OECD-FAO Agricultural Outlook 2023-2032

OECD

Food and Agriculture Organization of the United Nations

OECD-FAO Agricultural Outlook 2023-2032

Please cite this publication as:
OECD/FAO (2023), *OECD-FAO Agricultural Outlook 2023-2032*, OECD Publishing, Paris, https://doi.org/10.1787/08801ab7-en.

ISBN 978-92-64-61933-3 (print)
ISBN 978-92-64-45854-3 (pdf)
ISBN 978-92-64-68830-8 (HTML)
ISBN 978-92-64-66718-1 (epub)

OECD-FAO Agricultural Outlook
ISSN 1563-0447 (print)
ISSN 1999-1142 (online)

FAO
978-92-5-137923-3 (print and pdf)

Photo credits: Cover © Original cover concept designed by Juan Luis Salazar. Adaptations by OECD.

Corrigenda to OECD publications may be found on line at: www.oecd.org/about/publishing/corrigenda.htm.

Foreword

The *Agricultural Outlook 2023-2032* 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), Hubertus Gay (*Outlook* co-ordinator), Céline Giner, Gaëlle Gouarin, Tomoo Higuchi, Lee Ann Jackson (Head of Division), Edith Laget, 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 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 Caitlin Boros, Edmund Linton, Catalina Mas, 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), 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: Sabine Altendorf, Sergio René Araujo Enciso, Giulia Caddeo, André Croppenstedt, Holger Matthey (Team Leader), Svetlana Mladenovic, Sabina Tuspayeva and Irmak Yaka. For fish, the team consisted of Pierre Charlebois, Adrienne Egger, 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). Macroeconomic projections benefited from the input by Oxford Economics. The sugar and cotton sections were contributed by Mamoun Amrouk and Fabio Palmeri, with data and technical advice by Lorena Ruiz from the International Cotton Advisory Committee(ICAC). The section on bananas and major tropical fruits was prepared by Sabine Altendorf, Giuseppe Bonavita and Pascal Liu. Carola Fabi, Salar Tayyib and Francesco Tubiello advised on FAOSTAT data. Commodity expertise was provided by Erin Collier, Shirley Mustafa, G.A. Upali Wickramasinghe, and Di Yang. Marion Delport and Jodie Hattingh from the Bureau for Food and Agricultural Policy (BFAP) 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 Mathewson, Kimberly Sullivan, and Ettore Vecchione for their invaluable assistance with publication and communication issues.

Tracy Davids from BFAP led the drafting of the Regional Briefs. They were produced with generous support from the FAO Regional offices and national collaborators. Special thanks go to Mohammed Ahmed (RNE), Nicolas Coppellotti (RLC), Aziz Elbehri (RAP), Cheng Fang (REU), Stephan Gagne (AAFC/AAC), Daniela Godoy (RLC), Suffyan Koroma (RAF), Mario Lubetkin (RLC), Ameir Mbonde (RAF), Ahmad Mukhtar (RNE), Tamara Nanitashvili (RNE), Maya Takadi (RLC) and Pieter VanLierop (RLC)).

Finally, information and feedback provided by the International Cotton Advisory Committee, International Dairy Federation, International Fertilizer Association, International Grains Council, International Sugar Organization, Marine Ingredients Organisation (IFFO) and World Association of Beet and Cane Growers is gratefully acknowledged.

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 2023-2032* is available in the OECD's iLibrary and FAO Document Repository.

Table of contents

Tables

Figures

Boxes

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%)
BFAP	Bureau for Food and Agricultural Policy
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
COMTRADE	Commodity Trade Statistics Database
COP21	21st Conference of the Parties to the 1992 United Nations Framework Convention on Climate Change
CPI	Consumer Price Index
CPO	Crude Palm Oil
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
CV	Coefficient of variation
c.w.e.	Carcass weight equivalent
DDGs	Dried Distiller's Grains
dw	Dry weight
dwt	Dressed carcass weight
E10	Fuel mixture composed of 10% ethanol and 90% gasoline
E15	Fuel mixture composed of 15% ethanol and 85% gasoline
E20	Fuel mixture composed of 20% ethanol and 80% gasoline
EBA	Everything-But-Arms Initiative (European Union)
EBP	Ethanol Blended Petrol
EJ	Exajoule
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
ESCWA	United Nations Economic and Social Commission for Western Asia
est	Estimate
EU	European Union (excludes the United Kingdom)
EVs	Electric Vehicles
FAO	Food and Agriculture Organization of the United Nations
FBS	Food Balance Sheet
FDI	Foreign Direct Investment
FFV	Flex-Fuel Vehicles
FLW	Food loss and waste

FMD	Foot and Mouth Disease
FOB	Free on board (export price)
FTA	Free Trade Agreement
g	grams
GDP	Gross Domestic Product
GE	Genetically Engineered
GHG	Greenhouse gas
GIEWS	Global Information and Early Warning System on Food and Agriculture
GMO	Genetically modified organism
GSSE	General Services Support Estimate
GtCO2-eq	Giga tons of CO_2 equivalents
ha	Hectares
HFCS	High Fructose Corn Syrup
HIS	High Intensive Sweeteners
HPAI	Highly Pathogenic Avian Influenza
HQCF	High Quality Cassava Flour
HVO	Hydrotreated Vegetable Oil
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
IRA	Inflation Reduction Act
ISO	International Sugar Organization
IUU	Illegal, unreported and unregulated (fishing)
kcal	Thousand calories
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
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
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
SEA	Southeast Asia
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
UNEP	United Nations Environment Programme
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
WOAH	World Organization for Animal Health (previously OIE)
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 groupings 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 2023-2032* provides an assessment of the ten-year prospects for agricultural commodity and fish markets at national, regional, and global levels in a context of continued economic risks, uncertainty, and high energy prices. The report is a collaborative effort between the OECD and FAO, prepared with inputs from Member countries and international commodity organisations.

The surge in agricultural input prices experienced over the last two years has raised concerns about global food security. This year's *Outlook* demonstrates that rising fertiliser costs can lead to higher food prices. The OECD-FAO Aglink-Cosimo modelling of production yields allows at present to separate the costs of the main mineral fertilisers used from those of other production inputs. Based on this new feature, a scenario analysis estimates that for each 1% increase in fertiliser prices, agricultural commodity prices would increase by 0.2%. The increase would be more significant for crops that use fertilisers as direct inputs than for livestock products that use them indirectly, with the exception of poultry and pigmeat production which relies heavily on compound feed. Although this scenario focuses on the link between fertilisers and agricultural commodities, fluctuations in energy, seeds, labour and machinery prices would also affect food prices.

This year's *Outlook* provides improved estimates for food consumption by incorporating analytical methods to calculate food loss and waste. They contribute to the measurement efforts needed to devise evidence-based policies in support of the SDG 12.3 target to halve per capita food waste at the retail and consumer levels, and to reduce food losses within production and supply chains by 2030.

Baseline projections in this *Outlook* for the coming decade take into account the IMF *World Economic Outlook* October 2022 downgrade in expected average economic growth for the coming decade, from 2.7% to 2.6%, as well as the decrease in the People's Republic of China's (hereafter "China") population as of 2022. Similar to last year's assumptions, the current baseline projections assume that energy prices will decrease in 2023 before resuming a slow increase to 2032. The projections incorporate short-term assessments of the impact of the [Russian Federation's (hereafter "Russia") war against Ukraine (hereinafter referred to as "war"), but no evaluation of medium-term developments in the region can be provided at this time. Against this backdrop, the global projections of medium-term trends for supply, demand, trade, and prices for the main agricultural commodities and fish deviate only marginally from last year's projections.

Nevertheless, the war continues to add uncertainties to food, energy, and input prices. At the onset of the war, reduced availability of grains and fertilisers were a major concern for global markets. A year later, supply issues have improved thanks to the enforcement and subsequent extensions of the Black Sea Grain Initiative.

In this context, global food consumption in calories – the main use of agricultural commodities – is projected to increase by 1.3% per year over the next decade, a slower pace than the previous decade due to the foreseen slowdown in population and per capita income growth. The second most important use of agricultural commodities is as feed for livestock and increasingly aquaculture. The *Outlook* highlights the rapid expansion and intensification that is expected in the production of livestock in low- and middle-income countries, resulting in a fast-growing demand for feed over the next decade. In contrast, in high-income countries and some upper middle-income countries, including China, lower growth in livestock production and improved feeding efficiency should result in slower growth in feed demand compared to the last decade.

Demand for first generation biofuel feedstocks is expected to grow slowly over the next ten years. Most additional biofuel use of agricultural crops is expected to occur in India and Indonesia, driven by increasing transport fuel use and higher biofuel blending requirements. In other key markets, e.g. European Union, the demand for first generation biofuel feedstocks is expected to decrease due to a decline in transport fuel use and a shift to other feedstocks. Overall, the biofuel share of global sugarcane and vegetable oil use is projected to increase, while the biofuel share of maize is expected to decline.

The situation with respect to investments in technology, infrastructure, and training remains fundamentally unchanged from last year's projections; as such, growth in total global agricultural production should remain at 1.1% per year. Most of this growth will occur in middle- and low-income countries. The *Outlook* assumes wider access to inputs, although if increases in energy and agricultural input prices (e.g. fertilisers) are to resume, this would raise production costs that could lead to food price inflation and greater food insecurity.

Global crop production growth will mainly be driven by increased productivity rather than increased land use. Therefore, investments in raising yields and improved farm management are essential. Assuming continued progress in plant breeding and a transition to more intensive production systems, yield improvements are projected to account for 79% of global crop production growth, cropland expansion for 15%, and higher cropping intensity for 6% over the *Outlook* period. Yields for crops such as oil palm and rapeseed have not increased, however, in major producing countries over the last ten years; more investments are needed to improve the productivity of these crops.

Similar to trends in crop production, a large share of the projected 1.3% annual growth in livestock and fish production will result from improvements in per animal productivity resulting from more efficient herd management and higher feed intensity. Poultry is projected to account for about half of the global growth in meat production due to sustained profitability and favourable meat-to-feed price ratios. Pigmeat production is still recovering from the outbreak of African Swine Fever (ASF) in East Asia and is projected to resume a pre-crisis growth path in a few years. Global milk production is projected to grow strongly in the coming decade, with half of this growth occurring in India and Pakistan. Despite its limited growth prospects, aquaculture overtook the global production volume of capture fisheries in 2022.

The *Outlook* highlights the significance of global agricultural greenhouse gas (GHG) emissions, which are projected to increase by 7.6% in the next decade. At the global level, growth in GHG emissions will be lower than in the previous decade, and lower than the projected 12.8% growth in agricultural output, indicating a faster decline in the carbon intensity of agricultural production. Nevertheless, pioneering efforts need to be widely adopted to ensure that agriculture contributes effectively to climate change mitigation, as set out in the Paris Agreement, especially for livestock which is estimated to account for 80% of the increase in agricultural GHG emissions. At the same time, agricultural production systems face the challenge to adapt to a changing climate, including more frequent and intense extreme weather events. Mitigation and adaption solutions include large-scale and inclusive adoption of climate-smart and carbon-neutral production processes and technologies.

Trade in primary agricultural commodities and processed products is projected to grow in line with production over the next decade. The COVID-19 pandemic led to worldwide disruptions in commerce, but trade in the agricultural commodities has proven to be resilient. Russia's war against Ukraine has been impacting agricultural commodity trade, especially Ukrainian exports, and prices. The Black Sea Grain Initiative, agreed to in July 2022, and the European Union–Ukraine Solidarity Lanes have helped, however, to re-establish trade to support global food security. The baseline projections underscore the critical importance of a well-functioning, transparent, and rules-based multilateral trading system. Export bans only aggravate the adverse effect of price uncertainties and increase prices. This results not only in a negative impact on global food security (and livelihoods) in the short term, but undermines supply capacity over the long term.

The medium-term projections in the *Outlook* are based on the assumption that current policies will remain in place, and that consumer preferences and production technology will evolve on-trend. These assumptions are subject to uncertainties with respect to environmental, social, geopolitical and economic developments, e.g. a prolonged period of high inflation or a global recession would alter the projections. The scenario analysis presented in this report provides indications as to the magnitude of such impacts.

1 Agricultural and food markets: Trends and prospects

This chapter presents the trends and prospects of the *OECD-FAO Agricultural Outlook 2023-2032* derived from the medium-term projections of the most globally produced, consumed and traded agricultural and fish commodities. Following a description of the macroeconomic and policy assumptions underlying the projections, it highlights the key findings for the consumption, production, trade, and prices of those commodities for the period 2023 to 2032. Agricultural demand is projected to grow more slowly over the coming decade due to the foreseen slowdown in population and per capita income growth. Production of agricultural commodities is also projected to grow at a slower pace. The reduced growth incentives are not only driven by a weakening global demand for agricultural products but by decelerating productivity growth resulting from increased input prices, notably fertilisers, and tightening of environmental regulations. The expected developments in global demand and supply will keep real agricultural prices on a slightly declining trend over the next decade. International trade will remain essential for food security in food-importing countries and for the livelihoods of workers along the food supply chains in food-exporting countries. There is a growing risk that weather variability, animal and plant diseases, changing input prices, macro-economic developments, and other policy uncertainties will lead to deviations in market outcomes from the current projections.

The *OECD-FAO Agricultural Outlook* 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). It presents a consistent baseline scenario for the evolution of agricultural commodity and fish markets at national, regional, and global levels for the period 2023 to 2032. 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 1.1.

The projections are based on a short-term assessment of the Russian Federation's (hereafter "Russia") war against Ukraine, no evaluation of medium-term market prospects in the region can be provided at this time.

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 parts:

- *Part 1*: *Agricultural and food markets: Trends and prospects.* Following the description of the macroeconomic and policy assumptions underlying the projections (Section 1.1), 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 1.2), production (Section 1.3), trade (Section 1.4), and prices (Section 1.5).
- *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 2.1) and South and Southeast Asia (Section 2.2), Sub-Saharan Africa (Section 2.3), Near East and North Africa (Section 2.4), Europe and Central Asia (Section 2.5), North America (Section 2.6), and Latin America and the Caribbean (Section 2.7). 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 (Chapter8), 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 (2032) relative to a three-year base period (2020-22). The statistical annex is not part of the printed version of the *Outlook* but can be accessed online.

Figure 1.1. Market conditions for key commodities

Current market conditions

Cereal: Global wheat production and stocks have increased, while production of maize and other coarse grains has not been sufficient to meet demand. Rice production was above-average level, while prices remain relatively high. Wheat and coarse grain prices in 2021/2022 were the highest recorded in the past 20 years, but began to fall in late July 2022 as an agreement was reached on the Black Sea Grain Initiative.

Oilseed: International prices for oilseeds have dropped from the record highs observed in 2022 but remain above average levels of recent years. The price declines were chiefly underpinned by global output recoveries of soybean and rapeseed, despite sunflower seed production losses in Ukraine and reduced prospects for soybeans in Argentina. Global vegetable oil markets saw a steep decline in prices, mainly fueled by improving exportable supplies of palm oil from Indonesia and Malaysia.

Sugar: Global demand to increase in the current season, although at a slower pace due to slowing economic growth. Despite the recovery in Brazil, the main world sugar supplier, declining production prospects in other key exporters along with high input costs is likely to partly offset the overall downward pressure on international sugar prices.

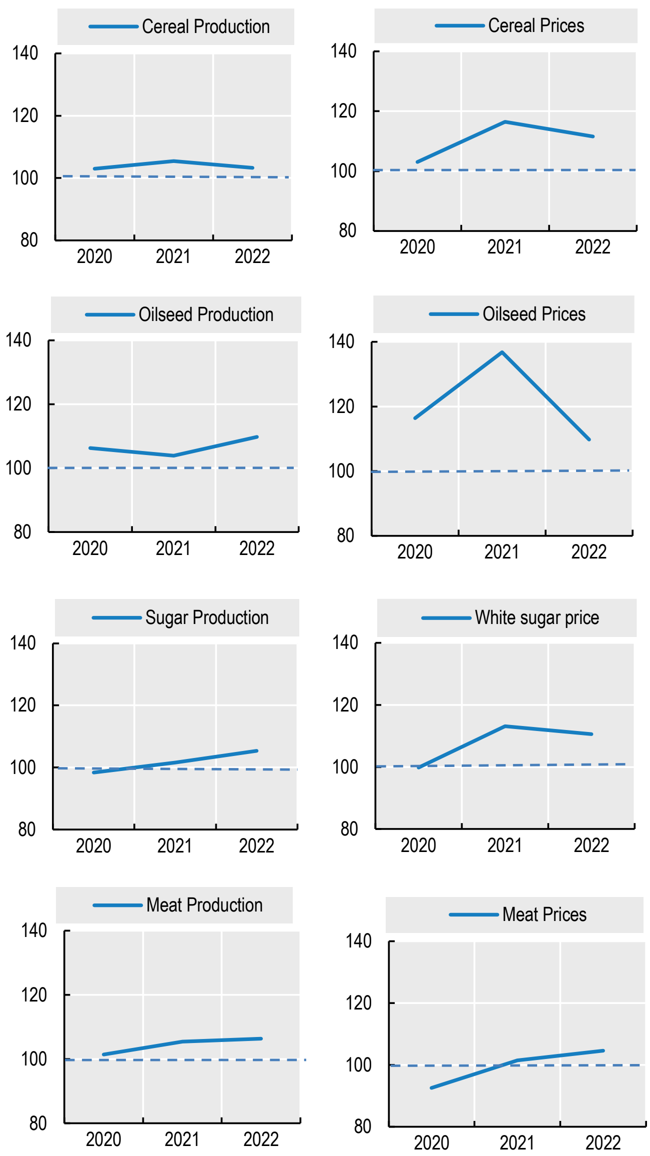
Meat: In 2022, international meat prices remained high, except for sheep meat, which saw a slight decline due to weakened import demand from China. However, various factors such as animal diseases, increasing input costs, and extreme weather conditions acted as obstacles to meat production growth. Despite these challenges, there was an overall expansion in meat production, mainly driven by increased output in Asia, notably a surge in pig meat production in China.

Production index

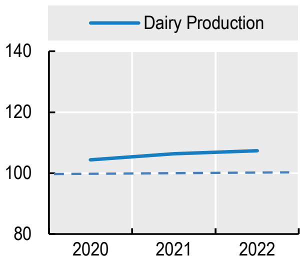
Average 2013-2022 = 100

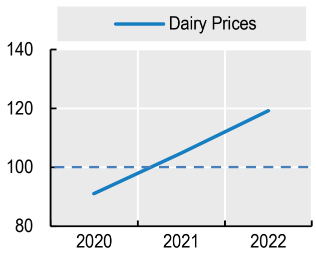
Real Price Index

Average 2013-2022 = 100

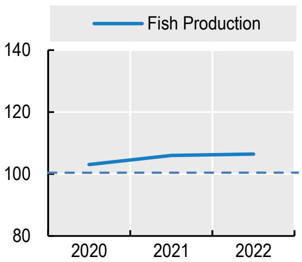


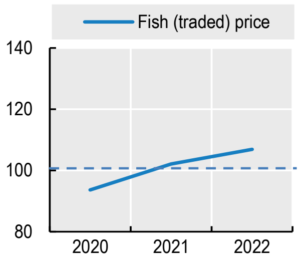
Dairy: International dairy prices increased by 20% in 2022 but started to decline towards the end of 2022. Increasing input cost were one of the main drivers of price increase. Domestic prices often show a slightly different development as only a small share of milk is internationally traded. Milk production increased globally slower in 2022 than in previous years. World trade in dairy products declined, mainly due to lower imports by China.



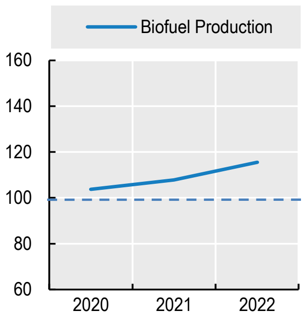


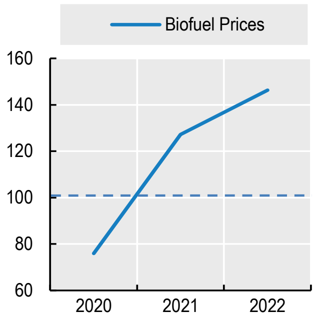
Fish: Fish: After a strong recovery in 2021, world fish consumption continued to expand in 2022 driven by the global economic recovery, while fish production rose only marginally. International fish prices, which had risen significantly in 2021, continued doing so in 2022 driven by increased demand and higher production costs, reaching levels just under the record highs of the early 1990s.



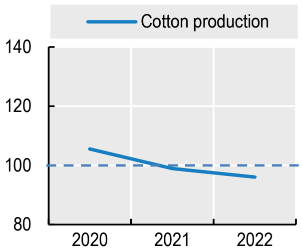


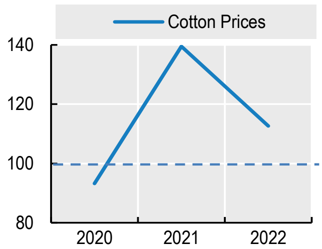
Biofuels: In 2022, biofuels consumption increased, offsetting for the decrease that was caused by the drop of global transport fuel use during the COVID-19 pandemic. The ethanol market nearly came back to levels witnessed in 2019. The biodiesel market recovered as well, but was less affected by the pandemic. Biofuels world prices increased owing to higher production costs of production.





Cotton: In 2022, global consumption decreased in most of the major textile-producing countries as a consequence of economic uncertainty, inflation and high depreciation against US dollar. As a result, international prices dropped in the second half of 2022, after reaching an eleven-year high in May 2022. World cotton production slightly decreased mainly reflecting reduced outputs in the United States and Pakistan.





Note: All graphs expressed as an index where the average of the past decade (2013-2022) is set to 100. Production refers to global production volumes. Price indices are weighted by the average global production value of the past decade as measured at real international prices. More information on market conditions and evolutions by commodity can be found in the commodity snapshot in the Annex and the online commodity chapters.

Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/231495

1.1. Macroeconomic and policy assumptions

1.1.1. The main assumptions underlying the baseline projections

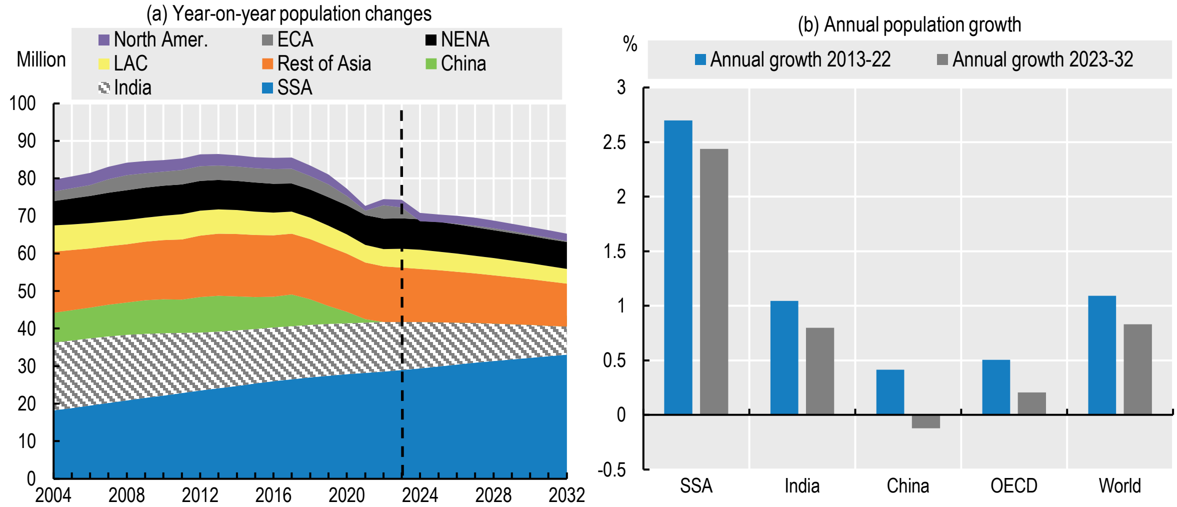
This *Outlook* presents a consistent baseline scenario for the medium-term evolution of agricultural and fish commodity markets, based on a set of macro-economic, policy and demographic assumptions. The main assumptions underlying the projections are highlighted in this section. Detailed data are available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

1.1.2. Population growth

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

Over the projection period, world population is expected to grow from 7.9 billion in 2022 to 8.6 billion people in 2032. This corresponds to an average annual growth rate of 0.8%, a slowdown compared to the 1.1% p.a. rate experienced over the last decade. Population growth is concentrated in low-income countries, particularly Sub-Saharan Africa which is expected to have the fastest growth at 2.4% p.a. over the coming decade. The population of the People's Republic of China (hereafter "China") declined for the first time in 2022 (according to the 2022 Revision of the United Nations *Population Prospects)*and is expected to decline further over the projection period to 1.41 billion inhabitants in 2032. With a population of 1.52 billion people in 2032, India is expected to overtake China in 2024 as the most populous country of the world. The populations of several European countries, Japan, and Korea are expected to decline during the projection period.

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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/hub0or

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* (October 2022). Per capita incomes are expressed in constant 2010 United States dollars.

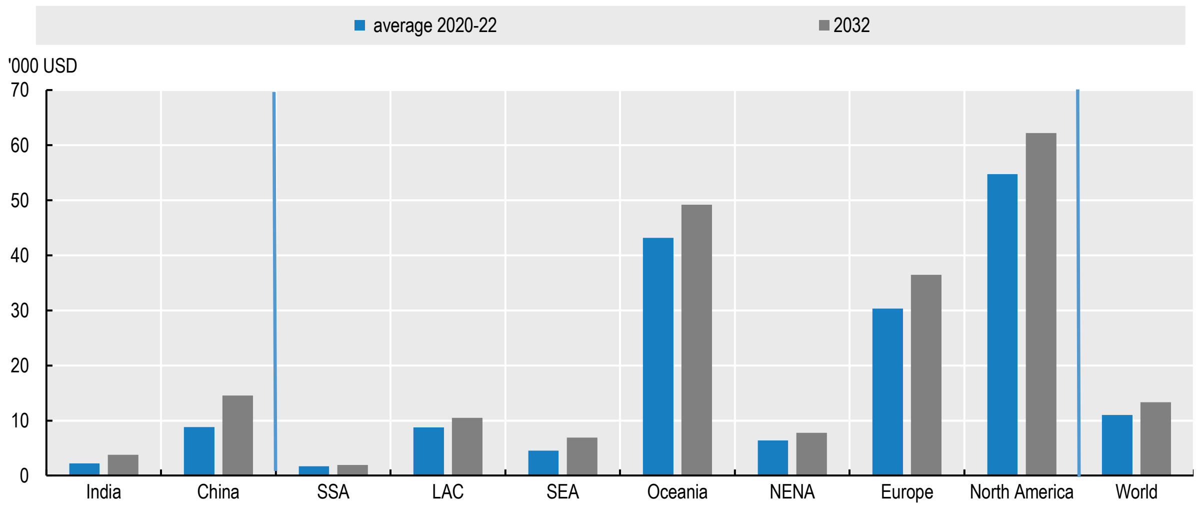
Following a decline from 5.8% in 2021 to 3% in 2022, global GDP growth is expected to continue to slow down in 2023 and to stabilise at an average rate of 2.6% over the next decade. Over the period 2023-32, GDP will continue to grow the strongest in the Asia Pacific region, in particular in India, China and Southeast Asia. In Sub-Saharan Africa, and the Near East and North Africa, average GDP growth is projected to be higher than the global average, whereas that of Latin America and Caribbean and OECD countries is projected to be lower.

National average per-capita income is approximated in this *Outlook* using per capita real GDP. 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* 2022 report, national economic growth is unevenly distributed. This is particularly the case with Sub-Saharan countries, where 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; the percentage income losses of the poorest are estimated to be double those of the richest, thereby delaying access to high-value food products for the poorest populations whose primary source of calories is derived from staples.

After a recovery in 2021, global per capita income growth was 2% p.a. in 2022 and is expected to weaken in 2023 to 1% p.a. Over the next decade, an average annual growth rate of 1.7% p.a. in real terms is projected. Strong per capita income growth is expected in Asia, especially in Viet Nam (5.6% p.a.), India (5% p.a.), China (4.7% p.a.), the Philippines (4.5% p.a.), Indonesia (4% p.a.), and Thailand (3% p.a.). In Sub-Saharan Africa, average per capita incomes are projected to grow slowly at 1.1% p.a. over the coming decade. Strong population growth limits the real per capita income increase in Sub-Saharan Africa. Ethiopia is expected to experience robust growth at 4% p.a. due to a very low base and increasing economic stability. In Latin America and the Caribbean, average per capita income growth is projected at 1.6% p.a., with smaller regional variations. In the Near East and North Africa region, average per capita income growth is projected at 1.7% p.a., led by the Near East region and Egypt. In OECD countries, per capita income is projected to increase on average at around 1.4% p.a.

Figure 1.3 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 (3.6% p.a.) corresponds to only a modest growth in per capita terms (at around 1.1% p.a.). The same applies to a lesser extent to the Near East and North Africa region. The modest economic growth in Europe at 1.5% p.a., where the population is expected to decrease over the next ten years, translates into a per capita income growth rate of 1.7% p.a. over the coming decade.

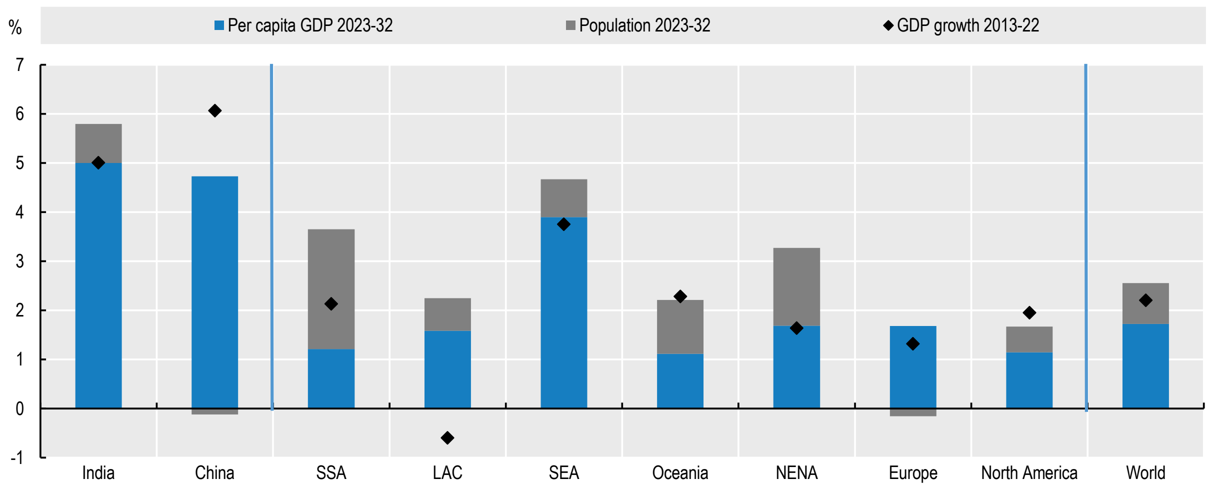
Figure 1.3. Per capita income



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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/2mi0kx

Figure 1.4. 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/su8c9o

1.1.4. Exchange rates and inflation

Exchange rate assumptions are based on the *IMF World Economic Outlook* (October 2022). Some currencies are expected to appreciate in real terms compared to the United States dollar; this is the case for Brazil, Mexico, Chile, Argentina, and Paraguay, for which exports should be relatively less competitive on the international markets over the next decade. A very strong real appreciation is also expected in Nigeria, Ethiopia, and Ukraine, whereas a real depreciation is expected for South Africa, Japan, Korea, Norway, Australia, China, and the European Union.

Inflation projections are based on the private consumption expenditure (PCE) deflator from the *IMF World Economic Outlook* (October 2022). Despite high inflation rates in all countries in 2022, projected rates are expected to slow down in 2023 and over the next ten years through tighter monetary policies. In OECD countries, following an inflation rate of 13% in 2022, this is projected to ease at 4.4% p.a. over the coming decade, with an annual inflation rate of 2% 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 10.3% p.a. in Türkiye and 9.1% p.a. in Argentina, despite a strong decrease compared to the previous decade. Inflation should ease in India, from 4.8% p.a. to 3.8% p.a. and in Brazil, from 5.9% p.a. to 3.1% 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 (12.6% p.a.), Nigeria (9.5% p.a.) and Ghana (6.9% p.a.). High inflation is also expected in Egypt (6.5% 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 seeds and energy, as well as various other tradable and non-tradable inputs. It is based on historical cost shares for each country and commodity, and 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. Costs of tradable inputs such as machinery and chemicals are approximated by the evolution of the real exchange rate, while the costs of non-tradable inputs (mainly labour) are approximated by the progress of the GDP deflator. Seed prices follow respective crop prices. Fertiliser costs, which are not included in the composite cost index, are explicit in yield and land allocation equations. Three fertiliser types are distinguished: nitrate, phosphate, and potassium. The quantities applied to single crops are decision variables, while prices are linked to crop and crude oil prices.

Historical data for world oil prices are based on Brent crude oil prices in 2021, taken from the short-term update of the *OECD Economic Outlook* N°112 (December 2022). For 2022, the annual average daily spot price in 2022 was used, while the December average daily spot price is used for 2023. For the remainder of the projection period, the reference oil price used in the projections is assumed to remain constant in real terms. After a decrease from USD 98/barrel in 2022 to USD 82/barrel in 2023 (USD 77/barrel and USD 63/barrel respectively in real terms), the oil price is assumed to increase to USD 98/barrel in nominal terms and USD 63/barrel in real terms in 2032.

1.1.6. Policy

Policies play a significant role in agricultural, biofuel, and fisheries markets, and policy reforms may therefore trigger changes in market structures. The *Outlook* assumes 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* take into account the reform of the European Union (EU) Common Agricultural Policy (CAP) – which came into force at the beginning of 2023 – as EU Member States have submitted their CAP strategic plans to the Commission. However, several policy initiatives, notably under the European Green Deal and in particular the targets of the Farm to Fork and Biodiversity strategies and for which legislation is in preparation, are not reflected in the baseline because their objectives have not yet been quantified in detail. Therefore, in the case of the EU, only free trade agreements that had been ratified up to the end of September 2022 are considered, while others (e.g. EU-Mercosur) are pending.

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.

The free trade agreements considered in the *Outlook* for regions other than the European Union are those ratified by the end of December 2022 (e.g. Association of Southeast Asian Nations, United States-Mexico-Canada Agreement (USMCA), African Continental Free Trade Area, Regional Comprehensive Economic Partnership).

The United States Inflation Reduction Act (IRA) of 2022, which includes funds for agriculture-related programs, is not considered in its entirety in the *Outlook* because the implementation of many provisions will not be effective immediately. However, the model considers the fact that the IRA has extended and increased production targets already in place in 2022 for renewable fuel programs and biomass-based diesel tax credits at both the state and federal levels.

1.2. Consumption

The *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),[1] and their by-products[2] as food, animal feed, raw materials for biofuels and other industrial uses. The demand for food and non-food uses of agricultural commodities and their changing components is projected based on an assessment of the main driving factors: population dynamics, disposable incomes, prices, consumer preferences and policies. The baseline thereby covers the final use of minimally processed crops, but also includes first level processing, such as the crush of oilseeds and the subsequent use of the derived products as food, feed and biofuel. Accounting for direct feed use of cereals, as well as the use of processed products such as protein meal, fishmeal, cereal bran, and other by-products in the livestock sector allows the *Outlook* to identify the sector's net contribution to human nutrition and to gauge the potential impact of developments on global food and nutrition security.

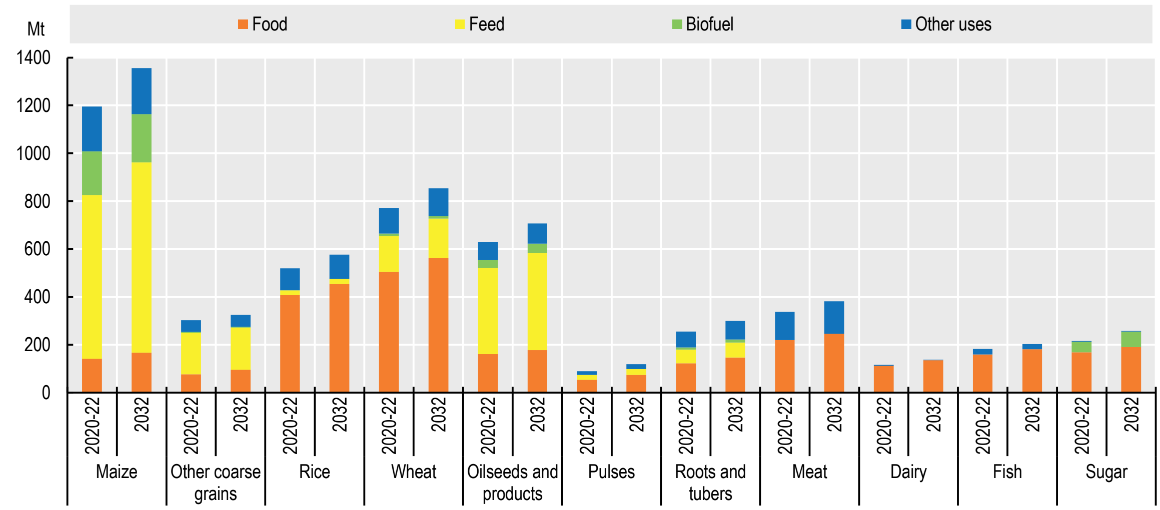
1.2.1. Population and income growth remain key drivers of demand for agricultural commodities

Over the decade to 2032, the evolving energy and nutrition requirements of a growing and increasingly affluent global population are expected to be the key drivers of demand for agricultural commodities. The macroeconomic assumptions underlying the projections suggest a slowdown in global population growth alongside a decline in the population of China. Meanwhile, global economic growth will result in per capita income growth in most parts of the world. Projected rates of inflation are expected to slow down in 2023 and over the next ten years. However, economic developments and their respective impacts will vary by country. Furthermore, while global reference prices are expected to decline slightly in real terms, there is uncertainty how international price signals will transmit to domestic consumer prices and thereby impact demand at the local level. In addition, diverging population dynamics in different countries and regions, income-driven divergences in consumer preferences, and rapid urbanisation in many emerging economies will mean that consumption trends will also vary by country and region. Policy developments and social factors, alongside risks and uncertainties, are similarly likely to affect consumption to differing extents and outcomes at the local level, most importantly as income growth and distribution will continue to remain uneven across and within regions and countries. For example, in low-income countries where the share of food in household expenditures is high, income and food price shocks will have disproportionately larger consequences for consumption than in high-income countries. Preferences shaped by local culture and tradition will continue to lead to differences in demand for agricultural commodities among different regions and income classifications. Health and sustainability concerns are expected to increasingly shape the demand for food in affluent and emerging regions.

Food remains the primary use for basic agricultural crop commodities, currently accounting for 49% of quantities consumed at the global level. However, in recent decades feed and fuel uses have gained in importance. Prominently, growth in the global production of animal products has necessitated a substantially higher allocation of crops to feed, which currently accounts for 26% of total global use. Biofuels and industrial applications, meanwhile, currently consume an estimated 8% of global agricultural crop output.

Amidst a globally rising production of animal products over the *Outlook* period 2023-2032, growth in the non-food use of crops is expected to continue to outpace growth in food use, due to intensifying livestock practices and increasing demand for biofuel. Growth in feed use will be particularly pronounced in maize and oilseeds, the two foremost feed components (Figure 1.5).

Figure 1.5. Global use of major commodities



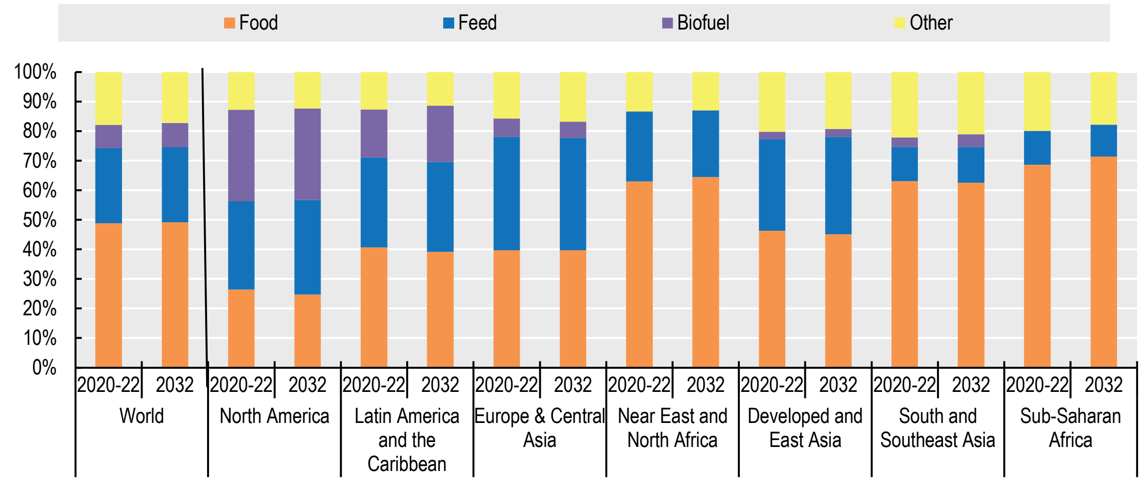
Note: Crushing of oilseeds is not reported as the uses of 'vegetable oil' and 'protein meal' are included in the total; Dairy refers to all dairy products in milk solid equivalent units; Sugar biofuel use refers to sugarcane and sugar beet, converted into sugar equivalent units.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/d8uchn

1.2.2. Geographic differences in using agricultural commodities

The use of agricultural commodities varies substantially by country and region (Figure 1.6). Most strikingly, the share of food use in Sub-Saharan Africa has remained above that of all other world regions, accounting for 69% of total use of agricultural commodities at present. This share is predicted to rise to 71% by the end of the *Outlook* period, as population growth is expected to have a larger effect on agricultural commodity demand than income growth, resulting in a larger expansion in the consumption of staple foods than of animal products across the region. At the other end of the spectrum is the distribution of agricultural commodities in North America, where food accounts for only 26% of total use, less than the share of feed or biofuels. The size as well as the feed-intensive production technology of the region's livestock sector require a high use of agricultural commodities as feed. Increases in the feed use of agricultural commodities are also expected in Latin America and the Caribbean and the Near East and North Africa regions over the *Outlook* period, in part due to growth in production to satisfy the income-driven growth in the domestic consumption of animal products, but more importantly due to meat export growth.

Figure 1.6. Use of agricultural commodities by type and region



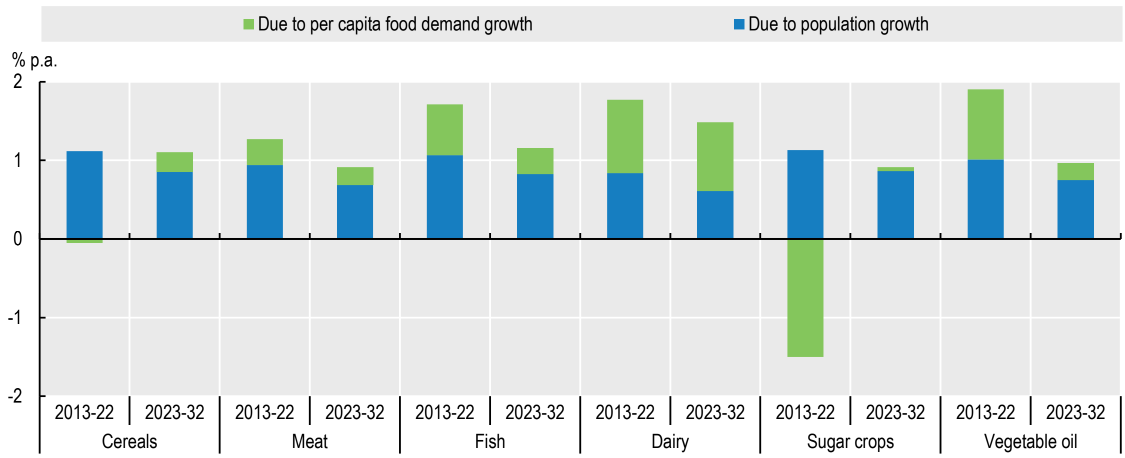
Note: the shares are calculated from the data in calories equivalent.
Source: FAO (2023). FAOSTAT Food Balances Database, http://www.fao.org/faostat/en/#data/FBS; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/tz8l1j

1.2.3. Key drivers of food demand for agricultural commodities

Under the baseline assumptions, population growth will continue to be the main factor shaping food demand at the global level, driven predominantly by the increasing consumption requirements of rising populations in Sub-Saharan Africa, India and the Near East and North Africa region. The projected developments in the global use of staples and fish will primarily be determined by population growth, while consumption growth of higher value products, especially fresh dairy, meat, and sugar will to large extent be fuelled by income-driven growth in per capita consumption (Figure 1.7). However, based on demographic and economic projections, global consumption of agricultural commodities, with the exception of sugar, is expected to expand less rapidly over the *Outlook* period than over the previous decade.

Figure 1.7. Average annual growth in demand for key commodity groups, 2013-22 and 2023-32



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 food demand.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/dup0hr

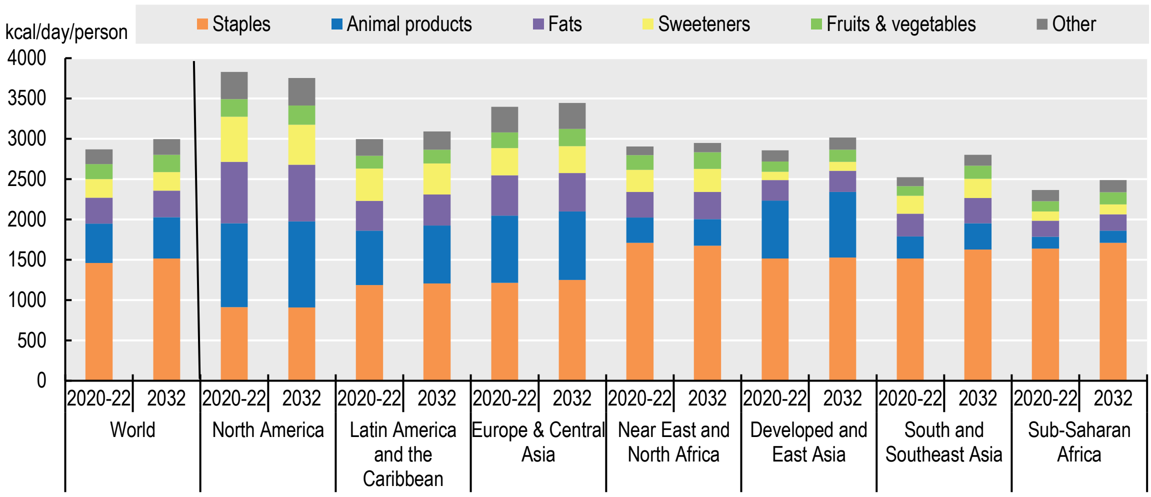
1.2.4. Global outlook for food use of agricultural commodities

Due to the increase of the global population as well as gains in per capita income in all regions, total consumption of the food commodities covered in this *Outlook* is expected to rise by 15%. Overall, Asia will continue to play the most significant role in shaping global demand for food over the outlook period (Figure 1.9). The projected population increase in India as well as significant growth in per capita incomes in both India and China are expected to contribute significantly to growth in the consumption of all food commodities covered in the *Outlook*.

Global consumption of staples, the most significant source of calories, is expected to increase by 4% from the base period and account for just over half of total global food consumption in 2032, as measured in terms of daily per capita calorie availability (Figure 1.8). Since demand for staple foods is predominantly driven by population growth, the largest expansion in the consumption of staples is expected to take place in regions with the highest expected population growth. As such, the global consumption of staples will increase most importantly in Asia (lead by India), Sub-Saharan Africa, and the Near East and North Africa region.

However, globally, the growth of overall cereal demand, the most important staple, is expected to be slower over the next decade than it was in the past decade due to slowing growth in feed demand, biofuels, and other industrial uses. Moreover, in many countries direct human per capita food consumption of most cereals is approaching saturation levels, thus constraining gains in overall demand. Particularly in North America and Western Europe, per capita food use of cereals is expected to be stagnant, or even declining, due to low population growth and consumer preferences moving away from staple commodities.

Figure 1.8. Contribution of food groups to total daily per capita calorie food consumption by region

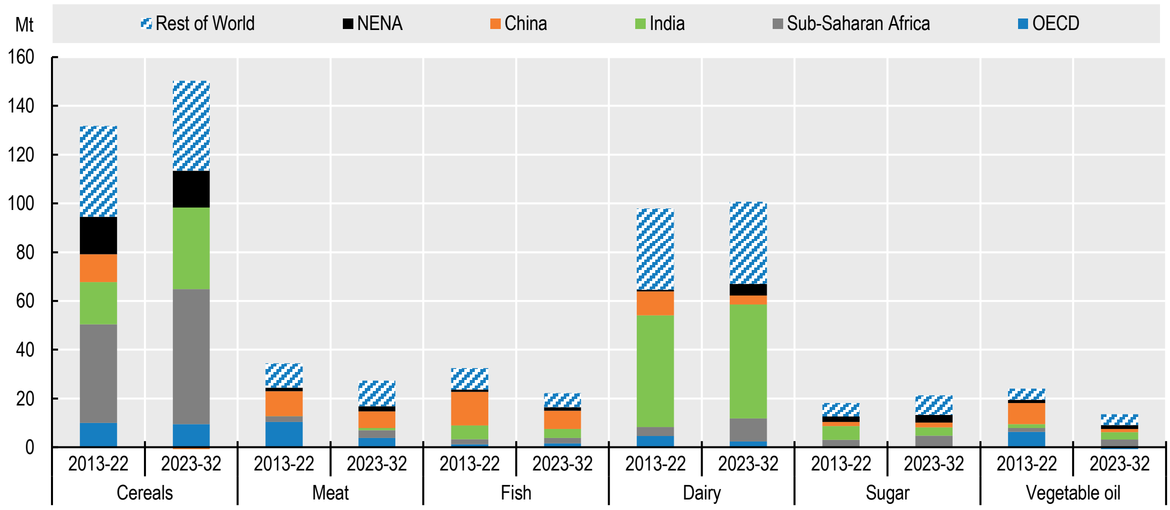


Note: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets database which are extended with the *Outlook* database. Products not covered in the *Outlook* are extended by trends. The 38 individual countries and 11 regional aggregates in the baseline are classified into the 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 include 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 (2023). FAOSTAT Food Balances Database, http://www.fao.org/faostat/en/#data/FBS; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/ekbyt1

Global consumption of higher value food will primarily expand in response to rising incomes in emerging markets in Asia, where approximately half of the increase will come from higher demand for meat and fish in China (Figure 1.19). India will account for most of the consumption growth for fresh dairy products and an important share of additional consumption of vegetable oil and sugar. In North America and Europe, income growth will similarly reduce per capita demand for basic foodstuffs, in particular for cereals, and thus facilitate a shift in consumption towards foods of higher nutritional value, most importantly in items that are dense in micronutrients such as fruits, vegetables, seeds, and nuts.

Figure 1.9. Regional contributions to food demand growth by region, 2013-22 and 2023-32



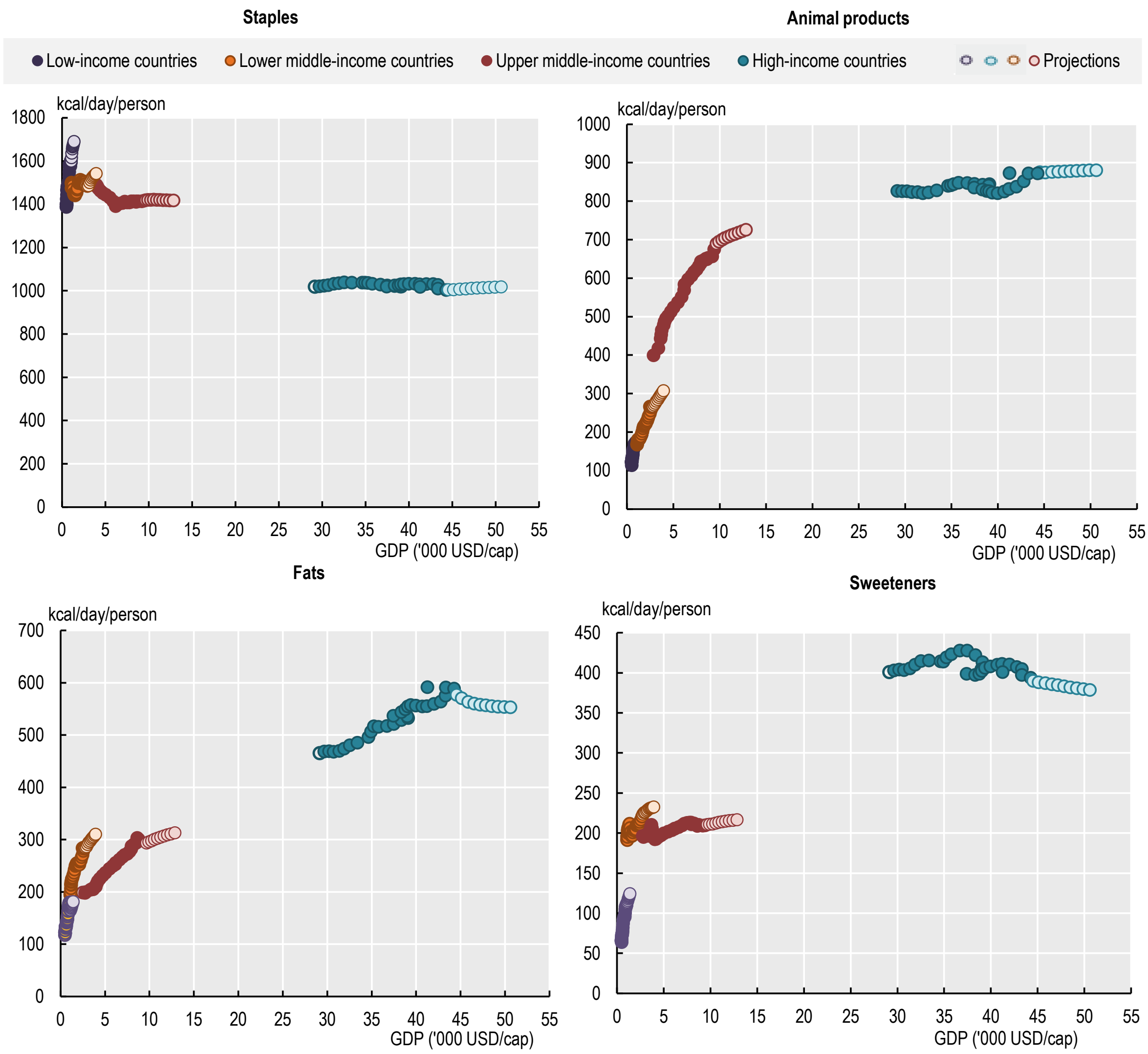
Note: Each column shows the increase in global demand over a ten-year period, split by region, for food uses only. NENA stands for Near East and North Africa, and is defined as in Chapter 2.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

The consumption projections reflect varying developments in per capita incomes and their respective impact on food consumption patterns (Figure 1.10). As income rises, food consumption of the various food groups tends to increase rapidly, leading to a higher consumption of calories overall. At a certain income level, however, growth in food consumption begins to slow down. The level of income at which this takes place as well as the pace of the slowdown vary by food group. For example, the responsiveness of consumer demand to changes in income remains higher for animal products and some other higher priced items than for staple products.

In line with this, in high-income countries, per capita consumption of most food commodities is expected to level off due to saturation. Per capita consumption of sweeteners and fats are projected to decline over the coming decade due to growing health concerns and policy measures that discourage their excessive consumption.

In middle-income countries, the evolution towards the dietary patterns of high-income countries away from staples is expected to continue, with the consumption of animal products projected to increase at fast pace. Low-income countries, meanwhile, will continue to obtain most of their calories from staples. Due to income constraints, low growth in the consumption of animal products and other higher-value foods (e.g. fruits and vegetables) is expected in low-income countries.

Figure 1.10. Evolution of daily per capita calorie consumption, by food groups and income level



Note: Per capita consumption beyond 2032 is extended based on trends. The 38 individual countries and 11 regional aggregates in the baseline are classified into 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

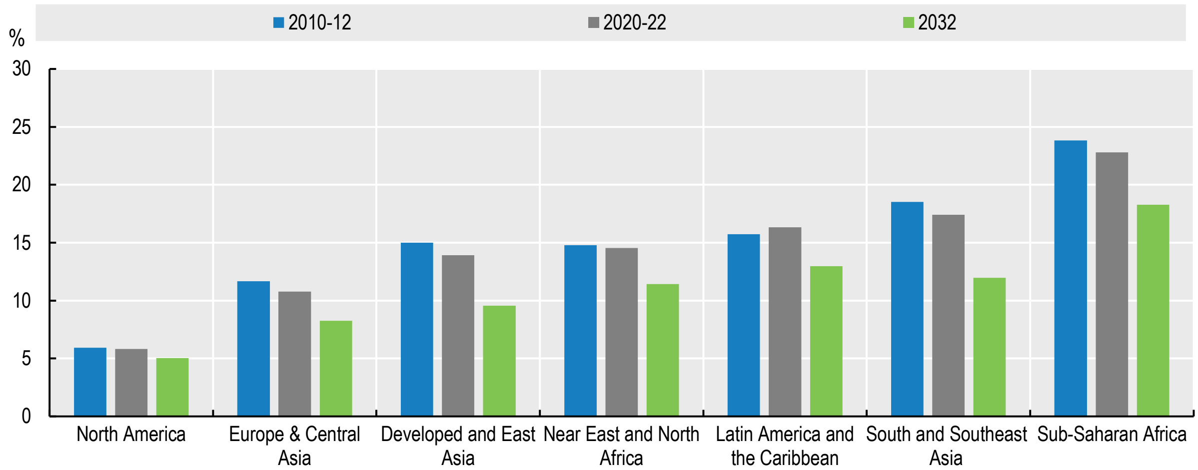
StatLink https://stat.link/k67pfw

1.2.5. Share of income spent on food continues to fall in emerging economies, but remains high in Least Developed Countries

The share of disposable household income spent on food is expected to continue to fall in all regions (Figure 1.11), with the largest declines foreseen in the emerging economies in Asia. Average expenditures on food are projected to fall to 10% of total household expenditures in Developed and East Asia by 2032, from 14% in the base period 2020-2022, and from 17% in the base period to 12% in 2032 in South and Southeast Asia.

In Sub-Saharan Africa, a similar development is expected but the region remains with highest share of food in household expenditure at 18% in 2032 (Figure 1.11). Particularly in the least developed countries of the region, the share of food in household expenditures is set to remain high, reflecting a vulnerability of households to income and food price shocks in the most food insecure countries.

Figure 1.11. Food as a share of household expenditures by region



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/i9tx74

1.2.6. Accounting for loss and waste along the food value chain

Another issue of increasing concern to the efficiency of the global food system are food losses along the value chain including food wasted in households and retail establishments. Across the globe, approximately 14% of the world's food, valued at USD 400 billion is lost on an annual basis between harvest and the retail market. At the same time, an estimated further 17% of food is wasted at the retail and consumer levels. Reducing food loss and waste is a significant lever for broader improvements of food systems' outcomes, including improving food security and sustainability as well as increasing efficiency. Box 1.1 examines the current and projected state of food loss and waste along the value chain at the retail stage and by households.

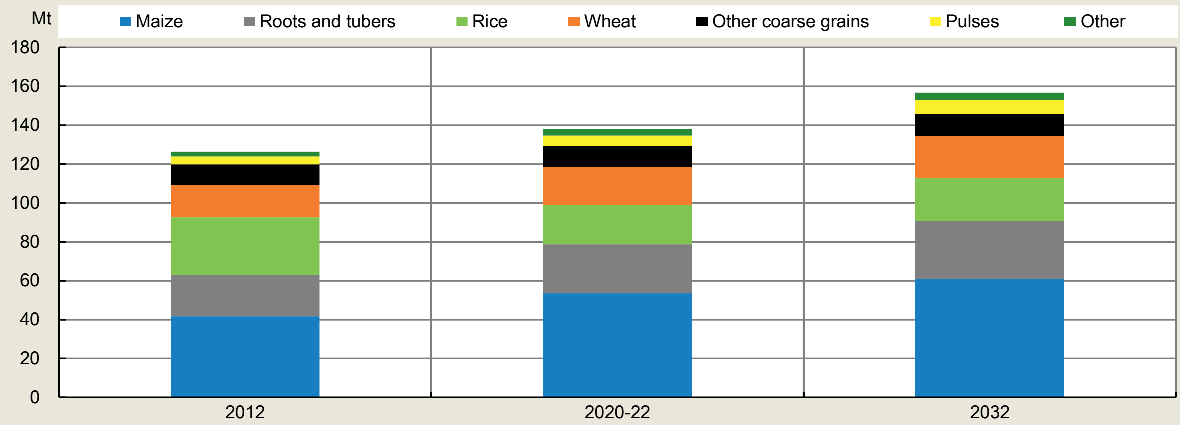
Box 1.1. Food loss and waste: Definitions, global estimates and drivers

Literature provides several definitions of food loss and waste (FLW), which complicates the analysis thereof (FAO, 2019[1]). Food waste and losses include plants and animals produced or harvested for human consumption but not ultimately consumed by people (Lipinski et al., 2013[2]); this excludes materials for non-food purposes such as crops for biofuels (FAO, 2011[3]) (FAO, 2019[1]). Since agricultural produce is classified as food when it is ready to be harvested or slaughtered, yield losses resulting from weather events or diseases are excluded (Beausang, Hall and Toma, 2017[4]). Some studies have defined these terms relative to the stage at which the loss or waste occurs in the food value chain (Figure 1.14). Studies by the FAO (2011[3]); (Kummu et al., 2012[5])and (Parfitt, Barthel and Macnaughton, 2010[6])have highlighted that food is *lost* at the early stages of the value chain, specifically at primary production, post-harvest, and processing, while food is *wasted* at a later stage, in retail and consumption by end-consumers. Food that was intended for human consumption but is diverted to animal feed is excluded from the definition (waste) where the animals remain part of the food value chain (Beausang, Hall and Toma, 2017[4]).

Although the definitions provided by the literature differentiate between food loss and waste, there is not one database that measures food loss or waste separately over time. Moreover, the available data does not explicitly distinguish between food loss and food waste. Food loss or waste data is mostly presented as a percentage loss or in quantity (tonnes). Most literature providing FLW estimates contains data from 2005 onwards, with the most publications only post-2015. According to The State of Food and Agriculture report by the (FAO, 2019[1]) only 39 countries have officially reported FLW data on an annual basis between 1990 and 2017. Case studies may cover losses at specific nodes in the value chain, but these differ from case to case. The UNEP Food Index Report (2021[7]) and the Sustainable Development Goals (SDG) Report (2022) prepared by the FAO are examples of sources that provide global estimates for FLW. According to the UNEP (2021[7]), global food waste amounts to 931 Mt per annum – generated from households (61%), and the distribution (26%) and food service industries (13%). According to the SDG Progress Report (2022), global food loss remained stable from 2016 to 2020, with substantial variations across regions and subregions. The percentage of food lost in 2020 was 13.3%, compared to 13% in 2016 (FAO, 2022[8]).

Figure 1.12 presents losses along the value chain for major crops. Total value chain losses of major crops are estimated at 137.9 Mt in the base period and are estimated to increase up to 157 Mt by 2032.

Figure 1.12. Global staples and other field crop losses along the value chain



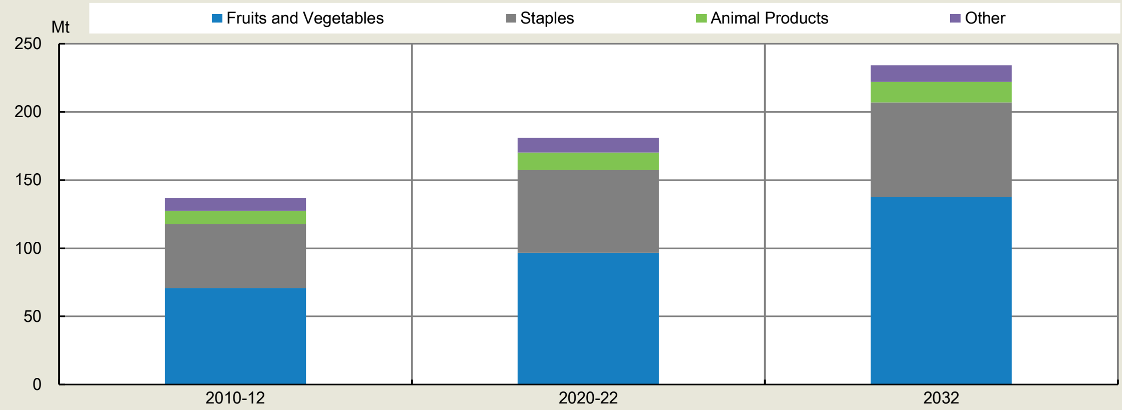
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/a2f3gi

Figure 1.13 illustrates retail waste of major food commodities. Fruits and vegetables contribute more than half of total distribution waste. Rice and wheat as major staples contribute also substantially to total distribution waste (22% during the base period), which is estimated to increase from 180 Mt in the base period to 234 Mt by 2032.

Literature broadly accounts for six main factors that generate food loss and waste. These are: economic factors, e.g. globalisation, urbanisation, industrialisation, increasing incomes and consequently dietary transitions; post-harvest losses and value chain inefficiencies in the form of limited access to infrastructure, technology and markets; marketing specifications, including product quality and retailer standards; natural or environmental factors, e.g. climate change and perishability of products; legislation, e.g. agricultural and food safety policies; and technical inefficiencies, poor management, planning and handling.

