**	**-1.24**	**-0.42**	**42 415**	**46 817**	**2.73**	**1.46**
DEVELOPING COUNTRIES	**118 396**	**145 965**	**0.44**	**1.47**	**36 993**	**42 075**	**3.44**	**1.53**	**5 513**	**5 816**	**-2.80**	**-1.09**
LEAST DEVELOPED COUNTRIES (LDC)	25 828	32 623	1.27	2.07	1 066	962	5.64	3.74	588	695	-2.68	-4.35
OECD[3]	**154 494**	**154 438**	**0.36**	**0.28**	**9 317**	**9 355**	**-1.09**	**0.66**	**31 532**	**33 492**	**1.60**	**0.49**
BRICS	**58 513**	**65 862**	**0.74**	**0.93**	**17 037**	**19 871**	**10.00**	**0.81**	**4 789**	**6 778**	**1.67**	**1.43**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**299 151**	**330 752**	**0.70**	**0.92**	**169 553**	**181 634**	**0.49**	**0.74**	**10.4**	**11.4**	**0.03**	**0.69**
NORTH AMERICA	18 422	19 564	-0.73	0.49	11 989	12 528	-0.58	0.68	4.9	5.0	2.22	-0.15
Canada	8 693	9 211	1.52	0.45	7 660	7 785	0.63	0.53	12.4	12.2	5.73	-0.73
United States	9 729	10 353	-2.44	0.53	4 329	4 743	-2.60	0.96	4.1	4.1	1.16	0.01
LATIN AMERICA	17 991	20 073	-2.12	0.98	12 079	13 443	-3.84	0.96	3.5	3.6	-1.57	0.23
Argentina	3 390	4 146	-2.63	0.72	1 893	2 642	-4.32	0.94	14.3	13.6	-3.21	-0.43
Brazil	4 275	5 348	3.85	1.93	2 813	3 528	3.95	1.70	1.9	2.3	2.19	1.84
Chile	835	822	-4.27	0.88	523	474	-7.39	0.77	3.9	3.9	1.13	-0.03
Colombia	347	409	-8.61	1.34	17	20	-30.76	2.39	0.5	0.5	-12.38	0.12
Mexico	6 274	6 204	-5.24	0.41	5 552	5 419	-5.77	0.37	5.6	5.5	-1.35	-0.12
Paraguay	104	131	0.69	1.52	89	107	-0.39	1.36	0.0	0.0	-2.19	-0.41
Peru	422	475	1.89	1.08	5	7	0.75	2.81	6.7	7.0	0.60	0.08
EUROPE	115 100	112 870	-0.07	-0.05	84 690	82 992	-0.06	0.13	13.8	14.0	-0.72	0.01
European Union[1]	74 964	72 682	0.07	-0.18	56 728	55 342	-0.05	0.09	10.4	10.9	-0.18	0.46
United Kingdom	7 161	6 959	1.67	-0.12	4 256	3 517	3.49	-1.28	35.3	35.0	-0.36	-0.05
Russia	21 520	21 271	0.34	0.14	15 367	15 350	0.33	0.32	12.7	12.2	-2.22	-1.07
Ukraine	5 091	5 085	-3.36	0.22	3 364	3 408	-3.69	0.46	17.0	15.8	-2.19	-0.74
AFRICA	59 069	74 994	2.24	2.25	8 773	10 477	1.59	2.30	31.7	32.8	0.01	0.10
Egypt	1 057	1 230	0.02	1.90	702	845	0.00	2.44	2.9	2.6	-2.07	-0.99
Ethiopia	13 396	17 379	3.60	2.56	540	595	-0.71	2.88	93.5	98.1	0.98	0.54
Nigeria	8 843	11 008	1.99	2.24	333	220	-2.87	0.77	39.1	38.4	0.02	-0.14
South Africa	730	711	2.36	0.93	96	132	-4.28	1.82	2.5	2.3	-1.20	-0.95
ASIA	81 156	96 053	1.60	1.28	46 441	56 957	2.87	1.47	5.1	5.3	-1.24	0.19
China[2]	24 931	28 459	5.25	0.65	13 730	16 656	15.53	0.68	3.2	3.0	-0.44	-0.55
India	18 259	23 168	0.16	1.62	1 805	3 192	14.42	3.05	11.4	12.2	-1.66	0.41
Indonesia	73	78	-4.67	0.63	0	0	0.00	0.00	0.3	0.3	-5.80	-0.24
Iran	5 089	5 892	3.55	1.07	4 911	5 691	3.70	1.08	0.3	0.3	-1.32	-0.99
Japan	2 472	2 122	-3.75	-1.15	1 430	1 379	-7.40	-1.04	1.8	1.9	-0.20	0.41
Kazakhstan	2 723	3 143	3.96	1.49	1 720	2 094	3.14	2.00	2.5	2.2	-1.39	-0.75
Korea	303	278	1.60	-0.36	62	60	-0.76	0.00	4.7	4.3	2.01	-0.40
Malaysia	13	16	145.20	2.04	12	15	167.51	2.08	0.0	0.0	160.05	0.01
Pakistan	656	816	2.62	2.11	196	277	0.12	3.40	1.9	1.8	2.27	-0.19
Philippines	42	53	2.12	2.43	30	39	0.86	2.60	0.0	0.0	1.76	0.54
Saudi Arabia	6 868	7 546	-3.59	2.13	6 672	7 332	-3.69	2.17	2.6	2.3	-2.09	-0.99
Thailand	1 040	1 279	25.68	1.53	687	896	39.31	1.76	1.4	1.4	-0.31	0.10
Türkiye	9 191	11 826	1.34	2.13	8 141	10 644	1.65	2.22	3.5	3.2	-1.48	-0.75
Viet Nam	103	128	4.95	1.95	0	0	0.00	0.00	0.0	0.0	1.20	0.97
OCEANIA	7 413	7 198	3.20	-0.04	5 581	5 236	3.17	-0.11	6.7	7.0	-0.49	0.07
Australia	6 925	6 727	3.66	-0.09	5 220	4 907	3.72	-0.15	8.0	8.5	-0.52	0.02
New Zealand	401	369	-2.39	0.39	343	311	-2.76	0.47	1.7	1.5	-0.93	-0.65
DEVELOPED COUNTRIES	**149 692**	**149 246**	**0.07**	**0.09**	**108 020**	**107 634**	**0.04**	**0.26**	**9.0**	**8.9**	**-0.51**	**-0.18**
DEVELOPING COUNTRIES	**149 459**	**181 506**	**1.37**	**1.65**	**61 533**	**74 000**	**1.37**	**1.48**	**10.7**	**11.9**	**0.11**	**0.80**
LEAST DEVELOPED COUNTRIES (LDC)	25 947	32 684	1.60	2.19	1 746	1 592	-0.88	2.77	22.2	23.8	-0.13	0.12
OECD[3]	**129 196**	**130 000**	**-0.20**	**0.15**	**95 949**	**96 423**	**-0.36**	**0.32**	**7.7**	**7.8**	**-0.05**	**0.09**
BRICS	**69 715**	**78 958**	**1.96**	**0.87**	**33 810**	**38 857**	**4.54**	**0.80**	**7.0**	**7.4**	**-1.30**	**0.30**

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**516 305**	**584 380**	**0.82**	**1.09**	**46 598**	**64 482**	**2.84**	**2.45**	**48 763**	**64 482**	**1.88**	**2.45**
NORTH AMERICA	6 360	6 738	0.13	0.31	1 496	1 670	4.35	1.83	2 904	2 855	-1.48	0.18
Canada	0	0	..	..	418	477	1.66	1.41	0	0	..	..
United States	6 360	6 738	0.13	0.31	1 078	1 194	5.58	2.00	2 904	2 855	-1.48	0.18
LATIN AMERICA	18 595	19 117	0.38	0.08	4 512	5 054	2.28	2.05	3 574	3 116	1.09	-0.72
Argentina	864	950	-2.75	0.19	9	10	6.13	-0.15	372	295	-4.77	-2.84
Brazil	7 575	7 155	-0.57	-0.41	793	862	3.05	0.86	1 000	745	1.92	-1.67
Chile	110	112	1.90	1.09	174	189	5.58	-0.04	1	0	-12.88	..
Colombia	1 937	1 992	5.43	0.01	144	250	-13.50	7.43	3	1	155.87	-1.97
Mexico	291	211	6.22	-2.63	740	913	1.71	2.79	10	0	18.50	..
Paraguay	803	1 039	10.11	1.96	1	0	-5.16	..	710	935	11.39	2.10
Peru	2 290	2 605	1.74	0.24	281	279	3.59	10.84	70	23	28.12	-6.16
EUROPE	2 839	2 860	-0.38	0.40	2 702	3 047	2.48	1.07	684	880	-0.55	3.77
European Union[1]	1 686	1 610	-0.78	-0.38	1 462	1 803	4.35	1.95	468	657	2.08	3.54
United Kingdom	0	0	..	..	675	686	0.42	0.13	38	23	-0.58	-4.73
Russia	1 103	1 196	0.91	1.49	236	237	0.44	-0.37	163	187	-5.34	6.87
Ukraine	37	39	-9.05	1.65	95	84	3.69	-1.11	7	5	-2.34	1.13
AFRICA	25 094	29 411	2.76	1.47	17 295	31 737	3.39	5.17	451	316	-4.90	-3.52
Egypt	4 439	5 187	-2.45	1.82	327	542	48.10	2.94	0	0	-85.22	..
Ethiopia	113	127	6.36	1.13	580	1 220	16.47	4.36	0	0	..	..
Nigeria	4 990	6 085	4.78	1.81	2 173	5 220	-2.45	6.57	0	0	..	..
South Africa	2	2	0.00	1.54	886	1 099	-2.03	1.45	0	0	..	..
ASIA	463 132	525 863	0.78	1.13	19 797	22 071	2.36	-0.21	41 086	57 213	2.56	2.80
China[2]	147 198	156 028	0.52	0.42	2 814	2 999	2.20	-0.41	2 403	1 515	31.89	-2.62
India	123 160	149 731	2.25	1.79	4	2	16.25	0.93	17 207	25 763	6.07	3.85
Indonesia	34 927	36 475	-0.90	0.57	508	823	-8.15	-2.43	1	3	1.80	0.75
Iran	2 456	2 330	6.12	1.87	1 151	1 605	-3.42	-0.33	2	1	19.19	0.02
Japan	7 378	6 181	-0.88	-1.58	754	719	-0.39	-0.33	99	123	-0.62	3.50
Kazakhstan	360	525	5.67	4.00	12	9	-5.19	-7.81	101	223	9.34	8.77
Korea	3 683	3 393	-1.69	-1.21	407	428	-0.20	0.98	54	50	67.62	-0.39
Malaysia	1 539	1 664	-1.41	0.69	1 170	1 409	2.05	1.30	57	78	30.31	-0.97
Pakistan	8 224	9 914	3.86	0.95	6	4	-27.88	0.08	4 080	4 572	1.72	-0.32
Philippines	12 738	15 497	0.82	1.75	2 573	2 830	11.31	1.06	0	0	-20.58	..
Saudi Arabia	0	0	..	..	1 325	1 541	-0.07	1.54	0	0	..	..
Thailand	20 644	25 369	-1.33	1.64	227	180	-8.31	3.27	6 300	10 721	-2.92	3.04
Türkiye	596	701	1.66	1.13	283	250	0.57	-0.63	25	29	-3.14	0.52
Viet Nam	28 196	32 094	-0.26	1.39	1 049	1 634	7.84	-1.89	6 758	8 006	-2.94	1.93
OCEANIA	283	392	-17.67	2.07	796	901	5.57	0.79	64	100	-26.23	4.96
Australia	271	378	-18.46	2.16	269	234	8.10	-2.00	63	99	-26.39	5.07
New Zealand	0	0	..	..	55	59	3.16	1.50	0	0	..	..
DEVELOPED COUNTRIES	**17 614**	**17 170**	**-0.77**	**-0.23**	**6 477**	**7 169**	**1.85**	**0.98**	**3 854**	**4 181**	**-2.50**	**1.37**
DEVELOPING COUNTRIES	**498 691**	**567 210**	**0.88**	**1.14**	**40 121**	**57 312**	**3.00**	**2.64**	**44 909**	**60 300**	**2.34**	**2.52**
LEAST DEVELOPED COUNTRIES (LDC)	78 817	93 483	1.36	1.50	11 225	19 266	5.75	4.47	4 263	6 267	5.36	3.21
OECD[3]	**22 313**	**21 316**	**-0.49**	**-0.57**	**6 728**	**7 506**	**2.03**	**1.34**	**3 668**	**3 842**	**-2.24**	**0.84**
BRICS	**279 039**	**314 112**	**1.22**	**1.04**	**4 733**	**5 198**	**1.18**	**0.16**	**20 772**	**28 210**	**7.18**	**3.22**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**511 385**	**583 716**	**1.08**	**1.13**	**54.1**	**55.5**	**-0.04**	**0.17**
NORTH AMERICA	5 076	5 523	2.61	0.98	13.8	14.1	1.92	0.41
Canada	418	477	1.66	1.41	11.1	11.6	0.69	0.64
United States	4 658	5 047	2.70	0.94	14.1	14.4	2.04	0.40
LATIN AMERICA	19 566	21 031	0.41	0.61	27.2	27.0	-0.43	-0.12
Argentina	558	664	1.82	1.92	11.1	12.8	2.11	0.99
Brazil	7 380	7 272	-1.19	-0.14	31.9	29.6	-1.80	-0.62
Chile	287	300	4.57	0.36	12.4	12.2	3.04	-0.01
Colombia	2 059	2 237	3.93	0.54	37.2	38.0	2.15	0.02
Mexico	918	1 123	0.49	0.96	7.1	7.9	-0.68	0.11
Paraguay	85	103	2.26	1.14	6.2	6.5	-0.06	0.16
Peru	2 521	2 856	2.00	1.05	68.3	70.5	0.53	0.26
EUROPE	4 848	5 025	1.29	0.28	6.4	6.7	1.17	0.39
European Union[1]	2 690	2 756	1.31	0.21	6.0	6.2	1.19	0.31
United Kingdom	636	663	0.44	0.35	9.4	9.4	-0.19	-0.01
Russia	1 158	1 243	2.31	0.50	7.9	8.7	2.15	0.72
Ukraine	125	118	-1.36	-0.37	2.8	2.8	-0.72	0.27
AFRICA	41 818	60 549	3.30	3.27	27.3	31.4	0.84	1.20
Egypt	4 663	5 711	0.87	1.83	41.0	42.4	-0.71	0.26
Ethiopia	660	1 325	14.59	4.09	5.1	8.3	10.72	2.02
Nigeria	7 296	11 264	1.91	3.78	30.5	36.9	-0.72	1.52
South Africa	922	1 100	-0.96	1.46	15.2	16.3	-1.70	0.46
ASIA	439 040	490 397	0.89	0.92	76.9	78.7	-0.08	0.15
China[2]	149 376	157 996	1.29	0.45	76.5	76.5	0.08	0.00
India	102 423	123 487	1.00	1.49	69.1	76.1	0.08	0.66
Indonesia	36 561	37 268	-0.78	0.45	123.5	115.3	-0.83	-0.48
Iran	3 695	3 930	3.25	0.91	38.5	38.0	1.52	0.01
Japan	7 238	6 879	-1.22	-0.28	51.4	51.9	-1.14	0.30
Kazakhstan	281	312	3.96	1.07	13.4	13.5	2.24	0.15
Korea	3 980	3 772	-1.12	-1.20	57.9	47.4	-1.91	-1.69
Malaysia	2 658	2 993	-0.07	1.03	76.5	76.3	-0.87	-0.02
Pakistan	3 896	5 312	5.10	2.21	14.4	16.3	2.49	0.66
Philippines	15 352	18 283	2.26	1.61	121.1	126.5	0.63	0.44
Saudi Arabia	1 244	1 533	-0.81	1.64	35.2	38.0	-2.84	0.51
Thailand	13 137	14 769	-0.52	0.64	102.1	104.2	0.41	0.06
Türkiye	848	921	1.74	0.55	9.5	9.8	0.55	-0.03
Viet Nam	22 450	25 681	0.92	0.99	148.4	145.7	-0.89	-0.11
OCEANIA	1 036	1 191	3.37	0.89	19.2	21.0	3.28	0.25
Australia	476	512	0.43	-0.33	10.8	12.6	2.08	-0.53
New Zealand	55	59	3.16	1.50	11.3	11.3	2.20	0.82
DEVELOPED COUNTRIES	**19 605**	**20 226**	**0.58**	**0.36**	**12.9**	**13.1**	**0.25**	**0.24**
DEVELOPING COUNTRIES	**491 779**	**563 490**	**1.10**	**1.15**	**63.5**	**64.2**	**-0.18**	**0.05**
LEAST DEVELOPED COUNTRIES (LDC)	85 987	106 148	1.68	1.90	76.6	75.6	-0.13	-0.17
OECD[3]	**24 534**	**25 046**	**0.53**	**0.08**	**15.9**	**15.6**	**-0.04**	**-0.13**
BRICS	**261 259**	**291 097**	**1.10**	**0.87**	**66.2**	**69.2**	**0.02**	**0.31**

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
ARGENTINA												
Crops export tax	%	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Rice export tax	%	12.0	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	89.6	89.7	89.7	89.7	89.7	89.7	89.7	89.7	89.7	89.7	89.7
Rice[5]	mln EUR	55.6	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	42.0	42.3	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	4 164.5	3 447.2	3 447.2	3 447.2	3 447.2	3 447.2	3 447.2	3 447.2	3 447.2	3 447.2	3 447.2
Coarse grain tariff-quota[1]	kt	4 451.4	4 434.1	4 435.1	4 436.1	4 437.1	4 438.1	4 439.1	4 440.1	4 441.1	4 442.1	4 442.1
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	%	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Maize tariff-quota	kt	9 893.3	11 280.0	11 280.0	11 280.0	11 280.0	11 280.0	11 280.0	11 280.0	11 280.0	11 280.0	11 280.0
In-quota tariff	%	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Out-of-quota tariff	%	328.0	328.0	328.0	328.0	328.0	328.0	328.0	328.0	328.0	328.0	328.0
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	%	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	%	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
Out-of-quota tariff	%	513.0	513.0	513.0	513.0	513.0	513.0	513.0	513.0	513.0	513.0	513.0
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
UNITED STATES												
ARC participation rate												
Wheat	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Coarse grains	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Wheat loan rate	USD/t	124.2	124.2	124.2	124.2	124.2	124.2	124.2	124.2	124.2	124.2	124.2
Maize loan rate	USD/t	86.6	86.6	86.6	86.6	86.6	86.6	86.6	86.6	86.6	86.6	86.6
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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
INDIA												
Minimum support price												
Rice	INR/t	21 042	19 206	20 006	20 736	21 426	22 102	22 799	23 481	24 148	24 800	25 437
Wheat	INR/t	18 299	22 624	22 057	22 282	22 703	23 294	23 940	24 624	25 293	25 948	26 605
Wheat tariff	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Rice tariff	%	70.4	70.4	70.4	70.4	70.4	70.4	70.4	70.4	70.4	70.4	70.4
RUSSIA												
Wheat export tax	%	11.0	29.5	20.7	16.2	15.5	15.3	16.2	16.7	17.2	17.8	18.3
Maize export tax	%	7.5	21.7	10.6	5.2	4.0	3.9	5.2	5.8	6.2	6.7	7.1
Other coarse grains export tax	%	9.6	29.4	20.0	15.3	14.0	13.5	14.7	15.4	16.1	16.7	17.2

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**353 031**	**411 059**	**2.91**	**0.99**	**160 482**	**178 801**	**5.97**	**0.72**	**158 486**	**178 801**	**4.86**	**0.72**
NORTH AMERICA	116 964	138 210	2.96	0.85	801	1 044	-7.48	1.18	59 224	65 294	3.70	0.67
Canada	6 258	8 631	2.29	2.65	347	505	4.57	2.79	4 059	5 551	2.78	2.35
United States	110 706	129 579	3.00	0.74	454	539	-13.31	-0.14	55 165	59 744	3.77	0.52
LATIN AMERICA	188 816	216 930	2.65	0.94	11 254	10 966	9.90	0.51	95 316	109 208	5.54	0.74
Argentina	45 645	52 864	-2.46	0.88	3 392	3 005	752.34	0.01	9 506	12 307	-6.04	0.91
Brazil	129 222	147 108	5.73	0.86	410	399	-0.55	1.03	78 097	87 416	8.55	0.58
Chile	0	0	..	..	212	213	-1.18	0.93	2	2	65.73	-0.92
Colombia	75	90	0.93	1.40	584	615	0.13	0.91	0	0	-42.87	..
Mexico	240	490	-1.74	5.91	5 316	5 418	5.02	0.93	5	3	49.67	0.00
Paraguay	8 513	10 711	-1.18	1.97	33	97	-45.46	1.12	5 350	6 917	0.04	2.37
Peru	5	6	0.00	1.41	380	413	7.84	0.90	0	0	..	..
EUROPE	10 856	13 195	7.31	2.11	17 393	15 963	2.03	-1.16	3 312	3 585	8.62	1.34
European Union1	2 727	3 719	11.33	2.23	13 731	12 546	1.13	-1.26	223	279	8.76	1.72
United Kingdom	0	0	..	..	758	780	0.12	0.26	0	0	..	..
Russia	4 603	5 671	12.76	2.06	2 078	1 891	9.54	-1.84	1 316	1 551	43.45	0.00
Ukraine	3 070	3 327	0.90	2.31	15	10	31.78	-0.34	1 766	1 747	0.77	2.64
AFRICA	2 869	3 370	3.93	1.39	5 458	6 148	12.04	0.99	168	152	-0.02	-0.41
Egypt	30	36	-0.56	0.96	4 173	4 648	13.52	0.92	13	0	-58.57	..
Ethiopia	121	136	9.24	0.85	3	0	-57.23	..	79	84	11.43	0.34
Nigeria	705	784	1.86	0.90	71	144	147.50	7.28	10	8	99.50	-1.65
South Africa	1 233	1 554	7.59	1.96	81	102	14.93	-2.00	2	1	-30.97	0.18
ASIA	33 488	39 255	2.98	1.35	125 572	144 677	6.23	0.95	463	551	-3.41	0.19
China2	18 783	21 004	5.49	1.20	96 281	112 093	5.92	0.94	236	309	-4.51	0.00
India	12 469	15 615	0.74	1.57	356	49	88.82	-17.85	64	80	-10.73	4.05
Indonesia	552	717	-5.49	1.32	2 626	3 111	4.20	1.70	4	5	8.36	-0.22
Iran	219	256	3.14	1.40	2 040	2 423	20.22	1.45	20	17	16.73	-1.42
Japan	220	231	-0.29	0.25	3 365	3 127	2.37	-0.16	0	0	..	..
Kazakhstan	287	353	5.68	1.71	47	44	8.15	-2.66	13	0	53.54	..
Korea	93	94	-5.09	0.19	1 278	1 293	0.06	-0.02	0	0	..	..
Malaysia	0	0	..	..	977	1 016	7.50	0.30	10	9	-15.12	-0.30
Pakistan	2	2	-12.20	1.46	2 466	3 173	27.70	2.09	0	0	..	..
Philippines	1	1	0.00	1.45	202	267	17.02	1.90	0	0	..	..
Saudi Arabia	0	0	..	..	808	881	13.62	1.31	0	0	..	..
Thailand	43	49	-4.46	1.39	3 858	4 325	9.05	0.98	5	3	-19.35	-0.97
Türkiye	139	147	-0.98	0.77	2 892	3 297	8.16	1.21	5	5	-19.17	-0.83
Viet Nam	68	77	-12.26	1.25	1 907	2 251	5.07	1.16	67	89	149.00	-1.14
OCEANIA	38	100	-2.82	3.80	5	4	9.66	-0.24	2	11	-10.09	5.35
Australia	38	100	-2.82	3.80	4	3	15.38	-0.33	2	11	-10.10	5.35
New Zealand	0	0	..	..	1	1	0.00	-0.02	0	0	..	..
DEVELOPED COUNTRIES	**129 602**	**153 645**	**3.30**	**0.96**	**22 431**	**21 142**	**1.59**	**-0.83**	**62 554**	**68 891**	**3.90**	**0.70**
DEVELOPING COUNTRIES	**223 430**	**257 414**	**2.67**	**1.00**	**138 051**	**157 659**	**6.83**	**0.95**	**95 932**	**109 910**	**5.48**	**0.73**
LEAST DEVELOPED COUNTRIES (LDC)	897	992	1.98	0.90	1 617	2 039	21.51	2.13	20	17	-2.53	-0.85
OECD3	**120 503**	**143 086**	**3.06**	**0.90**	**30 045**	**29 548**	**1.96**	**-0.19**	**59 461**	**65 595**	**3.71**	**0.67**
BRICS	**166 310**	**190 951**	**5.36**	**1.00**	**99 206**	**114 535**	**5.97**	**0.86**	**79 716**	**89 357**	**8.66**	**0.57**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**360 090**	**410 783**	**3.50**	**1.05**	**327 017**	**372 008**	**3.71**	**1.10**
NORTH AMERICA	65 238	73 844	2.77	1.22	60 464	68 290	2.91	1.28
Canada	2 630	3 575	2.53	3.24	1 814	2 577	1.89	3.78
United States	62 608	70 269	2.78	1.12	58 650	65 713	2.95	1.19
LATIN AMERICA	105 778	118 669	1.51	1.18	98 537	110 411	1.50	1.17
Argentina	39 531	43 579	-0.34	0.81	38 511	42 513	-0.35	0.82
Brazil	52 202	60 057	2.83	1.44	46 714	53 682	2.93	1.45
Chile	216	211	-0.91	0.94	215	211	-0.97	0.94
Colombia	660	705	0.74	0.97	652	697	0.73	0.98
Mexico	5 668	5 905	5.38	1.55	5 429	5 652	5.65	1.60
Paraguay	3 297	3 890	-0.81	1.40	3 181	3 770	-0.70	1.38
Peru	386	419	8.27	0.91	386	419	8.28	0.91
EUROPE	25 440	25 571	3.44	-0.03	23 157	23 313	3.52	-0.05
European Union[1]	16 499	15 986	2.37	-0.70	14 717	14 267	2.27	-0.78
United Kingdom	758	780	0.12	0.26	701	689	0.51	-0.12
Russia	5 564	6 012	8.87	1.19	5 481	5 933	8.80	1.21
Ukraine	1 360	1 587	1.42	2.01	1 225	1 452	1.44	2.16
AFRICA	8 386	9 364	8.91	1.17	7 735	8 580	10.49	1.07
Egypt	4 246	4 683	13.61	0.93	4 237	4 680	13.63	0.93
Ethiopia	46	52	5.68	1.84	25	24	5.37	1.41
Nigeria	770	919	3.12	1.71	647	754	11.31	1.21
South Africa	1 464	1 654	8.58	1.69	1 326	1 498	8.60	1.68
ASIA	155 207	183 243	5.12	1.06	137 083	161 323	5.64	1.15
China[2]	111 426	132 681	5.36	1.00	97 077	114 933	5.74	1.12
India	12 760	15 573	0.92	1.45	11 037	13 566	1.93	1.43
Indonesia	3 200	3 822	1.98	1.63	2 626	3 128	4.20	1.78
Iran	2 303	2 662	17.57	1.48	2 277	2 640	17.79	1.49
Japan	3 528	3 360	1.83	-0.44	2 677	2 549	1.97	-0.50
Kazakhstan	314	396	5.00	1.19	181	227	5.11	1.03
Korea	1 382	1 387	-0.16	-0.01	1 357	1 363	0.04	-0.03
Malaysia	970	1 007	8.81	0.37	968	1 004	8.77	0.37
Pakistan	2 440	3 171	28.14	2.15	2 436	3 167	28.11	2.16
Philippines	210	268	17.33	1.95	206	268	17.32	1.95
Saudi Arabia	808	881	13.66	1.31	806	881	13.63	1.31
Thailand	3 846	4 370	8.80	1.03	3 834	4 354	8.94	1.04
Türkiye	3 023	3 431	8.34	1.22	2 955	3 364	8.29	1.23
Viet Nam	1 905	2 234	3.81	1.44	1 888	2 234	4.45	1.44
OCEANIA	41	92	-0.49	3.44	40	91	-0.45	3.51
Australia	40	91	-0.47	3.49	40	91	-0.45	3.51
New Zealand	1	1	0.00	-0.02	0	0	0.00	0.00
DEVELOPED COUNTRIES	**96 777**	**105 777**	**3.00**	**0.86**	**88 588**	**96 828**	**3.12**	**0.90**
DEVELOPING COUNTRIES	**263 313**	**305 006**	**3.69**	**1.12**	**238 429**	**275 180**	**3.93**	**1.17**
LEAST DEVELOPED COUNTRIES (LDC)	2 502	3 013	10.66	1.74	2 057	2 478	13.72	1.74
OECD[3]	**98 135**	**106 917**	**2.86**	**0.84**	**90 319**	**98 387**	**2.98**	**0.89**
BRICS	**183 415**	**215 975**	**4.32**	**1.16**	**161 634**	**189 612**	**4.65**	**1.24**