Figure 1.13. Global distribution waste

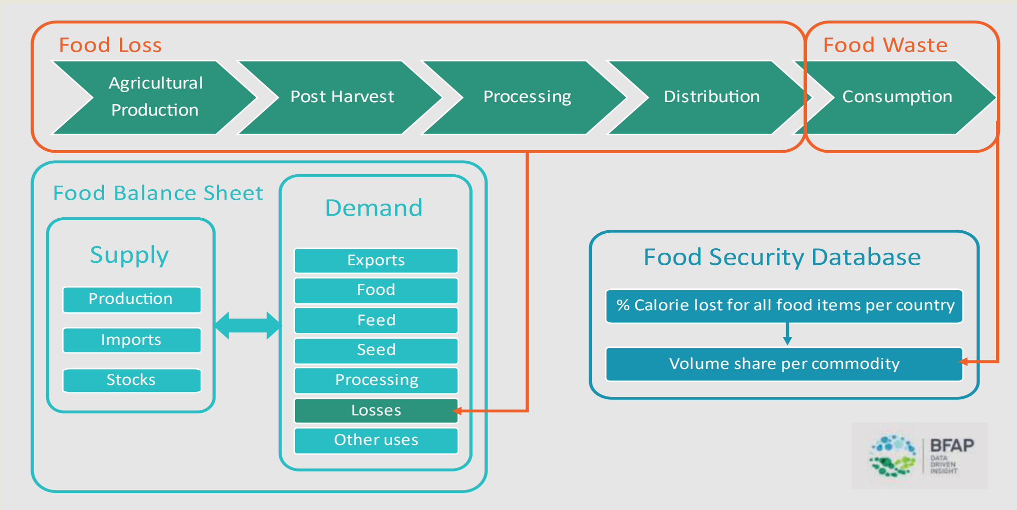


Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/56qgmd

In order to account for food losses and waste, the first step was the compilation of a database trough that combined existing FLW data sources. Figure 1.14 illustrates how the losses quoted in the FAO food balance sheet database (FBS) relate to the definitions of food loss and waste throughout the food value chain as discussed above. The losses set out in the FBS are assumed to cover all food loss up to the retail point of the food value chain.

Figure 1.14. Food loss and waste along the food value chain



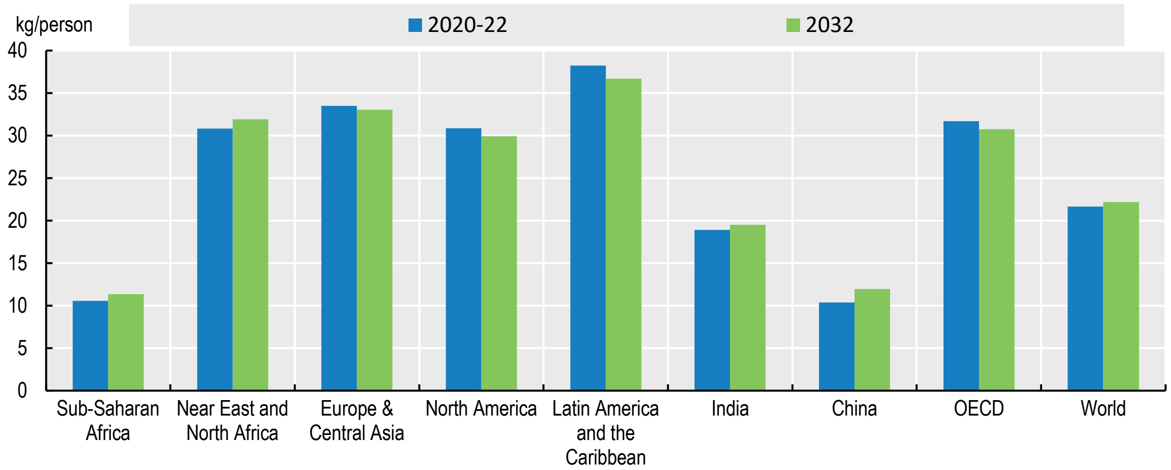
Different approaches were used to estimate the share of food losses and waste at the distribution level. For each food group, we derived an equation relating food loss share to relevant macroeconomic variables (selected to represent drivers of food loss identified in literature) to estimate a share of food loss for each country.

The FAO Food Security database includes a percentage of total calories lost of all food items per country. This was used to estimate the consumption waste share for each commodity using the study by Oelosfe et al. (2021[9]) *to "translate" the total calorie loss share per food item to a food waste volume share per food group*.

1.2.7. Developments in sugar consumption

World sugar consumption is expected to continue to rise primarily in regions with significant population growth, notably Sub-Saharan Africa, Asia and the Near East and North Africa region (Figure 1.15). In high-income countries a decline in per capita consumption is projected, reflecting rising health concerns among consumers and measures implemented by countries to discourage sugar consumption. The pace of growth in consumption is expected to slow down in nearly all regions compared to the previous decade.

Figure 1.15. Evolution in per capita food consumption of sugar, by world region, 2020-22 to 2032



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/dlc59f

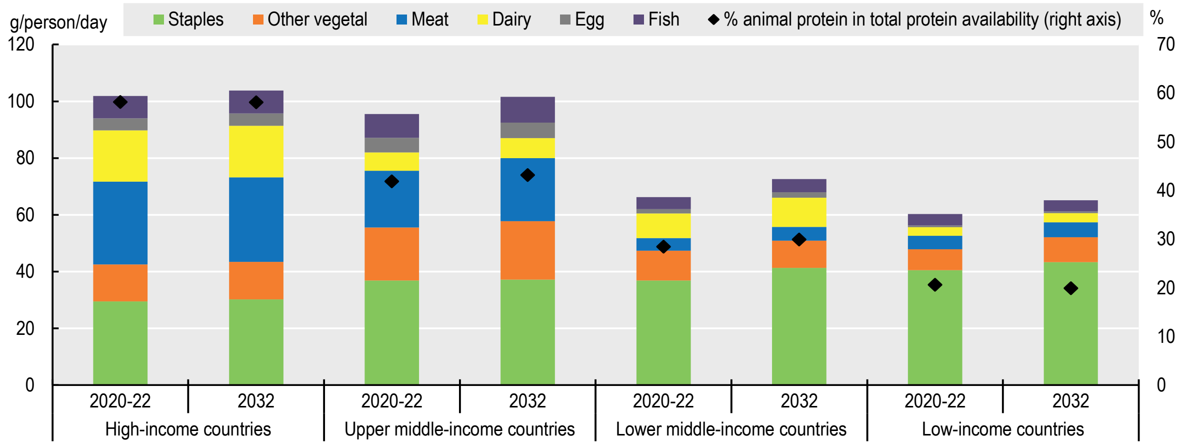
1.2.8. Developments in protein consumption

In response to changing dietary preferences among increasingly affluent and health-conscious consumers in high-income and emerging countries, total per capita availability of protein sources is expected to rise at the global level to 88.4g per day in 2032, from 83.9g per day in the base period. However, regional differences in the composition of protein sources will persist, with Sub-Saharan Africa and the Near East and North Africa region expected to remain heavily dependent on proteins from crop sources, given their substantially lower average household incomes (Figure 1.16). Protein from animal sources will continue to account for the bulk of protein consumption in the high-income regions of North America, Europe, and Central Asia.

About two-thirds of meat is expected to be consumed by one-third of the world's population in 2032, which is only a slight improvement from the base period. The high per capita use in high-income countries is the main reason for this. In some countries such as China, despite per capita consumption being comparatively low, total meat consumption will be substantial given their large population sizes (Figure 1.17).

Over the outlook period, animal proteins are expected to make further advances in their contribution to total daily per capita availability due to rising per capita incomes globally. Growth in animal protein consumption will be particularly pronounced in Asia and the Latin America and Caribbean region, where daily per capita meat and fish availability is expected to rise by 11-13% and 6-4%, respectively. Income-driven growth in consumption of meat and fish in China, which is respectively expected to see an 12% and 14% total increase in daily per capita availability by 2032, will be the main contributor. However, regarding the projected increase in meat consumption in China, it is important to note that this will be from a lower base following the recent shock caused by the outbreak of African Swine Fever.

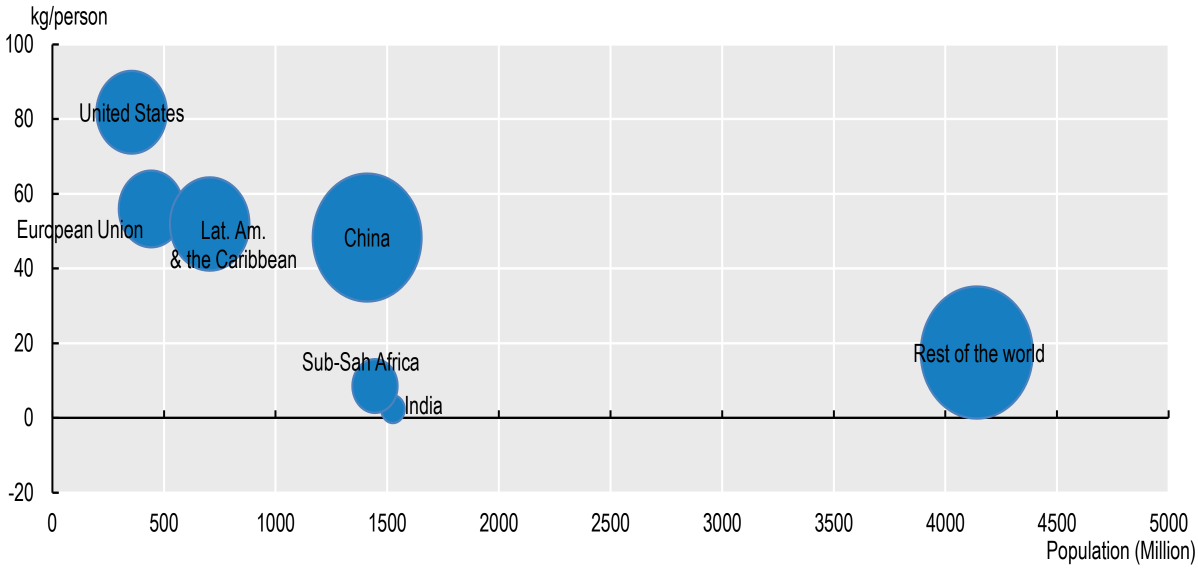
Figure 1.16. Contribution of protein sources to total daily per capita food consumption



Note: Staples include cereals, pulses, and roots and tubers.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/2xhjyn

Figure 1.17. Meat consumption in the largest consuming countries, 2032



Note : The size of the bubbles represents total meat consumption (Mt).
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/z1ixp5

Overall, growth in global average consumption of meat is expected to increase by 2.5% over the outlook period, amounting to an increase of 0.7 kg/per capita/year in boneless retail weight equivalent, to reach 29.5 kg/year by 2032. Consumption growth in middle-income countries, as outlined above, will account for a significant share of this increase. However, against high and rising consumer expenses and weaker income growth, the *Outlook* expects growth in global meat demand to be slower than over the last decade. Expenditures on meat constitute a sizeable share of the food basket in middle- and high-income countries. In view of strong inflationary pressures and reduced purchasing power, consumers are expected to increasingly shift their spending towards cheaper meats and meat cuts, as well as potentially reduce their overall consumption and out-of-home consumption of meat.

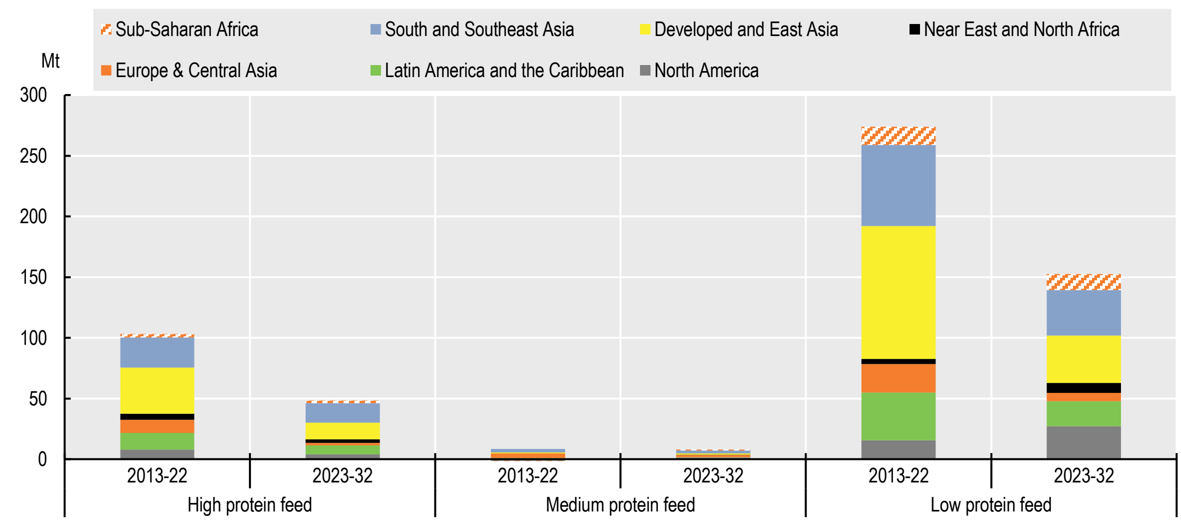
In terms of substitution between meat and aquatic foods, mounting environmental and health concerns are expected to continue to shift consumer preferences away from red and processed meat, notably beef, towards leaner and allegedly more environmentally friendly alternatives, notably poultry and fish. These shifts will be particularly pronounced in Europe and North America. Demand for poultry in Sub-Saharan Africa will be primarily driven by the higher affordability of poultry compared to beef.

1.2.9. Global outlook for feed use of agricultural commodities

Demand for feed is driven by two factors: the number of farm animals and the feed use per animal. Over the projection period, the expanding animal herds and the continuing intensification of the livestock sector will drive an increase in feed demand in most world regions (Figure 1.18). Low- and middle-income countries are expected to account for the bulk of the increase as moderate to strong growth in feed consumption is projected over the coming decade, in line with or exceeding the growth in animal production, as these countries move to more commercialised and feed-intensive production systems. Particularly in Southeast Asia, increasing animal production is projected to raise demand for mostly imported protein meal. By contrast, demand growth in China is expected to slow down considerably, driven by improved feed efficiency combined with efforts to achieve lower protein meal shares in livestock feed rations.

In high-income countries, higher production efficiency resulting in herd reductions, especially in dairy production, means feed consumption of both protein meal and cereals is expected to grow slowly as improvements in animal genetics, feed technology and herd management will continue to generate substantial efficiency gains in livestock and dairy production. Notably 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 (Figure 1.19).

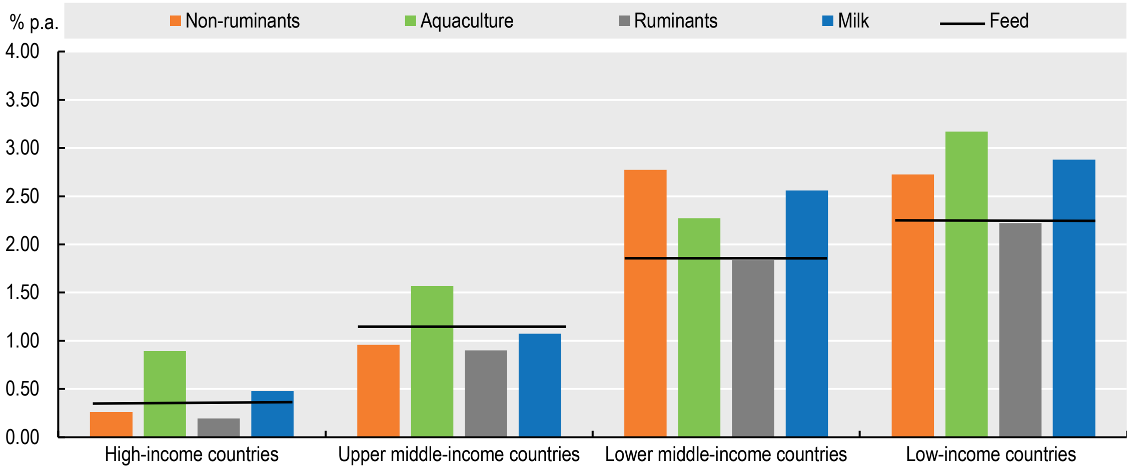
Figure 1.18. Feed demand by component and by region, 2013-22 and 2023-32



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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/jguiv8

Figure 1.19. Annual change in feed use and in livestock production, 2023-2032



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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/x7t6hd

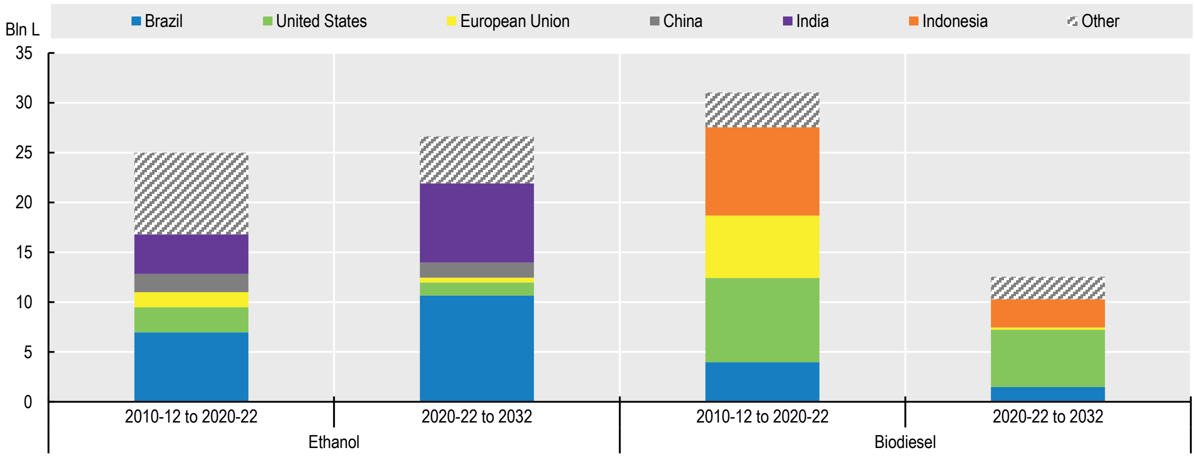
1.2.10. Global outlook for industrial use of agricultural commodities

Biofuels have become the dominant industrial use of agricultural commodities in recent years. Their production uses cereals and sugar crops, but also processed products such as molasses and various vegetable oils. Demand for biofuels is largely determined by transport fuel demand and domestic support policies. Over the next decade, global biofuel use is projected to continue to expand substantially, driven mainly by additional demand for biofuels in middle-income countries, where higher blending rates are being implemented, supported by subsidies for domestic production and blended fuel use (Figure 1.20). A substantial increase in biodiesel production in the United States due to increasing targets and the increased application of state and federal renewable fuel programmes and biomass-based diesel tax credits (under the IRA of 2022) will further generate additional demand. By contrast, in other high-income countries, notably in the European Union, demand growth will be constrained by declining transport fuel demand and reduced policy incentives. In the European Union, the RED II (Renewable Energy Directive) has classified palm oil-based biodiesel in the high ILUC (Indirect Land Use Change) risk category. As a result, the use of palm oil-based biodiesel is expected to decrease, thereby slightly reducing total biodiesel use in the European Union. Nevertheless, the share of biodiesel in total diesel use is expected to grow over the coming decade.

Transport fuel consumption is expected to expand in Brazil, Argentina, Colombia, and Paraguay over the coming years, with ethanol and biodiesel usage projected to increase accordingly. Indonesia's diesel use is set to rise and the blending rate is assumed to stay above 30% (B30). In South and Southeast Asia, biodiesel is expected to become more popular due to the growth in transport fuel demand and for industrial use. In India, sugarcane-based ethanol is projected to contribute significantly towards the goal of achieving an ethanol blend rate of 16% by 2025, whereas the E20 target should be met by 2032.

Agricultural commodities are also used as feedstock for other industrial applications, including in the material (plastic, clothing, paint), bio-chemical, and bio-pharmaceutical industries. “Other” uses, mostly industrial applications of agricultural commodities for commercial production such as grains for industrial starch production, have become increasingly important in recent years and are expected to gain importance in absolute terms.

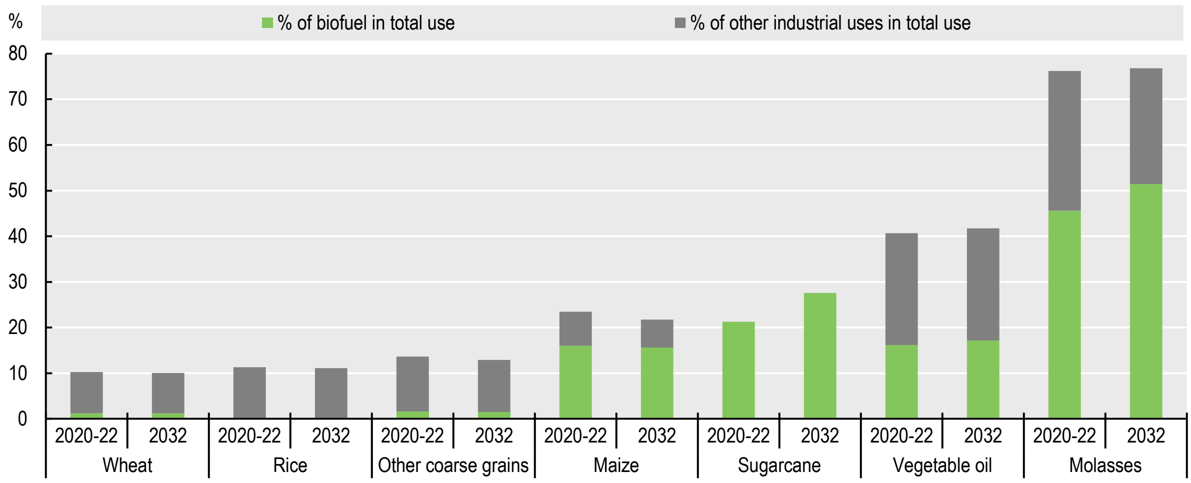
Figure 1.20. Changes in biofuel consumption in key consuming countries



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/z4bqfo

Figure 1.21. Share of biofuel and other industrial uses in total use of agricultural commodities



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/txrfb8

1.2.11. Uncertainties affecting global demand for agricultural commodities

The medium-term projections presented in the *Outlook* assume a fast recovery from inflationary pressures, no change to policies in place, and an on-trend evolution in consumer preferences over the coming decade. These assumptions introduce some uncertainty into the projections of agricultural commodity demand.

Aside from conflict and geopolitical tensions, at present the most severe threat to the consumption of agricultural commodities – and the consumption of food in particular – is posed by the adverse economic repercussions of persistently high inflation rates and a potential global recession. At the time of writing, global reference prices in real terms were expected to decline slightly over the coming decade; however, consumer prices may spike in response to severe economic, political or environmental events, as further described in the prices section. Uncertainty further arises from the fact that many additional factors along the food value chain may contribute to food price inflation, including market power in the processing and retailing sectors. The war in Ukraine has demonstrated its global economic implication and potentially threatens the proper functioning of local and global food systems. Coupled with other uncertainties such as climate change, the negative ramifications of all these factors for global economic growth may result in a global recession, suggesting that the income growth projections underlying the *Outlook* may not materialise. In this regard, the reduced prospects would likely result in a downward adjustment in global food demand, with different adjustment for different commodities. Furthermore, the last revision of the UN's population projection resulted in a downward revision of population growth in some countries (e.g. China), and while not significant, does point to the possibility of lower-than-expected population growth in the future, with direct implications for lower growth in global demand for food. Income and food price shocks, especially in countries where the share of food in expenditures is high, pose an additional threat, as does the risk of further disease outbreaks that may disrupt human health or the production of agricultural commodities.

Mounting environmental and health concerns, as well as animal welfare concerns, are expected to increasingly influence consumer choices and to drive growing demand for higher value items, such as poultry, fish, fruits, vegetables, nuts and seeds, as well as for alternative food stuffs, such as dairy alternatives, gluten free foods, and vegan meat substitutes. These ongoing developments could have a significant impact on agricultural commodity demand in the future, especially regarding the consumption of products with large environmental footprints or purportedly adverse health effects, such as palm oil, cotton, beef, and sugar. In contrast, demand for certified food as well as vegetarian and vegan alternatives, often touted as more nutritious and environmentally friendly, may increase. However, the potential trade-offs between healthier and more sustainable diets based on Life Cycle Analysis need to be considered. For example, while an increase in the consumption of fruits and vegetables may be desirable from a health point of view, the typically intensive use of agro-chemicals and water in their cultivation as well as the high emissions from cold chains and transport may not be desirable from an environmental perspective. On the other hand, a reduction in meat and dairy consumption in populations where it is very high may provide net benefits.

1.3. Production

Projections for the production of crops, livestock and fish products covered by the *Outlook* are presented. This section also examines the underlying drivers of production, namely crop yields, cropping intensity, and agricultural land use in the crop sector, and the number of farm animals and output per animal in the livestock sector.

Over the coming decade, the global production (measured in constant prices) of crops, livestock and fish commodities covered by the *Outlook* is expected to increase by 1.1% p.a., a slower rate than in previous decades. The reduced growth incentives are driven by a weakening of expected gross returns for producers from both sales and due to costs developments. The proceeds of production sales are not expected to follow a sustained growth because of projected flat or slightly declining trends of world prices in real terms and slower population growth. Input costs are expected to increase, notably because of the nexus between energy and fertiliser prices and tightening of environmental regulations.

Middle- and low-income countries, including China, India and other Asian countries, will continue to drive growth (Figure 1.22). By 2032, the whole Asian region is expected to account for more than half of global crop production, almost half of livestock production, and almost three-quarters of fish production. Production growth will be driven almost entirely by productivity in this resource-constrained region.

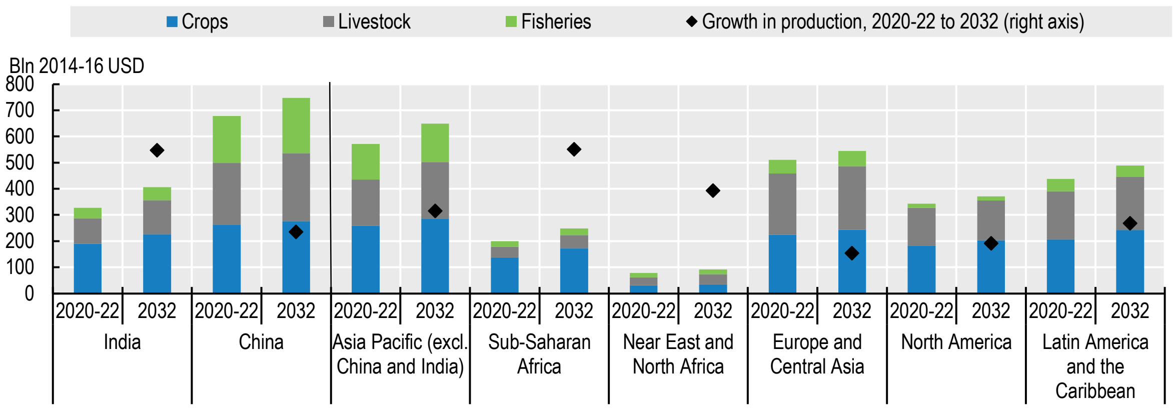
Production in Sub-Saharan Africa and Near East and North Africa is expected to grow significantly, although from a low base. In these regions, the bulk of agricultural output comes from crops production, but higher value livestock production is expected to grow faster over the coming decade in response to a rapid population increase and urbanisation. In Sub-Saharan Africa, growth in crop production will be underpinned by a combination of area expansion, changing crop mix, and productivity gains; dairy will drive much of the growth of livestock production. In Near East and North Africa, growth in crop production will be derived mainly from productivity gains as the region is faced with severe constraints in the availability of arable land and water. Poultry will drive most of the increase in livestock production.

Europe and Central Asia is expected to be the region with the slowest production growth, mostly driven by Central Asia and Eastern Europe. Growth will mainly be derived from productivity gains as the long-term decline in agricultural land-use is expected to persist, but tighter regulations related to environmental sustainability and animal welfare will place downward pressure on yield improvements.

Production growth in North America is expected to be limited. Crop production is expected to grow faster than livestock production, reversing the trend of the past decade. Production growth will be driven by productivity gains.

In Latin America and the Caribbean, production growth is projected to slow down compared to the last decade. Growth is expected to come predominantly from crop production. The region's land abundance contributes to strong crop production growth, which is derived from a combination of expansion and intensification, but yield gains are expected to play a bigger role because of an expected rapid increase in fertiliser application. Despite slower growth in livestock production, the region will continue to be a large contributor to global production.

Figure 1.22. 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.

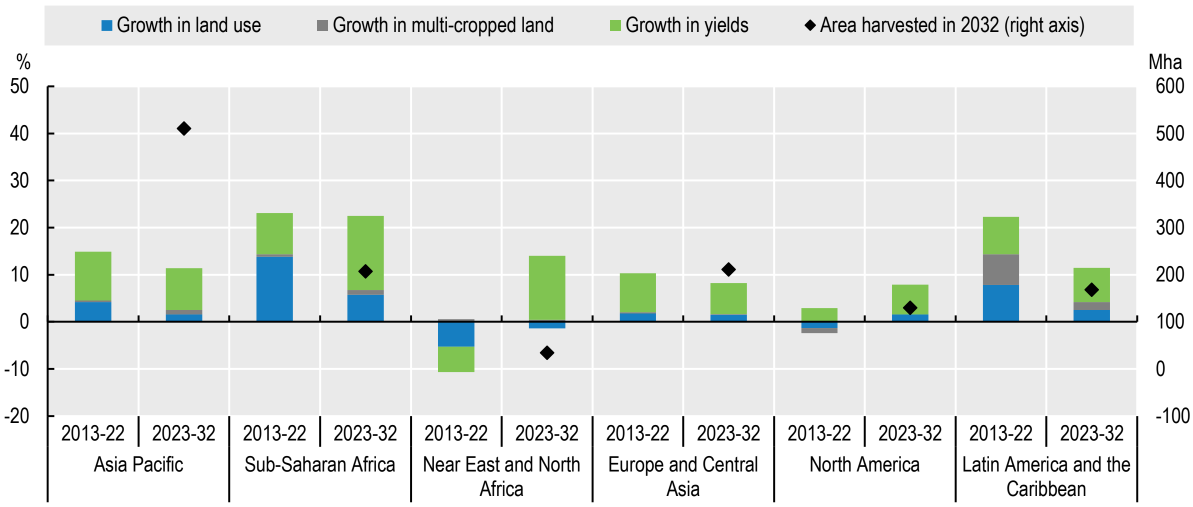
Source: FAO (2023). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/mjs9hd

1.3.1. Productivity improvements drive crop production growth

Overall, crop production is projected to expand slightly faster (1.2% p.a.) than livestock or fish production (each at 1.1% p.a.). This result is driven by productivity, mostly from yield developments and to a lesser extent crop intensification rather than from land use, but with important regional and sectoral variations (Figure 1.23).

Figure 1.23. Sources of growth in crop production



Note: Figure shows the decomposition of total production growth (2013-22 and 2023-32) 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, sugar beet, sugarcane, wheat and palm oil.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/rowqum

In Sub-Saharan Africa, yield growth is expected to almost double to 16% over the next decade compared to 8% over the previous one. Investments in locally adapted and improved crop varieties, increased access to fertilisers, and consolidation of land holdings that has allowed for more large-scale and mechanised farming will spur growth in crop production. Sub-Saharan Africa is the region with the largest untapped agricultural land and the expansion of the area harvested has been an important driver of production growth over the last decade. However, the role of land expansion in production growth is projected to decrease because it is increasingly difficult to convert land for agriculture in what remains largely unreachable areas, conflict zones, or conservation areas. Growth in the Near East and North Africa region is entirely based on yield growth because of the decline in the harvested area.

In Western Europe, yield growth is projected to slow down due to stricter environmental regulations, whereas in North America it will be underpinned by investment in innovations and wider biotechnological options.

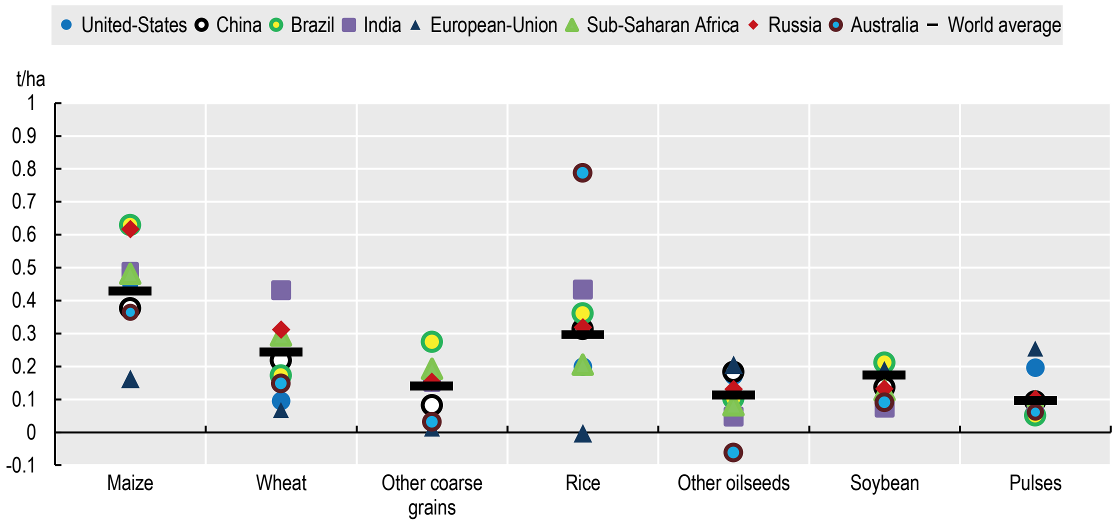
Crop yield variations

Over the coming decade, yield growth is projected to contribute 79% on average to global production growth of the main crops covered by the *Outlook*. Projected rates differ across regions and countries due to differences in production technologies, management practices, natural resource endowment, and local climatic conditions (Figure 1.24).

Farmers in low- and middle-income countries, notably Brazil and India, are projected to achieve growth rates above the world average for maize, wheat and rice through better adapted seeds and improved crop management. Notable yield increases in Sub-Saharan Africa are also projected, but average cereal yields in 2032 are expected to remain at less than a third of high-income countries.

In high-income countries, the growth in yields is projected to be smaller than the world average for the main crops, except for pulses. Yields in these countries are already close to the production frontier and further increases are constrained by stricter environmental regulations. However, production and investment in nitrogen-fixing crops known for their productivity-increasing properties are expected to expand to meet sustainable food production objectives.

Figure 1.24. Change in projected yields for selected crops and countries, 2023 to 2032



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

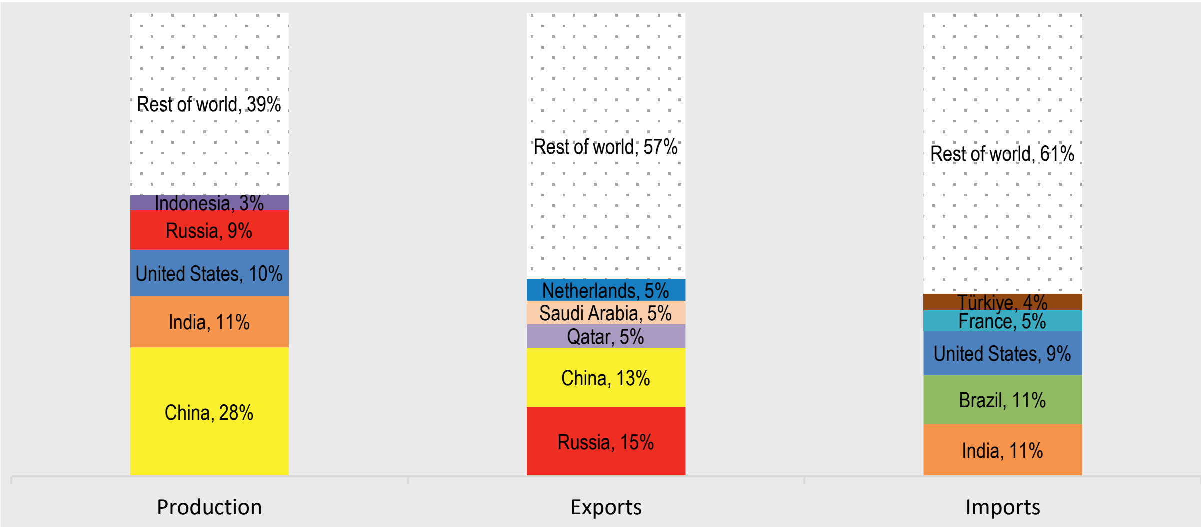
StatLink https://stat.link/zg8e5a

1.3.2. The role of fertiliser prices in driving food prices

Fertilisers provide essential nutrients for maintaining agricultural crop yields and quality, and for growth in production. The three most important nutrients are nitrogen (N), phosphorus (P), and potassium (K). Nitrogen is the most fundamental nutrient for crop yields because it ensures that plants remain healthy as they develop and are nutritious once they are harvested. Phosphorus supports a plant's ability to use and store energy, and helps with normal development. Potassium strengthens a plant's resistance to disease and its overall quality. The application of N-based fertilisers is critical for crop yields in the short run and the effectiveness depends on the timing of its application. Application of N-based fertilisers cannot be delayed in response to price changes, in contrast to the application of P and K fertilisers which can be in order to optimise variations in overall input costs since P and K nutrients remain in the soil for a longer period of time.

The production of N-based mineral fertilisers is dependent on the availability of natural gas both as a raw material and to power the synthesis process. Given this link, the production of nitrogen fertilisers is concentrated in countries that have access to natural gas: China, India, the United States, and Russia (Figure 1.25). Over the period 2016-2020, Russia was the main exporter of N-based fertilisers, responsible for 15% of global exports, followed by China (13%). Key importers of nitrogen fertilisers over the same period were India and Brazil, both accounting for 11% of global imports.

Figure 1.25. Main producers and traders of nitrogen-based fertilisers (average 2016-2020)

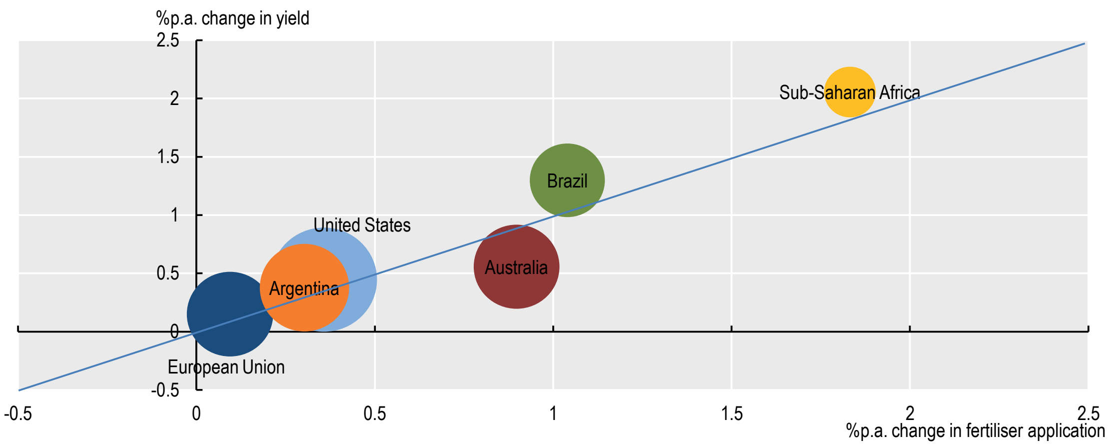


Source: FAOSTAT.

StatLink https://stat.link/uhma2o

In this context, focusing on the application of N-fertilisers per hectare of planted crop in relation to output per hectare can provide elements to qualitatively explain the observed variation in production efficiency across regions. Figure 1.26 shows how the projected per annum changes in N-fertiliser application compare to the corresponding per annum changes in yield in selected countries or regions for maize.

Figure 1.26. Change in N-fertiliser application per hectare and yields for maize, 2023 to 2032



Note: The size of each bubble reflects yield in 2032
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/o9nzw6

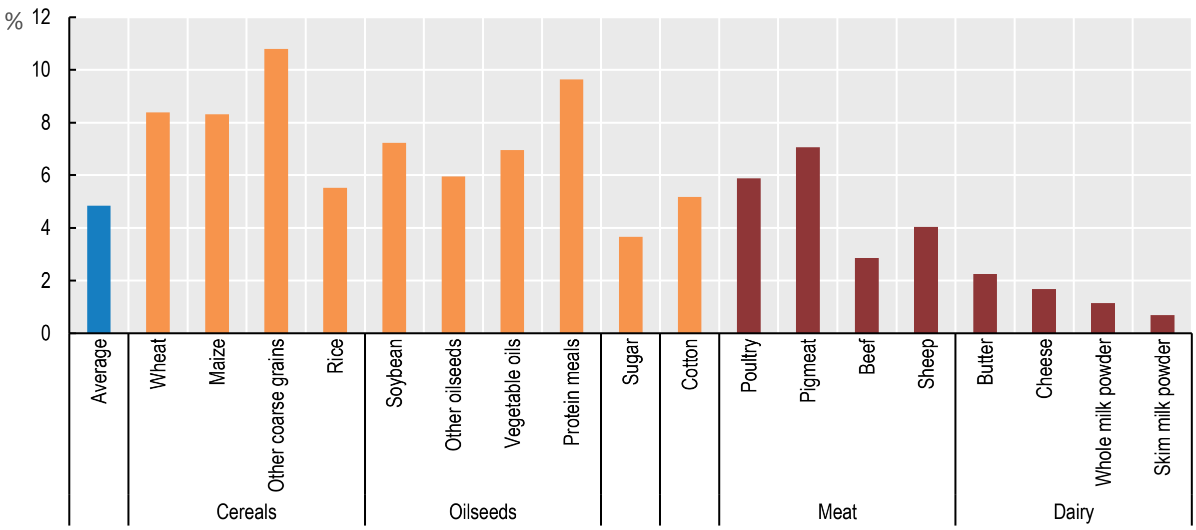
In the European Union and the United States, where yields are high, future development in production practices will be limited compared to other countries but changes in yields are expected to be greater than changes in fertiliser application. High-income countries are rolling out various incentives to curb the use of synthetic fertilisers, notably by increasing their efficiency through better management practices or expanding the use of nutrient alternatives such as biofertilisers. In Australia, the relatively limited increase in yields can be explained by physical and climatic constraints.

In Brazil, the use of N-fertilisers is expected to grow significantly due to the increase in production, and yield increase should outpace N-fertiliser application over the projected period. While several factors such as progress in breeding can play a role in future yield developments, improvements in crop management, use of nitrogen-fixing crops or biofertilisers will play a critical role in the increase of maize production yields. Sub-Saharan Africa is also expected to experience significant increases in both N-fertiliser application and yields, but from a low base.

A scenario analysis was undertaken to examine the impact of a 25% increase of N-, P- and K-fertiliser prices on fertiliser application, resulting crop production and commodity prices, while keeping oil price constant. Factors underpinning such fertiliser price increases other than an oil shock would include, for example, market access restrictions, tighter environment regulations, or increases in other manufacturing costs such as labour or minerals.

Figure 1.27 shows the percentage change of selected commodity prices from the baseline projections in 2032 to those of the scenario projections in 2032. On average, agricultural commodity prices would increase by 5%. The impact would be greater on crops that use fertilisers as direct inputs than on livestock products that use them indirectly through feed. Among livestock products, the increase in prices is greater for poultry and pigmeat than it is for ruminants because the former relies more on compound feed.

Figure 1.27. Change in agricultural commodity prices due to 25% increase in fertiliser prices



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/cqrl79

This scenario illustrates how changes in fertiliser prices readily translate into changes of product prices and hence food prices. Consumers who spend a high share of their household budget on food and fuel would be particularly impacted. The impact on producers is mixed, as only the most efficient users of fertilisers would benefit from higher product prices and increase their margins. Rising costs for agricultural inputs will inevitably translate into higher food prices unless new models of production can be found to make agriculture less dependent on conventional fertilisers.

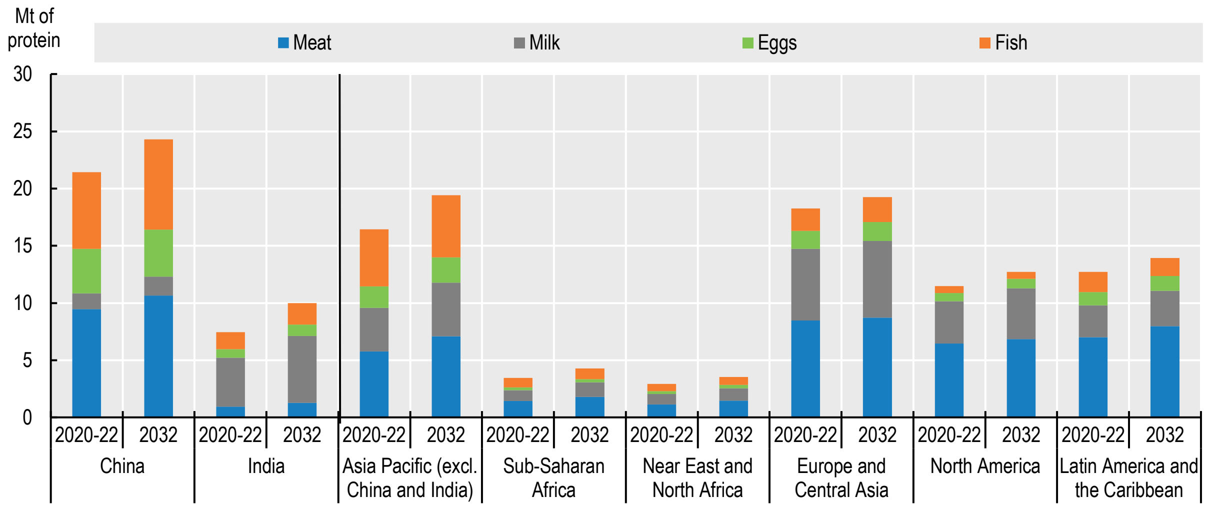
1.3.3. Growth in livestock and fish production varies in intensity across region

Global production of livestock and fish is projected to expand by 10% over the next decade, almost half the rate of the previous decade. A significant share of this growth will be driven by production in China (13%), India (34%), and other middle- and low-income countries (Figure 1.28). In China, the expansion will be largely underpinned by the recovery from African Swine Fever (ASF) and in India by sustained growth in diary production.

In Sub-Saharan Africa and Near East and North Africa, livestock and fish production is expected to increase by more than 20%, mostly because of the expansion of the dairy and poultry meat sectors. The rising demand for high value food spurred by the ongoing urbanisation of these regions is expected to be mainly met by local production rather than by imports. Insufficient infrastructures and associated elevated transport and logistic costs will remain major impediments to trade in these regions.

In high-income countries, overall growth will be limited. In Europe, factors such as the current African Swine Fever outbreaks, stricter environmental laws, and animal welfare regulations in some EU countries will exert pressure on production growth. In North America, the intensive production system is expected to recover slowly from recent high feed prices and labour costs. Almost all production of animal proteins will experience single-digit growth over the coming decade, except for the dairy sector in North America which will grow by 20% by 2032. Improvements in dairy cow milk yields will be the main contributor to milk production in the region.

Figure 1.28. Global livestock and fish production on a protein basis



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

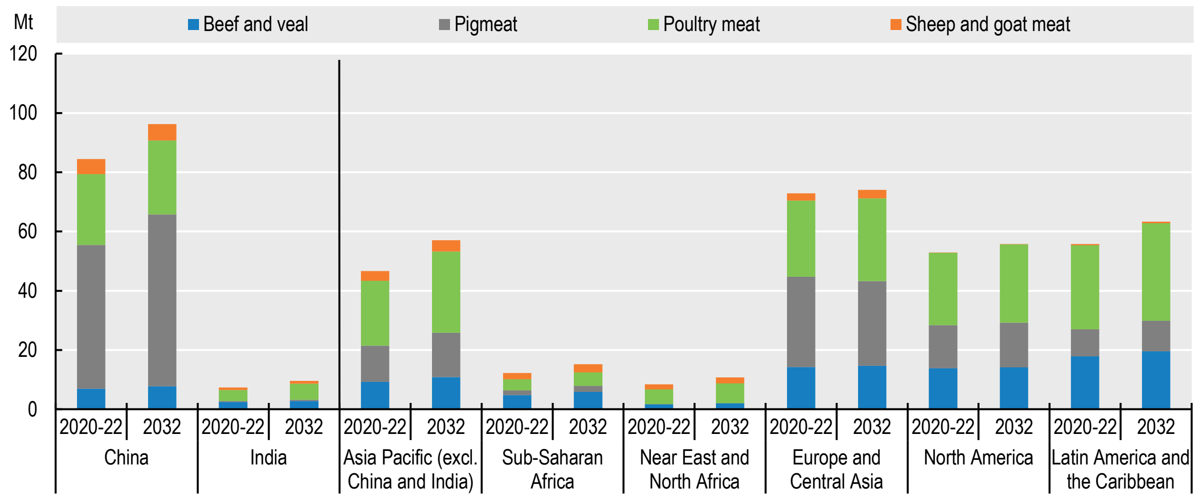
StatLink https://stat.link/e1ivxs

Meat production

Over the coming decade, increased global meat production is expected to originate mainly in middle-income countries (Figure 1.29), supported by global herd and flock expansion and improved per-animal performance through higher feed intensity, and continuous improvement in animal breeding, management, and technology.

Poultry meat will be the fastest growing segment of animal protein production (14%) and is projected to account for 48% of the increase in total meat production over the coming decade. The greatest increase in production will occur in Asia Pacific, notably in India, largely as a result of increased feed intensity and breeding improvements. Poultry meat will significantly expand in Sub-Saharan Africa and Near East and North Africa, albeit from a low base. In North America and Europe and Central Asia, poultry meat will be driven by its greater attractivity for consumers compared to bovine meat and its improved profitability in the medium term due to shorter production cycles.

Figure 1.29. Global meat production in carcass weight equivalent



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/5h9u7a

Pigmeat production is expected to recover in Asian ASF-affected countries, growing by 19% in China, the largest producing country, and 23% in other Asian countries over the coming decade. In Europe, pigmeat production will decline over the next decade mainly because of stricter environmental regulations and animal welfare standards.

Beef production is expected to expand by 9% and contribute to 16% of the total increase in global meat production. Overall, beef production will increase with higher carcass weights as feed costs decline and animal genetics improve, although in the fastest growing African regions the increase will be driven by higher herd numbers. In Europe and North America, beef production will adjust to stricter environmental sustainability standards for the former and severe pressure on the profitability of the intensive model of production for the latter.

Sheepmeat production will contribute only 6% to the overall growth in meat production and is expected to expand by 15% over the coming decade. Increased availability in the global sheepmeat market will be due to flock rebuilding and increased lambing rates in Asia and Sub-Saharan Africa. Production in the European Union is projected to increase slightly due to income support and favourable producer prices. Sheep and goat meat production in Sub-Saharan Africa will grow by almost 30% despite pressure on pasture land due to desertification.

Dairy production

Dairy will remain the fastest expanding livestock sector over the next decade, with global milk production projected to increase by 17%. In low- and middle-income countries, milk production will be driven by an increase in inventory and yields, while in high-income countries it will be almost entirely supported by improvements in yields due to optimisation, improved animal health, and better genetics.

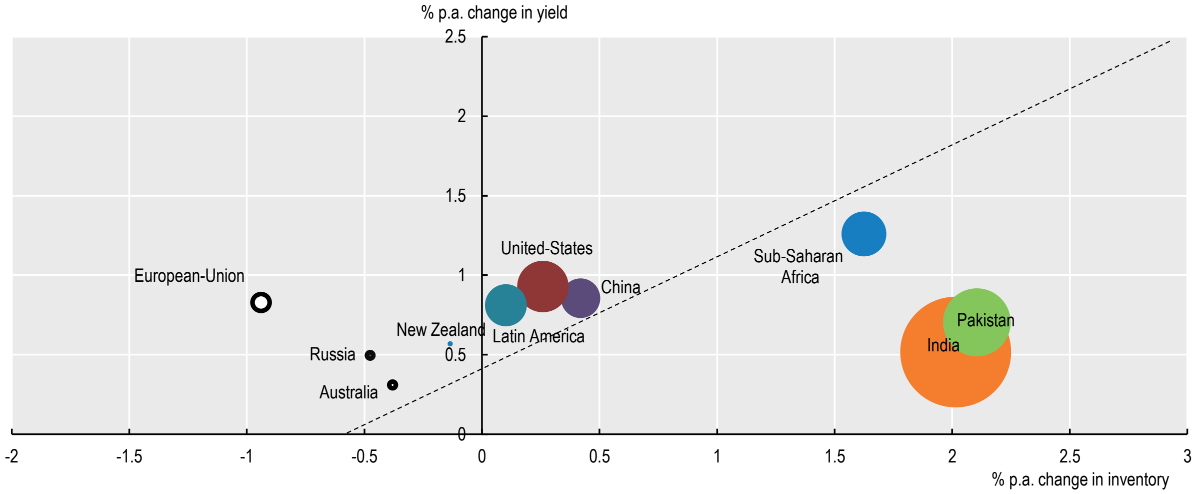
Population growth in the main consuming middle- and low-income regions, as well as per capita consumption growth for fresh and processed dairy products will incentivise investments in dairy production.

India and Pakistan are projected to rank first and second, respectively, in terms of absolute growth of milk production and to generate over half of the increase in global milk production; they will jointly account for 30% of production by 2032. In these countries, the increase in milk production will be due primarily to herd expansion (Figure 1.30).

In Sub-Saharan Africa, the 33% growth in milk production is projected to originate from an increase in the number of milk-producing animals. The region will also experience some yield improvement, albeit from the lower levels produced by ovine animals that are mainly used to provide milk.

Production in the European Union, the second largest global milk producer after India, is expected to decline slightly in response to the ongoing transition towards environmentally sustainable production, the expansion of organic production, and the shift from intensive to pasture-based production systems.

Figure 1.30. Changes in inventories of dairy herds and yields, 2020-2022 to 2032



Note: The size of the bubble reflects absolute growth in dairy production between 2020-22 and 2032.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/0bcfp1

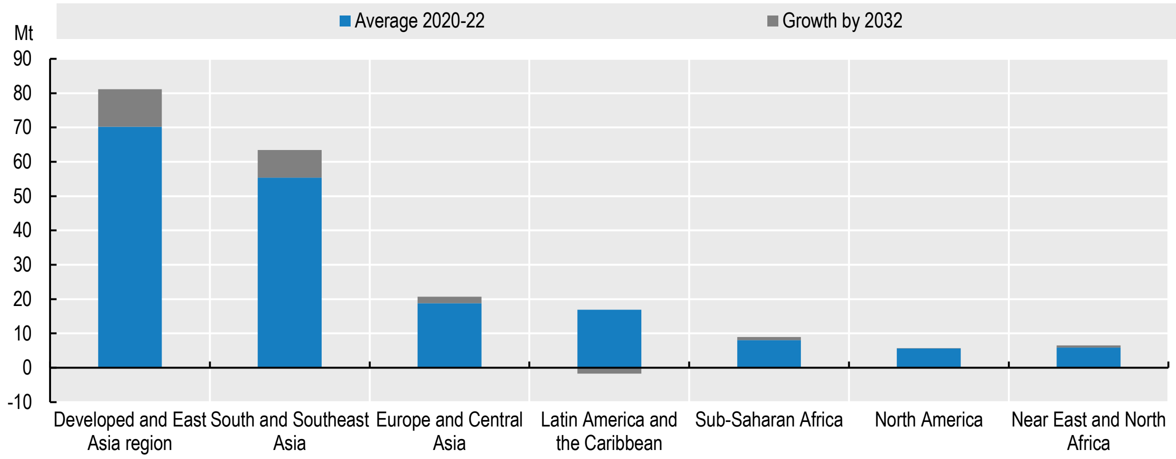
Fish production

Global fish production is projected to grow by 12% over the coming decade, albeit at a slower rate compared to the previous decade. This slowdown in growth reflects the impact of policy changes in China toward more sustainable fisheries, the higher costs for fuel inputs, and the assumption that 2024, 2028 and 2032 will be *El Nino* years that will result in lower production, mainly in Latin America and the Caribbean (Figure 1.31). Most of the increase in fish production is expected to come from Asia, which will account for more than 70% of global production by 2032. The largest contributors to output growth are expected to be China, India, Indonesia, and Viet Nam.

Production will be driven by continuing but slower progression in aquaculture production and broadly stable capture fisheries production, except during the years of *El Nino*. By 2032, aquaculture production is projected to account for more than half of total fish production.

The increase in aquaculture production is expected to be largely achieved by productivity gains and technological improvements related to spatial planning, breeding, feed, and disease management.

Figure 1.31. Regional fish production



Note: The regions Developed and East Asia, and South and Southeast Asia are defined as in Chapter 2.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/e4g9xr

1.3.4. Investments and human capital are vital for productivity gains

Investments in agricultural infrastructure, research and development, wider access to more productive agricultural inputs, improved farm management practices, including the adoption of digital automation technologies are important factors that enhance productivity.

The availability of human capital employed in the agricultural sector is a key determinant of production growth. Nevertheless, there remain important barriers for human capital to thrive within the current food systems. For instance, the lack of access to finance for youth or smallholders, or the insufficient attention to the constraints faced by women in food systems (Box 1.2) are impediments to productivity gains. A recent FAO report on the status of women in agrifood systems (FAO, 2023[10]) shows that inequalities related to land tenure, credit, training, and technology create a 24% gender gap in productivity between women and men farmers on farms of equal size. In September 2021, the United Nations Food Systems Summit urged for the greater integration of women in food systems, notably calling for solutions that narrow the gender gap and support women entrepreneurship. Subsequently, in adopting the Ministerial Declaration on Transformative Solutions for Sustainable Agriculture and Food Systems in November 2022, Ministers of Agriculture of OECD countries and partner economies worldwide committed to promoting and measuring progress towards inclusive food systems and to reinforce measures that foster greater opportunity for women in the agricultural sector.

Box 1.2. Gender and food systems

Understanding the role of women in food systems

The livelihoods of men and women in food-related activities differ. The contribution of women to food systems remains overlooked, irrespective of their role as entrepreneurs, workers, or consumers. A recent OECD report (Giner, Hobeika and Fischetti, 2022[11]) explores the extent of women's participation to food systems and identifies the following key insights.

- *Women as entrepreneurs*: Women are less likely than men to lead businesses in *the* agri-food industry.
- *Women as workers*: Women represent one-third of the workforce in agriculture, but earn disproportionately less than men and are more involved *in* lower-skilled or informal jobs.
- *Women as consumers*: Given their overrepresentation among low-income and single parent households, women tend to spend a larger share of their disposable income on food and are more at risk of food insecurity.

Barriers to enhanced women's entrepreneurship in agri-food systems are threefold.

- *Inequality of endowments* with unequal access to land and assets, education, entrepreneurial and digital skills, and professional networks,
- *Formal and informal external barriers* including longstanding sociocultural and institutional gender norms and land inheritance systems,
- *Internal barriers*, such as internalised discriminatory practices, that lead to reduced self-confidence and undervaluation of competencies of women with consequences on the tasks undertaken by female farm owners and managers.

Fostering gender inclusion can have positive impacts on the triple challenge faced by food systems, which is to ensure food security and nutrition for a growing population, support the livelihoods of millions of people working in the food supply chain, and to do so in an environmentally sustainable way. Greater gender diversity at the decision-making level can translate into firms taking more environmentally conscious decisions.

Evidence gaps on women in food systems

A move towards greater gender equality requires applying a gender lens when developing and implementing policies related to food systems, as well as collecting better evidence on gender and food systems.

The contributions of women as entrepreneurs, workers, and consumers across food systems are difficult to recognise because of the lack of sex-disaggregated data. This prevents policy makers from considering the interests and concerns of both women and men at all stages of policy processes.

Digital technologies and government-wide commitments can facilitate the information collection process. Regular reporting on the situation of women across food systems can raise awareness on their roles, on the barriers they face, and on progress achieved.

Gender in food systems policies

The main strategy to reach gender equality is to apply *gender mainstreaming* to agricultural and food policies. This is the process of assessing the implications for women and men of any planned action, including legislation, regulations, policies, or programmes, in all areas and at all levels.

Furthermore, countries use a combination of instruments to support women as workers and entrepreneurs in food systems, with the aim of supporting: the rights and needs of women on family farms, and access to land, equipment, finance and markets. However, not much is known about the effectiveness and impact of these policy instruments; robust *ex ante* and *ex post* gender impact assessments could evaluate the cost-effectiveness of measures introduced and revaluate resource allocations.

A roadmap for addressing evidence gaps

Many countries are committed to achieving gender equality. Giner, Hobeika and Fischetti (2022[11]) provide a five-step roadmap to identify and overcome evidence gaps on gender aspects and policies that address gender inequality in food systems.

- Apply a gender lens when developing policies related to food systems.
- Identify and close evidence gaps on gender and food systems by collecting sex-disaggregated data.
- Develop and implement a mix of policy instruments that address gender inequality and support women in food systems.
- Monitor and evaluate policy impacts and their effectiveness.
- Adjust policy responses.

Notes: Gender is defined as Socially constructed and socially learned behaviours and expectations associated with females and males. All cultures interpret and elaborate the biological differences between women and men into a set of social expectations about what behaviours and activities are appropriate and what rights, resources, and power women and men possess. Like race, ethnicity, and class, gender is a social category that largely establishes one's life chances and participation in society and in the economy (OECD, 2018[12]).

1.3.5. Environmental impacts of agricultural production

Direct GHG emissions

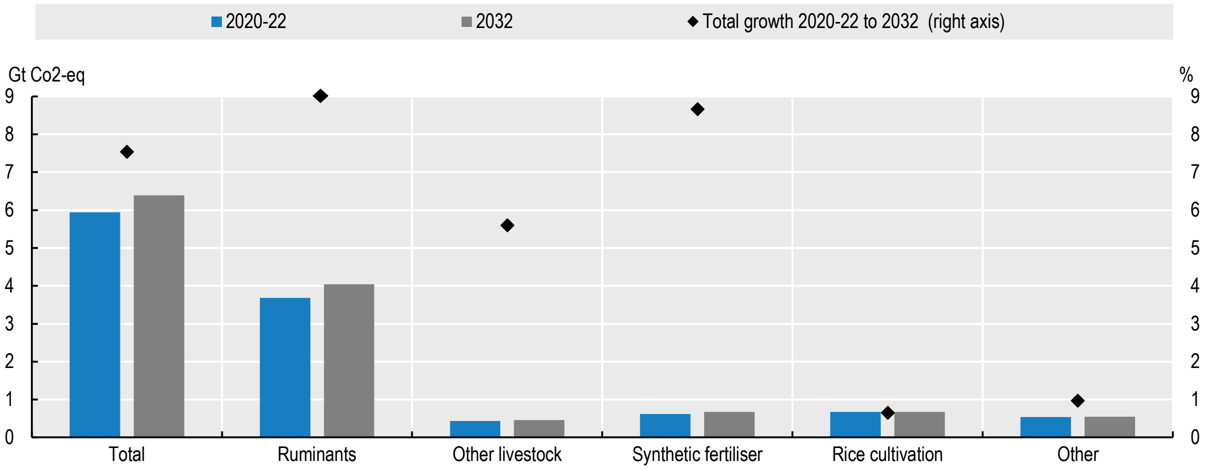
The *Outlook* estimates direct GHG emissions using the FAOSTAT Emissions-Agriculture database and following the IPCC's Tier 1 approach (i.e. basic method relying on direct emission factors such as herd size). The projections assume no change in current policies and on-trend technological progress. Higher-tier methods (that account for management practices or land use change for instance) would provide greater certainty of the estimates but are not undertaken given the scope of the *Outlook*.

Subject to the above caveat, global direct agricultural emissions are set to increase by 7.5% over the coming decade, while the projected increase in agricultural production is 13% (Figure 1.32). Livestock production will account for 80% of this increase. Geographically, most of the increase in emissions is projected to occur in middle and low-income regions due to the higher growth in ruminant production in systems that are emission intensive.

Synthetic fertilisers are an important source of direct GHG emissions. High energy prices, domestic policies, and developments in market access will shift the use of fertilisers at the global level (Section 1.3.2). Country-level efficiencies in applying fertilisers to agricultural soils by, for example, applying a new generation "special fertiliser products", such as stabilised nitrogen fertilisers, slow and controlled-release fertilisers, and water-soluble fertilisers, can increase nutrient use efficiency and reduce the need for application; thus lowering GHG emissions. In some countries, governments strongly encourage the use of special fertiliser products or organic fertilisers. In others, farmers have adopted these products without government intervention because of the economic and environmental benefits.

Rice cultivation is another major source of GHG emissions because irrigated paddy fields emit a lot of methane. The projected increase in rice production, however, will be largely the result of yield improvements with unchanged paddy areas, thereby largely limiting any increase in GHG emissions.

Figure 1.32. 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.CO2 equivalents are calculated using the global warming potential of each gas as reported in the IPCC Sixth Assessment Report (AR6). 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 savanna, crop residues, and cultivation of organic soils.
Source: FAOSTAT Emissions-Agriculture Database, http://www.fao.org/faostat/en/#data/GT, accessed January 2022; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

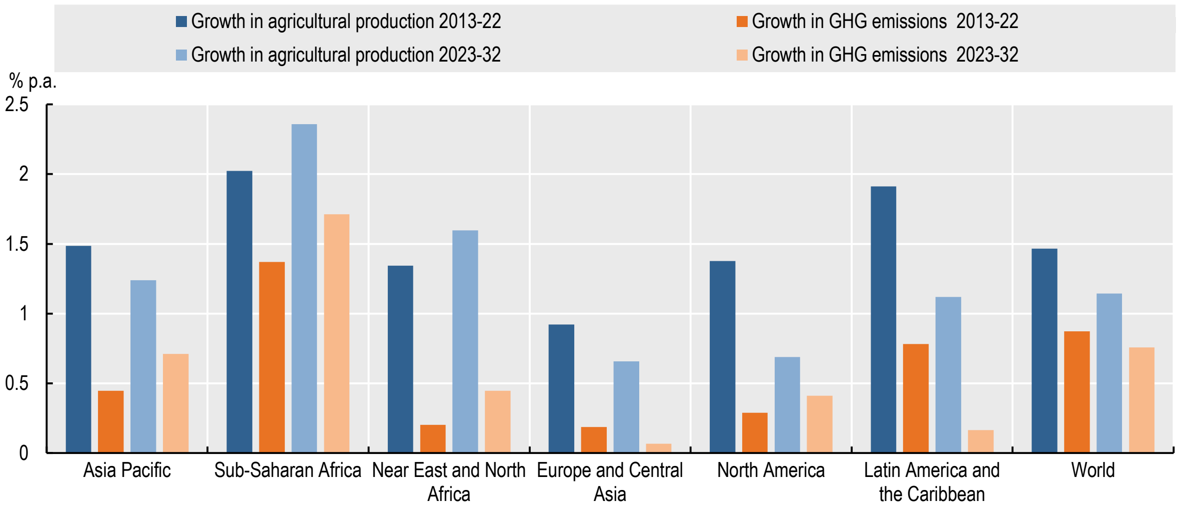
StatLink https://stat.link/zk1iuh

At the global level, growth in direct GHG emissions from agriculture will be lower than in the previous decade and lower than the projected growth in agricultural output, indicating a faster decline in the carbon intensity of agricultural production (Figure 1.33). This will be the case in Europe, Central Asia, Latin America and the Caribbean due to yield improvements and a declining share of ruminant production.