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**159 762**	**187 619**	**2.27**	**1.16**	**21 330**	**25 799**	**2.01**	**1.27**	**22 380**	**25 799**	**2.54**	**1.27**
NORTH AMERICA	21 508	27 191	0.47	0.99	901	985	-1.29	0.11	9 249	12 247	-1.04	3.01
Canada	17 049	22 038	0.33	1.05	270	272	1.74	-0.28	8 578	11 474	-1.12	3.15
United States	4 459	5 153	1.23	0.74	632	712	-2.26	0.26	671	773	-0.25	1.14
LATIN AMERICA	6 181	6 933	2.94	0.80	1 434	1 881	-1.92	1.38	1 044	1 197	6.90	0.95
Argentina	4 324	4 680	3.10	0.41	1	1	0.00	0.00	651	711	4.99	0.49
Brazil	604	839	4.95	2.88	6	5	-8.48	0.00	174	223	16.57	2.15
Chile	199	201	1.94	-0.04	35	37	14.94	1.97	9	8	10.71	-1.64
Colombia	2	2	0.00	0.38	7	7	0.00	-0.02	0	0	..	..
Mexico	104	116	-1.46	0.62	1 358	1 806	-2.19	1.41	2	2	-4.37	0.00
Paraguay	217	245	-2.20	1.49	0	0	..	..	27	35	-2.01	3.46
Peru	6	7	0.00	0.42	1	0	0.00	..	0	0	..	..
EUROPE	66 436	80 083	3.21	1.49	7 771	8 135	6.25	0.39	6 148	7 343	6.05	1.09
European Union[1]	26 089	31 050	-0.18	0.96	6 757	7 181	5.46	0.46	842	877	-0.80	-0.42
United Kingdom	1 561	1 971	-5.84	0.39	373	318	8.82	0.25	94	130	-22.75	-0.98
Russia	17 917	21 702	8.00	1.48	253	265	9.53	0.31	1 813	1 929	32.91	-1.22
Ukraine	18 519	22 673	6.32	2.40	31	32	2.36	-0.09	2 672	3 577	6.82	3.21
AFRICA	9 348	10 632	0.87	1.13	383	400	0.33	0.76	374	429	14.29	-0.09
Egypt	118	133	-0.04	1.06	68	59	1.49	0.24	22	22	6.87	-0.24
Ethiopia	100	111	-2.54	0.77	0	4	..	55.00	0	0	..	..
Nigeria	2 121	2 491	-0.34	1.42	0	0	..	..	14	13	-8.24	-2.63
South Africa	965	1 123	4.07	1.10	24	23	-13.40	-0.26	2	1	-12.45	-0.14
ASIA	51 844	59 400	2.02	1.07	10 809	14 369	0.65	1.91	2 112	2 305	6.84	0.50
China[2]	29 144	32 218	1.02	0.83	3 502	6 521	-1.84	4.15	697	679	3.69	0.00
India	14 951	17 892	3.83	1.29	142	160	-4.39	0.55	701	919	10.40	0.71
Indonesia	468	532	-5.99	1.45	247	222	5.41	-1.26	1	1	0.90	0.12
Iran	402	459	6.84	1.13	112	117	10.86	0.21	1	1	0.00	-0.02
Japan	23	25	1.33	0.70	2 284	2 448	-1.46	-0.08	0	0	..	..
Kazakhstan	1 199	1 464	9.53	1.47	7	7	-1.68	-0.10	458	498	18.92	1.23
Korea	13	14	-1.75	-0.23	31	30	2.13	0.22	0	0	..	..
Malaysia	5	5	0.00	0.13	44	49	1.53	1.19	3	3	0.00	-1.17
Pakistan	969	1 170	1.35	1.65	1 032	1 182	1.26	0.74	0	0	-72.37	..
Philippines	20	23	0.20	1.36	89	105	7.20	1.02	0	0	..	..
Saudi Arabia	3	3	0.00	1.53	4	4	0.00	0.79	0	0	..	..
Thailand	90	101	0.12	1.23	59	56	-0.08	-0.66	4	4	-0.76	0.48
Türkiye	1 889	2 400	3.37	2.28	1 025	808	3.27	-1.62	22	13	-4.58	0.32
Viet Nam	319	371	2.73	1.63	187	174	3.70	-0.39	35	36	8.45	0.39
OCEANIA	4 444	3 379	1.33	-1.99	31	29	4.98	0.10	3 454	2 278	0.98	-3.06
Australia	4 431	3 367	1.33	-2.00	27	24	6.29	0.00	3 454	2 278	0.98	-3.06
New Zealand	10	10	0.00	-0.05	4	4	0.00	0.00	0	0	..	..
DEVELOPED COUNTRIES	**94 703**	**113 409**	**2.62**	**1.23**	**11 401**	**12 036**	**3.57**	**0.27**	**19 339**	**22 395**	**2.02**	**1.39**
DEVELOPING COUNTRIES	**65 059**	**74 210**	**1.81**	**1.05**	**9 929**	**13 763**	**0.48**	**2.24**	**3 041**	**3 403**	**6.47**	**0.48**
LEAST DEVELOPED COUNTRIES (LDC)	6 798	7 710	1.46	1.04	347	574	8.78	4.00	315	370	22.54	0.00
OECD[3]	**55 977**	**66 522**	**0.24**	**0.80**	**12 953**	**13 810**	**2.28**	**0.31**	**13 688**	**15 571**	**-0.52**	**1.41**
BRICS	**63 580**	**73 774**	**3.39**	**1.15**	**3 927**	**6 974**	**-1.63**	**3.85**	**3 386**	**3 752**	**15.51**	**-0.39**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**159 859**	**187 596**	**2.29**	**1.22**	**138 267**	**166 205**	**2.57**	**1.43**
NORTH AMERICA	14 625	15 924	3.34	0.71	12 373	13 628	3.23	0.69
Canada	10 118	10 832	4.21	0.72	9 682	10 349	4.06	0.69
United States	4 506	5 091	1.60	0.67	2 691	3 279	0.66	0.70
LATIN AMERICA	6 713	7 617	1.54	0.93	6 239	7 085	1.85	0.89
Argentina	3 818	3 970	3.30	0.39	3 684	3 833	3.92	0.39
Brazil	433	620	2.10	3.13	353	499	1.32	2.95
Chile	226	230	3.16	0.32	207	209	3.30	0.26
Colombia	9	10	0.00	0.07	8	8	0.00	0.09
Mexico	1 461	1 920	-2.10	1.37	1 349	1 821	-2.06	1.41
Paraguay	190	210	-2.99	1.19	157	170	-3.25	1.03
Peru	7	8	0.00	0.78	3	3	0.00	0.70
EUROPE	67 754	80 891	3.00	1.33	63 058	75 870	3.12	1.43
European Union[1]	32 502	37 354	0.83	0.99	29 804	34 727	0.68	1.06
United Kingdom	1 840	2 159	-0.63	0.46	1 765	2 084	-0.62	0.48
Russia	16 402	20 029	6.41	1.77	15 670	19 125	6.84	1.76
Ukraine	15 017	19 156	5.28	1.72	14 060	17 983	5.73	1.95
AFRICA	9 376	10 599	0.50	1.18	5 663	6 109	0.80	0.70
Egypt	171	170	0.15	0.96	119	113	1.25	0.89
Ethiopia	100	114	-2.54	1.14	62	73	-2.94	1.32
Nigeria	2 112	2 478	-0.29	1.44	739	805	-0.31	0.37
South Africa	965	1 141	2.96	1.08	867	1 017	2.89	1.08
ASIA	60 366	71 436	1.67	1.26	50 027	62 498	2.05	1.75
China[2]	31 863	38 061	0.71	1.34	25 059	33 279	1.01	2.30
India	14 322	17 114	3.49	1.31	12 740	15 194	3.87	1.30
Indonesia	707	752	-3.22	0.63	279	316	3.29	1.08
Iran	518	575	7.61	0.99	476	527	7.68	0.97
Japan	2 311	2 473	-1.44	-0.08	2 167	2 329	-2.15	-0.08
Kazakhstan	752	971	6.15	1.57	597	759	6.35	1.50
Korea	44	44	0.76	0.08	40	40	0.86	0.09
Malaysia	46	51	1.46	1.21	45	50	1.51	1.22
Pakistan	1 988	2 350	0.72	1.27	1 835	2 163	0.73	1.24
Philippines	110	128	5.80	1.10	97	114	6.73	1.09
Saudi Arabia	7	7	0.00	1.11	5	5	0.00	1.10
Thailand	143	153	0.11	0.52	88	97	0.04	0.80
Türkiye	2 888	3 192	3.37	1.10	2 678	2 953	3.40	1.08
Viet Nam	472	509	3.10	1.01	358	381	3.21	0.87
OCEANIA	1 026	1 130	2.28	1.09	908	1 015	2.17	1.22
Australia	1 009	1 113	2.32	1.11	896	1 003	2.20	1.24
New Zealand	14	14	0.00	-0.03	11	11	0.00	0.00
DEVELOPED COUNTRIES	**87 921**	**103 055**	**2.97**	**1.19**	**80 425**	**95 106**	**3.02**	**1.27**
DEVELOPING COUNTRIES	**71 938**	**84 541**	**1.51**	**1.26**	**57 842**	**71 099**	**1.97**	**1.65**
LEAST DEVELOPED COUNTRIES (LDC)	6 846	7 913	1.22	1.29	4 759	5 330	1.37	0.97
OECD[3]	**57 211**	**64 753**	**1.36**	**0.87**	**51 557**	**59 108**	**1.17**	**0.92**
BRICS	**63 984**	**76 964**	**2.60**	**1.45**	**54 689**	**69 114**	**3.13**	**1.91**

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**357 505**	**409 553**	**3.10**	**1.14**	**91 072**	**101 540**	**1.86**	**0.97**	**90 689**	**101 540**	**0.79**	**0.97**
NORTH AMERICA	57 351	64 523	2.82	1.22	5 126	4 588	1.48	-0.25	17 860	21 867	3.05	1.78
Canada	6 919	7 895	3.41	1.40	1 166	1 035	3.45	-1.34	5 132	5 541	4.67	0.54
United States	50 432	56 629	2.74	1.19	3 960	3 553	0.95	0.09	12 728	16 325	2.45	2.24
LATIN AMERICA	82 545	93 211	1.45	1.29	9 542	11 036	1.74	1.29	47 915	54 072	-0.20	1.24
Argentina	31 840	35 060	-0.33	0.80	0	0	..	..	27 693	30 213	-0.63	0.69
Brazil	38 301	44 623	2.92	1.72	5	5	4.91	0.00	16 476	20 203	0.68	2.37
Chile	287	285	0.49	0.65	1 133	1 036	-0.37	0.62	1	1	0.00	-0.06
Colombia	711	776	1.26	0.87	1 721	2 283	8.28	2.04	102	85	5.92	-2.00
Mexico	5 296	5 779	3.84	1.58	1 896	1 991	1.95	0.43	22	22	0.84	0.00
Paraguay	2 565	3 024	-1.04	1.37	2	2	0.06	0.64	1 875	1 998	-2.38	0.94
Peru	327	355	6.59	0.84	1 484	2 002	6.96	2.64	5	5	0.00	-0.63
EUROPE	48 203	54 371	2.86	0.88	27 287	24 957	-0.37	-0.92	10 452	13 434	3.73	2.25
European Union[1]	27 864	30 202	1.07	0.35	22 071	19 882	-0.41	-1.06	2 072	2 256	0.11	1.72
United Kingdom	1 480	1 646	-0.10	0.29	2 921	2 618	-0.16	-0.93	394	537	11.05	1.42
Russia	9 886	11 586	7.66	1.58	423	499	-4.79	-0.02	2 567	3 131	3.91	2.50
Ukraine	7 229	9 138	5.09	1.98	30	29	-6.91	0.27	5 130	7 225	5.25	2.46
AFRICA	10 899	12 417	6.35	1.10	4 022	5 546	-3.72	3.44	691	503	1.76	-3.61
Egypt	3 476	3 816	12.70	0.93	328	824	-16.63	12.03	8	5	18.06	-1.27
Ethiopia	111	134	2.36	2.15	20	35	23.57	4.82	0	0	..	..
Nigeria	1 028	1 194	4.95	1.07	641	760	21.66	0.38	188	177	2.02	-0.38
South Africa	1 477	1 686	6.89	1.48	642	734	-6.64	0.56	33	32	-3.82	-0.24
ASIA	157 610	184 060	4.03	1.13	41 836	51 465	4.24	1.77	13 704	11 575	-0.06	-2.29
China[2]	93 088	109 179	4.47	1.09	4 846	6 754	27.22	2.04	1 088	996	-6.83	-0.25
India	21 944	26 145	1.90	1.36	460	1 202	12.70	12.41	2 735	1 101	-1.11	-11.04
Indonesia	8 206	9 551	4.82	1.20	5 458	6 219	4.81	0.84	5 491	5 180	4.83	-0.83
Iran	2 132	2 463	15.06	1.40	2 040	2 526	-0.59	0.33	10	10	-24.55	-0.04
Japan	3 378	3 365	0.32	-0.34	2 087	1 889	0.19	-0.25	3	3	16.73	0.00
Kazakhstan	490	633	5.42	1.52	5	5	-0.04	-0.18	176	225	7.20	1.57
Korea	1 176	1 178	0.04	-0.03	3 433	3 658	-0.92	0.70	43	39	-16.46	0.00
Malaysia	3 365	3 736	1.12	0.74	1 509	1 518	1.58	0.38	2 504	2 509	-0.22	-0.38
Pakistan	4 022	4 829	3.45	1.64	410	1 284	-9.42	10.20	66	43	-13.22	-3.82
Philippines	1 130	1 358	2.65	1.55	2 969	3 683	3.85	1.96	343	288	-4.79	-1.92
Saudi Arabia	639	698	13.52	1.31	1 669	1 997	10.51	1.86	12	5	45.46	-0.53
Thailand	3 568	4 110	9.34	1.11	3 369	3 814	0.45	1.15	12	12	8.61	-0.11
Türkiye	4 489	5 282	5.42	1.36	2 255	2 729	3.72	2.18	235	222	12.74	-2.02
Viet Nam	1 727	2 032	4.31	1.38	6 044	7 698	5.80	2.22	47	36	-10.07	-1.14
OCEANIA	898	972	-0.47	0.21	3 259	3 947	4.03	1.86	65	90	-8.82	-0.11
Australia	766	817	-0.73	0.18	1 058	1 377	6.48	2.44	12	12	-22.04	0.00
New Zealand	8	8	0.10	0.00	2 192	2 564	3.04	1.56	0	0	..	..
DEVELOPED COUNTRIES	**113 290**	**127 248**	**2.76**	**1.02**	**39 334**	**37 418**	**0.19**	**-0.39**	**28 554**	**35 586**	**3.24**	**1.95**
DEVELOPING COUNTRIES	**244 215**	**282 306**	**3.26**	**1.20**	**51 738**	**64 123**	**3.28**	**1.87**	**62 135**	**65 954**	**-0.20**	**0.48**
LEAST DEVELOPED COUNTRIES (LDC)	5 253	6 356	4.86	1.40	1 363	2 308	10.84	4.83	356	213	2.36	-5.97
OECD[3]	**103 318**	**114 421**	**2.26**	**0.92**	**47 587**	**46 628**	**0.70**	**-0.08**	**20 770**	**25 068**	**2.71**	**1.70**
BRICS	**164 696**	**193 219**	**3.89**	**1.30**	**6 376**	**9 193**	**12.76**	**2.65**	**22 900**	**25 463**	**-0.11**	**1.12**

.. Not available

Note: Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31
WORLD	**358 503**	**409 437**	**3.42**	**1.15**
NORTH AMERICA	**44 658**	**47 243**	**2.55**	**0.81**
Canada	2 970	3 386	1.19	1.91
United States	41 688	43 857	2.65	0.73
LATIN AMERICA	**44 237**	**50 158**	**3.62**	**1.36**
Argentina	4 146	4 847	2.01	1.56
Brazil	21 831	24 425	4.93	1.20
Chile	1 401	1 319	-0.14	0.65
Colombia	2 325	2 971	6.01	1.92
Mexico	7 168	7 748	3.28	1.28
Paraguay	733	1 022	1.54	2.63
Peru	1 816	2 350	6.61	2.41
EUROPE	**65 031**	**65 892**	**1.31**	**-0.07**
European Union[1]	47 862	47 829	0.41	-0.32
United Kingdom	4 007	3 727	-0.87	-0.73
Russia	7 628	8 954	8.45	1.19
Ukraine	2 175	1 939	4.95	0.52
AFRICA	**14 231**	**17 452**	**2.81**	**1.98**
Egypt	3 766	4 632	4.98	2.26
Ethiopia	131	169	4.21	2.63
Nigeria	1 478	1 777	10.37	0.95
South Africa	2 087	2 386	0.81	1.24
ASIA	**186 248**	**223 863**	**4.48**	**1.50**
China[2]	97 332	114 934	5.23	1.16
India	19 644	26 220	3.01	2.84
Indonesia	8 034	10 573	4.62	2.19
Iran	4 222	4 977	5.44	0.87
Japan	5 463	5 251	0.20	-0.31
Kazakhstan	319	412	4.99	1.52
Korea	4 579	4 798	-0.29	0.52
Malaysia	2 370	2 744	2.97	1.69
Pakistan	4 364	6 064	2.08	3.07
Philippines	3 779	4 749	5.13	2.16
Saudi Arabia	2 306	2 689	11.51	1.72
Thailand	6 908	7 911	4.03	1.14
Türkiye	6 553	7 777	4.69	1.76
Viet Nam	7 807	9 692	5.96	2.06
OCEANIA	**4 098**	**4 829**	**3.29**	**1.54**
Australia	1 821	2 182	3.70	1.54
New Zealand	2 198	2 571	3.02	1.56
DEVELOPED COUNTRIES	**124 115**	**129 073**	**1.78**	**0.36**
DEVELOPING COUNTRIES	**234 388**	**280 364**	**4.38**	**1.54**
LEAST DEVELOPED COUNTRIES (LDC)	**6 223**	**8 445**	**6.11**	**2.55**
OECD[3]	**130 264**	**135 963**	**1.60**	**0.43**
BRICS	**148 521**	**176 918**	**4.94**	**1.40**

Note: Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**214 328**	**248 952**	**3.21**	**1.13**	**84 280**	**93 536**	**2.42**	**0.71**	**85 607**	**93 536**	**2.41**	**0.71**
NORTH AMERICA	18 243	19 959	3.10	1.11	5 152	5 362	3.33	0.69	4 660	4 776	2.22	2.90
Canada	4 569	4 920	3.91	0.94	358	284	0.34	-2.73	3 349	3 517	3.48	0.69
United States	13 674	15 039	2.84	1.16	4 794	5 078	3.61	0.92	1 311	1 259	-0.81	13.24
LATIN AMERICA	27 337	31 421	2.36	1.30	4 523	5 003	0.49	0.66	11 001	11 124	2.15	-0.10
Argentina	8 634	9 378	0.34	0.75	17	17	1.46	-0.02	6 202	6 604	1.92	0.11
Brazil	10 180	12 119	3.45	1.89	485	635	0.41	1.36	1 180	750	-3.19	-2.64
Chile	118	118	1.81	0.47	475	554	4.05	1.08	1	1	-5.68	-0.16
Colombia	1 970	2 398	5.57	0.76	626	609	3.34	0.53	810	747	13.94	-0.53
Mexico	2 006	2 305	2.49	1.53	889	1 029	0.61	0.44	54	62	3.32	0.00
Paraguay	650	809	-0.62	1.35	13	9	0.00	-1.18	562	683	0.44	1.19
Peru	293	339	4.54	1.42	608	722	4.81	1.67	1	0	0.00	-0.14
EUROPE	31 071	36 722	3.28	1.23	14 406	11 687	2.16	-2.31	14 176	17 480	6.98	1.74
European Union[1]	15 505	17 478	1.15	0.74	10 563	7 993	1.67	-3.20	2 439	2 596	0.33	0.92
United Kingdom	915	1 035	-0.75	0.39	1 227	1 119	2.12	0.03	322	242	1.37	0.06
Russia	7 190	8 795	7.13	1.67	1 394	1 448	6.21	0.06	4 846	6 341	14.20	1.74
Ukraine	6 555	8 440	5.62	1.96	278	205	-1.61	-2.11	6 090	7 821	6.32	2.16
AFRICA	9 017	10 588	3.61	1.20	10 884	14 867	1.49	3.04	1 555	1 214	1.11	-2.71
Egypt	853	926	11.21	0.93	1 597	2 011	-1.75	2.33	131	98	-11.18	-2.28
Ethiopia	60	74	1.42	2.11	517	826	3.74	4.93	0	0	..	..
Nigeria	1 983	2 515	4.21	1.71	1 225	1 911	-1.43	4.67	40	17	-17.03	-1.69
South Africa	574	661	4.91	1.31	793	894	-0.47	1.33	19	20	-16.95	-0.91
ASIA	127 360	148 736	3.38	1.08	48 942	56 191	2.81	0.89	53 266	57 830	1.54	0.50
China[2]	28 161	33 401	3.56	1.23	11 355	11 022	2.73	-0.94	171	110	-4.37	0.00
India	10 493	12 396	1.97	1.33	13 564	16 249	1.72	1.80	281	387	9.11	-1.21
Indonesia	51 566	60 561	5.74	1.00	136	115	3.06	0.03	31 122	35 046	3.16	0.58
Iran	627	720	12.50	1.30	1 920	2 855	3.07	0.73	201	368	-7.77	-0.73
Japan	1 406	1 477	-1.00	-0.23	857	950	0.87	0.10	2	2	-4.25	0.00
Kazakhstan	327	422	5.31	1.57	171	198	10.17	1.09	74	64	15.63	-1.08
Korea	292	292	0.08	-0.02	1 251	1 408	5.34	1.02	3	3	1.65	0.01
Malaysia	20 188	22 409	-0.93	0.83	2 159	2 211	6.59	-0.58	17 696	18 532	-0.91	0.58
Pakistan	1 708	1 992	-0.26	1.42	3 228	4 473	2.95	2.57	50	23	-12.14	-1.89
Philippines	1 899	2 250	1.28	1.47	1 302	1 581	9.23	1.30	921	746	0.08	-1.28
Saudi Arabia	147	161	13.17	1.30	885	1 033	8.22	1.34	55	47	23.92	-1.32
Thailand	4 118	5 148	7.33	1.48	312	334	1.67	-3.02	576	749	4.98	3.12
Türkiye	2 077	2 438	4.27	1.35	1 547	1 475	0.26	0.30	502	375	-4.03	-0.30
Viet Nam	695	811	3.99	1.24	1 163	1 390	5.56	1.32	155	123	4.05	-1.30
OCEANIA	1 299	1 525	1.82	0.54	372	426	3.85	1.00	949	1 114	2.97	0.48
Australia	433	470	0.37	0.61	247	289	5.41	0.99	192	211	3.82	1.48
New Zealand	5	5	0.29	0.00	97	111	1.87	1.35	0	0	..	..
DEVELOPED COUNTRIES	**53 025**	**60 803**	**3.05**	**1.14**	**22 245**	**20 266**	**2.40**	**-1.05**	**19 154**	**22 570**	**5.56**	**1.95**
DEVELOPING COUNTRIES	**161 303**	**188 149**	**3.26**	**1.13**	**62 035**	**73 270**	**2.43**	**1.25**	**66 453**	**70 966**	**1.64**	**0.34**
LEAST DEVELOPED COUNTRIES (LDC)	4 137	4 834	2.41	1.17	7 058	9 711	3.69	2.80	566	410	6.74	-3.88
OECD[3]	**43 221**	**48 254**	**2.20**	**0.91**	**23 691**	**21 672**	**2.29**	**-0.97**	**9 127**	**9 155**	**2.02**	**1.68**
BRICS	**56 598**	**67 372**	**3.63**	**1.42**	**27 591**	**30 248**	**2.13**	**0.61**	**6 498**	**7 607**	**7.73**	**1.02**

.. Not available

Note: Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**213 827**	**248 681**	**3.30**	**1.15**	**18.1**	**19.2**	**1.69**	**0.53**
NORTH AMERICA	18 679	20 546	3.29	0.62	39.6	41.6	1.42	0.62
Canada	1 535	1 688	4.90	0.73	36.9	37.1	3.37	-0.04
United States	17 144	18 858	3.15	0.61	39.9	42.1	1.24	0.69
LATIN AMERICA	20 929	25 295	1.98	1.88	18.0	20.1	-0.86	1.43
Argentina	2 446	2 790	-3.21	2.39	19.5	20.5	0.47	0.44
Brazil	9 531	12 002	4.21	2.31	22.4	27.2	-1.79	2.95
Chile	593	671	3.61	1.00	8.7	8.8	-0.81	0.36
Colombia	1 790	2 258	2.53	1.21	18.4	21.3	0.31	0.56
Mexico	2 848	3 273	1.90	1.21	22.1	23.1	0.72	0.36
Paraguay	102	135	-7.02	2.02	12.5	15.6	-8.56	1.04
Peru	904	1 060	4.82	1.62	10.7	11.4	3.16	0.98
EUROPE	31 149	30 929	1.42	-0.55	24.3	24.4	2.04	0.39
European Union[1]	23 490	22 875	1.46	-0.94	25.1	24.3	2.70	0.15
United Kingdom	1 820	1 911	0.68	0.22	26.8	27.0	0.05	-0.13
Russia	3 723	3 901	1.19	0.93	25.5	27.3	1.03	1.16
Ukraine	739	824	-1.31	0.46	12.6	15.4	-1.03	0.81
AFRICA	18 448	24 230	2.62	2.58	8.9	9.6	-0.46	0.91
Egypt	2 346	2 837	2.86	2.09	7.0	8.1	-0.79	1.87
Ethiopia	578	900	3.50	4.67	4.7	5.8	1.04	2.53
Nigeria	3 194	4 408	2.40	2.92	9.8	10.6	-0.56	0.76
South Africa	1 366	1 534	2.26	1.38	12.6	13.8	1.05	1.27
ASIA	123 900	146 845	4.19	1.27	18.1	19.8	2.69	0.66
China[2]	39 861	44 288	3.76	0.64	27.7	30.2	3.27	0.52
India	24 039	28 242	1.90	1.67	10.9	11.6	1.22	1.08
Indonesia	20 204	25 491	10.59	1.59	25.7	31.2	8.03	1.44
Iran	2 244	3 197	4.33	1.24	14.4	19.0	4.83	0.79
Japan	2 236	2 426	-0.18	-0.07	17.7	20.2	0.03	0.43
Kazakhstan	426	556	5.82	1.88	21.0	25.0	3.97	1.04
Korea	1 551	1 697	4.39	0.88	17.6	22.0	3.06	1.52
Malaysia	5 110	6 055	2.54	1.27	23.1	25.5	0.55	0.62
Pakistan	4 911	6 434	2.17	2.28	15.9	18.0	-1.25	0.96
Philippines	2 269	3 082	6.01	2.17	13.8	16.1	5.43	1.25
Saudi Arabia	977	1 145	8.51	1.50	23.6	24.5	7.16	0.49
Thailand	3 875	4 729	7.76	0.84	13.7	14.8	7.70	0.62
Türkiye	3 094	3 531	3.52	1.10	26.4	27.5	1.81	0.35
Viet Nam	1 717	2 077	5.18	1.50	2.7	2.9	4.90	0.57
OCEANIA	723	836	1.51	0.93	16.8	17.1	0.15	-0.21
Australia	493	548	1.42	0.48	19.3	19.3	0.09	-0.48
New Zealand	101	116	1.80	1.30	21.0	22.2	0.86	0.62
DEVELOPED COUNTRIES	**55 901**	**58 498**	**2.05**	**0.03**	**26.4**	**27.6**	**1.65**	**0.56**
DEVELOPING COUNTRIES	**157 927**	**190 183**	**3.78**	**1.52**	**16.3**	**17.4**	**1.80**	**0.60**
LEAST DEVELOPED COUNTRIES (LDC)	10 674	14 130	3.19	2.50	8.2	9.0	0.56	0.83
OECD[3]	**57 562**	**60 764**	**2.25**	**0.06**	**27.3**	**28.4**	**1.66**	**0.46**
BRICS	**78 520**	**89 968**	**3.07**	**1.20**	**19.8**	**21.3**	**2.07**	**0.73**

Note: Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), “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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
ARGENTINA												
Export tax												
Soybean	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Other oilseeds	%	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Soybean meal	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Soybean oil	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
CANADA												
Tariffs												
Palm oil	%	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
EUROPEAN UNION[1,2]												
Voluntary coupled support												
Soybean	mln EUR	33	35	36	36	36	37	38	39	39	41	40
Tariffs												
Soybean oil	%	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Rapeseed oil	%	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
KOREA												
Soybean tariff-quota	kt	800	1 200	1 200	1 200	1 200	1 200	1 200	1 200	1 200	1 200	1 200
In-quota tariff	%	3	3	3	3	3	3	3	3	3	3	3
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	%	51.2	50.8	50.5	50.5	50.7	50.8	50.9	50.6	50.5	50.5	50.5
Soybean loan rate	USD/t	227.8	227.8	227.8	227.8	227.8	227.8	227.8	227.8	227.8	227.8	227.8
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	%	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	%	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
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	%	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3
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 2019-21est: Data for 2021 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 (2022), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