In other regions, the growth of GHG emissions is projected to be greater than in the previous decade. In low- and middle-income countries in Asia Pacific and Sub-Saharan Africa, increased GHG emissions are due to the projected higher output growth in these regions. While important efforts are undertaken in these regions to make production systems more sustainable, on average those tend to be more emission-intensive than in high-income countries. By 2032, Sub-Saharan Africa will experience the highest growth in direct GHG emission per year (1.7%), accounting for 16% of global direct GHG emissions from agriculture but only 7% of crop and livestock production.

In Europe and Central Asia, annual direct GHG emissions from agriculture are projected to be divided by three, while agricultural output is expected to increase by 7%. Further reductions in the carbon intensity of agricultural production could be achieved by the large-scale adoption of emission-reducing technologies and agricultural practices.

Figure 1.33. Annual change in agricultural production and direct GHG emissions, 2023 to 2032



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. CO2 equivalents are calculated using the global warming potential of each gas as reported in the IPCC Sixth Assessment Report (AR6). 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 savanna, crop residues, and cultivation of organic soils. The Net Value of Production uses own estimates for internal seed and feed use.

Source: FAOSTAT Emissions-Agriculture and Value of Agricultural Production databases, http://www.fao.org/faostat/en/#data, accessed January 2022; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/rk2xtz

Land use

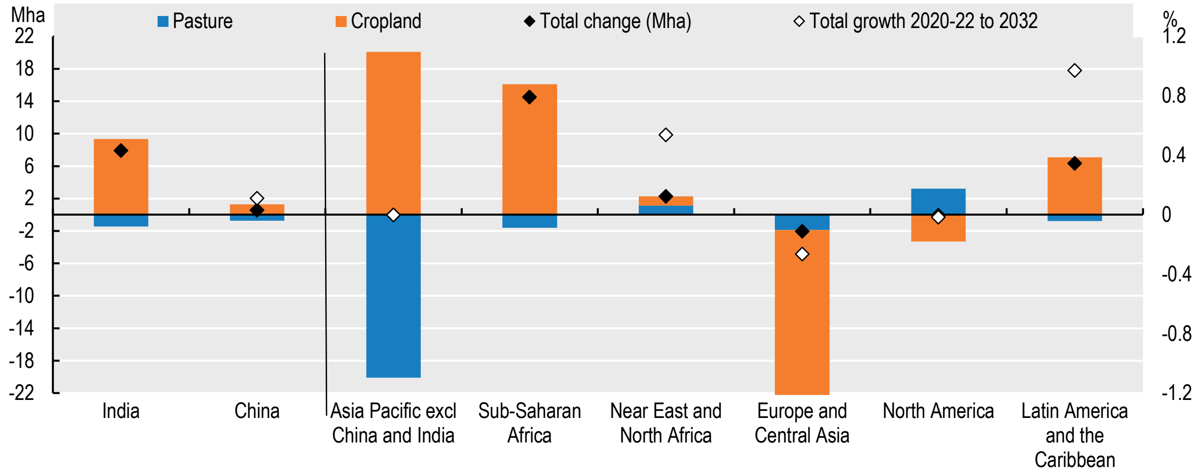
Agriculture uses 38% of the global land area, with one-third of this area dedicated to the cultivation of crops and the rest to livestock grazing. Land conversion from natural ecosystems to agriculture has been historically the largest cause of GHG emissions. The expansion of cropland is projected to account for 15% of crop production growth. Over the coming decade, total agricultural land use is not expected to increase as overall cropland increases will be offset by overall pasture decreases. There will be regional variations in the locations where there are increases in cropland and decreases in pastureland.

Figure 1.34 shows the changes in total crop land over the coming decade. Projected trends in land use will vary across regions and commodities, with the largest reduction in pastureland use and the largest increase in cropland use occurring in the Asia and Pacific region. In this region, pasture is expected to be converted into cropland, whereas in Latin America 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 used for fruits, vegetables and other crops is expected to decline.

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

Figure 1.34. Change in agricultural land use 2020-22 to 2032



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/f7igxa

1.3.6. Uncertainties affecting agricultural production

Russia's war against Ukraine, and policy responses introduced in many countries, have triggered further rise in energy and fertiliser prices, and increased the price volatility of those inputs. Despite recent easing, the risk of continued uncertainties could alter production decisions, limit input use and subsequently depress yield growth, eventually threatening global food security.

The production of agricultural commodities remains vulnerable to plant and animal diseases. The recent ASF outbreak led to significant losses in pigmeat 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.

Historically, private sector investment has been the principal driver of productivity growth and productivity enhancement was expected to come from tangible inputs. Private companies usually invested more into technological innovations and research and development related to the development of new plant varieties, equipment, machinery and chemicals inputs for which they could expect return on investment from intellectual property rights and direct sales to farmers.

It is currently unknown how the strengthening of environmental policies to foster sustainability of the agricultural sector might reshape global patterns of production. Future policies will likely impose stricter standards on the use of chemicals in production and promote new production practices, including the use of organic alternatives. However, this risks placing downward pressure on yields, which could lead to higher food prices if other innovations are not developed or adopted fast enough. There is at present a gap in research and programmes that aim to transmit better management practices to farmers given that such activities neither bring in royalties nor have public institutions endorsed them (OECD, 2022[13]).

As climate change is expected to increase, the magnitude and frequencies of extreme weather events, sanitary and phytosanitary conditions will change, and the natural endowment of agriculture and food producing regions could be irreversibly changed (IPCC, 2022[14]); this could encourage producers to adjust their production methods.

1.4. Trade

International agricultural trade links the food systems of countries. By efficiently moving agricultural products globally from surplus to deficit regions, trade continues to play a critical role in providing consumers worldwide with sufficient, safe, and nutritious food, while generating income for farmers, workers and traders in agriculture and food industry.

The COVID-19 pandemic led to trade disruptions worldwide, but trade in the agricultural commodities covered by the *Outlook* proved to be more resilient than other sectors of the economy. In the short run, the *Outlook* assumes the continuation of the Black Sea Grain Initiative, which is crucial for global food security as grain and fertiliser prices remain high.

The importance of trade in ensuring food security will likely increase in the future in view of changing demand and supply forces. First, the ongoing major demographic changes combined with developments in income, dietary preferences, and urbanisation are expected to have an increasing impact on global consumption patterns. In this respect, trade can help improve availability and access to food and agriculture products. Second, as the significant adverse effects of climate change on agriculture and food supply are expected to worsen, trade can also contribute to the stability of food security.

Well-functioning domestic and international markets are essential to supporting the transformation towards the greater sustainability and resilience that is needed to address the triple challenge facing agriculture and food systems.

1.4.1. Agricultural and fish trade continues to grow but at a slower pace

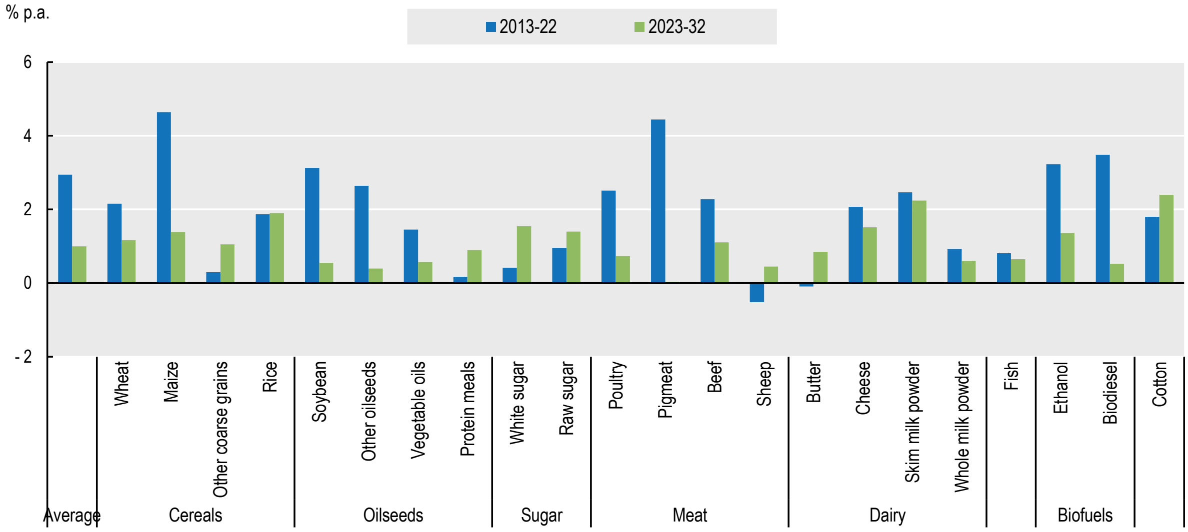
Over the coming decade, trade in agricultural commodities covered in the *Outlook* is projected to expand by 1% p.a., which about a third of the rate of the last ten years. This slowdown is due to the expected weakening of the main historical drivers of global demand for traded commodities, namely the slower growth in demand for agricultural products by China and other middle-income countries.

Agricultural commodities products were traded more intensively in the early 2000s, reflecting the implementation of the WTO Agreement on Agriculture and China's accession to the rules-based trading system in December 2001. Growth in both agricultural and industrial trade entered a downward trend in the aftermath of the financial crisis of 2008. The *Outlook* assumes a diminishing impact of previous trade liberalisation efforts that boosted agricultural trade, as progress to reduce multilateral tariffs and reforms to trade-distorting producer support have largely stalled in recent years.

Figure 1.35 shows the average annual growth in trade volumes for selected commodities covered in the *Outlook*. Given their share in overall volumes traded, maize, soybeans and wheat contributed the most to overall agrifood trade growth of the last decade. These commodities are projected to experience the biggest drop in trade growth over the coming decade. Because of their importance in feed use, the drop in the global export of maize can be explained by the projected increase in maize production in China that will reduce its need for imported feed over the medium term.

Trade growth in poultry and beef are expected to drop sharply due to the slowdown of the convergence in diets and the reduction in Chinese imports from Europe and Latin America and Caribbean regions. The exceptionally high growth of trade in pigmeat over the previous decade was due to the African Swine Fever outbreak in China, which forced the country to import massively in 2019 and 2020.

Figure 1.35. Growth in trade volumes, by commodity



Note: Annual growth rate of trade volumes as calculated from 2014-16 reference prices.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/g28zwv

The increase in the growth of cotton traded will reflect 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 top exporters (the United States, Brazil, and Sub-Saharan Africa). International trade in sugar will continue to grow, mainly reflecting expanding demand from deficit regions in low- and middle-income economies. Trade in rice is projected to increase, supported by India's production surplus mainly directed to Sub-Saharan Africa.

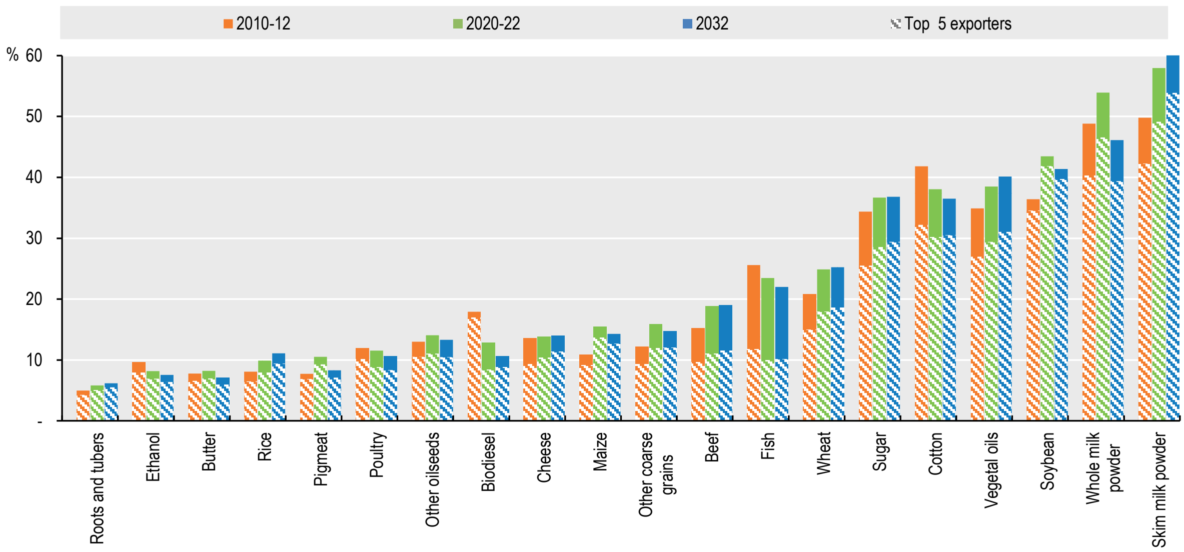
1.4.2. The share of production traded is stabilising, with sustained dominance of top exporting countries

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 the baseline period 2020-22, and reflects a trade sector that has been growing at a faster pace than agricultural production. Assuming a diminishing impact of previous trade liberalisation efforts that boosted global agricultural trade and no major changes in policies, trade relative to production is projected to stabilise over the next decade, with growth in trade and production being more closely aligned.

However, there are significant variations in the importance of trade across commodities (Figure 1.36). For many agricultural commodities, most of the production is used domestically. For a few commodities trade represents at least one-third of global production. This is the case for sugar, cotton, vegetable oils, soybean, and milk powders, which are either demanded for further processing or produced in highly concentrated markets.

Over the coming decade, the share of production that is traded will not change significantly for most commodities covered in the *Outlook* and few will experience some shifts in trading patterns. The export ratio of cotton and fish is projected to decline marginally, reflecting either weakness in import demand or increasing domestic use, or in the case of biodiesel, both tendencies. For skim milk powder (SMP), vegetable oils, wheat, and rice, trade is expected to expand at a higher pace than global output, resulting in an increase in the share of production traded for these commodities.

Figure 1.36. 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/5gz8nf

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 coming decade. Figure 1.34 shows the export share of the top five exporters for each commodity. For soybeans, this share exceeded 96% in 2020-22. Even for commodities with relatively less concentrated exports, such as fish and beef, the five leading exporters accounted for 42% and 58% of global exports in 2020-22, respectively.

For almost all commodities (except pigmeat, ethanol, and whole milk powder), exports from the top five exporters are expected to increase over the coming decade. The biggest increase in export dominance of the top five exporting countries is projected for trade in biodiesel. The top five exporters of biodiesel are expected to increase their share from 65% to 79% over the next ten years, supported by growing exports of biodiesel from recycled cooking oil from Singapore and of soybean-oil based biodiesel from the United-States. The biodiesel export share of China, however, is projected to drop over the next ten years due to limited growth in its production of biodiesel from recycled cooking oil.

The dominance of the top five exporting countries of cereal is projected to increase over the next ten years. The share of the top five exporting countries of rice is projected to rise from 80% in 2020-22 to 85% in 2032, mainly due to strong export growth in India and Thailand. The export share of the five leading exporters is projected to increase from 75% in 2020-22 to 78% in 2032 for other coarse grains. This share is expected to slightly increase by 2 percentage points over the same period reaching 74% in 2032 for wheat, while it will remain unchanged for maize.

Dairy exports are expected to become more dominated by the top five exporting countries, with growing dominance from key suppliers in high-income countries. For cheese, for instance, the export share of the top five exporters is projected to increase from 75% to 80%, mainly driven by strong export growth in the leading exporter, the European Union. The share of the top five exporting countries 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 2032, up from 30% in 2020-22.

This high dominance of leading exporting countries risks having 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 conflict. Such interruptions could affect prices and availability of agricultural commodities, with implications for global food security. Risks to global markets are particularly high for highly traded commodities.

1.4.3. Growing differentiation between net exporting and net importing regions

Over the coming decade, the net exporting position of the Americas and Eastern Europe Central Asia and net importing position of Asia, the Middle East and Africa are expected to deepen. The evolution of agri-food surpluses and deficits of the main regions of the world (Figure 1.37, panel a) and important trading countries (Figure 1.37, panel b) sheds light on the direction of trade that differentiates net exporters from net importers.

Increasing trade surpluses from traditional exporters

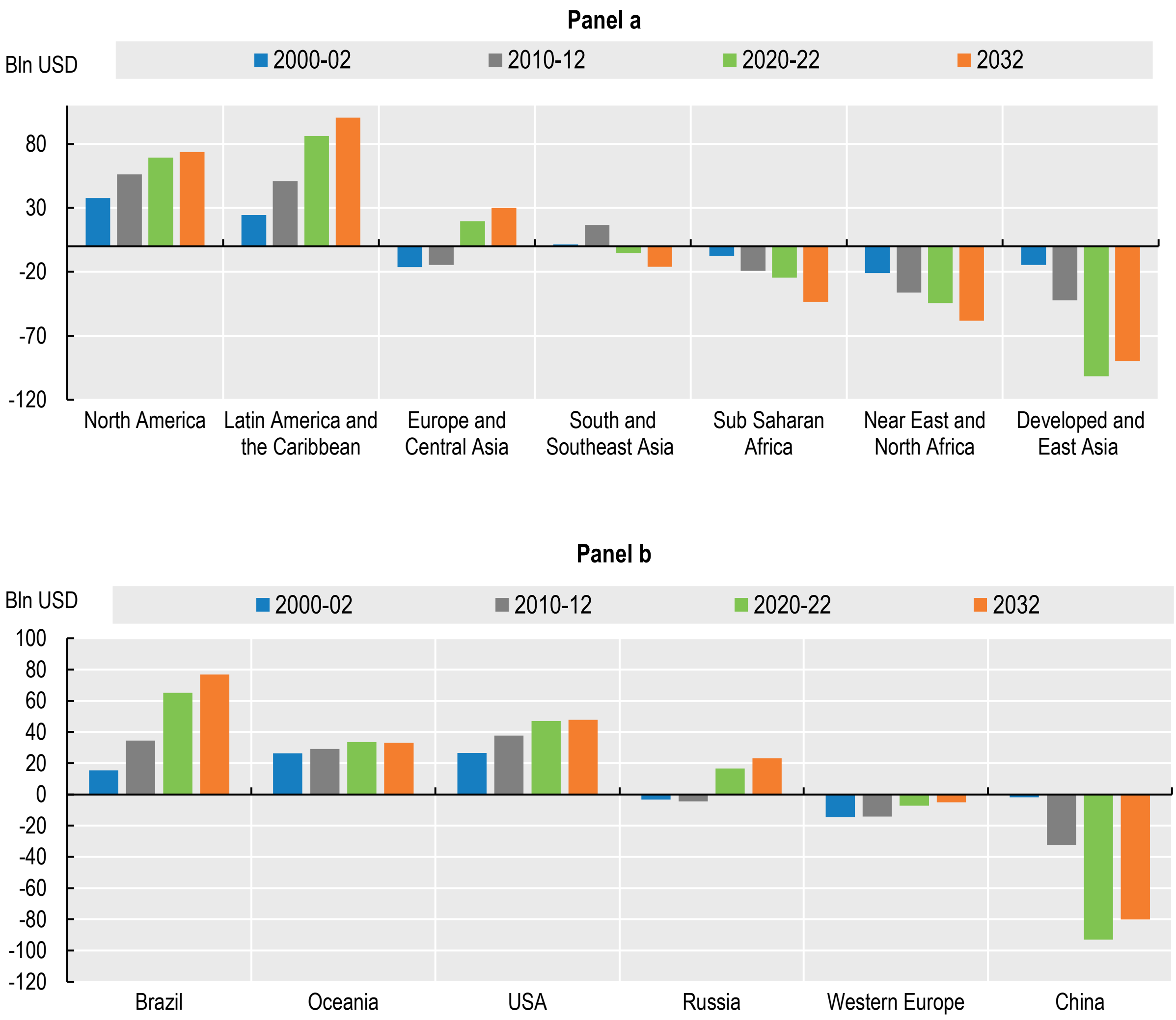
The Latin America and Caribbean region has experienced a vast expansion of its exports, notably from Brazil, and is projected to reinforce its position as the world's prime exporter of basic agricultural commodities. The dramatic surge in South America owes much to the spread of farming into the drylands of the *cerrado* in Brazil, which was not cultivated until the 1990s. The continued growth in production of soybeans, maize, protein meals, meat and raw sugar are expected to increase the net export position of the region by 17% between the baseline period 2020-22 and 2032.

Eastern Europe and Central Asia became a net exporting region in 2008. The collapse of the Soviet Union and the subsequent privatisation of state and collectively owned enterprises including farms led to significant productivity gains that boosted agricultural production. The limited domestic demand, due to stagnating population and per capita consumption, combined with a strong economic relationship with booming Asia contributed to the export expansion of the region. However, while Europe and Central Asia are projected to maintain a strong net exporting position, their past increase in trade surpluses of is expected to slow down in the short run because Russia's war against Ukraine is hampering growth in agricultural production and exports from these countries, with more profound impacts on the Ukrainian agricultural sector related to limited marketing opportunities, low farm gate prices and high input costs. In the medium term, the *Outlook* assumes that production and exports of these two countries will return to their pre-war trends. Western Europe (Figure 1.37, panel b) is a net importing region for the agricultural commodities covered in the *Outlook*, but a net exporter of processed food products. Western Europe's net trade deficit will decrease due to slower demand growth.

North America is expected to remain the second largest exporter of agricultural commodities to world markets over the next ten years, but its continued strong domestic consumption growth is expected to slightly slow down the progression of its net exporting position.

In Oceania, Australia and New Zealand are traditional net exporters of agricultural commodities. Over the coming decade, the region is expected to continue maintaining their net trade position, due to continued efforts to increase its access to other market through the negotiation of preferential trade agreements.

Figure 1.37. 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/fwb8az

Deepening net importing positions from regions with fastest population growth

Import patterns have changed significantly due to the substantial and continuous growth in demand for food and agriculture products from population booms and resource-constrained regions. Asia, with about 60% of the current world population, has seen its import demand more than quadruple in 30 years; this demand has been largely driven by rapid developments in China. China's net import position more than doubled over the last ten years and peaked in 2020 to represent 48% of the overall Asian trade deficit as the ASF outbreak caused a surge in its import demand; the country's exports remained broadly stable. The projected decrease in Chinese population growth will result in a stabilisation of its food consumption and feed use over the coming decade, implying that Asia's net trade deficit will increase by 11% only, in contrast to when it doubled between 2010 and 2020.

With the fastest growing population, Sub-Saharan Africa is the third largest net importing region of agricultural commodities, notably of cereals that support food security both directly and through their use as animal feed. In Sub-Saharan Africa, imports (mainly of maize, rice, wheat, and soybeans) are projected to grow strongly over the coming decade, as population growth is expected to outpace output growth. As a result, the region's trade deficit is projected to further increase by 77% between 2022 and 2032.

In the Near East and North Africa region, imports are projected to continue expanding over the next ten years, while exports are expected to decline, increasing the net trade deficit of the region by a further 32% until 2032. Strong population growth and limited growth in domestic production due to natural resource constraints underpin these trends.

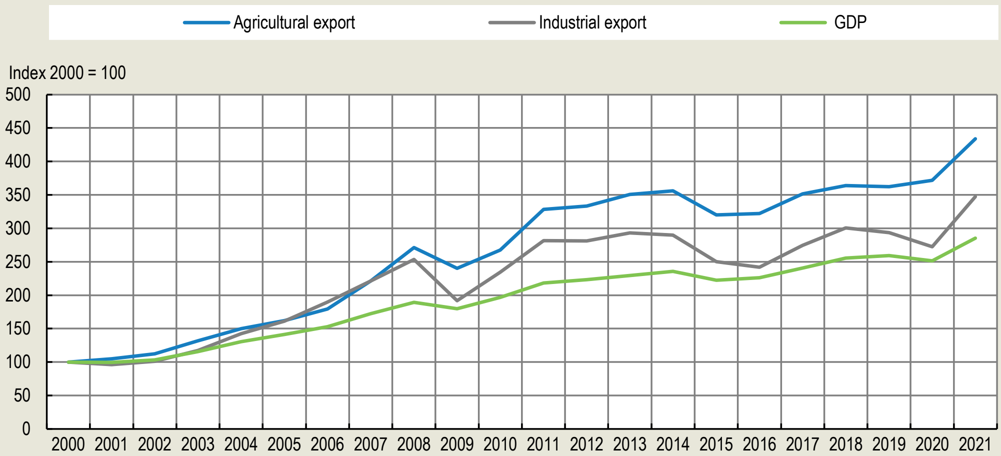
Trade liberalisation at the multilateral and regional levels has fostered greater participation in international markets. Box 1.3 looks at the evidence of globalisation and regionalisation of agricultural trade and highlights the role of trade policies in shaping the geography of trade. The global food and agricultural market has become more resilient, but many countries remain vulnerable to the impact of trade shocks on food security.

Box 1.3. From globalisation to regionalisation

Agricultural trade has been more resilient than industrial trade but is nevertheless affected by the transformation of global supply chains

After booming in the 1990s and the 2000s, the pace of globalisation stalled due to the global financial crisis, the deadlock in multilateral liberalisation negotiations, and diminishing civil society support for mega regional trade agreements. Trade in food and agricultural products showed more resilience than industrial trade during the COVID-19 pandemic. While sustained global cooperation and supportive trade policies maintained a well-functioning global agricultural market (unlike during the 2008 food crisis) (Figure 1.38), agricultural global supply chains are evolving towards greater regionalisation.

Figure 1.38. Growth in agricultural and industrial trade



Source: COMTRADE and World Bank World Development Indicators.

StatLink https://stat.link/uxij24

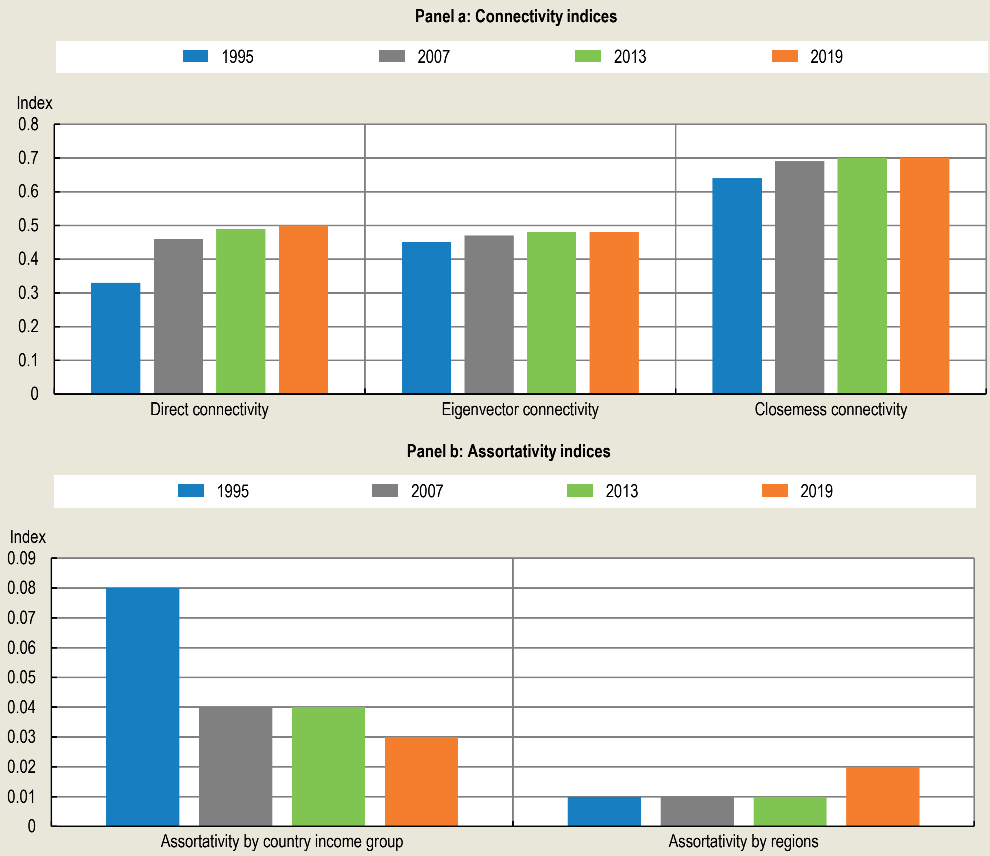
At present, more countries are trading and the global agrifood market is less concentrated and more decentralised than in 1995 because of the greater participation of low- and middle-income countries. Before the creation of the WTO, a few large trading hubs dominated the trade network. Their dominance over time weakened as more countries participated in agricultural global value chains, resulting in more

South-North trade and more hubs than two decades ago. This trade integration has been an important driver of the diffusion of technology and knowledge necessary to promote productivity and overall growth.

The regionalisation of food and agricultural trade – the tendency of countries to trade more within a region than with countries outside the region – increased between 1995 and 2019. Within the global food and agricultural trade network, countries tend to form particular trade clusters and to trade more within them. These clusters may be regional, or they may expand to include countries across regions. They are often shaped by geographic proximity and economic integration fostered by trade agreements.

The global network of food and agricultural trade has become more balanced. Today, more countries are connected to more trade partners, which can strengthen the buffer capacity and resilience of the network. Several network indicators show that the connectivity of countries to the global network of food and agricultural trade has increased (Figure 1.39, Panel a). The higher the connectivity, the more countries are connected directly with each other (direct connectivity) and with countries that are themselves connected to many others (indirect connectivity). Connectivity can be measured by the number of links or by the value of products that are traded via these links.

Figure 1.39. Average connectivity between countries in the global food and agricultural trade network, 1995-2019



Note: Connectivity is measured by the number of trade links, i.e. import or export flows between countries. The higher the connectivity, the more countries are connected directly with each other (direct connectivity) and with countries that are themselves connected to many others (eigenvector or "indirect" connectivity). The closeness index indicates how "close" a country is to all other countries in the network. It is measured by counting the shortest paths, where each short path is defined as the strongest link, that is the link with the highest trade intensity (value of import or export flows of a country), between two countries. The higher the closeness index, the more central a country is located in the network and the "closer" it is to all other countries.
Source: Jafari, Engemann and Zimmermann (2022[15]).

StatLink https://stat.link/vrbz2a

Countries are closely connected with each other and, overall, are better integrated in the trade network, as indicated by the connectivity indices (Figure 1.39, Panel a). The direct connectivity index counts the number of trade links that a country has within the global network of food and agricultural trade and is normalised by the total number of possible links in the network. The eigenvector connectivity further counts the trade links of all direct trade partners. The closeness connectivity index counts the shortest paths, where each short path represents the link with the highest trade intensity, between two countries. The higher the closeness index, the more central a country is located in the network and the "closer" it is to all other countries.

Historically, countries with similar income per capita tended to trade more amongst each other, reflecting similar tastes and preferences. However, with the increasing participation of low- and middle-income countries in global food and agricultural markets, high trade intensity was more likely to take place between countries of a different income group in 2019 than in 1995 (Figure 1.39, Panel b). The assortativity index by regions suggests that countries within a region tend to trade more with each other than with countries in other regions. The more pronounced regionalisation of agrifood trade is often shaped by geographic proximity and economic integration forged by regional trade agreements (RTAs).

Only a few countries continue to account for most of the value traded and only a few source a large variety of food and agricultural products from many different exporters. The fact that imports of most countries are concentrated on a few products from a limited number of trade partners makes them vulnerable to shocks in exporter markets. To improve their resilience and to ensure food security and healthy diets, countries should aim to diversify products imported and to increase the number of trading partners.

Source: FAO (2022[16]).

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

International trade forms the backbone of the global food system. When the terms of trade are determined by comparative advantage and economies of scale, mutually beneficial trade can improve the availability and affordability of different foods and offer a wider choice for consumers. Trade is particularly important for resource-constrained countries, which are highly dependent on the import of basic and high-value commodities. Trade is also a driver of economic growth as it creates opportunities for producers, including smallholders, to access additional markets. Exports of agricultural commodities that account for a large share of domestic production in some countries are therefore an important source of income.

Figure 1.40 illustrates the share of exports in total production (panel a) and the share of imports in total consumption (panel b) for selected regions, measured in calorie equivalent. These shares should be put in perspective with the historical and projected developments of the net trade positions presented in Figure 1.37. At the global level, while net exporting and net importing positions are projected to deepen, the share of trade in production and consumption is expected to remain stable over the coming decade, suggesting they are proportional to production.

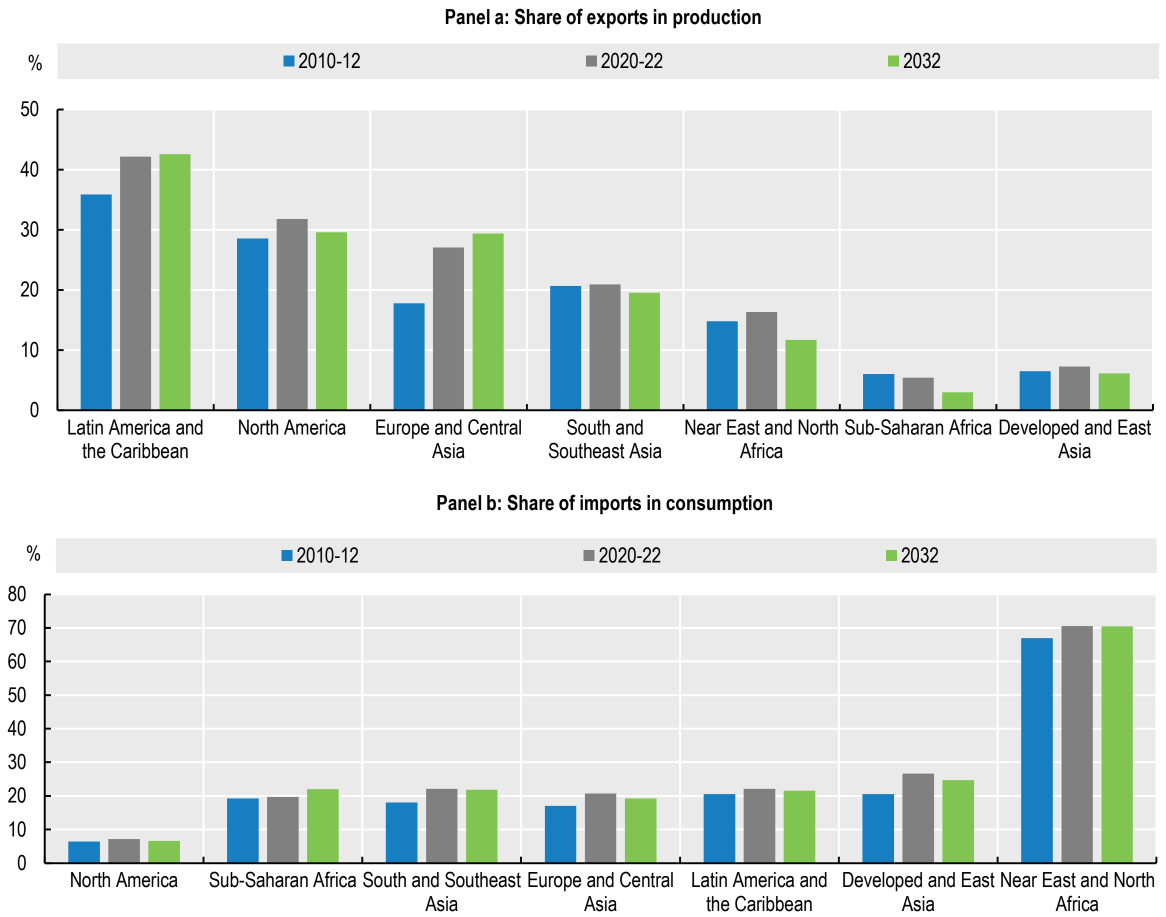
Large producing regions such as Latin America and the Caribbean and North America tend to export (including via intra-regional trade) a large share of their domestic production, at 42% and 32%, respectively in the baseline period 2020-22, and are expected to maintain these shares for the former or slightly reduce it for the latter in 2032. The Europe and Central Asia region is expected to increase its share of exports in domestic production from 27% in 2020-22 to 29% in 2032 (Figure 1.40, panel a).

The role of trade in providing a wider range of food is confirmed by the fact that even large net exporting regions rely on imports for their domestic consumption. In Latin America and the Caribbean, for instance, imports account for about 22% of total demand for commodities covered in the *Outlook* (Figure 1.40, panel b).

In the Near East and North Africa region, where the 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 71% of total demand of agricultural commodities in the region in 2020-22, a share that is expected to remain stable over the coming decade.

In Sub-Saharan Africa, the share of imports in total demand was lower, at 20% in 2020-22. However, this share is expected to reach 22% by 2032 as growth in domestic production will not keep up with high population growth (Figure 1.40, panel b). Insufficient infrastructure supporting the development of trade, but also the prominence of informal cross-border trade in the region, can explain the relatively low level of imports in consumption goods.

Figure 1.40. 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. The regions Developed and East Asia, and South and Southeast Asia are defined as in Chapter 2.

Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/5fi36y

1.4.5. Uncertainties affecting international trade in agricultural commodities

The disruptions in global supply chains caused by the COVID-19 pandemic due to the increased demand for durable goods and the logistical bottlenecks created by movement restrictions in locked-down countries, have faded. While freight and shipping container rates are decreasing, infrastructure challenges continue to be a problem for some supply chains. Moreover, energy price hikes and the sustained price volatility resulting from Russia's war against Ukraine have had a big impact on transportation costs and their evolution remains subject to high uncertainty.

The recent price surge and volatility have revived the risk of countries imposing export restricting measures to keep domestic food inflation in check. According to the International Food Policy Research Institute (IFPRI) presentation given during the Agricultural Market Information System (AMIS) initiative webinar "Ukraine One Year Later – The Impact of the War on Agricultural Markets and Food Security" (AMIS, 2023[17]), at least 20 countries have imposed a limit on exports since the war began. Yet export bans are only aggravating the adverse effect of price uncertainties and can only push prices further up. They have a negative impact on global food security (and livelihoods) in the short term, and undermine supply capacity in the long term.

Increasing concerns on the role of globalisation in global warming, the depletion of natural resources, deforestation, and biodiversity loss support growing demands for more sustainable food and agricultural trade. However, the agricultural support policies and unilateral trade policy approaches adopted to pursue climate change mitigation objectives can create important distortions on production and trade.

Developments in trade policies that will be negotiated and implemented over the coming decade could have significant impacts. The *Outlook* includes only policies that are currently in place and holds them constant over the medium term; this constitutes a source of uncertainty as any change in policies over the coming decade will affect the projections. New trade agreements (e.g. Regional Comprehensive Economic Partnership, EU-Mercosur), for instance, will potentially increase intra-regional and inter-regional trade over the next ten years.

1.5. Prices

The *Outlook* uses prices recorded in the main international markets for each commodity as international reference prices. In addition to market fundamentals, current prices are influenced by the effects of short-term demand and supply shocks, such as economic and political shocks (e.g. the COVID-19 pandemic and conflicts), and annual weather fluctuations. In addition, speculation within the context of portfolio investment decisions can influence prices at certain points in time. As the effects of these shocks are largely unpredictable and cannot be incorporated into the projections, prices in the *Outlook* are assumed to return to their long-term trends, which are determined by demand and supply fundamentals.

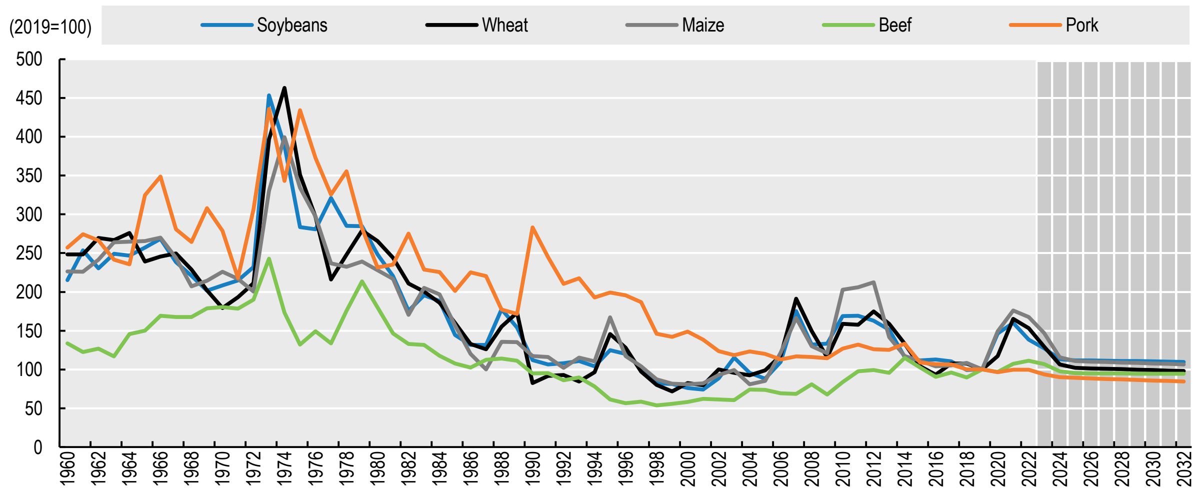
1.5.1. Agricultural price trends and main drivers

Productivity gains the key to production increases

Current real prices (i.e. adjusted for inflation) for most agricultural commodities covered in the *Outlook* are high by historical comparison, but have started to fall in 2022 and are expected to continue downward over the coming decade returning to their projected longer-term trend level (Figure 1.41).

Real prices of agricultural commodities have been on a declining trend since the 1960s due to rising productivity, which lowers the marginal cost of production of food commodities. Prior to 1990, most output growth at the global level was driven by intensifying land use and increasing the area under cultivation, as well as extending irrigation. After 1990, growth in total factor productivity (TFP, i.e. output expressed relative to total inputs used in production) accounted for most of the growth in world output. The emergence of new technologies in the 1990s contributed to improved yields and led to falling marginal production costs, resulting in lower food prices despite rising food demand, especially in high-, upper and lower middle-income countries.[3] Looking forward, yield increases will continue to be the main driver of production increases as the availability of new land is limited. However, sustained agricultural productivity growth may be threatened in the longer-term as average temperatures exceed the biological thresholds of many crop and livestock species.

Figure 1.41. 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

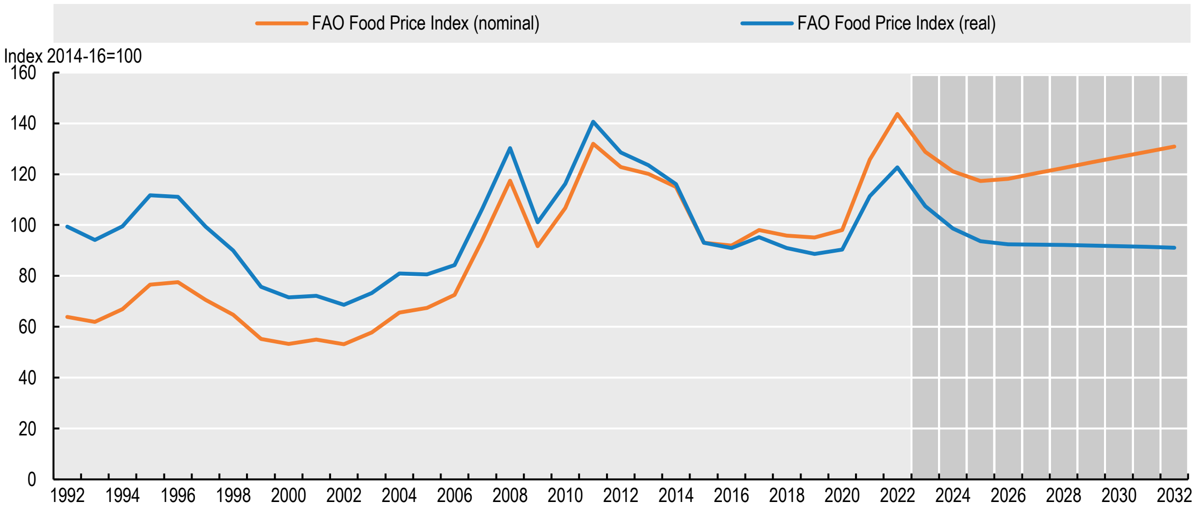
StatLink https://stat.link/rb2v60

Many real prices of agricultural commodities rose substantially in 2020 and 2021, and rose or remained high in 2022. This was due to the recovery following the COVID-19 pandemic, tight global supplies because of higher production costs (mainly energy and fertiliser) due mainly to supply chain disruptions. Poor weather affected harvests in several important producing countries. In addition, Russia's war against Ukraine reduced harvests of key crops in 2022 in Ukraine.

The *Outlook* projects that real prices of agricultural commodities will fall more rapidly in the early years of the projection period as the factors that underpinned the price increases subside; real prices will then resume their projected long-term declining trend, consistent with supply and demand fundamentals expected over the next decade. These projections take into account income and population growth, combined with prevailing consumer trends that influence demand, and continued productivity growth increasing supply.

The FAO Food Price Index (FPI) shows the development of international reference prices of major traded food commodities in a single indicator, and it is aligned with the projections for the commodities covered in the report (Figure 1.42).

Figure 1.42. 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/2d9g0o

1.5.2. Commodity price trends

The grain price spike was due to the COVID-19 pandemic restrictions, and the high input, energy and transport costs. Prices of wheat and maize peaked in 2022, and they are expected to remain higher than their pre-COVID-19 levels in 2023. However, assuming average yields and a broad geopolitical stability grain prices will return towards their long-term trends. Falling wheat prices and recovering rice prices indicate the rice-to-wheat price ratio approach long-term, pre-COVID-19 levels. As cereal prices revert to their projected long-term trend, the co-movement of wheat and rice prices will maintain or return to their historic ratio.

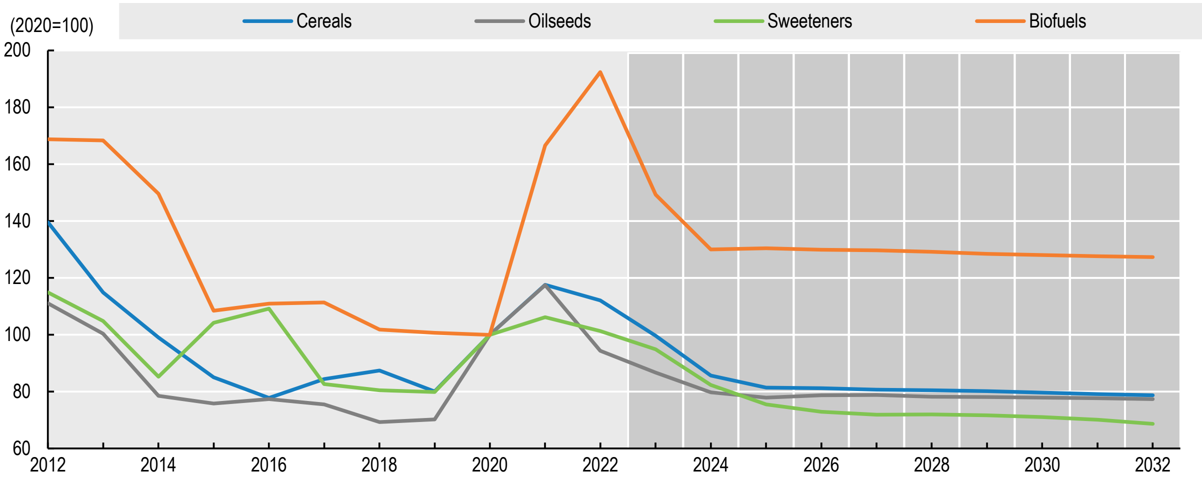
Oilseed prices increased rapidly since 2021 largely due to strong demand, especially for soybeans from China, where hog herds were being rebuilt following the African swine fever (ASF) outbreak necessitating higher feed use. In addition, lower production of soybeans in South America and rapeseed in Canada, combined with Indonesia's export restrictions on palm oil and reduced sunflower oil exportable availabilities following the outbreak of the Russia's war against Ukraine pushed up prices further. After reaching all-time highs in early 2022, international prices for oilseeds and derived products started to fall, mainly on account of prospects of a record soybean harvest in Brazil and ample vegetable oil supplies following the relaxation of restrictive export measures in Indonesia. In the longer-run, oilseed and protein meal prices are expected to decline in real terms while vegetable oil prices could increase in nominal and real terms due to strong demand and constrained production growth as palm oil plantations in Indonesia and Malaysia are maturing and arable land available for oilseeds cultivation in the European Union and China is limited.

Real sugar prices also peaked in 2021 as exports from Brazil were reduced at a time of strong global demand. Higher global production in 2022/23, mainly due to better harvests in Brazil and Thailand, is reflected in higher availability, causing sugar prices to further fall in the near term, although this decline is dampened by still high input prices. The downward trend in sugar prices will continue over the longer-term, due to rising productivity and slowing demand growth. However, stable international crude oil prices are expected to partially offset downward pressure on sugar prices.

Real biofuel prices rose dramatically in 2020 and 2022, driven by high feedstock prices and higher labour costs. Real feedstock prices (i.e. sugarcane, molasses, maize, and vegetable oil) are expected to return to their projected long-term trend over the projection period and biofuel prices are expected to decline and stabilise, although at a higher level than in 2014-2020. However, biofuel production and consumption, and hence prices, will remain heavily influenced by policies, such as blending mandates and domestic support measures.

The higher biofuel to fossil fuel price ratios in 2020 and 2021 reflected high feedstock prices combined with relatively low oil prices. As feedstock prices decline over the projection period, this ratio is expected to revert to historic levels (Figure 1.45). In this regard, the assumption in the *Outlook* of mandates that bind the demand for biofuels with fossil fuel, will contribute to the stability of their relative price.

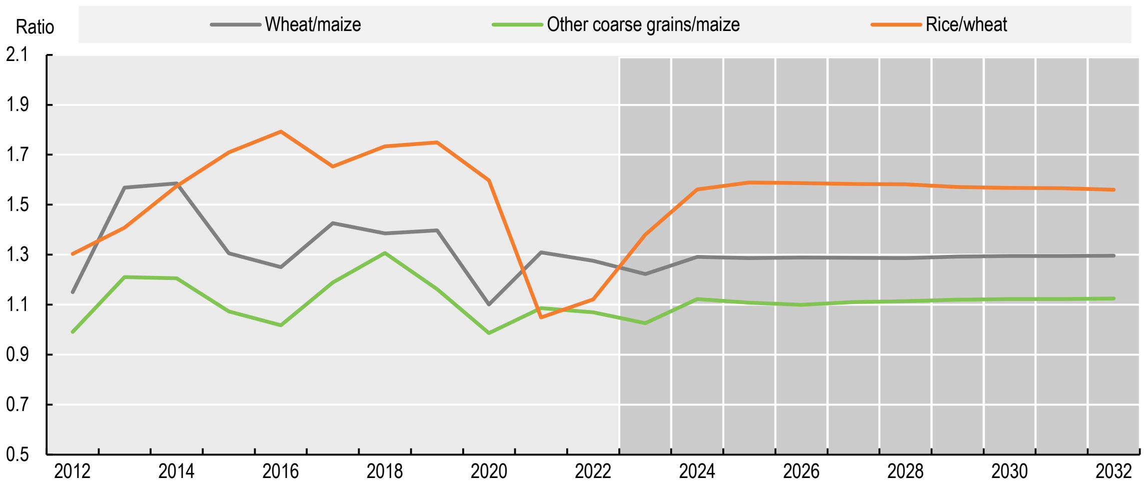
Figure 1.43. Medium-term evolution of crop-based commodity prices, in real terms



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/zwxptn

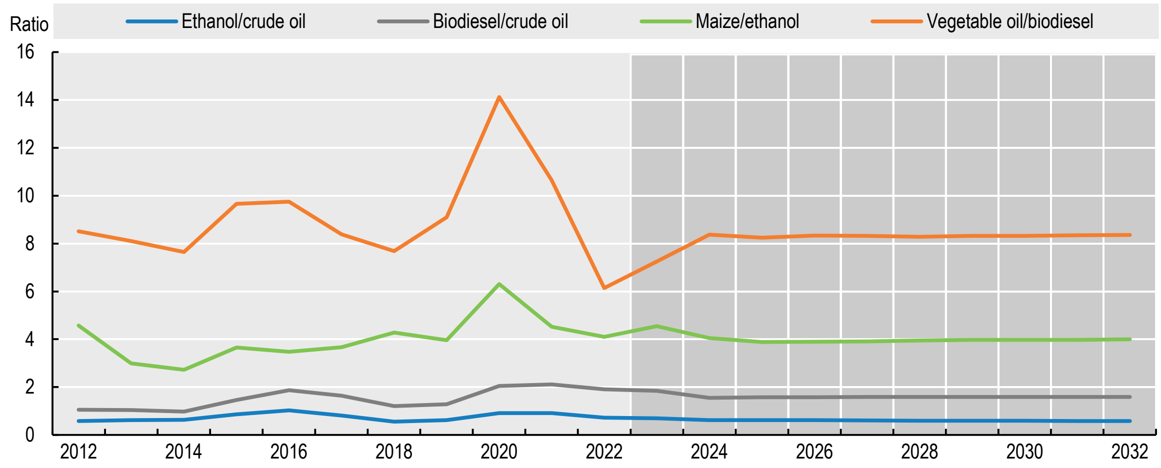
Figure 1.44. Cereals' price ratios



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/dmxf7t

Figure 1.45. Biofuel price ratios

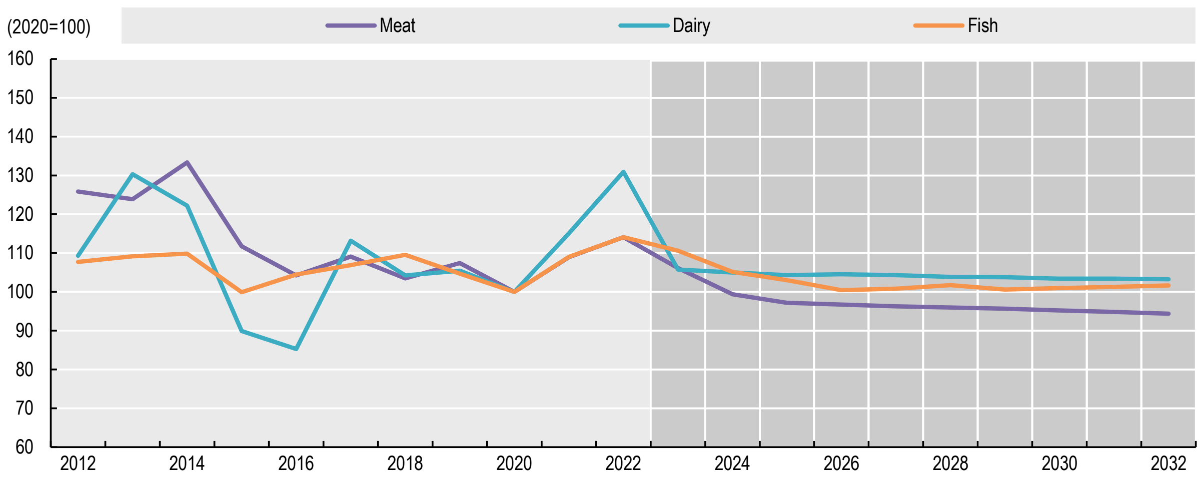


Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/b86vqy

Real meat prices rebounded in 2021 and 2022, reflecting higher demand following the economic recovery from the COVID-19 pandemic as well as increased transportation and marketing costs. Meat prices are projected to decline in 2023 and continue to gradually fall in real terms over the next decade as demand weakens, supply chains stabilise, productivity continues to grow and feed costs decrease (Figure 1.46). Pigmeat prices are expected to decline more than prices for other meats due to the recovery of production following the ASF outbreak, especially in China, Viet Nam, and the Philippines.

Figure 1.46. Medium-term evolution of animal-based commodity prices, in real terms

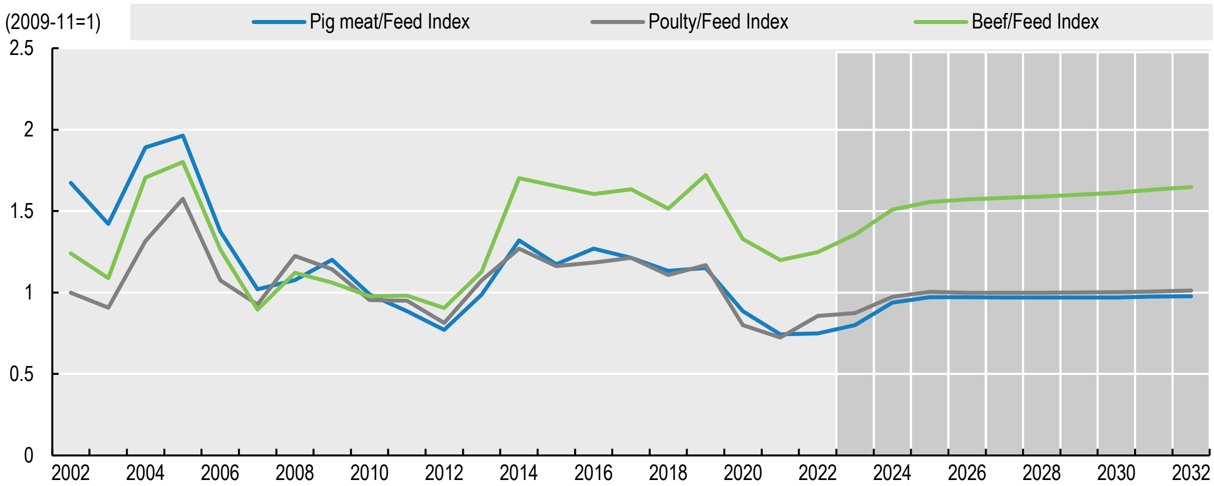


Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/48u5ka

The ratio of meat prices to a feed price index is expected to rise in the short term and then stabilise (Figure 1.47). Beef prices, however, are less affected by cereal and protein meal prices, since most global beef production is pasture-based. Pigmeat 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 1.47. Meat to feed price ratios



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

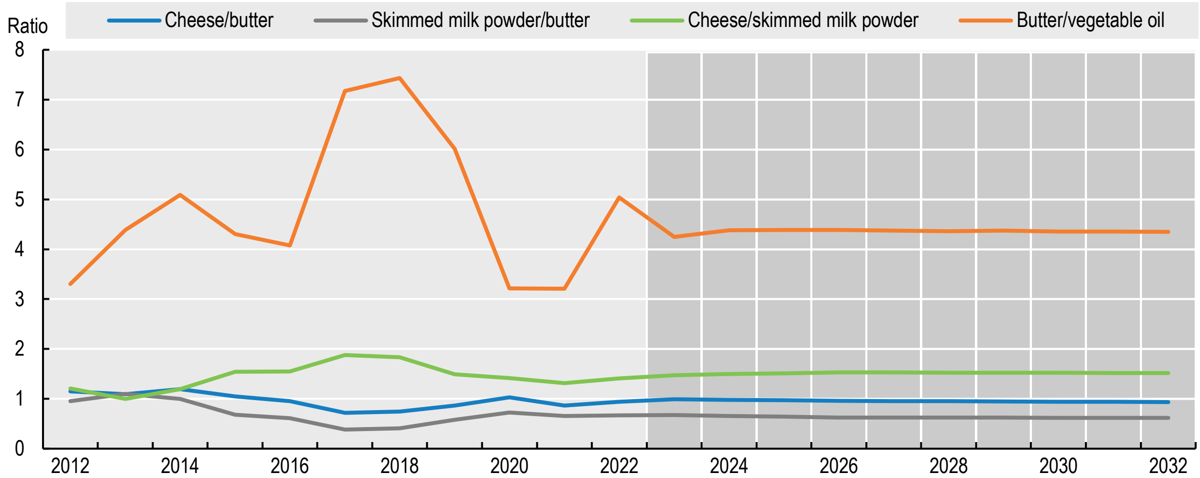
StatLink https://stat.link/e1cdyp

About 93% of global milk production is consumed domestically in the form of fresh, unprocessed, or lightly processed (e.g. pasteurised or fermented) dairy products. Marginal productivity is assumed to improve in dairy sectors across the world leading to a gradual decline in real prices for these fresh dairy products. Higher international prices in 2021 and 2022 were driven by high demand, high inputs costs and tight supply from the main exporters. International dairy prices are expected to fall in the short-term and return to the longer-term pre-COVID-19 trend as supply chain disruptions ease and marginal costs decline.

Global price developments in the dairy sector are mainly determined by trends in the international prices of butter and skim milk powder (SMP), which set the value of milk fat and non-fat milk solids, respectively. Both SMP and butter prices were 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 the price of butter increasing more than vegetable oils through 2022 (Figure 1.48). SMP and butter prices are expected to start decreasing thereafter and to resume their long-term declining trends as supplies respond to current price signals. Real prices of cheese and whole milk powder (WMP) also track developments of butter and SMP prices, respectively.

Real fish prices rose in 2021 and 2022 due to high demand at both household and food service levels, following the recovery from the COVID-19 pandemic, and the modest supply response to growing demand. After 2023, real prices for capture fish are projected to decline while for aquaculture and fish oil there is a modest upward trend. Real prices for aquatic food are projected to remain flat while fishmeal prices fluctuate around a flat trend. Although over the longer-term real prices of fish are projected to decline or remain largely flat, fluctuations over the next decade are expected because of recurring *El Niño* conditions that limit capture in the Pacific.

Figure 1.48. Dairy price ratios



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/tuibwg

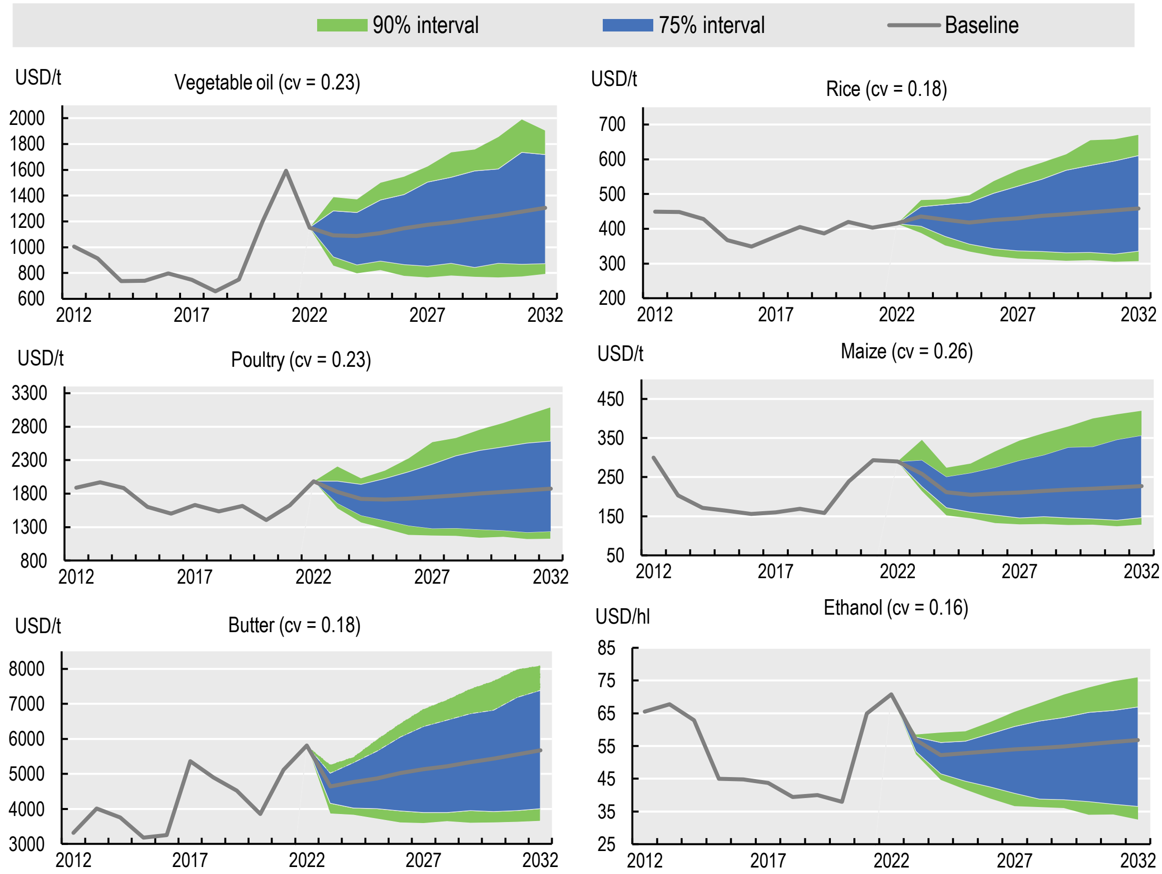
1.5.3. Transmission of price signals within the global food system

While the international reference prices used in the *Outlook* characterise global markets, their actual impact on the decisions of producers and consumers is thought to be indirect. In domestic markets, individual producers and consumers are mainly price takers and their aggregate behaviour determines domestic reference prices. Globally aggregated production and consumption decisions drive international reference prices. The formation and transmission of these price signals depend on the integration of domestic markets into the global trading system, currency movements, and the cost of trade.

How price signals are transmitted between domestic and international markets depends on the share of the domestic consumption that is imported or of the domestic production that is exported, as well as on the responsiveness of domestic prices to trade. In countries with a small share in global markets, a well-developed trade infrastructure and/or high substitutability of trade for domestic products, domestic market shocks are absorbed quickly through trade, and domestic prices are not affected. Major producer and consumer countries transmit their domestic market trends and variability more directly into the global market. By contrast, countries having only very limited interaction with the global market, i.e. those with high self-sufficiency, are mostly, but not always, shielded from shocks transmitted by global price movements, yet they are more exposed to domestic shocks.

Price transmissions are also affected by trade policies, where restrictive policies can effectively dampen the transmission of price volatility to domestic markets. However, when restrictive policies are implemented by countries that account for a large share of the market, or when such policies are implemented collectively, they are likely to exacerbate price volatility.

Figure 1.49. 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/8pg6yb

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

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 an unavoidable degree of uncertainty attached to the projections and to the underlying assumptions. Until a mutually agreeable solution is identified, Russia's war against Ukraine will continue to add uncertainties to energy, input, and agricultural commodities prices. At the onset of the war, reduced availability of grains, oilseeds and fertilisers was of major concern for global markets. More than one year after the start of the war in February 2022, market access issues have somewhat improved thanks to the enforcement and subsequent extension of the Black Sea Grain Initiative, as well as expanding capacity of rail, road and river based export channels from Ukraine via the European Union-Ukraine Solidarity Lanes. However, high and volatile energy prices remain an important factor in food price inflation. In addition, the possible use of trade restrictions and subsidies by some countries to manage domestic inflation is a further source of uncertainty. And in the longer-term, climate change and environmental policies may cause market disruptions.