ANNEX C

Table C.23.1. Sugar projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**169 979**	**190 070**	**0.02**	**0.93**	**60 708**	**66 464**	**0.46**	**1.38**	**62 531**	**68 288**	**0.16**	**1.34**
NORTH AMERICA	7 609	8 616	0.89	0.44	4 151	3 517	-0.49	0.03	102	80	-11.10	0.00
Canada	111	132	2.06	0.26	1 186	1 194	0.54	0.82	60	50	7.72	0.00
United States	7 499	8 483	0.87	0.44	2 966	2 323	-0.92	-0.34	42	30	-19.75	0.00
LATIN AMERICA	56 905	63 649	-0.98	1.65	2 223	2 396	-0.31	1.06	33 968	40 442	-0.97	2.60
Argentina	1 730	1 932	-1.32	1.69	0	0	..	..	394	632	7.58	6.58
Brazil	37 418	44 014	-0.88	2.57	0	0	-68.56	..	27 033	33 466	-0.66	3.33
Chile	138	108	-8.37	-0.54	599	600	1.62	-0.35	0	0	..	..
Colombia	2 127	2 027	-0.33	-0.25	225	226	3.82	0.88	645	493	-0.45	-0.87
Mexico	5 702	5 917	-1.23	-0.32	41	34	22.00	-0.29	1 324	1 558	-5.21	-1.77
Paraguay	147	95	-1.80	-3.12	77	117	175.09	2.42	87	65	3.69	-2.36
Peru	1 157	1 077	0.21	-0.61	341	580	7.26	3.93	122	71	3.23	-3.78
EUROPE	24 488	25 327	0.33	0.30	4 725	3 572	-6.15	-1.44	2 244	2 970	-4.09	6.92
European Union[1]	15 044	15 994	0.37	0.33	2 493	1 572	-7.91	-2.63	863	1 706	-8.44	6.03
United Kingdom	1 068	1 021	-1.70	-0.22	1 087	1 097	-0.32	-0.03	235	264	-1.62	-0.69
Russia	5 979	6 140	3.32	0.73	292	84	-18.24	-1.94	669	506	70.80	22.21
Ukraine	1 261	1 091	-5.24	-1.77	67	1	34.40	-21.75	65	199	1.14	28.51
AFRICA	11 104	13 337	1.19	1.11	14 504	17 250	1.92	2.34	5 367	4 746	2.13	-0.64
Egypt	2 627	3 327	3.84	1.61	851	981	-5.93	2.32	235	265	-3.15	-2.26
Ethiopia	406	509	3.41	1.96	404	587	29.03	5.92	37	48	207.68	-2.78
Nigeria	20	0	10.45	..	1 550	1 731	-0.07	2.88	0	0	-58.08	..
South Africa	2 024	2 191	0.44	0.56	345	185	-6.95	-2.02	966	1 073	10.53	2.06
ASIA	65 667	74 561	0.60	0.65	34 790	39 415	1.30	1.44	17 581	16 588	2.96	-1.02
China[2]	10 307	10 495	-2.31	0.35	5 396	7 460	0.61	2.95	112	70	9.38	0.00
India	30 318	31 992	3.10	0.05	820	341	-15.36	8.43	6 801	2 764	19.05	-7.78
Indonesia	2 135	2 587	-2.10	1.80	5 580	6 684	5.88	2.02	5	0	41.90	..
Iran	1 328	1 531	0.12	1.75	1 476	1 099	4.03	-2.52	6	0	-68.37	..
Japan	722	765	0.59	0.07	1 288	1 144	-0.44	-0.87	4	5	20.88	0.00
Kazakhstan	51	0	32.47	..	470	527	0.19	0.51	6	0	-46.42	..
Korea	0	0	..	..	1 978	2 032	0.74	0.15	317	363	-0.37	0.73
Malaysia	0	0	-78.96	..	2 072	2 391	0.77	1.17	187	130	-7.07	-1.15
Pakistan	5 588	7 254	1.03	2.05	195	55	26.32	-3.29	356	272	-5.38	1.88
Philippines	2 236	2 246	-1.33	-0.04	156	318	568.49	3.05	112	95	-4.89	-3.01
Saudi Arabia	0	0	..	..	1 775	1 915	4.27	0.47	448	456	12.09	-0.47
Thailand	8 310	12 456	-1.96	1.55	0	0	..	..	6 609	10 080	0.14	2.03
Türkiye	2 785	3 015	3.26	0.51	189	281	40.29	5.14	314	263	26.33	-4.89
Viet Nam	777	912	-8.61	0.31	889	601	22.63	0.05	308	325	5.41	-0.05
OCEANIA	4 207	4 580	-1.81	0.09	314	314	-2.77	0.13	3 269	3 462	-1.83	-0.35
Australia	4 004	4 345	-1.74	0.08	18	20	-23.20	0.00	3 108	3 331	-1.70	-0.34
New Zealand	0	0	..	..	227	224	-0.93	-0.11	20	20	-2.31	0.00
DEVELOPED COUNTRIES	**39 031**	**41 424**	**0.25**	**0.32**	**13 351**	**11 505**	**-3.01**	**-0.43**	**6 651**	**7 659**	**-1.98**	**2.36**
DEVELOPING COUNTRIES	**130 949**	**148 646**	**-0.04**	**1.11**	**47 357**	**54 959**	**1.66**	**1.81**	**55 880**	**60 629**	**0.42**	**1.22**
LEAST DEVELOPED COUNTRIES (LDC)	3 934	4 739	1.51	1.09	9 632	12 472	3.01	2.84	2 387	2 014	-3.45	-0.20
OECD[3]	**39 429**	**42 038**	**0.00**	**0.19**	**13 056**	**11 552**	**-1.92**	**-0.35**	**6 936**	**8 087**	**-2.93**	**0.20**
BRICS	**86 047**	**94 832**	**0.54**	**1.24**	**6 852**	**8 071**	**-2.99**	**2.92**	**35 582**	**37 879**	**1.90**	**2.00**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

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

Table C.23.2. Sugar projections: Consumption, per capita

Marketing year

	CONSUMPTION (kt)		Growth (%)[4]		PER CAPITA (kg/cap)		Growth (%)[4]	
	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**169 838**	**187 758**	**0.65**	**0.91**	**21.9**	**21.9**	**-0.44**	**0.02**
NORTH AMERICA	11 680	12 047	0.58	0.26	30.8	30.0	0.32	-0.29
Canada	1 256	1 275	0.79	0.19	24.5	24.0	3.30	-0.43
United States	10 424	10 772	0.55	0.27	31.5	30.6	0.13	-0.27
LATIN AMERICA	25 123	25 487	-0.93	0.17	38.5	36.0	-1.88	-0.56
Argentina	1 290	1 298	-3.70	0.29	28.5	26.3	-4.64	-0.50
Brazil	10 277	10 489	-1.60	0.34	48.4	46.7	-2.38	-0.13
Chile	742	710	-0.45	-0.38	38.9	36.3	-1.62	-0.54
Colombia	1 737	1 759	0.27	0.07	34.2	32.8	-0.99	-0.40
Mexico	4 314	4 394	0.06	-0.05	33.5	31.0	-1.10	-0.89
Paraguay	137	147	0.82	0.63	19.2	18.3	-0.48	-0.41
Peru	1 401	1 575	2.56	1.03	42.5	43.4	1.10	0.18
EUROPE	27 197	26 035	-0.57	-0.30	36.3	35.1	-0.71	-0.19
European Union[1]	16 623	15 925	-0.55	-0.30	37.3	36.1	-0.67	-0.20
United Kingdom	1 868	1 868	-1.35	-0.05	27.5	26.4	-1.97	-0.40
Russia	5 861	5 720	0.82	-0.12	40.2	40.0	0.66	0.10
Ukraine	1 251	922	-5.47	-2.18	28.6	22.7	-5.00	-1.51
AFRICA	20 077	25 702	1.79	2.29	15.1	15.0	-0.76	-0.01
Egypt	3 222	4 016	0.31	2.00	31.5	32.7	-1.76	0.38
Ethiopia	672	1 020	6.27	3.77	5.8	6.9	3.47	1.46
Nigeria	1 517	1 726	-0.60	2.86	7.4	6.4	-3.15	0.42
South Africa	1 537	1 300	-3.46	-0.79	25.9	19.5	-4.82	-1.79
ASIA	84 391	97 064	1.35	1.21	18.3	19.5	0.40	0.55
China[2]	15 653	17 855	0.64	1.10	10.9	12.2	0.16	0.98
India	25 841	29 544	1.21	1.17	18.7	19.5	0.14	0.34
Indonesia	7 313	9 199	3.08	1.95	26.7	30.5	1.87	1.08
Iran	2 476	2 625	0.37	0.30	29.5	28.1	-0.96	-0.61
Japan	2 004	1 904	-1.09	-0.51	15.8	15.9	-0.89	-0.01
Kazakhstan	488	527	0.60	0.48	26.0	25.3	-0.79	-0.40
Korea	1 625	1 670	0.98	0.05	31.7	32.7	0.72	0.10
Malaysia	1 884	2 261	2.38	1.36	58.2	62.1	1.01	0.32
Pakistan	5 576	7 035	2.45	2.02	25.2	26.3	0.37	0.32
Philippines	2 164	2 452	-0.14	0.88	19.7	19.6	-1.60	-0.29
Saudi Arabia	1 272	1 449	2.01	1.13	36.5	36.5	-0.12	-0.01
Thailand	2 604	2 348	-0.89	-0.51	37.3	33.4	-1.23	-0.54
Türkiye	2 632	2 985	2.41	0.81	31.2	33.3	0.90	0.29
Viet Nam	1 541	1 174	-0.85	0.09	15.9	11.2	-1.84	-0.53
OCEANIA	1 369	1 423	0.04	0.45	32.8	30.0	-1.37	-0.69
Australia	1 027	1 031	-0.39	0.18	40.3	36.3	-1.69	-0.78
New Zealand	210	204	-0.46	-0.12	43.6	39.3	-1.38	-0.79
DEVELOPED COUNTRIES	**46 145**	**45 350**	**-0.32**	**-0.09**	**32.0**	**30.7**	**-0.63**	**-0.27**
DEVELOPING COUNTRIES	**123 693**	**142 408**	**1.04**	**1.25**	**19.6**	**20.0**	**-0.25**	**0.20**
LEAST DEVELOPED COUNTRIES (LDC)	10 770	15 109	4.07	2.76	12.1	13.4	1.68	0.59
OECD[3]	**45 425**	**45 523**	**-0.03**	**0.00**	**32.3**	**31.4**	**-0.47**	**-0.26**
BRICS	**59 169**	**64 908**	**0.35**	**0.85**	**18.3**	**19.0**	**-0.40**	**0.40**

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
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	17.0
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	%	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4
Tariff, over-quota	%	70.6	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
EUROPEAN UNION[2]												
Voluntary coupled support												
Sugarbeet[3]	mln EUR	172.9	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	0.0	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	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
RUSSIA												
Minimum tariff, raw sugar	USD/t	190.3	171.0	203.0	203.0	240.0	240.0	240.0	203.0	203.0	203.0	203.0
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	435.4	435.4	435.4	435.4	435.4	435.4	435.4	435.4	435.4	435.4	435.4
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	1 637	1 487	1 494	1 502	1 509	1 517	1 525	1 533	1 541	1 546	1 552
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	%	81.1	81.1	81.1	81.1	81.1	81.1	81.1	81.1	81.1	81.1	81.1

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 are estimated. The sources for tariffs and Tariff Rate Quotas are the national questionnaire reply, UNCTAD and WTO.

1. Refers to mainland only.
2. Refers to all current European Union member States (excludes the United Kingdom)
3. Implemented in 11 Member States.

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**329 284**	**377 205**	**1.18**	**0.95**	**37 563**	**40 419**	**3.97**	**0.33**	**38 942**	**40 037**	**3.18**	**0.31**
NORTH AMERICA	52 514	55 591	1.99	0.65	2 833	3 082	2.52	0.01	10 351	10 482	2.29	0.45
Canada	5 202	5 431	1.85	0.43	694	809	-0.15	0.99	2 235	2 264	3.12	0.12
United States	47 312	50 160	2.00	0.68	2 139	2 273	3.56	-0.32	8 116	8 218	2.07	0.54
LATIN AMERICA	54 816	61 613	1.60	0.91	4 960	5 899	4.00	0.98	10 263	11 608	4.20	1.01
Argentina	6 107	6 754	2.37	1.00	42	39	1.54	0.40	986	1 238	10.81	1.90
Brazil	27 567	29 697	1.18	0.54	49	45	-2.50	-0.01	7 009	7 553	3.02	0.94
Chile	1 576	1 796	1.06	0.90	675	770	10.84	0.25	471	506	6.34	0.21
Colombia	2 930	3 680	2.91	1.85	247	350	11.55	1.48	45	85	11.36	1.55
Mexico	7 386	8 127	2.93	0.78	2 243	2 670	4.30	1.25	579	654	11.45	1.22
Paraguay	647	1 004	6.03	2.66	35	36	3.66	0.33	376	666	3.87	3.16
Peru	2 141	2 767	3.94	2.33	109	97	13.87	-3.46	1	1	-27.87	0.53
EUROPE	64 591	63 718	1.76	-0.23	4 875	5 003	-3.55	-0.10	10 231	8 645	5.65	-1.71
European Union[1]	44 789	43 247	1.38	-0.47	1 402	1 498	-1.77	0.56	7 728	6 343	5.12	-2.11
United Kingdom	4 003	3 911	1.74	-0.28	1 730	1 975	0.82	0.61	875	651	2.15	-2.80
Russia	10 655	11 339	4.05	0.48	700	399	-14.22	-5.48	592	500	30.25	0.58
Ukraine	2 236	2 279	0.53	0.63	411	396	0.93	-0.35	488	547	16.30	0.77
AFRICA	18 023	22 687	2.36	2.28	2 949	4 933	1.65	3.74	330	348	2.25	0.68
Egypt	2 158	3 084	1.34	3.49	321	383	-3.23	1.04	4	2	-0.47	-1.16
Ethiopia	790	938	3.56	1.57	1	2	5.13	11.96	14	17	-0.53	3.83
Nigeria	1 223	1 396	1.28	1.34	7	16	13.78	4.18	0	0	..	..
South Africa	3 458	4 146	2.23	1.51	530	451	1.03	-0.88	149	222	0.81	3.85
ASIA	132 982	166 333	0.35	1.39	21 363	20 806	7.34	-0.39	5 030	5 783	1.82	1.57
China[2]	75 416	94 292	-1.26	0.91	8 237	6 198	23.83	-2.60	708	607	-2.24	-0.27
India	7 475	10 394	1.90	2.76	2	2	4.13	0.34	1 347	1 444	-2.45	0.16
Indonesia	4 675	5 805	8.36	1.96	250	356	20.55	1.81	3	3	-6.16	1.34
Iran	3 033	3 825	1.34	1.78	135	117	0.28	2.56	75	146	-1.92	5.53
Japan	3 445	3 354	0.76	-0.12	3 105	3 093	2.60	-0.09	19	23	7.72	0.24
Kazakhstan	1 010	1 235	4.00	1.15	321	382	1.36	1.49	28	32	26.29	-1.44
Korea	2 680	2 713	2.57	0.14	1 419	1 621	5.72	0.70	62	51	6.56	-0.75
Malaysia	2 015	2 587	1.47	2.06	340	404	3.24	1.29	221	221	5.50	-1.16
Pakistan	4 723	6 462	6.66	2.52	2	2	-12.82	0.21	81	55	4.27	-2.83
Philippines	3 075	4 280	-0.55	4.54	713	1 175	10.84	1.00	7	8	-10.64	-0.22
Saudi Arabia	915	1 323	7.28	3.26	841	823	-3.60	-0.91	61	68	-1.16	1.15
Thailand	3 128	3 612	0.78	1.60	30	34	-7.11	-0.02	1 313	1 682	6.32	2.31
Türkiye	3 400	4 137	3.02	2.29	74	83	-1.61	-0.56	716	1 155	7.11	5.93
Viet Nam	5 435	7 025	3.18	2.03	770	518	-3.07	-2.58	35	25	5.96	1.36
OCEANIA	6 357	7 262	0.29	1.11	582	696	3.12	1.22	2 737	3 171	-1.46	1.25
Australia	4 768	5 598	-0.02	1.31	379	424	2.74	0.64	1 629	2 068	-3.31	1.81
New Zealand	1 450	1 511	1.31	0.40	82	97	4.89	1.25	1 105	1 100	1.90	0.29
DEVELOPED COUNTRIES	**134 332**	**138 788**	**1.79**	**0.29**	**12 658**	**13 248**	**-0.21**	**0.08**	**23 544**	**22 594**	**3.09**	**-0.31**
DEVELOPING COUNTRIES	**194 952**	**238 417**	**0.78**	**1.36**	**24 906**	**27 171**	**6.79**	**0.45**	**15 398**	**17 442**	**3.33**	**1.17**
LEAST DEVELOPED COUNTRIES (LDC)	11 268	14 605	3.00	2.55	1 219	2 487	2.16	5.36	82	47	14.58	-5.19
OECD[3]	**130 488**	**135 381**	**1.73**	**0.34**	**14 475**	**16 013**	**2.75**	**0.49**	**23 607**	**23 133**	**2.98**	**-0.11**
BRICS	**124 570**	**149 868**	**-0.10**	**0.93**	**9 518**	**7 095**	**10.98**	**-2.68**	**9 803**	**10 327**	**2.29**	**0.79**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2019-21est: Data for 2021 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 and Costa Rica 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 (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**327 683**	**377 206**	**1.25**	**0.96**	**34.1**	**35.6**	**0.21**	**0.09**
NORTH AMERICA	45 281	48 420	1.97	0.66	98.5	99.2	1.34	0.12
Canada	3 320	3 646	1.38	0.79	70.5	71.3	0.52	0.05
United States	41 961	44 774	2.02	0.65	101.7	102.5	1.41	0.13
LATIN AMERICA	49 061	55 424	1.32	0.90	60.9	63.4	0.47	0.19
Argentina	5 162	5 555	1.26	0.81	89.6	88.4	0.41	0.05
Brazil	20 519	22 088	0.68	0.39	77.7	79.2	0.07	-0.06
Chile	1 760	2 038	2.56	0.84	73.4	83.2	1.27	0.69
Colombia	3 080	3 882	3.35	1.85	49.6	59.6	2.29	1.45
Mexico	8 825	9 909	2.99	0.92	56.0	57.2	1.84	0.08
Paraguay	302	371	8.67	1.62	32.2	35.3	7.03	0.59
Peru	2 248	2 863	4.36	2.08	58.4	67.7	2.97	1.24
EUROPE	58 926	59 858	0.62	0.03	63.2	65.0	0.56	0.16
European Union[1]	38 136	38 178	0.59	-0.10	68.5	69.4	0.53	0.02
United Kingdom	4 857	5 235	1.34	0.42	58.0	60.1	0.76	0.08
Russia	10 775	11 238	0.76	0.19	59.8	63.7	0.75	0.43
Ukraine	2 154	2 125	-1.55	0.40	40.4	43.0	-0.98	1.15
AFRICA	20 713	27 445	2.30	2.57	12.7	13.1	-0.18	0.29
Egypt	2 509	3 496	0.56	3.16	20.0	23.3	-1.25	1.64
Ethiopia	753	918	3.97	1.74	5.1	4.8	1.44	-0.51
Nigeria	1 283	1 493	1.32	1.47	5.0	4.5	-1.19	-0.93
South Africa	3 778	4 295	1.80	1.16	52.6	53.2	0.41	0.15
ASIA	149 784	181 671	1.10	1.15	26.3	29.6	0.22	0.53
China[2]	82 995	99 809	-0.09	0.65	46.3	54.7	-0.51	0.54
India	6 118	8 941	3.12	3.25	3.7	5.0	2.10	2.51
Indonesia	5 053	6 317	8.75	1.93	15.7	17.8	7.77	1.08
Iran	3 080	3 780	1.50	1.69	31.0	34.4	0.10	0.79
Japan	6 530	6 425	1.59	-0.11	41.5	43.0	1.83	0.39
Kazakhstan	1 307	1 589	3.08	1.28	55.0	60.8	1.68	0.42
Korea	4 026	4 283	3.53	0.36	62.2	66.4	3.29	0.41
Malaysia	2 152	2 788	1.32	2.23	56.5	65.4	-0.01	1.22
Pakistan	4 634	6 399	6.68	2.58	16.6	19.2	4.71	0.92
Philippines	3 788	5 454	1.16	3.66	28.4	35.9	-0.09	2.47
Saudi Arabia	1 850	2 254	1.02	1.39	45.7	48.8	-1.10	0.25
Thailand	1 592	1 631	-3.09	0.70	18.5	18.9	-3.53	0.67
Türkiye	2 778	3 082	1.66	1.11	26.9	28.2	0.15	0.56
Viet Nam	6 193	7 533	2.23	1.64	50.6	57.6	1.43	1.04
OCEANIA	3 918	4 389	2.45	0.87	75.6	75.0	1.01	-0.23
Australia	3 237	3 594	2.68	0.80	101.9	102.2	1.30	-0.13
New Zealand	424	469	1.12	0.69	72.2	74.2	0.38	0.04
DEVELOPED COUNTRIES	**123 141**	**129 040**	**1.32**	**0.38**	**69.0**	**70.8**	**0.97**	**0.21**
DEVELOPING COUNTRIES	**204 542**	**248 166**	**1.20**	**1.27**	**26.2**	**28.3**	**0.01**	**0.25**
LEAST DEVELOPED COUNTRIES (LDC)	12 448	17 161	3.06	2.95	11.2	12.3	0.72	0.81
OECD[3]	**120 817**	**127 640**	**1.63**	**0.44**	**69.5**	**71.4**	**1.14**	**0.20**
BRICS	**124 186**	**146 371**	**0.30**	**0.73**	**31.0**	**34.6**	**-0.35**	**0.30**

Note: Calendar year; except year ending 30 June for New Zealand. Average 2019-21est: Data for 2021 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 and Costa Rica 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 (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**70 556**	**76 384**	**0.92**	**0.61**	**11 011**	**12 782**	**4.45**	**0.99**	**10 680**	**12 525**	**2.63**	**0.99**
NORTH AMERICA	13 590	14 111	1.47	0.33	1 696	1 800	2.86	0.16	1 981	2 231	4.50	0.88
Canada	1 534	1 575	1.80	0.20	223	304	-2.21	2.29	555	616	7.07	0.70
United States	12 056	12 536	1.43	0.35	1 474	1 496	3.89	-0.22	1 426	1 616	3.65	0.95
LATIN AMERICA	18 041	19 987	0.47	0.56	808	885	0.65	0.46	4 074	5 141	7.28	1.19
Argentina	3 101	3 415	2.04	0.76	7	7	0.00	-0.05	715	936	20.16	1.86
Brazil	8 727	9 377	-0.63	0.29	39	41	-3.28	0.00	1 964	2 351	5.84	1.05
Chile	235	255	1.00	0.55	369	423	8.71	0.79	23	21	18.48	-0.78
Colombia	818	890	-1.33	0.35	8	22	13.28	2.12	44	85	15.13	1.55
Mexico	2 054	2 178	1.73	0.52	126	115	-1.70	-0.65	271	300	9.13	1.39
Paraguay	530	851	5.42	2.80	5	4	12.03	-0.17	364	654	3.50	3.24
Peru	188	203	-0.32	0.67	10	7	7.43	-2.99	0	0	..	..
EUROPE	10 771	10 177	0.48	-0.51	1 207	1 134	-3.16	-0.81	1 098	1 177	3.93	0.47
European Union[1]	7 166	6 612	0.68	-0.76	338	390	0.07	1.18	591	644	3.84	0.63
United Kingdom	912	870	0.69	-0.15	333	387	1.13	0.54	152	111	1.06	-1.13
Russia	1 634	1 669	0.13	0.17	372	196	-9.43	-5.66	75	85	38.86	-1.22
Ukraine	352	288	-2.19	-0.97	7	9	4.20	-1.33	39	52	7.89	3.16
AFRICA	6 373	7 660	1.20	1.86	489	917	-2.14	5.12	90	136	-3.08	5.38
Egypt	566	808	-4.50	2.17	294	366	2.81	0.88	1	1	15.43	-0.08
Ethiopia	445	504	2.12	1.24	0	0	..	..	0	0	31.92	..
Nigeria	277	296	-0.98	0.62	2	3	-3.69	0.91	0	0	..	..
South Africa	1 096	1 299	2.37	1.47	10	10	-19.92	1.91	56	127	4.50	8.48
ASIA	18 719	20 966	1.50	0.90	6 773	8 012	8.55	1.13	1 681	1 739	-1.53	0.00
China[2]	6 740	7 216	1.31	0.51	2 536	3 255	42.13	0.85	16	20	-11.05	0.03
India	2 425	2 683	-0.73	0.35	0	0	..	..	1 330	1 433	-2.40	0.18
Indonesia	386	421	-2.10	1.03	246	348	21.62	1.78	1	1	-3.53	-0.14
Iran	483	606	3.39	0.69	97	62	-3.82	8.00	6	7	12.32	-1.59
Japan	477	460	-0.77	-0.43	859	844	2.36	0.00	9	13	30.46	0.00
Kazakhstan	515	592	4.23	1.18	66	71	0.20	0.35	9	7	38.12	-0.90
Korea	294	309	-1.53	0.48	569	610	7.65	0.46	5	4	0.86	-1.98
Malaysia	29	33	0.40	0.78	199	227	1.39	0.82	11	13	-0.66	-0.81
Pakistan	2 306	2 907	5.01	1.96	1	1	-6.29	0.39	67	41	7.11	-3.55
Philippines	180	166	-7.48	-0.67	171	274	5.73	3.61	4	4	-1.51	-1.20
Saudi Arabia	41	44	-1.64	1.16	172	213	0.62	1.27	11	9	-10.53	-1.26
Thailand	185	170	-3.21	-0.06	25	30	-4.89	-0.04	46	51	-1.69	0.04
Türkiye	974	1 044	2.74	1.61	6	3	-8.86	-0.50	28	69	4.96	2.29
Viet Nam	448	522	3.35	0.83	370	275	-9.49	1.68	1	1	37.26	-0.16
OCEANIA	3 062	3 484	-1.10	1.21	37	33	0.80	0.00	1 756	2 101	-2.76	1.59
Australia	2 329	2 730	-1.99	1.47	18	14	5.95	0.00	1 103	1 460	-5.22	2.18
New Zealand	724	747	2.13	0.35	10	10	1.32	0.02	650	638	2.98	0.40
DEVELOPED COUNTRIES	**31 108**	**31 969**	**0.96**	**0.25**	**4 076**	**4 162**	**0.57**	**-0.01**	**4 911**	**5 657**	**1.34**	**1.16**
DEVELOPING COUNTRIES	**39 449**	**44 415**	**0.89**	**0.87**	**6 935**	**8 620**	**7.50**	**1.51**	**5 770**	**6 868**	**3.86**	**0.86**
LEAST DEVELOPED COUNTRIES (LDC)	3 848	4 658	2.04	1.90	89	340	-4.05	9.95	13	5	0.51	-8.64
OECD[3]	**29 879**	**30 527**	**0.85**	**0.21**	**4 530**	**4 875**	**3.17**	**0.44**	**4 861**	**5 581**	**1.49**	**1.10**
BRICS	**20 622**	**22 245**	**0.17**	**0.43**	**2 957**	**3 502**	**14.70**	**0.34**	**3 442**	**4 016**	**2.06**	**0.83**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2019-21est: Data for 2021 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 and Costa Rica 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 (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**70 684**	**76 386**	**1.12**	**0.61**	**6.4**	**6.2**	**0.00**	**-0.29**
NORTH AMERICA	13 556	13 921	1.19	0.20	25.7	24.8	0.51	-0.36
Canada	1 012	1 079	0.39	0.54	18.8	18.4	-0.57	-0.23
United States	12 544	12 842	1.26	0.17	26.5	25.6	0.60	-0.37
LATIN AMERICA	14 300	15 244	-1.01	0.35	15.3	15.1	-1.97	-0.38
Argentina	2 393	2 487	-0.57	0.38	37.1	35.2	-1.54	-0.42
Brazil	6 714	6 969	-1.85	0.00	22.1	21.7	-2.63	-0.47
Chile	560	635	4.63	0.77	20.5	22.8	3.41	0.61
Colombia	728	763	-2.06	0.29	10.0	10.0	-3.29	-0.18
Mexico	1 661	1 751	1.08	0.48	9.0	8.6	-0.09	-0.36
Paraguay	168	197	10.60	1.46	16.5	17.2	9.17	0.41
Peru	198	210	-0.02	0.53	4.2	4.1	-1.44	-0.32
EUROPE	10 660	9 973	-0.57	-0.58	10.0	9.4	-0.70	-0.47
European Union[1]	6 680	6 196	0.23	-0.67	10.5	9.8	0.11	-0.58
United Kingdom	1 093	1 145	0.76	0.18	11.3	11.3	0.14	-0.17
Russia	1 952	1 787	-3.52	-0.60	9.4	8.8	-3.67	-0.38
Ukraine	314	239	-3.13	-1.71	5.0	4.1	-2.65	-1.03
AFRICA	6 878	8 625	1.02	2.16	3.6	3.5	-1.51	-0.13
Egypt	891	1 204	-2.47	1.70	6.1	6.9	-4.49	0.09
Ethiopia	421	500	2.48	1.58	2.6	2.4	-0.22	-0.68
Nigeria	329	375	-0.74	1.17	1.1	1.0	-3.29	-1.23
South Africa	987	1 103	0.60	1.06	11.7	11.6	-0.82	0.04
ASIA	24 222	27 586	3.42	0.99	3.7	3.9	2.45	0.34
China[2]	9 358	10 474	5.47	0.55	4.6	5.0	4.97	0.43
India	1 095	1 250	2.24	0.54	0.6	0.6	1.15	-0.28
Indonesia	777	936	3.54	1.26	2.0	2.2	2.32	0.40
Iran	577	662	2.90	1.22	4.8	5.0	1.54	0.31
Japan	1 326	1 293	1.19	-0.16	7.3	7.5	1.40	0.35
Kazakhstan	574	659	3.54	1.10	21.4	22.2	2.10	0.21
Korea	854	914	3.45	0.48	11.7	12.5	3.18	0.53
Malaysia	233	263	0.73	0.85	5.0	5.1	-0.61	-0.19
Pakistan	2 230	2 857	4.94	2.08	7.1	7.5	2.80	0.38
Philippines	354	443	-2.14	1.78	2.3	2.5	-3.56	0.60
Saudi Arabia	202	249	1.20	1.35	4.1	4.4	-0.91	0.21
Thailand	121	111	-3.30	-0.14	1.2	1.1	-3.63	-0.17
Türkiye	974	994	1.77	1.51	8.1	7.8	0.27	0.98
Viet Nam	838	809	-3.35	1.10	6.0	5.4	-4.31	0.47
OCEANIA	1 069	1 037	2.37	-0.01	17.9	15.3	0.93	-1.14
Australia	976	949	3.21	0.05	26.8	23.4	1.86	-0.90
New Zealand	76	75	-3.84	-0.55	11.0	10.1	-4.73	-1.22
DEVELOPED COUNTRIES	**30 033**	**30 163**	**0.71**	**0.04**	**14.7**	**14.4**	**0.30**	**-0.14**
DEVELOPING COUNTRIES	**40 652**	**46 223**	**1.43**	**0.99**	**4.5**	**4.6**	**0.14**	**-0.06**
LEAST DEVELOPED COUNTRIES (LDC)	3 992	5 111	2.26	2.30	3.1	3.2	-0.08	0.14
OECD[3]	**29 055**	**29 283**	**1.05**	**0.08**	**14.6**	**14.2**	**0.51**	**-0.18**
BRICS	**20 106**	**21 583**	**1.17**	**0.30**	**4.3**	**4.4**	**0.41**	**-0.16**