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 drives and specific agricultural crop yields. Variability related to animal disease or policy changes is not considered. The aggregated results of multiple PSA simulations indicate the sensitivity of the baseline price paths (Figure 1.49). With 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.

Overall, the price variability range is considerably larger than that estimated for last year's *Outlook*. This is most pronounced for vegetable oil, rice, poultry and maize. Notably, the variability is generally much larger above the baseline.

References

AMIS (2023), *Ukraine One Year Later - The Impact of the War on Agricultural Markets and Food Security*, https://www.amis-outlook.org/events/detail/en/c/1156244/ (accessed on 12 April 2023). [17]

Beausang, C., C. Hall and L. Toma (2017), "Food waste and losses in primary production: Qualitative insights from horticulture", *Resources, Conservation and Recycling*, Vol. 126, pp. 177-185, https://doi.org/10.1016/j.resconrec.2017.07.042. [4]

FAO (2023), *The status of women in agrifood systems*, https://doi.org/10.4060/cc5343en. [10]

FAO (2022), *The State of Agricultural Commodity Markets 2022. The geography of food and agricultural trade: Policy approaches for sustainable development*, Rome, FAO, https://doi.org/10.4060/cc0471en. [16]

FAO (2022), *Tracking progress on food and agriculture-related SDG indicators 2022*, https://doi.org/10.4060/cc1403en. [8]

FAO (2019), *The state of Food and Agriculture, moving forward on food loss and waste reduction*, https://doi.org/10.4060/CA6030EN. [1]

FAO (2011), *Global Food Losses and Food Waste. Extent, Causes and Prevention*, FAO. [3]

Giner, C., M. Hobeika and C. Fischetti (2022), "Gender and food systems: Overcoming evidence gaps", *OECD Food, Agriculture and Fisheries Papers*, No. 184, OECD Publishing, Paris, https://doi.org/10.1787/355ba4ee-en. [11]

IPCC (2022), *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, https://doi.org/10.1017/9781009325844. [14]

Jafari, Y., H. Engemann and A. Zimmermann (2022), *The evolution of the global structure of food and agricultural trade: Evidence from network analysis. Background paper for the State of Agricultural Commodity Markets 2022*, Rome, FAO. [15]

Kummu, M. et al. (2012), "Lost food, wasted resources: Global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use", *Science of The Total Environment*, https://doi.org/10.1016/j.scitotenv.2012.08.092. [5]

Lipinski, B. et al. (2013), *Reducing food loss and waste*. [2]

OECD (2022), *Agricultural Policy Monitoring and Evaluation 2022*, https://doi.org/10.1787/7f4542bf-en. [13]

OECD (2018), *Toolkit for Mainstreaming and Implement Gender Equality*, https://www.oecd.org/gender/governance/toolkit/. [12]

Oelosfe, S. et al. (2021), *Increasing reliable, scientific data and information on food losses and waste in South Africa*. [9]

Parfitt, J., M. Barthel and S. Macnaughton (2010), "Food waste within food supply chains: quantification and potential for change to 2050", *Philosophical Transactions of the Royal Society B*, https://doi.org/10.1098/rstb.2010.0126. [6]

UNEP (2021), *Food Waste Index Report 2021*. [7]

Notes

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

[2] 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.

[3] Fuglie, K., J. Jelliffe, and S. Morgan, “International Agricultural Productivity”, https://www.ers.usda.gov/data-products/international-agricultural-productivity/. Last updated: Friday, 7 October 2022.

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 2023-32, and provides background information on key regional issues.

The regional briefs in the *Outlook* highlight broad trends for the regions defined by the FAO in the implementation of its global workplan. Recognising regional diversity, the intention is not to compare results across regions. Instead, they illustrate some of the latest regional developments, highlighting responses to global challenges and emerging trends, and relating these to the main messages of the *Outlook*. The assessments generally compare the end point of the *Outlook's* projection (2032) to the base period of 2020-22. The large and diverse Asia Pacific region has been disaggregated into two separate parts: Developed and East Asia, and South and Southeast Asia.

Agriculture and food systems globally have faced multiple disruptions in recent years – first in the form of the COVID-19 pandemic, and subsequently the impact of Russia's war against Ukraine. The subsequent rise in food prices has impacted affordability and food security in multiple regions. These briefs do not present a quantitative assessment of the impacts of these disruptions, though they do account for the latest expectations with respect to macro-economic developments as the world emerges from these disruptions. The trends and issues presented are those expected to underpin the *Outlook* in the medium term. They assume that the adverse effects on food, feed and fuel production, consumption and trade will gradually moderate, recognising that several uncertainties remain.

This chapter contains 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 for the region.

2.1. Regional Outlook: Developed and East Asia

2.1.1. Background

Rapid urbanisation driving demand preferences

The Developed and East Asia region,[1] with its 1.6 billion people, is the second most populous of those covered in this Chapter, with the overwhelming majority living in The People's Republic of China (hereafter "China"). It is also the only region where the population is expected to decline over the coming decade. The region encompasses a diverse range of countries, that play a central role in global markets. This includes China and Japan, the second and third largest economies in the world. Considered on a per capita basis, income levels range from USD 8 789 in China to USD 62 344 in Australia. The region has urbanized rapidly, and estimates suggest that by 2032, 74% of people will reside in urban settings, up from just 55% in 2010. Such urbanisation contributes to dietary change, including the associated rising consumption of higher value, processed and conveniently packaged food, and consequently contributes to rapid transformation of food systems.

Income growth in the region has been resilient in the face of numerous exogenous shocks. The decline in per capita GDP of only 0.6% in 2020 makes it one of the least affected economically by the pandemic, though clear differences exist across countries, with sharp decreases Japan, Australia, and New Zealand, offset by continued growth in China of 2.0%. Its recovery was also one of the fastest. Regional growth rebounded by 5.7% in 2021, with broad recovery amongst all countries – to the extent that average per capita income in 2021 was already 5.1% higher than in 2019. Despite ongoing war in Ukraine, the consequent increase in energy prices and spiralling inflation, per capita income expanded further by 2.9% in 2022 and is expected to rise by 3.5% in 2023 as China continues to lift pandemic related restrictions. While positive, this marks a sharp slowdown from historic norms and near-term growth prospects face many risks, including a more constrained global environment where demand is softer, commodity prices are falling, inflation is high and monetary policies are tightening. In the medium term, per capita incomes are projected to grow by 3.4% per year, implying incomes in 2032 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 countries.

The region's agricultural resource base is as diverse as the countries included in it. Severe resource constraints in China, Korea and Japan are contrasted by abundance in both Australia and New Zealand. The share in the economy of primary agriculture and fish value added has declined to about 5% and is expected to fall further to 4% by 2032. Economic growth has been accompanied by a reduction in the share of food in total household expenditure to 14%, but it ranges in the region from 18% in China to 8% in Australia. Prevailing high prices and affordability challenges could have a notable impact on food security within the region, but global shocks may be muted to some degree by domestic protection in various countries.[2]

The region encompasses a range of important exporters and importers of agricultural and food products. China and Japan are the largest and second largest net food commodity importers in the world, while Korea is the sixth largest.[3] These countries trade sufficiently to have a notable impact on global agricultural markets and value chains. New Zealand and Australia are among the top 10 global net exporters of food commodities in value terms, particularly for livestock and dairy products. Based on specialisation in the region, there is extensive and growing interregional trade. Apart from Australia and New Zealand, interventionist government policies are influential in local markets. Changes to such domestic policies have the potential to impact global markets significantly, due to the size and contribution to global trade from the countries in which they are imposed.

The challenges facing the region are as numerous as they are diverse. Natural resource constraints in China, Korea, and Japan have led to intensive application of purchased inputs, and growing sustainability concerns. In some areas, water resources have reached critically low levels and parts of the region are highly vulnerable to climate change. Increasingly severe droughts are occurring more frequently, particularly in Australia, a situation that will likely persist and possibly intensify due to climate change. Amongst the major threats specific to meat production are animal diseases such as ASF and Avian Influenza. The extent of impact from the ASF outbreak in China in 2018 serves to highlight the importance of improved measures required to manage these threats.

Despite these challenges, agricultural value addition per unit of land used for agricultural purposes continues to rise. Total factor productivity growth over the last decade is estimated at 1.6% p.a., down from 2% p.a. in the preceding decade.[4] Considering resource constraints, continued investments in productivity growth in the region will be critical to future sustainability.

2.1.2. Production

China driving production growth

The region is the second largest global producer of agriculture and fish commodities, contributing almost a fifth of the value of global output in the 2020-22 base period. By 2032, 9% growth in the net value of production results in a modest decline in its share in global production. China is central in the region's output. In the 2020-22 base period, it already accounted for almost 90% of total value and Figure 2.1 indicates that it is also the sole driver of growth over the outlook period. While China is expected to add 10% to its agriculture and fish production value by 2032, the rest of the region contracts by 3%, mainly due to reduced output in Australia and Japan. 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, and strengthened trade competition.

The regions crop sector accounts for 38% of total agriculture and fish output in the base period, although accounting for fruits and vegetables would increase this contribution. Growth of only 4% implies that the share of crops in total agricultural value added could decline to 36% by 2032. Most of this decline is picked up by fish production, which could account for 27% of total value added by 2032, while the livestock sector sustains its share at 37%.

Total land used for agricultural purposes is expected to decline slightly by 2032, in line with historic trends. This reflects a reduction in pasture, as land used for crop production is expected to expand by 5%, almost exclusively in Australia. Resource constraints in the rest of the region suggest that productivity gains must be central to growth. The value generated per hectare of cropland is already higher in Developed and East Asia than any other region and is expected to remain fairly stable towards 2032. d While some yield gains are expected, due to progress in new seed varieties, improved production practices and expanded irrigation, these are generally slower than in the past. There are mounting environmental and food safety concerns, due to water scarcity, and the fact that synthetic fertiliser use, on a per hectare basis, is already the highest amongst all regions. Fertiliser application per hectare could rise further over the outlook period, albeit slowly, but the projected crop mix and productivity gains are such that the energy produced per unit of fertiliser applied is also expected to rise by 5%.

The region’s crop area is dominated by cereals. Its contribution to global production is notable for several crops, including rice, maize and wheat. Its processing sector also contributes a substantial share of protein meal and vegetable oil produced in the world, but it relies mostly on imported oilseeds. Almost all maize produced in the region is attributed to China, which also contributes 93% of its rice output and 80% of wheat. The balance of wheat production is almost exclusively from Australia. China is expected to expand its area under maize production by 2.3 Mha over the coming decade which, combined with yield gains of 0.7% p.a., fuels production growth of 12% by 2032. Conversely, the area cultivated to rice and wheat is expected to contract by 1.2 Mha and 1.3 Mha respectively. Yield gains are sufficient to induce a 2% expansion in rice production, and maintain wheat production at current levels, despite the area contraction. In Australia, the only other notable wheat producer in the region, production is expected to contract by 16% relative to the base period, reflecting a 5% reduction in area harvested, as well as a normalisation in yields from record levels attained in 2022. Almost all of the decline in regional wheat production is attributed to Australia.

Livestock production constitutes 37% of the total value of agricultural and fish production and growth of 9% is sufficient to sustain this share by 2032. Growth emanates mainly from intensification and productivity gains, reflecting the contracting pasture land base in Australia, New Zealand, and Japan. More than three quarters of meat production growth from the region is expected to be pigmeat, with a further 11% attributed to poultry.

China remains the largest contributor to livestock production in the region, accounting for almost 80% of livestock production value. Pigmeat and poultry are the biggest sectors, constituting 58% and 28% of total Chinese meat production respectively. Meat production in China is expected to grow by 14% over the next ten years and 80% of the additional meat produced will be Pigmeat. Following the devastating impact of the 2018 African Swine Fever (ASF) outbreak, China’s pig herd has largely been rebuilt and in 2022, its pig herd inventory surpassed 2017 levels. Pigmeat production in 2032 is expected to be 8% higher than in 2022, reflecting large scale intensification in the sector as it recovered from ASF. Many smaller producers were replaced by large, commercial production units that prioritise biosecurity. The effects of ASF in the recent past also initiated growth in poultry production, which has a short production cycle and was able to respond the fastest to high meat prices in China at the height of ASF. From 2018 to 2022, poultry production expanded by 20%, but the recovery in pigmeat production and subsequent normalisation in prices results in further growth of only 4.5% by 2032.

Despite its much smaller share in total meat production from the Developed and East Asian region, Australia’s resource base is more conducive to bovine animals, which account for almost half of its total meat production. In turn, Australia contributes 20% of bovine meat production from the region. Growth of 0.8% per annum implies that it will also be a major driver of expanding regional bovine meat production.

The Developed and East Asian region contributes almost 40% of global fish production and 90% is sourced in China. China is also the major driver of fish production growth in the region, which is projected at 1.3% per annum. Growth is much faster in aquaculture, at 1.5% p.a. over the coming decade, compared to only 0.6% p.a. in captured fisheries. Consequently, aquaculture could account for almost 78% of total production from the region by 2032. Given its central role in regional production, the policy environment in China, which has increasingly prioritised sustainability in recent years, will guide fish market developments.

Total agricultural GHG emissions by the region are projected to increase by 5.1% by 2032. Emissions from animal sources are projected to rise by 5.1%, reflecting a 7% and 3% rise in bovine herds and sheep flocks respectively. Crop related emissions also rise by 4.6% over the ten-year period. Nevertheless, when considered relative to the value generated from agriculture and fisheries, the decline in GHG emissions per unit value produced is expected to continue, albeit at a slower rate.

2.1.3. Consumption

Dietary change in China driving increased meat consumption

The East Asian region has made great strides in improving food security and the impact of the pandemic was smaller than in most other regions. While COVID-19 undoubtedly influenced consumer behaviour and agriculture supply chains, GDP performance was fairly resilient, particularly in China, and income support measures in developed countries further mitigated large scale impacts on food security. Despite the marginal increase in the prevalence of moderate to severe food insecurity in 2020, the recovery in 2021 was such that it reached its lowest level in five years, despite rising prices. Total calorie availability increased in 2022 and is expected to rise again in 2023, despite high inflation and the surging cost of living. By 2032, total calorie availability is expected to rise by 6%, around 200 kcal/person/day to reach 3473 kcal/person/day. This is the second highest among all regions and reflects the generally high per capita income levels in most countries. However, corrected for estimated household waste, total calorie intake is expected below 3239 kcal/person/day.

Various trends in population dynamics affect countries across the region. Populations in many parts of the region are aging, with dependency ratios[5] in Japan and Korea already high and set to increase further by 2030 (UN DESA, 2020[1]). It is generally assumed that the aging population trend will have a dampening effect on overall food consumption growth rates in these countries. Conversely, rapid urbanisation, particularly in China, drives growing consumption of convenience foods, and meats, fats, and sugars, which will outpace most other food groups. Sugar consumption is expected to grow fastest among the various food groups and while vegetable oil consumption growth is slower, absolute levels are already high. By 2032, it is expected to approach 28 kg per capita, exceeding the global average by 70%.

Given the level of incomes, development, and maturity in most countries of the region, the greatest shift in dietary composition is set to occur in China. By 2032, per capita consumption of sugar products is expected to rise by 15%, whereas fish, meat and dairy consumption are set to expand by 14%, 12% and 12% respectively. These rates contrast with growth of less than 0.5% in cereal consumption, underscoring the extent of dietary change expected.

Increased meat consumption will also result in increased protein availability, with an expected gain of 10g/person/year by 2032. This brings total protein availability in the region to 118g/person/year – more than 30% above the global average. Most of this gain is expected in China, while small increases are also evident in Korea and Japan. In Australia and New Zealand, protein availability is expected to decline relative to 2020-22, mainly due to reduced dairy product consumption, but from high base levels.

At regional level, per capita fish consumption is also expected to grow by 13% or 5 kg per capita by 2032 relative to the base period. This includes strong growth of 14% in China, smaller gains of 6% in Australia, 5% in New Zealand and 4% in Korea, along with relative stability in Japan.

The region accounts for just over a quarter of global animal feed use. By 2032, the use of animal feed is expected to increase by 11%, sustaining the regions share in global use at current levels. Several factors combine to determine total feed use, including the intensity of feeding across different production systems and the efficiency of feed conversion by different species. Differences in production practices and predominant species are prevalent across countries. More than 85% of the feed used in the region is attributed to China, where total feed use is expected to rise by 13% by 2032. This encapsulates rising demand from increasingly intensive pigmeat and poultry operations. These large scale, fully commercial systems use feed more intensively than smaller, more traditional producers, but the combination of controlled environment and improved genetics also yields much improved feed conversion. Considering this combination of factors total animal feed use in China is expected to grow marginally slower than meat production. Conversely, dairy, beef and sheep production systems in Australia and New Zealand are more flexible in terms of feed use intensity and more reliant on pasture. Thus, growth in total feed use is slower.

In feed-intensive production systems, maize and protein meal remain the core ingredients in most pre-mixed feed rations and account for almost 70% of total feed raw material use between them. Their use in animal feed across the region is expected to grow by 15% and 11% respectively over the coming decade, with the slower rate in protein meal reflecting China’s efforts to reduce protein inclusion in rations. While wheat constitutes a much smaller share of total feed, its use is expected to grow by 21% over the coming decade.

The region accounts for roughly 10% of global ethanol use and almost 80% of this is attributed to China. In 2017, China announced an ambitious E10 mandate with targeted implementation across the country by 2020 and the aim of reducing excessive maize stocks. Stocks have since normalised, providing limited incentive to expand ethanol production. The *Outlook* therefore assumes that blending rates will increase to only 1.7% by 2032, an increase from the 1.2% average over the base period, but well below the ambitious 10% target. With total gasoline use expected to decline, the increased blending rate sustains China’s ethanol consumption growth at 1.1% p.a. over the ten-year period. By 2032, China will still only account for approximately 7% of global ethanol production.

2.1.4. Trade

Diverse group of net importers and exporters

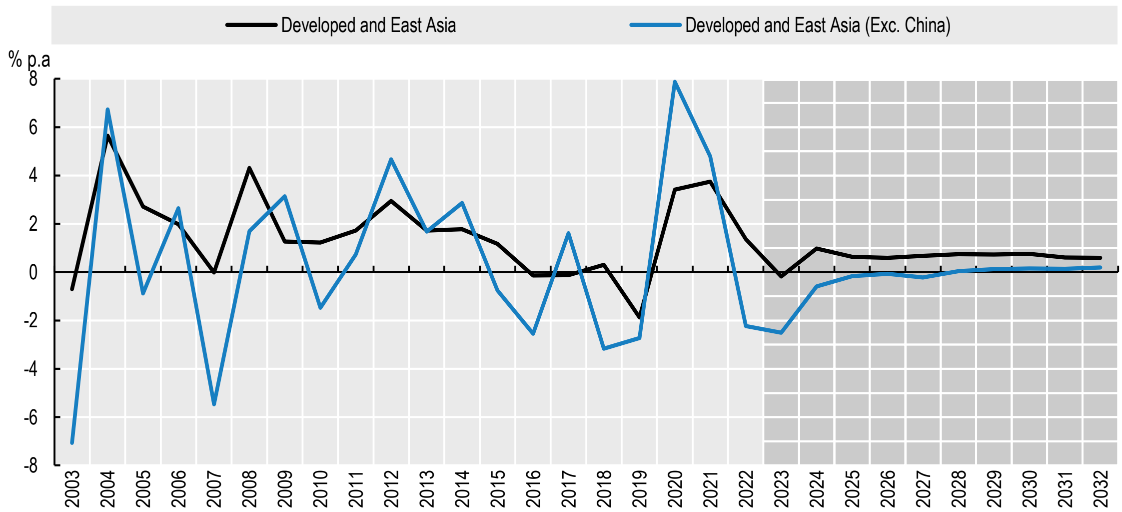
The region’s trade deficit is foreseen to stabilise over the coming decade, but it remains the biggest net importer amongst those covered in the *Outlook*. This position mainly emanates from imports into East Asia, particularly China and Japan, and masks net exports from the Oceanic region. The major products imported into the East Asian region include soybeans, maize, barley, sorghum, wheat, vegetable oil and livestock products. 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 7% by 2032 relative to the 2020-22 base period – a significant slowdown compared to the past decade. Almost three-quarters of the additional imports accrue to China, the largest soybean importer in the world. China’s soybean imports reached an all-time high in 2020, despite the logistical challenges associated with the COVID-19 pandemic. Import demand was driven by rapid growth in poultry production, as well as the recovery in its pig herd post ASF. Imports have subsequently slowed in the current high price environment, but by 2032 are expected to rise by a further 6% due to further livestock production growth and fewer trade related challenges. Despite the slowdown in growth relative to the past, China will still account for 60% of global soybean trade, with the bulk of products sourced from Brazil, the United States and Argentina. While growing animal feed use is also driving demand for maize, imports are set to decline because of strong domestic production growth. By 2032, China is expected to produce almost 95% of its total maize use yet will still account for 9% of global maize trade.

Meat imports into the region are set to decline by 14% over the next ten years, mainly due to the 25% reduction in imports into China, given that its own production has recovered from the impacts of ASF. Bovine and to a much lesser extent ovine are the only meat types where China is expected to increase imports. In the rest of the region, Korean meat imports are set to expand by 12%, but its contribution to total imports into the region is much smaller. Part of East Asia's meat import requirement will likely be met by rising exports from Oceania, which is favourably located to supply Asian markets. Australia is already amongst the top 5 suppliers of bovine meat into China and bilateral trade relations have improved. Australia's bovine exports are expected to grow by 19% to reach 1.8 Mt by 2032. The additional 290 Kt supplied from Australia by 2032, however, only equates to a third of China's expected import growth for bovine meat.

The Oceanic region is a major exporter of numerous other products, but several of these are expected to contract over the coming decade. Wheat exports are expected to decline, but Australia remains an important global supplier, particularly amid the ongoing war in Ukraine, which has constrained exports from the Black Sea region. By 2032, Australia is still expected to constitute 10% of global wheat exports. Despite its small land area, New Zealand accounts for more than 30% of global sheepmeat exports and for 23% of the world's dairy exports. With pastureland increasingly constrained and set to decline further by 2032, sheepmeat exports are projected to remain stable, while dairy exports grow by a modest 6%. Consequently, New Zealand's share in global exports is expected to decline for both products.

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 (2023). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

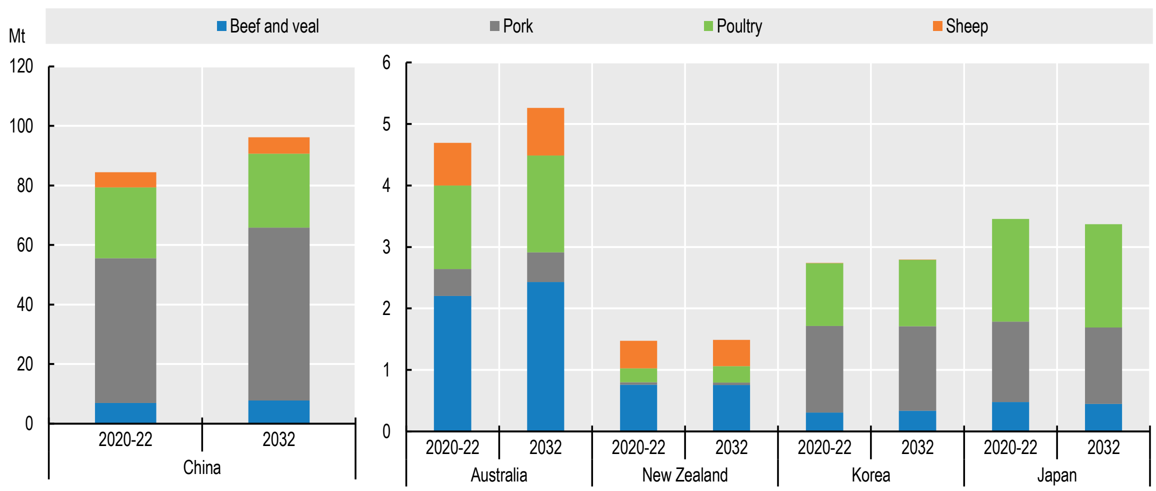
StatLink https://stat.link/dk7wxa

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

Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/js0mwu

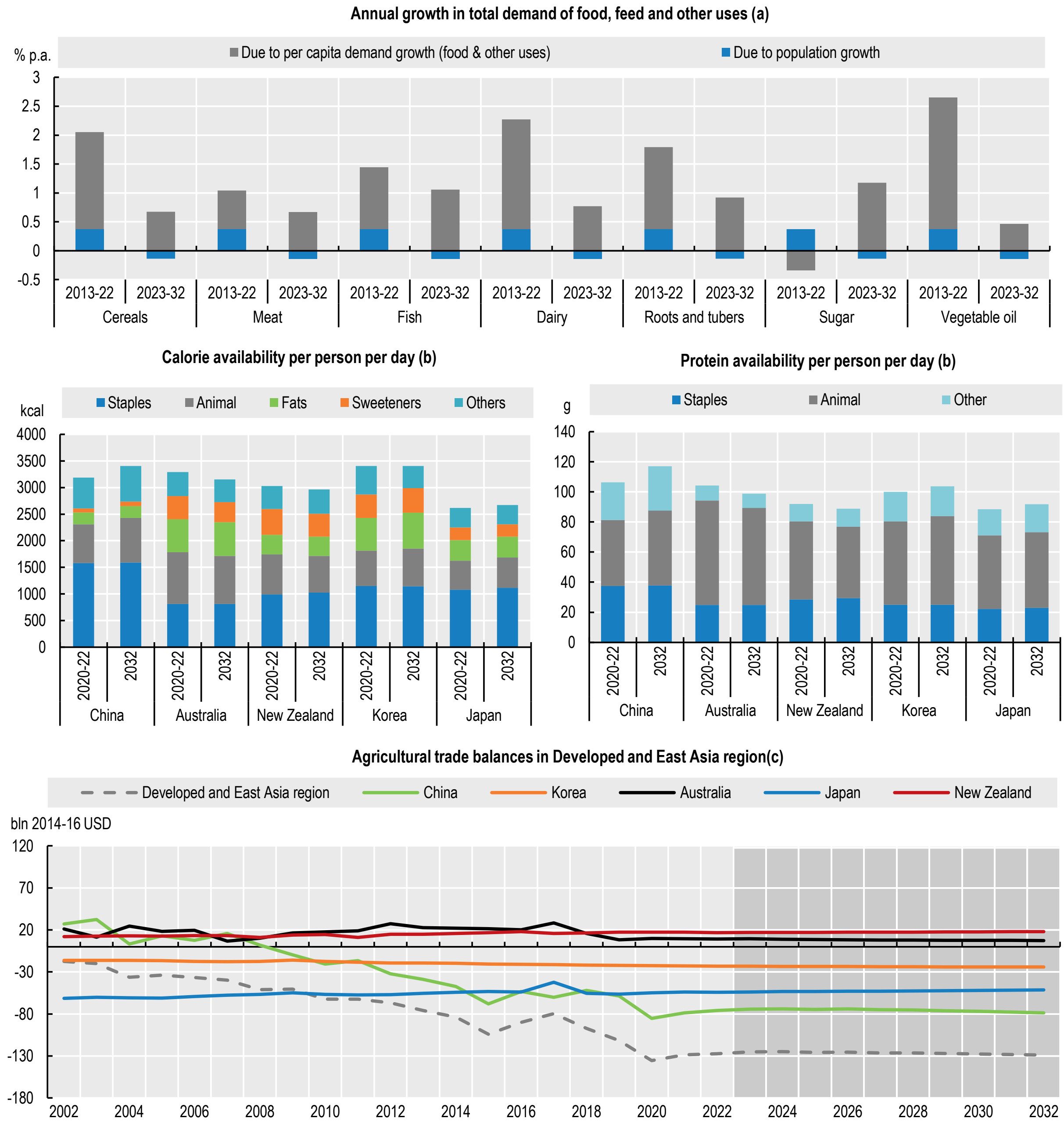
Figure 2.3. Livestock production in Developed and East Asia



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/tb5xil

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 (2023). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV ; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/1po7ik

Table 2.1. Regional Indicators: Developed and East Asia

	Average			%	Growth[2]	
	2010-12	2020-22 (base)	2032	Base to 2032	2013-22	2023-32
Macro assumptions						
Population ('000)	1 561 225	1 633 052	1 612 371	-1.27	0.37	-0.14
Per capita GDP[1] (kUSD)	9.65	13.42	19.48	45.10	3.22	3.42
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	693.6	778.5	845.1	8.56	0.80	0.69
Net value of crop production[3]	249.8	293.3	304.3	3.74	1.61	0.47
Net value of livestock production[3]	277.2	287.8	312.6	8.61	-0.12	0.48
Net value of fish production[3]	166.6	197.4	228.2	15.65	1.06	1.31
Quantity produced (kt)						
Cereals	530 611	631 947	656 970	3.96	0.94	0.58
Pulses	7 698	7 997	8 954	11.96	1.49	0.96
Roots and tubers	39 781	46 356	48 490	4.60	1.62	0.29
Oilseeds[4]	29 227	42 359	45 285	6.91	4.15	0.24
Meat	90 627	96 787	109 126	12.75	-0.03	0.60
Dairy[5]	9 454	10 536	11 447	8.64	1.05	0.71
Fish	59 227	70 199	81 153	15.60	1.08	1.31
Sugar	16 334	14 888	15 612	4.86	-1.65	0.51
Vegetable oil	22 025	30 655	34 679	13.13	2.57	0.83
Biofuel production (mln L)						
Biodiesel	1 220	2 648	2 627	-0.80	6.16	-1.76
Ethanol	8 952	10 406	11 678	12.23	0.63	0.99
Land use (kha)						
Total agricultural land use	933 488	901 336	891 156	-1.13	-0.14	-0.11
Total land use for crop production6	158 208	154 968	162 724	5.01	-0.50	0.61
Total pasture land use[7]	775 280	746 368	728 432	-2.40	-0.06	-0.26
GHG Emissions (Mt CO2-eq)						
Total	967	887	932	5.08	-0.68	0.34
Crop	455	378	395	4.57	-1.61	0.51
Animal	500	498	525	5.42	0.08	0.20
Demand and food security						
Daily per capita caloric food consumption[8] (kcal)	2 948	3 154	3 351	6.25	0.65	0.43
Daily per capita protein food consumption[8](g)	94.5	104.7	114.3	9.21	1.11	0.61
Per capita food consumption (kg/year)						
Staples[9]	156.3	156.3	157.1	0.54	0.06	0.02
Meat	40.3	43.2	48.1	11.41	0.84	0.65
Dairy[5]	4.7	5.4	5.9	9.00	1.97	0.72
Fish	36.0	41.0	46.2	12.55	0.81	1.07
Sugar	11.9	12.0	13.3	10.81	-0.37	1.17
Vegetable oil	20.4	25.1	26.2	4.59	1.65	0.52
Trade (bln 2014-16 USD)						
Net trade[3]	- 64	- 130	- 129	-1.10	..	..
Value of exports[3]	109	119	138	16.35	0.25	1.46
Value of imports[3]	173	249	267	7.21	2.94	0.92
Self-sufficiency ratio10						
Cereals	96.1	91.2	91.8	0.64	-0.34	-0.04
Meat	98.8	91.0	93.7	2.96	-1.07	0.07
Sugar	79.9	70.0	70.0	0.09	-1.45	-0.70
Vegetable oil	66.0	72.0	78.5	9.11	0.01	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. 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 food consumption 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 (2023). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.2. Regional outlook: South and Southeast Asia

2.2.1. Background

Population and robust income growth support strong demand, putting pressure on resources

The South and Southeast Asia region is home to 34% of the global population, making it the most populous region amongst those covered in this Chapter. Just over half of its 2.7 billion people reside in India. Urbanisation is rising across the region and the share of population residing in urban areas is expected to surpass 46% by 2032, from an average of 41% in 2020-22. On average, income levels amount to USD 3 157 per capita, which is at the lower end of the global spectrum, but it includes a diverse range of countries. Amongst its least developed nations, income levels average USD 1 345 per capita, whereas in Singapore, they are above USD 60 000 per capita.

Growth in per capita income, at 3.8% p.a., is expected to outpace all other regions in the coming decade. It has been robust in the past, rebounding quickly from the COVID-19 related contraction in 2020. By 2022, average per capita income levels exceeded those of 2019 by more than 3%. In several countries endowed with energy or commodity reserves, the rebound benefitted from the higher commodity price cycle. Given historic growth, the share of primary agriculture, fish and forestry is anticipated to continue its longer-term decline from a share of about 13% in the base period, to around 9% by 2032.

With strong economic growth, the average share of food in household expenditures in the region has fallen to below 17%. However, for the least developed countries this share is 30%[6] and consequently the rise in food prices over the past two years impacted considerably on the food security of many in these countries. This is evident in the rise in moderate to severe food insecurity in both Southern and Southeast Asia – both regions that have made rapid progress in reducing hunger in the past.

The region has increased its positive trade surplus with respect to agricultural goods, although resources are increasingly strained. It encompasses some 580 Mha of agricultural land, which amounts to just 0.2 ha/person, compared to the world average of around 0.6 ha/person. With population growth expected at 0.9% p.a., resource pressures will only intensify, which means productivity gains are of paramount importance. At 2% p.a., total factor productivity growth exceeded the global average of 1.4% p.a. in the last decade, which was a key factor that facilitated economic growth.[7] Given existing pressure on its resource base, sustainability will need to be at the core of future productivity gains.

Rising income and a growing, increasingly urbanised population imply strong demand growth for food products, but the evolution of consumer preferences remains somewhat uncertain, particularly with respect to animal sourced products. Urbanisation typically leads to rising consumption of higher value, more processed and convenience food products. However large parts of the region are either vegetarian (particularly in India), averse to pigmeat consumption, or lactose intolerant, suggesting that diets may evolve differently to many other parts of the world. At the same time, the heterogeneity across the region implies that demand preferences may evolve differently across it and in some countries, the demand for meat products is growing rapidly.

The region has a fairly small positive trade balance but within it are several important importers and exporters of a range of agricultural and food products. It typically exports almost a quarter of agriculture and fish production. Exports are dominated by plant-based products, particularly rice and vegetable oil, where the region has an 81% and 61% share in global exports respectively. The Southeast Asia region is considered a major player in may global value chains, such as fisheries, cassava, or those involving vegetable oils and their further processed products.[8]

The main challenges facing the region relate to its ability to sustainably increase productivity and innovation, particularly in the face of resource limitations, climate change risks and its growing population. Despite historic progress, the region still accounts for about one-third of the world's undernourished population. To continue improving food security, it will need to sustain income growth in a less supportive global environment, amid high inflation and ongoing affordability challenges. Thus, key policy considerations include the nature and extent of market intervention schemes and how they affect global market interactions.

2.2.2. Production

Sustainable productivity gains are paramount to offset resource constraints

The South and Southeast Asian region is the largest contributor to the total value of global output from agriculture and fisheries. Crop production accounts for the biggest share, at 52%, but livestock production is growing faster. By 2032, agricultural output from the region is expected to expand by 20%, among the fastest of all regions and over the projection period, it will account for the biggest share of global output growth. The rate of agricultural production growth is almost double that of its population, suggesting that the value of agricultural output is also set to rise in per capita terms.

Crop production is expected to expand by 16%, resulting in a slight reduction in its share of total agriculture and fisheries output by 2032. This growth is achieved despite a mere 3.5% increase in land used for crop production over the ten-year period. In fact, growth in value generated per hectare of cropland accelerates over the projection period, to 1.2% p.a., reflecting a combination of intensification, crop mix changes and enhanced productivity. Increased fertiliser use will contribute to achieving yield gains, as application per hectare is expected to increase 8% by 2032. The response rates are such that the number of calories produced per unit fertiliser applied is also foreseen to rise.

The region is a major contributor to global output for a variety of food products, including rice, wheat, 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 these products.

Cereal production in the region is concentrated in India, Indonesia, Pakistan and LDC's such as Bangladesh, Cambodia, and Myanmar. India alone accounts for around 70% and 40% of the region's wheat and rice production respectively. Growth in cereal production is also concentrated in India, which accounts for three quarters of additional wheat and 46% of additional rice production over the coming decade. Growth in rice production is exclusively yield based, with a 15% increase in India and a 14% increase in Least Developed Asia by 2032, on an almost unchanged area.

Sugar production is dominated by India and Thailand, which account for almost 60% and 17% of regional production respectively. Of the projected growth of 17% in regional sugar production, just over half is expected to come from Thailand, where varietal improvements and improved extraction rates are expected to drive growth, with a mere 3% expansion in area.

The region accounts for 44% of vegetable oil produced globally, owing primarily to palm oil output in Malaysia and Indonesia. This sector has faced numerous disruptions in recent years, including adverse weather conditions, severe labour shortages due to restrictions in mobility of foreign workers through the pandemic and a temporary ban on exports from Indonesia to safeguard domestic supply. These are additional to pre-existing structural constraints, such as aging oil palm plantations and increasing focus on sustainability concerns. Limited expansion of the mature oil palm area underpins a significant slowdown in palm oil production growth in the coming decade, particularly in Indonesia. Most of the additional production is expected to come from yield gains, due to increased mechanisation and renewal of old plantations.

Livestock products currently account for 28% of the value of agriculture and fish output and growth of 2.6% p.a. will lead to an expansion of this share to 31% by 2032. India and Pakistan are the biggest contributors to this growth, which emanates mainly from dairy products. Milk production growth of 33% stems from a 23% expansion in cow numbers and an 8% improvement in milk yield per cow. Half of the expansion in the region's cow inventory is attributed to India.

Poultry accounts for just over half of total meat production and for nearly 60% of additional meat production by 2032. Growth in this sector is largely a result of increased feed intensity and breeding improvements. Pigmeat 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), pigmeat production in Viet Nam has rebounded strongly and by 2022, exceeded 2018 levels. In the medium term, it is expected to expand by an annual average of 1.8%, to exceed 4.7 Mt by 2032. Bovine meat production is expected to rise by 1.6% p.a., with India and Pakistan contributing more than 60% of total production.

Fish production is an important contributor to agricultural output in the region at 20% of total value. However, growth of 15% by 2032 is the slowest amongst the three subsectors, reducing its contribution over time. Whilst growth in captured fisheries is limited, reflecting resource limitations, growth of 2.3% p.a. in aquaculture implies that it will surpass captured fisheries by 2025, accounting for 54% of production by 2032.

Total direct GHG emissions from agriculture are set to rise by 11% by 2032 relative to 2020-22, driven predominantly by the livestock sector. While crop related emissions will rise by 4%, livestock related emissions, which reflect ruminant herd expansion, will increase at a rate marginally slower than the past decade at 1.2% p.a. By 2032, 29% of agriculture related GHG emissions globally will be attributable to the region.

2.2.3. Consumption

Strong demand growth but with distinct regional preferences

After years of progress in reducing food insecurity and undernourishment, these trends in the South and Southeast Asian region have reversed, reflecting reduced income due to the pandemic in 2020, as well as subsequent rising food prices. These factors combined to impact significantly on food affordability and, particularly in East Asia, the prevalence of undernourishment rose above 15% for the first time in a decade. In both Southern and Southeast Asia, the prevalence of undernourishment rose further in 2021, despite the strong rebound in economic growth. Notwithstanding expectations of further income growth, the persistence of high food prices continues to constrain large scale improvements in food security in the short term and, having increased by less than 0.5% in 2022, improvements in calorie availability is again expected to be small in 2023. In the medium term, as food prices start to normalise, the combination of accelerated income growth, modest declines in population growth rates and consistent, albeit slow urbanisation, will support the continued evolution of dietary patterns, driving demand for calorie and nutrient dense foods (Law, Fraser and Piracha, 2020[2]; Kelly, 2016[3]; Reardon et al., 2014[4]). The type of products consumed are, however, also dictated by the region's somewhat unique preferences, with a significant share of the population being vegetarian. By 2032, average calorie availability for consumption is projected to increase by 265 kcal/person/day to approach 2900 kcal, just 5% below the world average, predominantly derived from growth in consumption of wheat, pulses, rice, dairy products, and vegetable oils.

Cereals still account for more than half of the calories available for consumption in the region. By 2032, the share of cereals in total calories consumed is expected to decline to 51%. Rice still accounts for the biggest share of total cereal consumption, but wheat consumption is also rising. At regional level, per capita consumption of rice and wheat products are expected to rise by 0.4% and 0.7% p.a. towards 2032, but trends diverge across countries. In India, rice and wheat consumption are expected to rise at a similar rate. Conversely, in Indonesia and Vietnam, rice consumption per capita is expected to decline, replaced by a concomitant rise in wheat products.

Average protein intake remains well below the global level, but with gains of 9g/person/day by 2032, the deficit is expected to be close to 14%. This is underpinned by growing consumption of dairy and meat products. Dairy product consumption is already well above the world level and growth of 20% in per capita terms by 2032 will see it rise to almost 25% above the average level of consumption globally. The bulk of growth is attributed to fresh dairy products, which are expected to grow considerably in both India and Pakistan. Meat consumption is also expected to grow, but from a low base to reach just 12 kg per capita by 2032, but this regional average masks significant differences within it. In India, meat consumption is very limited and only expected to reach 3.3 kg per capita per year, whereas in Viet Nam, it is expected to rise by 7 kg per capita, to reach 52 kg by 2032. At the regional level, more than half of the growth in meat consumption is attributed to poultry, but in Viet Nam, it's mainly driven by pigmeat.

As livestock and dairy production grow, the combination of herd expansion, rising feed use intensity and efficiency gains will support growth of 21% in feed use by 2032. This expansion is slower than that of meat and dairy production, reflecting the impact of improved feed conversion ratios across the region. In Viet Nam, growth in feed use is much faster, at 34%, due to increasing feed use intensity in its pigmeat sector. Maize and protein meal constitute the bulk of animal feed in the region. The use of maize and protein meal in animal feed is expected to expand by 27% and 23% respectively by 2032, implying that the share of maize in total feed use will continue to rise.

The region is foreseen to increase its share of global ethanol use to 12% by 2032, from less than 8% in 2020-22. This represents a significant gain in its global market share, which rests largely on increasing mandates, particularly in India, which now aims to achieve its ambitious E20 blending target by 2025. However, given limitations in feedstock supply, it is assumed to only reach this level by 2032. In Thailand, which has also developed blending targets as part of its Alternative Energy Development Plan, blending rates are expected to reach 14% by 2032. Ethanol production will add to the demand for agricultural products in these countries, particularly sugarcane, which is a major feedstock.

The region currently contributes a larger share of 22% in global biodiesel use, and this is expected to grow to 24% by 2032, mainly due to increases in Indonesia where implementation of a 30% biodiesel blend aims to reduce dependency on imported fossil fuels. Combined with support measures under its biodiesel programme, this is expected to direct domestic palm oil supplies to the biodiesel market, underpinning growth of 33% in its biodiesel use by 2032. The additional stability that the biodiesel sector provides to palm oil prices could help to encourage investment into the sector, resulting in increased renewal of oil palm plantations.

2.2.4. Trade

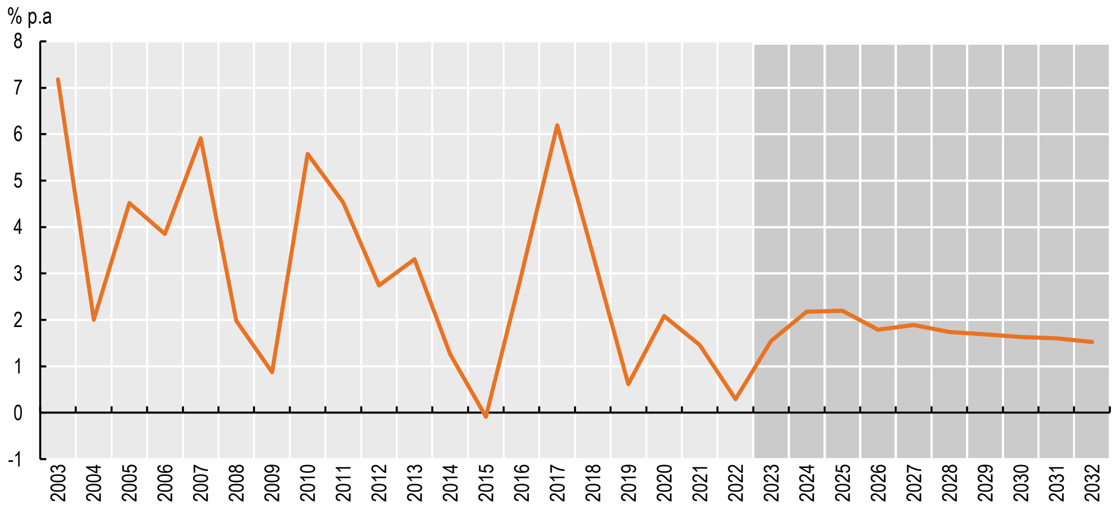
Export surplus sustained by India

The South and Southeast Asia region is a small net exporter of agricultural commodities, but this surplus is expected to decline and become a small deficit by 2032. The region's aggregate position masks significant differences within it. India is by far the biggest net exporter, and historically drove increasing surpluses, but over the outlook is also the primary driver of the decline in exports. Southeast Asia is also a net exporter, but its surplus is small and remains fairly consistent by 2032. By contrast, net imports from the LDC's and other developing countries of the region continue to rise. With the reduction in India's surplus, the region reaches a net importing position by 2029.

Total net exports from the region are expected to contract by 6.7% over the next ten years. Export products comprise mainly rice, roots and tubers, sugar, vegetable oil, and meat. Vegetable oil exports mainly accrue to Indonesia and Malaysia, the biggest palm oil exporters in the world. Growth in vegetable oil exports is limited, at just 0.3% p.a., resulting in a slight reduction in the region's share of global exports. Conversely, rapid export growth for rice and sugar implies that the region will increase its global market share to 86% and 28% respectively. Almost a third of the growth in rice exports are expected to come from Thailand, whose exports could rise by an average of 1.9% p.a., with further significant contributions also coming from Viet Nam and LDC's such as Myanmar and Cambodia. While the region is responsible for almost a quarter of global fish exports, this share is expected to decline, due to limited growth in fish exports amid rising domestic consumption. A significant share of fish trade will occur within the region.

The region is increasingly dependent on imports for several commodities, including wheat, maize, soybeans, protein meal. Import dependence for these commodities is expected to rise over the next ten years. While the region is expected to account for a growing share of global meat and dairy product imports, these comprise a small share of total consumption and self-sufficiency rates remain fairly stable by 2032. In several individual countries, the role of imports are more pronounced.

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 (2023). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV ; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

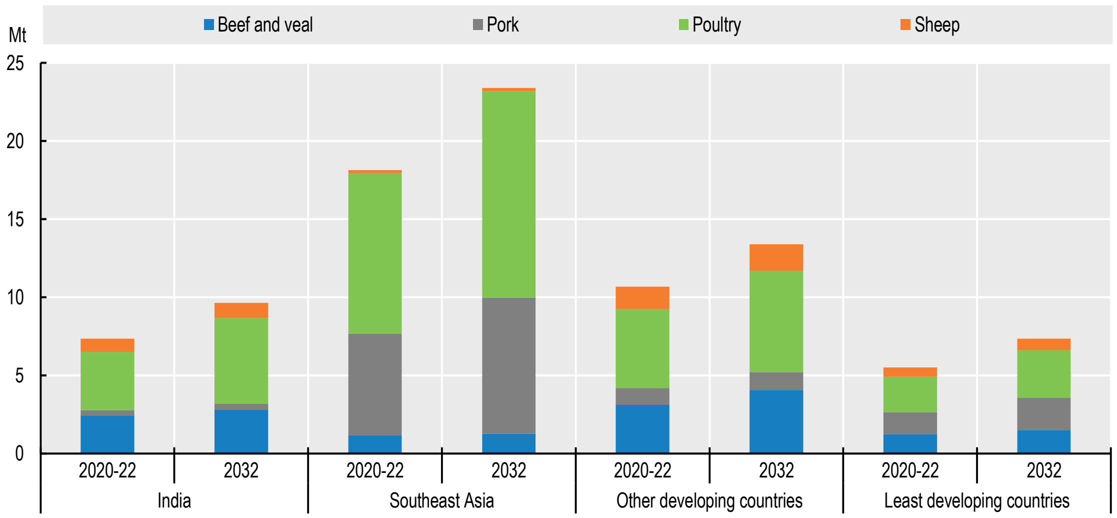
StatLink https://stat.link/k64brx

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

Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/01acn2

Figure 2.7. Livestock production in South and Southeast Asia



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/f1ro4x

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 (2023). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/qsoy7m

Table 2.2. Regional Indicators: South and Southeast Asia

	Average			%	Growth[2]	
	2010-12	2020-22 (base)	2032	Base to 2032	2013-22	2023-32
Macro assumptions						
Population ('000)	2 383 748	2 684 329	2 966 152	10.50	1.16	0.88
Per capita GDP[1] (kUSD)	2.38	3.16	4.75	50.43	2.68	3.76
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	629.4	797.7	957.7	20.06	2.35	1.79
Net value of crop production[3]	359.1	416.5	485.1	16.47	1.50	1.50
Net value of livestock production[3]	154.9	223.8	292.1	30.51	3.68	2.58
Net value of fish production[3]	115.4	157.3	180.5	14.70	2.89	1.36
Quantity produced (kt)						
Cereals	504 777	584 230	681 730	16.69	1.51	1.53
Pulses	26 682	30 403	43 320	42.49	1.59	2.73
Roots and tubers	38 474	52 751	64 465	22.21	2.91	1.93
Oilseeds[4]	16 030	20 723	23 666	14.20	4.40	0.96
Meat	31 371	41 689	53 783	29.01	2.57	2.44
Dairy[5]	29 084	43 441	57 657	32.73	3.44	2.58
Fish	40 966	55 368	63 491	14.67	2.77	1.36
Sugar	47 908	58 418	68 157	16.67	2.06	0.83
Vegetable oil	69 621	96 029	107 361	11.80	3.11	0.83
Biofuel production (mln L)						
Biodiesel	2992.03	13573.36	17767.39	30.90	13.43	1.84
Ethanol	4 122	9 241	18 040	95.22	8.08	3.41
Land use (kha)						
Total agricultural land use	557 782	576 986	587 154	1.76	0.39	0.15
Total land use for crop production6	324 090	348 184	360 525	3.54	0.73	0.29
Total pasture land use[7]	233 692	228 802	226 629	-0.95	-0.12	-0.06
GHG Emissions (Mt CO2-eq)						
Total	1 564	1 705	1 890	10.85	1.07	0.90
Crop	661	689	713	3.59	0.55	0.49
Animal	891	1 002	1 163	16.07	1.42	1.16
Demand and food security						
Daily per capita caloric food consumption[8] (kcal)	2 419	2 541	2 788	9.73	0.49	0.98
Daily per capita protein food consumption[8](g)	60.0	64.7	72.8	12.52	0.7	1.2
Per capita food consumption (kg/year)						
Staples[9]	171.7	172.7	183.4	6.16	0.03	0.58
Meat	8.8	9.8	11.3	15.76	0.81	1.35
Dairy[5]	13.1	16.5	19.9	20.32	1.86	1.69
Fish	14.4	17.1	18.4	7.56	1.54	0.65
Sugar	19.8	21.2	22.7	7.12	0.51	0.51
Vegetable oil	8.3	9.6	10.6	11.05	0.65	0.93
Trade (bln 2014-16 USD)						
Net trade[3]	30	45	-18	-139.97	..	..
Value of exports[3]	179	246	230	-6.70	4.00	-2.16
Value of imports[3]	148	201	248	23.36	3.40	1.73
Self-sufficiency ratio10						
Cereals	97.2	92.6	92.4	-0.19	-0.45	0.11
Meat	94.6	96.6	97.2	0.70	-0.03	0.10
Sugar	98.9	99.9	99.0	-0.87	0.63	-0.26
Vegetable oil	146.3	126.8	119.9	-5.43	-1.23	-0.46

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. 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 food consumption 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 (2023). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.3. Regional outlook: Sub Saharan Africa

2.3.1. Background

Food security for a growing population remains a big challenge

Sub-Saharan Africa (SSA) is a vast and diverse region that comprises 19% of the world's agricultural land and home to 1.1 billion people, 14% of the global population. Amongst the regions covered in this chapter, SSA has a distinct and striking demographic profile. Its population is the youngest, its rate of population growth is the fastest and its urbanisation rate is the slowest. By 2032, SSA's 1.45 billion inhabitants are expected to account for 17% of the world's population. While urbanisation is occurring, it is one of only two regions (the other being Near East and North Africa) where the absolute size of the rural population is still increasing and the only region where more than half of the total population is still expected to reside in rural areas by 2032.

Average per capita income levels in the region are the lowest globally, at USD 1 706 in constant 2010 terms. However, levels vary considerably within the region, with incomes of less than USD 1 000 per capita in the Least Developed Countries, to USD 7 810 in South Africa. Economies typically depend strongly on resource based commodities, such as agriculture, oils and mining, with agriculture (including fisheries and forestry) accounting for 15% of economic output between 2020 and 2022. In some countries, this share is much higher. Despite high commodity prices, per capita GDP growth in the region only recovered by 1.9% in 2021, following the 5% contraction in 2020 amid the COVID-19 pandemic. Further recovery momentum has been constrained by the global slowdown, tighter financial conditions across the world, limited funds to support recovery and surging inflation. Amid rising uncertainty in the global economy, exchange rates in many of the developing countries in the region depreciated sharply, accelerating inflation and in some instances leading to concerns over foreign currency reserves. In per capita terms, income growth amounted to less than 1% in 2022 and is expected to be similar in 2023, before averaging 1.2% over the remainder of the projection period. This will enable average income levels per capita to reach USD 1 930 by 2032, but current projected growth rates imply that the region will only surpass pre-pandemic income levels by 2025.

Consistent with low absolute income levels, households in SSA spend a bigger share of total income on food than any other region covered in this chapter. On average, across SSA, this share is 23%, but it varies amongst countries, with the LDCs in the region spending on average 31%.[9] Per capita calorie intake is already amongst the lowest in the world and the large share of total income spent on food heightens the region's vulnerability to the persistently high food prices evident over the past two years. Amid a myriad of external shocks, such as the pandemic and the ongoing war in Ukraine, food affordability, and consequently food security, has become increasingly strained. The FAO's State of Food Security and Nutrition (2022) notes that the recovery in GDP growth in 2021 did not translate to improvements in food security, as the prevalence of undernourishment rose further to 23.2%, having already increased from 20.1% in 2019 to 22.7% through the pandemic in 2020. The absolute number of undernourished people in the region increased by 12 million in 2021, which was less than half the 34 million additional undernourished in 2020. While the prevalence of undernourishment in the region has been rising since 2018, the pandemic in 2020 induced a sharp acceleration that is proving difficult to turn around in the current environment. The combination of surging inflation, weaker economic growth, and high prices in 2022 will likely have led to further deterioration, with relief only likely when prices start to normalise.

Sub-Saharan Africa is an agro-ecologically diverse, land abundant region that accounts for 16% of global crop land and 20% of pasture. Despite the region's land abundance, significant differences exist among countries in terms of land availability and farm structures. In some regions, there is clear evidence that more medium scale farmers are emerging (Jayne et al., 2016[5]), whereas in others, the agricultural sector is facing pressures from land shortages and declining plot sizes. Large parts of available arable land are concentrated in few countries and is often under forest cover (Chamberlin, Jayne and Headey, 2014[6])), whereas in others it sits in remote areas poorly connected to markets and infrastructure. Despite its high share of land use globally, production practices are often less intensive in nature and the SSA region produced only 5% of the global value of agricultural and fish production in 2020-22. The regions share in global consumption is significantly higher, underpinned by its large population. Dietary composition is still highly staple-dependant and from 2020-22 SSA accounted for 42% of global roots and tuber consumption and 12% of cereals, compared to only 7% of sugar consumption and 6% of global vegetable oil consumption. Protein intake is comparatively low, reflecting weaker purchasing power, with only 6% of global fish consumption, 5% of dairy product consumption and 4% of meat consumption attributed to the region. Despite significant variation across countries, self-sufficiency rates for SSA overall are decreasing for most major food commodities, as domestic supply growth has failed to keep up with the rate of population expansion.

Amongst the greatest challenges facing the region in the near and medium term will be reducing hunger and improving food security in a persistently low-income environment, amid increasingly volatile weather conditions resulting from climate change. Despite improvements and success stories in selected countries, productivity in most of the region remains stubbornly low. Concentration of land abundance in a few countries implies that substantial opportunities may arise to expand intra-regional trade, particularly considering tariff reductions contained in the African Continental Free Trade Area (AfCFTA) agreement, but trade-related costs need to be reduced to improve competitiveness. Over the outlook period, imports into the region are therefore expected to rise further. In an increasingly volatile and fragmented global market, the region's greatest opportunity to supply more affordable food to its growing population and improve food security rests in closing the productivity gap, improving market access, and reducing the costs of transportation and regional trade.

2.3.2. Production

Raising productivity is critical

Over the coming decade, agriculture and fish production in the region is projected to expand by 24% in net value-added terms. This average annual gain of 2.2% remains slower than the expected population growth in the region and hence, the value of production per capita is set to decline further, in line with the trend observed since 2015 (Figure 2.5). The bulk of growth in total value is expected to come from crop production, which will account for more than 70% of total agricultural value by 2032, a slight increase from the base period. While the rate of growth in livestock production is marginally higher than crops, it occurs from a smaller base and its share in total value added is expected to rise only modestly from 19.5% in 2020-22 to 19.8% in 2032. The contribution from fish production to total value is set to decline to 10%. Cereals, roots, and tubers constitute the bulk of crop production in the region and, for many crop types, SSA's share in global production is set to rise. By 2032, the SSA region is expected to contribute 42% of global production of roots and tubers, 22% of pulses, 6.5% of cereals, 2% of oilseeds and 6% of cotton. LDC's account for around 65% of the region's cotton production, mostly situated in West Africa where Benin and Burkina Faso are major contributors. Cotton production from Sub Saharan Africa's LDC's is expected to grow by only 1.5% per annum on average, mostly due to yield gains as a small decline is projected in the area planted to cotton.

Growth of 27% in food crop production over the coming decade will be underpinned by a combination of intensification, productivity gains and changes to the crop mix. The real value of crop production, expressed per unit of cropland used, is expected to rise by 1.7% p.a., accelerating from the past decade. This reflects some intensification, combined with a 7% expansion in land used for crop production by 2032. Double cropping is prevalent in many of the tropical regions with bimodal rainfall, as well as irrigated regions in Southern Africa, where soybeans and wheat are often produced consecutively in a single year. The expansion of rice cultivation, notably in Nigeria, is also expected to benefit from rising prevalence of multiple annual harvests. Further to the intensification, area expansion is also expected in several crops, with increases in roots and tubers, maize, rice, pulses, and other coarse grains only partly offset by reductions in wheat and cotton.

The relatively small expansion in total land use of 0.2% p.a. over the outlook period represents a significant slowdown, at merely half the rate observed over the past decade. The region is mostly considered land abundant, but Chamberlain et al. already noted in 2014 that almost 65% of the available land for expansion is concentrated in only ten countries (Sudan, Madagascar, Democratic Republic of Congo, Mozambique, Angola, Congo Republic, Central African Republic, Ethiopia, and Zambia). Elsewhere, the ongoing expansion of agricultural land use is constrained by land fragmentation, land degradation challenges, conflict in some land abundant countries, and the presence of other competing uses such as mining and urban sprawl. This accentuates the importance of achieving productivity gains to expand production in the region.

Average cereal yields are projected to grow by 1.9% p.a. over the outlook period, marginally faster than the past decade. Continued yield 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 remain substantial by 2032. 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 2022 dampened purchases further. In many instances, this resulted in later, suboptimal application. Over the outlook period, fertiliser use is projected to increase by 9%, but application per hectare is still expected to be less than 20% of the global average (Figure 2.6). This increase is faster in LDC's, where base period application rates are lower, but closure of the gap in fertiliser use remains constrained by affordability, partly due to the high cost of imported fertiliser in the region.

The net value of livestock production is expected expand by 27% over the coming decade, marginally faster than crops. Much of this growth is led by the dairy sector, with the region expected to add 10 Mt of milk and almost 3 Mt of meat by 2032. Bovine meat is currently the largest among the different meat sectors in SSA and along with poultry is expected to account the biggest share of additional meat production, with 1 Mt of bovine meat and 916 Kt of poultry added by 2032. This is further supplemented by 622 Kt of ovine meat and almost 400 Kt of pigmeat. Most meat production growth is expected to occur in the region's LDC's (Figure 2.12).

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 2020-22, 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 has increased steadily over the past decade and is projected to expand to almost 19% by 2032, yet its share in global beef production will remain just below 8%. Similarly, the region constitutes 13% 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 will graze 29% of the global flock. The extensive nature of production systems also implies that a substantial share of production is reliant on natural grazing, which is influenced by weather conditions. Consequently, extreme weather conditions such as the prolonged drought in the Horn of Africa has resulted in large scale losses due to limited availability of grazing. Such pressures could increase in the coming decade, as the projected herd expansion will occur on an area of almost unchanged pastureland and climate change could have severe impacts on the frequency and intensity of extreme weather events.

While extensive poultry production systems, reliant on indigenous, dual-purpose breeds are still common in the region, a greater degree of intensification is also emerging, particularly in countries that produce surplus feed grains, such as South Africa. Albeit from a small base, feed intensity is expected to continue increasing in the region as supply chains modernise in countries such as Zambia, Tanzania, and Nigeria, but many smaller producers still 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 slower rate than poultry production, but this difference is bigger in Ethiopia and other LDC where intensification is still slower.

Fish production in the SSA region is still mostly based on captured fisheries, which constituted more than 90% of total fish production in the 2020-22 base period. Aquaculture is growing and is expected to expand by almost 20% by 2032, but from a small base and is still expected to account for just under 10% of total fish production by 2032, compared with 8.7% in the base period. Growth in captured fisheries is slower, at 11% for the ten-year period to 2032, reflecting the finite nature of fisheries resources.

These projections imply that the region's direct greenhouse gas (GHG) emissions from agriculture are expected to rise by 19% in 2032 compared to the base period. This is largely underpinned by further growth in extensive livestock, often in semi-arid areas where crop production is not viable and, by 2032, Sub-Saharan Africa will account for 16% of the total direct agriculture emissions globally. However, agricultural emissions per USD value of production in the region are expected to continue a declining trend.

2.3.3. Consumption

Dietary diversification remains sluggish

The region is home to the highest concentration of poor and undernourished people in the world. Total calorie availability per capita is the lowest amongst the regions covered in this chapter. Pre-existing food security challenges in SSA were exacerbated in recent years by the prolonged effects of COVID-19 and the restrictions imposed to contain it, along with the ongoing war in Ukraine, surging inflation, and slow economic recovery. The initial shock from the pandemic was twofold, through supply chain disruptions, particularly in informal markets that abound in the region, as well as income and employment shocks which inhibited affordability of foods. While economies have opened post COVID-19, the effects of the war in Ukraine prolonged many of the supply chain challenges, particularly for commodities such as wheat, which are mostly imported into the region. The combination of persistently high food prices, slower economic growth in the short term and surging inflation will only perpetuate affordability constraints. Consequently, food security and undernourishment will likely remain challenges and even as income levels start to rise, a sustained recovery will require improvements in the availability, accessibility, affordability, and utilisation of food supplies in the future.

The combination of economic contraction in 2020 and high prices since has led to reduced calorie availability per capita in the region for successive years. Stubbornly high inflation and the slow projected recovery in income levels further implies that per capita gains in calorie availability will be slow, suggesting that population growth will remain the major driver of rising food consumption in the region. In fact, the rate of population growth is such that, despite a mere 5% gain in total calorie availability per capita by 2032, SSA will still be one of the largest sources of additional food demand. Consequently, the region's share of total food calorie consumption in the world is expected to rise from 12% in the 2020-22 base period to 14% by 2032.

Increases of 124 kcal/day over the outlook period will enable average calorie availability in the region to exceed 2555 kcal/capita per day by 2032. Adjusting for estimated household food waste, however, reduces the total intake to 2450 kcal/capita per day. Regardless of adjustments for household waste, total calorie availability in the region is 17% below the global average and still anticipated to be the lowest in the world by 2032.

In terms of composition, the contribution of staples to total calorie availability is higher in SSA than any other region, at almost 70% in 2020-22 (Figure 2.13). Amongst these, maize, roots, and tubers account for the greatest share in total food staples consumption. Per capita consumption of food staples is set to rise further over the outlook period, but the composition is expected to change, with relative stability in roots and tubers contrasted by rising intake of rice and maize. The share of staples in total calorie availability is also expected to decline marginally. For most other commodity groups, including meat, dairy, fish, sugar and vegetable oils, per capita consumption levels are currently the lowest globally. While per capita consumption of meat, dairy, sugar, and vegetable oil is set to rise modestly over the outlook period, a small decline is projected in per capita consumption of fish. Changes in per capita consumption levels suggest that dietary diversification remains slow, but given rapid population growth, total food consumption will rise considerably for all commodities.

Protein availability is expected to increase by 2.6 g per person per day, primarily from plant-based sources (Figure 2.13). Meat and dairy consumption gains are minimal, while fish is expected to decline, limiting improvements in vital nutrient and micronutrient intake.

Cereals are set to overtake roots and tubers over the coming decade as the main source of feed to the livestock sector – with maize the major contributor. However, the extensive nature of production systems that predominate across most of the region dictate that total feed use is low. By 2032, it will account for just over 4% of total animal feed consumed in the world, despite being home to 17% of the world's population.

2.3.4. Trade

Import dependence grows with slow progress in regional trade agreements

To supply its rapidly expanding population, the region is expected to rely progressively on imports to supplement regional production. With few exceptions, most basic food commodities in the region are produced for domestic consumption rather than exports, but domestic production of many products is insufficient to meet demand. Nevertheless, many countries also benefit from counter seasonality in the northern hemisphere and competitive labour costs, enabling net exports of high value fresh produce.

The region's trade deficit in major food items is anticipated to deepen over the coming decade, as the need for imports grows faster than the supply of exports. In constant (2014-16) global reference prices, the deficit is projected to accelerate compared to the past decade, from about USD 9 billion in 2020-22 to USD 24 billion by 2032. Persistent food deficits are expected to be amplified by an increasing food import bill due to global inflation, national debt denominated in US dollars and rising US interest rates, particularly for African countries that are over-exposed to the US dollar.