Note: Calendar year; except year ending 30 June for New Zealand. Average 2019-21est: Data for 2021 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 and Costa Rica 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 (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**110 613**	**128 895**	**-0.48**	**0.63**	**11 617**	**10 470**	**6.37**	**-1.19**	**11 623**	**10 201**	**5.07**	**-1.32**
NORTH AMERICA	14 690	15 415	2.45	0.82	729	839	2.12	-0.44	4 655	4 644	3.82	0.27
Canada	2 189	2 191	1.56	0.01	271	278	2.51	-0.04	1 535	1 488	2.93	-0.21
United States	12 501	13 225	2.61	0.96	458	562	1.93	-0.63	3 119	3 156	4.28	0.50
LATIN AMERICA	8 744	9 814	2.93	0.87	1 781	2 263	8.09	1.51	1 477	1 366	8.86	-0.51
Argentina	647	730	7.53	0.94	28	25	7.76	1.36	33	18	24.46	-1.35
Brazil	4 254	4 578	2.98	0.62	2	1	-8.85	-2.08	851	699	8.32	-1.23
Chile	565	622	0.32	0.21	153	183	22.65	0.15	262	276	6.46	-0.15
Colombia	441	577	8.26	1.68	127	199	14.00	1.61	0	0	..	..
Mexico	1 624	1 772	3.80	0.53	1 061	1 387	6.78	2.07	302	345	14.27	1.00
Paraguay	63	80	9.60	1.47	4	5	5.66	0.41	6	5	15.42	-0.52
Peru	173	225	4.26	2.08	10	27	6.80	9.41	0	0	..	..
EUROPE	30 405	29 573	1.51	-0.54	1 231	1 343	-6.85	0.84	5 237	3 882	5.94	-3.35
European Union[1]	23 397	22 075	0.94	-0.81	160	177	0.99	-0.01	4 727	3 561	6.21	-3.44
United Kingdom	933	952	2.21	-0.14	748	762	0.40	0.28	269	222	4.28	-2.00
Russia	4 210	4 639	6.21	0.51	69	57	-31.00	3.05	165	30	25.99	-2.75
Ukraine	707	778	-0.20	0.56	42	47	-11.39	1.54	5	8	-15.75	-0.22
AFRICA	1 593	1 955	3.58	2.09	275	531	2.19	5.83	30	28	2.62	-2.97
Egypt	1	1	4.74	-1.70	2	3	31.97	3.19	0	0	..	..
Ethiopia	2	3	1.90	1.90	0	1	..	..	0	0	..	..
Nigeria	296	323	2.30	1.28	5	13	33.26	4.97	0	0	..	..
South Africa	303	364	4.68	0.80	31	40	-1.99	3.39	26	23	2.77	-3.28
ASIA	54 612	71 492	-2.59	1.03	7 161	4 982	12.13	-3.36	191	245	-4.90	2.57
China[2]	42 580	57 051	-3.41	0.78	4 044	1 749	25.69	-6.60	69	95	-11.45	2.68
India	342	374	-0.47	1.24	1	1	2.94	0.10	1	2	25.10	-0.10
Indonesia	252	303	-2.36	1.84	3	6	3.52	3.64	0	0	..	..
Iran	0	0	..	..	1	0	157.39	..	1	0	125.69	..
Japan	1 313	1 282	0.25	-0.06	1 340	1 338	2.84	0.01	2	4	5.30	1.49
Kazakhstan	88	92	-1.96	-0.10	40	61	-1.20	1.92	1	1	17.28	-0.33
Korea	1 380	1 372	2.36	-0.01	631	760	4.32	0.85	6	3	8.15	-5.85
Malaysia	220	227	0.20	0.53	23	36	5.85	3.85	4	3	-6.84	-1.69
Pakistan	0	0	..	..	0	0	..	..	0	0	..	..
Philippines	1 432	2 158	-2.60	6.81	184	129	7.82	-12.50	2	3	-4.37	1.63
Saudi Arabia	0	0	..	..	17	16	13.96	0.00	2	2	15.77	0.00
Thailand	1 105	1 242	0.75	1.64	1	1	-18.71	0.27	45	65	5.17	7.25
Türkiye	0	0	..	..	20	27	4.69	0.00	20	27	4.69	0.00
Viet Nam	3 534	4 546	1.46	2.03	179	31	71.96	-21.88	16	14	-4.00	3.08
OCEANIA	569	647	2.05	1.07	441	512	3.14	0.92	33	36	2.60	0.49
Australia	426	489	2.67	1.08	361	409	2.58	0.67	31	35	2.15	0.56
New Zealand	45	47	-0.88	0.54	69	83	5.94	1.47	1	1	..	0.01
DEVELOPED COUNTRIES	**47 338**	**47 343**	**1.76**	**-0.07**	**3 843**	**4 175**	**-1.44**	**0.35**	**9 958**	**8 595**	**4.88**	**-1.53**
DEVELOPING COUNTRIES	**63 274**	**81 552**	**-1.91**	**1.05**	**7 773**	**6 295**	**13.28**	**-2.09**	**1 665**	**1 606**	**6.23**	**-0.10**
LEAST DEVELOPED COUNTRIES (LDC)	2 195	2 948	4.88	3.11	146	334	1.63	7.07	1	1	-5.76	-0.53
OECD[3]	**45 191**	**44 990**	**1.60**	**-0.09**	**5 425**	**6 189**	**3.68**	**0.62**	**10 281**	**9 124**	**5.16**	**-1.38**
BRICS	**51 689**	**67 006**	**-2.36**	**0.75**	**4 146**	**1 849**	**13.37**	**-6.28**	**1 112**	**849**	**6.67**	**-1.00**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2019-21est: Data for 2021 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 and Costa Rica 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 (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**110 471**	**128 893**	**-0.39**	**0.63**	**11.1**	**11.7**	**-1.49**	**-0.26**
NORTH AMERICA	10 773	11 607	1.92	0.97	22.8	23.1	1.23	0.41
Canada	775	832	0.13	0.27	16.0	15.8	-0.82	-0.49
United States	9 998	10 775	2.06	1.03	23.6	23.9	1.41	0.48
LATIN AMERICA	9 070	10 718	2.99	1.20	10.8	11.8	1.99	0.47
Argentina	642	737	6.94	1.02	11.1	11.6	5.90	0.22
Brazil	3 405	3 880	1.92	1.02	12.5	13.5	1.11	0.55
Chile	456	530	1.12	0.38	18.6	21.2	-0.06	0.22
Colombia	568	776	9.34	1.66	8.7	11.3	7.97	1.18
Mexico	2 405	2 821	4.03	1.20	14.5	15.5	2.83	0.35
Paraguay	61	80	8.89	1.55	6.7	7.7	7.48	0.50
Peru	183	252	4.43	2.62	4.3	5.4	2.94	1.75
EUROPE	26 382	27 017	0.25	0.00	27.5	28.4	0.11	0.11
European Union[1]	18 802	18 666	-0.08	-0.21	32.9	33.0	-0.20	-0.12
United Kingdom	1 413	1 490	0.89	0.38	16.2	16.4	0.26	0.03
Russia	4 109	4 660	2.16	0.56	22.0	25.4	2.00	0.79
Ukraine	746	820	-2.19	0.62	13.3	15.8	-1.70	1.32
AFRICA	1 838	2 458	3.36	2.86	1.1	1.1	0.76	0.55
Egypt	3	3	22.60	2.14	0.0	0.0	20.07	0.52
Ethiopia	2	4	1.11	5.47	0.0	0.0	-1.55	3.12
Nigeria	302	337	2.53	1.39	1.1	1.0	-0.11	-1.02
South Africa	308	381	3.98	1.36	4.0	4.5	2.52	0.34
ASIA	61 432	75 970	-1.53	0.66	10.4	11.9	-2.46	0.00
China[2]	46 506	58 607	-2.33	0.45	25.2	31.2	-2.79	0.33
India	341	373	-0.51	1.24	0.2	0.2	-1.57	0.42
Indonesia	241	300	-2.28	2.08	0.7	0.8	-3.42	1.21
Iran	0	0	..	..	0.0	0.0	23.39	-0.90
Japan	2 650	2 616	1.48	-0.03	16.3	17.0	1.69	0.47
Kazakhstan	127	152	-1.72	0.66	5.3	5.7	-3.09	-0.22
Korea	2 000	2 129	3.02	0.30	30.4	32.5	2.75	0.36
Malaysia	239	261	0.83	0.95	5.8	5.6	-0.51	-0.08
Pakistan	0	0	..	..	0.0	0.0	21.31	-1.67
Philippines	1 614	2 284	-1.47	4.09	11.5	14.3	-2.91	2.88
Saudi Arabia	15	14	15.48	0.00	0.3	0.3	13.07	-1.13
Thailand	849	883	-1.23	0.91	9.5	9.8	-1.56	0.87
Türkiye	0	0	..	..	0.0	0.0	-1.48	-1.22
Viet Nam	3 698	4 565	2.19	1.40	29.6	34.0	1.18	0.76
OCEANIA	977	1 123	2.53	1.02	18.2	18.4	1.09	-0.12
Australia	756	863	2.68	0.90	23.1	23.7	1.34	-0.06
New Zealand	113	129	2.68	1.13	18.2	19.3	1.73	0.45
DEVELOPED COUNTRIES	**41 216**	**42 902**	**0.79**	**0.29**	**22.4**	**22.8**	**0.38**	**0.10**
DEVELOPING COUNTRIES	**69 256**	**85 991**	**-1.04**	**0.80**	**8.5**	**9.4**	**-2.30**	**-0.24**
LEAST DEVELOPED COUNTRIES (LDC)	2 351	3 293	4.62	3.44	2.1	2.3	2.22	1.25
OECD[3]	**40 331**	**42 033**	**1.10**	**0.32**	**22.5**	**22.8**	**0.56**	**0.06**
BRICS	**54 669**	**67 901**	**-1.78**	**0.50**	**13.2**	**15.5**	**-2.51**	**0.05**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2019-21est: Data for 2021 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 and Costa Rica 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 (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**132 476**	**153 850**	**2.82**	**1.39**	**13 831**	**16 081**	**2.23**	**0.90**	**15 496**	**16 081**	**2.46**	**0.90**
NORTH AMERICA	24 146	25 969	2.03	0.73	253	281	-0.50	0.57	3 714	3 605	-0.32	0.42
Canada	1 462	1 648	2.36	1.25	180	205	-1.12	0.77	145	160	-4.76	1.04
United States	22 684	24 321	2.01	0.70	73	76	1.16	0.04	3 569	3 445	-0.10	0.39
LATIN AMERICA	27 575	31 315	2.00	1.16	2 358	2 741	2.84	0.74	4 685	5 067	1.03	1.30
Argentina	2 306	2 551	1.76	1.35	6	7	-10.44	-1.88	235	280	-2.24	2.32
Brazil	14 447	15 588	1.88	0.66	5	0	296.33	..	4 194	4 503	1.13	1.29
Chile	762	906	1.74	1.55	153	164	8.69	-0.91	180	205	5.41	0.91
Colombia	1 670	2 212	4.34	2.57	112	129	9.19	1.18	0	0	-42.05	..
Mexico	3 603	4 068	3.34	1.06	1 052	1 167	3.14	0.55	4	7	0.25	6.96
Paraguay	51	70	10.70	2.56	25	28	1.80	0.40	6	6	279.19	-0.40
Peru	1 742	2 301	4.60	2.56	88	64	15.96	-6.20	1	1	-27.90	0.54
EUROPE	22 128	22 669	2.90	0.30	2 194	2 334	-1.43	-0.07	3 733	3 433	6.02	-0.40
European Union[1]	13 587	13 896	2.62	0.21	756	827	-2.96	0.90	2 355	2 063	3.39	-0.44
United Kingdom	1 849	1 790	2.29	-0.47	564	748	2.05	1.27	361	249	2.61	-4.19
Russia	4 597	4 820	3.98	0.60	257	145	-9.31	-7.26	345	385	30.89	1.39
Ukraine	1 165	1 206	2.06	1.12	361	340	5.84	-0.56	443	486	19.96	0.56
AFRICA	6 716	8 917	3.42	2.83	2 174	3 477	3.30	3.14	178	145	6.86	-1.70
Egypt	1 533	2 199	5.61	4.06	25	14	-20.15	5.94	2	1	-4.95	-1.72
Ethiopia	64	78	0.25	1.73	1	1	..	0.35	0	0	..	..
Nigeria	238	281	2.22	1.58	0	0	..	..	0	0	..	..
South Africa	1 881	2 300	2.05	1.73	487	400	2.54	-1.26	65	68	-2.36	0.90
ASIA	50 311	63 108	3.57	2.03	6 771	7 121	3.16	0.32	3 130	3 781	4.83	2.33
China[2]	21 164	24 448	2.48	1.30	1 284	799	12.32	-4.70	622	493	-0.07	-0.76
India	3 862	6 379	4.23	4.37	1	1	22.88	0.73	5	3	-6.34	-3.74
Indonesia	3 897	4 931	11.50	2.10	0	0	-27.84	..	2	2	-6.39	1.83
Iran	2 223	2 865	1.57	2.33	24	55	-22.14	-1.38	67	139	-2.94	6.07
Japan	1 656	1 612	1.68	-0.08	884	888	2.59	-0.30	8	6	-1.26	0.00
Kazakhstan	235	372	9.53	1.90	216	250	2.29	1.75	16	23	22.55	-1.68
Korea	1 003	1 031	4.43	0.24	200	233	4.69	1.00	52	44	6.91	-0.07
Malaysia	1 765	2 326	1.68	2.24	85	103	7.50	1.19	206	206	6.36	-1.18
Pakistan	1 669	2 591	8.96	3.25	1	1	-15.91	0.12	9	8	10.24	-1.19
Philippines	1 430	1 913	3.59	3.00	358	771	15.92	5.56	1	2	-23.34	-0.42
Saudi Arabia	874	1 279	7.91	3.34	630	566	-4.40	-1.73	48	56	4.06	1.66
Thailand	1 836	2 197	1.31	1.72	3	3	-13.39	0.69	1 222	1 566	6.76	2.23
Türkiye	2 308	2 973	3.34	2.65	47	53	2.79	-0.84	668	1 057	7.30	6.42
Viet Nam	1 432	1 933	8.73	2.38	221	212	2.10	2.71	17	10	61.08	-0.56
OCEANIA	1 598	1 872	2.84	1.24	82	127	7.30	3.06	57	50	1.38	0.41
Australia	1 333	1 574	2.69	1.27	0	0	..	..	40	35	-0.29	0.18
New Zealand	233	263	3.88	1.00	1	1	64.57	0.00	16	15	6.63	1.00
DEVELOPED COUNTRIES	**52 469**	**55 810**	**2.44**	**0.61**	**4 310**	**4 530**	**0.27**	**0.04**	**7 615**	**7 197**	**2.41**	**0.00**
DEVELOPING COUNTRIES	**80 006**	**98 040**	**3.07**	**1.86**	**9 522**	**11 551**	**3.21**	**1.27**	**7 881**	**8 884**	**2.52**	**1.70**
LEAST DEVELOPED COUNTRIES (LDC)	3 185	4 332	3.47	2.91	982	1 811	3.02	4.43	65	40	24.22	-4.16
OECD[3]	**52 976**	**57 253**	**2.45**	**0.75**	**4 074**	**4 552**	**1.43**	**0.53**	**7 414**	**7 290**	**1.61**	**0.63**
BRICS	**45 951**	**53 535**	**2.55**	**1.38**	**2 033**	**1 344**	**4.53**	**-4.16**	**5 230**	**5 452**	**1.72**	**1.08**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**130 832**	**153 846**	**2.80**	**1.39**	**14.8**	**15.8**	**1.66**	**0.49**
NORTH AMERICA	20 717	22 643	2.52	0.80	49.4	50.8	1.83	0.24
Canada	1 496	1 695	2.85	1.22	34.9	36.3	1.87	0.45
United States	19 220	20 949	2.50	0.77	51.1	52.4	1.84	0.23
LATIN AMERICA	25 248	28 990	2.26	1.09	34.1	36.0	1.28	0.36
Argentina	2 077	2 277	2.25	1.23	40.4	40.6	1.25	0.43
Brazil	10 258	11 085	2.21	0.42	42.5	43.4	1.40	-0.05
Chile	735	865	2.13	1.19	33.9	39.0	0.94	1.03
Colombia	1 782	2 342	4.63	2.49	30.9	38.4	3.32	2.00
Mexico	4 651	5 227	3.29	0.93	31.7	32.4	2.10	0.09
Paraguay	70	91	5.56	2.08	8.7	10.0	4.19	1.02
Peru	1 829	2 364	5.08	2.21	48.8	57.3	3.58	1.36
EUROPE	20 577	21 569	1.88	0.37	24.2	25.6	1.75	0.48
European Union[1]	11 978	12 660	2.05	0.36	23.7	25.2	1.93	0.45
United Kingdom	2 052	2 290	2.19	0.61	26.6	28.5	1.56	0.25
Russia	4 506	4 580	1.84	0.16	27.2	28.2	1.69	0.39
Ukraine	1 083	1 059	-0.50	0.80	21.8	23.0	0.00	1.49
AFRICA	8 712	12 249	3.34	2.99	5.8	6.3	0.74	0.67
Egypt	1 555	2 212	4.35	4.08	13.4	15.9	2.20	2.42
Ethiopia	64	79	0.30	1.72	0.5	0.5	-2.34	-0.55
Nigeria	238	281	2.22	1.58	1.0	0.9	-0.41	-0.83
South Africa	2 303	2 631	2.32	1.23	34.2	34.8	0.88	0.22
ASIA	53 954	66 446	3.46	1.82	10.3	11.8	2.49	1.16
China[2]	21 826	24 754	2.99	1.08	13.3	14.9	2.50	0.96
India	3 859	6 377	4.26	4.37	2.5	3.7	3.15	3.52
Indonesia	3 895	4 929	11.51	2.10	12.5	14.4	10.20	1.23
Iran	2 180	2 781	1.72	2.09	22.8	26.2	0.37	1.17
Japan	2 532	2 494	1.95	-0.16	17.6	18.3	2.16	0.34
Kazakhstan	435	600	5.20	2.00	20.4	25.4	3.74	1.10
Korea	1 152	1 221	4.36	0.39	19.8	21.0	4.09	0.44
Malaysia	1 643	2 224	1.44	2.57	44.7	53.7	0.09	1.52
Pakistan	1 661	2 584	8.92	3.26	6.6	8.5	6.70	1.54
Philippines	1 787	2 682	5.41	3.68	14.4	18.9	3.87	2.47
Saudi Arabia	1 457	1 789	1.17	1.49	36.8	39.7	-0.94	0.35
Thailand	618	634	-5.18	0.57	7.8	7.9	-5.51	0.54
Türkiye	1 688	1 969	1.78	1.00	17.6	19.3	0.28	0.48
Viet Nam	1 636	2 134	6.51	2.43	14.8	17.9	5.45	1.79
OCEANIA	1 624	1 949	3.08	1.37	34.2	36.1	1.63	0.23
Australia	1 293	1 539	2.79	1.30	44.6	47.6	1.44	0.33
New Zealand	217	249	3.72	1.00	39.6	42.2	2.76	0.32
DEVELOPED COUNTRIES	**49 184**	**53 140**	**2.25**	**0.65**	**30.2**	**31.9**	**1.84**	**0.46**
DEVELOPING COUNTRIES	**81 648**	**100 706**	**3.15**	**1.80**	**11.4**	**12.5**	**1.84**	**0.75**
LEAST DEVELOPED COUNTRIES (LDC)	4 103	6 102	3.19	3.41	4.1	4.8	0.82	1.22
OECD[3]	**49 658**	**54 512**	**2.52**	**0.75**	**31.3**	**33.3**	**1.97**	**0.49**
BRICS	**42 752**	**49 428**	**2.75**	**1.22**	**11.6**	**12.7**	**1.98**	**0.76**

Note: Calendar year; except year ending 30 June for New Zealand. Average 2019-21est: Data for 2021 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 and Costa Rica 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 (2022), “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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**15 640**	**18 076**	**2.03**	**1.21**	**1 104**	**1 086**	**0.59**	**0.20**	**1 143**	**1 229**	**0.81**	**0.60**
NORTH AMERICA	88	96	-1.16	0.75	155	161	7.05	-0.19	2	2	-9.39	0.12
Canada	17	18	0.40	0.82	21	22	2.02	0.00	0	0	..	..
United States	71	78	-1.50	0.73	134	139	8.07	-0.22	2	1	-9.38	0.13
LATIN AMERICA	456	497	1.06	0.49	14	9	-10.04	0.20	27	34	1.98	-0.35
Argentina	53	57	-1.49	0.69	0	0	..	..	4	5	5.35	0.45
Brazil	139	154	2.56	0.79	3	2	-11.34	1.73	0	0	..	..
Chile	14	13	-0.66	-1.45	0	0	..	..	6	5	1.03	-2.33
Colombia	1	1	3.73	-0.09	0	0	..	..	0	0	..	..
Mexico	105	110	0.98	0.40	4	1	-17.11	-1.76	1	2	..	0.00
Paraguay	3	3	-4.80	0.82	0	0	..	..	0	0	..	..
Peru	38	38	-1.07	-0.29	0	0	..	..	0	0	..	..
EUROPE	1 288	1 299	0.63	0.20	243	191	-3.02	-2.25	162	152	0.47	0.51
European Union[1]	640	664	0.49	0.44	149	104	-2.03	-2.78	55	76	5.61	3.62
United Kingdom	308	300	0.43	0.03	85	78	-3.74	-1.67	94	68	-2.52	-2.21
Russia	215	210	1.59	-0.20	2	1	-20.37	-2.54	6	0	79.78	..
Ukraine	12	7	-5.19	-2.49	0	1	..	-1.39	0	0	..	..
AFRICA	3 341	4 156	2.05	2.01	12	8	-21.78	-1.54	33	39	-0.80	1.43
Egypt	59	76	-10.29	2.56	0	0	-34.48	..	0	0	..	..
Ethiopia	279	352	7.45	2.01	0	0	..	..	14	17	-0.91	4.18
Nigeria	411	497	1.80	1.70	0	0	..	..	0	0	..	..
South Africa	177	182	-0.14	0.49	3	1	-20.88	-6.52	2	5	3.52	4.95
ASIA	9 339	10 768	2.57	1.15	658	692	3.69	1.11	28	18	-6.96	0.00
China[2]	4 932	5 578	2.51	1.01	374	396	9.48	0.51	0	0	-32.25	..
India	845	959	1.63	1.18	0	0	..	..	11	6	-7.18	-2.34
Indonesia	140	150	3.90	0.64	2	1	-0.03	3.52	0	0	..	..
Iran	327	355	-2.59	-0.37	13	0	0.18	..	0	0	..	..
Japan	0	0	..	..	22	22	0.10	-0.33	0	0	..	..
Kazakhstan	172	179	1.30	0.26	0	0	..	..	2	1	169.95	-0.28
Korea	2	2	5.38	0.00	18	18	17.78	-0.47	0	0	..	..
Malaysia	1	0	-10.63	..	33	38	3.94	2.35	0	0	..	..
Pakistan	748	964	7.38	2.35	0	0	..	..	6	5	-13.20	1.66
Philippines	33	44	-7.22	2.23	1	1	-3.77	6.34	0	0	..	..
Saudi Arabia	0	0	..	..	22	27	-11.65	1.33	1	0	-16.65	..
Thailand	2	3	3.77	0.31	1	0	-2.64	-2.85	0	0	..	..
Türkiye	117	121	-0.36	-0.15	0	0	..	..	1	2	..	5.57
Viet Nam	21	25	13.28	1.43	0	0	-26.11	..	0	0	..	..
OCEANIA	1 128	1 259	0.09	0.69	22	24	-4.01	0.53	892	985	1.22	0.64
Australia	680	806	0.70	1.03	0	0	..	..	454	538	2.12	1.10
New Zealand	448	453	-0.76	0.13	3	3	-1.84	0.00	438	447	0.34	0.11
DEVELOPED COUNTRIES	**3 417**	**3 666**	**0.54**	**0.64**	**429**	**381**	**-0.33**	**-1.32**	**1 061**	**1 145**	**1.12**	**0.64**
DEVELOPING COUNTRIES	**12 222**	**14 410**	**2.47**	**1.37**	**675**	**705**	**1.35**	**1.12**	**82**	**85**	**-2.64**	**0.23**
LEAST DEVELOPED COUNTRIES (LDC)	2 039	2 667	2.30	2.53	2	2	-1.54	0.30	4	1	0.54	-16.96
OECD[3]	**2 442**	**2 610**	**0.19**	**0.49**	**446**	**396**	**0.45**	**-1.26**	**1 051**	**1 138**	**1.01**	**0.61**
BRICS	**6 308**	**7 082**	**2.28**	**0.98**	**382**	**400**	**7.49**	**0.48**	**19**	**11**	**-3.64**	**0.31**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2019-21est: Data for 2021 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 and Costa Rica 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 (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**15 695**	**18 081**	**2.07**	**1.21**	**1.8**	**1.9**	**0.94**	**0.31**
NORTH AMERICA	236	249	3.91	0.16	0.6	0.6	3.21	-0.40
Canada	38	40	1.11	0.36	0.9	0.9	0.15	-0.40
United States	198	209	4.53	0.12	0.5	0.5	3.85	-0.42
LATIN AMERICA	443	472	0.37	0.53	0.6	0.6	-0.60	-0.20
Argentina	50	53	-1.84	0.71	1.0	0.9	-2.79	-0.09
Brazil	142	155	1.99	0.75	0.6	0.6	1.18	0.27
Chile	8	8	-1.64	-0.85	0.4	0.3	-2.79	-1.01
Colombia	1	1	4.19	0.12	0.0	0.0	2.88	-0.35
Mexico	108	110	-0.54	0.38	0.7	0.7	-1.69	-0.46
Paraguay	3	3	-4.79	0.82	0.3	0.4	-6.02	-0.22
Peru	38	38	-1.07	-0.29	1.0	0.9	-2.48	-1.13
EUROPE	1 306	1 299	-0.42	-0.04	1.5	1.5	-0.55	0.07
European Union[1]	676	656	-0.90	-0.06	1.3	1.3	-1.02	0.03
United Kingdom	299	310	0.05	0.12	3.9	3.9	-0.57	-0.23
Russia	208	210	0.49	-0.22	1.3	1.3	0.34	0.01
Ukraine	12	7	-5.99	-2.74	0.2	0.1	-5.52	-2.06
AFRICA	3 284	4 113	1.89	2.05	2.2	2.1	-0.67	-0.25
Egypt	59	77	-14.00	2.56	0.5	0.5	-15.77	0.93
Ethiopia	265	335	8.23	1.95	2.0	2.0	5.38	-0.33
Nigeria	414	501	1.86	1.68	1.8	1.6	-0.76	-0.73
South Africa	180	179	-1.09	0.33	2.7	2.4	-2.48	-0.68
ASIA	10 177	11 668	2.63	1.15	1.9	2.1	1.66	0.50
China[2]	5 305	5 973	2.87	0.98	3.2	3.6	2.38	0.86
India	823	941	1.64	1.22	0.5	0.5	0.56	0.39
Indonesia	141	152	3.86	0.66	0.5	0.4	2.64	-0.19
Iran	323	337	-1.86	-0.40	3.4	3.2	-3.16	-1.30
Japan	22	22	0.10	-0.33	0.2	0.2	0.31	0.18
Kazakhstan	171	178	1.11	0.27	8.0	7.5	-0.30	-0.61
Korea	20	20	15.88	-0.43	0.3	0.3	15.58	-0.38
Malaysia	37	41	3.07	2.06	1.0	1.0	1.70	1.01
Pakistan	743	959	7.73	2.35	3.0	3.2	5.54	0.65
Philippines	33	44	-7.16	2.28	0.3	0.3	-8.52	1.09
Saudi Arabia	176	201	-1.02	0.68	4.4	4.5	-3.08	-0.45
Thailand	3	3	-0.83	-0.29	0.0	0.0	-1.17	-0.33
Türkiye	117	119	-0.75	-0.23	1.2	1.2	-2.22	-0.75
Viet Nam	22	25	8.66	1.42	0.2	0.2	7.59	0.79
OCEANIA	249	279	-1.15	0.30	5.2	5.2	-2.54	-0.83
Australia	212	243	-0.15	0.39	7.3	7.5	-1.46	-0.58
New Zealand	18	16	-6.91	-1.23	3.3	2.6	-7.78	-1.89
DEVELOPED COUNTRIES	**2 709**	**2 836**	**0.31**	**0.39**	**1.7**	**1.7**	**-0.10**	**0.20**
DEVELOPING COUNTRIES	**12 986**	**15 245**	**2.47**	**1.37**	**1.8**	**1.9**	**1.17**	**0.32**
LEAST DEVELOPED COUNTRIES (LDC)	2 003	2 654	2.71	2.62	2.0	2.1	0.35	0.45
OECD[3]	**1 772**	**1 812**	**-0.01**	**0.07**	**1.1**	**1.1**	**-0.54**	**-0.20**
BRICS	**6 659**	**7 459**	**2.49**	**0.95**	**1.8**	**1.9**	**1.72**	**0.50**