While largely self-sufficient in maize production, the region is highly reliant on imports of major cereals such as rice and wheat. Amid rising import volumes, self-sufficiency ratios for both these commodities are set to decline to 50% and 24% respectively by 2032. With a large share of wheat imports typically procured from both Russia and Ukraine, imports into the region were severely disrupted at the start of the war in 2022. The cost of imported products also rose sharply over the past year, but initial availability constraints eased following the UN brokered grain deal. Amid ongoing war in Ukraine, and the debilitating, multi-year drought in East Africa, the renewal of this deal in 2023 is critical to the region.

While most trade related problems directly associated with the initial wave of the COVID-19 pandemic have eased, the region already scored poorly in trade efficiency indicators such as the World Bank's logistics performance index prior to the disruptions that characterised the past three years. Import volumes of most commodities have increased following the challenges of 2020, but the region continues to be bedevilled by high freight rates and persistently high fuel costs, which have exacerbated pre-existing high trade costs, increasing prices for consumers, bearing heavily on those with low incomes.

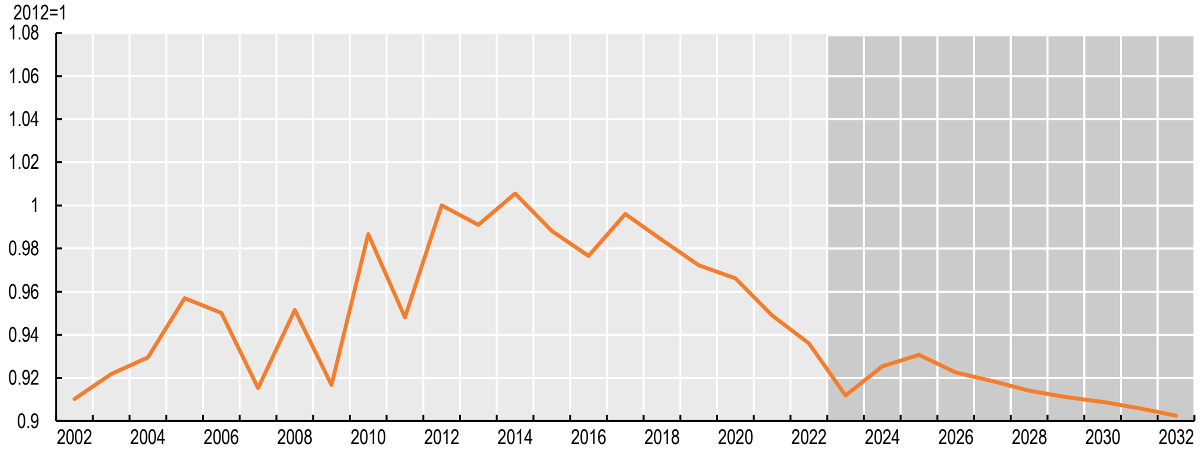
In contrast to basic food crops, the region is a net exporter of higher value products such as cotton, as well as fresh fruit and vegetables. The bulk of cotton is sold in the global market and by 2032, more than 85% of domestic cotton production will be exported. The real value of fruit and vegetable exports are expected to grow by 28% and 44% respectively by 2032. Consequently, the total value of agricultural exports from the region, expressed in 2014-16 USD, are expected to grow by almost 19% over the coming decade.

The SSA region has placed much hope for expanded intra-regional trade on the successful implementation of the AfCFTA. Regionalisation of agricultural value chains for prioritised commodities are part of the African Union strategy to drive agrifood system transformation, increased productivity and agro-processing growth by linking producers and agro-parks in surplus areas to markets and areas of need. The agreement is in its second year of operation and its goal of growing internal trade across the region is critical for economic development, particularly amid rising global uncertainties. The COVID-19 pandemic delayed initial 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 had an impact, but expectations are high and renewed political momentum has provided the agreement with much needed impetus.

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. So far, eight countries are already participating in the Guided Trade Initiative, which seeks to allow commercially meaningful trade under the agreement, to test operational, institutional, legal and trade policy. The products earmarked for trade under this initiative include several agricultural and food products. Despite progress made, many rules of origin agreements remain outstanding, and some customs union members are yet to ratify the agreement, 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. 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. The UNCTAD, in its 2021 *Economic Development Report on Africa* notes that the projected USD 3 trillion borderless market could be instrumental in reversing current trends in poverty, inequality and growth on the continent.

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 in the continent, as per 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[10] and more than 100% higher compared to non-agricultural manufacturing products. 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. 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 *Outlook's* baseline projection.

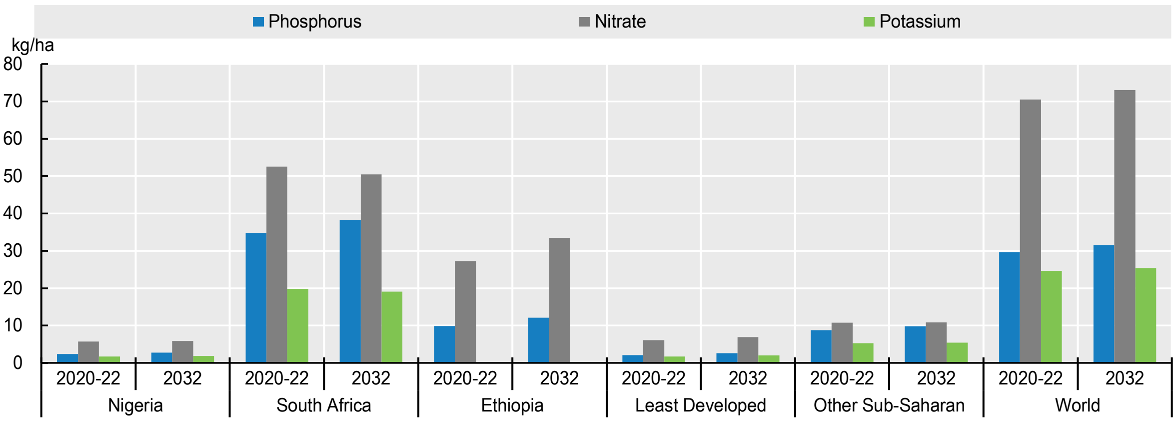
Figure 2.9. Per capita net value of agriculture and fish production in Sub-Saharan Africa



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.
Source: FAO (2023). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/9oavqy

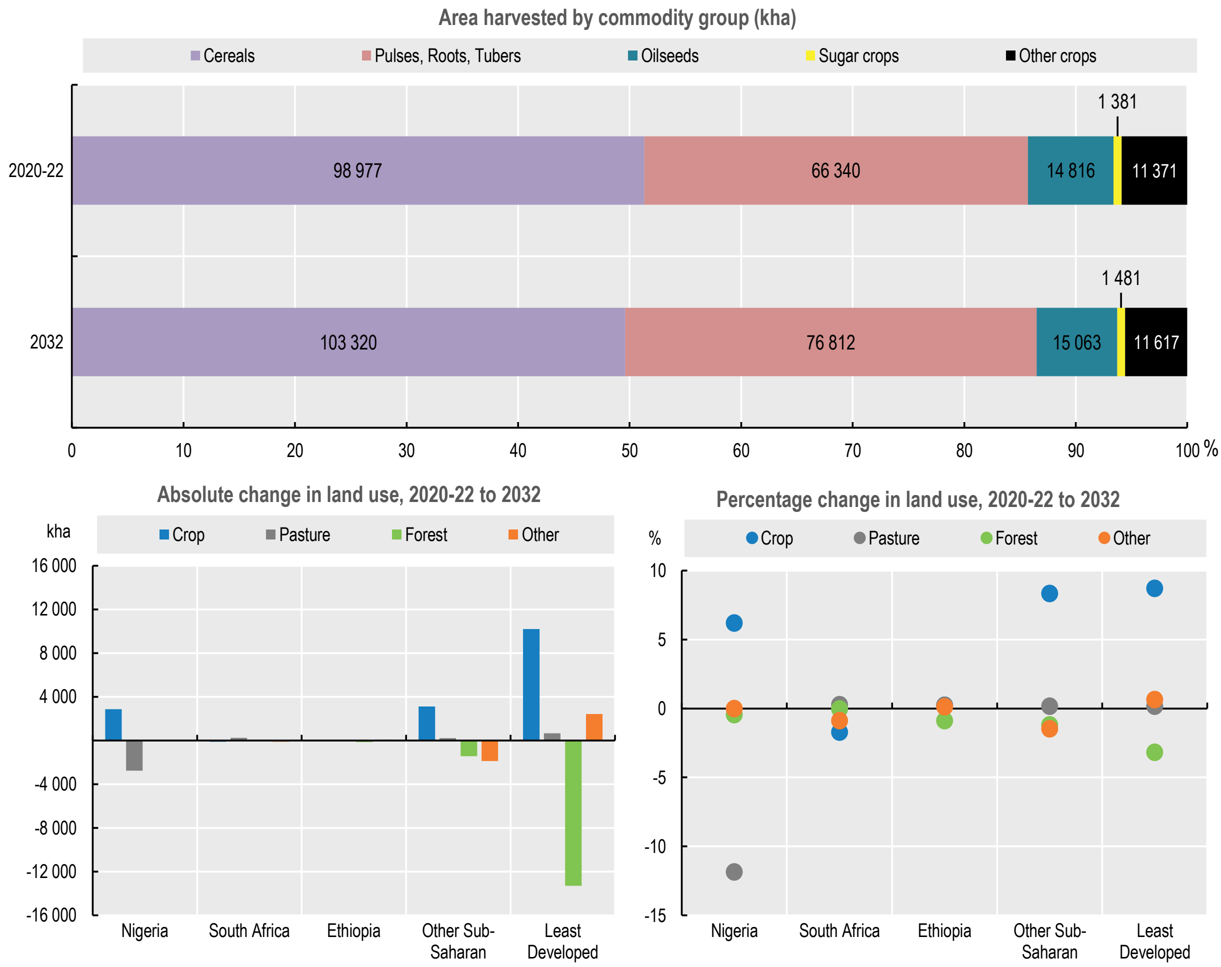
Figure 2.10. Fertiliser application per hectare of land used for crop production is low in Sub-Saharan Africa



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/f3in7l

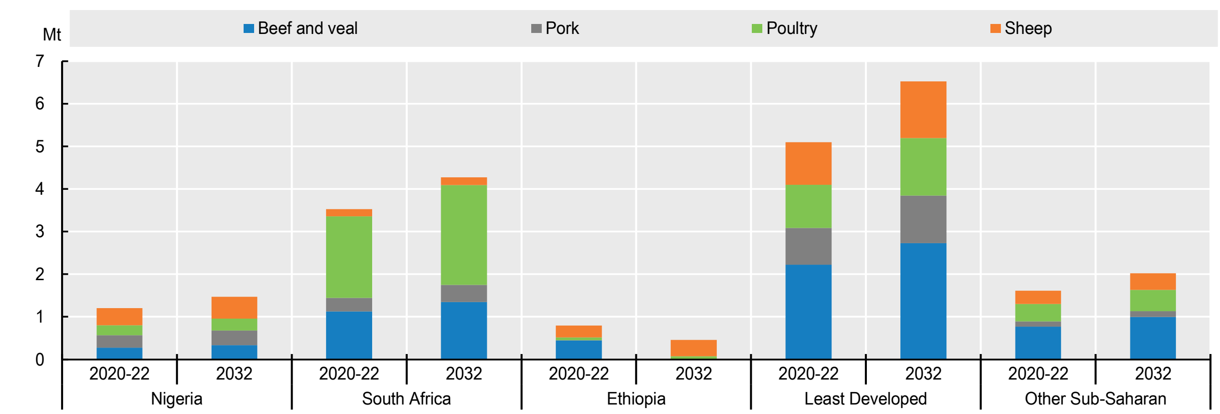
Figure 2.11. Change in area harvested and land use in Sub-Saharan Africa



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/gkc2t7

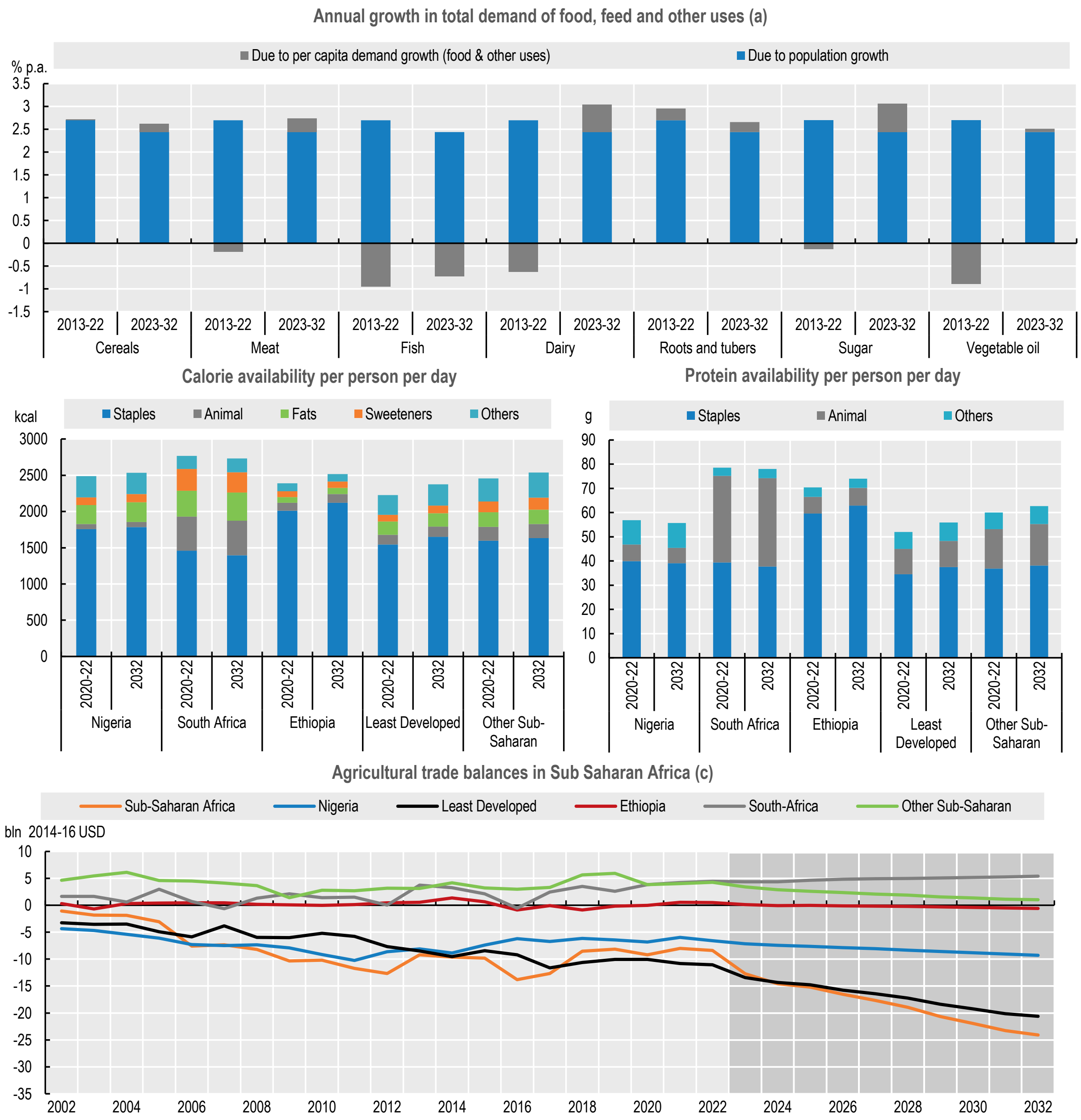
Figure 2.12. Livestock production in Sub-Saharan Africa



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/v4gdnl

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 (2023). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Stat https://stat.link/v35alo

Table 2.3. Regional indicators: Sub Saharan Africa

	Average			%	Growth [2]	
	2010-12	2020-22 (base)	2032	Base to 2032	2013-22	2023-32
Macro assumptions						
Population ('000)	845 829	1 106 238	1 445 172	30.64	2.70	2.44
Per capita GDP[1] (kUSD)	1.71	1.71	1.93	13.28	-0.56	1.21
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	157	200	248	24.10	2.04	2.19
Net value of crop production[3]	104	138	174	25.41	2.42	2.33
Net value of livestock production[3]	36	39	49	26.65	0.72	2.46
Net value of fish production[3]	18	23	25	11.69	2.21	0.80
Quantity produced (kt)						
Cereals	120 032	157 616	201 865	28.07	2.67	2.29
Pulses	16 944	20 664	26 885	30.10	1.61	2.67
Roots and tubers	71 176	96 871	123 649	27.64	2.81	2.68
Oilseeds[4]	7 575	8 662	10 030	15.80	1.11	1.45
Meat	9 651	12 241	15 216	24.30	2.02	2.25
Dairy[5]	3 401	3 975	5 292	33.15	2.27	2.91
Fish	6 343	8 015	8 954	11.71	2.16	0.80
Sugar	6 795	7 632	8 876	16.30	1.34	1.52
Vegetable oil	5 684	7 657	8 533	11.44	3.07	1.03
Biofuel production (mln L)						
Biodiesel	0	0	0	142.91	0.00	2.16
Ethanol	623	923	934	1.12	4.30	2.74
Land use (kha)						
Total agricultural land use	856 537	888 950	903 462	1.63	0.36	0.15
Total land use for crop production[6]	184 325	220 195	236 296	7.31	1.65	0.62
Total pasture land use[7]	672 211	668 755	667 166	-0.24	-0.04	-0.02
GHG Emissions (Mt CO2-eq)						
Total	779	889	1 058	18.97	1.37	1.71
Crop	237	213	221	3.42	-0.46	0.29
Animal	542	674	835	23.92	2.01	2.13
Demand and food security						
Daily per capita caloric food consumption[8] (kcal)	2 368	2 359	2 480	5.14	-0.09	0.74
Daily per capita protein food consumption[8](g)	59.9	57.6	60.1	4.39	-0.41	0.66
Per capita food consumption (kg/year)						
Staples[9]	182.0	187.0	197.5	5.63	-0.07	0.23
Meat	8.3	8.3	8.5	2.26	-0.32	0.26
Dairy[5]	4.3	3.8	3.9	2.25	-0.52	0.55
Fish	9.5	8.8	8.3	-6.35	-0.81	-0.65
Sugar	10.5	10.6	11.4	7.34	-0.13	0.53
Vegetable oil	7.8	7.3	7.8	7.33	-2.08	0.83
Trade (bln 2014-16 USD)						
Net trade[3]	-12	-9	-24	181.96	..	..
Value of exports[3]	32	49	58	18.64	3.02	1.67
Value of imports[3]	43	57	82	43.01	2.00	3.05
Self-sufficiency ratio[10]						
Cereals	83.5	81.9	77.6	-5.22	0.09	-0.24
Meat	87.4	83.4	77.5	-7.14	-0.71	-0.47
Sugar	73.7	64.3	53.1	-17.47	-0.61	-1.10
Vegetable oil	58.6	58.5	49.7	-15.05	1.21	-1.46

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. 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 food consumption 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 (2023). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.4. Regional outlook: Near East and North Africa

2.4.1. Background

Rising import dependence due to fundamental supply constraints

The Near East and North Africa[11] region encompasses a range of countries with diverse income and socioeconomic profiles. Many face similar challenges with respect to the agricultural production environment and a fragile natural resource base. In the region, less than 5% of total land is considered arable and water resources are constrained, so most countries face water scarcity. In several countries, this is extreme. In 2020, 19 of 22 Arab states fell below the threshold for renewable water scarcity of 1 000 m^3 per capita per year, with 13 states situated below the absolute water scarcity threshold of 500 m^3 per capita per year (UN WWDR, 2022[7]). The region is also amongst the most vulnerable to climate change, due to its arid nature and already limited water resources.

Across the spectrum of least developed, middle- and high-income economies, the region includes many oil exporting nations in the Gulf, whose economies are intrinsically tied to energy markets. The contribution of oil to revenue implies that it can have significant impacts on demand prospects. In this regard, energy market volatility in recent years impacted significantly on income levels. The region's economy was amongst the worst affected by the COVID-19 pandemic and per capita income contracted by over 7% in 2020, before rebounding only modestly with gains of less than 2% in 2021. In 2022, support from high oil prices provided new impetus, and growth accelerated to 3.3%. The region's inherent sensitivity to energy market developments implies that it will likely continue to face significant volatility in the short term, as Russia's war against Ukraine continues, but energy prices are expected to remain below 2022 levels by 2032. Medium term prospects will also be influenced by the increasingly challenging global environment and per capita income growth is expected to average 1.7% p.a. over the coming decade. Consequently, it is unlikely to constitute a major driver of demand, which is a concern in a region where healthy diets are unaffordable to more than half of the population (FAO, IFAD, UNICEF, WFP and WHO, 2022[8]).

Population growth is another important factor determining demand and growth is expected to slow only marginally from 22% 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 510 million people by 2032. Approximately 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 substantial quantities of vegetable oil and sugar.

The region is amongst the largest net food importers in the world, largely due to the challenging production environment resulting from its natural resource limitations. Self-sufficiency rates are low for most commodities, but particularly for cereals, vegetable oils and sugar (Figure 2.15). High import dependency also implies that the trade related challenges of the past three years have been particularly impactful in the region. Logistical problems and surging shipping costs emanating from the COVID-19 pandemic and the fragilities it exposed in global trade systems were further exacerbated by Russia's war against Ukraine. Traditionally, the region is highly reliant on both Russia and Ukraine for its wheat supplies. Initial disruptions to trade have been eased somewhat by the grain deal which enabled exports from Ukraine to resume, but volumes are much lower than before, and the region has been forced to source significant quantities elsewhere. The increase in imported cereal prices, further exacerbated by currency depreciation in many non-oil exporting nations, combined with surging inflation and the cost-of-living crisis, strained affordability of basic foods in lower income areas and that of healthy diets across the region. With average food expenditures around 17% of total household expenditures, and least developed countries at 33%, income and price shocks can have a significant impact on welfare.[12]

In an effort to reduce import dependence in major cereals and thereby also the associated vulnerabilities to disruptions, policies have historically sought to stimulate production. While these policies strove to reduce risk, they in fact constrained growth, as these cereals compete with higher value crops for limited water resources. Consequently, the region's already limited resource base was stretched and with rising cereal production, the availability of higher value fresh produce declined. Such produce might otherwise have aided in improving dietary diversity and provide higher income from the same limited resources. Climate change remains a major challenge and geopolitical conflict in the region has further reduced investment and displaced populations, hindering production growth.

The GDP derived from the agriculture, forestry and fishery sector currently comprises only 5% of economic activity and it is expected to decline to 4% by 2032. Egypt produces 25% of the net value of agriculture and fish production in the region, with a further 51% attributed to the rest of North Africa (18% from LDC's and 33% from other North African countries). These shares are expected to be sustained, such that North Africa will continue to constitute more than three quarters of net agricultural output value in the region by 2032.

In a low-income growth environments, and with several countries affected by geopolitical conflict, some of the greatest challenges facing the region relate to accessibility of affordable food products to a growing population. Import dependence is inevitable given limitations to production and natural resource endowment, particularly in a region highly impacted by climate change, hence self-sufficiency rates for most major commodities are expected to decline further. Imports contribute significantly to dietary diversity and efficient trade facilitation can propel progress toward the 2030 goal of eradicating hunger, food insecurity and malnutrition. However, in an increasingly volatile and fragmented global market, faced with a mounting number of severe trade related disruptions in recent years, adaptable and effective policies and procurement practices will be essential to ensure food security and improve resilience. In an effort to mitigate vulnerability, many countries are actively seeking to diversify import sources.

2.4.2. Production

Productivity gains urgently needed to confront severe resource constraints

The region's dependence on global markets is expected to deepen (Figure 2.14), reflecting a projected expansion of 1.5% p.a. in agriculture and fish production, which is slower than the past decade and below the population growth rate of 1.6% p.a. Crop production from the commodities covered in the *Outlook* constitutes 40% of total value, but average growth of only 1% p.a. implies that this share could decline to 38% by 2032. Livestock production growth is stronger at 2.1% p.a., with its share in total net value increasing to 42% by 2032.

Fish production is an important contributor, comprising 21% of agricultural value, but growth of just 0.9% p.a. is markedly slower than the past decade and will see its share decline marginally to 20% by 2032. Almost 70% of total production comes from capture in coastal areas, but fish stocks are under pressure, resulting in a significant slowdown over the outlook period. The aquaculture sector is growing in importance and expanded by more than 5% p.a. over the past decade, with Egypt the major contributor. Growth is projected to slow over the outlook period, but at 2.4% p.a. is still sufficient to drive aquaculture's share in total production to 33% by 2032.

Little change is expected in total agricultural land use, which expands by only 0.5% over the ten-year period. The expansion is concentrated in the least developed regions, mainly Sudan and Mauritania, and almost half of the additional land is for pasture. In most countries in the region, conditions are not conducive to large scale crop production, but more than half of total cropland is expected to be allocated to cereal production by 2032, reflecting a modest decline of 2% from current levels. Coarse grains and wheat account for the bulk of total cereal production and will account for 63% and 35% respectively of total land used for cereals by 2032.

In a region facing such severe constraints in the availability of arable land and water, productivity gains are essential to drive growth. Total factor productivity grew by a modest 1.2% p.a. in the decade to 2019, driven largely by increased capital inputs.[13] The value generated per hectare land used for crop production has increased consistently by 0.8% p.a. over the past decade and this is expected to accelerate over the next ten years to 1.2% p.a. This trend involves multiple factors. The first is intensification, as the 1.5 Mha expansion in total crop area harvested exceeds the 1.2 Mha gain in land used for crop production. The second is considerable improvements in yields for most major crops. Wheat yields are expected to improve by an annual average of almost 1%, to reach 3 tonnes per hectare by 2032, almost 80% of the global average. Coarse grain yields are expected to rise by 1.8% p.a., but only reach 44% of the global average. Most of the expected yield gains are underpinned by improvement in technology, with fertiliser use per hectare expected to decline marginally over the ten-year period to 2032.

Meat production is expected to grow by almost 2.4 Mt by 2032, mostly derived from poultry. Poultry production already comprises 59% of total meat production and growth of 2.8% p.a. increases its share to 62% by 2032. Anticipated growth in bovine meat and sheepmeat production is slower at 1.9% p.a. and 1.5% p.a. respectively. In the case of ovine meat, this represents an acceleration from the past decade, whereas for bovine meat it represents a turnaround from an historic contraction. Growth in inventory is slower than that of production for both bovine and ovine species, reflecting expected productivity gains in meat production.

Direct GHG emissions from livestock activities in the region will expand by 6.8% by 2032 compared to 2020-22, which sharply contrasts with the growth of 28.0% and 23.9% for meat and dairy production respectively. Such differences clearly illustrate that productivity gains are imperative to contain emissions. With crop emissions expected to decline by 3.2%, total direct emissions from agriculture are projected to expand 5.4% by 2032. The historic decline in GHG emissions per unit value of output is set to continue.

2.4.3. Consumption

Affordability limits a shift to healthier, more diverse diets

In an effort to promote food security, policies in the region have traditionally focussed on supporting the consumption of basic foodstuff through subsidies. In recent years, these have been expanded to include animal products. While they did initially improve food security, these policies have further entrenched the region's staple-heavy diets. Furthermore, in recent years, both the prevalence of undernourishment and the number of undernourished people has started rising again. Impact of the COVID-19 pandemic accelerated these trends in 2020. In the current high price environment, the region has been unable to reverse them, with further deterioration of food security in 2021, despite a higher share of total income being spent on food products and the introduction of a range of policies to improve food security and increase resilience. Despite accelerated income growth in 2022, the combination of persistently high food prices and sustained general inflation further constrained affordability and total calorie availability declined.

By 2032, total calorie availability is expected to increase only marginally to 3034 kcal/person/day, slightly lower than the global average. Accounting for household food waste estimates implies that total calorie intake could be around 2 830 kcal/person/day. Limited gains over the outlook period reflects a combination of factors. Firstly, the prolonged nature of the economic recovery, which sees income levels surpass pre-pandemic levels by 2024. Secondly, the influence of high current prices, which results in reduced calorie availability in the short term. Thirdly, it also reflects an increasing awareness of healthy eating. There is however great diversity within the region and the relative contribution of these three factors in influencing the number of calories consumed will vary. In the LDC's in the Middle East, calorie availability remains low and is only expected to reach 2 650 kcal/person/day, almost 15% below the global average (Figure 2.19). Within these lower income countries, the share of total expenditure spent on food is also higher, which magnifies the impact of the recent high price environment on food security.

The projections for the average diet in the region suggest that 53% of calories will come from cereals by 2032, well above the global average of 43%. A similar picture emerges for sugar, where the region's share of total calorie consumption derived from sugar will be 9% compared to a global average of 8%. The typical diet, which is highly dependent on starchy foods and sugar is calorie dense but nutrient poor and often associated with a rising incidence of over-weight and obesity, as well as 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 of lower income or affected by conflict. This reflects diversity amongst countries, but also suggests that the "triple burden" of malnutrition (undernutrition, overweight and micronutrient deficiency) will be a key policy challenge that will need to be addressed over the medium term , with food quality central to a solution. However, affordability remains a major constraint to the adoption of healthier, higher quality diets.

The average level of protein availability in the region is projected to reach 84 g/day in 2032, still less than in the base period. Most of the decline is attributed to reduced consumption of plant-based proteins, which is not fully offset by higher quality meat and fish protein sources. Per capita consumption of poultry, bovine meat and most dairy products is set to rise, but typically by less than 1% p.a.

The growth of the livestock sector, particularly poultry, will increase feed use by 15% over the coming decade, but efficiency gains keep the rate of growth below that of meat production. Commodities such as maize, barley and protein meals, are expected to account for more than 70% of the total feed use. The bulk of feed materials will continue to be imported, with maize, for example, reaching 30 Mt by 2032 compared to 25 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.

2.4.4. Trade

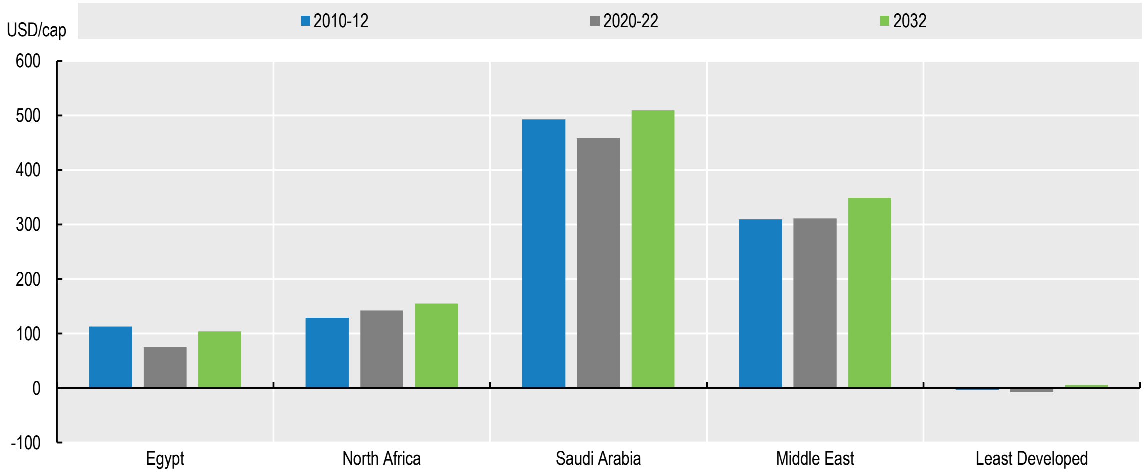
Rising imports continue for most products

The region is expected to become increasingly dependent on imports of food products over the coming decade, owing to the combination of strong population growth and severe limitations in production capacity. By 2032, the region's net imports of food products are expected to be second only to 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 Middle East area which include the Gulf States (Figure 2.14).

At the height of 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 rose by almost 5% in 2022, despite the problems with trade from the Black Sea region, reflecting the extent of economic recovery amid high oil prices. Imports are expected to rise further, but slower in 2023, constrained by persistently high food product prices and weaker income growth. By 2032, the region's import bill is expected to increase by 30% relative to the base period.

Imports are expected to rise for almost all commodities, though generally at a faster rate for meat and dairy than plant-based products. Imports by the region will sustain high and generally rising shares of global markets for many commodities by 2032, including wheat (26%), sugar (23%) and maize (15%). The region will also account for high shares in global trade for sheepmeat (34%), cheese (21%) and poultry (18%) by 2032. The region is a major importer globally, but as imports comprise a substantial share of domestic consumption, significant developments in either global or domestic markets have broad food security implications in the Near East and North Africa.

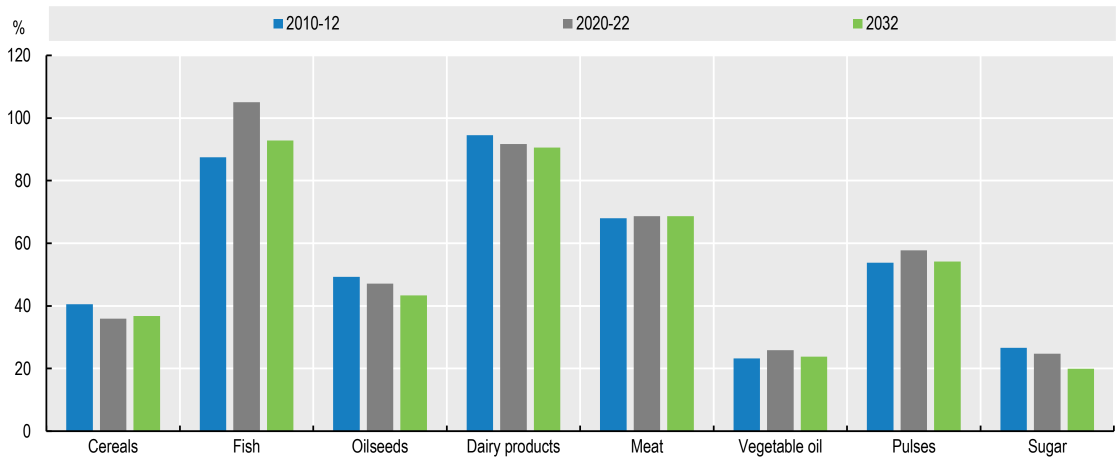
Figure 2.14. Value of net food imports per capita in Near East and North Africa (including processed products)



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 (2023). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/a42t10

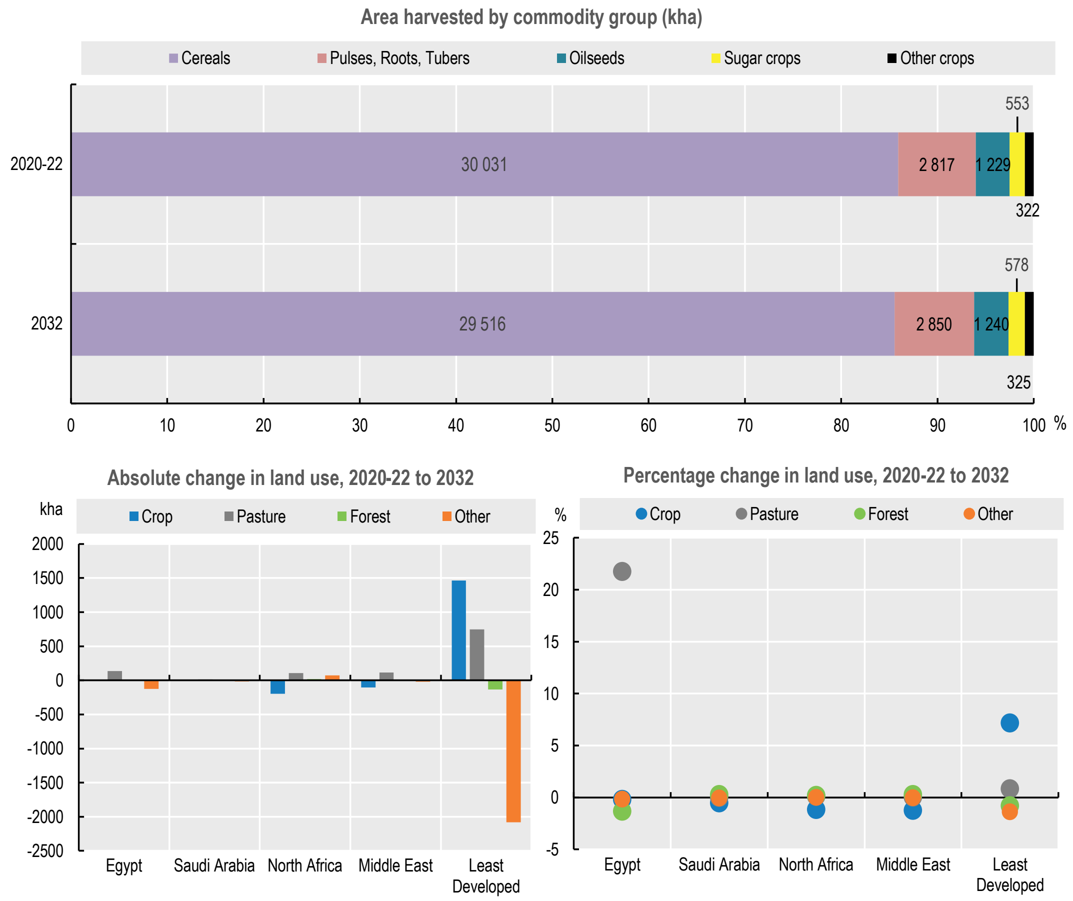
Figure 2.15. Self-sufficiency ratios for selected commodities in Near East and North Africa



Note: Self-sufficiency ratio calculated as (Production / (Production + Imports - Exports))*100
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/3lmku1

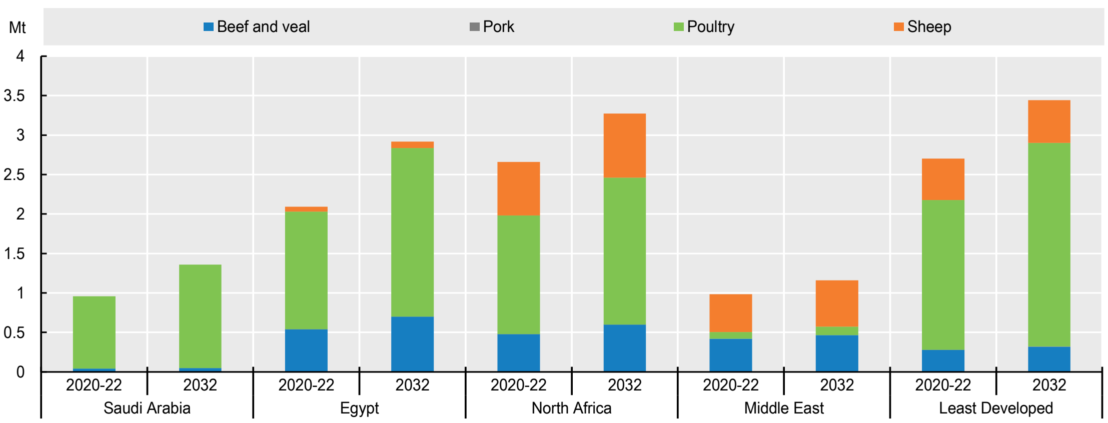
Figure 2.16. Change in area harvested and land use in Near East and North Africa



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/39b1am

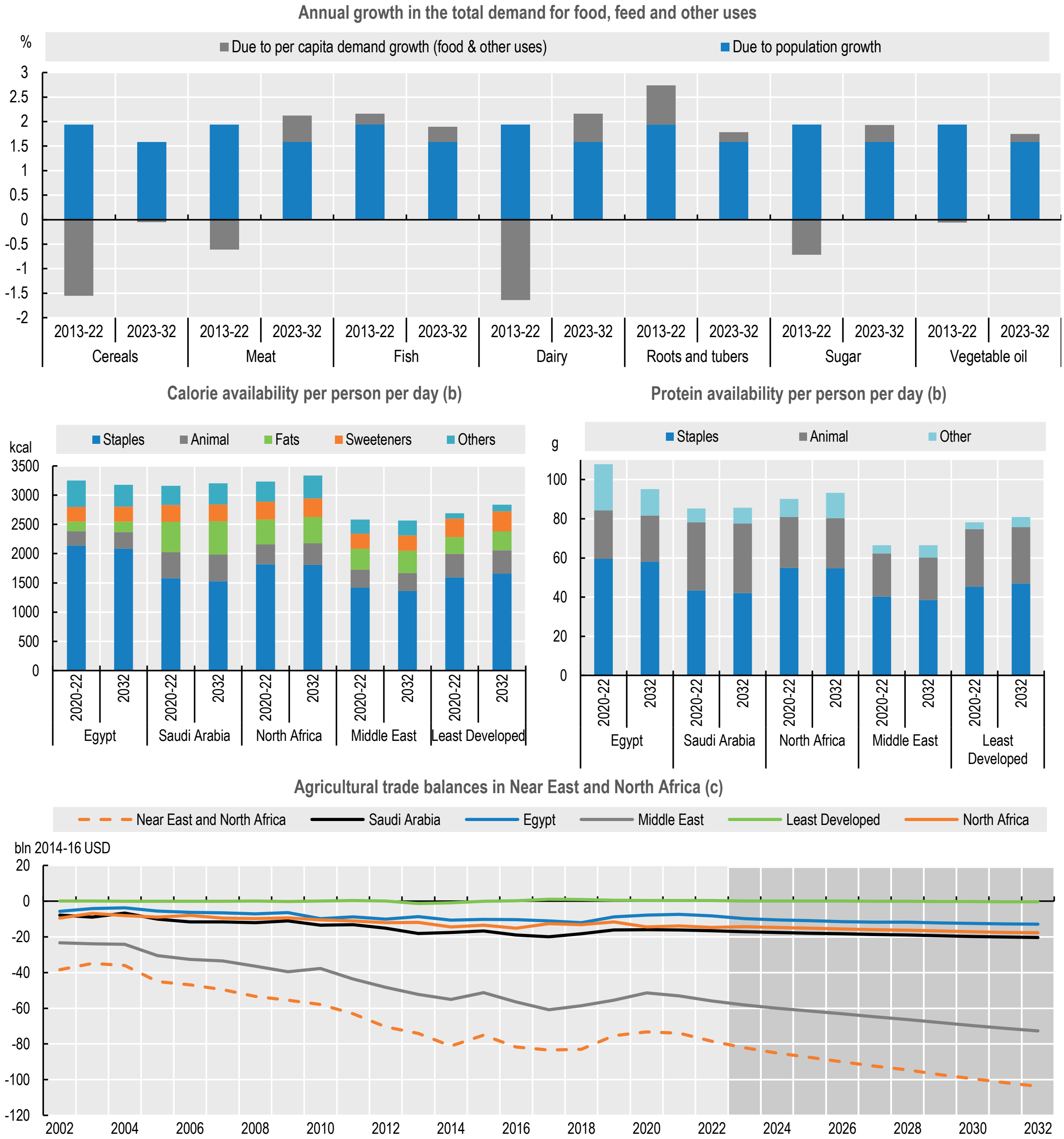
Figure 2.17. Livestock production in Near East and North Africa



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/q69o24

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 (2023). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/7mstfx

Table 2.4. Regional indicators: Near East and North Africa

	Average			%	Growth [2]	
	2010-12	2020-22 (base)	2032	Base to 2032	2013-22	2023-32
Macro assumptions						
Population ('000)	349 438	426 622	510 419	19.64	1.94	1.58
Per capita GDP[1] (kUSD)	6.37	6.41	7.76	21.14	-0.29	1.68
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	62.4	78.4	91.9	17.20	2.02	1.46
Net value of crop production[3]	24.9	31.0	35.3	13.74	1.93	1.04
Net value of livestock production[3]	27.0	30.7	38.2	24.14	0.77	2.14
Net value of fish production[3]	10.5	16.6	18.5	10.84	4.88	0.92
Quantity produced (kt)						
Cereals	49 624	49 947	60 254	20.64	-1.61	0.94
Pulses	1 616	1 944	2 188	12.52	2.47	1.68
Roots and tubers	2 959	4 002	4 946	23.60	2.68	1.93
Oilseeds[4]	1 023	1 052	1 148	9.12	-0.52	0.93
Meat	6 882	8 439	10 798	27.95	2.27	2.39
Dairy[5]	3 514	3 426	4 148	21.07	0.08	1.87
Fish	3 720	5 900	6 539	10.82	4.91	0.92
Sugar	3 056	3 252	3 330	2.40	-0.98	1.66
Vegetable oil	1 514	2 264	2 644	16.78	6.05	0.93
Biofuel production (mln L)						
Biodiesel	0.02	0.02	0.04	116.15	0.00	0.79
Ethanol	525	556	687	23.67	1.21	1.94
Land use (kha)						
Total agricultural land use	459 460	419 365	421 625	0.54	0.13	0.05
Total land use for crop production[6]	44 669	51 020	52 174	2.26	1.19	0.20
Total pasture land use[7]	414 791	368 345	369 450	0.30	-0.01	0.03
GHG Emissions (Mt CO2-eq)						
Total	178	188	198	5.44	0.20	0.45
Crop	25	26	25	-3.24	0.41	0.09
Animal	153	162	173	6.82	0.17	0.50
Demand and food security						
Daily per capita caloric food consumption[8] (kcal)	2 908	2 914	2 921	0.23	-0.30	0.28
Daily per capita protein food consumption[8](g)	81.4	84.2	81.3	-3.51	0.3	0.3
Per capita food consumption (kg/year)						
Staples[9]	213.1	209.3	206.7	-1.22	-0.30	-0.17
Meat	18.0	17.6	18.7	6.09	-0.58	0.49
Dairy[5]	12.4	10.9	11.6	5.89	-1.69	0.56
Fish	11.2	11.4	12.3	8.07	-0.79	0.58
Sugar	32.5	31.0	31.9	2.99	-0.93	0.29
Vegetable oil	10.8	11.2	12.5	10.88	-1.11	0.79
Trade (bln 2014-16 USD)						
Net trade[3]	-64	-75	-104	37.74	..	..
Value of exports[3]	22	34	39	13.76	4.27	1.15
Value of imports[3]	86	109	142	30.28	0.94	2.19
Self-sufficiency ratio[10]						
Cereals	40.7	36.3	36.8	1.40	-1.30	-0.48
Meat	66.6	67.9	68.6	1.14	0.93	0.26
Sugar	25.8	22.4	19.9	-11.08	-1.75	0.00
Vegetable oil	22.0	25.6	23.8	-7.14	4.0	-0.8

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. 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 food consumption 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 (2023). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.5. Regional outlook: Europe and Central Asia

2.5.1. Background

Increasing focus on sustainability amid ongoing risks from Russia's war against Ukraine

The Europe and Central Asian[14] region includes a diverse range of countries that span two continents and exhibit various stages of development. Considerable difference exists across countries in terms of agricultural resources, demographics and public policies. It also faces a multitude of risks, most pertinently Russia's war against Ukraine, which also contributes to persistently high food inflation, and the ever present risks associated with climatic fluctuations.

The region accounts for 12% of world population, but with growth of less than 1% by 2032, this share is set to decline. Population dynamics differ significantly across the region. In Western Europe, home to 55% of the region's inhabitants, it remains almost unchanged by 2032, whereas in Eastern Europe, it is expected to decline by 0.7%. By contrast, in Central Asia, it is anticipated to expand by 11%, but by 2032, Central Asia will still only account for 11% of the region's people. The rate of urbanisation is high across the region and by 2032, 75% of its inhabitants are expected to reside in urban environments. In Central Asia, this share is lower than in Europe, and expected to reach 51% by 2032.

Average income in the region is over USD 26 600 per capita per year. This encompasses a range from almost USD 39 000 per capita per year in Western Europe's highly developed economies, to USD 12 700 per capita in the resource dependant eastern regions to merely USD 5020 per capita per year in central Asia. Having successfully navigated the economic challenges brought by the COVID-19 pandemic with a 5.7% rebound in per capita GDP in 2021, Russia's war against Ukraine unleashed a humanitarian crisis in 2022. The persistence of the war is also taking a growing toll on Europe's economies. The energy crisis had already hampered households' purchasing power, and with Central Banks acting to control obstinately high inflation, financial conditions have tightened substantially. Growth in per capita GDP is expected at just 0.2% in 2023, before improving to 1.6% p.a. in the medium term. Much of the medium-term prospects will depend on the duration of the war, but its current protracted nature suggests that there are significant downside risks to growth, while inflationary risks remain.

In line with different stages of development, the share of primary agriculture, forestry, and fish production in GDP ranges from less than 2% in the European Union, to 13% in Central Asia. Similarly, it is estimated that the share of food in household expenditures averaged about 11% in the region in 2020-2022, from around 6% for United Kingdom to around 17% in Türkiye and even higher in many Central Asian countries.[15] Consequently, the impact of current high food prices, amid elevated general inflation, will differ across countries, with a generally greater impact in regions that spend a larger share of total income on food. This is evident in the sharp increase in the prevalence of moderate to severe food insecurity in Central Asia, due to the pandemic in 2020 and again in 2021, despite the recovery in incomes. Particularly in Eastern Europe, this may increase further in 2022 and 2023 because of the ongoing war.

Major agricultural producers in the region include the European Union, United Kingdom, Russia, Ukraine, Türkiye, and Kazakhstan. It currently accounts for 12% of the global value of agriculture and fish production, a share which is set to decline to 11% by 2032, largely due to stagnation in Western Europe, with output set to expand by 1.2% p.a. and 1.8% p.a. respectively in Eastern Europe and Central Asia. This mirrors historic disparities in 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, but starting from a low base.

The region's agricultural sector overcame a multitude of challenges through the COVID-19 pandemic, including changes to demand, both in terms of quantity and composition, logistical bottlenecks, and workforce shortages , influenced by labour mobility challenges. Over the past year, it has dealt with a new layer of complexity due to the ongoing war. Historically, Russia was a major supplier of agricultural inputs to the rest of Europe and Central Asia, and to many other countries outside the region. After a sharp initial increase, input prices have started to soften and trade patterns have changed. Both Russia and Ukraine are also significant contributors to agricultural exports. The protracted nature of the war limits Ukraine's ability to engage in agricultural activities and destruction to infrastructure has reduced its productive capacity. By December 2022, after eight months of active war, the (FAO, 2022[9]) estimated that damages to the agricultural sector, emanating from destruction of machinery and equipment, storage facilities, livestock, and perennial crops, as well as stolen inputs and output, already exceed USD 2.2 billion. With export volumes severely reduced, despite the enabling role of the Black Sea Grain Initiative, many countries have needed to find alternative sources of imports.

The Europe and Central Asia region's export growth has been striking in the past. Over the past decade, the region accounted for almost 13% of the total growth in the global net value of agriculture and fish, but it constituted 38% of growth in global exports. This reflects improved productivity in both crop and livestock production, along with limited population growth and a relatively mature consumption base in the region. Eastern Europe's expansion was a major contributor to its growing export orientation, with central contributions from both Russia and Ukraine. Consequently, this trend is expected to moderate, particularly in the short term, due to the impacts of the war on Ukraine's production and subsequent ability to export. Many uncertainties remain with respect to possible resolutions to the conflict, and the time required to rebuild damaged infrastructure and fully restore productive capacity. Sanctions imposed on Russia will also influence trade. Although these sanctions do not directly affect trade in agriculture and food products, indirect effects are possible due to logistical challenges and financial constraints. A substantial share of trade occurs within the region, which implies that the evolution of preferential trade agreements, such as future arrangements between the United Kingdom and the European Union, will also play a role.

The European Union accounts for almost half of the value of the region's agriculture and fish production. Its priority afforded to sustainability and improved resilience is reflected in its Farm to Fork and Biodiversity strategies. The Farm to Fork strategy envisions a fair, healthy, environmentally friendly, and sustainable food system. It may influence demand trends, trade flows, competitiveness, and production growth in the region. Other objectives contained in its reforms to the Common Agricultural Policy (CAP), such as the reduction in energy dependency through increased renewable energy production, bolstered sector resilience and changing diets will also play a role.

Russia's war against Ukraine implies that, among the regions included in the *Outlook*, Europe and Central Asia face the most uncertainty. After more than a year of war, even when a resolution is found, the extensive destruction of infrastructure, loss of lives and displacement of labour will require considerable investments to restore productive capacity in the agro-food chain. The uncertainty with respect to production prospects from Eastern Europe comes at a time when policies in the European Union are increasingly focused on sustainability, which implies that the cost of increasing production will rise, particularly in the face of ongoing climate change impacts. Amid ongoing efforts to reduce energy dependence and bolster the resilience of the agricultural sector, achieving sustainable productivity gains will remain critical.

2.5.2. Production

Growth slows amid ongoing war in Ukraine

Compared to the 2020-22 base period, the net value of agriculture and fish production is only expected to grow 7% by 2032, less than half the rate observed in the past. This entails an expansion of 22% in Central Asia and 11% in Eastern Europe, whereas output from Western Europe rises by less than 2% in 2032 compared to current levels. While Ukraine is assumed to reach historic productive capacity by 2032, the recovery is slow. Output growth from Eastern Europe is expected to be led by Türkiye and Russia, at 26% and 9% respectively. Kazakhstan accounts for almost a third of the growth from Central Asia. In Russia, growth is underpinned by the crop sector, whereas in Türkiye and Kazakhstan, significant additional output is expected from both crops and livestock products.

Growth is mainly derived from productivity gains, as the long-term decline in agricultural land-use is expected to persist. The contraction in land used for crop production, at 128 Kha, is a fraction of pastureland, at 1.9 Mha. These aggregate shifts in land use mask some regional differences. For instance, in Central Asia, a minimal expansion is expected in total agricultural land-use, but this is much more substantial in pasture than in cropland. In Eastern Europe, land used for crop production could expand marginally, but a significant decline is expected in pastureland. In Western Europe, a contraction is foreseen in both pasture and land used for crop production.

In the total Europe and Central Asia region, 44% of the value generated by agriculture and fish production is attributed to the crop sector. An expansion of 0.9% p.a. is sufficient to push this share up marginally by 2032. This growth combines the effects of intensification, in both Western Europe and Central Asia, and yield improvements, underpinned by technological innovation. Yield gains are expected across all major crops, ranging from 0.7% p.a. for cereals to 0.9% p.a. for pulses. As fertiliser prices normalise, a 7% increase in fertiliser application per hectare of cropland is expected to contribute to these gains.

The bulk of crop production growth from the region is ascribed to cereals and oilseeds, mainly from Eastern Europe. Russia in particular is expected to sustain robust growth in maize (24%), wheat (14%), soybeans (32%) and other oilseeds (19%) over the coming decade. By 2032, Russia is expected to account for 44% of the region’s soybean production, as well as 28% of other oilseeds and 29% of wheat. Growth arises from a combination of yield gains and area expansion, with these four crops accounting for an additional 2.7 Mha by 2032 relative to 2020-22. At the same time, yield gains are expected to exceed 1% p.a. for wheat and maize, and only marginally below 1% for oilseeds. Beyond Russia, notable wheat production growth is also expected in Türkiye and Kazakhstan, at 19% and 29% respectively by 2032. In Ukraine, a major contributor to historic increases, the prolonged recovery from ongoing war limits future growth prospects.

Livestock production accounts for 46% of total agriculture and fish output in the region. Production growth is expected to be slower than that of crops, at just 0.4% p.a. Western Europe still accounts for 63% of the region’s livestock, but a modest contraction over the coming decade, amid its ongoing transition to environmental sustainability, will see this share diminish to 59% by 2032. Stronger growth in Eastern Europe and Central Asia will enable these regions to expand their contribution to total livestock production in the region to 39% and 12% respectively. Poultry accounts for the bulk of additional meat produced by 2032 and while growth is robust across most of the region, the bulk of additional production emanates from Eastern Europe, as Türkiye accounts for almost 40% of additional output. Pigmeat production is expected to contract, mainly due to reduced output from Western Europe.

Almost half of the region’s dairy products are produced in Western Europe, but this share is expected to decline by 2032 to 44%. This follows an anticipated reduction in output from Western Europe of 5%, combined with growth of 7% and 35% respectively in Eastern Europe and Central Asia, which yields a net gain of 5% across the region. While cow inventories are rising in Eastern Europe and Central Asia, a contraction of 9% is foreseen in Western Europe, mainly from intensive systems. This reduction is shaped by the European Union's ongoing prioritisation of sustainability, which is expected to reduce its share in global production to less than 15% by 2032, down from 17% in the 2020-22 base period.

Fish production constitutes 10% of total agricultural output and growth of 10.5% by 2032 is sufficient to sustain this share. Aquaculture's share in total production is expected to reach 25% by 2032, thanks to growth of 1.6% p.a., compared to a mere 0.5% p.a. for captured fisheries.

Direct agricultural GHG emissions are projected to remain almost unchanged at regional level, rising by only 0.6% by 2032. This encompasses a decline of 5% in Western Europe and 4% in the European Union, mainly from reductions in the livestock sectors. At the same time, emissions are expected to rise in Eastern Europe and Central Asia, where livestock herds are still expanding. Amid ongoing productivity gains, GHG emissions expressed relative to the value of agricultural production are projected to decline by 6% compared to its level in the 2020-22 base period. The decline in emissions relative to output is highest in Western Europe at 7%.

2.5.3. Consumption

Diverging trends in animal sourced foods with reductions in Western Europe and increases in Central Asia

Despite the relative maturity of most of the region's consumer base, the impact of disruptions such as the COVID-19 pandemic, Russia's war against Ukraine and growing inflationary pressure, particularly for food, are widespread. Affordability concerns are greatest in regions with less comprehensive income support measures and a higher share of total income spent on food. Furthermore, in Eastern Europe, the ongoing war brought a whole new set of food security concerns and supply chain disruptions, with millions of people displaced, infrastructure and distribution channels damaged and significant price volatility. Beyond the war-affected region, most of the disruptions associated with the pandemic have eased, but many of the consumer trends that accompanied it, such as shifts in procurement channels, increased local sourcing and a heightened focus on "healthy eating" are expected to persist, influencing demand preferences.

The region's average daily calorie availability per capita is well above the global average and is projected to increase by only 2%, or 54 kcal/day to exceed 3 430 kcal/day by 2032. However, this is not uniform across the region. In Western Europe, and particularly the European Union, total calorie availability is expected to decline, as heightened health consciousness and growing awareness of sustainability (particularly from an environmental perspective) amongst its mature consumer base lead to reduced consumption of vegetable oils and animal-based products. Conversely, calorie availability is expected to rise in Eastern Europe and Central Asia, by 163 kcal/day and 222 kcal/day respectively. These gains are spread across most food groups, with significant contributions from cereals, vegetable oils, meat, and dairy.

Protein availability, expressed in per capita terms, was almost 23% above the global average in 2020-22. By 2032, it is only expected to increase by 4%, to reach 107g/day. While gains are expected across the region, they are smaller in Western Europe than elsewhere. More than half of the additional protein consumption is anticipated to come from plant-based sources, which are often perceived as healthy alternatives. Growth in meat and dairy product consumption is also notable, at 0.2% and 0.6% p.a. respectively, though it will be concentrated in Eastern Europe and Central Asia. Meat consumption is expected to approach 50kg per capita by 2032, more than 67% above the global average.

In the European Union, protein consumption is already high and consumers are increasingly aware of health and environmental considerations. Consequently, dairy product consumption is expected to decline by 5%, but it remains an important product group and by 2032 is still expected to contribute 13% of total calories and 21% of total protein. Per capita consumption of cheese and butter remain more than six times and double the global average level respectively. Similarly, meat products constitute 24% of total protein availability by 2032, despite the modest decline in total per capita consumption. Minor declines in pigmeat, bovine and ovine meat consumption is expected to be partly negated by rising poultry intake, thereby increasing the share of poultry in total meat consumption to almost 30% by 2032.

Overall, across the region, fish consumption is expected to rise by 5%, with faster growth expected in Central Asia, and the European Union. In Western Europe, consumption levels are already high, and by 2032 are expected to exceed the global average by almost 10%, or 2kg per capita. Conversely, growth in Central Asia, from a small base, is only sufficient for consumption to reach 22% of the global average level by 2032.

The relative importance of animal products in terms of both consumption and production is also reflected in feed, where the region accounts for almost a quarter of global use. Growth prospects mirror those of livestock production, with a distinct slowdown in the coming decade. Total feed use is only expected to expand by 2.6% by 2032, with a 4% reduction in Western Europe offset by gains of 12% and 25% respectively in Eastern Europe and Central Asia. Almost half of the additional feed used in Eastern Europe is attributed to Türkiye. The concentration of growth in Eastern Europe also underpins the faster rate of growth in maize feed use relative to wheat.

The European Union’s drive to increase renewable energy production is enshrined in its new overall renewable energy target of 32% by 2030. Despite expected reductions in both gasoline and diesel use, ethanol use is expected to expand by almost 8% over the coming decade, while biodiesel use remains stable. Considering sustainability concerns around palm oil, which is classified as high risk under the new Renewable Energy Directive, its use for biodiesel production is expected to decline by almost 11%.

2.5.4. Trade

Slow recovery in Ukraine exports depends on resolution of the war

Trade in Europe and Central Asia has been amongst the most dynamic of the regions covered in this chapter. Historically a major net importer, this deficit has shrunk to merely a third of the level ten years ago. The primary driver of this shift was Eastern Europe, mainly Russia and Ukraine, where the exportable surplus in 2020-22 was bigger than the deficit a decade ago (Figure 2.19). In light of ongoing war in the region, this trend is also set to change, at least in the short term. Over the past decade, Ukraine accounted for almost 40% of the growth in net exports from Eastern Europe. While the grain deal, signed mid-2022 under the Black Sea Grain Initiative was a critical in enabling continued exports from Ukraine, volumes were significantly reduced and with production set to decline as a result of the war, exports are expected to contract further in the short term. The continued extension of the grain deal also remains uncertain. While a resolution to the ongoing war would enable both production and export growth to resume in the medium term, restoration of its productive and trade capacity would likely require substantial investment and time. Under the baseline assumptions, Ukraine’s exports are only expected to recover to 2021 levels by 2031. Consequently, while net exports from Eastern Europe are expected to rise by just over 22% compared to the 2020-22 base period, the absolute growth in net exports is less than half of the level achieved in the past decade. Growth is expected to be concentrated in Russia and Türkiye, where exports are set to expand by 1.9% p.a. and 2.4% p.a. respectively. Combined with growth of 1.8% p.a. in exports from Western Europe, this is sufficient for the total Europe and Central Asian region to reach a small net trade surplus by 2032.

Total exports from the region could expand 19% by 2032, due in large to a 23% expansion in crop product exports, with more subdued growth of 12% in animal-based products. Cereal exports are expected to rise by 20%, or 32 Mt by 2032, with Russia accounting for more than half of additional volumes. By 2032, the Europe and Central Asian region will account for 36% of global cereal exports, with both the Near East and North Africa and Sub-Saharan Africa being significant importers. In line with the concentration in Russia, more than half of additional cereal exports by 2032 will be wheat, resulting in its increased share in total cereal exports from the region. Maize exports are also expected to rise and by 2032, the region is set to contribute 22% of global maize trade.

Europe and Central Asia contribute more than 40% of livestock product exports globally and almost 90% of these volumes come from the European Union. While growth in the European Union's exports of animal-based products is expected to slow compared to the past decade, the region still constitutes 46% of global trade in such products by 2032. Its share is significant in both meat and dairy products. In line with reduced production, meat exports from the European Union are expected to decline by 16%, but most of this emanates from the pigmeat sector, as poultry and bovine meat exports are anticipated to remain fairly stable. The reduction in pigmeat exports implies that its share in global pigmeat trade will decline to 31%.

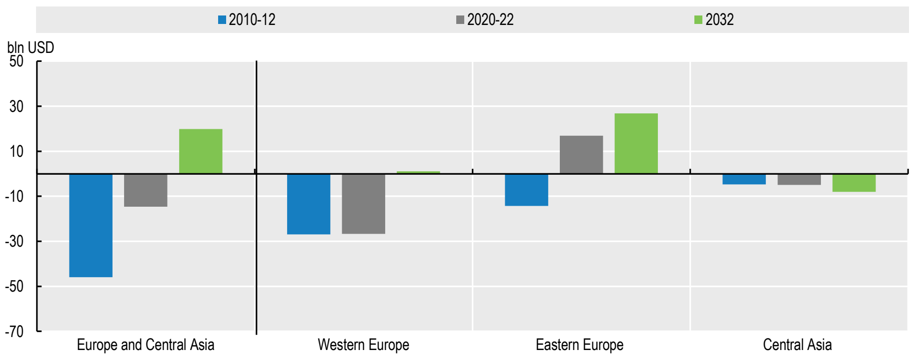
The European Union constitutes 28% of global dairy exports and growth of 1.6% p.a. is sufficient to sustain this share by 2032. Its relative contribution and growth prospects differ across the various dairy products. An increasing share of its smaller milk production pool will be processed into cheese and butter, enabling cheese exports to rise by almost 28% over the next ten years, while butter exports grow by 17%. This enhances its share in the global market to 43% by 2032. On the other hand, its share in the global trade of SMP and WMP is expected to decline.

The region is also an important exporter of fish products, with Russia and Norway the major contributors. The region's 26% share in global fish exports is the highest amongst those covered in this chapter. With growth set to slow to 0.3% p.a., the Developed and East Asia region will capture a bigger market share by 2032.

Despite the shift to export orientation, the region also remains a significant importer of many agricultural products. By 2032, imports are anticipated to increase by 13%, though growth from Central Asia is much faster at almost 39%, from a smaller base. The growing export orientation in Europe, combined with rising imports from Central Asia implies that a substantial share of additional imports could be supplied from within the region. Around 15% of Central Asia's additional imports is expected to be animal products, of which the European Union is a major supplier.

Further to animal products, the region is a significant importer of rice and vegetable oil, as well as maize and protein meal for use in animal feed. For both protein meal, and to a lesser extent wheat, its share in global imports is expected to decline by 2032, due to its projected slowdown in livestock production growth and thus feed use.