Note: Calendar year; except year ending 30 June for New Zealand. Average 2019-21est: Data for 2021 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 and Costa Rica 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 (2022), “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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
ARGENTINA												
Beef export tax[2]	%	6.8	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	103.0	106.9	107.9	109.3	110.8	112.3	113.7	115.1	116.6	118.0	119.4
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[3,4]												
Voluntary coupled support												
Beef and veal[5]	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[6]	mln EUR	510	505	505	505	505	505	505	505	505	505	505
Beef basic price[1]	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 tariff-quota	kt cwe	347.9	324.0	325.6	327.1	328.7	329.2	329.7	330.2	330.7	331.2	331.2
Pig tariff-quota	kt cwe	211.0	212.1	213.0	213.9	214.8	215.7	216.6	217.5	218.4	219.3	220.2
Poultry tariff-quota	kt rtc	948.0	809.2	811.3	813.3	815.4	817.4	819.5	821.6	823.6	825.7	825.7
Sheep meat tariff-quota	kt cwe	251.8	163.1	163.3	163.5	163.7	163.9	164.1	164.3	164.5	164.7	164.9
JAPAN[7]												
Beef stabilisation prices												
Upper price	JPY/kg dwt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lower price	JPY/kg dwt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beef tariff	%	27.7	24.3	23.5	22.7	21.8	21.0	20.2	18.6	16.8	15.0	13.1
Pigmeat stabilisation prices												
Upper price	JPY/kg dwt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lower price	JPY/kg dwt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pig meat import system												
Tariff	%	2.2	1.5	1.3	1.0	0.8	0.5	0.3	0.1	0.0	0.0	0.0
Standard import price	JPY/kg dwt	365.2	454.4	337.1	300.2	274.9	266.7	258.3	248.1	241.4	234.9	227.6
Poultry meat tariff	%	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
KOREA												
Beef tariff	%	16.0	10.6	8.0	5.3	2.6	0.0	0.0	0.0	0.0	0.0	0.0
Pigmeat tariff	%	16.0	10.6	8.0	5.3	2.6	0.0	0.0	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[8]												
Beef and veal tariff-quota	kt pw	73.3	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[9]	%	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0
Poultry meat tariff-quota	kt pw	110.0	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	%	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Pigmeat tariff-quota[10]	kt pw	143.3	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	%	38.3	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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
CHINA												
Beef tariff	%	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Pigmeat tariff	%	9.3	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
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	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
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	%	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4
SOUTH AFRICA												
Beef tariff	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Pigmeat tariff	%	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Sheep meat tariff	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Poultry meat tariff	%	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1

Note: Average 2019-21est: Data for 2021 are estimated.

1. Price for R3 grade male cattle.
2. In Argentina, a temporary export tax is applied on all goods from September 4th 2018 until December 31st 2020.
3. 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
4. Refers to all current European Union member States (excludes the United Kingdom)
5. Implemented in 24 Member States.
6. Implemented in 22 Member States.
7. Year beginning 1 April.
8. Intended for countries which whom Mexico has no free trade agreements.
9. 25% for frozen beef.
10. Eliminated in 2020 and replaced by import tariff.

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**12 318**	**15 043**	**2.57**	**1.88**	**1 022**	**1 126**	**1.29**	**1.32**	**1 039**	**1 126**	**-0.12**	**1.32**
NORTH AMERICA	1 061	1 171	1.86	1.12	60	66	22.37	-1.58	28	46	-8.01	6.03
Canada	116	133	3.87	1.52	20	28	16.83	0.06	0	0	-30.91	..
United States	944	1 038	1.63	1.07	40	38	26.20	-2.63	28	46	-7.78	6.03
LATIN AMERICA	432	484	0.43	0.73	64	78	0.03	3.64	34	38	-7.09	0.00
Argentina	30	34	-7.08	1.11	0	0	..	..	7	7	-9.31	2.55
Brazil	110	110	3.85	0.06	2	9	-0.87	8.12	0	1	-11.58	-4.20
Chile	24	26	1.14	1.06	5	6	14.59	-0.61	2	1	-8.56	0.60
Colombia	18	14	-1.89	-2.25	0	3	..	77.46	1	0	..	..
Mexico	204	240	1.88	1.36	35	37	-1.70	2.96	7	12	9.28	5.95
Paraguay	1	1	-1.16	3.11	0	0	..	..	1	2	9.13	2.63
Peru	6	8	7.14	2.93	7	8	3.52	2.82	0	0	..	..
EUROPE	3 127	3 240	2.05	0.45	279	278	0.00	0.27	432	505	2.76	1.98
European Union[1]	2 355	2 474	2.04	0.50	39	34	-1.59	-0.14	280	352	3.22	2.98
United Kingdom	177	155	2.30	0.47	92	99	-1.81	0.68	49	41	0.72	-0.69
Russia	305	310	4.37	0.30	128	120	2.32	-0.19	4	5	2.78	0.00
Ukraine	79	71	-2.59	-0.68	8	14	-3.99	3.72	13	7	26.50	-3.59
AFRICA	328	400	0.25	2.01	77	93	-6.92	2.81	6	9	-12.13	5.00
Egypt	109	129	-1.81	1.86	29	32	-8.74	0.91	2	1	-5.93	-0.21
Ethiopia	15	24	-1.62	4.49	0	0	..	..	0	5	..	24.01
Nigeria	12	16	-0.46	1.98	2	5	-14.82	14.05	0	0	..	..
South Africa	17	16	0.20	-0.34	5	10	5.18	6.64	3	1	-10.78	-6.22
ASIA	6 829	9 230	3.65	2.72	499	564	2.34	1.84	76	74	7.14	0.94
China[2]	92	100	-1.37	0.70	114	147	10.87	0.67	2	2	0.76	1.00
India	4 844	6 703	3.65	2.96	0	0	-23.21	..	28	18	18.61	-3.90
Indonesia	0	0	..	..	21	25	1.43	2.13	1	1	..	0.00
Iran	197	208	1.67	0.24	22	9	-19.88	9.55	1	2	-18.04	-1.14
Japan	68	67	0.39	-0.54	16	10	5.95	-0.01	0	0	..	..
Kazakhstan	18	28	3.51	3.49	6	3	-6.22	-5.00	3	7	56.91	5.26
Korea	3	3	-2.26	0.44	18	20	15.82	0.28	0	0	..	..
Malaysia	0	0	..	..	20	27	3.33	2.38	4	3	-0.45	0.00
Pakistan	1 090	1 473	5.22	2.73	0	1	0.69	..	0	0	..	..
Philippines	0	0	..	..	33	38	9.43	1.87	0	1	..	0.00
Saudi Arabia	7	7	0.76	-1.16	48	51	-2.21	1.18	8	8	9.04	-1.16
Thailand	3	4	160.79	1.38	13	15	0.55	0.76	1	1	0.21	0.00
Türkiye	268	335	3.71	1.81	16	0	-12.67	-14.31	11	18	29.15	14.11
Viet Nam	0	0	..	..	15	16	0.81	0.63	0	0	..	..
OCEANIA	541	518	-1.82	0.16	44	46	8.61	0.32	463	454	-1.59	0.43
Australia	74	56	-6.62	-2.03	40	40	9.88	0.00	20	15	-11.78	-0.93
New Zealand	466	462	-0.85	0.47	1	1	2.10	1.00	443	439	-0.85	0.48
DEVELOPED COUNTRIES	**4 877**	**5 099**	**1.50**	**0.59**	**440**	**438**	**2.84**	**0.01**	**935**	**1 021**	**-0.05**	**1.38**
DEVELOPING COUNTRIES	**7 441**	**9 945**	**3.32**	**2.62**	**582**	**688**	**0.24**	**2.24**	**104**	**105**	**-1.10**	**0.76**
LEAST DEVELOPED COUNTRIES (LDC)	259	318	3.22	1.83	10	51	-3.64	23.10	1	1	-16.77	-3.47
OECD[3]	**4 782**	**5 071**	**1.50**	**0.70**	**333**	**328**	**3.20**	**0.30**	**841**	**925**	**-0.34**	**1.69**
BRICS	**5 369**	**7 239**	**3.57**	**2.74**	**250**	**286**	**5.17**	**0.61**	**37**	**27**	**7.99**	**-3.05**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**12 262**	**15 041**	**2.71**	**1.88**	**1.6**	**1.8**	**1.57**	**0.97**
NORTH AMERICA	1 080	1 190	2.85	0.73	2.9	3.0	2.16	0.17
Canada	137	161	5.47	1.28	3.6	3.9	4.47	0.50
United States	943	1 030	2.51	0.65	2.8	2.9	1.85	0.11
LATIN AMERICA	465	525	1.28	1.17	0.7	0.7	0.30	0.43
Argentina	25	28	-4.50	0.80	0.6	0.6	-5.43	0.00
Brazil	112	118	3.87	0.52	0.5	0.5	3.04	0.05
Chile	27	31	3.91	0.72	1.4	1.6	2.69	0.56
Colombia	18	17	-2.50	0.00	0.3	0.3	-3.73	-0.47
Mexico	232	265	1.30	1.40	1.8	1.9	0.12	0.55
Paraguay	0	0	..	..	0.0	0.0	-57.71	0.16
Peru	13	16	4.99	2.88	0.4	0.4	3.49	2.01
EUROPE	2 953	3 013	1.71	0.20	3.9	4.1	1.57	0.31
European Union[1]	2 109	2 155	1.88	0.13	4.7	4.9	1.76	0.23
United Kingdom	204	213	-0.30	0.81	3.0	3.0	-0.92	0.45
Russia	430	425	3.47	0.16	2.9	3.0	3.31	0.39
Ukraine	73	77	-4.75	0.31	1.7	1.9	-4.28	1.01
AFRICA	399	484	-1.22	2.11	0.3	0.3	-3.70	-0.19
Egypt	136	160	-3.60	1.68	1.3	1.3	-5.59	0.06
Ethiopia	16	19	-1.42	2.28	0.1	0.1	-4.01	0.00
Nigeria	14	20	-3.53	3.86	0.1	0.1	-6.01	1.39
South Africa	20	25	4.38	2.40	0.3	0.4	2.91	1.37
ASIA	7 244	9 718	3.51	2.68	1.6	2.0	2.54	2.02
China[2]	204	245	4.10	0.68	0.1	0.2	3.61	0.56
India	4 817	6 685	3.58	2.98	3.5	4.4	2.49	2.14
Indonesia	21	24	1.33	2.19	0.1	0.1	0.14	1.32
Iran	218	216	-0.61	0.53	2.6	2.3	-1.92	-0.37
Japan	80	77	0.72	-0.48	0.6	0.6	0.92	0.02
Kazakhstan	21	23	-0.95	1.52	1.1	1.1	-2.33	0.62
Korea	17	20	8.74	1.30	0.3	0.4	8.45	1.36
Malaysia	16	24	4.39	2.77	0.5	0.7	3.01	1.71
Pakistan	1 090	1 473	5.22	2.73	4.9	5.5	3.08	1.02
Philippines	33	38	9.31	1.90	0.3	0.3	7.71	0.71
Saudi Arabia	46	50	-3.10	1.25	1.3	1.3	-5.12	0.11
Thailand	16	18	3.12	0.91	0.2	0.3	2.77	0.88
Türkiye	273	317	2.73	1.40	3.2	3.5	1.21	0.86
Viet Nam	15	16	0.74	0.63	0.2	0.2	-0.26	0.00
OCEANIA	122	110	1.56	-0.80	2.9	2.3	0.13	-1.92
Australia	94	81	1.50	-1.28	3.7	2.8	0.17	-2.23
New Zealand	24	24	7.00	0.28	5.0	4.6	6.00	-0.39
DEVELOPED COUNTRIES	**4 345**	**4 516**	**1.98**	**0.34**	**3.0**	**3.1**	**1.56**	**0.15**
DEVELOPING COUNTRIES	**7 917**	**10 525**	**3.13**	**2.62**	**1.3**	**1.5**	**1.82**	**1.55**
LEAST DEVELOPED COUNTRIES (LDC)	268	368	3.11	3.33	0.3	0.3	0.75	1.15
OECD[3]	**4 233**	**4 472**	**2.01**	**0.46**	**3.0**	**3.1**	**1.46**	**0.20**
BRICS	**5 583**	**7 498**	**3.60**	**2.68**	**1.7**	**2.2**	**2.82**	**2.21**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**24 823**	**28 164**	**1.74**	**1.10**	**3 432**	**4 133**	**3.10**	**1.57**	**3 469**	**4 133**	**2.08**	**1.57**
NORTH AMERICA	6 556	7 630	2.67	1.41	175	180	-0.03	-0.81	383	510	2.90	2.92
Canada	497	572	3.09	1.59	38	53	6.85	0.98	10	8	-2.04	0.41
United States	6 059	7 057	2.63	1.40	137	126	-1.42	-1.48	372	501	3.05	2.97
LATIN AMERICA	2 190	2 662	-0.52	1.68	388	530	4.22	2.26	178	164	1.21	-0.94
Argentina	443	532	-2.60	1.63	1	1	-10.97	0.00	63	64	1.26	0.00
Brazil	774	1 002	1.08	2.14	30	30	1.67	1.86	4	6	6.19	3.45
Chile	100	117	1.52	1.16	58	88	15.44	1.60	8	6	0.57	-1.56
Colombia	52	48	-1.89	-0.28	5	13	13.66	4.69	1	1	12.83	-2.00
Mexico	321	391	0.00	1.33	118	166	2.71	3.27	9	4	12.08	-1.34
Paraguay	0	0	..	..	5	5	12.35	2.19	0	0	..	..
Peru	25	29	1.75	1.77	9	14	15.55	2.06	0	0	..	..
EUROPE	12 580	13 865	1.94	0.81	1 211	1 320	1.07	1.06	1 988	2 482	2.92	1.99
European Union[1]	10 689	11 706	1.81	0.78	208	208	2.09	1.20	1 383	1 816	2.26	2.49
United Kingdom	486	507	2.96	0.11	511	560	1.42	1.19	193	151	5.60	-1.56
Russia	554	680	2.28	1.49	311	340	-2.32	1.00	31	22	4.30	-3.82
Ukraine	154	151	-1.48	0.04	42	77	15.25	4.24	7	5	-22.33	-3.39
AFRICA	998	1 147	-0.17	1.31	147	222	-0.42	4.87	110	56	-6.81	-3.03
Egypt	602	680	-0.61	1.06	29	54	-3.54	7.86	91	29	-5.87	-7.29
Ethiopia	5	8	-1.91	5.09	0	0	..	..	0	2	..	32.43
Nigeria	10	10	-0.74	0.03	1	8	8.96	17.54	0	0	..	..
South Africa	55	76	-3.62	3.56	8	4	-3.44	-7.65	10	21	0.03	8.28
ASIA	1 735	2 033	0.91	1.45	1 400	1 764	5.82	1.73	312	378	1.25	0.90
China[2]	207	225	-2.53	0.61	138	170	15.86	1.09	0	0	..	..
India	6	6	12.38	-2.57	2	2	5.09	1.72	8	8	11.58	-1.69
Indonesia	0	0	..	..	29	38	5.05	2.30	2	2	13.44	-2.25
Iran	312	326	2.48	0.46	0	0	..	..	89	91	5.27	-0.03
Japan	160	166	2.33	0.17	294	373	3.17	2.45	1	0	16.45	..
Kazakhstan	30	37	4.24	1.68	30	38	4.10	1.83	3	3	23.44	-1.79
Korea	32	30	4.93	0.79	145	189	7.64	1.87	1	1	..	0.00
Malaysia	0	0	..	..	33	44	10.35	2.04	1	1	18.72	-2.00
Pakistan	0	0	..	..	2	3	3.19	7.57	0	0	..	..
Philippines	0	0	..	..	44	71	12.63	3.36	1	1	-8.67	-3.25
Saudi Arabia	118	150	-3.56	3.25	184	200	3.66	-0.40	83	78	-5.96	0.41
Thailand	2	2	-10.39	1.38	17	21	9.83	1.22	1	1	..	0.00
Türkiye	260	379	3.70	2.74	10	6	0.05	-1.26	50	111	3.12	6.06
Viet Nam	0	0	..	..	10	10	13.65	1.50	0	1	..	0.00
OCEANIA	765	828	2.41	0.37	110	118	3.85	0.67	498	544	1.55	0.46
Australia	389	418	2.33	0.33	97	103	3.14	0.49	158	174	-0.33	0.55
New Zealand	377	410	2.53	0.41	12	13	12.20	2.00	340	370	2.57	0.42
DEVELOPED COUNTRIES	**20 407**	**22 926**	**2.16**	**1.01**	**1 862**	**2 063**	**1.52**	**1.05**	**2 893**	**3 568**	**2.68**	**1.88**
DEVELOPING COUNTRIES	**4 416**	**5 238**	**-0.03**	**1.51**	**1 570**	**2 070**	**5.28**	**2.11**	**577**	**565**	**-0.60**	**-0.23**
LEAST DEVELOPED COUNTRIES (LDC)	441	511	2.62	1.47	25	84	6.71	9.63	0	0	..	..
OECD[3]	**19 858**	**22 286**	**2.11**	**1.00**	**1 737**	**1 996**	**2.89**	**1.33**	**2 609**	**3 230**	**2.42**	**1.98**
BRICS	**1 595**	**1 989**	**0.71**	**1.76**	**489**	**546**	**0.93**	**0.97**	**53**	**56**	**4.14**	**0.39**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**24 774**	**28 136**	**1.87**	**1.10**	**3.2**	**3.3**	**0.74**	**0.20**
NORTH AMERICA	6 343	7 272	2.60	1.23	17.2	18.5	1.91	0.66
Canada	526	617	3.72	1.56	13.9	15.0	2.73	0.78
United States	5 817	6 654	2.51	1.20	17.6	18.9	1.85	0.65
LATIN AMERICA	2 400	3 028	0.01	1.94	3.7	4.3	-0.95	1.20
Argentina	381	469	-3.17	1.87	8.4	9.5	-4.11	1.06
Brazil	799	1 027	1.07	2.12	3.8	4.6	0.27	1.64
Chile	150	198	5.53	1.46	7.8	10.1	4.29	1.29
Colombia	56	59	-1.18	0.62	1.1	1.1	-2.42	0.15
Mexico	431	552	0.50	1.90	3.3	3.9	-0.67	1.05
Paraguay	5	5	13.93	2.33	0.6	0.6	12.45	1.27
Peru	33	42	4.02	1.89	1.0	1.2	2.53	1.03
EUROPE	11 803	12 702	1.70	0.62	15.8	17.1	1.56	0.73
European Union[1]	9 514	10 098	1.76	0.51	21.4	22.9	1.64	0.61
United Kingdom	804	915	1.45	1.08	11.9	12.9	0.82	0.72
Russia	834	998	0.09	1.46	5.7	7.0	-0.07	1.69
Ukraine	190	223	4.49	1.41	4.3	5.5	5.01	2.12
AFRICA	1 034	1 313	0.58	2.07	0.8	0.8	-1.95	-0.22
Egypt	540	704	0.07	2.03	5.3	5.7	-2.00	0.41
Ethiopia	5	6	-1.85	2.28	0.0	0.0	-4.44	0.00
Nigeria	11	17	0.07	4.72	0.1	0.1	-2.50	2.22
South Africa	53	60	-4.24	1.16	0.9	0.9	-5.59	0.15
ASIA	2 821	3 419	3.06	1.66	0.6	0.7	2.09	1.00
China[2]	344	394	2.10	0.81	0.2	0.3	1.61	0.69
India	0	0	..	..	0.0	0.0	-65.31	2.44
Indonesia	27	36	4.63	2.59	0.1	0.1	3.40	1.71
Iran	222	235	1.85	0.65	2.7	2.5	0.50	-0.26
Japan	451	539	2.81	1.69	3.6	4.5	3.02	2.21
Kazakhstan	57	72	3.60	1.92	3.0	3.5	2.16	1.03
Korea	176	218	7.11	1.72	3.4	4.3	6.83	1.77
Malaysia	32	43	10.16	2.15	1.0	1.2	8.69	1.10
Pakistan	2	3	3.17	7.60	0.0	0.0	1.08	5.80
Philippines	43	70	13.69	3.48	0.4	0.6	12.03	2.28
Saudi Arabia	219	272	4.34	1.20	6.3	6.8	2.17	0.06
Thailand	19	23	5.04	1.28	0.3	0.3	4.68	1.24
Türkiye	220	275	3.59	1.62	2.6	3.1	2.06	1.09
Viet Nam	9	9	12.94	1.66	0.1	0.1	11.82	1.03
OCEANIA	372	403	3.76	0.33	8.9	8.5	2.31	-0.80
Australia	322	347	3.75	0.27	12.6	12.2	2.39	-0.69
New Zealand	48	54	3.96	0.72	10.0	10.3	3.00	0.04
DEVELOPED COUNTRIES	**19 364**	**21 393**	**2.02**	**0.87**	**13.5**	**14.6**	**1.60**	**0.68**
DEVELOPING COUNTRIES	**5 409**	**6 743**	**1.36**	**1.85**	**0.9**	**0.9**	**0.07**	**0.80**
LEAST DEVELOPED COUNTRIES (LDC)	466	595	2.81	2.31	0.5	0.5	0.45	0.15
OECD[3]	**18 973**	**21 023**	**2.14**	**0.88**	**13.6**	**14.6**	**1.59**	**0.61**
BRICS	**2 031**	**2 479**	**0.64**	**1.61**	**0.6**	**0.7**	**-0.11**	**1.16**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**4 527**	**5 426**	**2.00**	**1.81**	**2 652**	**3 222**	**3.53**	**1.66**	**2 686**	**3 222**	**3.86**	**1.66**
NORTH AMERICA	1 265	1 609	2.23	1.58	4	3	-3.28	0.00	839	1 151	7.30	2.26
Canada	94	112	1.73	1.23	1	1	-14.18	0.00	35	28	16.47	5.27
United States	1 170	1 497	2.27	1.60	3	2	8.26	0.00	804	1 123	6.90	2.20
LATIN AMERICA	287	327	-0.29	1.14	486	570	5.52	1.34	59	59	1.91	0.39
Argentina	40	44	2.15	1.05	0	0	..	..	21	26	0.92	2.07
Brazil	159	197	1.04	1.63	22	24	-3.20	0.00	0	1	..	2.03
Chile	13	8	-1.06	-4.29	13	16	7.21	4.20	1	1	-5.32	-2.21
Colombia	0	0	..	..	29	36	30.04	2.17	0	0	..	..
Mexico	45	46	-2.01	0.27	337	385	5.92	1.19	16	12	21.70	0.00
Paraguay	0	0	..	..	1	1	0.55	0.00	1	1	..	0.00
Peru	0	0	..	..	23	31	1.45	1.91	0	0	..	..
EUROPE	1 898	2 260	3.23	2.09	148	162	-2.72	1.47	1 108	1 324	5.75	2.44
European Union[1]	1 460	1 860	3.57	2.71	42	27	4.25	-1.18	855	1 078	6.41	2.94
United Kingdom	81	88	1.73	1.09	25	25	-6.79	-0.13	99	106	6.89	0.84
Russia	91	76	4.66	-1.20	68	75	-4.81	0.94	2	2	-4.90	0.00
Ukraine	94	54	-1.61	-4.20	3	25	7.99	14.45	16	2	-4.34	-12.62
AFRICA	11	20	0.65	7.69	440	622	3.82	3.17	20	25	2.57	0.12
Egypt	0	0	..	..	75	96	0.19	2.99	0	0	-33.02	..
Ethiopia	0	0	..	..	1	1	19.58	2.28	0	0	..	..
Nigeria	0	0	..	..	99	179	14.10	4.22	1	1	..	-4.05
South Africa	7	16	1.18	10.21	14	10	7.76	-3.52	8	13	-2.66	3.65
ASIA	524	710	4.65	3.29	1 551	1 844	3.52	1.34	150	206	-1.01	-0.37
China[2]	21	21	0.52	0.51	368	462	8.68	1.14	1	2	8.86	0.00
India	308	485	6.53	4.52	1	0	-14.86	..	20	9	-15.99	-13.45
Indonesia	0	0	..	..	195	243	4.10	2.03	1	1	-2.31	-1.99
Iran	0	0	..	..	25	47	5.76	0.00	24	47	10.68	0.00
Japan	131	114	-0.34	-0.39	40	33	2.10	-2.48	0	0	..	..
Kazakhstan	1	0	-11.95	..	22	26	1.10	2.51	1	1	21.58	-2.44
Korea	9	11	-7.27	1.78	20	21	0.06	-0.32	0	0	..	..
Malaysia	0	0	..	..	122	128	0.95	0.85	3	2	-27.10	-0.85
Pakistan	0	0	..	..	27	32	-1.14	5.04	0	0	..	..
Philippines	0	0	..	..	174	191	6.62	1.45	0	1	..	-1.43
Saudi Arabia	0	0	..	..	15	16	-17.62	0.48	8	8	-12.44	-0.48
Thailand	0	0	..	..	65	67	0.33	0.36	7	6	35.16	0.00
Türkiye	45	70	249.24	4.09	3	12	17.98	0.00	41	82	51.51	3.37
Viet Nam	0	0	..	..	110	130	5.38	1.04	1	10	14.22	0.00
OCEANIA	543	500	-2.47	-0.14	24	21	14.16	-0.18	509	457	-1.53	-0.49
Australia	148	114	-5.75	-1.62	16	13	18.44	-1.03	120	77	-3.25	-3.88
New Zealand	395	386	-0.91	0.34	5	3	-2.84	0.00	389	380	-0.91	0.34
DEVELOPED COUNTRIES	**3 854**	**4 508**	**1.79**	**1.58**	**270**	**273**	**0.18**	**0.61**	**2 470**	**2 952**	**4.24**	**1.86**
DEVELOPING COUNTRIES	**673**	**918**	**3.32**	**3.01**	**2 381**	**2 949**	**3.97**	**1.76**	**216**	**271**	**0.22**	**-0.30**
LEAST DEVELOPED COUNTRIES (LDC)	0	0	..	..	125	174	2.92	3.36	10	10	11.67	-2.66
OECD[3]	**3 640**	**4 354**	**1.78**	**1.75**	**538**	**582**	**4.92**	**0.74**	**2 372**	**2 899**	**4.71**	**1.97**
BRICS	**585**	**796**	**4.20**	**3.03**	**473**	**571**	**4.64**	**0.95**	**31**	**27**	**-11.25**	**-5.65**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**4 576**	**5 426**	**2.18**	**1.81**	**0.6**	**0.6**	**1.08**	**1.01**
NORTH AMERICA	431	461	-4.10	0.02	1.1	1.0	-5.12	-0.51
Canada	62	85	-1.96	0.10	0.7	0.6	-3.53	0.18
United States	369	376	-4.57	0.00	1.1	1.1	-5.19	-0.54
LATIN AMERICA	714	839	3.04	1.33	1.0	1.1	2.20	0.58
Argentina	19	18	5.92	-0.29	0.4	0.4	4.89	-1.07
Brazil	180	220	0.38	1.44	0.6	0.7	-0.85	0.97
Chile	25	23	2.88	0.83	1.3	1.2	1.67	0.67
Colombia	29	36	30.31	2.20	0.6	0.7	28.68	1.72
Mexico	365	418	3.69	1.13	2.8	2.9	2.49	0.28
Paraguay	0	0	..	..	0.0	0.0	-41.30	0.78
Peru	23	31	1.45	1.91	0.7	0.9	0.01	1.05
EUROPE	1 022	1 097	1.26	1.60	1.2	1.3	0.95	2.04
European Union[1]	727	810	2.34	2.27	1.4	1.6	2.15	2.96
United Kingdom	10	7	-17.77	0.36	0.1	0.1	-18.28	0.00
Russia	157	149	0.13	-0.23	1.1	1.0	-0.02	-0.01
Ukraine	80	77	-0.52	-0.24	1.8	1.9	-0.02	0.45
AFRICA	430	617	3.79	3.42	0.3	0.4	1.19	1.10
Egypt	75	96	0.39	3.00	0.7	0.8	-1.69	1.36
Ethiopia	1	1	19.58	2.28	0.0	0.0	16.43	0.00
Nigeria	99	178	14.03	4.26	0.5	0.7	11.10	1.78
South Africa	13	13	17.46	1.61	0.2	0.2	15.80	0.59
ASIA	1 917	2 348	4.31	2.06	0.4	0.5	3.38	1.42
China[2]	388	481	8.07	1.12	0.3	0.3	7.56	1.00
India	289	477	12.09	5.42	0.2	0.3	10.90	4.55
Indonesia	193	242	4.16	2.06	0.7	0.8	2.93	1.19
Iran	1	0	-11.29	..	0.0	0.0	-12.47	-0.09
Japan	162	147	-0.27	-0.90	1.1	1.0	-0.25	-0.60
Kazakhstan	22	25	0.07	2.66	1.2	1.2	-1.32	1.76
Korea	31	32	0.50	0.35	0.6	0.6	0.24	0.41
Malaysia	120	126	4.35	0.88	3.7	3.5	2.96	-0.15
Pakistan	27	32	-0.73	5.05	0.1	0.1	-2.75	3.30
Philippines	174	190	6.59	1.46	1.6	1.5	5.04	0.28
Saudi Arabia	8	8	-21.50	1.52	0.2	0.2	-23.14	0.37
Thailand	58	61	-1.17	0.40	0.8	0.9	-1.51	0.37
Türkiye	7	0	30.59	..	0.1	0.0	28.66	-0.05
Viet Nam	108	120	5.38	1.13	1.1	1.2	4.34	0.50
OCEANIA	62	64	-6.05	2.72	1.5	1.3	-7.37	1.56
Australia	47	51	-8.45	3.25	1.8	1.8	-9.65	2.26
New Zealand	11	9	1.48	0.07	2.3	1.7	0.54	-0.60
DEVELOPED COUNTRIES	**1 734**	**1 830**	**-0.60**	**1.01**	**1.1**	**1.1**	**-1.24**	**1.02**
DEVELOPING COUNTRIES	**2 841**	**3 596**	**4.21**	**2.25**	**0.4**	**0.5**	**2.95**	**1.20**
LEAST DEVELOPED COUNTRIES (LDC)	115	165	2.38	3.85	0.1	0.1	0.04	1.65
OECD[3]	**1 888**	**2 038**	**0.18**	**1.15**	**1.2**	**1.3**	**-0.50**	**1.09**
BRICS	**1 028**	**1 340**	**5.58**	**2.34**	**0.3**	**0.4**	**5.08**	**1.93**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**5 272**	**6 108**	**0.69**	**1.48**	**2 828**	**3 035**	**1.66**	**0.94**	**2 770**	**3 035**	**1.74**	**0.94**
NORTH AMERICA	67	82	13.91	1.44	12	14	-3.68	0.00	35	71	17.23	4.96
Canada	8	7	-2.67	-1.72	3	3	-3.19	0.00	1	1	3.50	1.21
United States	59	75	19.47	1.79	9	11	-3.47	0.00	35	70	17.70	5.01
LATIN AMERICA	1 348	1 761	0.46	2.33	300	317	-4.68	1.18	302	346	-1.11	1.63
Argentina	186	209	-4.63	1.21	0	0	..	..	115	150	-6.20	2.59
Brazil	592	896	0.79	3.41	66	54	2.14	-0.18	2	13	-6.47	8.13
Chile	95	98	-0.09	0.19	6	10	0.20	2.07	2	1	-24.36	-0.88
Colombia	37	28	-1.89	-1.69	18	39	11.21	7.15	2	2	-9.75	-4.70
Mexico	226	266	1.44	1.33	24	39	-40.07	6.47	12	0	-45.84	..
Paraguay	0	0	..	..	7	7	23.28	0.00	7	7	44.46	0.00
Peru	0	0	..	..	26	39	5.95	1.90	0	0	..	..
EUROPE	904	988	0.84	1.51	84	77	-2.18	-0.01	426	445	-0.98	0.92
European Union[1]	707	771	0.95	1.65	27	15	-3.17	-2.45	320	324	-2.22	0.96
United Kingdom	50	53	0.63	0.73	19	20	-4.82	0.09	54	56	4.21	0.34
Russia	60	64	-0.54	0.81	34	39	0.06	1.41	18	17	42.30	0.00
Ukraine	9	9	-1.27	-0.12	0	1	..	2.99	6	3	21.32	-2.90
AFRICA	38	50	3.55	2.36	541	706	0.23	2.73	22	17	-4.35	0.76
Egypt	0	0	..	..	19	23	-13.20	3.55	8	2	15.88	-3.43
Ethiopia	0	0	..	..	2	3	22.86	2.28	0	0	..	..
Nigeria	0	0	..	..	59	114	-2.78	4.94	1	0	-4.53	..
South Africa	20	29	8.13	4.20	4	3	5.87	-5.53	6	9	-3.69	5.85
ASIA	1 313	1 427	-1.23	1.33	1 844	1 888	3.53	0.40	400	348	5.04	-0.57
China[2]	1 151	1 242	-1.64	1.26	720	657	5.09	-1.05	1	2	-18.42	0.34
India	4	6	35.26	3.33	0	0	..	..	2	3	18.79	7.06
Indonesia	87	123	2.93	2.64	56	89	0.94	3.36	1	1	-24.33	-0.74
Iran	1	1	-0.60	0.56	4	4	15.72	0.00	3	5	14.46	0.08
Japan	35	13	-0.98	-2.35	2	2	45.14	0.00	0	0	..	..
Kazakhstan	24	29	5.24	1.84	2	0	-8.33	-65.64	0	1	..	..
Korea	1	1	-6.70	1.29	5	6	15.70	1.31	0	0	..	..
Malaysia	0	0	..	..	51	45	8.82	0.55	39	25	13.53	-0.55
Pakistan	0	0	..	..	0	0	-25.00	..	0	0	-37.94	..
Philippines	0	0	..	..	27	23	-2.16	1.28	8	7	-11.29	-1.26
Saudi Arabia	0	0	..	..	137	145	3.99	1.34	9	8	-10.67	-1.32
Thailand	0	0	..	..	60	70	7.20	0.95	2	3	-7.03	0.00
Türkiye	0	0	..	..	2	2	6.03	0.00	2	2	6.03	0.00
Viet Nam	0	0	..	..	41	48	0.46	1.21	15	13	38.10	0.00
OCEANIA	1 601	1 801	2.20	0.80	47	34	16.31	-1.17	1 583	1 809	2.34	1.00
Australia	48	30	-10.42	-2.88	38	22	23.26	-2.50	36	44	-10.92	8.21
New Zealand	1 553	1 771	2.94	0.87	2	2	9.36	0.00	1 547	1 764	2.94	0.86
DEVELOPED COUNTRIES	**2 652**	**2 943**	**1.93**	**1.07**	**152**	**131**	**1.89**	**-0.68**	**2 051**	**2 334**	**1.69**	**1.10**
DEVELOPING COUNTRIES	**2 620**	**3 165**	**-0.45**	**1.88**	**2 676**	**2 904**	**1.64**	**1.02**	**718**	**700**	**1.83**	**0.41**
LEAST DEVELOPED COUNTRIES (LDC)	10	11	5.58	-0.73	262	347	3.16	3.18	5	4	-13.98	-2.92
OECD[3]	**2 835**	**3 130**	**1.75**	**0.99**	**162**	**178**	**2.33**	**1.77**	**2 010**	**2 265**	**1.51**	**1.08**
BRICS	**1 827**	**2 236**	**-0.77**	**2.09**	**824**	**752**	**4.46**	**-0.91**	**30**	**44**	**-0.47**	**3.42**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), “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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**5 323**	**6 109**	**0.64**	**1.49**	**0.7**	**0.7**	**-0.47**	**0.59**
NORTH AMERICA	39	24	2.39	-4.66	0.1	0.1	1.70	-5.19
Canada	5	9	-12.99	3.32	0.1	0.2	-13.82	2.53
United States	34	15	8.22	-7.55	0.1	0.0	7.53	-8.04
LATIN AMERICA	1 347	1 732	-0.49	2.25	2.1	2.4	-1.45	1.51
Argentina	70	59	-1.40	-1.71	1.6	1.2	-2.37	-2.48
Brazil	656	937	1.14	3.12	3.1	4.2	0.34	2.63
Chile	99	107	2.07	0.36	5.2	5.5	0.88	0.20
Colombia	53	65	0.97	2.83	1.1	1.2	-0.29	2.35
Mexico	239	306	1.23	1.79	1.9	2.2	0.05	0.94
Paraguay	0	0	..	..	0.0	0.0	-43.05	-0.10
Peru	26	39	5.98	1.90	0.8	1.1	4.47	1.05
EUROPE	558	620	1.89	1.74	0.7	0.8	1.75	1.85
European Union[1]	415	462	3.97	1.96	0.9	1.0	3.85	2.06
United Kingdom	15	17	-11.95	1.30	0.2	0.2	-12.50	0.94
Russia	76	85	-3.08	1.25	0.5	0.6	-3.23	1.47
Ukraine	4	7	-13.98	2.10	0.1	0.2	-13.55	2.81
AFRICA	557	739	0.66	2.75	0.4	0.4	-1.86	0.44
Egypt	10	21	-21.87	4.69	0.1	0.2	-23.48	3.02
Ethiopia	2	3	24.00	2.28	0.0	0.0	20.73	0.00
Nigeria	59	114	-2.74	4.99	0.3	0.4	-5.24	2.49
South Africa	17	23	16.41	1.57	0.3	0.3	14.76	0.55
ASIA	2 758	2 968	0.86	0.96	0.6	0.6	-0.09	0.30
China[2]	1 869	1 897	0.47	0.40	1.3	1.3	0.00	0.28
India	2	3	19.81	0.82	0.0	0.0	18.54	0.00
Indonesia	141	211	2.80	2.96	0.5	0.7	1.60	2.09
Iran	1	0	-53.29	..	0.0	0.0	-53.90	-0.09
Japan	36	15	-0.42	-2.15	0.3	0.1	-0.22	-1.66
Kazakhstan	26	28	3.26	0.82	1.4	1.4	1.83	-0.07
Korea	7	8	9.02	0.55	0.1	0.1	8.73	0.61
Malaysia	13	20	1.03	2.11	0.4	0.6	-0.31	1.06
Pakistan	0	0	14.67	..	0.0	0.0	12.34	0.00
Philippines	19	15	8.72	2.77	0.2	0.1	7.14	1.58
Saudi Arabia	127	137	6.53	1.52	3.7	3.5	4.31	0.38
Thailand	58	67	8.24	1.00	0.8	1.0	7.87	0.97
Türkiye	0	0	..	..	0.0	0.0	-1.48	-0.05
Viet Nam	26	35	-4.81	1.71	0.3	0.3	-5.75	1.07
OCEANIA	65	26	5.45	-9.74	1.6	0.5	3.97	-10.76
Australia	50	8	6.61	-19.37	2.0	0.3	5.22	-20.14
New Zealand	8	9	4.19	3.08	1.7	1.6	3.23	2.39
DEVELOPED COUNTRIES	**744**	**739**	**2.41**	**0.68**	**0.5**	**0.5**	**1.99**	**0.49**
DEVELOPING COUNTRIES	**4 579**	**5 369**	**0.38**	**1.60**	**0.7**	**0.8**	**-0.90**	**0.55**
LEAST DEVELOPED COUNTRIES (LDC)	267	354	3.96	3.13	0.3	0.3	1.58	0.95
OECD[3]	**980**	**1 044**	**2.24**	**0.97**	**0.7**	**0.7**	**1.70**	**0.70**
BRICS	**2 621**	**2 945**	**0.60**	**1.22**	**0.8**	**0.9**	**-0.15**	**0.76**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**3 291**	**3 754**	**1.63**	**1.10**	**1 648.6**	**1 946.1**	**3.80**	**1.74**	**2 001.0**	**2 260.4**	**1.98**	**1.48**
NORTH AMERICA	479	510	-1.10	0.67	6.5	6.3	4.34	0.15	221.6	240.6	-1.40	0.93
Canada	41	47	4.08	1.59	6.5	6.3	4.34	0.15	43.0	43.2	5.19	0.08
United States	439	463	-1.49	0.58	0.0	0.0	..	..	178.6	197.4	-2.57	1.13
LATIN AMERICA	154	185	-0.23	1.47	140.3	153.7	1.81	0.89	177.1	197.5	-0.97	1.08
Argentina	73	88	0.69	1.63	0.5	0.5	-27.66	0.00	49.9	59.9	-4.14	1.61
Brazil	0	0	..	..	14.5	14.6	-5.22	0.02	0.5	0.5	..	0.00
Chile	8	10	5.54	1.16	10.3	22.0	15.86	7.14	18.4	31.4	9.40	4.99
Colombia	0	0	..	..	14.1	19.0	7.56	2.29	0.0	0.0	-74.29	..
Mexico	57	70	0.56	1.33	71.1	66.0	3.53	-0.51	71.1	66.0	3.53	-0.55
Paraguay	0	0	..	..	1.5	2.2	51.11	2.68	0.0	0.0	..	..
Peru	0	0	..	..	9.2	8.9	1.13	-0.60	9.2	8.9	1.13	-0.60
EUROPE	2 347	2 697	2.15	1.15	185.8	179.0	0.16	0.25	937.5	1 064.7	2.43	0.82
European Union[2]	2 122	2 468	2.23	1.19	54.3	50.7	-1.65	1.46	681.0	785.6	3.76	0.80
United Kingdom	66	50	0.32	-1.10	47.9	38.2	6.06	-2.00	50.9	45.8	-0.33	-1.00
Russia	1	1	1.12	0.00	63.3	63.4	-2.06	0.00	63.3	63.4	-2.06	0.00
Ukraine	23	23	0.44	0.04	4.0	9.2	17.84	7.99	24.9	30.1	1.93	1.90
AFRICA	2	3	-4.77	3.56	74.5	99.8	7.18	2.61	41.4	59.0	3.92	3.36
Egypt	0	0	..	..	23.9	36.2	4.86	3.83	23.9	36.2	4.86	3.83
Ethiopia	0	0	..	..	0.8	0.8	36.58	0.00	0.0	0.0	..	..
Nigeria	0	0	..	..	3.5	0.0	-0.91	-42.25	3.5	0.0	-0.91	-44.33
South Africa	2	3	-4.77	3.56	21.3	25.0	11.79	1.20	0.3	0.0	-25.37	..
ASIA	166	206	5.44	1.63	1 206.6	1 468.2	4.39	2.02	577.0	652.8	4.04	2.96
China[3]	78	84	-0.02	0.50	578.6	795.2	5.64	1.69	0.8	0.8	7.44	0.00
India	2	2	9.12	-2.57	9.0	13.3	8.46	4.19	0.2	0.6	..	..
Indonesia	0	0	..	..	138.6	197.8	4.67	3.25	138.6	197.8	4.67	3.25
Iran	9	9	4.18	0.46	5.2	8.4	6.55	4.67	6.3	8.8	-4.48	3.85
Japan	19	19	530.82	0.00	55.1	54.6	1.20	0.01	0.0	0.0	..	..
Kazakhstan	0	0	..	..	9.4	15.4	8.72	4.64	9.4	15.4	8.72	4.64
Korea	0	0	..	..	39.5	34.7	0.87	-0.83	0.3	0.3	..	..
Malaysia	0	0	..	..	86.7	116.7	2.24	2.68	86.7	116.7	2.24	2.68
Pakistan	0	0	..	..	29.1	37.6	5.44	2.26	29.1	37.6	5.44	2.26
Philippines	0	0	..	..	54.2	92.5	11.31	5.01	54.2	92.5	11.31	5.01
Saudi Arabia	0	0	..	..	6.3	10.1	10.59	4.44	6.3	10.1	10.59	4.44
Thailand	0	0	..	..	61.7	0.0	1.16	..	61.7	0.0	1.16	..
Türkiye	59	92	10.80	3.45	0.1	0.0	..	..	58.8	92.0	11.72	3.45
Viet Nam	0	0	..	..	46.1	0.0	1.95	..	46.1	0.0	1.95	..
OCEANIA	141	153	2.14	0.34	34.9	39.1	9.07	0.44	46.4	45.6	0.02	0.16
Australia	110	119	1.80	0.33	14.4	22.1	3.26	0.75	32.2	30.2	-1.68	0.04
New Zealand	31	34	3.40	0.41	20.2	16.8	17.00	0.07	14.1	15.5	6.06	0.39
DEVELOPED COUNTRIES	**2 989**	**3 382**	**1.65**	**1.04**	**322.2**	**338.5**	**2.17**	**0.74**	**1 222.1**	**1 382.1**	**1.58**	**0.91**
DEVELOPING COUNTRIES	**301**	**371**	**1.43**	**1.64**	**1 326.4**	**1 607.6**	**4.21**	**1.96**	**778.9**	**878.3**	**2.66**	**2.44**
LEAST DEVELOPED COUNTRIES (LDC)	0	0	..	..	23.7	38.0	9.63	4.42	14.1	24.8	9.36	5.28
OECD[4]	**2 978**	**3 396**	**1.81**	**1.08**	**342.7**	**339.7**	**2.78**	**0.26**	**1 154.9**	**1 314.1**	**2.24**	**0.90**
BRICS	**83**	**90**	**-0.09**	**0.53**	**686.8**	**911.6**	**4.59**	**1.55**	**65.1**	**65.3**	**-2.18**	**0.06**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**438 723**	**556 930**	**2.19**	**2.27**	**56.5**	**64.9**	**1.09**	**1.37**
NORTH AMERICA	25 212	23 995	-1.43	-0.38	68.2	60.9	-2.10	-0.94
Canada	2 771	2 700	-0.94	0.00	74.0	66.1	-1.93	-0.76
United States	22 440	21 294	-1.49	-0.42	67.5	60.3	-2.12	-0.96
LATIN AMERICA	35 835	41 214	-0.13	1.24	54.6	57.8	-1.07	0.52
Argentina	1 562	1 686	-0.95	0.39	27.9	27.6	-1.22	-0.34
Brazil	16 319	19 793	1.01	1.62	77.0	88.4	0.19	1.17
Chile	259	238	-11.50	0.41	13.6	12.2	-12.54	0.25
Colombia	4 804	5 372	-2.29	1.15	94.5	100.1	-3.51	0.67
Mexico	3 450	3 271	-0.55	-0.47	26.9	23.1	-1.74	-1.30
Paraguay	320	440	-6.54	3.00	44.9	54.8	-7.75	1.94
Peru	1 901	2 470	2.21	2.26	57.7	68.0	0.76	1.40
EUROPE	75 752	75 550	-0.41	0.06	100.4	100.6	-0.50	0.17
European Union[1]	37 772	38 157	0.44	0.18	82.5	82.8	0.14	0.24
United Kingdom	7 423	7 192	-0.79	-0.28	111.1	105.5	-0.21	-0.43
Russia	16 630	17 001	-0.51	0.10	116.2	121.2	-0.61	0.33
Ukraine	6 721	6 079	-2.69	-0.35	153.7	149.8	-2.21	0.34
AFRICA	33 551	46 515	-0.11	3.27	25.3	27.2	-2.61	0.95
Egypt	621	935	-10.16	4.15	6.1	7.6	-12.02	2.50
Ethiopia	3 287	5 184	-0.94	4.49	28.6	35.0	-3.54	2.16
Nigeria	210	275	-1.75	2.58	1.0	1.0	-4.28	0.14
South Africa	1 999	2 267	-1.79	1.05	33.7	34.1	-3.18	0.04
ASIA	264 839	365 740	4.23	3.02	57.6	73.8	3.30	2.35
China[2]	27 420	29 648	1.73	0.32	19.8	21.1	1.65	0.26
India	128 329	184 265	5.20	3.51	93.0	121.7	4.08	2.66
Indonesia	1 099	1 511	1.21	3.37	4.0	5.0	0.02	2.49
Iran	1 813	2 104	-5.72	1.31	21.6	22.5	-6.97	0.39
Japan	4 375	4 246	0.35	-0.15	34.6	35.4	0.56	0.35
Kazakhstan	5 322	6 712	2.78	1.93	283.4	322.6	1.35	1.04
Korea	1 583	1 536	0.13	-0.49	31.1	30.1	0.00	-0.47
Malaysia	49	56	-7.31	0.96	1.5	1.5	-8.54	-0.07
Pakistan	44 724	65 361	6.08	3.51	202.4	244.8	3.92	1.78
Philippines	15	19	-3.89	2.85	0.1	0.2	-5.30	1.66
Saudi Arabia	1 953	2 412	7.62	1.59	56.1	60.8	5.38	0.45
Thailand	1 182	1 430	2.01	1.38	16.9	20.3	1.66	1.35
Türkiye	16 822	22 718	4.26	2.56	199.6	253.3	2.72	2.03
Viet Nam	1 080	1 673	11.80	4.11	11.1	16.0	10.69	3.46
OCEANIA	3 535	3 916	1.70	0.48	67.6	65.4	-1.56	-0.70
Australia	2 981	3 349	1.45	0.55	102.4	101.5	-0.99	-0.51
New Zealand	545	556	3.20	0.03	42.5	40.2	-5.97	-0.52
DEVELOPED COUNTRIES	**133 933**	**141 899**	**-0.03**	**0.59**	**92.5**	**95.5**	**-0.46**	**0.41**
DEVELOPING COUNTRIES	**304 791**	**415 030**	**3.30**	**2.91**	**48.4**	**58.5**	**2.03**	**1.84**
LEAST DEVELOPED COUNTRIES (LDC)	22 273	33 123	1.05	4.08	25.1	29.4	-1.27	1.88
OECD[3]	**107 016**	**112 459**	**0.18**	**0.47**	**75.5**	**76.6**	**-0.38**	**0.21**
BRICS	**190 697**	**252 974**	**3.58**	**2.65**	**59.3**	**74.6**	**2.86**	**2.18**

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**875 831**	**1 059 850**	**2.01**	**1.82**	**712 574**	**819 059**	**1.07**	**1.19**	**1.23**	**1.29**	**0.93**	**0.62**
NORTH AMERICA	111 645	126 016	1.50	1.13	10 364	10 689	0.25	0.20	10.77	11.79	1.25	0.92
Canada	10 666	12 084	2.80	1.33	965	1 085	0.08	0.28	11.07	11.14	2.72	1.05
United States	100 979	113 931	1.37	1.10	9 400	9 604	0.26	0.20	10.74	11.86	1.10	0.91
LATIN AMERICA	82 906	96 322	0.20	1.39	37 458	39 470	-3.46	0.43	2.21	2.44	3.80	0.95
Argentina	10 660	12 034	-0.76	1.02	1 717	1 698	-0.49	-0.10	6.21	7.09	-0.26	1.12
Brazil	36 517	44 705	0.64	1.88	16 194	17 642	-4.86	0.87	2.26	2.53	5.79	1.00
Chile	2 037	2 196	-1.86	0.75	761	676	-5.50	-1.39	2.68	3.25	3.84	2.16
Colombia	5 762	6 150	-2.22	0.79	3 391	2 976	-8.66	-1.25	1.70	2.07	7.05	2.06
Mexico	12 894	13 705	1.83	0.63	2 600	2 673	1.06	0.32	4.96	5.13	0.76	0.31
Paraguay	335	470	-6.33	3.01	217	259	-0.55	1.48	1.54	1.81	-5.81	1.50
Peru	2 172	2 814	2.39	2.27	1 180	1 335	0.13	0.83	1.84	2.11	2.25	1.42
EUROPE	227 619	232 818	0.87	0.32	39 622	36 199	-1.13	-0.75	5.75	6.43	2.02	1.08
European Union[2]	153 758	160 849	1.22	0.48	20 276	18 812	-0.75	-0.55	7.46	8.41	2.06	1.03
United Kingdom	15 092	13 758	0.75	-0.53	1 853	1 661	0.26	-1.06	8.14	8.28	0.49	0.53
Russia	31 969	31 081	0.70	0.00	7 805	7 371	-1.12	-0.47	4.10	4.22	1.85	0.47
Ukraine	9 404	8 572	-2.56	-0.37	2 550	2 013	-4.15	-2.24	3.69	4.26	1.66	1.92
AFRICA	44 589	59 728	0.01	2.92	234 640	274 831	1.74	1.39	0.19	0.22	-1.70	1.50
Egypt	4 562	5 463	-2.75	1.78	6 327	6 416	-0.85	0.10	0.72	0.85	-1.92	1.68
Ethiopia	3 627	5 721	-1.01	4.49	13 125	18 227	-1.65	2.86	0.28	0.31	0.66	1.59
Nigeria	526	661	-1.02	2.01	2 254	2 448	-0.53	0.43	0.23	0.27	-0.49	1.58
South Africa	2 843	3 288	-1.62	1.40	840	831	-1.49	-0.31	3.39	3.96	-0.13	1.72
ASIA	377 928	513 398	3.82	2.85	384 185	451 909	1.52	1.35	0.98	1.14	2.27	1.48
China[3]	37 759	40 777	0.73	0.53	13 815	13 426	-0.79	-0.37	2.44	2.73	1.83	0.96
India	191 458	271 607	4.74	3.33	143 006	173 103	2.11	1.64	1.34	1.57	2.57	1.66
Indonesia	1 637	2 277	1.78	3.12	14 825	18 138	2.54	1.60	0.11	0.13	-0.74	1.49
Iran	7 622	8 231	-0.60	0.56	20 855	18 418	0.12	-1.15	0.37	0.45	-0.73	1.73
Japan	7 422	7 311	-0.11	-0.01	841	809	-0.92	-0.31	8.82	9.03	0.82	0.30
Kazakhstan	6 049	7 710	2.91	2.03	2 946	3 079	1.74	0.22	2.05	2.50	1.15	1.80
Korea	2 067	1 997	-0.47	-0.35	245	235	-0.91	-0.34	8.45	8.48	0.44	-0.01
Malaysia	49	56	-7.31	0.96	46	40	-7.23	-1.14	1.07	1.40	-0.08	2.12
Pakistan	57 694	82 895	5.87	3.34	37 465	47 837	2.12	2.19	1.54	1.73	3.67	1.13
Philippines	15	19	-3.89	2.85	5	6	-0.01	0.35	2.71	3.38	-3.88	2.49
Saudi Arabia	2 821	3 479	3.37	1.88	4 884	5 109	0.31	0.36	0.58	0.68	3.05	1.51
Thailand	1 259	1 520	2.35	1.38	223	220	-0.51	-0.39	5.66	6.90	2.87	1.78
Türkiye	23 736	31 699	4.08	2.42	32 807	37 712	4.97	0.89	0.72	0.84	-0.84	1.51
Viet Nam	1 080	1 673	11.80	4.11	355	447	7.92	2.19	3.04	3.74	3.59	1.88
OCEANIA	31 143	31 569	0.50	0.07	6 304	5 962	-0.77	-0.45	4.94	5.30	1.28	0.52
Australia	9 081	8 413	-1.08	-0.85	1 368	1 169	-2.77	-1.22	6.64	7.20	1.74	0.38
New Zealand	22 042	23 137	1.22	0.42	4 898	4 761	-0.13	-0.24	4.50	4.86	1.34	0.67
DEVELOPED COUNTRIES	**407 063**	**437 198**	**1.09**	**0.73**	**74 309**	**73 891**	**-0.39**	**-0.06**	**5.48**	**5.92**	**1.49**	**0.78**
DEVELOPING COUNTRIES	**468 768**	**622 652**	**2.87**	**2.66**	**638 264**	**745 169**	**1.25**	**1.32**	**0.73**	**0.84**	**1.59**	**1.32**
LEAST DEVELOPED COUNTRIES (LDC)	29 901	42 353	1.52	3.53	221 476	261 714	1.50	1.52	0.14	0.16	0.01	1.98
OECD[4]	**372 429**	**402 513**	**1.26**	**0.75**	**80 608**	**83 365**	**0.90**	**0.18**	**4.62**	**4.83**	**0.36**	**0.57**
BRICS	**300 547**	**391 458**	**3.10**	**2.52**	**181 659**	**212 373**	**0.92**	**1.35**	**1.65**	**1.84**	**2.15**	**1.15**