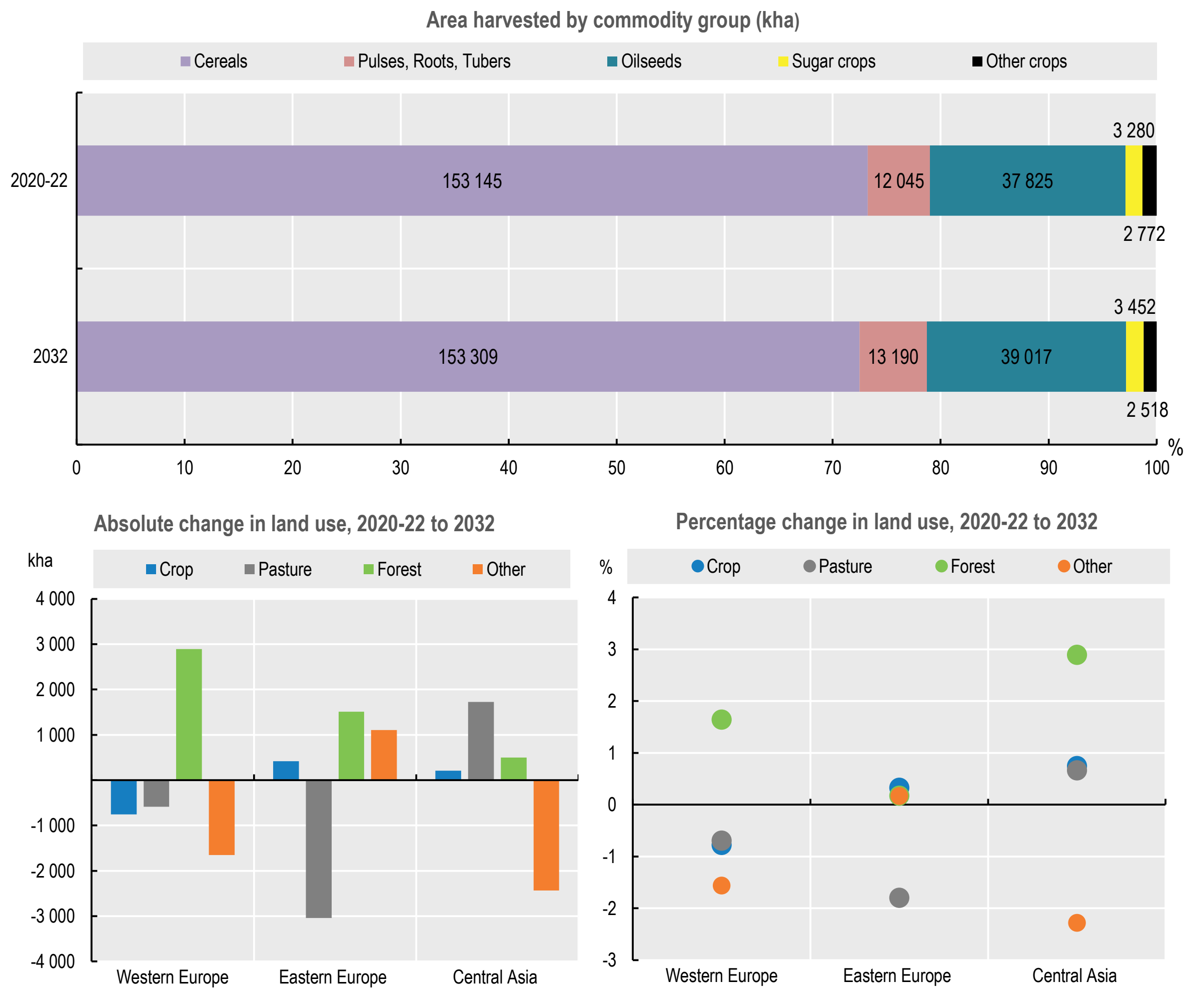
Figure 2.19. Net exports of agriculture and fish products from Europe and Central Asia (including processed products)



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 (2023). FAOSTAT Trade Indices Database, http://www.fao.org/faostat/en/#data/TI; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/f9mvkt

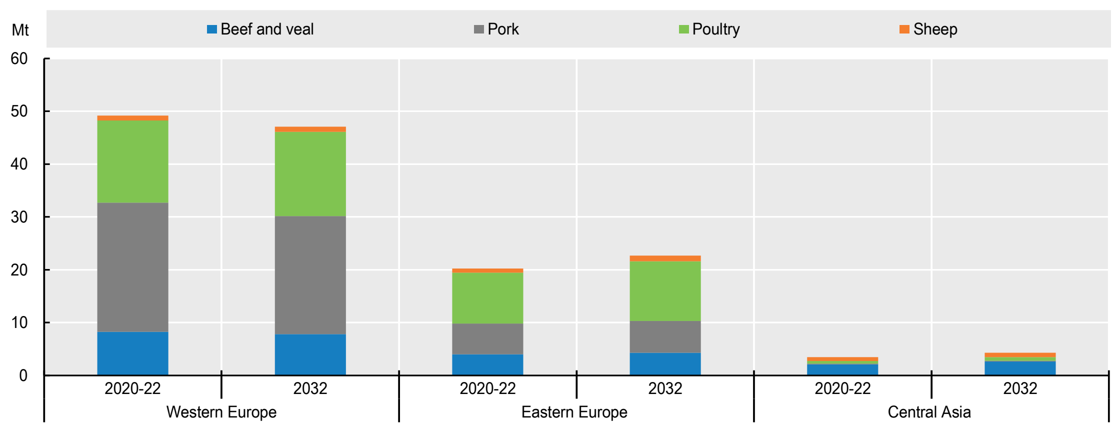
Figure 2.20. Change in area harvested and land use in Europe and Central Asia



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/o4g3au

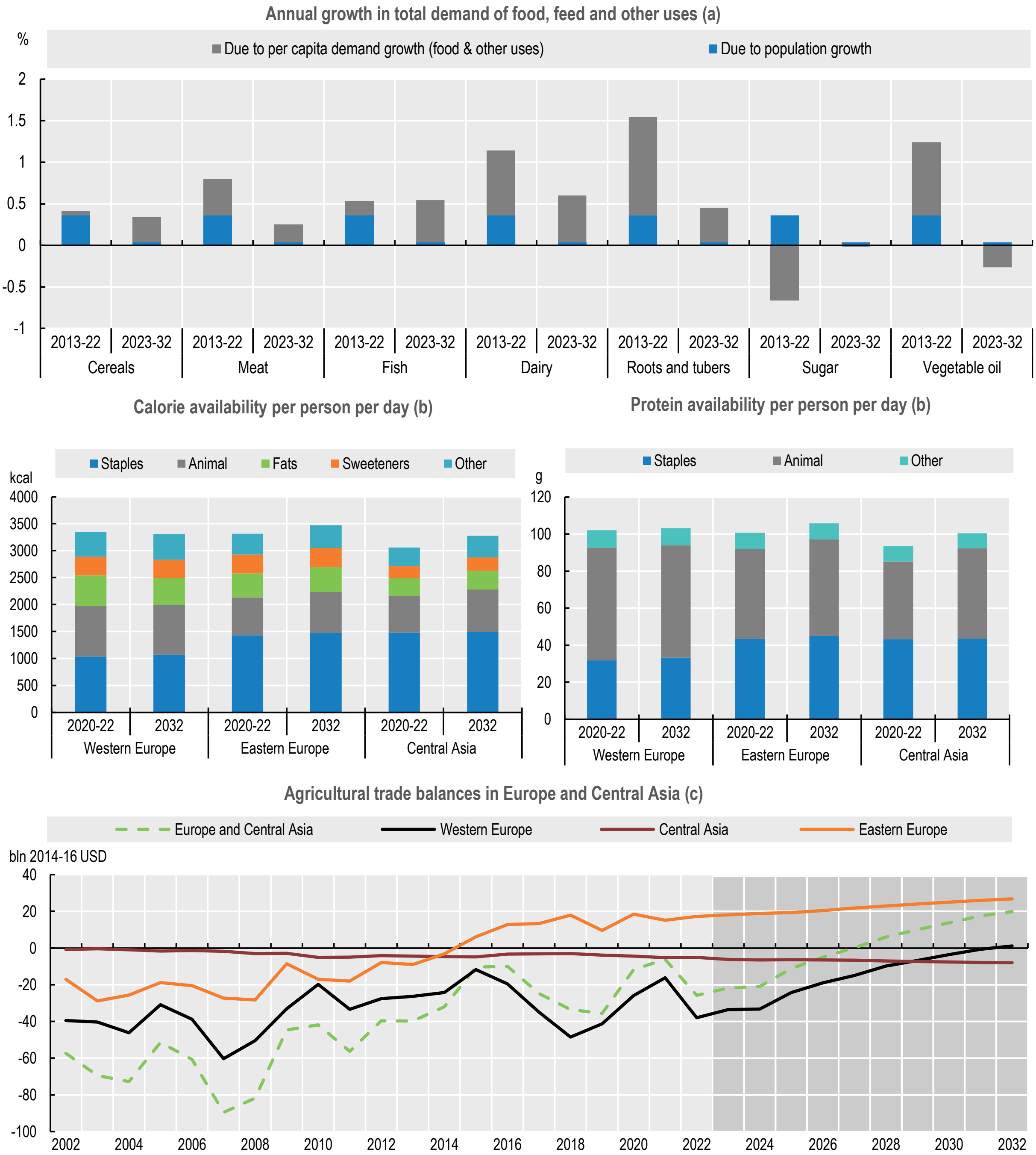
Figure 2.21. Livestock production in Europe and Central Asia



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/b95lqh

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 (2023). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/p65kns

Table 2.5. Regional indicators: Europe and Central Asia

	Average			%	Growth [2]	
	2010-12	2020-22 (base)	2032	Base to 2032	2013-22	2023-32
Macro assumptions						
Population ('000)	898 949	933 612	941 640	0.86	0.36	0.04
Per capita GDP[1] (kUSD)	24.14	26.67	31.98	19.89	1.17	1.62
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	446.1	510.2	544.4	6.71	0.90	0.67
Net value of crop production[3]	192.3	223.7	243.5	8.85	0.52	0.88
Net value of livestock production[3]	205.7	234.3	243.2	3.82	1.32	0.44
Net value of fish production[3]	48.1	52.2	57.7	10.51	0.75	0.80
Quantity produced (kt)						
Cereals	493 164	597 565	638 602	6.87	0.61	0.74
Pulses	8 450	12 888	16 742	29.90	4.63	2.47
Roots and tubers	28 705	31 318	33 355	6.50	1.52	0.54
Oilseeds[4]	49 460	69 540	76 464	9.96	2.19	1.08
Meat	61 798	72 875	74 075	1.65	1.66	0.26
Dairy[5]	25 684	29 588	31 628	6.90	1.25	0.69
Fish	17 177	18 767	20 699	10.30	0.87	0.79
Sugar	26 768	27 232	28 733	5.51	0.74	0.42
Vegetable oil	24 391	34 422	36 854	7.06	2.74	0.76
Biofuel production (mln L)						
Biodiesel	11322	17877	18071	1.09	4.34	0.12
Ethanol	7 028	8 402	9 266	10.28	1.46	1.03
Land use (kha)						
Total agricultural land use	774 111	767 890	765 863	-0.26	-0.05	0.01
Total land use for crop production[6]	254 143	254 015	253 887	-0.05	-0.03	0.09
Total pasture land use[7]	519 968	513 876	511 977	-0.37	-0.06	-0.03
GHG Emissions (Mt CO2-eq)						
Total	757	787	792	0.63	0.19	0.07
Crop	190	204	207	1.32	0.43	0.25
Animal	555	567	568	0.18	0.06	-0.03
Demand and food security						
Daily per capita caloric food consumption[8] (kcal)	3 269	3 307	3 359	1.57	0.05	0.32
Daily per capita protein food consumption[8](g)	99.0	100.8	104.6	3.8	0.2	0.4
Per capita food consumption (kg/year)						
Staples[9]	160.3	160.3	166.7	4.01	-0.15	0.39
Meat	46.2	47.8	48.7	1.85	0.20	0.16
Dairy[5]	27.3	29.4	31.1	5.71	0.58	0.56
Fish	18.5	18.1	18.7	3.33	-0.07	0.43
Sugar	35.9	33.2	33.1	-0.52	-0.57	-0.02
Vegetable oil	18.1	20.5	20.2	-1.45	0.18	0.02
Trade (bln 2014-16 USD)						
Net trade[3]	- 46	- 15	20	-235.86	..	..
Value of exports[3]	435	573	684	19.35	2.45	1.84
Value of imports[3]	481	588	664	13.00	2.09	1.04
Self-sufficiency ratio[10]						
Cereals	112.0	118.9	124.1	4.38	0.19	0.30
Meat	99.6	107.0	106.2	-0.80	0.86	0.01
Sugar	81.9	87.6	91.7	4.70	0.96	0.53
Vegetable oil	84.2	95.7	105.2	9.90	1.5	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 2004-06. 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 food consumption 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 (2023). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.6. Regional outlook: North America

2.6.1. Background

Productive and resilient agro-food sector

The North American region comprises just two countries, but it covers a vast land area, while its 375 million people comprise just 5% of the world's population. This share could decline somewhat by 2032, as population growth in the region is slow at only 5.8% for the ten-year period. More than 80% of the population already resides in urban areas, with little change expected by 2032. Both the United States and Canada are highly developed countries with mature and diverse economies. This is reflected in the low share of agriculture, forestry, and fisheries in total regional GDP, which is already below 2% and expected to decline further by 2032. This does not detract from its contribution to global agriculture, where it provides 11% of total output.

North America's contribution to global agriculture reflects its sizable land base. It accounts for 10% of the land used for agriculture globally and the availability of agricultural land per capita is the highest amongst all regions included in the *Outlook*. Its agricultural trade surplus is the third largest among all regions, after Latin America and South and Southeast Asia and it accounts for 12% of global exports. While positive, growth in agricultural production has been among the slowest of all regions, outpacing only Developed and East Asia and Europe and Central Asia over the past decade. By 2032, its share in global output and exports is expected to diminish, while its trade surplus could decline to just a quarter of current levels.

The region is highly productive, with an agricultural sector characterised by significant capital intensity and a predominance of large, commercially orientated farming enterprises that attain impressive yields. Production systems are input intensive and fertiliser application rates per hectare of cropland are high, implying that the sharp rise in fertiliser costs impacted substantially on producer margins. It also induced a reduction in fertiliser use per hectare in 2022, along with a heightened focus on optimising efficiency. Fertiliser imports into the United States declined by 22% in 2022. While prices normalise over the outlook period, fertiliser use per hectare does not fully recover to pre-2022 levels, reflecting the investments made to improve use efficiency, which also enable fertiliser use per calorie produced to decline further. Agricultural land use has stabilised over the past decade, with a consistent share of 37% dedicated to crop production. Thus, output growth has predominantly come from productivity gains. The relative importance of livestock is reflected in its 42% share of total agricultural production value, well above the global average of 36%. North America contributes 13% of the global value of livestock production, but thanks to high productivity, its share in livestock numbers is proportionately lower.

North America has a mature, high income consumer base and food intake is highest amongst all regions. Calories and protein available for consumption is 30% and 36% higher respectively than the world average. Consequently, consumer preferences could play a bigger role than income growth in the evolution of food demand. Consumption is proportionately high in animal products, which comprise almost 30% of total calories and 65% of total protein intake, compared to the global average of 18% and 40% respectively. Diets are also high in vegetable oil and sweeteners, where calorie shares are almost double the global average. Dietary composition and lifestyles in the region have led to higher incidence of obesity and food related chronic diseases such as diabetes, although the COVID-19 pandemic heightened awareness of healthy eating habits. This could have a lasting impact on consumer preferences and total calorie intake is expected to decline by 2032.

Even at the height of the pandemic, total food consumption remained high, reflecting the maturity of the region's consumer base, as well as income support measures that mitigated the effects of the economic contraction on spending power. Nevertheless, its influence on the composition and distribution of food sales was profound. Expenditure on food away from home declined, while retail sales increased, inducing significant changes in the food supply chain to adapt to both the type of food and packaging size requirements. Weersink et al. (2021[10]) note that, despite the time required to adapt to the changes, the adjustments in the supply chain have improved its resilience to future shocks.

Despite high average levels of income and food intake, the region is not immune to food security concerns amongst the lower echelons of its income distribution. Even prior to the pandemic, an estimated 10-13% of the region's population was estimated to experience food insecurity (Tarasuk and Mitchell, 2020[11]). Despite the mitigating effects of income support measures, the prevalence of moderate to severe food insecurity increased for the first time in 2020 and remained elevated in 2021 amid rising food prices. The current environment of financial tightening, high inflation and persistently high food prices will weaken affordability and likely constrain significant improvements to food security in 2022 and 2023.

The recovery from the pandemic induced recession in 2020 was robust and the 5.4% rebound in per capita GDP in 2021 elevated average per capita income beyond pre-pandemic levels. However, this momentum was short lived and as Russia's war against Ukraine provided new impetus to energy prices and rising inflation, growth in per capita GDP slowed to 1.6% in 2022. Expectations are for a mere 0.1% in 2023. The outlook will continue to be shaped by tightening financial conditions, as monetary policy strives to keep inflation under control amid Russia's war against Ukraine. In the medium term, growth in per capita income is expected to recover to an annual average of 1.1%, to exceed USD 62 100 per capita by 2032.

Industrial use of agricultural products is high in North America and the United States is the biggest producer of biofuel in the world, accounting for almost 38% of global output. This comprises mainly ethanol, derived from maize feedstocks, with some biodiesel derived from soybean oil and used cooking oils. Biofuel use in the United States is sustained by the Renewable Fuel Standard. The United States also supplies substantial ethanol exports to Canada.

The agriculture sector in North America is mature, productive, and resilient, contributing substantially to global production and exports of several products. Its ability to expand production may be critical to normalising the current high price cycle, amid ongoing war in the Black Sea region, particularly under conducive weather conditions. Nevertheless, it also faces challenges, as evidence suggests that its impressive historic productivity growth has slowed in the past decade (Fuglie, 2015[12]) and, as environmental costs continue to rise, competitiveness may be eroded in the future.

2.6.2. Production

Productivity gains are the primary driver of growth

Growth in agricultural and fish production in North America is expected to persist, but the expansion of 8% by 2032 is significantly slower than in the past. The strength of the US dollar is a contributing factor, combined with the expectation that most prices will normalise from current high levels and in the medium term, return to a long term trend of a decline in real terms. Growth in crop production is expected to outpace that of livestock, reversing the trend that emerged over the past decade. By 2032, an 12% expansion in crop production sees its share in total agricultural output rise to 55%, compared to 41% for livestock and only 4% from fisheries.

The historic decline in land used for agriculture stabilised over the past decade. By 2032, little change is expected in total agricultural land use, though some reallocation may occur from cropland to pasture in the United States. Despite the consequent decline of 1.9% in total land used for crop production by 2032, output from the crop sector is expected to rise by an annual average of 0.8%, benefitting from a combination of intensification and yield gains. The total area harvested is expected to decline by 1.2 Mha, less than half of the decline in land use. Similarly, the total value of crop production per hectare of land is expected to rise by 14%. This increase is more pronounced in Canada, where it reverses an historic decline.

The area under cereals and oilseeds is expected to expand by only 2.4% by 2032 but will still constitute the bulk of total area harvested, with almost 60% dedicated to maize, wheat and soybeans. Among smaller crops, the area under pulses and cotton could grow by 28% and 11% respectively. Despite the faster expansion, pulses will still only account for 4% of total area in the region, but in Canada their share is more prominent at 14%. Yield gains are expected to remain robust across all commodities, but growth rates differ. Maize yields already average more than 10 t/ha in the 2020-22 base period, which is 80% above the global average. By 2032, they are expected to rise by only 5%. Similarly, soybean yields are expected to rise by 7%, whereas for wheat and other coarse grains, yield gains are expected to be higher at 13% and 16% respectively. This reflects a degree of recovery, as wheat and barley yields were significantly reduced in 2021, due to inclement weather conditions, particularly in Canada.

Meat production systems in North America are highly intensive and profitability has come under severe pressure in recent years – initially due to weak prices at the height of the pandemic induced lockdown in 2020 and subsequently due to the sharp and persistent rise in feed costs. In the short term, these factors combined to result in reduced production volumes of both pigmeat and bovine meat, as well as a dramatic slowdown of poultry production. While some recovery is evident in the medium term once feed prices normalise, the net results is substantially slower growth in meat production, which is expected to rise by only 5.4% by 2032, to approach 56 Mt. The United States is expected to account for 90%. Poultry production is expected to grow faster than any other meat type, expanding by 8.2% over the ten-year period, compared to merely 3.3% for pigmeat and 2.6% for bovine meat, where production cycles are longer and the response to improved profitability takes longer. While improved profitability in the medium term could induce some expansion in poultry and pigmeat operations, bovine production growth is exclusively driven by productivity gains and increased carcass weights, as bovine herd numbers are not expected to fully recover to pre-2022 levels by 2032.

Milk production growth is expected to exceed that of meat and by 2032, could expand by 14% relative to the 2020-22 base period. These gains are derived predominantly from increased milk yields, which are already the highest of all regions. Cow inventories are only expected to rise by 2% – mainly in the United States, as Canada's dairy cow herd remain largely unchanged. By 2032, milk yields in the United States and Canada are expected to rise by 10% and 20% respectively. Consumer preferences dictate that an increasing share of total milk production is expected to be processed into products such as cheese, butter, and milk powders, with less going to fluid milk.

Captured fisheries still constitute the bulk of fish production in North America. Despite relative stability by 2032 in captured fisheries, growth of only 4.3% in aquaculture production implies that 88% of total production is still expected to come from captured fisheries. This also reflects the fact that production will be significantly impacted by environmental regulations. At present, 84% of total production comes from the United States, but the bulk of production growth is expected to come from Canada.

The North American region is responsible for 7% of direct agriculture related GHG emissions globally – less than its share in global output. While total agriculture emissions are expected to rise by 1.5% over the coming decade, the total emissions per unit of output value is expected to decline further. Additional emissions emanate mainly from livestock production, with increases of 0.45% p.a., compared to 0.12% p.a. from crop production.

2.6.3. Consumption

Changing consumer preferences are key to demand prospects

The highly developed nature of the United States and Canadian economies means that its mature, higher income consumers spend on average only 6% of total household expenditure on food. This implies that the current high food price cycle will present less of an affordability challenge than in many other regions, and that medium term demand prospects will to a large extent be dictated by the preferences of these consumers, with comparatively less influence from their economic means. Many of the expected changes in these preferences are centred around an increased focus on healthy eating habits, which was amplified by the COVID-19 pandemic. Such a shift would influence the absolute level of calories consumed, as well as their composition.

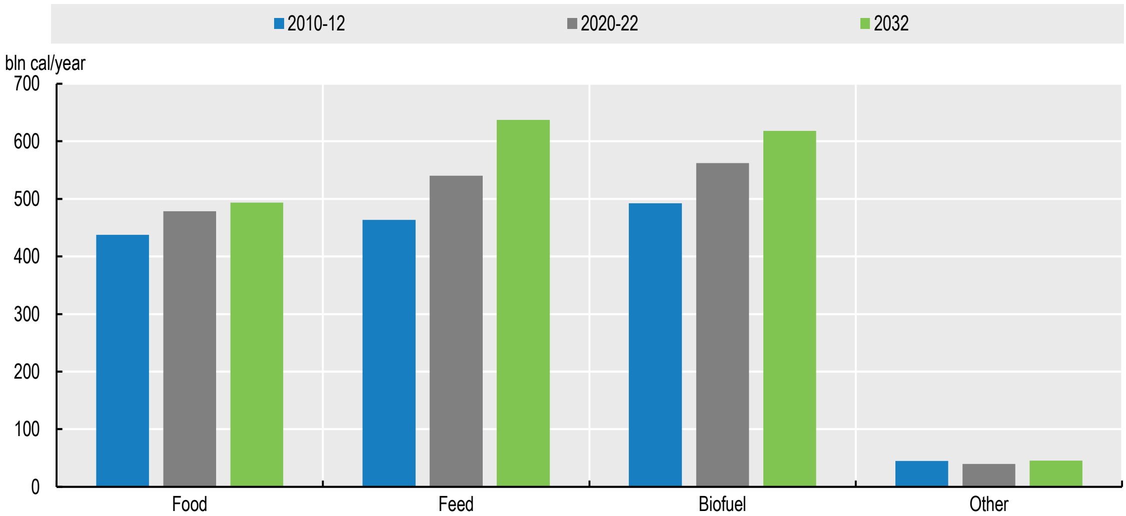
Total calories available for consumption, which includes substantial household waste, is the highest in the world. By 2032, it is expected to decline by almost 80kcal/person/day, to 3750 kcal/person/day – still 22% above the global average. Accounting for current estimates of household waste would bring caloric intake to 3480 kcal/person/day. The bulk of the decline emanates from the United States, with a far smaller reduction expected in Canada. In terms of composition, the heightened focus on health may induce a shift to increased fresh produce consumption, with fruit consumption per capita expected to rise by 14%. It is also foreseen to induce a reduction in products such as vegetable oil (-8%), sweeteners (-8.5%) and cereals (-1.2%). Meat consumption is expected to remain fairly stable, increasing by just 0.6% over the ten-year period, whereas the consumption of dairy products, on a dry matter basis, could rise by 3% and pulses, which are often perceived as healthy alternatives, could rise by 24%. This increase is from a small base, however, and by 2032, pulse consumption per capita will still be less than half of the global average, whereas consumption of products such as vegetable oil and sweeteners remain 125% and 77% respectively above the global average.

Protein intake in North America is expected to rise by a mere 1.8g/person/day by 2032, to reach 116g/person/day – still more than 30% above the global average. This increase is derived predominantly from animal sources, which are expected to rise by 2% over the ten year period, compared to just 0.4% from plant-based sources. While meat consumption remains fairly stable, increased intake of poultry and pigmeat products, combined with reductions in bovine and ovine meat consumption still enables a 1.7% increase in protein availability from meat products. Similarly, increased dairy product consumption encompasses an almost 17% increase in cheese intake, compared to a 2.4% gain in butter and reduced milk powder and fresh dairy consumption. Overall, this results in a 1.9% gain in protein available from dairy products by 2032. Per capita consumption of fish products is also expected to rise, to reach 23 kg per capita by 2032, a gain of 2.5% compared to 2020-22. In the case of plant-based protein sources, a gain of 0.4g of protein per person per day from pulses, is almost fully offset by the reduction in cereal consumption.

The intensity of livestock production in the region implies that feed use is already high, with calories dedicated to animal feed already exceeding those consumed as food in the base period (Figure 2.23). In line with expansion in pigmeat and poultry production, feed use is expected to rise by 13% over the coming decade, with maize and protein meal comprising almost 90% of the additional feed. By 2032, the share of maize in total feed use could rise to 55%, whereas the share of protein meal remains fairly constant at 17%.

Biofuel production is an important market for feed grains in the region, accounting for more calories than food or feed in the base period (Figure 2.23). The increasing focus on sustainability is reflected in further growth of 15% in biofuel production by 2032. Almost two-thirds of this growth is attributed to biodiesel, underpinned by increased renewable fuel targets and biomass-based diesel tax credits. The prevalence of used cooking oil as feedstock is expected to increase. Growth in ethanol production is slower, partly due to reduced gasoline use. Positive production growth reflects some additional E15 blends, but most of the gasoline will still be blended at 10%, as limitations in infrastructure and technology constrains wider adoption of mid to high level blending.

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 (2023). FAOSTAT Food Balances Database, http://www.fao.org/faostat/en/#data/FBS; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/7hb1tv

2.6.4. Trade

Trade surpluses continue to shrink

In line with the prevailing trend of the past decade, North America's trade surplus in agriculture and food products is expected to decline further and, by 2032, could be almost 75% smaller than current levels. This follows growth in net imports, which are expected to increase by 20% over the ten-year period, more than double the expected gain in net exports, which only rise by 8.6%. Trade developments in the United States also diverge from Canada, where the trade surplus is expected to grow by 3% p.a., but the United States is expected to move from a surplus in the 2020-22 base period, to a deficit position by 2032.

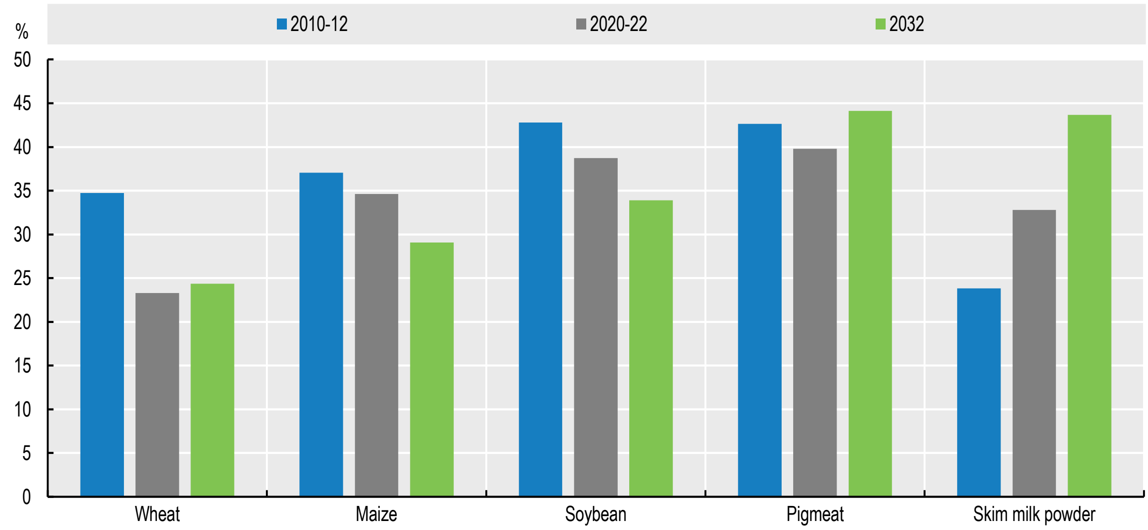
Amongst the factors contributing to the marked deceleration in export growth from the United States, is the slowdown in global demand, as well as its trade relations with China, which is the single biggest importer of US products, and rising competition from Latin America. After a period of turbulence, trade relations between the United States and China have improved, suggesting that the projected slowdown is mostly a factor of China's demand dynamics. Historic trade growth was driven mainly by feed products, such as soybeans and maize, due to rapid expansion in China's pigmeat and poultry operations, particularly in the years of rebuilding from the devastating impact of ASF. Consequently, soybean imports increased by nearly 4% p.a. over the past decade. In line with China's meat production dynamics, these imports are expected to be sustained, but further growth is limited at just 0.7% p.a. In the case of maize, China's imports are expected to decline. Amid rising competition from Latin America, the concomitant reduction in US exports of 8% for both soybeans and maize represents a marked turnaround, as these two products combined accounted for 45% of export growth over the past decade. Amid the slowdown in demand from China, opportunities for export growth could come from within the region, through the United States-

Mexico-Canada (USMCA) Agreement, which was implemented on 1 July 2020 to replace the North American Free Trade Agreement (NAFTA). Canada is already the second biggest export destination for US products and trade under the agreement has already grown substantially since its inception.

In line with its diminishing surplus, the North American region is also expected to account for a smaller share in global trade for several products. These include soybeans and maize, where its share in global exports could decline to 34% and 29% respectively by 2032, due to increasing competition from Latin America and the Caribbean. Conversely, it is expected to gain market share in wheat, partly due to the ongoing war in the Black Sea region, which constrains export growth from Ukraine in particular. The North American region is also expected to expand its share in global ethanol exports to almost 58% by 2032. Similarly, its share in global pigmeat exports could rise to 44%, while its contribution to global dairy exports could reach 17%, due mainly to growth in skim milk powders.

Despite its trade surplus and prolific role in global exports, the North American region is also a significant importer of several products. These include fish, bovine and ovine meat. Its share in bovine and ovine meat imports continues to decline, to the extent that it has in the past decade become a net exporter of bovine products, but it is still expected to account for 14% of global imports by 2032. In the case of fish, its imports continue to rise by 1.1% p.a. and by 2032, it will account for almost 16% of global fish imports. The region is also a major importer of fresh fruit and vegetables, which is expected to rise further to account for 18% and 23% of global imports respectively by 2032.

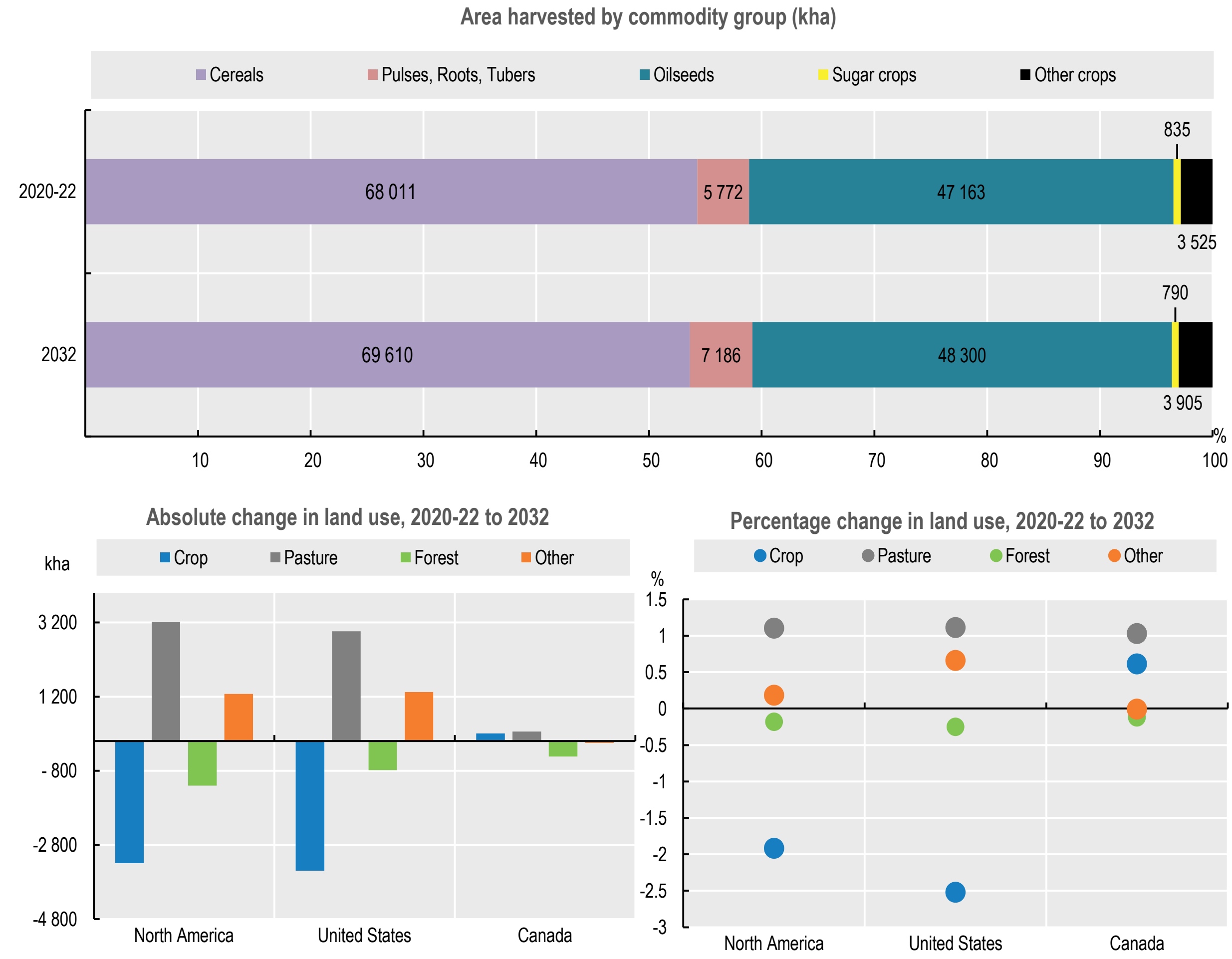
Figure 2.24. Trends in export market shares of selected commodities of North America



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/1s9nxb

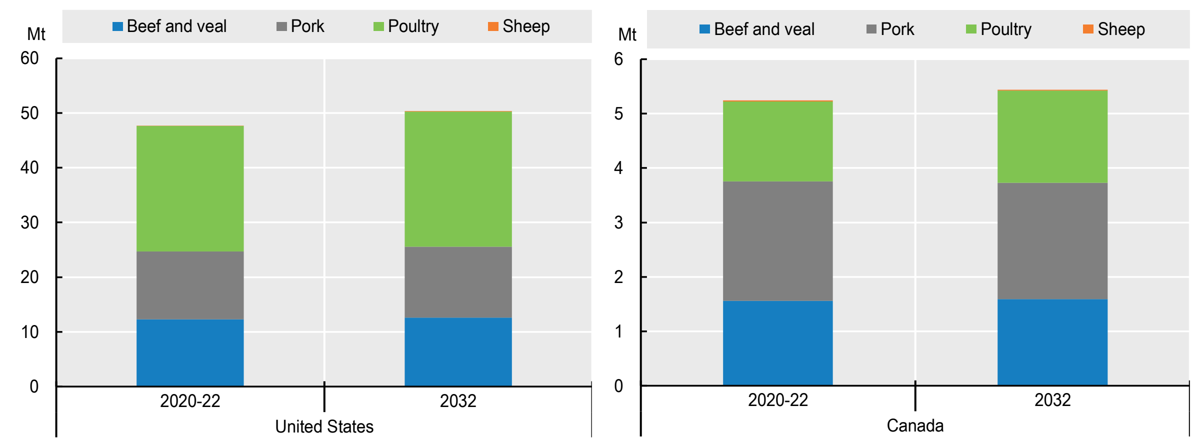
Figure 2.25. Change in area harvested and land use in North America



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/dy9t4h

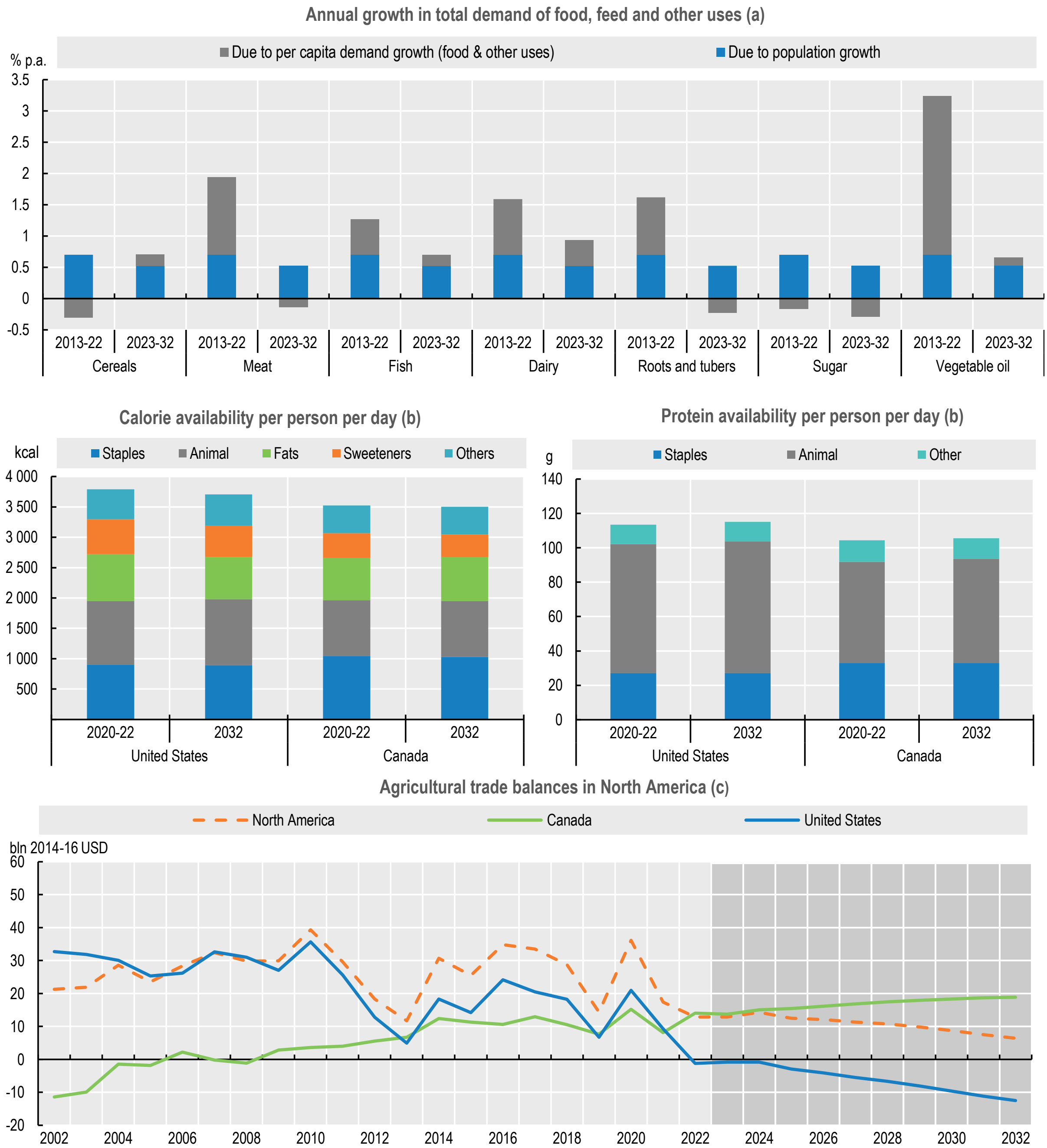
Figure 2.26. Livestock production in North America



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/1ey2kp

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) Includes processed products, fisheries (not covered in the FAOSTAT trade index) based on outlook data.
Source: FAO (2023). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/b3dpoh

Table 2.6. Regional indicators: North America

	Average			%	Growth [2]	
	2010-12	2020-22 (base)	2032	Base to 2032	2013-22	2023-32
Macro assumptions						
Population ('000)	348 230	375 243	397 039	5.81	0.70	0.52
Per capita GDP[1] (kUSD)	48.76	54.78	62.19	13.53	1.24	1.14
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	289.5	342.9	371.6	8.36	1.20	0.65
Net value of crop production[3]	154.2	182.4	203.6	11.62	0.24	0.81
Net value of livestock production[3]	117.6	144.8	152.1	5.05	2.97	0.53
Net value of fish production[3]	17.8	15.8	16.0	1.06	-1.92	-0.22
Quantity produced (kt)						
Cereals	426 672	489 245	540 956	10.57	-0.29	0.59
Pulses	7 769	10 432	14 519	39.18	0.95	2.13
Roots and tubers	5 146	5 706	5 968	4.58	1.23	0.33
Oilseeds[4]	17 574	21 874	25 423	16.22	-0.08	1.07
Meat	45 775	52 927	55 780	5.39	2.03	0.44
Dairy[5]	12 126	14 429	16 397	13.64	1.75	1.25
Fish	6 367	5 647	5 695	0.85	-1.72	-0.23
Sugar	7 175	7 820	8 510	8.82	0.98	0.72
Vegetable oil	13 990	18 407	20 842	13.23	2.74	1.15
Biofuel production (mln L)						
Biodiesel	3142.18	10210.14	16860.78	65.14	8.46	2.80
Ethanol	54 223	59 571	63 495	6.59	0.88	0.26
Land use (kha)						
Total agricultural land use	462 953	463 775	463 698	-0.02	0.05	0.00
Total land use for crop production[6]	171 953	172 077	168 781	-1.92	0.05	-0.18
Total pasture land use[7]	291 000	291 698	294 917	1.10	0.06	0.10
GHG Emissions (Mt CO2-eq)						
Total	435	442	448	1.54	0.29	0.41
Crop	120	117	117	0.64	-0.72	0.18
Animal	295	301	306	1.61	0.60	0.48
Demand and food security						
Daily per capita caloric food consumption[8] (kcal)	3 584	3 762	3 686	-2.01	0.55	-0.16
Daily per capita protein food consumption[8] (g)	108.2	112.6	114.4	1.6	0.7	0.0
Per capita food consumption (kg/year)						
Staples[9]	129.2	125.4	124.6	-0.62	-0.09	-0.08
Meat	73.4	79.4	79.1	-0.36	1.17	-0.11
Dairy[5]	32.0	34.6	35.7	3.15	0.78	0.41
Fish	21.6	23.3	23.4	0.59	0.85	0.31
Sugar	32.2	30.6	29.9	-2.31	-0.31	-0.29
Vegetable oil	35.7	39.1	36.6	-6.37	0.36	-0.23
Trade (bln 2014-16 USD)						
Net trade[3]	29	22	6	-71.13	..	..
Value of exports[3]	148	179	195	8.64	0.54	1.00
Value of imports[3]	119	157	188	19.88	2.02	1.58
Self-sufficiency ratio[10]						
Cereals	124.5	125.8	125.8	-0.03	0.01	-0.03
Meat	116.5	115.0	114.4	-0.52	0.13	0.03
Sugar	64.0	66.7	70.6	5.80	0.40	0.49
Vegetable oil	99.4	93.9	97.4	3.82	-0.62	0.46

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. 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 food consumption 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 (2023). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

2.7. Regional outlook: Latin America and the Caribbean

2.7.1. Background

Export led growth facing increased risk amid global volatility

The Latin America and Caribbean[16] region spans some 2 billion hectares and contains an abundance of agricultural resources. It houses more than 650 million people, almost 8.5% of the global population. While its average population density is low, it is the most urbanised amongst the developing regions. By 2032, its population is expected to exceed 700 million, of which 84% could reside in urban settings. This implies that most of the regions poor live in urban areas, but at the same time, the obstinately high incidence of poverty in rural settings presents significant challenges.

The disruptions of the past three years reversed years of progress in reducing poverty and hunger in the region. At the height of the COVID-19 pandemic in 2020, the combination of economic recession, deteriorating financial conditions and value chain disruptions resulted in a substantial increase in the prevalence of undernourishment and food insecurity. The Economic Commission for Latin America and the Caribbean suggests that the pandemic pushed the extreme poverty rate in the region to 13.8% by 2021, implying that the number of people living in extreme poverty reached 86 million. During the subsequent period of rising food prices, the prevalence of undernourishment increased further and in 2021, reached levels last seen in 2006. In 2022, the persistently high global food prices, which was exacerbated by Russia's war against Ukraine, combined with high general inflation, left little room for improvements in affordability and consequently food security, particularly in a region where the cost of healthy eating is the highest of those covered in this chapter (FAO, IFAD, PAHO, UNICEF and WFP, 2023[13]).

Economic prospects across much of the region have been uncertain for some time and income levels per capita contracted by an annual average of 1.5% over the past decade. Pre-existing structural challenges accentuated the effect of the COVID-19 pandemic and in 2020, per capita GDP declined by 7.1%. Propelled by high commodity prices and the substantial role of trade in the region, GDP rebounded by 5.9% in 2021 and a further 2.7% in 2022, enabling per capita income to surpass pre-pandemic levels. In 2023, the rebound is facing renewed resistance – inflation has reached a 25-year high, inducing interest rate hikes, and global conditions are less supportive. Commodity prices are softening, and global demand is weakening amid tighter financial conditions. Consequently, per capita GDP growth in Latin America and the Caribbean is expected to slow to less than 1% in 2023. Across the diverse range of countries in the region, the magnitude of the rebound and subsequent slowdown differs, depending on the composition of economic activity and the extent of domestic risks that amplify global effects.

In the medium term, per capita GDP is expected to rise by 1.6% p.a., to approach USD 10 500 per capita by 2032. This is only 6% higher than in 2014 and remains 21% below the global average of USD 13 342. On average across the region, households are estimated to spend around 16% of total expenditure on food. This suggests that the current cycle of high food prices, combined with elevated inflation and slower income growth in the short term could impact significantly on food security in the coming decade;[17] In countries with heightened macroeconomic instability, this impact could be even more pronounced.

Agriculture in the region is highly diverse. Farm structures range from , to some 15 million smallholder and family farms responsible for much of the region's food production ((OECD/FAO, 2019[14]). Agriculture and fish production accounts for almost 8% of total GDP. This share increased at the height of the pandemic, thanks to agriculture's robust performance and exemption from lockdown restrictions. The prolonged period of high prices further benefitted agricultural performance, sustaining its share in total GDP. As other sectors continue to recover and agricultural commodity prices normalise, it is anticipated that the share of agriculture and fish production in total economic activity will decline to below 7% by 2032. Short term impediments such as drought in Brazil or Argentina could accelerate this decline.

The region is a major contributor to global agriculture. Between 2020 and 2022, it accounted for 14% of the net value of agriculture and fish production globally and its share in total exports is higher at 17%. The importance of agricultural exports in the region is further underscored by its growing share in total production value, which has risen to 45%. Historic export growth has been aided by greater competitiveness, with total factor productivity increasing by 40% from 2000 to 2019.[18] Despite lower labour input, output growth has been underpinned by rising material inputs, notably fertiliser, which doubled over the period 2000 to 2019. Increasing cost pressure over the past two years, combined with availability constraints in 2022 following Russia's war against Ukraine curtailed historically high fertiliser application rates. With expected growth in the coming decade predominantly export led, input use efficiency and the success of its climate change mitigation and adaptation strategies will be critical to maintain and grow competitiveness, as will global approaches regarding openness to trade and an increased focus on environmental sustainability by some major importers. Despite the region's significant export orientation, several countries in the region are also net importers, such as Panama, El Salvador and most of the Caribbean, but intra-regional trade remains low.

As the biggest net exporter amongst all the regions covered in the *Outlook*, it is paradoxical that some of its major challenges relate to food security. These emanate from affordability constraints, rather than availability, and are underpinned by a combination of income distributional issues and current high prices. A major contributor has been rising poverty over the past decade, exacerbated by disruptions such as the pandemic and macroeconomic instability in many countries. The region's robust export orientation shielded agricultural growth from the macroeconomic challenges, but also made it vulnerable to increasing volatility, tighter financial conditions and weaker import demand globally in the near term. Post-pandemic, an increasing focus on development of domestic supply chains and the heightened awareness of environmental sustainability among some importers may influence trade policy and subsequent export prospects. Other trade related issues arise from increased concentration of exports by destination, which exposes export demand to higher market risks. Further to trade related risks, the sectors adaptation strategies and resilience to climate change impacts will be critical to sustained growth.

2.7.2. Production

Steady and sustained yield growth boosts crops and livestock

Agricultural and fish production in the region is projected to expand by 12% by 2032, markedly slower than in the past. Almost 70% of this growth is expected to come from crop production (+17%), compared to a more muted expansion of 11% in the livestock sector and a contraction of 10% in the value of fish production. Consequently, the share of crops in total production value is set to rise further to almost 60% by 2032, with a further 42% attributed to livestock and 9% to fish.

The region's land abundance contributes to strong crop production growth, which is derived from a combination of expansion and intensification. Total land used for agriculture is expected to rise by 6.3 Mha, reversing a historic trend of decline. This includes a 7.1 Mha expansion in cropland, as well as a small reduction in pasture. Amid rising prevalence of double cropping, the expansion in total area harvested, at 7%, is significantly faster than that of crop land use. Of the additional 13.9 Mha added to total area harvested by 2032, more than half is dedicated to maize and soybeans, which account for 29% and 22% of the expansion respectively by 2032. The region already accounts for just over half of global soybean production, and this share is expected to rise to 54% by 2032. Consequently, supply fluctuations within the region, particularly Brazil as its biggest producer, can cause substantial world price volatility. This was evident by the sharp increase in soybean prices amid drought conditions in 2021 and, in the face of ongoing climate change, such events may become more frequent. Many countries in the region are already challenged by prolonged drought conditions, which influence productive potential, as well as the prevalence of natural disasters such as wildfires. Under normal weather conditions, the region has ample potential to fill supply gaps resulting from reduced production in Ukraine, but heightened uncertainty from the ongoing war in the Black Sea region further accentuates price responses to weather conditions in the Latin America and Caribbean region. While its contribution to global maize production is smaller than that of soybeans, production growth of 1.5% p.a. is sufficient to push the region's share in total maize production to 19% by 2032, with Brazil contributing more than half.

Further to area expansion, yield gains were instrumental to the regions strong production growth. The region is an intensive user of fertiliser and application rates per hectare increased faster than any other region over the past decade. Recent high prices heightened awareness of optimizing efficiency in fertiliser use and over the coming decade, application rates per hectare are expected to rise by only 4%. Nevertheless, the combination of technological innovation and practices that optimize efficiency support expected yield gains in most major crops, including a 9% gain in cereal yields and a 12% gain in oilseed yields by 2032. This also enables further improvement of 12% in the net value of production per hectare of cropland, as well as a 6% reduction in the fertiliser required per calorie produced.

The region provides 16% of global livestock production and while growth of 1% p.a. is expected to be slower than in the crop sector, it is sufficient to sustain its contribution to global value. Growth prospects are sensitive to the risks posed by animal disease. Among the various meats, poultry is expected to grow the fastest, enabling it to account for just over 60% of additional meat production by 2032. Its short production cycle aids rapid improvements in genetics and feed conversion, supporting growth prospects, while the decline in feed prices relative to meat in the medium term will incentivise expansion. Bovine and pigmeat are expected to grow by 0.9% p.a. and 1.2% p.a. respectively, but the bovine sector is bigger and will account for 22% of additional meat production by 2032. Productivity gains will be instrumental to growth, as an 9% expansion in beef production results from a mere 3% expansion in the beef herd by 2032.

Fish production comprises just 11% of total value in the region and this share is expected to decline to 9% by 2032, due to a 10% contraction in total output. Production is still predominantly derived from captured fisheries, but aquaculture is developing in several countries and by 2032, is expected to contribute 30% of total fish production. Captured fisheries are expected to remain volatile over the projection period, influenced by intermittent *El Niño* effects, which have a strong impact in the region and tends to influence fish used for the production fishmeal and fish oil.

GHG emissions from agriculture are expected to rise by 3% over the coming decade, form both crop and livestock products. By 2032, the region is expected to account for almost 18% of the global emissions from agriculture, higher than its share in total output. Nevertheless, expressed relative to the net value of agricultural production, emissions per unit value of output are set to decline consistently over the next ten years.

2.7.3. Consumption

Dietary patterns are complex but evolving

A decade of growth in total calorie availability in the region has largely stagnated since 2015. This mirrors movements in per capita income levels, which declined because of macroeconomic instability. More recently, the pandemic induced recession in 2020 and subsequent increase in food prices further constrained affordability of nutritious food products, resulting in consecutive years of decline in calories available for consumption. By 2032, average per capita intake is expected to reach 3 111 kcal/person per year, but growth is slow at only 3% for the ten-year period. This marks an increase of only 89 kcal/person/day, due to gains in consumption of cereals, meat, dairy and vegetable oil, along with reduced sugar consumption. Despite the decline of 2 kg per person per year by 2032, sugar consumption in the region remains high, at almost 65% above the global average.

In a region challenged by the double burden of persistent food insecurity and malnutrition in all its form, amid rising prevalence of overweight and obesity, the reduction in sugar consumption reflects a shift to increased health awareness, which benefits from the introduction of initiatives such as front of package labelling legislation and sugar sweet beverage taxes. While efforts to induce healthy eating may start to bear fruit, the current cycle of high food prices continues to challenge food security and nutritional quality. Persistently high costs of healthy diets and affordability constraints amongst those on lower incomes affect both the quality and quantity of food intake, despite the positive impact of initiatives such as school feeding programs, which are estimated to benefit up to 37% of the poorer members of the population.

Per capita protein consumption is expected to reach 90g/person/day by 2032, an increase of 3.5g/person from current levels. This gain largely accrues to animal products, which accounts for two-thirds of the growth in protein availability. Meat consumption is expected to rise by 2.9 kg per capita to almost 53 kg/person/year by 2032 – almost 80% higher than the global average. Growth is derived from poultry and pigmeat, where consumption is expected to rise by 0.6% p.a., while a modest decline is expected in bovine meat consumption by 2032. Fish consumption in the region is still low, around half of the global average, but is set to expand by 0.3% p.a., to reach 11 kg/person/year by 2032.

Animal feed use is expected to rise by 13% over the next ten years, faster than meat and dairy production. This comes despite expected genetic improvement that results in better feed conversion ratios and reflects further intensification in livestock production systems, which is integral to growth. More than 60% of additional feed use comes from maize, with an additional 24% from protein meal, mirroring typical ratios in poultry rations and resulting in growth of 15% in maize and protein meal feed use.

The region is also a major contributor to the global ethanol market and by 2032 is expected to raise its share in world production to 31%. Brazil constitutes almost 90% of ethanol production and use in the region. Sustained by its RenovaBio programme, designed to reduce emission intensity as part of its COP 21 commitments, ethanol use is expected to rise by 35% over the coming decade. Its rate of production growth is only marginally slower at 33%, with sugarcane expected to remain the primary feedstock. Consequently, Brazil's share in global ethanol exports could decline to 15% by 2032.

2.7.4. Trade

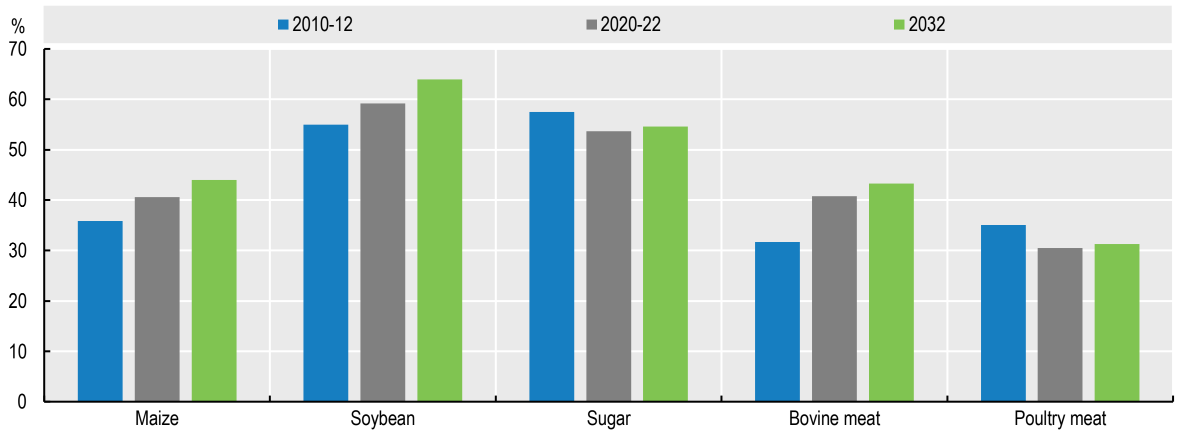
Exports are key to sustained agricultural growth

Latin America and the Caribbean is the largest net exporter amongst all the regions included in this Chapter. Exports have been integral to its agricultural growth, reducing its exposure to the macroeconomic instability within the region and improving resilience to exogenous shocks. The share of exports in total agricultural production has increased consistently and is expected to reach 50% by 2032. This follows an expected expansion of 27% in its trade surplus for agricultural products, which will also push its share in global exports to almost 18% by 2032. Brazil is the biggest exporter in the region and the primary driver of growth, but its projected expansion of 1.8% p.a. is significantly slower than the 6% p.a. achieved over the past decade. Other notable contributors to regional export growth include Mexico and Argentina, while exports of fresh fruit from Peru are also expected to rise rapidly.

The region counts amongst the leading global exporters for a range of commodities and by 2032 is expected to sustain a global export share of more than 30% for maize, soybeans, sugar, beef, poultry and fishmeal. In the case of maize, soybeans and beef, expected export growth is sufficient to increase its global market share to 44%, 64% and 43% respectively. Its share of sugar and poultry exports globally is also expected to increase marginally to 55% and 31% respectively, whereas reduced production volumes result in a declining share of the world's fishmeal exports.

The importance of exports to agriculture in the region is underscored by its central position in global trade, as well as the pivotal role of exports in driving production growth. Sustained growth will depend on continued orientation towards open trade in the global market. The disruptions of the past three years exposed vulnerabilities in the global trade system, which resulted in logistical bottlenecks and rising costs. Amid the crises, many exporting countries imposed trade policies that prioritise domestic supply, creating opportunities for the Latin American and Caribbean region, which did not impose restrictions, to gain export market share. At the same time, the development of domestic supply chains has been prioritised in many parts of the world, to mitigate risks of disruption. Over the coming decade, the evolution of trade relations in various parts of the world will influence the region, creating both new opportunities and further risks. While export led growth has served it well in the past, the global market is increasingly volatile and international trade more fragile, with risks of geopolitical fragmentation. Improved internal market integration and functioning of small and medium enterprises, cooperatives and family farms could expand trade within the region, thus diversifying market opportunities and bolstering the sector's resilience.

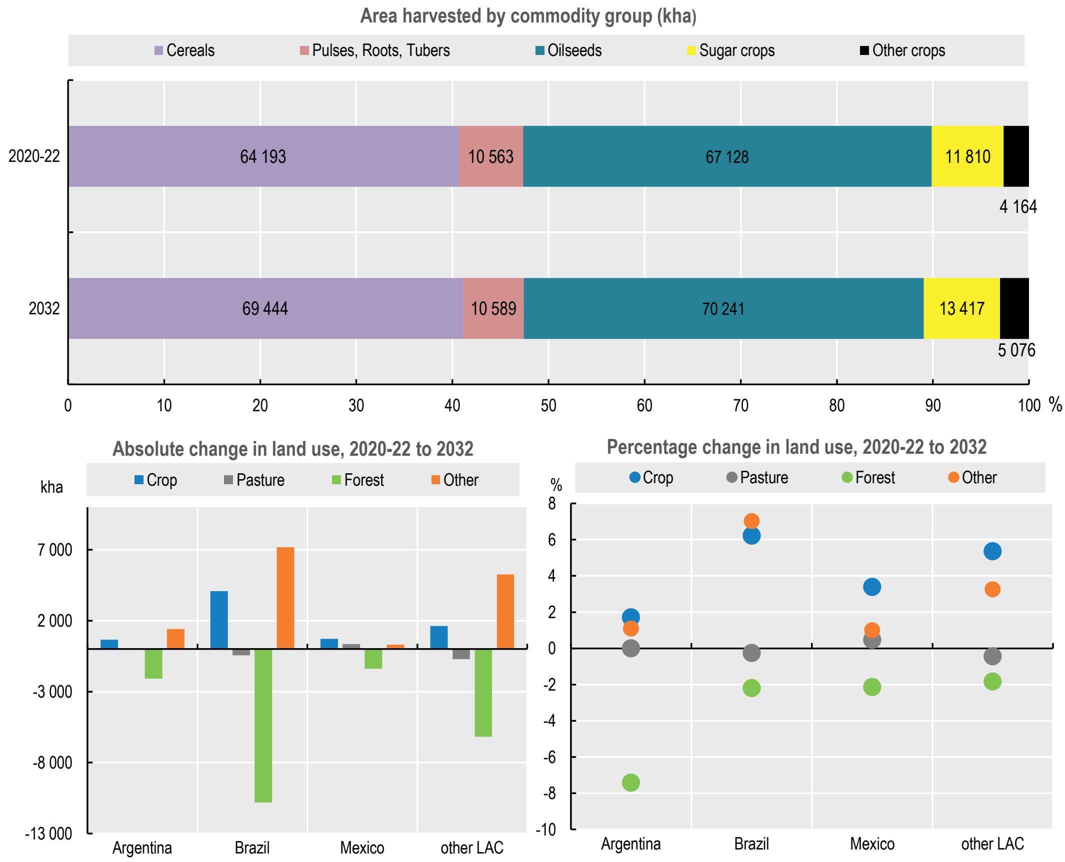
Figure 2.28. Trends in export market shares of the Latin America and the Caribbean



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/igmt7o

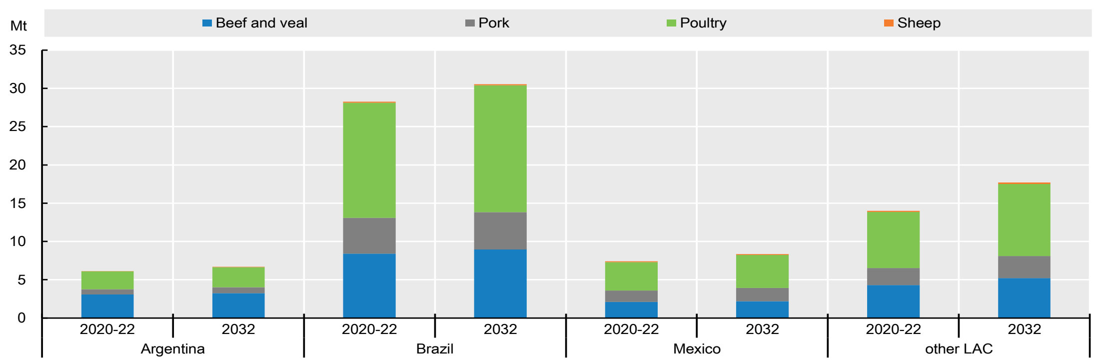
Figure 2.29. Change in area harvested and land use in Latin America and the Caribbean



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/ycoxit

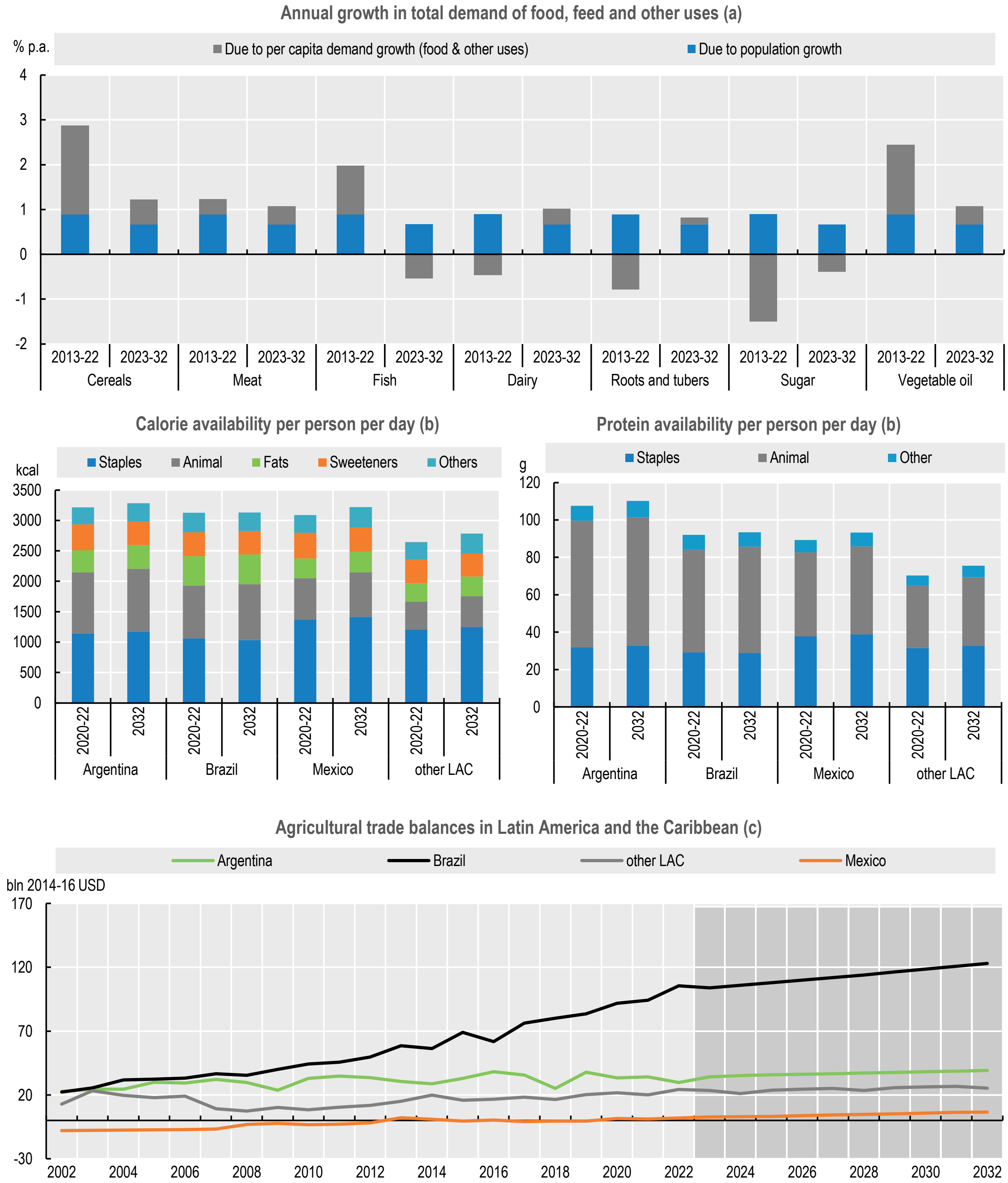
Figure 2.30. Livestock production in Latin America and the Caribbean



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/ed61fl

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 (2023) FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2023) "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/p5ytk9

Table 2.7. Regional Indicators: Latin America and the Caribbean Region

	Average			%	Growth [2]	
	2010-12	2020-22 (base)	2032	Base to 2032	2013-22	2023-32
Macro assumptions						
Population ('000)	595 669	654 446	704 792	7.69	0.89	0.66
Per capita GDP[1] (kUSD)	9.59	8.73	10.49	20.14	-1.47	1.58
Production (bln 2014-16 USD)						
Net value of agricultural and fisheries[3]	355.5	437.7	488.9	11.69	2.00	1.01
Net value of crop production[3]	161.2	206.7	241.9	17.02	1.85	1.23
Net value of livestock production[3]	150.0	183.2	203.9	11.30	1.99	0.99
Net value of fish production[3]	44.3	47.8	43.1	-9.82	2.76	0.06
Quantity produced (kt)						
Cereals	201 006	286 237	336 493	17.56	3.71	1.36
Pulses	7 401	7 212	7 944	10.15	-0.25	1.18
Roots and tubers	14 532	14 084	15 040	6.79	0.02	0.84
Oilseeds[4]	5 422	6 626	7 072	6.73	3.57	0.74
Meat	47 210	55 817	63 302	13.41	1.63	1.16
Dairy[5]	9 218	10 334	11 507	11.34	0.34	0.98
Fish	15 702	16 869	15 204	-9.87	2.69	0.05
Sugar	56 385	56 249	64 632	14.90	-0.40	1.14
Vegetable oil	21 311	27 837	32 955	18.39	1.91	1.21
Biofuel production (mln L)						
Biodiesel	5673.36	9278.75	11576.23	24.76	5.50	1.48
Ethanol	26 855	35 237	46 834	32.91	2.08	2.32
Land use (kha)						
Total agricultural land use	658 646	650 774	657 098	0.97	-0.10	0.09
Total land use for crop production[6]	150 296	155 801	162 905	4.56	0.42	0.33
Total pasture land use[7]	508 350	494 973	494 193	-0.16	-0.26	0.01
GHG Emissions (Mt CO2-eq)						
Total	1 027	1 095	1 128	3.01	0.78	0.16
Crop	98	106	112	5.98	1.75	0.60
Animal	910	959	983	2.54	0.59	0.10
Demand and food security						
Daily per capita caloric food consumption[8] (kcal)	2 867	2 927	3 012	2.91	0.07	0.26
Daily per capita protein food consumption[8](g)	80.5	83.7	87.1	4.1	0.2	0.3
Per capita food consumption (kg/year)						
Staples[9]	151.1	148.0	150.7	1.80	-0.16	0.17
Meat	46.9	49.7	51.9	4.31	0.46	0.37
Dairy[5]	15.9	15.9	16.5	3.68	-0.42	0.33
Fish	10	11	11	1.77	0.13	0.29
Sugar	44	38	37	-4.18	-1.27	-0.39
Vegetable oil	17	18	18	2.95	0.11	0.18
Trade (bln 2014-16 USD)						
Net trade[3]	88	153	194	26.76	..	..
Value of exports[3]	161	248	305	22.88	4.19	1.70
Value of imports[3]	74	95	111	16.63	3.15	1.19
Self-sufficiency ratio[10]						
Cereals	102.7	112.8	113.6	0.72	1.32	0.23
Meat	111.0	112.4	112.7	0.23	0.39	0.09
Sugar	211.5	226.2	245.5	8.56	0.65	1.04
Vegetable oil	122.6	125.5	129.7	3.34	-0.65	0.15

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. 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 food consumption 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 (2023). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

References

Chamberlin, J., T. Jayne and D. Headey (2014), "Scarcity amidst abundance? Reassessing the potential for cropland expansion in Africa", *Food Policy*, Vol. 48, pp. 51-65, https://doi.org/10.1016/j.foodpol.2014.05.002. [6]

FAO (2022), *Ukraine: Impact of the war on agriculture and rural livelihoods in Ukraine*, FAO, https://doi.org/10.4060/cc3311en. [9]

FAO, IFAD, PAHO, UNICEF and WFP (2023), *Regional Overview of Food Security and Nutrition – Latin America and the Caribbean 2022*, FAO, https://doi.org/10.4060/cc3859en. [13]

FAO, IFAD, UNICEF, WFP and WHO (2022), *The State of Food Security and Nutrition in the World 2022*, FAO, Rome, https://doi.org/10.4060/cc0639en. [8]

Fuglie, K. (2015), "Accounting for growth in global agriculture", *Bio-Based and Applied Economics*, Vol. 4/3, pp. 201-234, https://doi.org/10.13128/BAE-17151. [12]

Jayne, T. et al. (2016), "Africa's changing farm size distribution patterns: the rise of medium-scale farms", *Agricultural Economics*, Vol. 47/S1, pp. 197-214, https://doi.org/10.1111/agec.12308. [5]

Kelly, M. (2016), "The Nutrition Transition in Developing Asia: Dietary Change, Drivers and Health Impacts", in *Eating, Drinking: Surviving, SpringerBriefs in Global Understanding*, Springer International Publishing, Cham, https://doi.org/10.1007/978-3-319-42468-2_9. [3]

Law, C., I. Fraser and M. Piracha (2020), "Nutrition Transition and Changing Food Preferences in India", *Journal of Agricultural Economics*, Vol. 71/1, pp. 118-143, https://doi.org/10.1111/1477-9552.12322. [2]

OECD/FAO (2019), *OECD-FAO Agricultural Outlook 2019-2028*, OECD Publishing, Paris/Food and Agriculture Organization of the United Nations, Rome, https://doi.org/10.1787/agr_outlook-2019-en. [14]

Reardon, T. et al. (2014), *Urbanization, Diet Change, and Transformation of food supply chains in Asia*, Michigan State University, Global Center for Food Systems Innovation, https://www.fao.org/fileadmin/templates/ags/docs/MUFN/DOCUMENTS/MUS_Reardon_2014.pdf. [4]

Tarasuk, V. and A. Mitchell (2020), *Household food insecurity in Canada, 2017-18*, 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]

UN DESA (2020), *World Population Ageing 2019*, United Nations, New York, https://doi.org/10.18356/6a8968ef-en. [1]

UN WWDR (2022), *World Water Development Report 2022: Groundwater: Making the invisible visible*, United Nations, New York, https://unesdoc.unesco.org/ark:/48223/pf0000380721. [7]

Weersink, A. et al. (2021), "COVID-19 and the agri-food system in the United States and Canada", *Agricultural Systems*, Vol. 188, p. 103039, https://doi.org/10.1016/j.agsy.2020.103039. [10]

Notes

[1] Australia, China, Japan, Korea, and New Zealand.

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

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

[4] Fuglie, Keith (2015), "Accounting for growth in global agriculture", *Bio-based and Applied Economics*, Vol. 4 (3): 221-254. Estimates are based on the International Agricultural Productivity dataset produced by the USDA. See https://www.ers.usda.gov/data-products/international-agricultural-productivity.

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

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

[7] Fuglie, K. (2015), "Accounting for growth in global agriculture", *Bio-based and Applied Economics*, Vol. 4 (3): 221-254 (updated to 2019, USDA).

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

[9] Source OECD-FAO interpolated for 2018-20 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this *Outlook*.

[10] ESCAP-World Bank trade cost database: https://www.unescap.org/resources/escap-world-bank-trade-cost-database. Summarised in Tralac report: https://www.tralac.org/resources/infographics/15537-intra-africa-non-tariff-trade-costs-for-the-period-2015-2019.html.

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

[12] Source OECD-FAO interpolated for 2018-20 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this Outlook

[13] Fuglie, K. (2015), “Accounting for growth in global agriculture”, *Bio-based and Applied Economics*, Vol. 4 (3): 221-254 (updated to 2019, USDA, regional aggregation of countries).

[14] For mentioned regions, see summary table for regional grouping of countries.

[15] Source: OECD-FAO interpolated for 2018-20 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this *Outlook*.

[16] 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.

[17] Source OECD-FAO interpolated for 2018-20 from the database of the Global Trade Analysis Project (GTAP) 2011, using food expenditure and GDP data used in this *Outlook*.

[18] Fuglie, K. (2015), "Accounting for growth in global agriculture", *Bio-based and Applied Economics*, Vol. 4 (3): pp. 221-254 (updated to 2019, USDA).

3 Cereals

This chapter describes market developments and medium-term projections for world cereal markets for the period 2023-32. 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

Demand growth is slowing down, yields drive production

Over the next ten years, the growth of cereal demand is expected to be slower than the past decade due to weaker growth in feed demand, biofuels and other industrial uses. Moreover, in many countries direct human per capita food consumption of most cereals is approaching saturation levels, thus constraining growth in overall demand. Most of the increase in food demand is linked to population growth, particularly in low- and lower middle-income countries. Population-driven increases in the consumption of wheat and rice are expected in Asia, and of millet, sorghum, and white maize in Africa, while the growing role of rice in African diets is projected to translate into continued increases in its per capita food use in that continent.

In the next decade, global cereal production growth will be due to higher yields and more intensive use of existing arable land. The expected increase is attributed to the wider availability and adoption of new and improved seed varieties, more intense and efficient use of inputs and improved agricultural practices. Furthermore, market turbulence could revive policies aimed at increasing domestic production to reduce exposure to global markets. On the other hand, growth in production might be limited by the impacts of climate change on yields, a lack of access to new technologies in certain countries as well as insufficient investments. Moreover, heightened environmental awareness and new environmental policies could dampen yield growth.

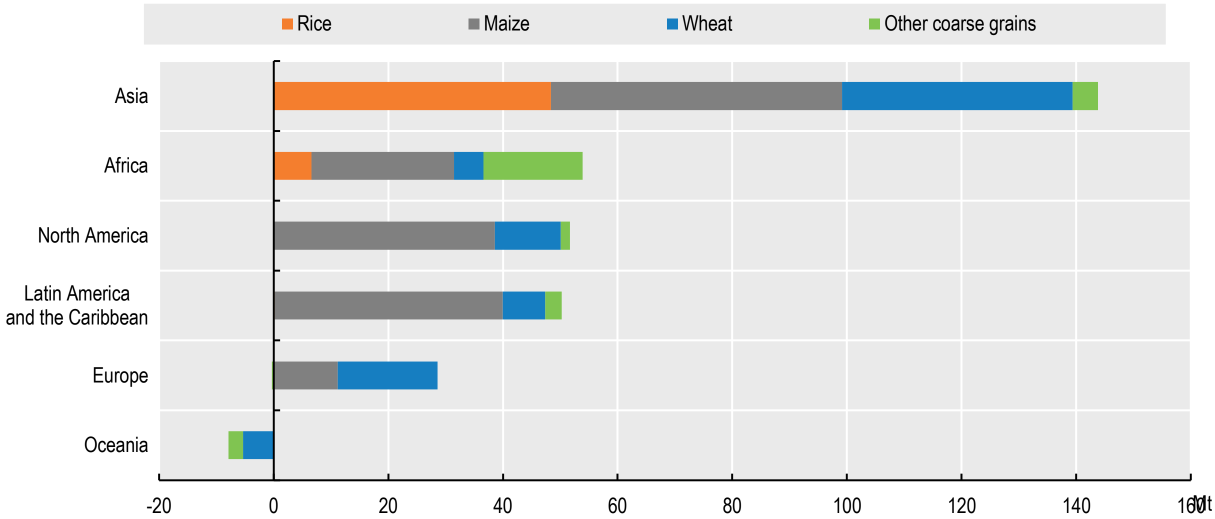
Global production of cereals is projected to increase from its current level by about 320 Mt to 3.1 bln t by 2032, largely from maize and rice. As over the past decade, the increase is expected to originate primarily in Asian countries, which will account for about 45% of global growth. Africa, where maize and other coarse grains will be the primary drivers of growth, is expected to contribute larger shares to global growth of cereal production than over the past decade. Latin America and the Caribbean will also generate a substantial portion of the increase, largely of maize. Under the assumption of average growing conditions, Oceania is not expected to maintain the record production levels experienced in the base period (Figure 3.1).

Overall, 17% of global cereal production was traded internationally in 2022. However, this share varies across the different cereals ranging from 10% for rice to 25% for wheat. This ratio is expected to remain stable over the next decade. Asia is projected to maintain its position as world largest rice exporting region, while countries in Latin America and the Caribbean will mostly import wheat and export maize. Many African and Asian countries are expected to become more reliant on cereal imports during the next decade.

It is projected that world cereal trade will increase by 11%, totalling 530 Mt by 2032. Wheat will contribute to 43% of this growth, while the rest is shared by maize (34%) and rice (20%) and other coarse grains (3%). The Russian Federation (hereafter "Russia") is projected to remain the largest wheat exporter, supplying 23% of global exports in 2032. The United States will remain the leading exporter of maize closely followed by Brazil, while the European Union will remain the main exporter of other coarse grains. India, Thailand and Viet Nam will continue to be the leading rice exporters, with Cambodia and Myanmar playing an increasingly significant export role. As in the past years, Chinese feed demand is expected to be a key factor in cereal markets. The projections assume Chinese imports of maize and wheat stay below recent peaks and reach 19 Mt and 7.5 Mt respectively by 2032.

The 2023/24 season is expected to continue to see high nominal grain prices. However, assuming average yields and geopolitical stability, the long-term downward trend in real terms may resume and continue until 2032.

Figure 3.1. Regional contribution of growth in cereal production 2020-22 to 2032



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/k9uasr

The COVID-19 pandemic restrictions (some still in place in the People's Republic of China – hereafter "China"), Russia's war against Ukraine, animal diseases, reduced production in some countries due to extreme weather events, high fertiliser and transport costs, and the macroeconomic environment, including high inflation, have caused a surge in grain prices. These factors are expected to subside by 2024 but may still influence prices during the outlook period. Furthermore, trade disruptions due to political instability and attempts to control domestic inflation can also have a profound effect on markets. Certain countries have expressed their intent to develop strategies to manage domestic prices, such as stock building, export restrictions, import barriers and increasing subsidies for producers and consumers, but the implementation of these measures is often unclear and financially difficult to achieve.

3.2. Current market trends

Wheat and coarse grain prices below recent peaks

The 2022/23 market situation of grains (wheat and coarse grains) is somewhat mixed compared to the preceding season. Global wheat production has reached unprecedented levels and global stocks are increasing. By contrast, production of maize and other coarse grains has not been sufficient to meet demand, leading to an expected drawdown of global coarse grain stocks by the close of season in 2023. Although the Black Sea Grain Initiative has facilitated the movement of more than 15 million tonnes of cereals until April 2023 which has helped to increase supplies and quell some of the uncertainty in grain markets, supplies from Ukraine remain constrained.

As for rice, after successive years of bumper harvests, inclement weather and hikes in production costs are set to lower world rice production in 2022/23, although a still robust level of plantings is expected to keep the global harvest at an above-average level. The season's anticipated production reduction, combined with policy changes, may forestall further increases in global rice utilisation and reduce world trade in rice 2023. However, efforts to reconstitute stocks by some countries are expected to keep world rice stocks in 2022/23 at their second highest level on record.

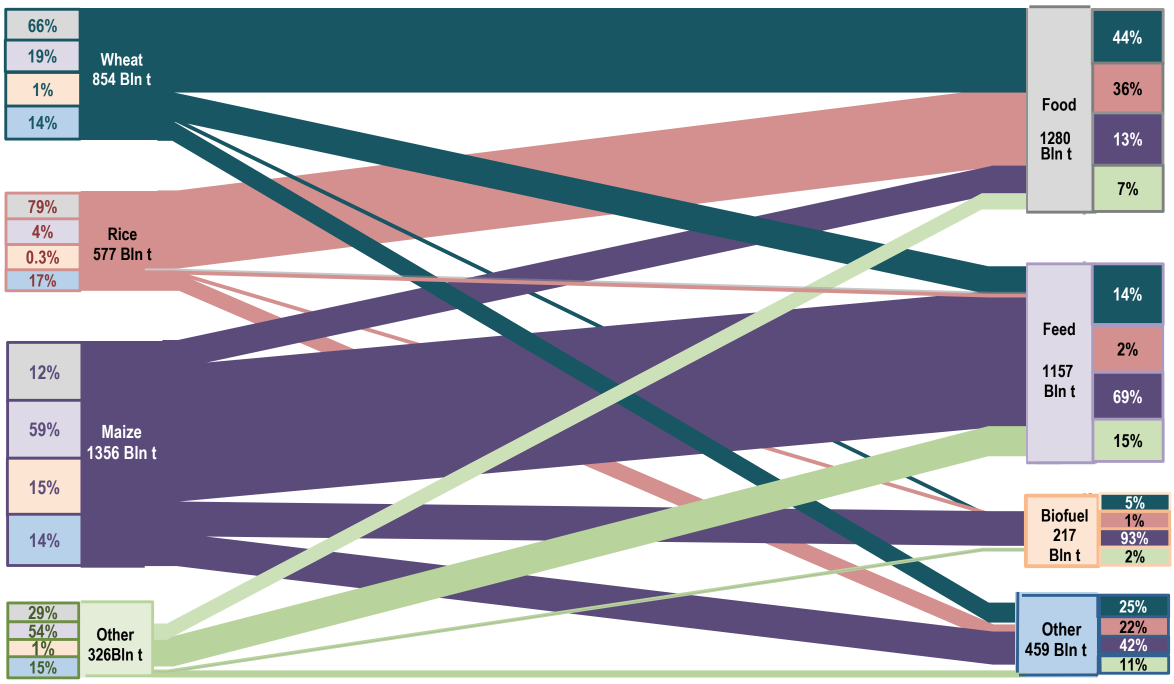
3.3. Market projections

3.3.1. Consumption

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

Cereal demand will continue to be dominated by food use closely followed by feed use. In 2032, 41% of all cereals will be directly consumed by humans, while 37% will be used for animal feeds. Biofuels and other uses are projected to account for the remaining 22% These shares, however, differ across the different cereal types. While wheat and rice is mainly used for food, feed use dominates maize and other coarse grains (Figure 3.2).

Figure 3.2. Global use of cereals in 2032



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/tegpql

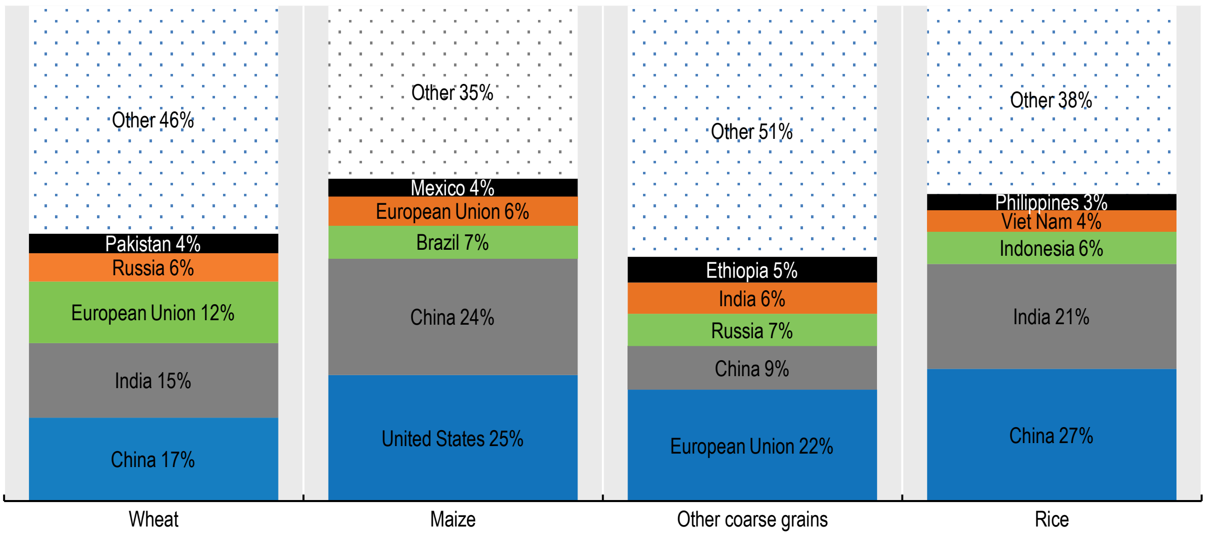
Between 49% and 65% of global *cereal* consumption occurs in the top 5 consumer countries of each commodity (Figure 3.3), which is clearly less concentrated than production (see Figure 3.4 below). Global use of cereals is projected to increase slightly from 2.8 bln t in the base period to 3.1 bln t by 2032, driven mainly by higher food use (+148 Mt), followed by feed use (+130 Mt). Asian countries will account for near 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 (0.9% p.a.) and other coarse grains (0.6% p.a.) over the next decade. Consumption of cereals for food is expected to increase at a slower rate than in the previous decade.

Wheat consumption is expected to be 11% higher in 2032 than in the base period. Four countries account for two-fifths of this increase: India, Pakistan, Egypt, and China. Global use of wheat for food is projected to increase by 57 Mt but to remain stable at about 66% of total consumption; growth will be slower compared to the previous decade as the rate of increase in world population slows down.

Globally, the projected increase in consumption of wheat for food is more than three 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 North Africa and Western Asia, such as Egypt, Türkiye, 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 offsetting the reduction in other countries.

Figure 3.3. Global cereal demand concentration in 2032



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/p8krid

Global *maize* consumption is projected to increase by 1.2% p.a., a much slower pace compared to 2.3% 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 57% in the base period to around 59% by 2032. 52% of the increase in feed consumption will be in Asian countries (more than half of this in China) due to fast expanding livestock and poultry sectors. Feed demand globally is expected to rise by 110 Mt to 794 Mt, mainly in China, the United States, Brazil, Indonesia, Argentina, India, Viet Nam, and Egypt. Consumption in Southeast Asia 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[1] will remain an important staple, accounting for about a quarter of total caloric intake. Growth in maize consumption as food in African countries is expected at about 2.7% p.a. on average.

Globally, maize use for biofuel production is expected to increase at a much slower rate than in the past two decades as national ethanol markets of key producers are constrained by biofuel policies. Brazil and the United States together account for more than 80% of the increase.

World utilisation of other coarse grains – sorghum, barley, millet, rye, and oats – is projected to increase by nearly 23 Mt, or 0.8% p.a., over the next ten years, compared to 0.2% p.a. in the previous decade, driven by additional use in African and Asian countries, while consumption is expected to remain stable in high-income countries. The food share of total consumption is projected to increase from about 26% in the base period to 29% by 2032. Sub-Saharan African countries, especially Ethiopia, rely heavily on millet as a food source owing to its resistance to droughts and the diverse climate conditions in the region.

Rice is primarily consumed as food and is 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., compared to 0.9% p.a. during the last decade, with Asian countries accounting for 66% 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 0.9 kg to around 53 kg per year.

Table 3.1. Rice per capita food consumption

kg/person/year

	2020-22	2032	Growth rate (% p.a.)
Africa	26.5	30.0	1.01
North America	11.9	12.7	0.33
Europe	7.2	7.2	0.33
Oceania	19.7	20.1	0.05
Latin America and the Caribbean	25.7	25.2	-0.02
Asia	74.2	75.5	0.27

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

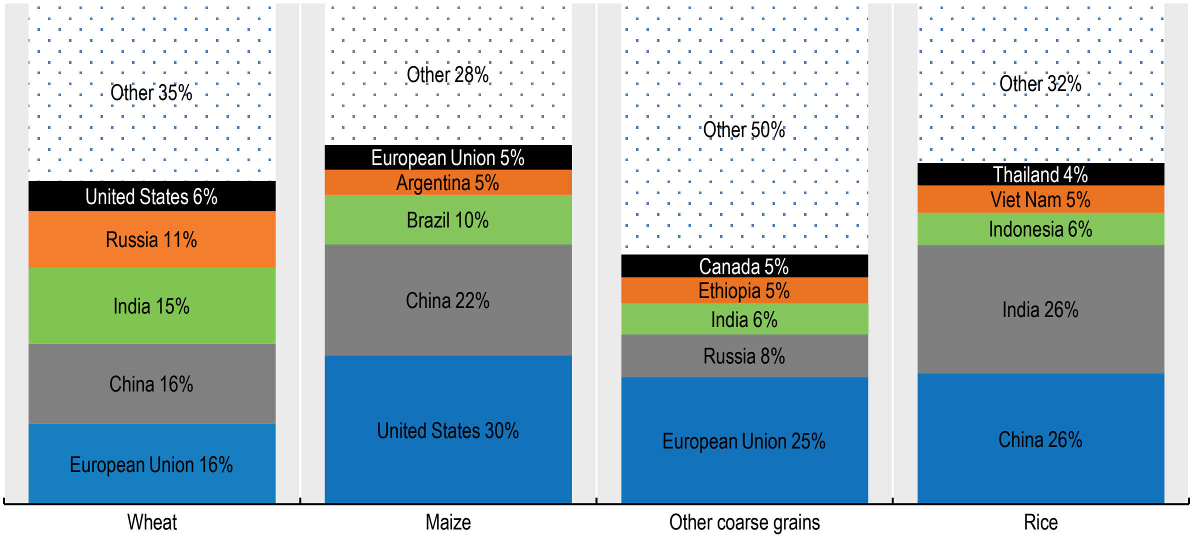
Improved technology and cultivation practices sustain yield and production growth

The global area harvested to cereals is expected to grow by 14.6 Mha (2%) by 2032. It will expand mainly in Latin American and the Caribbean countries by about 5 Mha, notably in Argentina and Brazil. Globally, wheat, maize and rice areas are projected to increase respectively by 1%, 5% and 1%, while other coarse grains areas are expected to remain unchanged. Decreasing harvested areas of rice in China, Japan and Brazil will be offset by gains in India, Thailand and African countries. Land availability compared to the previous decade is going to be limited in the future, as many governments place constraints on converting forest or pasture into arable land, as well as ongoing urbanisation, so increased global production is expected to be largely driven by intensification. This growth in yields from improving technology and cultivation practices, in middle-income countries in particular, is expected to sustain future cereals production. Globally, yields are projected to grow about 8% for wheat and other coarse grains, 9% for maize and 10% for rice.

Global *wheat* production is expected to increase by 76 Mt to 855 Mt by 2032, of which 40 Mt will be in Asia (Figure 3.1), a slower growth rate than in the last decade.

India, the world's third largest wheat producer, is expected to provide the largest share of the additional wheat, accounting for more than a quarter of the global production increase, driven by yield improvements and area expansion in response to national policies to improve self-sufficiency. There will also be significant production increases in Russia, Canada, Argentina and Pakistan. The European Union is projected to become the largest producer of wheat by 2032 (Figure 3.4), overtaking China, where wheat production is responding to demand decreases from negative population growth.

Figure 3.4. Global cereal production concentration in 2032



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/kx562v

Global *maize* production is expected to grow by 165 Mt to 1.36 bln t by 2032, with the largest increases in the United States and China, followed by Brazil, Argentina and India. Increased production in Brazil will be largely driven by higher second-cropped maize following the soybean harvest. Production growth in the United States is expected below the global average of 1.2% p.a., at 0.6% p.a. over the next ten years.

In Sub-Saharan Africa, total maize output is projected to increase by 24 Mt, of which white maize 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 that 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 52% 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 temporary stocks were depleted by 2019. 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 almost a fourth to increases in global maize output.

Global production of other coarse grains is projected to reach 330 Mt by 2032, up 23 Mt from the base period. African countries will contribute almost 75% to this increase. Africa has the fastest growing population and relies on grains such as millet and sorghum, mainly for food. On a single country basis, Ethiopia, India, Nigeria, and Argentina will contribute most to global production growth. Output in the European Union will decrease compared to the base period, which includes the record harvest of 2020, due to slower growth in feed demand.

Global *rice* production is expected to grow by 55 Mt to reach 577 Mt by 2032. Yield improvements are expected to drive this growth. Production expansions in Asian countries, which account for the bulk of global rice output, are expected to be robust. The highest growth is expected in India, followed by the LDC Asian region, Viet Nam, Thailand and China. India will remain a major producer of indica and basmati rice.

China, the world's largest rice producer, is expected to increase production at a similar pace to the last ten years. As most other major rice producers, projected output gains in China are expected to rely on yield improvements, amid expectations that efforts to move least productive land out cultivation will continue, as part of broader efforts to improve the quality of rice production. Production in high-income countries, such as the Korea, Japan is expected to remain on a downward trend. While output in the European Union will remain close to base period levels, in the United States and Australia it will expand by about 0.7% and 1.7% p.a. respectively.

3.3.3. Trade

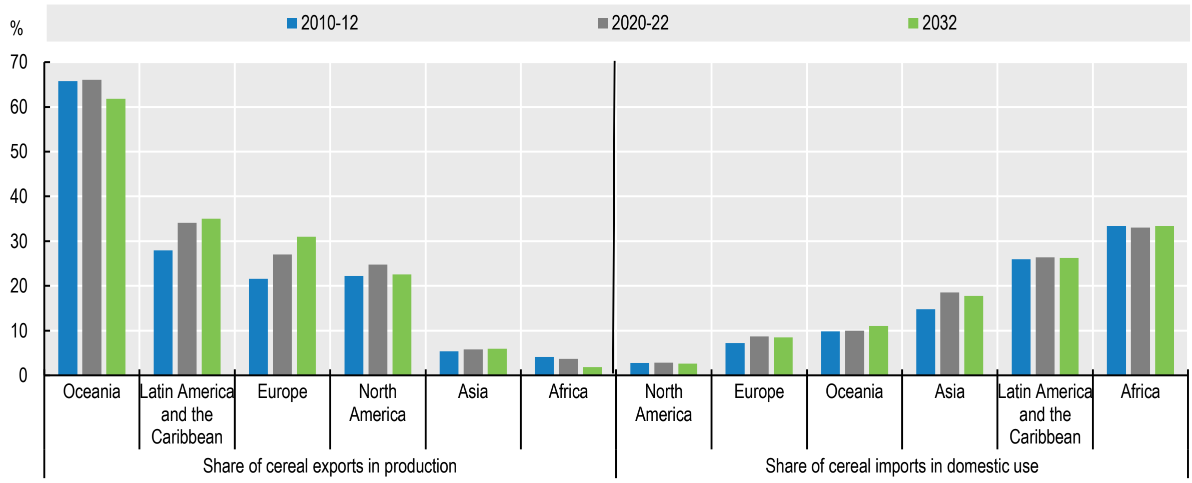
Trade in cereals will remain buoyant but with changing country shares

Trade in cereals presently accounts for about 17% of global consumption and this share is projected to stay at a similar level until 2032. 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 11% from the base period to 2032. Figure 3.5 illustrates how important cereal trade is relative to production and consumption. Net trade of cereals is low for Oceania and Latin America and the Caribbean, although the two regions are expected to have among the highest shares of grain exports in national production, 62% and 35% respectively by 2032. Amongst all regions, it is Africa where imports of cereals contribute most to domestic consumption and by 2032 almost 34% of domestic cereal use in Africa will originate from non-African countries.

Wheat exports are expected to grow by 20 Mt to 214 Mt by 2032, with Russia expected to maintain its position as the main exporter, accounting for 23% of global exports by 2032 (Figure 3.6).

The European Union, the second largest wheat exporter, will account for 17% of global trade in 2032, although exports are projected below the record volumes of 2019 and 2022. Compared to the base period, the European Union is expected to maintain international market shares mainly due to constrained growth in the Black Sea region. For the same reason, and due to the harvest failure of 2021 that reduced the base period trade volume, Canada is expected to gain export shares and reach 13% of global wheat exports by 2032. The United States, Canada, Australia and the European Union 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 are set to slightly increase the share of their imports in total trade from 25% currently to 26% over the next decade.

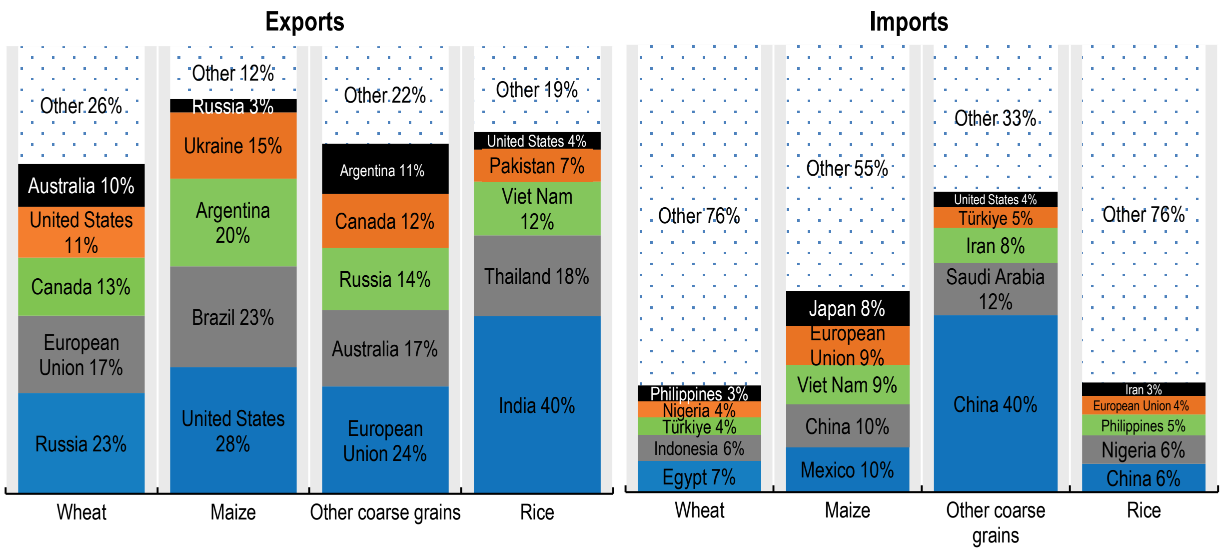
Figure 3.5. Trade as a percentage of production and consumption



Note: These estimates include intra-regional trade except for the European Union.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/fqg310

Figure 3.6. Global cereal trade concentration in 2032



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/j5sd4l

Maize exports are expected to grow by 18 Mt to 202 Mt by 2032. The export share of the top five exporters – the United States, Brazil, Argentina, Ukraine and Russia (overtaking the European Union as fifth largest maize exporter) – will account for 88% of total trade towards the end of the projection period. The United States is expected to remain the top maize exporter, although below the peak in 2020 and its export share will drop to 28%. Increasing export shares are expected for Brazil (23%) as production of second-crop maize increases. The LDC Sub-Saharan African region is expected to remain virtually self-sufficient in maize, with white maize continuing to play a key role for food security as a mainstay in local diets. South Africa will remain a regional supplier, but expansion will be limited as they produce genetically modified organisms (GMO) varieties that face import 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 imports are projected to stay below the large volumes in 2020 and 2021 which made the country the top-importer.(Figure 3.6). However, current policy discussion to ban imports of GMO maize may alter these projections (Box 3.1).

The international trade volume of *other coarse grains*, dominated by barley and sorghum, is much smaller than for maize or wheat. Global exports are expected to remain stable compared to the base period level at 50 Mt in 2032. The top five exporters – the European Union, Australia, Russia, Canada and Argentina are projected to account for 78% of global trade by 2032, 3 percentage points above the volume 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 the United States – absorb almost 67% of global trade, with China expected to account for 40% by 2032.

As it is assumed that maize production in China will increase more significantly than in the past decade, the net-feed deficit will decrease over the medium term. However maize imports are assumed reach 19 Mt through by the end of the projection period, well above the WTO agreed TRQ level, while imports of sorghum and barley are as well projected to increase to 19 Mt.

As during the past decade, *rice* trade is projected to grow at 1.9% p.a. over the next ten years, with overall export volumes rising by 12 Mt to reach 63 Mt by 2032. The export share of the top five major rice exporters – India, Thailand, Viet Nam, Pakistan, and the United States – is expected to increase from 77% 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 remain the second largest rice exporter but is to continue facing strong competition for markets.

Less developed countries in Asia, particularly Cambodia and Myanmar, are projected to register strong export expansion, with their rice shipments collectively increasing by 29% from 4.0 Mt in the base period to 5.2 Mt by 2032, 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.

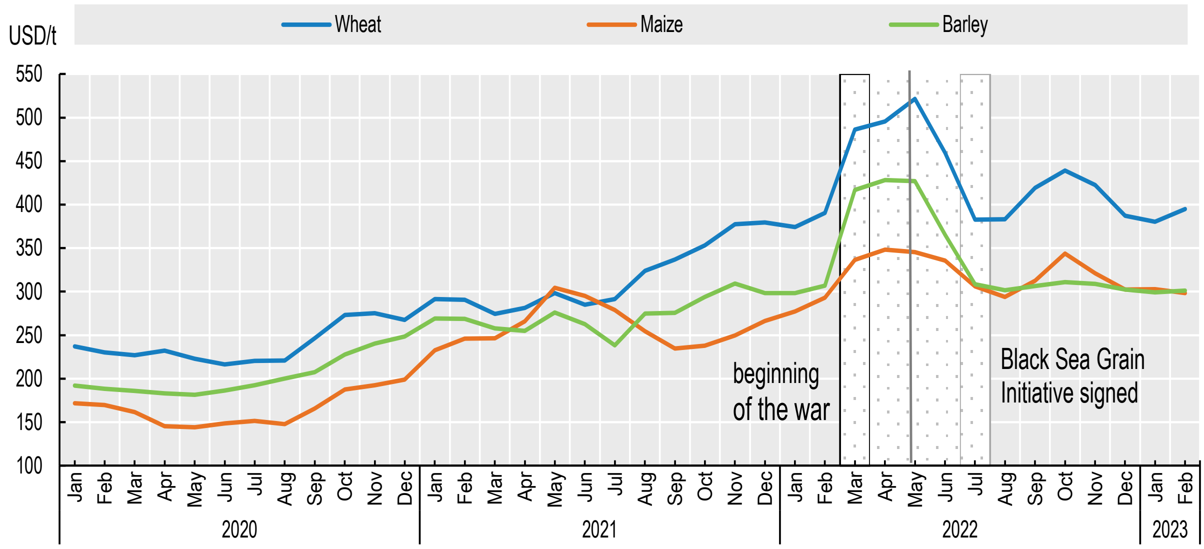
Imports by China, the largest importer of rice, are expected to drop from 5 Mt in the base period to 4 Mt in 2032, well below the peak in 2015. Imports are projected to increase significantly in African countries, where growth in demand continues to outpace production growth. Nigeria is projected to become the second largest importer of rice, increasing imports by 2.4 Mt to 4.0 Mt, or the equivalent of 38% of domestic consumption by 2032. Overall, imports by African countries are expected to increase from 18 Mt in the base period to 29 Mt by 2032, increasing Africa's share of world imports from 34% to 45%. In addition to China and Nigeria, the group of five major importers in 2032 is projected to include the Philippines, the European Union and the Islamic Republic of Iran, which overall would account for 25% of global rice imports by 2032.

3.3.4. Prices

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

The world wheat price averaged USD 319/t in the 2022 calendar year, the highest recorded in the past 20 years. Prices increased sharply when Russia's war against Ukraine started in February and remained high for several months mainly driven by the uncertainty about supplies to international markets. With increased seasonal supplies from harvests in the northern hemisphere and an agreement reached on the Black Sea Grain Initiative, prices started to fall before the agreement was signed in late July 2022. By early 2023 international wheat prices had fallen to their pre-war levels but remain elevated. Market prices for maize and barley have shown similar patterns since 2020 (Figure 3.7).

Figure 3.7. Monthly prices for wheat, maize and barley



Note: Wheat: US wheat, No.2 Hard Red Winter, fob Gulf; maize: US Maize, No.2 Yellow, fob Gulf; barley: France, feed barley, fob Rouen
Source: Food Price Monitoring and Analysis (FPMA) Tool.

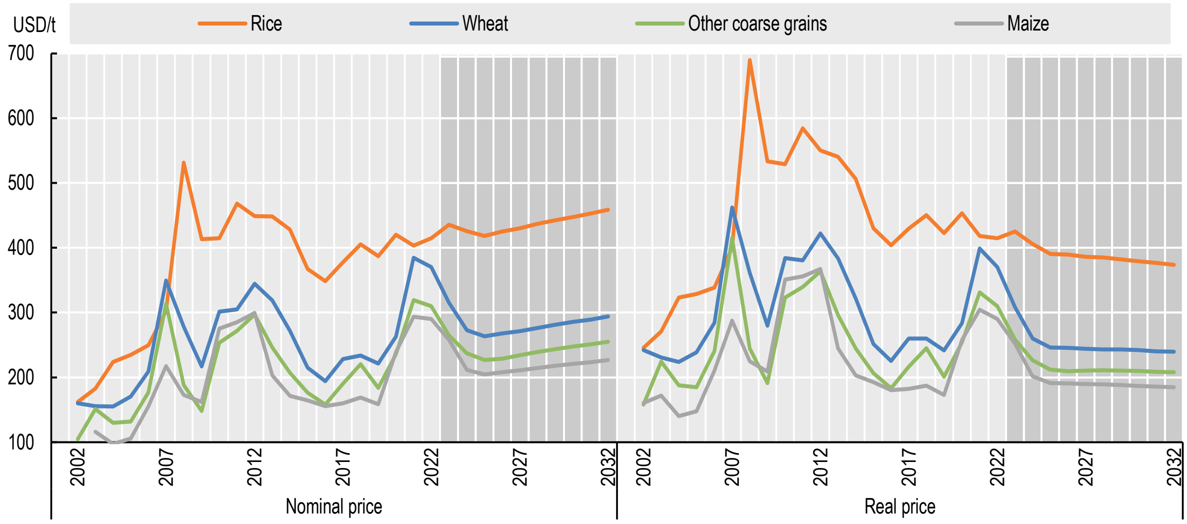
StatLink https://stat.link/cwyfs4

Nominal wheat prices are expected to remain below the 2022 level but remain elevated for another season before returning to their medium-term trend. After dropping, the price is projected to increase to USD 293/t by 2032. For maize and other coarse grain prices it is also expected that they return to the medium-term path by 2025. Over the medium term the global maize price is expected to reach USD 226/t and the price for other coarse grains (measured by the feed barley price fob Rouen) is projected to reach USD 255/t (Figure 3.8).

The reference export price for milled rice (FAO All Rice Price Index normalised to India 5%) moved within a narrow band of USD 387/t and USD 420/t between 2018 and 2022. In 2023, international rice prices are expected to increase, largely owing to tighter exportable supplies stemming from production contractions in some important exporters. Over the medium term, demand from countries in Far East, Africa, and the Middle East is expected to grow, but supply increases in exporters are expected to generate only a small increase in nominal prices to USD 459/t by 2032

Over the medium-term, prices for wheat, maize, other coarse grains and rice are expected to decline to 2032 when adjusted for inflation (real terms).

Figure 3.8. 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 (2022=1). Rice on secondary axis. Prices refer to marketing years.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/14fuvb

3.4. Risks and uncertainties

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

More than most other commodities, grain markets have been and could continue to be markedly affected by the outcome of the Russia's war against Ukraine given their strong participation in international markets, especially for wheat and maize, as well as fertilisers and fossil fuels. The production and export expectations for cereals from both countries, especially for Ukraine, 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 depended on cereal imports from the Black Sea region in the past have already started to find new sources of supply, but this process is not finished. The Black Sea Grain Initiative has eased the tense situation, but the extension of this deal is subject to many uncertainties. Rising fertiliser prices due to ongoing supply disruptions, the Russia's war against Ukraine, and other factors may lead to decreased yields in the short term, particularly in low-income countries. The resulting increase in commodity prices could exacerbate an already potentially difficult international food security situation.

Several other 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 cereal markets. Trade restrictions could provoke market reactions and changes in trade flows such as the past export measures applied to grains and rice. Relaxing policies related to GMO and gene editing could have a significant impact on the potential for cereal production globally, as could the speed of adoption of available conventional technologies and improved farm practices. These policy changes could also go in the opposite direction if countries become more GMO-unfriendly (Box 3.1).

Crop pests and animal diseases are a continuing risk that could disrupt markets. 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 African Swine Fever (ASF) outbreak in SE Asia.

Box 3.1. Mexico’s National Development Plan

In December 2020, the Mexican Government issued a decree with the aim of eliminating the use of glyphosate and GMO maize by the year 2024 in order to meet objectives set out by the National Development Plan (Plan de Desarrollo Nacional). This decree was revised in February 2023 to meet the requirements of the USMCA free trade agreement, allowing the use of GMO crops in the feed and industry sectors, but prohibiting their use for human consumption, such as in maize flour and tortillas.

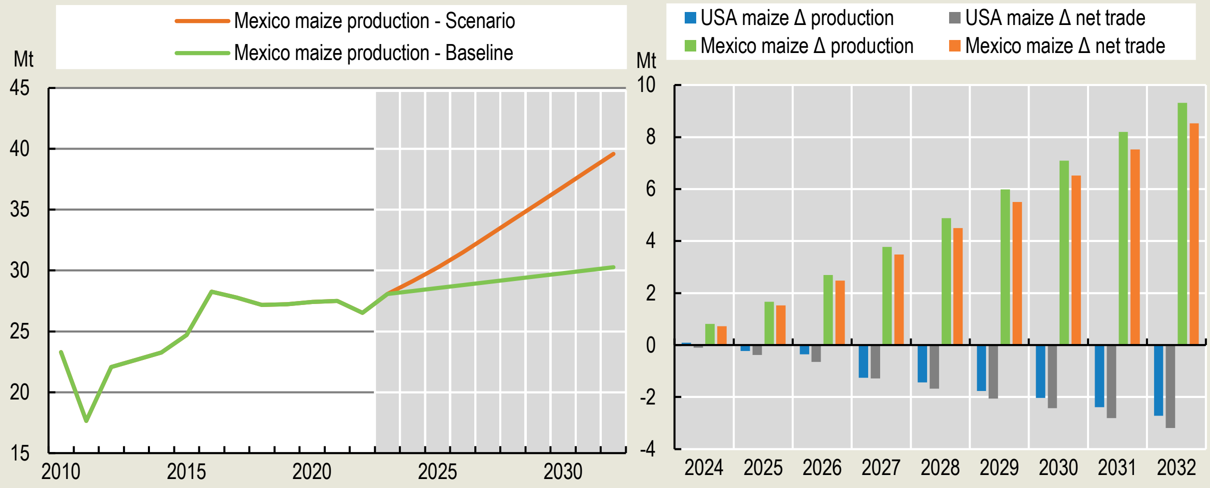
The Mexican Government also launched the programme “*Sembrando Vida*” in an effort to foster food self-sufficiency and alleviate rural poverty and environmental degradation in specific areas. Additionally, the government is attempting to reduce dependence on global grains markets, particularly maize, which represented 17% of the total value of agricultural imports in 2021.

In 2022, Mexico was the sixth largest maize producer globally, producing 27 Mt, yet it has been among the largest maize importers for years, importing 17 Mt in 2022. Production has increased by an average of 1.8% per year over the past decade, matching food demand at 1.28% per year, but imports have grown even faster, at 8.5% p.a., due to the surge in demand for feed, which has increased by almost double in the last decade. The majority of Mexico's maize imports come from the United States and are mainly GMO yellow maize.

In Mexico, maize production is not limited to certain regions like it is in many other large maize-producing countries; instead, it is spread across the entire country and covers different agroecological zones. As a result, 62% of the total maize production is from federal states with yields below the national average. The southern region, which makes up around half of Mexico's total maize production area, has below-average incomes and lacks infrastructure compared to more developed regions such as the centre and north. To address this discrepancy, the National Development Plan 2019-2024 aims to close the gap between the wealthy and poorer regions in the country, including the difference in income and productivity among farmers in the south.

The following scenario has been conducted with the Aglink-Cosimo model which assumes an increase in the average yield in Mexico of 23% with respect to the baseline value. Rather than assuming an immediate increase, this ambitious target is assumed to be gradually met by 2032 (Figure 3.9). This estimate was calculated by identifying the states included in the “Sembrando Vida” programme in which maize yields are below the country average and then increasing their yield to the country average yield in 2020[1] according to “*Sistema de Información Agralimentaria y Pesquera*” (SIAP) data in Mexico.[2]

Figure 3.9. Effects of maize yield increases in Mexico on production and trade in Mexico and the United States



Note: Right panel shows absolute changes between scenario and baseline
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/8ekbmj

The scenario results imply that if yields are improved this way, maize production in Mexico could be raised by 10.5 Mt, with imports decreasing by about the same amount. Despite this, Mexico will still be a net importer at 12.5 Mt. To become self-sufficient also for feed markets, yields need to be increased even further. The expected lower Mexican maize imports would decrease United States maize production by 2.7 Mt or -0.7%, compared to the baseline in 2032. Nevertheless, the decline in United States maize exports is smaller compared to the decline in Mexican imports. Global maize prices would be 2.5% lower than in the baseline.

This analysis assumes that yield improvement is attainable. Technically, it is feasible to reach such yields; experiments conducted by the *Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT)* in Chiapas, Mexico – a state with one of the lowest maize yields – showed that with adequate agronomic practices, yields could reach approximately 4 t/ha[3], close to the target yield assumed in this scenario. Nonetheless, the discussion and analysis on the efforts required to achieve such a goal are beyond the scope of this scenario.

Notes

[1] Chiapas, Oaxaca, Puebla, Veracruz, Guerrero, México, Hidalgo, Durango, San Luis Potosí, Tabasco, Campeche, Querétaro, Tlaxcala, Aguascalientes, Quintana Roo, Morelos, Yucatán, Nayarit and Colima.

[2] http://infosiap.siap.gob.mx/gobmx/datosAbiertos.php.

3 https://idp.cimmyt.org/demuestran-el-potencial-de-rendimiento-de-maices-nativos-en-la-plataforma-de-investigacion-masagro-de-comitan-chiapas/

Note

[1] White maize and yellow maize are the most prevalent colours of maize globally. The *Outlook* does not distinguish maize by colour though. Nutritionally, there is no difference between differently coloured types of maize, yet regional preferences and domestic availability drive demand.

4 Oilseeds and oilseed products

This chapter describes market developments and medium-term projections for world oilseed markets for the period 2023-32. 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.

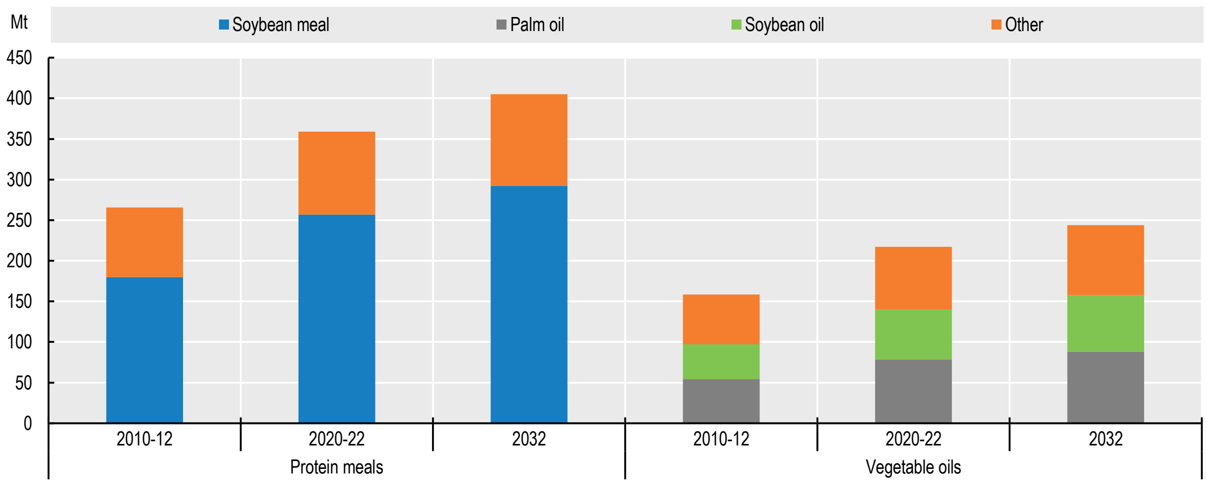
4.1. Projection highlights

Continued demand for vegetable oil will drive oilseed markets

Food use of *vegetable oils* should account for 57% of total consumption in 2032, driven by population growth and increased per capita use of vegetable oil in lower – 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 16% of global vegetable oil use, is projected to grow globally, especially in emerging markets like Indonesia and Brazil and in the United States, while declining use 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, especially in high-income countries, as it 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 the People's Republic of China (hereafter "China") is expected to slow down considerably, driven by improved feed efficiency combined with efforts to achieve lower protein meal shares in livestock feed rations. 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/szk0yg

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. Assuming increased replanting and increased mechanisation, a slight recovery in palm oil yields is expected over the outlook period. Palm oil production in other tropical countries is expected to expand more strongly, but Indonesia and Malaysia are still projected to account for 81% of global palm oil production.

Soybean production is expected to be dominated by yield improvements accounting for about three-quarters of the global growth while the expansion of harvested area, including increased double-cropping in Latin America, accounts for the remaining quarter. Soybean production is expected to reach 415 Mt by 2032, more than double the combined output of other oilseeds at 189 Mt. Brazil, the world largest producer and exporter, and the United States are expected to account for about two-thirds of world soybean production and more than 80% of global soybean exports.

Production of *other oilseeds* is projected to increase at a slower rate compared to the last decade, due to increasing competition by cereals for limited arable land in China and the European Union as well as stagnating demand for rapeseed oil as a feedstock in European biodiesel production. In general, the cultivation of other oilseeds such as rapeseed and sunflower seed is much less concentrated than that of soybeans. China, the European Union, Canada, and Ukraine each produce between 16 Mt to 36 Mt of these oilseeds. However, Russia's war against Ukraine is causing 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 more than 60% of their combined production and jointly accounting for nearly 60% of global vegetable oil exports. India, the world's biggest importer of vegetable oil, is projected to maintain its high import growth to satisfy growing domestic demand. Due to declining use for biodiesel production, imports of vegetable oil by the European Union are expected to decline strongly. 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 import demand by China.

While in the 2021 marketing year prices in the oilseed sector were at record highs, the current downward adjustment is expected to continue during the first years of the outlook period. Thereafter, prices are expected to increase slightly in nominal terms, while declining in real terms for oilseeds and protein meal following the long-term trend of agricultural commodity prices. Prices of vegetable oil could increase in real terms due to continued strong demand growth and limited potential for production expansion.

The use of vegetable oil as biodiesel feedstock is mostly determined by biofuel policies, which include countries' mandated blending ratios. In particular, the use by some countries of Sustainable Aviation Fuel (SAF) holds potential and could result in strong demand growth for vegetable oil. The future demand for protein meal in China depends on the balance between feed intensity and efficiency especially in rebuilding the pig meat sector, following African Swine Fever (ASF) as from 2018. The scope to increase palm oil output in Indonesia and Malaysia will increasingly depend on oil palm replanting activities and accompanying yield improvements (rather than area expansion), creating new challenges as yields of palm oil have been stagnant for several years. Sustainability concerns (i.e. deforestation and the use of sustainability certifications for vegetable oil) and concerns about the high saturated fat content of palm oil also influence the consumer acceptance and demand for palm oil.

4.2. Current market trends

Nominal prices are high but declining from record levels

International prices for oilseeds fell from record high levels observed in 2022 but remained above the average level of recent years in early 2023, mainly reflecting fluctuating prices for soybeans, sunflower seeds, and rapeseed. Meanwhile, world vegetable oil prices continued declining from record highs observed in early 2022, driven by lower world prices of palm, soy, sunflower seed and rapeseed oils. Concerning oil meals, international soymeal quotations rebounded in recent months, primarily underpinned by prospects of deteriorating production and crushing in Argentina.

Global soybean production in 2022/23 was lower than initially expected, largely tied to protracted dry conditions in Argentina, while harvest expectations in Brazil remain positive due to favourable weather conditions in most of the growing regions. In Indonesia, palm oil production is expected to increase in 2023, despite recent excessive rainfall in some areas that impeded the harvesting activities. In February, the Indonesian Government imposed temporary exports limits on palm oil, in order to secure enough domestic cooking oil. In Malaysia, palm oil production is also growing, thanks to generally conducive weather as well as to the gradual improvement of lingering labour shortages issues.

There are many uncertainties that can influence the market in the coming months, such as adverse climatic conditions, changes in policies, and the evolution of the Russia's war against Ukraine.

4.3. Market projections

4.3.1. Vegetable oil consumption

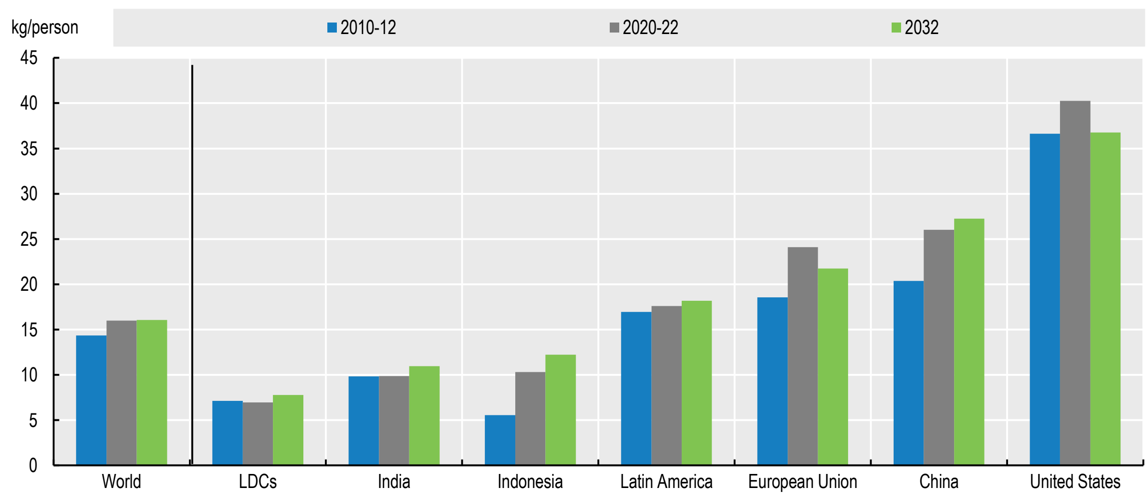
Demand for vegetable oil for food is slowing down

The two dominant uses of vegetable oil are for human consumption (57%) and a feedstock for the production of biodiesel (16%). In addition, vegetable oils are also used for cosmetics, varnishes, and increasingly in animal feed, especially for aquaculture.

Per capita consumption of vegetable oil for food is projected to grow by 0.1% p.a., considerably less than the 0.8% p.a. increase observed during 2013-22 due to declining food demand in high-income countries. In emerging markets such as China (27 kg/capita) and Brazil (23 kg/capita), the consumption of vegetable oil for food is set to reach levels comparable to those of wealthier economies (Figure 4.2).

India, the world's second largest consumer and main importer of vegetable oil, is projected to sustain a per capita consumption growth of 1% p.a., reaching almost 11 kg/capita by 2032. 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 low-income 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 1.2% p.a., to reach 8 kg per capita by 2032 due to higher incomes.

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

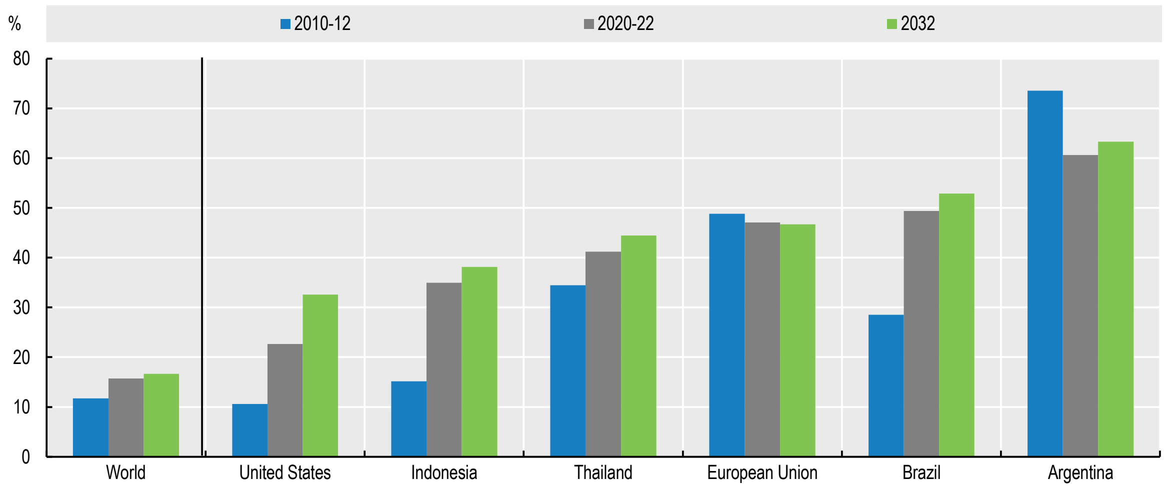


Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/18lp0u

The uptake of vegetable oil as feedstock for biodiesel (about 16% of global vegetable oil use) is projected to increase slower over the next ten years, compared to the 6.5% 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, largely due to specific policies. In the United States, Hydrotreated Vegetable Oil (HVO) or Renewable Diesel is considered an advanced biofuel and is expected to drive the considerable growth of biodiesel production. In Indonesia, the growth in the use of vegetable oil to produce biodiesel is projected to remain strong and reach 10.1 Mt by 2032 due to supportive domestic policies.

Figure 4.3. Share of vegetable oil used for biodiesel production



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

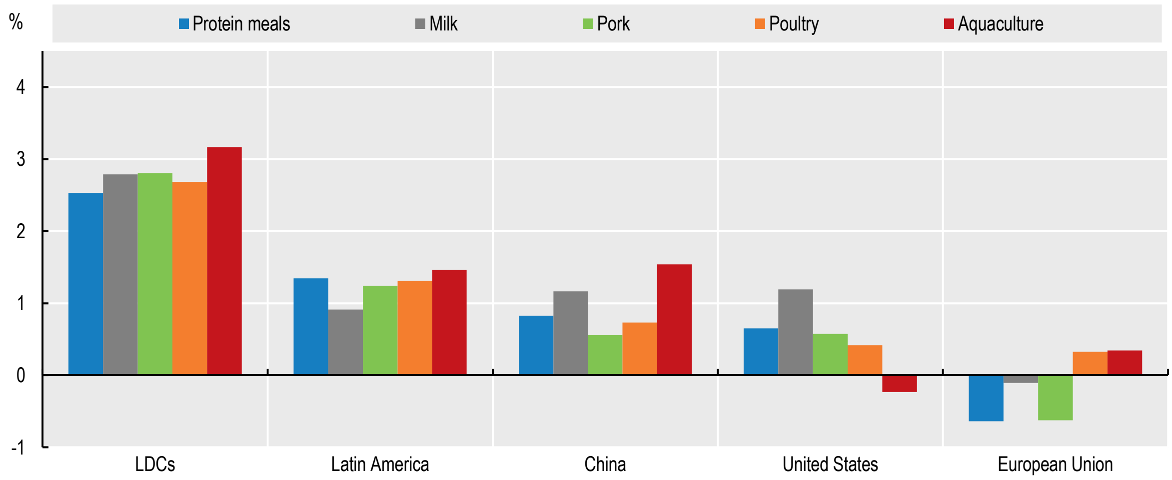
StatLink https://stat.link/la6h5j

4.3.2. Protein meal consumption

Feed demand is slowing, shaped by developments in China

Protein meal is exclusively used as feed and its consumption is projected to continue to grow at 0.9% p.a., considerably below that of the last decade (2.9% 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.

Figure 4.4. Average annual growth in protein meal consumption and animal production (2023-32)



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/0ipkmb

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. Nevertheless, due to strong growth of animal production, average use of protein meal per animal output continues to decline.

China accounts for more than a quarter of global protein meal demand and is therefore shaping global demand. 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 continues to exceed current levels in the United States and European Union.

In the European Union, and the United States, 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 results in lower demand for soybean meal.

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

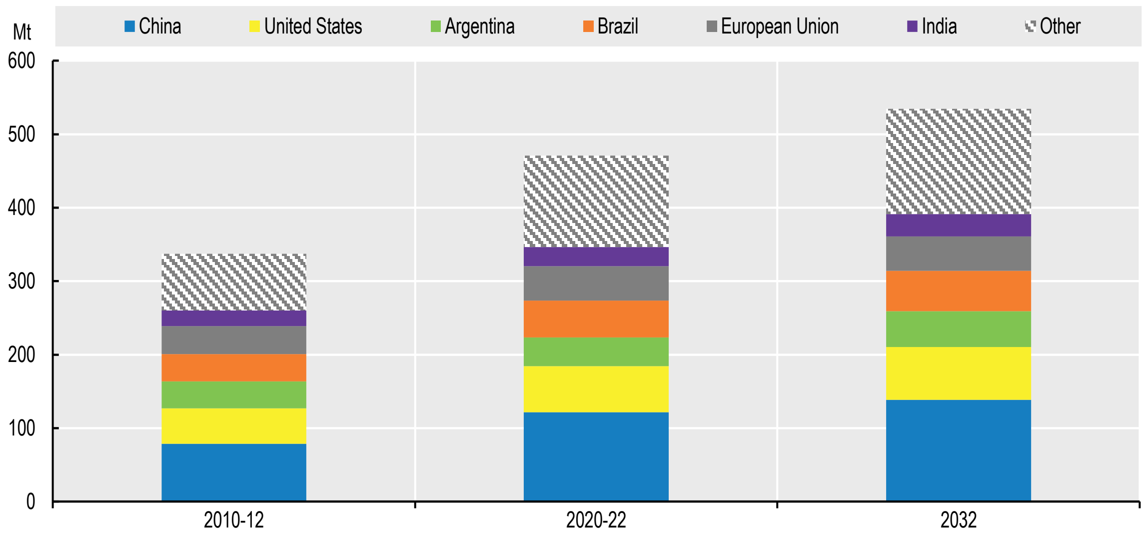
Slowing global oilseed crush and limited growth in palm oil production

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 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).