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
CANADA												
Milk target price[2]	CADc/litre	68.0	68.7	70.0	71.2	72.6	74.0	75.6	77.2	78.7	80.4	82.0
Butter support price	CAD/t	8 295.3	8 707.9	8 870.1	9 052.3	9 251.9	9 447.5	9 652.4	9 845.8	10 032.5	10 233.9	10 428.1
Cheese tariff-quota	kt pw	40.4	56.4	60.9	63.2	65.4	65.7	65.9	66.2	66.5	66.8	67.1
In-quota tariff	%	0.6	0.6	0.6	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	854	858	858	858	858	858	858	858	858	858	858
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	81.3	63.6	63.6	63.7	63.7	63.8	63.8	63.9	63.9	64.0	64.0
Cheese tariff-quotas	kt pw	114.3	104.3	104.7	105.0	105.3	105.6	106.0	106.3	106.6	106.9	106.9
JAPAN												
Direct payments[6]	JPY/kg	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
Cheese tariff[7]	%	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
Tariff-quotas												
Butter	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	%	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	%	271.0	246.6	270.9	285.7	297.1	303.0	306.1	311.8	314.3	319.0	323.5
SMP	kt pw	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2
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
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	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8
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	%	2.8	2.6	2.6	2.8	2.8	2.8	2.8	2.7	2.7	2.6	2.6
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	%	36.7	35.0	35.1	35.6	35.8	35.4	34.9	34.4	33.8	33.3	32.7
INDIA												
Butter tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
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 2019-21est: Data for 2021 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 (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**178 900**	**203 403**	**2.00**	**1.16**	**43 363**	**45 902**	**1.27**	**0.80**	**42 540**	**45 902**	**1.09**	**0.80**
NORTH AMERICA	5 961	6 362	-1.16	0.51	6 271	6 968	1.87	0.83	2 520	2 661	-1.85	1.14
Canada	931	1 070	-1.24	1.58	677	638	0.72	-0.66	791	815	-0.14	0.94
United States	5 030	5 292	-1.14	0.31	5 594	6 330	2.02	1.00	1 729	1 846	-2.55	1.24
LATIN AMERICA	16 255	18 151	2.10	0.80	2 299	2 675	-0.23	1.11	5 310	6 201	3.32	1.58
Argentina	839	900	0.65	0.74	62	69	0.93	-0.70	595	680	-0.03	1.34
Brazil	1 334	1 521	0.48	1.22	537	560	-5.25	-0.58	58	67	4.05	0.82
Chile	3 336	4 328	0.68	2.22	132	135	3.80	0.00	1 666	2 771	2.74	4.69
Colombia	266	303	6.51	0.62	263	400	2.10	3.75	53	48	-4.94	-1.78
Mexico	1 825	1 925	1.09	0.33	481	521	3.52	2.01	369	299	11.03	-1.90
Paraguay	31	37	4.00	1.45	5	5	3.67	0.00	0	0	..	..
Peru	5 801	6 201	3.23	0.23	159	169	5.47	0.61	788	629	1.34	-1.79
EUROPE	17 405	18 757	0.82	0.88	11 586	11 612	0.22	0.35	10 505	12 011	0.97	1.55
European Union[1]	5 182	5 564	-0.18	0.66	8 166	8 370	1.05	-0.07	2 558	2 886	0.21	0.43
United Kingdom	855	976	-0.37	0.73	1 158	1 183	-1.65	-0.01	787	840	-1.59	-0.02
Norway	3 893	4 011	1.72	0.40	258	260	0.61	-0.38	2 918	2 997	0.37	0.41
Russia	5 247	5 923	2.31	1.56	844	813	-4.81	2.87	2 392	3 387	3.00	5.45
Ukraine	93	69	-9.46	10.03	553	405	1.10	11.53	33	19	-9.71	14.70
AFRICA	12 281	13 926	2.81	1.07	4 642	6 232	0.58	2.69	2 924	2 409	3.46	-1.86
Egypt	2 027	2 384	5.10	1.75	638	998	1.44	5.60	31	11	1.04	0.00
Ethiopia	61	73	7.29	1.64	3	5	3.21	4.81	1	0	-18.22	..
Nigeria	1 075	1 219	1.42	1.13	669	861	-7.88	0.41	4	4	-24.53	0.00
South Africa	519	554	-1.31	0.17	286	323	3.73	0.98	77	122	-15.55	0.83
ASIA	125 168	144 277	2.24	1.29	17 949	17 726	2.33	0.43	20 194	21 512	0.66	0.53
China[2]	62 829	73 892	1.73	1.51	5 459	4 643	5.79	-0.08	7 347	7 696	-0.40	0.84
India	13 999	17 589	5.91	1.87	80	197	17.40	9.94	1 398	1 165	5.60	-3.35
Indonesia	12 456	13 820	3.49	1.17	150	275	-1.80	2.66	1 339	1 882	0.02	3.40
Iran	1 292	1 451	5.69	0.85	42	50	-6.36	1.51	134	106	9.13	-1.53
Japan	3 742	3 407	-1.83	-0.88	3 317	2 885	-1.57	-0.64	743	825	1.85	0.19
Kazakhstan	53	57	4.70	0.73	63	71	-2.66	1.53	40	41	0.58	0.00
Korea	1 963	1 932	-1.11	0.05	1 859	1 979	2.67	1.00	675	664	-0.14	0.48
Malaysia	1 659	1 809	-0.85	0.60	674	703	2.39	-0.36	421	425	5.37	-0.82
Pakistan	656	695	0.63	0.49	8	9	5.38	0.00	228	207	3.92	0.17
Philippines	2 767	3 307	-1.21	1.29	522	634	7.71	2.85	308	265	-2.34	-2.56
Saudi Arabia	161	204	9.92	1.69	302	334	-1.01	0.86	37	36	2.43	-1.32
Thailand	2 583	2 842	-1.10	0.87	2 017	1 974	2.35	-0.52	1 809	1 892	-3.46	0.61
Türkiye	821	790	3.86	-1.17	115	104	4.20	1.16	300	323	11.88	-2.09
Viet Nam	8 033	9 120	4.65	1.20	500	590	9.40	1.98	2 978	3 370	2.63	1.12
OCEANIA	1 830	1 930	3.09	0.24	626	690	-1.25	0.97	1 088	1 108	2.44	0.09
Australia	278	306	2.23	0.92	448	513	-0.65	1.28	78	52	5.20	-2.10
New Zealand	510	546	-0.86	0.31	59	60	0.96	0.00	408	437	-0.94	0.43
DEVELOPED COUNTRIES	**28 909**	**30 473**	**0.12**	**0.57**	**22 277**	**22 705**	**0.39**	**0.40**	**14 390**	**16 160**	**0.34**	**1.35**
DEVELOPING COUNTRIES	**149 991**	**172 930**	**2.39**	**1.27**	**21 097**	**23 198**	**2.30**	**1.21**	**28 150**	**29 742**	**1.50**	**0.51**
LEAST DEVELOPED COUNTRIES (LDC)	13 884	15 740	3.15	1.10	1 257	1 588	3.05	1.70	2 068	1 941	8.38	-0.63
OECD[3]	**28 653**	**30 470**	**-0.14**	**0.50**	**22 839**	**23 723**	**0.87**	**0.35**	**13 076**	**14 804**	**0.42**	**1.05**
BRICS	**83 928**	**99 479**	**2.33**	**1.56**	**7 205**	**6 537**	**2.74**	**0.41**	**11 272**	**12 436**	**0.81**	**1.34**

.. 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 2019-21est: Data for 2021 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 Costa Rica.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**15 959**	**16 492**	**1.28**	**0.15**	**158 897**	**183 136**	**2.01**	**1.36**	**20.5**	**21.4**	**0.88**	**0.46**
NORTH AMERICA	911	929	-1.02	0.08	8 221	9 232	1.18	0.78	22.3	23.5	0.49	0.22
Canada	9	19	-16.78	1.18	798	865	-0.10	0.48	21.1	21.0	-1.05	-0.28
United States	902	909	-0.65	0.06	7 423	8 368	1.32	0.81	22.4	23.8	0.67	0.27
LATIN AMERICA	5 887	6 275	1.08	-0.07	6 784	7 802	1.31	1.16	10.4	11.0	0.33	0.42
Argentina	0	0	0.00	0.00	305	288	2.18	-0.89	6.8	5.8	1.19	-1.67
Brazil	81	87	-2.22	1.07	1 731	1 927	-1.58	0.69	8.1	8.6	-2.36	0.22
Chile	1 269	1 209	-2.20	-1.13	235	243	0.26	0.34	12.3	12.4	-0.92	0.18
Colombia	0	0	0.00	0.00	476	657	5.64	2.98	9.4	12.2	4.31	2.49
Mexico	213	202	-5.21	0.04	1 723	1 945	1.56	1.19	13.4	13.7	0.38	0.34
Paraguay	0	0	0.00	0.00	36	42	3.94	1.27	5.0	5.2	2.60	0.22
Peru	4 234	4 610	3.50	0.20	963	1 101	4.51	1.36	29.2	30.3	3.02	0.51
EUROPE	2 457	2 420	3.53	0.41	15 742	15 684	0.04	0.11	21.0	21.2	-0.09	0.22
European Union[1]	736	665	3.84	0.68	9 940	10 254	0.42	0.13	22.3	23.2	0.30	0.23
United Kingdom	0	0	0.00	0.00	1 226	1 318	-0.84	0.54	18.1	18.6	-1.46	0.19
Norway	908	912	10.63	-0.06	275	312	0.74	1.08	50.8	52.7	-0.20	0.28
Russia	390	414	2.19	1.35	3 225	2 876	-0.37	-1.28	22.1	20.1	-0.52	-1.06
Ukraine	0	0	0.00	0.00	612	454	-0.33	11.18	14.0	11.2	0.17	11.95
AFRICA	672	737	-0.30	0.47	13 268	16 951	1.86	2.20	10.0	9.9	-0.70	-0.10
Egypt	0	0	0.00	0.00	2 633	3 371	4.34	2.77	25.8	27.5	2.18	1.14
Ethiopia	0	0	0.00	0.00	62	77	7.85	1.84	0.5	0.5	5.01	-0.44
Nigeria	0	0	0.00	0.00	1 740	2 076	-3.58	0.77	8.4	7.7	-6.06	-1.63
South Africa	295	320	2.16	0.73	432	436	2.51	0.18	7.3	6.5	1.06	-0.83
ASIA	5 936	6 041	1.54	0.26	113 939	132 335	2.47	1.46	24.7	26.6	1.50	0.81
China[2]	1 390	1 654	-7.94	0.32	58 051	67 936	2.50	1.57	40.3	46.4	2.01	1.45
India	933	948	14.83	1.37	11 331	15 434	5.63	2.90	8.2	10.2	4.51	2.06
Indonesia	85	85	18.98	0.00	11 182	12 129	3.82	0.90	40.9	40.2	2.60	0.05
Iran	110	134	1.10	0.02	1 090	1 262	5.08	1.19	13.0	13.5	3.69	0.28
Japan	693	482	-0.63	-2.77	5 623	4 986	-1.79	-0.71	44.5	41.5	-1.59	-0.21
Kazakhstan	0	0	0.00	0.00	76	86	-0.23	1.77	4.0	4.2	-1.61	0.88
Korea	116	117	-3.52	-0.42	2 893	3 071	0.77	0.65	56.4	60.1	0.51	0.70
Malaysia	128	105	-0.20	-1.07	1 756	1 982	0.04	0.90	54.3	54.4	-1.30	-0.14
Pakistan	134	128	3.81	0.00	303	369	-2.31	0.85	1.4	1.4	-4.30	-0.84
Philippines	0	0	0.00	0.00	2 981	3 676	0.14	1.89	27.2	29.4	-1.32	0.70
Saudi Arabia	0	0	0.00	0.00	426	503	1.76	1.37	12.2	12.7	-0.36	0.23
Thailand	312	236	-5.28	-2.40	2 292	2 587	4.10	0.73	32.8	36.8	3.74	0.70
Türkiye	123	151	4.31	2.51	512	419	0.97	-1.05	6.1	4.7	-0.52	-1.57
Viet Nam	1 379	1 482	13.76	1.29	3 983	4 758	3.95	1.52	40.9	45.5	2.92	0.89
OCEANIA	97	90	-4.57	0.02	978	1 162	0.08	1.38	23.4	24.5	-1.33	0.23
Australia	34	33	-3.55	0.02	614	735	0.14	1.47	24.1	25.8	-1.17	0.50
New Zealand	54	57	2.50	0.01	106	112	-0.92	-0.17	22.0	21.5	-1.84	-0.84
DEVELOPED COUNTRIES	**4 589**	**4 385**	**1.96**	**-0.06**	**31 262**	**31 781**	**0.06**	**0.22**	**21.8**	**21.7**	**-0.35**	**0.03**
DEVELOPING COUNTRIES	**11 371**	**12 107**	**1.05**	**0.23**	**127 671**	**151 385**	**2.55**	**1.61**	**20.2**	**21.3**	**1.25**	**0.56**
LEAST DEVELOPED COUNTRIES (LDC)	320	296	2.35	0.33	12 532	14 941	2.31	1.52	14.1	13.3	-0.04	-0.63
OECD[3]	**5 058**	**4 757**	**0.36**	**-0.46**	**32 179**	**33 647**	**0.29**	**0.37**	**23.1**	**23.4**	**-0.24**	**0.11**
BRICS	**3 090**	**3 422**	**-1.42**	**0.78**	**74 771**	**88 608**	**2.67**	**1.66**	**23.1**	**26.0**	**1.90**	**1.20**

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 2019-21est: Data for 2021 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 Costa Rica.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), “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 2019-21est	2031	2022-31	Average 2019-21est	2031	2022-31	Average 2019-21est	2031	2022-31
WORLD	**124 707**	**140 445**	**0.98**	**126 110**	**141 010**	**0.91**	**102 365**	**115 894**	**0.99**
NORTH AMERICA	60 172	63 721	0.21	57 452	60 649	0.27	54 175	57 160	0.26
Canada	1 990	2 178	0.95	3 217	3 866	1.46	2 674	3 215	1.38
United States	58 182	61 543	0.18	54 235	56 783	0.19	51 501	53 945	0.20
LATIN AMERICA	36 656	38 948	0.91	35 815	37 480	1.04	32 579	34 061	1.03
Argentina	1 128	1 164	0.02	1 116	1 118	-0.07	926	901	-0.73
Brazil	32 748	33 999	0.88	31 711	32 531	1.02	29 924	30 941	1.03
Chile	5	8	6.16	41	37	1.10	0	0	0.00
Colombia	495	794	1.86	790	952	1.02	687	851	1.14
Mexico	225	311	-0.92	461	452	-0.27	262	256	-0.37
Paraguay	583	946	2.49	403	638	3.47	360	575	3.93
Peru	212	285	2.36	265	386	1.69	181	232	1.84
EUROPE	7 603	8 173	0.74	8 758	8 490	-0.47	5 720	5 466	-0.76
European Union[1]	6 112	6 292	0.16	6 819	6 081	-1.51	4 924	4 181	-2.12
United Kingdom	577	910	5.95	1 010	1 487	4.26	664	1 132	6.02
Russia	643	641	0.07	534	523	0.03	0	0	0.00
Ukraine	160	215	2.72	165	192	3.11	88	130	3.76
AFRICA	1 271	1 301	2.43	1 404	1 646	2.09	122	193	3.74
Egypt	10	12	1.37	8	6	2.76	0	0	0.00
Ethiopia	113	165	3.57	114	167	3.53	50	84	4.15
Nigeria	49	79	4.75	199	228	1.42	0	0	0.00
South Africa	323	352	0.33	135	175	0.68	5	5	0.30
ASIA	18 677	27 981	3.15	22 381	32 476	2.45	9 554	18 824	4.21
China[2]	10 433	11 032	0.28	10 753	11 802	0.44	3 948	4 610	0.90
India	3 560	10 970	8.76	4 089	11 510	8.17	2 303	9 670	10.72
Indonesia	182	231	2.57	153	232	2.55	0	0	0.00
Iran	148	173	1.30	216	219	1.01	0	0	0.00
Japan	64	57	-0.10	1 717	1 496	-1.42	936	731	-2.71
Kazakhstan	59	74	2.14	85	92	1.68	0	0	0.00
Korea	155	139	-1.20	668	1 490	-2.76	0	884	-3.82
Malaysia	0	4	23.39	16	22	2.06	0	0	0.00
Pakistan	571	771	0.67	21	23	0.12	0	0	0.00
Philippines	361	600	3.64	838	1 134	1.76	596	819	1.30
Saudi Arabia	0	48	14.06	81	105	4.28	0	0	0.00
Thailand	1 794	2 064	0.51	1 807	2 055	0.54	1 531	1 753	0.62
Türkiye	131	202	2.82	312	394	1.35	91	119	0.83
Viet Nam	246	387	2.41	263	357	2.12	150	239	3.25
OCEANIA	326	321	-0.43	300	269	-0.63	215	190	-0.94
Australia	317	310	-0.48	292	260	-0.69	215	190	-0.94
New Zealand	3	3	0.00	0	0	..	0	0	0.00
DEVELOPED COUNTRIES	**68 589**	**72 756**	**0.27**	**68 535**	**71 268**	**0.14**	**61 051**	**63 552**	**0.13**
DEVELOPING COUNTRIES	**56 117**	**67 688**	**1.81**	**57 575**	**69 742**	**1.76**	**41 314**	**52 342**	**2.14**
LEAST DEVELOPED COUNTRIES (LDC)	735	653	3.51	740	936	2.73	0	0	0.00
OECD[3]	**68 254**	**72 748**	**0.27**	**69 736**	**73 438**	**0.08**	**61 997**	**65 528**	**0.07**
BRICS	**47 708**	**56 993**	**1.85**	**47 221**	**56 541**	**1.97**	**36 180**	**45 226**	**2.45**

.. Not available

Note: Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	Average 2019-21est	2031	2022-31	Average 2019-21est	2031	2022-31
WORLD	**..**	**..**	**11 475**	**11 569**	**-0.10**	**10 335**	**10 429**	**-0.11**
NORTH AMERICA	..	..	2 338	2 263	1.16	5 109	5 356	-0.12
Canada	6.0	6.8	1 291	1 780	2.08	90	91	-0.09
United States	9.8	11.0	1 047	483	-1.61	5 019	5 264	-0.12
LATIN AMERICA	..	..	1 880	1 127	0.36	2 911	2 592	-0.99
Argentina	10.9	11.7	2	3	5.35	21	50	2.56
Brazil	46.5	49.1	961	375	0.06	2 181	1 839	-1.53
Chile	..	..	37	32	0.00	1	3	0.00
Colombia	..	..	302	168	-2.17	6	9	0.48
Mexico	0.7	1.0	238	142	1.26	2	1	-0.20
Paraguay	..	..	0	0	..	180	308	0.71
Peru	..	..	211	236	0.00	157	136	0.00
EUROPE	..	..	1 993	1 933	0.44	958	1 021	2.47
European Union[1]	5.4	6.6	1 194	1 090	-0.19	610	707	3.76
United Kingdom	4.4	6.7	602	703	1.65	165	126	0.00
Russia	0.0	0.0	1	2	-1.14	111	119	0.22
Ukraine	..	..	27	2	0.00	21	25	0.00
AFRICA	..	..	682	604	0.52	276	259	0.00
Egypt	..	..	2	2	0.00	4	8	0.00
Ethiopia	..	..	1	2	0.00	0	0	..
Nigeria	..	..	151	149	0.00	0	0	..
South Africa	..	..	8	11	0.00	197	188	0.00
ASIA	..	..	4 536	5 609	-0.86	1 003	1 115	-0.03
China[2]	2.0	2.0	358	862	1.73	218	92	-4.39
India	..	..	623	640	0.18	94	99	-0.10
Indonesia	..	..	31	65	0.00	60	63	0.00
Iran	..	..	74	53	0.00	7	7	0.00
Japan	2.1	2.0	1 655	1 441	-1.46	1	2	-0.02
Kazakhstan	..	..	29	21	0.00	3	3	0.00
Korea	0.0	10.0	521	1 350	-2.92	0	0	..
Malaysia	..	..	16	18	0.00	0	0	..
Pakistan	..	..	0	1	1.16	550	749	0.69
Philippines	..	..	477	534	0.00	1	0	..
Saudi Arabia	..	..	81	57	0.00	0	0	..
Thailand	..	..	26	11	2.20	14	20	-1.23
Türkiye	..	..	186	197	0.00	5	5	0.00
Viet Nam	..	..	36	14	-2.65	19	44	2.70
OCEANIA	..	..	46	34	-1.46	78	86	-0.23
Australia	1.3	1.2	44	32	-1.53	74	82	-0.24
New Zealand	0.0	0.0	2	2	0.00	4	4	0.00
DEVELOPED COUNTRIES	**..**	**..**	**6 121**	**5 744**	**0.16**	**6 350**	**6 659**	**0.23**
DEVELOPING COUNTRIES	**..**	**..**	**5 354**	**5 826**	**-0.35**	**3 984**	**3 770**	**-0.70**
LEAST DEVELOPED COUNTRIES (LDC)	..	..	316	314	1.03	36	31	0.00
OECD[3]	**..**	**..**	**7 297**	**7 560**	**-0.50**	**5 981**	**6 299**	**0.24**
BRICS	**..**	**..**	**1 951**	**1 889**	**0.83**	**2 801**	**2 337**	**-1.44**

.. Not available

Note: Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2022-31	Average 2019-21est	2031	2022-31
WORLD	**48 422**	**55 390**	**-0.02**	**52 215**	**56 006**	**-0.02**
NORTH AMERICA	9 283	9 631	-1.28	10 600	10 829	-1.14
Canada	379	430	0.80	454	420	-0.53
United States	8 905	9 202	-1.37	10 145	10 409	-1.17
LATIN AMERICA	8 897	10 835	1.65	8 129	10 195	1.92
Argentina	1 765	2 003	3.10	856	1 242	7.83
Brazil	6 325	7 695	1.25	6 307	7 675	1.24
Chile	0	0	..	0	0	..
Colombia	622	856	1.72	622	856	1.72
Mexico	0	0	..	0	0	..
Paraguay	12	28	5.46	12	28	5.46
Peru	173	254	2.66	333	394	1.63
EUROPE	15 449	16 220	-0.98	20 956	18 296	-1.49
European Union[1]	14 882	15 599	-1.04	19 312	17 050	-1.50
United Kingdom	568	621	0.89	1 374	977	-2.35
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	14 755	18 652	0.66	12 503	16 650	1.49
China[2]	1 365	1 170	-5.97	742	864	4.29
India	209	389	1.84	155	323	1.38
Indonesia	8 476	10 930	1.27	8 006	10 927	1.31
Iran	0	0	..	0	0	..
Japan	23	21	-1.00	15	16	0.05
Kazakhstan	0	0	..	0	0	..
Korea	716	637	-0.24	691	616	-0.23
Malaysia	1 305	1 638	2.26	842	1 311	2.59
Pakistan	0	0	..	0	0	..
Philippines	185	279	2.24	185	279	2.24
Saudi Arabia	0	0	..	0	0	..
Thailand	1 443	2 142	0.93	1 867	2 314	1.24
Türkiye	0	0	..	0	0	..
Viet Nam	0	0	..	0	0	..
OCEANIA	37	51	2.14	27	36	3.17
Australia	37	51	2.14	27	36	3.18
New Zealand	0	0	..	0	0	..
DEVELOPED COUNTRIES	**24 793**	**25 924**	**-1.09**	**31 597**	**29 176**	**-1.35**
DEVELOPING COUNTRIES	**23 629**	**29 467**	**1.02**	**20 618**	**26 830**	**1.65**
LEAST DEVELOPED COUNTRIES (LDC)	0	0	..	0	0	..
OECD[3]	**26 130**	**27 417**	**-0.99**	**32 910**	**30 648**	**-1.26**
BRICS	**7 899**	**9 254**	**0.11**	**7 204**	**8 863**	**1.51**

.. Not available

Note: Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), “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 2019-21est	2031	Average 2019-21est	2031	2022-31	Average 2019-21est	2031	2022-31
WORLD	**..**	**..**	**7 799**	**6 407**	**-0.98**	**6 615**	**5 801**	**-1.08**
NORTH AMERICA	..	..	2 211	2 355	0.27	883	1 158	0.47
Canada	1.5	1.5	370	328	-0.91	294	338	0.76
United States	5.9	6.0	1 841	2 027	0.47	589	820	0.35
LATIN AMERICA	..	..	160	140	0.00	923	777	-1.48
Argentina	8.0	8.5	0	0	..	910	758	-1.57
Brazil	11.7	11.6	0	0	..	13	19	3.59
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	..	..	160	140	0.00	0	0	..
EUROPE	..	..	5 033	3 635	-1.99	1 720	1 573	3.57
European Union[1]	9.6	12.1	3 890	2 932	-1.79	1 653	1 496	3.69
United Kingdom	5.0	4.8	873	434	-5.45	67	77	1.52
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	..	..	395	275	4.03	3 079	2 278	-3.94
China[2]	0.7	0.6	390	102	-1.26	1 012	408	-14.89
India	..	..	3	1	0.74	57	67	4.87
Indonesia	..	..	0	0	..	470	3	-25.84
Iran	..	..	0	0	..	0	0	..
Japan	0.1	0.1	1	1	-0.21	9	6	-3.12
Kazakhstan	..	..	0	0	..	0	0	..
Korea	0.0	0.0	0	0	..	24	22	-0.77
Malaysia	..	..	0	0	..	463	326	1.04
Pakistan	..	..	0	0	..	0	0	..
Philippines	..	..	0	0	..	0	0	..
Saudi Arabia	..	..	0	0	..	0	0	..
Thailand	..	..	1	171	22.34	9	0	..
Türkiye	..	..	0	0	..	0	0	..
Viet Nam	..	..	0	0	..	0	0	..
OCEANIA	..	..	1	1	-0.37	11	16	0.00
Australia	0.2	0.4	1	1	-0.38	11	16	0.00
New Zealand	0.0	0.0	0	0	..	0	0	..
DEVELOPED COUNTRIES	**..**	**..**	**7 246**	**5 992**	**-1.15**	**2 622**	**2 753**	**2.11**
DEVELOPING COUNTRIES	**..**	**..**	**554**	**414**	**2.18**	**3 993**	**3 048**	**-3.32**
LEAST DEVELOPED COUNTRIES (LDC)	..	..	0	0	..	0	0	..
OECD[3]	**..**	**..**	**7 246**	**5 992**	**-1.15**	**2 647**	**2 774**	**2.08**
BRICS	**..**	**..**	**393**	**103**	**-1.25**	**1 083**	**494**	**-13.12**

.. Not available

Note: Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), “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

		2021est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
ARGENTINA												
Biodiesel												
Export tax	%	8.0	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]	%	10.0	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	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
EUROPEAN UNION												
Biofuel												
Energy share in fuel consumption[6]	%	8.2	8.2	8.3	8.5	8.7	8.9	9.2	9.5	9.9	10.3	10.5
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	%	8.0	10.0	10.0	10.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
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]	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
MALAYSIA												
Biodiesel												
Blending target[2]	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
THAILAND												
Ethanol												
Blending target[2]	%	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
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
UNITED STATES												
Renewable Fuel Standard[7]												
Total	mln L	75 025	73 411	72 060	72 008	71 955	71 902	71 850	71 797	71 745	71 693	71 640
advanced mandate	mln L	19 368	19 368	19 368	19 368	19 368	19 368	19 368	19 368	19 368	19 368	19 368
cellulosic ethanol	mln L	1 737	1 737	1 737	1 737	1 737	1 737	1 737	1 737	1 737	1 737	1 737
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	26.42	26.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: 2021est: Data for 2021 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 (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**26 177**	**30 554**	**0.19**	**1.58**	**9 836**	**12 436**	**1.39**	**2.28**	**9 738**	**12 436**	**1.22**	**2.28**
NORTH AMERICA	3 784	4 459	2.01	1.51	1	1	-3.24	0.62	3 322	3 795	4.35	1.67
Canada	0	0	..	..	0	0	..	..	0	0	..	..
United States	3 784	4 459	2.01	1.51	1	1	5.82	1.01	3 322	3 795	4.35	1.67
LATIN AMERICA	3 220	4 780	7.51	5.12	317	341	-3.87	0.52	2 145	3 630	14.05	6.34
Argentina	284	337	4.39	1.28	0	0	-63.84	..	121	118	11.49	-0.20
Brazil	2 583	4 064	8.76	6.07	3	3	-21.64	0.01	1 924	3 396	14.42	6.95
Chile	0	0	..	..	0	0	..	..	0	0	..	..
Colombia	17	16	-5.14	0.00	17	11	-8.90	0.00	0	0	-70.66	..
Mexico	301	324	4.82	0.61	173	206	-4.16	0.41	94	109	14.70	0.35
Paraguay	4	5	-10.36	-0.05	2	2	13.01	0.59	5	5	-5.81	-0.59
Peru	20	22	-4.70	-0.36	41	39	-4.08	0.12	1	0	-7.64	..
EUROPE	282	295	-1.31	0.26	250	311	-6.10	0.24	352	421	-3.14	-0.07
European Union[1]	281	294	-1.32	0.26	205	270	-5.54	0.18	350	419	-3.16	-0.07
United Kingdom	0	0	..	..	0	0	..	..	0	0	..	..
Russia	0	0	..	..	31	27	-10.58	0.00	0	1	40.14	0.00
Ukraine	0	0	..	..	1	1	-7.04	3.14	0	0	..	..
AFRICA	2 066	2 666	5.18	1.50	147	133	-0.57	1.10	1 773	2 385	5.03	1.58
Egypt	84	76	-2.51	0.95	110	104	7.38	1.63	82	48	11.68	-1.60
Ethiopia	62	82	6.59	2.80	0	1	-34.06	..	2	0	-47.79	..
Nigeria	78	93	3.66	0.00	1	1	0.00	0.00	42	0	-0.36	0.00
South Africa	28	25	19.17	0.14	13	12	-4.56	-0.50	25	0	21.79	0.51
ASIA	16 321	17 963	-1.46	0.95	9 120	11 649	1.97	2.41	1 658	1 815	-8.12	-0.08
China[2]	5 843	5 879	-2.18	0.32	2 318	2 513	-2.20	-0.37	33	29	18.06	-0.16
India	6 627	7 552	0.00	1.34	255	109	1.08	-2.17	1 014	1 271	-6.32	2.22
Indonesia	3	3	-9.30	0.30	594	761	-2.08	3.90	1	1	-34.22	-3.75
Iran	70	86	2.48	0.86	79	112	5.91	3.98	0	0	..	..
Japan	0	0	..	..	42	37	-6.64	-0.26	0	0	..	..
Kazakhstan	79	114	1.65	2.48	0	0	..	..	66	96	2.45	2.31
Korea	0	0	..	..	140	198	-9.60	0.49	0	1	-26.09	0.00
Malaysia	0	0	..	..	150	172	5.90	1.96	61	45	0.93	-1.92
Pakistan	1 179	1 241	-7.77	1.00	954	1 290	17.76	1.98	16	9	-23.21	-0.42
Philippines	0	0	..	..	10	11	-0.78	4.50	0	0	..	..
Saudi Arabia	0	0	..	..	0	0	..	..	0	0	..	..
Thailand	1	1	2.41	-1.65	168	197	-9.73	2.54	0	0	..	..
Türkiye	845	1 190	2.69	2.09	1 044	972	2.64	1.04	111	152	13.23	-1.02
Viet Nam	1	1	-11.95	0.49	1 557	2 464	12.70	4.71	0	0	..	..
OCEANIA	504	393	-6.33	-2.27	1	1	-0.18	0.00	488	390	-8.00	-2.29
Australia	503	392	-6.34	-2.27	0	0	..	..	487	389	-8.02	-2.30
New Zealand	1	1	0.00	0.00	1	1	0.00	0.00	1	1	0.00	0.00
DEVELOPED COUNTRIES	**6 112**	**6 909**	**0.49**	**1.01**	**311**	**365**	**-5.99**	**0.17**	**4 576**	**4 904**	**-0.99**	**0.51**
DEVELOPING COUNTRIES	**20 065**	**23 645**	**0.11**	**1.75**	**9 525**	**12 071**	**1.75**	**2.35**	**5 163**	**7 532**	**3.61**	**3.61**
LEAST DEVELOPED COUNTRIES (LDC)	1 549	2 063	4.36	1.55	1 703	2 714	5.94	4.50	1 195	1 726	4.79	1.81
OECD[3]	**5 741**	**6 685**	**1.00**	**1.23**	**1 626**	**1 698**	**-1.34**	**0.70**	**4 375**	**4 875**	**1.59**	**1.00**
BRICS	**15 081**	**17 520**	**0.22**	**1.88**	**2 620**	**2 663**	**-2.34**	**-0.45**	**2 996**	**4 718**	**3.31**	**5.37**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31
WORLD	**25 528**	**30**	**1.02**	**1.62**
NORTH AMERICA	**512**	**636**	**-5.41**	**1.56**
Canada	0	0	..	..
United States	512	636	-5.40	1.56
LATIN AMERICA	**1 410**	**1 376**	**-1.93**	**0.41**
Argentina	130	112	-1.07	0.18
Brazil	708	663	-2.42	0.33
Chile	0	0	..	..
Colombia	31	27	-8.11	0.00
Mexico	386	420	-0.67	0.55
Paraguay	2	1	-11.85	3.43
Peru	64	60	-4.16	-0.04
EUROPE	**167**	**183**	**-6.43**	**1.46**
European Union[1]	129	143	-4.46	0.91
United Kingdom	0	0	..	..
Russia	25	26	-14.57	4.54
Ukraine	1	1	-7.39	3.19
AFRICA	**363**	**410**	**-0.32**	**1.89**
Egypt	134	132	0.12	2.66
Ethiopia	55	83	3.10	2.86
Nigeria	29	30	6.07	0.00
South Africa	20	16	-1.23	-0.69
ASIA	**23 071**	**27 683**	**1.52**	**1.68**
China[2]	7 970	8	0.59	0.05
India	5 644	6	1.63	1.21
Indonesia	575	763	-2.59	3.90
Iran	141	198	3.96	2.53
Japan	43	37	-6.64	-0.28
Kazakhstan	16	19	1.70	3.44
Korea	140	198	-9.32	0.51
Malaysia	89	127	18.86	3.79
Pakistan	2 221	3	-0.65	1.50
Philippines	10	11	-0.31	4.52
Saudi Arabia	0	0	..	..
Thailand	185	198	-8.68	2.51
Türkiye	1 596	2 001	1.75	2.29
Viet Nam	1 546	2	13.19	4.72
OCEANIA	**4**	**3**	**-11.93**	**0.00**
Australia	3	2	-15.13	0.00
New Zealand	1	1	0.00	0.00
DEVELOPED COUNTRIES	**1 709**	**2 340**	**0.71**	**2.52**
DEVELOPING COUNTRIES	**23 819**	**27 953**	**1.04**	**1.55**
LEAST DEVELOPED COUNTRIES (LDC)	**1 910**	**3 048**	**4.41**	**4.13**
OECD[3]	**2 842**	**3 467**	**-1.54**	**1.71**
BRICS	**14 366**	**15 354**	**0.76**	**0.54**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2019-21est: Data for 2021 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 and Costa Rica 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 (2022), "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 2019-21est	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
ARGENTINA												
Export tax equivalent of export barriers	%	2.8	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	5 967.2	8 490.0	10 629.9	10 629.9	10 629.9	10 629.9	10 629.9	10 629.9	10 629.9	10 629.9	10 629.9
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
RUSSIA												
Tariff equivalent of import barriers	%	3.3	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	66.1	66.1	66.1	66.1	66.1	66.1	66.1	66.1	66.1	66.1	66.1
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 2019-21est: Data for 2021 are estimated.
Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**246 781**	**288 262**	**2.30**	**1.40**	**16.9**	**18.0**	**0.75**	**0.64**
NORTH AMERICA	5 636	5 897	0.88	0.28	12.7	12.5	0.53	-0.31
Canada	966	1 010	0.44	0.39	17.0	16.6	1.79	-0.46
United States	4 670	4 888	0.98	0.26	12.2	12.0	0.34	-0.30
LATIN AMERICA	14 050	15 013	-0.03	0.63	12.3	12.7	-0.27	0.38
Argentina	629	700	1.18	0.93	9.4	9.4	-0.48	0.02
Brazil	5 880	5 412	-3.23	-0.53	11.6	10.7	-3.59	-0.50
Chile	290	302	3.16	0.10	14.3	16.0	1.62	0.88
Colombia	1 414	1 539	2.96	0.81	22.5	24.0	1.65	0.48
Mexico	404	463	-0.15	1.07	3.4	3.4	-0.87	0.03
Paraguay	1 049	1 248	5.66	1.55	40.5	39.8	0.01	0.03
Peru	1 747	2 150	2.98	1.95	34.6	40.7	2.24	1.42
EUROPE	28 600	29 306	2.10	0.68	17.8	17.8	0.23	0.14
European Union[1]	12 932	13 406	1.98	0.17	13.5	12.8	-0.99	-0.40
United Kingdom	1 178	1 287	1.70	0.84	24.9	25.9	1.82	0.31
Russia	7 430	8 034	2.96	0.49	25.1	26.9	1.54	0.51
Ukraine	5 477	4 899	2.59	2.60	29.1	28.9	1.17	1.76
AFRICA	97 683	121 973	2.92	1.95	41.8	42.6	0.46	0.20
Egypt	1 205	1 525	2.37	2.28	8.3	9.1	0.09	0.86
Ethiopia	2 561	3 317	2.95	2.37	18.7	18.9	-0.41	0.21
Nigeria	33 523	41 138	2.82	1.76	69.7	70.7	0.59	0.16
South Africa	505	630	1.35	2.08	5.9	5.9	-0.83	0.01
ASIA	99 701	114 817	2.23	1.19	10.5	10.8	0.39	0.25
China[2]	44 233	47 633	1.66	0.57	15.3	15.3	-0.05	0.03
India	14 190	17 163	3.00	1.60	7.3	8.0	1.18	0.73
Indonesia	9 873	11 372	2.61	1.04	19.3	20.3	1.52	0.29
Iran	986	1 073	0.41	0.99	9.9	9.8	-1.03	0.09
Japan	719	696	-1.73	-0.14	6.2	6.2	-0.95	0.03
Kazakhstan	823	999	3.21	1.82	21.9	24.0	0.77	0.79
Korea	275	286	2.87	0.17	5.4	5.6	3.66	0.01
Malaysia	40	47	1.95	1.32	3.7	4.2	1.15	1.07
Pakistan	1 088	1 311	3.39	1.59	3.8	4.0	1.13	0.54
Philippines	1 102	1 427	3.02	2.25	9.8	11.0	1.54	1.02
Saudi Arabia	78	95	-0.85	1.98	4.8	5.2	3.74	0.59
Thailand	11 287	14 262	2.90	2.19	5.5	6.0	0.37	0.70
Türkiye	746	786	-1.82	0.50	6.6	6.4	-4.08	-0.01
Viet Nam	4 271	5 432	3.28	2.00	3.9	4.0	-0.12	0.01
OCEANIA	1 111	1 255	0.97	0.70	22.1	22.6	-0.69	0.00
Australia	246	265	-1.10	0.60	9.9	8.8	-2.13	-0.99
New Zealand	141	151	2.76	0.49	11.8	12.7	-0.16	0.61
DEVELOPED COUNTRIES	**38 344**	**39 899**	**1.81**	**0.69**	**14.5**	**14.3**	**0.15**	**-0.02**
DEVELOPING COUNTRIES	**208 437**	**248 363**	**2.39**	**1.52**	**17.4**	**18.8**	**0.84**	**0.72**
LEAST DEVELOPED COUNTRIES (LDC)	49 807	63 612	3.12	2.16	35.3	37.1	0.92	0.47
OECD[3]	**24 251**	**25 364**	**1.42**	**0.29**	**11.7**	**11.5**	**-0.19**	**-0.17**
BRICS	**72 237**	**78 872**	**1.55**	**0.71**	**11.9**	**12.1**	**0.01**	**0.10**

Note: Calendar year. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), "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 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**97 276**	**120 053**	**3.78**	**1.71**	**7.9**	**9.0**	**1.56**	**1.07**
NORTH AMERICA	9 620	11 491	1.40	1.52	5.4	6.2	2.30	1.20
Canada	6 632	7 677	0.66	1.22	12.2	13.8	3.52	1.02
United States	2 988	3 815	3.29	2.16	4.6	5.3	2.05	1.21
LATIN AMERICA	7 640	8 431	1.20	1.00	9.6	10.2	-1.82	0.52
Argentina	815	987	6.97	1.56	2.6	3.1	15.84	1.46
Brazil	2 997	3 091	0.23	0.65	12.7	13.0	-3.06	0.51
Chile	67	81	4.22	0.90	4.2	4.3	3.02	0.08
Colombia	197	209	-0.89	0.33	6.5	6.8	-0.91	0.25
Mexico	1 732	1 838	1.49	0.88	8.6	9.2	-2.21	0.00
Paraguay	88	107	4.44	0.99	10.0	10.5	2.59	0.34
Peru	251	306	-1.10	0.70	8.4	9.1	-0.78	0.84
EUROPE	10 245	12 879	6.12	2.57	3.6	4.6	2.52	3.06
European Union[1]	4 050	5 813	5.34	3.73	4.2	5.7	2.73	3.99
United Kingdom	836	952	6.88	1.05	3.1	3.1	-0.28	0.10
Russia	3 646	4 365	6.49	1.57	2.8	3.3	5.44	1.24
Ukraine	1 142	1 071	14.62	3.17	1.5	1.7	-0.44	0.66
AFRICA	21 903	27 575	3.72	1.82	11.6	11.7	0.28	0.00
Egypt	397	433	7.57	0.23	4.9	5.2	-2.37	0.53
Ethiopia	3 279	3 958	6.14	1.64	22.3	22.0	3.03	-0.19
Nigeria	3 787	4 857	5.10	1.82	12.1	12.5	2.58	-0.08
South Africa	92	101	0.87	0.82	1.5	1.5	-7.51	0.11
ASIA	45 136	56 116	4.48	1.65	7.6	8.9	2.41	1.22
China[2]	5 532	6 146	3.37	0.75	1.7	2.0	3.87	1.51
India	26 987	34 276	6.28	1.77	17.3	20.1	2.99	1.01
Indonesia	183	202	-5.23	0.82	0.9	1.0	-4.07	0.57
Iran	527	592	-5.16	1.00	7.4	7.5	-2.53	0.18
Japan	98	96	-0.43	-0.05	1.6	1.6	0.45	0.14
Kazakhstan	866	1 317	42.04	3.78	0.5	0.5	-0.52	0.11
Korea	16	22	-0.56	3.40	1.4	1.4	-0.27	-0.03
Malaysia	0	0	..	..	2.9	2.9	-0.92	0.08
Pakistan	457	545	-7.39	1.13	5.4	6.1	-0.86	0.92
Philippines	74	80	0.44	0.47	1.6	1.7	0.99	0.68
Saudi Arabia	15	18	1.54	0.63	5.6	5.7	-0.72	0.04
Thailand	207	230	-0.50	0.03	2.5	2.6	-1.57	0.21
Türkiye	1 337	1 554	1.20	0.82	13.2	13.5	0.53	0.10
Viet Nam	292	357	-0.13	1.01	3.3	3.9	0.35	1.20
OCEANIA	2 732	3 560	2.46	1.19	1.7	1.9	0.91	1.03
Australia	2 695	3 522	2.53	1.21	1.4	1.6	3.85	1.40
New Zealand	22	23	-2.33	0.53	3.3	3.7	-1.20	1.20
DEVELOPED COUNTRIES	**24 272**	**30 177**	**4.12**	**1.99**	**3.6**	**4.3**	**1.96**	**2.10**
DEVELOPING COUNTRIES	**73 003**	**89 876**	**3.68**	**1.62**	**8.9**	**10.0**	**1.43**	**0.89**
LEAST DEVELOPED COUNTRIES (LDC)	18 424	23 414	2.47	1.97	11.0	11.6	-0.23	0.49
OECD[3]	**20 736**	**25 672**	**2.37**	**1.80**	**5.1**	**6.0**	**1.18**	**1.57**
BRICS	**39 254**	**47 980**	**5.26**	**1.54**	**9.1**	**10.8**	**2.59**	**1.29**

.. Not available

Note: Calendar year. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.47. Egg projections : Production and food consumption

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		FOOD CONSUMPTION (kg/cap)		Growth (%)[4]	
	Average 2019-21est	2031	2012-21	2022-31	Average 2019-21est	2031	2012-21	2022-31
WORLD	**90 513**	**105 809**	**3.04**	**1.34**	**10.9**	**11.6**	**1.75**	**0.48**
NORTH AMERICA	6 432	7 469	2.31	1.86	16.9	18.1	1.71	0.82
Canada	602	691	3.54	1.03	16.2	17.2	3.22	0.42
United States	5 830	6 779	2.19	1.95	17.0	18.2	1.56	0.86
LATIN AMERICA	9 880	11 300	3.17	1.02	14.3	15.1	2.16	0.35
Argentina	863	968	3.75	1.01	19.0	19.5	2.79	0.21
Brazil	2 854	3 120	4.12	0.62	13.3	13.8	3.39	0.16
Chile	227	256	1.22	0.67	9.6	10.8	-0.54	0.67
Colombia	889	1 091	4.34	1.44	13.9	16.9	3.15	1.28
Mexico	3 030	3 435	2.59	1.03	23.8	24.4	1.41	0.17
Paraguay	119	151	-0.82	2.03	16.4	18.5	-1.88	1.00
Peru	503	593	5.67	1.03	11.2	12.6	4.38	0.51
EUROPE	11 494	12 428	1.13	0.56	14.6	15.9	0.83	0.63
European Union[1]	6 364	6 834	1.35	0.44	13.6	14.6	1.19	0.44
United Kingdom	1 007	1 129	2.96	0.78	16.1	17.3	1.25	0.38
Russia	2 618	2 711	1.60	0.23	17.9	19.0	1.18	0.45
Ukraine	940	1 135	-2.41	1.73	14.3	20.3	-3.32	3.18
AFRICA	3 459	4 360	1.01	1.97	2.2	2.2	-1.59	0.02
Egypt	384	488	-2.35	2.72	2.9	3.3	-4.42	1.75
Ethiopia	55	83	3.85	3.62	0.4	0.5	0.66	1.99
Nigeria	640	800	-0.11	1.75	2.8	2.8	-2.72	-0.53
South Africa	564	626	2.10	0.74	7.2	7.3	1.08	-0.06
ASIA	58 901	69 816	3.66	1.44	11.9	13.3	2.47	0.87
China[2]	33 945	36 300	2.21	0.64	23.5	24.7	1.73	0.52
India	5 966	9 199	6.33	3.14	3.7	5.5	5.38	2.71
Indonesia	5 292	7 766	20.73	3.44	15.6	22.3	19.34	3.22
Iran	702	758	-2.97	0.89	6.2	6.2	-4.42	0.28
Japan	2 662	2 613	0.88	-0.27	21.7	22.4	0.82	0.28
Kazakhstan	285	329	3.70	1.10	7.9	9.1	-0.21	1.10
Korea	791	851	2.86	0.30	15.5	16.7	2.58	0.33
Malaysia	874	1 024	3.17	1.18	19.0	20.9	2.67	0.57
Pakistan	938	1 462	5.09	3.41	3.6	4.9	3.26	2.16
Philippines	654	943	4.95	3.42	5.0	6.7	3.43	2.73
Saudi Arabia	360	431	6.15	1.25	9.3	9.9	9.15	0.23
Thailand	1 113	1 249	0.22	0.92	12.0	13.8	-0.68	1.17
Türkiye	1 281	1 405	3.66	0.57	8.8	9.5	1.46	0.43
Viet Nam	410	798	0.12	5.65	3.6	7.1	-1.94	5.61
OCEANIA	348	435	2.35	1.85	8.2	9.1	0.88	0.71
Australia	259	325	1.99	1.87	10.3	11.5	0.64	0.88
New Zealand	69	86	2.89	1.90	14.1	16.6	2.28	1.22
DEVELOPED COUNTRIES	**22 673**	**24 964**	**1.66**	**0.91**	**14.9**	**16.0**	**1.03**	**0.59**
DEVELOPING COUNTRIES	**67 840**	**80 845**	**3.54**	**1.47**	**10.0**	**10.7**	**2.11**	**0.52**
LEAST DEVELOPED COUNTRIES (LDC)	1 988	2 880	4.03	3.33	1.9	2.3	1.50	1.62
OECD[3]	**23 308**	**25 842**	**2.09**	**0.93**	**16.0**	**17.0**	**1.41**	**0.53**
BRICS	**45 948**	**51 956**	**2.75**	**1.02**	**13.8**	**14.9**	**1.94**	**0.59**

Note: Calendar year. Average 2019-21est: Data for 2021 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 and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2022), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.48. Information on food price changes

	Total inflation % change (year-on-year)		Food inflation % change (year-on-year)[3]		Expenditure share of food		Food contribution to total change in inflation[4]	
	2021	2022	2021	2022	2021	2022	2021	2022
OECD								
Australia[1]	1.1	..	10.0	..	12.8	12.8	1.3	..
Austria	0.8	5.0	-1.1	4.9	12.0	12.0	-0.1	0.6
Belgium	0.3	7.6	1.2	2.4	17.4	17.4	0.2	0.4
Canada	1.0	5.1	0.1	6.5	11.5	11.5	0.0	0.7
Chile	3.1	7.7	7.8	6.0	18.9	18.9	1.5	1.1
Colombia	1.6	6.9	5.5	19.9	34.7	34.7	-0.1	1.3
Czech Republic	2.2	9.9	0.6	5.4	17.0	17.0	0.9	3.4
Denmark	0.6	4.3	0.3	4.0	11.5	11.5	0.1	0.6
Estonia	0.2	11.3	0.1	9.3	21.7	21.7	0.1	0.9
Finland	0.9	4.4	0.4	3.2	13.4	13.4	0.0	1.2
France	0.6	2.9	1.0	1.7	14.7	14.7	0.1	0.5
Germany	1.0	4.9	1.9	4.9	10.4	10.4	0.1	0.2
Greece	-2.0	6.2	-0.4	5.2	17.1	17.1	0.3	0.8
Hungary	2.7	7.9	3.4	10.1	19.6	19.6	-0.1	1.0
Iceland	4.3	5.7	6.7	3.5	14.9	14.9	0.5	1.5
Ireland	-0.2	5.0	-2.1	2.1	11.7	11.7	0.8	0.4
Israel	-0.4	3.1	-0.1	4.2	14.3	14.3	-0.3	0.3
Italy	0.4	4.8	0.7	3.6	16.3	16.3	0.0	0.7
Japan	-0.7	0.5	-0.1	2.3	19.0	19.0	0.1	0.7
Korea	0.9	3.6	6.4	5.5	14.4	14.4	0.0	0.3
Luxembourg	1.9	3.6	1.2	2.8	11.1	11.1	0.7	0.6
Mexico	3.5	7.1	5.1	11.9	18.9	18.9	0.2	0.5
Netherlands	1.6	6.4	0.5	4.4	11.3	11.3	0.6	1.3
New Zealand[1]	1.5	..	0.9	..	17.4	17.4	0.1	..
Norway	2.5	3.2	0.7	-1.6	13.3	13.3	0.1	-0.2
Poland	2.6	8.7	0.8	9.4	24.1	24.1	0.2	-0.4
Portugal	0.3	3.3	1.0	3.7	18.1	18.1	0.1	1.7
Slovak Republic	0.7	8.4	-0.5	8.1	18.4	18.4	0.2	0.7
Slovenia	-0.7	5.8	0.1	4.6	17.0	17.0	-0.1	1.4
Spain	0.5	6.1	1.7	4.8	18.2	18.2	0.0	0.8
Sweden	1.6	3.7	1.9	1.9	13.9	13.9	0.2	0.7
Switzerland	-0.5	1.6	-0.3	-1.5	10.8	10.8	0.2	0.2
Türkiye	15.0	48.7	18.1	55.6	26.8	26.8	-0.1	-0.4
United Kingdom	0.9	4.9	-0.7	4.4	11.8	11.8	2.1	6.6
United States	1.4	7.5	3.7	7.3	7.8	7.8	-0.1	0.3
OECD Total[2]	1.6	7.2	3.1	7.5	..	..	..	..
Enhanced Engagement								
Brazil	4.6	10.4	16.2	8.0	22.5	22.5	1.2	1.3
China	-0.3	0.9	1.4	-3.8	33.6	33.6	5.4	2.7
India	3.2	5.8	1.9	..	35.4	35.4	1.1	2.7
Indonesia	1.6	2.2	2.8	3.5	19.6	19.6	0.6	0.7
Russia	5.2	8.7	8.0	12.7	32.8	32.8	2.6	4.2
South Africa	3.3	5.7	5.3	5.7	18.3	18.3	1.0	1.0

Table C.48. Information on food price changes *(cont.)*

	Total inflation % change (year-on-year)		Food inflation % change (year-on-year)[3]		Expenditure share of food		Food contribution to total change in inflation[4]	
	2021	2022	2021	2022	2021	2022	2021	2022
Non OECD								
Algeria	4.2	9.0	4.0	13.3	43.8	43.8	0.6	-1.7
Bangladesh	5.0	5.9	5.2	5.6	28.6	28.6	1.1	3.8
Bolivia	1.2	0.7	1.2	0.5	27.6	27.6	1.4	1.5
Botswana	2.3	10.6	0.5	7.0	23.7	23.7	0.3	0.1
Bulgaria	-0.6	4.1	-0.4	3.7	37.2	37.2	0.2	2.6
Costa Rica	1.0	3.5	3.8	3.2	21.4	21.4	0.8	0.7
Dominican Republic	6.2	8.5	8.9	9.3	29.2	29.2	2.6	2.7
Ecuador	-1.0	2.6	1.0	0.5	23.0	23.0	0.2	0.1
Egypt	4.8	7.3	-0.5	12.5	26.3	26.3	-0.1	3.3
El Salvador	-0.7	6.5	0.1	4.5	26.0	26.0	0.0	1.2
Ethiopia	19.2	34.5	23.2	39.9	57.0	57.0	13.2	22.7
Ghana	9.9	13.9	12.8	13.7	37.0	37.0	4.7	5.1
Guatelama	5.2	2.9	9.2	3.1	28.6	28.6	2.6	0.9
Haiti	18.7	24.0	22.5	25.0	50.4	50.4	11.3	12.6
Honduras	4.2	6.2	3.7	7.5	31.8	31.8	1.2	2.4
Iraq	0.9	5.3	-3.1	8.4	35.0	35.0	-1.1	2.9
Jordan	-0.3	2.5	-0.8	4.0	35.2	35.2	-0.3	1.4
Kenya	5.7	5.4	7.4	8.9	36.0	36.0	2.6	3.2
Madagascar	5.0	..	5.7	..	60.0	60.0	3.4	..
Malawi	7.7	12.1	9.7	14.2	50.0	50.0	4.9	7.1
Malaysia	-0.2	2.3	1.5	3.6	56.3	56.3	0.8	2.0
Moldavia	0.2	16.6	1.3	21.1	60.0	60.0	0.8	12.6
Morocco	0.0	4.3	-0.8	4.2	40.4	40.4	-0.3	1.7
New Caledonia	-0.7	2.3	4.4	..	21.0	21.0	0.9	3.3
Nicaragua	4.1	7.7	5.9	10.3	26.1	26.1	1.5	2.7
Niger	..	..	..	..	40.0	40.0	..	..
Nigeria	16.5	15.6	20.6	17.1	51.8	51.8	10.7	8.9
Pakistan	5.7	13.0	6.7	12.5	37.5	37.5	2.5	4.7
Panama	-1.1	3.0	1.0	2.2	33.6	33.6	0.3	0.7
Paraguay	2.6	7.9	5.4	5.8	39.1	39.1	2.1	2.3
Peru	2.9	5.7	3.7	8.0	25.0	25.0	0.9	2.0
Philippines	2.2	3.0	5.4	6.4	39.0	39.0	2.1	2.5
Romania	3.0	8.4	2.9	7.2	37.4	37.4	1.1	2.7
Rwanda	2.8	1.3	2.0	-2.8	39.0	39.0	0.8	-1.1
Senegal	0.9	5.5	0.6	9.1	53.4	53.4	0.3	4.9
Singapore	0.2	2.6	1.5	4.0	21.7	21.7	0.3	0.9
Sri Lanka	3.3	14.2	7.9	24.4	41.0	41.0	3.2	10.0
Chinese Taipei	-0.2	2.8	1.2	3.8	23.7	23.7	0.3	0.9
Tanzania	3.5	4.0	2.8	6.3	38.5	38.5	1.1	2.4
Thailand	-0.4	3.2	0.6	7.6	33.0	33.0	0.2	2.5
Tunisia	4.9	6.7	4.9	7.6	28.7	28.7	1.4	2.2
Uganda	3.7	2.7	-1.2	5.3	27.2	27.2	-0.3	1.4
Zambia	21.5	15.1	25.6	16.9	52.5	52.5	13.4	8.9

.. Not available

1. No data available for January 2022 in Australia and New Zealand.
2. Excludes Costa Rica.
3. CPI food: definition based on national sources.
4. Contribution is food inflation multiplied by expenditure share, expressed in %.

Source: OECD and national sources.

OECD-FAO Agricultural Outlook 2022-2031

The *OECD-FAO Agricultural Outlook 2022-2031* provides a consensus assessment of the ten-year prospects for agricultural commodity and fish markets at national, regional, and global levels, and serves as a reference for forward-looking policy analysis and planning. Projections suggest that, following a business-as-usual path, SDG 2 on Zero Hunger would not be achieved by 2030 and greenhouse gas (GHG) emissions from agriculture would continue to increase. To achieve the Zero Hunger target while reducing direct GHG by 6%, overall agricultural productivity would need to increase by 28% over the next decade. Comprehensive action to boost agricultural investment and innovation, and to enable technology transfer are urgently required in order to put the agricultural sector on the necessary sustainable growth trajectory. Additional efforts to reduce food loss and waste, and to limit excess calorie and protein intakes would also be necessary. This report is a collaborative effort between the Organisation for Economic Co-operation and Development (OECD) and the Food and Agricultural Organization (FAO) of the United Nations, prepared with inputs from Member countries and international commodity organisations. It highlights fundamental economic and social trends driving the global agri-food sector, assuming no major changes to weather conditions or policies.

More information can be found at www.agri-outlook.org.

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