Soybean crush is projected to expand by 44 Mt over the *Outlook* period, significantly less than the 75 Mt in the previous decade. Chinese soybean crush is projected to increase by 9 Mt, accounting for about 21% of the world's additional 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. Global crush of other oilseeds is expected to grow in line with production by 19 Mt over the *Outlook* period and to occur more often in the producing country.

Global protein meal output from oilseed crush is projected to increase by 0.9% p.a., reaching 405 Mt by 2032. 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/10utq5

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 production is expected to weaken due to increasing sustainability concerns and the aging of oil palm trees in Indonesia and Malaysia, which account for almost 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 0.8%. 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 3.5 Mt by 2032, Colombia 2.6 Mt, and Nigeria 1.7 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, now dominated by palm kernel oil with a bye-product of the growing production of palm oil. Cottonseed oil is a by-product of cotton ginning (Chapter 10), with global production concentrated largely in India, the United States, Pakistan, and China. Overall, vegetable oil production is projected to increase globally by 0.9% p.a., driven mainly by food demand in low- and middle-income countries resulting from population and income growth.

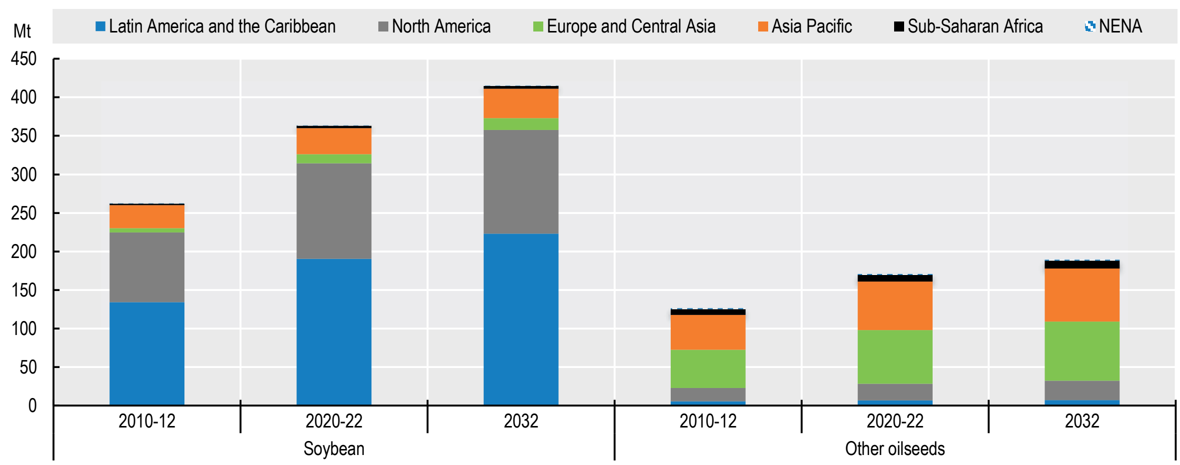
4.3.4. Oilseed production

Soybean production shifts to Latin America while palm oil and rapeseed yield growth is sluggish

The production of soybeans is projected to grow by 0.9% p.a., compared to 2.2% p.a. over the last decade. Growth will be dominated by yield increases, accounting for almost 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 soybeans 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 0.8% p.a. over the next decade – slightly stronger than the United States, the second largest producer, at 0.6% p.a., due to double cropping with maize. The production of soybeans is projected to grow strongly elsewhere in Latin America, with Argentina and Paraguay producing 51 Mt and 12 Mt, respectively, by 2032 (Figure 4.6). In China, soybean production is expected to continue to increase in response to reduced policy support for the cultivation of cereals, but at slower pace than the previous decade. Soybean production is also expected to increase in India, the Russian Federation (hereafter “Russia”), Ukraine, and Canada.

Figure 4.6. Oilseed production by region



Note: NENA stands for Near East and North Africa, and is defined as in Chapter 2.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

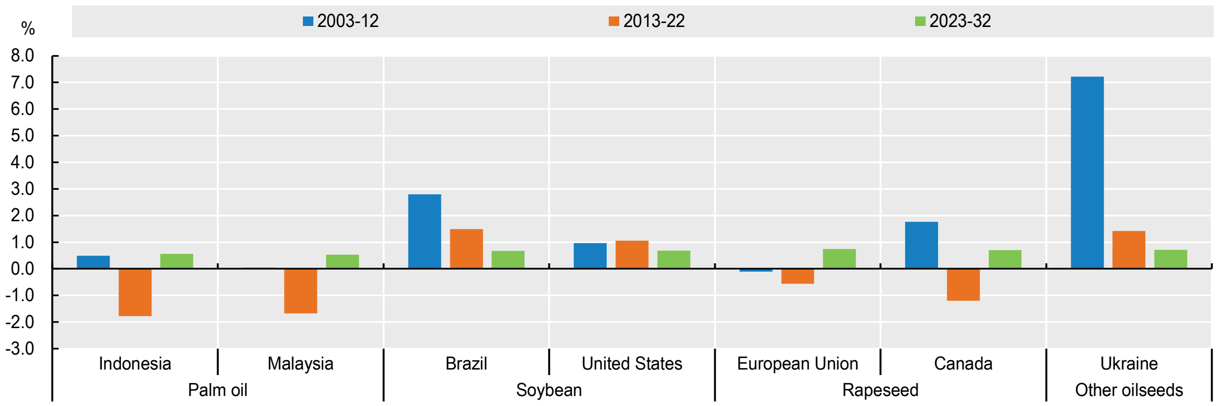
StatLink https://stat.link/26ek0m

The production of other oilseeds (rapeseed, sunflower seed, and groundnuts) will also grow at a slower pace, at 0.9% p.a. compared to 2.6% p.a. over the previous ten years (2013-2022). 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 40 Mt and 30 Mt, respectively, by 2032. 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 1.2% p.a., to reach 20 Mt by 2032.

Decomposing production between the contribution of yield and area shows that yields for major producers of palm oil and for some major suppliers of rapeseed have fallen or grown slowly during the last decade (Figure 4.7). There are many reasons for this development; 1) a strong increase in production area so that less favourable land is used for production reducing average yields; 2) the ageing of oil palms as well as labour shortages has reduced yields; 3) restrictions in the use of pesticides adversely affected average rapeseed yields in the European Union; and 4) shifting weather patterns adversely affected yields. It remains uncertain how this will play out over the coming decade, but lower area expansion could result in a recovery in yields over the *Outlook* period. If this is not the case it will be a challenge to satisfy growing demand, especially for vegetable oil.

Soybean stocks are projected to reach a stock-to-use ratio of almost 12% by 2032, which remains low compared to the past two decades, so harvest failures could quickly lead to market shortages.

Figure 4.7. Average annual yield growth for palm oil and oilseeds



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/0528b7

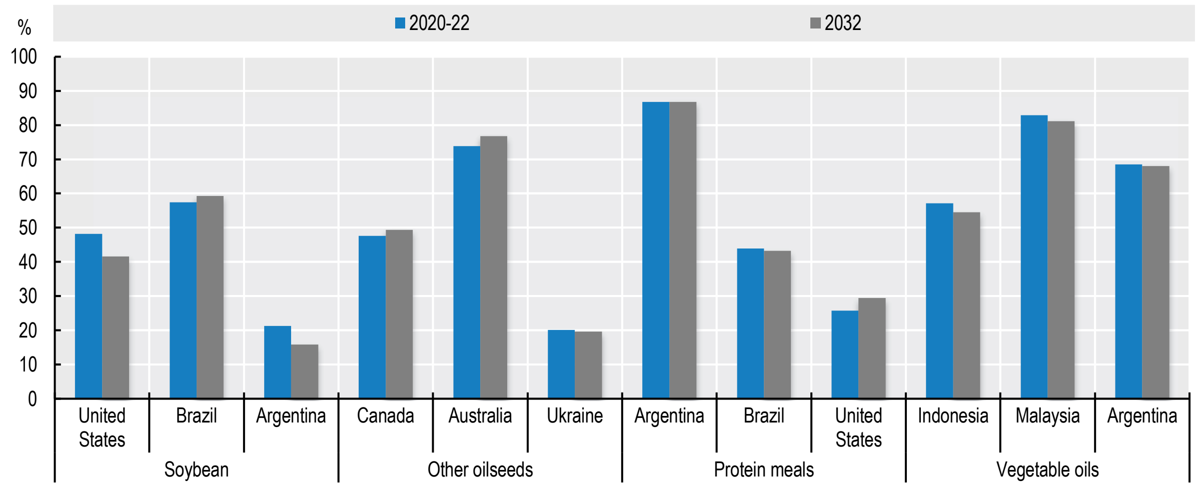
4.3.5. Trade

Trade is significant for oilseeds and products, but slowing down

Over 40% 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 Chinese imports are projected to grow by 0.7% p.a. to about 102 Mt by 2032 (down from 4.0% p.a. in 2013-2022), accounting for about 60% 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 now taken over with steady growth in its export capacity and is projected to account for 53% of total global exports of soybean by 2032.

For other oilseeds, the internationally traded share of global production 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 70% of world exports by 2032. In Canada and especially in Australia, more than half of the production of other oilseeds (primarily rapeseed) is exported (Figure 4.8). Additional oilseed production is crushed domestically and exported in the form of vegetable oil or protein meal.

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



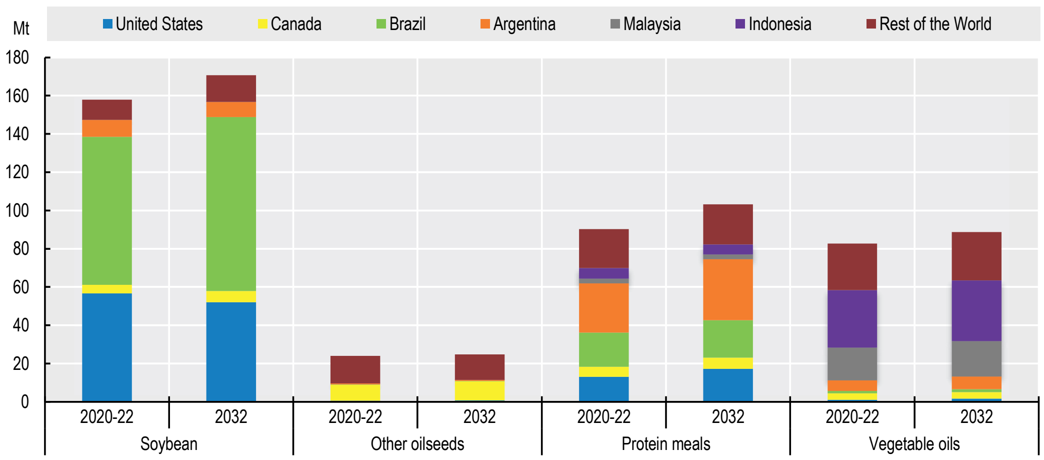
Note: The figure only shows the direct share of exports and does not include the export of further processed products, which would lead to higher export shares.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/30hmki

Vegetable oil exports, which amount to 38% of global vegetable oil production, continue to be dominated by a few players. Indonesia and Malaysia are expected to continue to account for almost 60% of total vegetable oil exports during the *Outlook* period (Figure 4.9). 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 1.5% p.a., reaching 18 Mt by 2032, to meet increasing demand driven by population growth, urbanisation, and rising disposable income.

The projected growth in world trade of protein meal is 0.9% p.a. over the *Outlook* period and Argentina is expected to remain by far the largest meal exporter with its clear export orientation. The largest importer is the European Union, with imports expected to decline due to reduced domestic demand for protein meal. More than three-quarters of the global import growth in protein meal is projected to occur in Asia, in particular in Southeast Asia with its increasing animal production. 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.

Figure 4.9. Exports of oilseeds and oilseed products by region



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

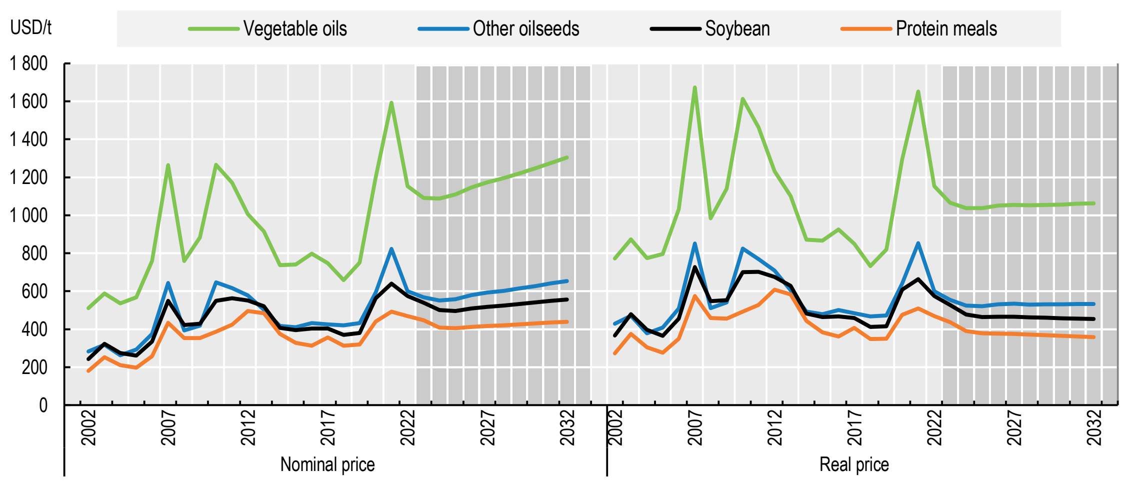
StatLink https://stat.link/9cpvm2

4.3.6. Prices

Current high prices will weaken over the next decade

A downward adjustment is expected during the first years of the *Outlook* period, reflecting expectations of better production prospects, partly fueled by the incentive 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 4.10). Due to expected stronger demand for vegetable oil than protein meal, prices of vegetable oil are projected to rise compared to protein meal. This will also favour other oilseeds prices over soybeans as they contain higher shares of vegetable oil.

Figure 4.10. 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 (2022=1).
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/gwcz7q

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 new 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. 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, there are concerns with competing certification schemes in Malaysia and Indonesia.

Other 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 2020-22. 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.

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 16% 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 United States Renewable Diesel or HVO receive considerable support in some states that show strong production growth rates. In the European Union, policy reforms and the emergence of second-generation biofuel technologies will likely prompt a shift away from crop-based feedstocks. Globally, Sustainable Aviation Fuels (SAF) are expected to be a substantial use of biofuels but the timing of introduction remains largely uncertain. The development of crude oil prices, which affects the competitivity and profitability of biodiesel production, remains a major source of uncertainty.

China's import demand for soybean remains uncertain and many factors influence it. Overall, the development of the meat demand is shaped by declining population, slower but still substantial economic growth which will be the main determinant of feed and especially protein meal demand. The pig meat industry recovery from ASF combined with its restructuring 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.

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 while also leading to a shortfall of vegetable oil and protein meal for feed in Ukraine.

5 Sugar

This chapter describes market developments and medium-term projections for world sugar markets for the period 2023-32. 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

Over the next decade, world per-capita sugar consumption is projected to increase, mainly spurred by income growth in low and middle-income countries in Asia and Africa. The overall rise in sugar intake is expected to be mitigated by a modest decline in per capita consumption in high-income countries, reflecting rising health concerns among consumers, and measures implemented at country level to discourage sugar consumption. Despite the diverging trend, however, average per-capita consumption in low- and middle-income countries, notably in Sub-Sahara Africa, is anticipated to remain substantially lower than in high-income countries.

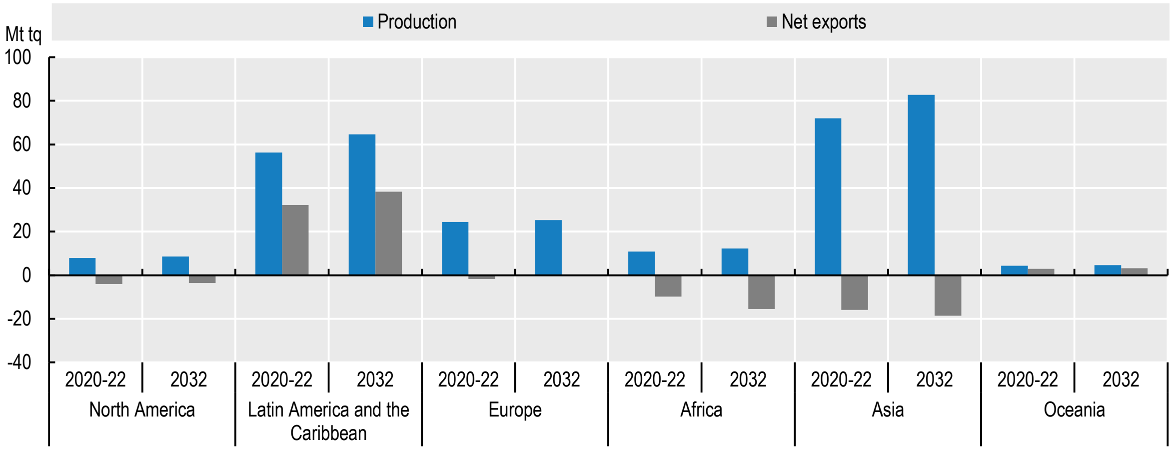
Sugar is projected to remain the most consumed caloric sweetener still accounting for 80% of the global sweetener utilization despite general efforts to find substitutes. The main alternative caloric sweetener, High Fructose Corn Syrup (HFCS), is anticipated to, at best, maintain its share at around 8% of total consumption, while the remaining balance is accounted for by low-caloric High Intensive Sweeteners (HIS), including saccharin, sucralose and aspartame.[1]

Over the outlook period, sugar production is expected to expand mainly in key sugarcane producing countries. Sugarcane, which grows mostly in tropical and sub-tropical regions, will continue to account for more than 85% of the aggregate sugar crops output. Brazilian production is expected to increase as a result of both area expansion and yield improvements, driven by remunerative prices. Productivity gains, including varietal improvements and higher extraction rates, will drive sugar production growth in India and Thailand, with acreage projected to remain relatively stable. In Africa, sugarcane production in the key producer, South Africa, is anticipated to expand on account of government support measures to the sector. Production of sugar beet, which grows mainly in the Northern Hemisphere, is foreseen to remain quite stable in the European Union, while increasing in Egypt, boosted by rising regional and industrial demand. The increase in sugar beet production in Egypt is projected to consolidate its position as the continent's largest sugar producer by 2032.

Over the next decade, the supply of sugar will continue to be tempered by the use of sugar crops as a feedstock for ethanol. In Brazil, the ambitions of the Renovabio program encourage ethanol production and sugarcane will remain the main feedstuff for reaching the 2030 target. Constant real international crude oil prices will favour sugarcane-based ethanol production, while Brazilian sugar production will remain competitive in international markets, even if the Real is assumed to appreciate in real terms. Brazilian processors, who can easily switch between sugar or ethanol from sugarcane, will continue to arbitrate according to the relative profitability of the two products; over the next ten years, ethanol is projected to become more attractive relative to sugar. In some other countries, implementation of policies promoting the development of biofuels will also add some pressure to the availability of sugarcane for sugar production, especially in India, with the Ethanol Blended Petrol (EBP) Programme aimed at reaching a blending rate of 20% of ethanol in petrol (E20) by 2025/26.

In 2032, Brazil and India are foreseen to account for about 23% (45 Mt) and 19% (38 Mt) of the world's total sugar output respectively. Better growth prospects are expected in Brazil, supported by profitable sales on the international market while in India, despite an increase in the extraction rate, the increase is projected lower given the diversion of sugarcane to ethanol production. Elsewhere, the largest significant increase in production, in absolute terms compared to the base period, is anticipated in Thailand (+ 5 Mt).

Figure 5.1. Sugar production and trade, by region



Note: data are expressed on a tel quel basis (tq)
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/wqnd8e

International trade will continue to grow, mainly reflecting expanding demand from deficit regions in low- and middle-income economies. Exports are anticipated to increase over the decade with shipments representing about 38% of global sugar production in 2032, up from 36% in the base period. Exports will continue to originate in a few countries, mainly in Brazil (46% of world trade), followed by Thailand and India. Imports are anticipated to remain less concentrated with the main increases projected in Asia and Africa, while the strongest declines in imports are foreseen in the United States, Russia and Japan, reflecting higher domestic production and a contraction in domestic demand for the latter. While the bulk of the sugar marketed worldwide will continue to be in the form of raw sugar from sugarcane, the share of white (refined) sugar from sugar cane and sugar beet is seen increasing moderately.

International sugar prices in real terms are foreseen to fall from the current high levels amid an improvement in global export availabilities and to decline during the projection period from productivity gains. The downward pressure on prices is expected to be partially offset by constant real international crude oil prices, encouraging the use of sugar crops for ethanol production. The white sugar premium (difference between white and raw sugar prices), which was particularly high (on average USD 101/t during the base period) due to tightness on the white sugar market, is anticipated to slightly increase in nominal terms over the outlook period, with the share of white sugar imports in total trade growing by 2032.

The dynamics of the sugar markets as presented in this *Outlook* are subject to many risks and uncertainties, including developments in the global macroeconomic context and implementation of new sugar-related policies. In addition, weather conditions, profitability of sugar *vis-à-vis* ethanol, and competition with other crops are sources of production uncertainty. On the demand side, developments in the global economy that affect consumers' purchasing power, consumers' preferences and inflation levels are key factors that could alter the consumption patterns presented in this *Outlook*.

5.2. Current market trends

After reaching a 16-month low in October 2022, international sugar prices rebounded sharply later in the year and in early 2023, mainly reflecting prevailing overall tight global sugar supplies amid strong global import demand. More recently, concerns over diminishing production prospects in key producing countries exerted further upward pressure on world sugar prices. Sugar production is forecast to decline in India and in the European Union, due to lower sugar beet plantings and yields. However, overall, world sugar production in the 2022/23 season is anticipated to increase from last year, on expectations of a significant recovery in Brazil's production, the world's largest sugar producer and exporter, and a larger crop in Thailand. On the demand side, world sugar consumption is seen increasing for a third successive season in 2022/23. However, the growth of global sugar consumption is anticipated to be moderate due to the projected deceleration in global economic growth in 2022/2023. The slower increase in consumption, compared to production, is expected to push the sugar market into a global surplus in 2022/23. Because of larger exportable availabilities, particularly from Brazil and Thailand, world sugar trade is predicted to expand compared to the previous season, which should match an anticipated higher global import demand in 2022/23, with the People's Republic of China (hereafter "China") and Indonesia continuing as the largest buyers of sugar, mainly in raw form for industrial use.

5.3. Market projections

5.3.1. Consumption

Over the next ten years, global sugar consumption is projected to continue growing at around 1.1% p.a., reaching 193 Mt by 2032, driven by population and income growth. After experiencing a decline at the end of the 2010s, especially during the COVID-19 pandemic, world average per capita consumption is now expected to rebound and reach 22.5 kg/capita in 2032.

In general, sugar consumption over the next decade is projected to grow mainly where the level of per capita intake is currently low as, in all its forms, it represents a key source of energy in human diet. An opposite trend is foreseen where per capita consumption is high resulting in health concerns (risk of weight gain and tooth decay health). The WHO recommends reducing the daily intake of free sugars to less than 10% of the total energy intake for health reasons.

Development prospects are higher in Asia and Africa

Asia and Africa will be the regions that will contribute most to additional global demand compared to the reference period, accounting for 67% and 32% of the world total, respectively. Urbanization, a growing middle class, and a young demographic are expected to be the key drivers of the increase in per capita consumption in these regions. Despite the projected increase, which adds to the continuous expansion of the past years, per capita consumption by 2032 is anticipated to remain below the global average in both Asia and Africa.

In Asia, population and income growth as well as higher sugar-containing product consumption for industrial purposes, including sugar-rich confectionery products and soft drinks will drive sugar consumption. It is expected that India, followed by Indonesia and China, will provide the largest contribution to the overall increase in sugar consumption. In India and Indonesia, population growth, although slower than in the past decade, and income growth associated with stronger demand for processed food and beverage products is expected to sustain the increase in overall sugar consumption over the next decade. In China, consumption is emerging from a period of no real growth that started in 2016 with a period of high prices, followed by a three-year zero-Covid policy. With the reopening of the markets at the start of the projections, consumption is expected to rise again over the next ten years. Nevertheless, in terms of per capita consumption, it should remain well below the global average level in 2032 (12.6 kg/cap). Strong growth prospects are also expected in Least Developed Asian countries. Per capita consumption in Asia is expected to grow by 0.8% p.a. over the next decade compared with 0.3% in the last decade.

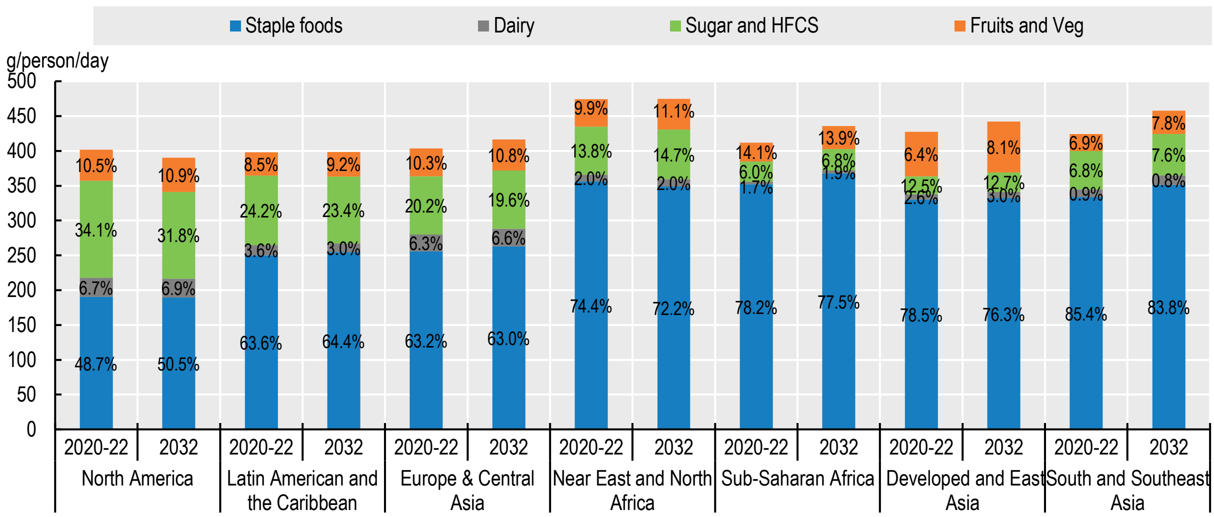
In Africa, sustained population and income growth, are projected to drive the overall increase in sugar consumption, mainly on account of higher direct consumption in urban areas. Least Developed Sub-

Saharan countries are foreseen to record the highest growth rate in per capita consumption across the region. In addition, with Least Developed Sub-Saharan countries expected to record the world's highest population growth, sugar consumption growth in these countries is projected to be the strongest globally. 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.

Over the coming decade, even if total daily carbohydrate intake in Asia and Africa will remain 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) are expected to remain a small part of daily carbohydrate intake (Figure 5.2). 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.

In rest of the world, the share of carbohydrates in daily intake should not change, except in North America, where a slight downward trend will be pronounced.

Figure 5.2. Carbohydrate consumption per capita and by type, in the different regions



Note: Staple foods include cereals, roots and tubers, and pulses.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/mfd4lw

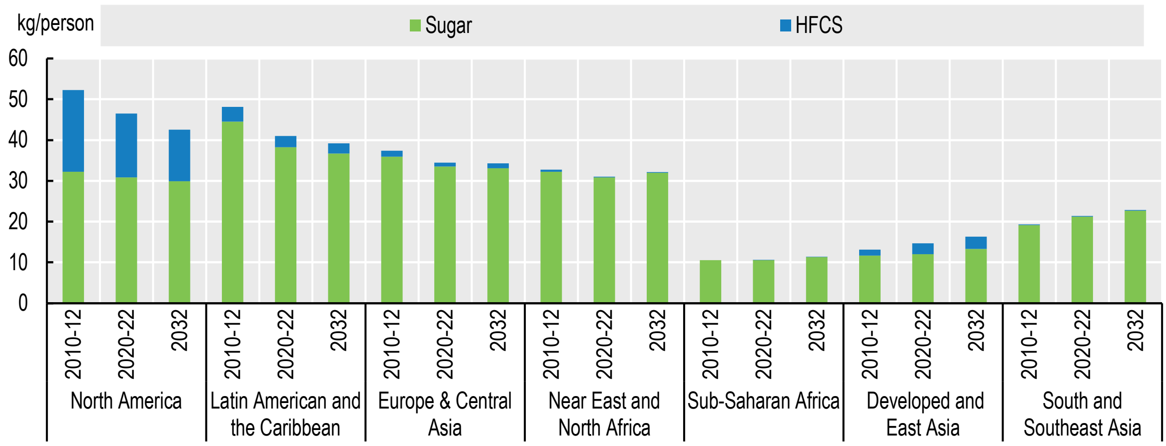
Downward trends will continue in other regions, high sugar consuming countries

Traditionally, the Americas, the Caribbean and European countries record the highest level of per capita sugar consumption although caloric sweeteners represent a small part of carbohydrates in the diet. Since 2010 globally, in those countries, caloric sweetener consumption has trended down with adverse health effects being highlighted. Over the next decade, the decline is projected further, although at a slower pace.

In Latin America, the world's largest sugar supplier, high per capita consumption levels have raised concerns about the negative effects on health. Some countries during the last decade, including Chile, Ecuador, Mexico, Peru and more recently Colombia, have introduced a tax on sugar-sweetened beverages to try reducing soft drink intake. Measures to limit the sale and/or the promotion of sugary drinks or sweet products to children under 18 years were also taken, and some countries like Argentina have passed laws for mandatory front-of-package labelling with strict thresholds for healthier products. Per capita consumption, which already declined in the past few years, is projected to decrease further from 38.6 kg/capita during the base period to 37.1 kg/cap.

Europe was the second most sugar-consuming region, although far behind Asia, among the seven regions presented in this *Outlook*. Over the next decade, while remaining the third most populated region, it is expected to give way to Africa followed by Latin America and the Caribbean. In Europe, for two decades countries have sought to take measures to avoid excessive consumption of sugar. Taxing sugar is among the measures implemented. Recently, Italy and Poland introduced a sugar tax, and it is currently being voted in the Russian Federation (hereafter "Russia") (to be implemented 1 July 2023). The industry has also been looking for solutions to tackle the problem of obesity by reducing the amount of sugar in products or use artificial sweeteners as substitutes. Per capita sugar consumption in Europe is expected to see a continued decline, albeit at a slower pace than in the previous decade. In Ukraine, per capita consumption of sugar dropped markedly following the outbreak of the war in February 2022. However, sugar intake is projected to recover over the next decade and reach the levels prior the war by 2032. Among the other high sugar consuming countries, the level of consumption is projected to decline in Australia and New Zealand. This trend will also be visible in Canada and the United States. However, the United States shows the highest per capita consumption of caloric sweeteners which include HFCS (48.1 kg/capita during the base period) and over the projection period, caloric sweeteners are expected to decrease the most in favour of greater consumption of fruit and vegetables.

Figure 5.3. Carbohydrate consumption per capita, per type, in the different regions



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/rtxh2z

The High Fructose Corn Syrup market will grow slowly

High Fructose Corn Syrup, the other caloric sweetener, is used primarily in beverages as a substitute to sugar. Unlike sugar, it is a liquid product and therefore less easily traded. Global consumption will remain the domain of a limited group of countries with no real development.

The leading producers, United States and Mexico, will remain the main consumers with respectively 13.7 kg and 9.2 kg per person in 2032. In the United States, since the mid-2000s, when it represented with sugar the two main caloric sweeteners in equal proportion, its share has decreased. This trend is expected to continue as the debate on the potential greater health hazard of HFCS over sugar is still ongoing. In 2032, both products are foreseen to represent respectively 31% and 69% of the caloric sweetener consumption in the United States by 2032. In Mexico, government efforts to reduce caloric sweetener consumption and the decline in per capita HFCS consumption is expected to continue over the next ten years. As a result, and because the demand in HFCS will not change much, the United States is foreseen to record a production decline (-13%) when compared to the base period and reach 6 Mt by 2032.

China, the world's largest starch producer, is expected to see the biggest changes as its per capita caloric sweetener consumption is very low compared to the rest of the world. Since 2020, corn prices have increased, and this was passed on the cost of producing/consuming HFCS, leading to some substitution with sugar or some other alternative sweeteners in soft drinks (erythritol), depending on the profitability of products. Over the next decade, with more competitive corn prices, China HFCS production is projected to increase to meet some growth in domestic demand (2.8 kg/capita in 2032). No increase is foreseen in Japan and Korea with a consumption of about 6 kg/capita. In the European Union, HFCS will remain uncompetitive with sugar over the next decade, accounting for only 1.6 kg/capita in 2032.

Market developments in the rest of the world will not be significant. Overall, 80% of the overall amount consumed will remain sugar and less than 8% HFCS, the leading alternative product. The rest will come from high-intensity (low-calorie) sweeteners which are not covered in the *Outlook*.

5.3.2. Production

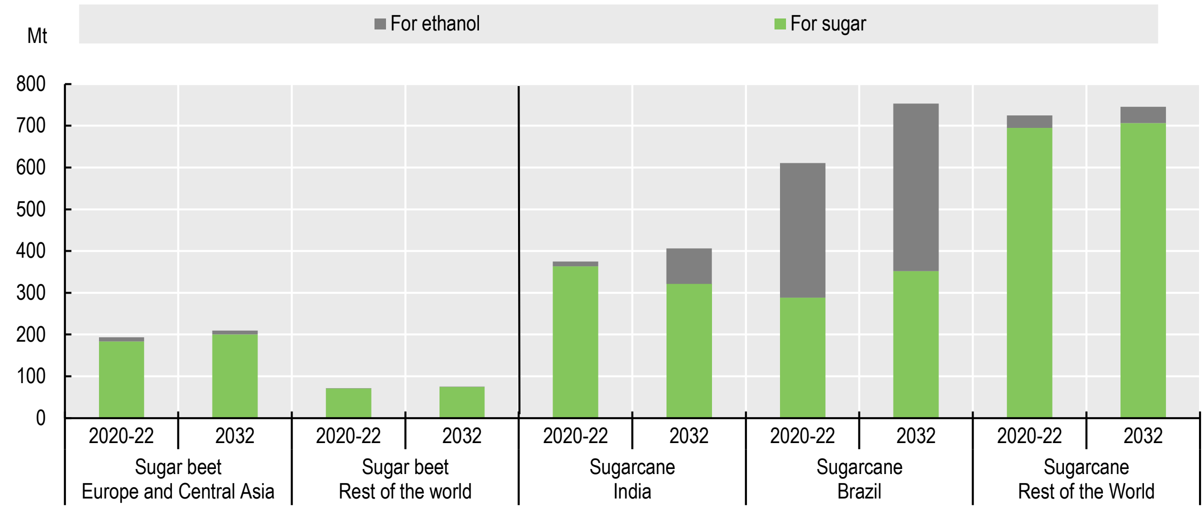
Assuming normal weather conditions, world sugar production is expected to slightly increase over the outlook period although high input costs and competition from other agricultural crops are likely to moderate the magnitude. Being a capital-intensive sector, remunerative domestic prices are foreseen to be high enough to support investments and developments, both in crops and in sugar factories.

Sugarcane is the main sugar crop. It grows mainly in tropical and sub-tropical regions. As a perennial crop, the same plants can be harvested after 12 to 18 months for about five years as cane can be self-propagated, although yields decline over time. Apart from sugar, sugarcane is also used as feedstock to produce ethanol (with a certain flexibility in Brazil). In addition to sugar and ethanol, sugarcane can produce molasses, a thick juice, and the residue from cane milling (bagasse, the fibre left after extracting the thick juice) is burned to supply energy (cogeneration feedstock for electricity). Conversely, sugar beet is an annual crop, more dependent on the variability of input costs. It is cultivated mostly in temperate zones; its thick juice is used for sugar or ethanol production; it has two derivative products: beet pulp which is used in animal feed and molasses. Moreover, molasses can be further processed to extract crystal sugar which generates molasses by-product again. Sugar crops are used to produce a wide range of products, including food (sugar), feed, bio-based products for industry (pharmaceuticals, plastics, textiles, and chemicals) and ethanol. Also, the by-product molasses from these two sugar crops can be further processed to produce sugar or 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 result in an increase in sugar crop production.

Sugarcane will maintain its position as major main sugar crop

Sugarcane will continue to account for around 87% of sugar crops. Over the outlook period, global *sugarcane* production is projected to grow by 1% p.a. and reach 1 905 Mt by 2032, with Brazil, India and Thailand anticipated to contribute the most to the change in global output volume (+142 Mt, +31 Mt and +6 Mt respectively). This mainly reflects relative higher crop yields notably in India as well as, although from a lower base, in Argentina; while area expansion is mainly expected in Brazil (+1.6 Mha).

Figure 5.4. World production of sugar crops classified according to their end product



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/htfawu

Brazil is the biggest sugarcane producing country, more than half of which is used to produce ethanol. Over the next ten years, the growth in demand as well as the expected profitability of the two products, sugar and ethanol, will encourage the sector to respond to market needs. Investments aimed at developing mechanisation and more sustainable production practices should make it possible, among other things, to reduce the effects of the drought encountered in recent years. Some area expansion is foreseen and the share of area cultivated with sugarcane in total arable land availability (12.8% during the base period) will increase to 14.4% in 2032, while little improvement in yields is foreseen due to drier climatic conditions compare to the past.

In India, the growth in sugarcane production is projected to stem mostly 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, higher fertiliser prices and 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, for a couple of years, regional authorities will continue to support farmers and millers to modernize and maximize their yields. But with the end of the zero COVID policy at the start of the projections, only moderate growth is expected as rising input costs, competition for land with other crops and comparatively cheaper sugar imports will slow efforts and efficiency.

Prospects are less robust for sugar beet, the other sugar crop, as it is sensitive to high input costs. Some improvement in yields will contribute to a slight increase in production. It is projected to reach 284 Mt by 2032, with slower annual growth rate (0.4% p.a.) than during the past decade (0.5% p.a.) (Figure 5.4). Compared to the base period, expansion is expected in Russia (+8.1 Mt, from a low base), Türkiye, Egypt, China, the United States and Ukraine. During the last decade, Egypt and China were contributing the most to the global increase in sugar beet.

Global sugar beet area is expected to decline, because of higher fertiliser prices as well as energy prices (beet mills need to buy energy to be able to operate unlike cane mills which can operate from bagasse), which negatively impact profit margins. Only higher yields will help the crop to keep market share. This should notably be the case in the United States, where both sugar crops are cultivated in almost equal proportion, 55% of sugar continuing to be produced from sugar beet. In the European Union, production is projected to stagnate due notably to high input costs compare to other crops, and stricter environmental legislation;[2] yields are not expected to improve, and some farmers will turn to other crops.

In Egypt, remunerative procurement prices are expected to boost plantings of sugar beet, while efforts are also being made for the adoption of improved seed varieties. Government efforts to boost domestic agricultural production are underway and are projected to contribute to the overall increase in sugar beet area and crop yields.

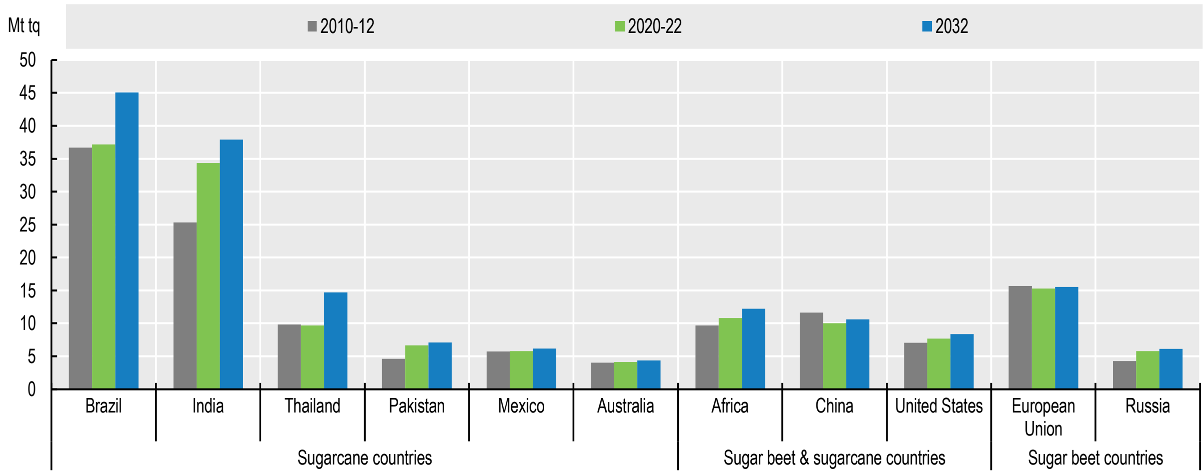
If during the last decade, 81% of world sugar crops were used to produce sugar, this share is expected to decline to 76% by 2032 over the outlook period (72% in the case of sugarcane and 97% in the case of sugar beet), due to growing competition of sugar crops for ethanol production, because mills often easily have the option of switching to one or the other. Brazil will continue to be the main producer of sugar and sugarcane-based ethanol, producing 40% of the world's sugarcane by 2032. Its sugarcane will account for 23% of global sugar production and 76% of global sugarcane-based ethanol production (compared to 21% and 88% during the base period).

Global sugar production is set to increase

Global sugar production is expected to grow from 175 Mt during the base period to 198 Mt by 2032, 23% of which will be sourced in Brazil who is expected to meet the growing needs of the international market, especially in the second half of the decade.

Asia will remain the leading producing region producing about 42% of the world global output. Thailand is foreseen to provide the largest share of the sugar supply to the world market after Brazil, increasing its sugar production by +5 Mt by 2032 compared to the base period. The 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.

Figure 5.5. Main sugar producing countries/regions classified by sugar crops



Note: data are expressed on a tel quel basis (tq)
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/b1tukw

Brazil, the world’s largest sugar producer makes Latin America the second largest sugar producing region. Recovering from a long financial crisis and episode of drought, higher investments are expected in the sector. Considering the profitability of international sugar markets, sugar production is expected to increase by 5.2 Mt over the next decade.

Africa is expected to improve its share in the global market mainly on account of Sub-Saharan African countries, where government support measures and foreign investments are expected to contribute to the increase in sugar production over the next years. In addition, suitable conditions for growing sugarcane, including potential for area expansion and lower costs of production, are expected to favour the increase in production.

Compared to the base period, production in OECD countries is foreseen to account for less than 10% of the global increase. In 2032, the region will represent 21.2% of the global market, compared to 22.7% in the base period. Although it will retain its position as the main producer of this regional market (37%), the European Union's sugar production is expected to stabilize. The higher sugar supply increase, when compared to the base period, is foreseen in the United States (+0.7 Mt) as production 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 domestic needs (through tariff rate quotas, regional agreements, and the Suspension Agreements on Sugar with Mexico).

5.3.3. Trade

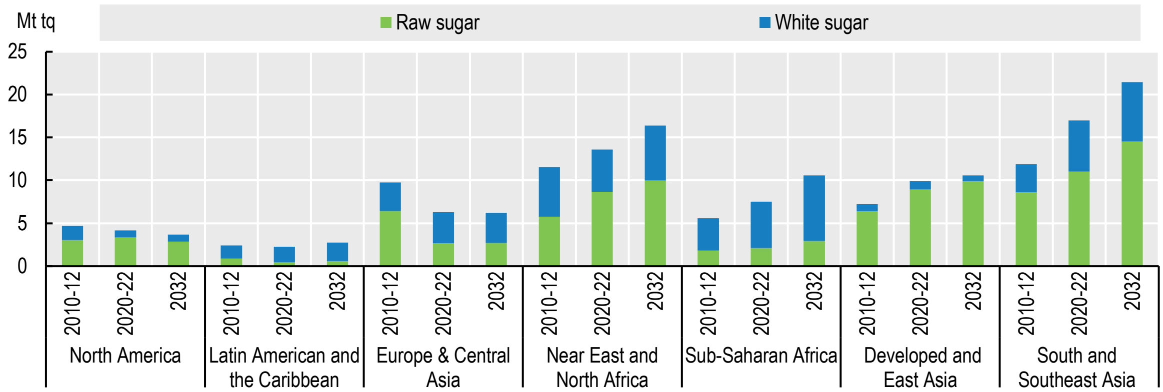
Sugar remains heavily traded over the outlook period

Sugar will remain a highly traded product. Most of it will continue to be raw sugar (60%). However, the share of white sugar imports that includes a premium will increase relatively more (Figure 5.6).

Imports are foreseen to account for 37% of global consumption in 2032 with Asia and Africa remaining net-importing regions. However, in Africa, efforts to boost domestic production capacities will reduce its share of dependence on imports, which will still represent 72% of consumption in 2032. The growth in consumption in Least Developed Sub-Saharan countries is expected to drive an increase in the share of imported white sugar for direct consumption. In Asia no significant changes are expected in terms of dependence: imports will continue to represent 42% of consumption and the share of imported raw sugar for industrial use will continue to increase, mainly driven by key buyers, China and Indonesia. By 2032, Africa and Asia will account respectively for 28% and 59% of global imports.

In the past decade, South and Southeast Asia, Europe and Near East and North Africa regions were the major importing regions. Over the next decade, with the end of the zero Covid policy and a strong growth in consumption, South and Southeast Asia is projected to take the position as the leading sugar importing region by 2032, with Indonesia the world's largest importer. Strong growth is also foreseen for Near East and North Africa region as well as in Sub-Saharan Africa, although from a lower base.

Figure 5.6. Raw and white sugar imports, by regions



Note: data are expressed on a tel quel basis (tq)
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/j2e3t9

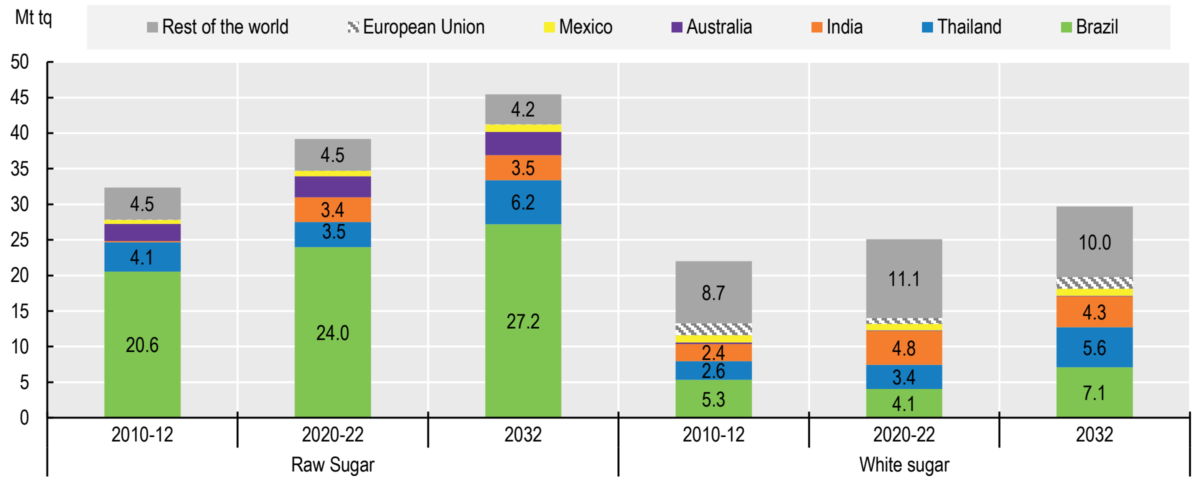
Over the coming decade, sugar imports are expected to continue to decline mainly in the United-States, and the Russian Federation due to improving supply prospects while in Japan, this will be due to reduced population. The United States is traditionally a sugar-deficit country where national policies 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, sugar imports are foreseen to decrease to 1.9 Mt by 2032 because of the lower demand.

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 88% of the market share for raw sugar by 2032: Brazil (60%), Thailand (14%), India (8%) and Australia (7%). For white sugar, Brazil (24%), Thailand (19%), India (15%) and the European Union (5%) will supply about 63% of the market.

Brazil will remain the leading exporter (46% in 2032) (Figure 5.7). Millers should benefit from attractive incentives to produce sugar for exports. 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 34 Mt in 2032, +6 Mt over the outlook period, mainly under the form of raw sugar although the share of white sugar is foreseen to increase, from 14% to 21% by 2032.

In Thailand, the world's second largest sugar exporter, very little ethanol is produced directly from sugarcane (less than 2%) because molasses or cassava are mainly used. By 2032, the share of sugar exports is expected to increase to 16% and reach 11.8 Mt. This compares to a share of 11% and a volume of 6.9 Mt during the base period, which is due to the drop in production in 2020. In India, sugar exports are not expected to grow significantly amid government's continued efforts to promote ethanol. In Australia, another export-oriented country, sugar exports are expected to continue to account for about three-quarters of production.

Figure 5.7. Sugar exports for major countries and regions



Note: data are expressed on a tel quel basis (tq).
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

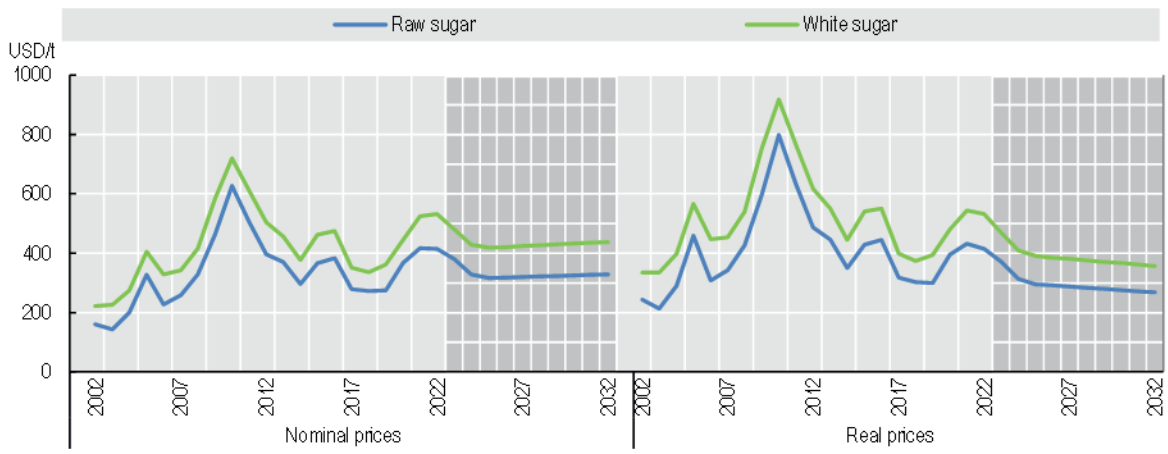
StatLink https://stat.link/u1x6oh

5.3.4. Prices

Prices expected to fall in real terms

At the start of the outlook period, despite indications of a return to a global surplus, and a Brazilian domestic gasoline policy (lower price but tax resumption at the end of February) tending to favour sugar over ethanol, international sugar prices are expected to ease only slightly, due to high input costs.

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 (2022=1).
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/gy9shj

International sugar prices, in real terms, are foreseen to fall from the current high levels amid an improvement in global export availabilities and to decline during the projection period on account of productivity gains. The downward pressure on prices is expected to be partially offset by constant real international crude oil prices, as this would encourage the use of sugar crops for ethanol production (Figure 5.8). 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).

Nominal prices are projected to follow a moderate upward trend, as demand is foreseen to return to pre-COVID-19 pandemic levels, assuming little change in relative ethanol and sugar prices.

The white sugar premium (difference between white and raw sugar prices), which was particularly high (on average USD 101/t during the base period) due to increasing energy costs and tightness on the white sugar market, is anticipated to slightly increase in nominal terms over the outlook period, with the increase in the share of white sugar exports in total trade by 2032.

5.4. Risks and uncertainties

This *Outlook* assumes normal climatic conditions which gives favourable prospect for sugar crop production. But unfavourable weather events, such as those linked to climate change, could have a marked impact on output and prices, considering the relatively high market concentration for export. A change in the price ratio between crops could also influence planting decisions in favour of more profitable crops.

The fluctuation of crude oil and sugar relative prices affects the competitiveness and profitability of sugar production versus sugar crop-based ethanol production, and remains a major source of uncertainty. This fluctuation plays an important role in the decisions of the sugarcane millers as to the profitability of sugar vis-à-vis ethanol, which in turn impacts the sugar quantity produced for the international market. In Brazil, additionally, the fuel prices for refined petroleum products can be set freely, although consideration must be given to the influence of the Brazilian state-owned petroleum industry Petrobras. Its decision on when and how to react to the international crude oil price could have some influence on the level of the national gasoline price. In India, the implementation of policies promoting the development of biofuels will add pressure on the availability of sugarcane for sugar, with the Ethanol Blended Petrol (EBP) Programme aimed at reaching a blending rate of 20% of ethanol in petrol (E20) by 2025/26. While this *Outlook* already accounts for the above-mentioned policy, any further policy development could have a consequential effect on sugar production.

Domestic policies may also cause market variability. In this *Outlook*, the risk that Mexico imposed a ban on genetically modified corn to be activated in 2025 is not taken into account. If implemented, it could affect Mexico HFCS imports from the United States and by repercussion, US sugar imports from Mexico, which are foreseen to account for about 40% of the highly regulated American imports.

In countries with high levels of consumption, if a sugar tax is implemented in an attempt to curb consumption for health reasons, this could also lead to effects that are enhanced as the price elasticity of the demand is high. Consumers' preferences towards low- and no-sugar products could also contribute to curb consumption projections. Similarly, if the market for alternative lower calorie sugar substitutes expands, in response to increasing health concerns, this will have implications on sugar demand.

On the supply side, the dominance of few exporters over the next ten years is also a source of uncertainty for sugar markets. About 60% of sugar is traded under the form of raw in-bulk vessels. Given the growing demand for imports of white sugar, investments are expected to increase the export capacity of refined sugar, which is much more delicate due to the risks of contamination, drying out and clumping. According to the outlook, the white sugar premium should be attractive enough for Brazil, a traditional exporter of raw sugar, and Thailand to invest in their white sugar delivery capacity. However, refining capacity in destination countries could also develop, which would change the situation.

New investments in research and development in the sector (new breeding techniques for sugar crops such as gene editing), new diversification opportunities for the sugar industry (bioethanol, bioplastics and biogas) could also influence the dynamic of the market.

Notes

[1] Projections in this report only refer to caloric sweeteners, sugar and high fructose syrup (HFCS).

[2] Neonicotinoid, used in the coating of beet seeds to combat Virus Yellows Disease, were banned in 2019; some emergency authorisations were granted to a limited number of member states and for selected years.

6 Meat

This chapter describes market developments and medium-term projections for world meat markets for the period 2023-32. 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

Inflation dampens growth in demand in the early years

The *Outlook* expects downward pressure on the growth of meat demand amid high and rising consumer costs and weak income growth. This is anticipated to persist in the early years of the *Outlook,* with reduced purchasing power, despite the government household support offered in some countries. Consumers are expected to shift spending priorities to limit the overall purchase of meat, which constitutes a sizeable share of the food basket in middle- and high-income countries. This may include, *inter alia*, a shift toward cheaper meats and meat cuts, as well as reduced out-of-home food expenditures.

Over the projection period, it is expected that global average per capita demand for meat will increase by 2%, from the 2020-2022 base period to 2032. Consumption growth in middle-income countries will account for a significant share of this increase (Figure 6.1). As noted in last year's *Outlook*, disposable income in high-income countries is no longer a main determinant of changes in meat consumption. Instead, concerns about human health, environmental impacts and animal welfare are the main motivations prompting consumers in these countries to shift towards a diet that shifts demand among meat products (e.g. red vs white meat) or reduces overall meat demand. In middle-income countries, where economic growth, urbanization, and the growth of the fast-food industry progresses, more significant changes in the consumer meat choices are anticipated. In low-income countries, high population growth is expected to remain the key driver of higher meat consumption. However, limited access at relatively low income levels will continue to constrain growth in per capita meat consumption, which is only 15% of the average in high-income countries.

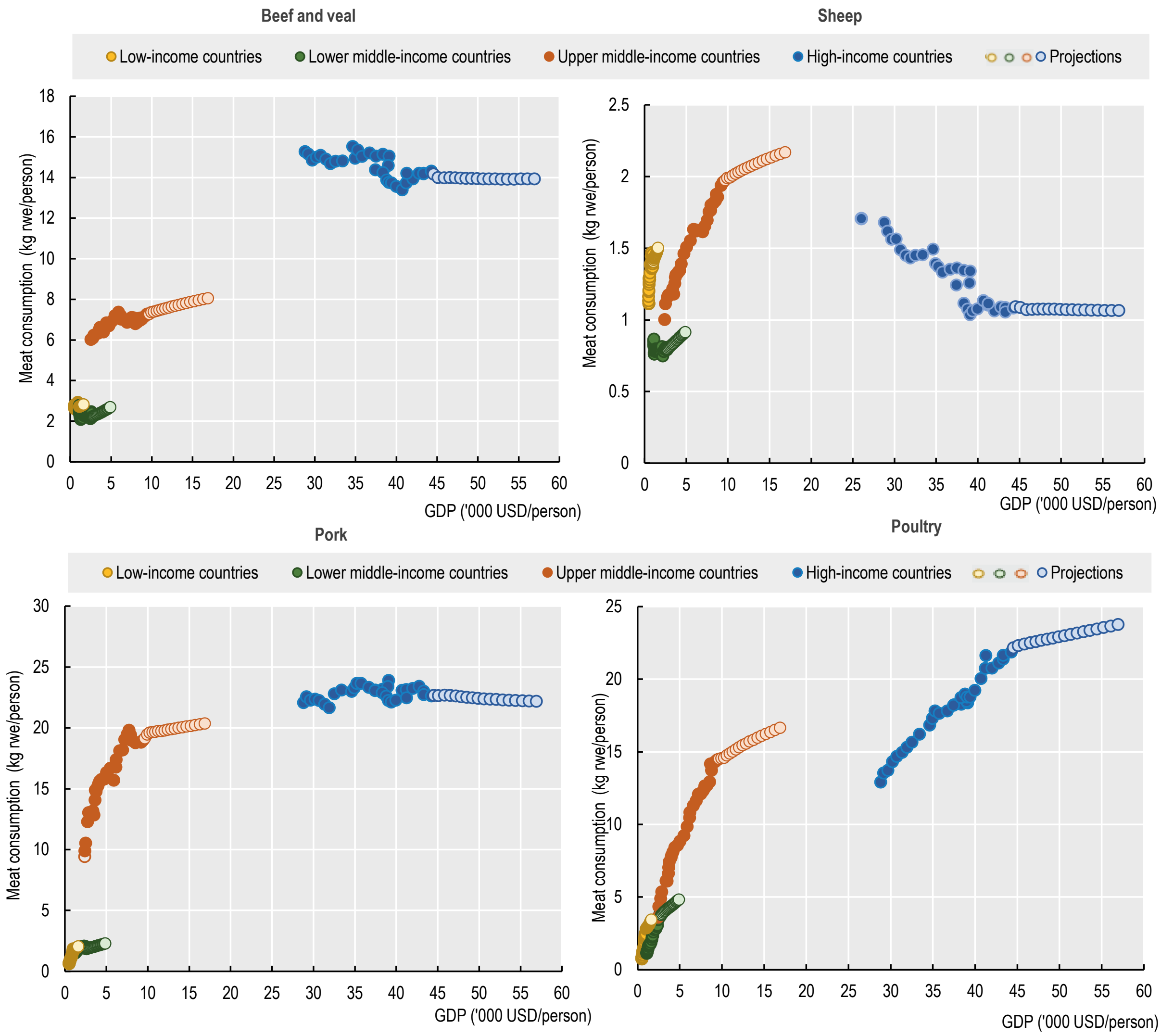
The structure of global meat markets in recent years was affected by the significant decline in pigmeat consumption due to the outbreak of African Swine Fever (ASF) in the People's Republic of China (hereafter "China"), that started in 2018. The *Outlook* projects its per capita consumption to return to the level preceding the outbreak by 2023, as the impact on domestic availability abates and per capita consumption returns to its longer-term trend. The modernisation of the supply chain and improved genetics, combined with increasing investment in large-scale production units, will reduce production costs and increase productivity, and support a rebound in Chinese meat consumption.

Growth in meat supply will expand to meet modestly rising demand

Global herd and flock expansion, combined with continuous improvements in animal breeding, management, infrastructures, and technology will increase production over the outlook period, particularly in upper middle-income countries (+14%). These countries will drive the growth in global meat production to reach 382 Mt (+12%) by 2032. Nevertheless, high inflation and rising costs early in the projection period will limit the medium-term growth per annum (p.a.) to a slower pace (1% p.a.) than in the last decade (1.2% p.a.).

Global meat production will be mainly driven by growth in poultry meat and a significant increase in pigmeat production assuming ongoing recovery from the major outbreaks of ASF in Asia in the first years in the coming decade. The recovery in pigmeat production in the Philippines and Thailand is assumed to be completed by 2026. The various outbreaks have highlighted the need to implement a comprehensive policy approach that combines biosecurity measures, surveillance, compensation, import/export regulations, and the development of a vaccination programme to successfully control and recover from ASF.

Figure 6.1. Growth in Gross Domestic Product (GDP) and change in per capita consumption for meat, 1990 to 2040



Note: Per capita consumption beyond 2032 is extended based on trends. The 38 individual countries and 11 regional aggregates in the baseline are classified into 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/mcpdaq

Lower growth in trade as domestic supplies rise in importing countries

The main features of the global meat trade will be the ongoing reduction in China's meat imports, which is expected to be offset by a growing demand from middle-income countries in Asia that shift toward diets that include higher shares of animal products, and from low-income countries with high population growth. On the other hand, rising domestic production in several other countries including Iran, the Russian Federation, Saudi Arabia, South Africa, Viet Nam, and in particular countries in Latin America, is likely to dampen the growth of their meat imports in the medium term. As a result, the global meat trade will expand by only 0.7% p.a., much slower than in the last decade.

Lower feed costs and productivity gains bring prices down in real terms

This *Outlook* projects that while nominal meat prices remain high, they are anticipated to be soften in 2023 and continue to decline modestly in real terms over the next decade with weaker demand, lower feed costs (in real term), and ongoing productivity growth. As feed prices decrease and consumer spending on meat recovers in middle-income countries, particularly for poultry and pigmeat, overall meat prices will return to their long-term trend levels. However, demand growth for red meat products, particularly in middle-income countries, combined with lower productivity gains, will keep their prices in real terms relatively more expensive over the outlook period.

Animal disease outbreaks are significant risks in the meat sector

The meat sector faces various uncertainties, including changing consumer preferences, public health concerns, climate impacts, international trade policies, and animal welfare concerns. With relatively large income elasticities, meat demand remains sensitive to macroeconomic conditions, particularly in emerging developing countries. On the supply side, recent animal diseases such as African Swine Fever (ASF) and Avian Influenza (AI) have disrupted supply chains and resulted in the culling of large numbers of animals. These outbreaks have also led to trade restrictions and reduced demand for meat products due to public health concerns. The uncertainties related to animal diseases highlight the importance of collaboration between government and industry stakeholders in investing in biosecurity measures and effective treatments to ensure the sector's sustainability.

6.2. Current market trends

International market prices rise due to limited supplies

Global meat production is estimated to have grown 1% to 347 Mt cwe in 2022. Several factors limited growth, including animal diseases, high and rising input costs, and extreme weather events. The expansion was driven primarily by increased output in Asia, specifically a rise in pigmeat production in China for a second year. In North and South America, production remained relatively stable, while it declined in Europe and Oceania. Generally, the industry’s profitability improved somewhat toward the end of 2022 as the cost for input such as energy, animal feed, and fertilisers abated. However, disruptions due to animal diseases continue to disrupt meat production in many large-producing countries, with resulting trade restrictions.

In 2022, global meat exports declined by 3% to 40 Mt, primarily due to production shortfalls and higher internal demand in major exporting countries, including Brazil, Canada, the European Union, the United States and New Zealand. In addition, pigmeat imports in ASF recovering regions also contracted as their domestic supplies recovered. However, some countries, including Australia, China, India, Thailand, and Türkiye, experienced a year-on-year increase in meat exports.

With lower export supplies, the FAO meat price index rose to average 118.8 in 2022, an increase of 10% from the previous year. Despite this increase, meat-to-feed price ratios remained low, squeezing profitability in intensive feed-grain livestock operations at the start of the *Outlook* period.

6.3. Market projections

6.3.1. Consumption

Meat demand is only expanding marginally in high-income countries

Meat consumption patterns of consumers in most high-income countries (which represent 33% of total meat consumption for 16% of population in 2022) have started to stagnate, with changes mostly based on the type and quality of the meat consumed. However, due to their lower base intake and more rapid increases in population and incomes, growth will be generated primarily from low- and middle-income countries.

Worldwide, poultry, pigmeat, beef, and sheepmeat consumption is projected to grow 15%, 11%, 10%, and 15% respectively by 2032. Poultry meat is expected to account for 41% of the protein consumed from all meat sources in 2032, followed by pig, bovine and ovine meat. The overall growth in the volume of meat consumption, aside from the United States, Brazil and China, is expected to be greater in low-income countries, especially India, Pakistan, the Philippines, Viet Nam, and the Sub-Saharan region of Africa.

On a per capita basis, global meat consumption is set to rise by 2%. This increase of 0.7 kg/year/person on an edible retail weight equivalent basis (hereafter “rwe”) by 2032 is similar to the previous decade and, again, is mainly due to the increase in the consumption of poultry meat (Box 6.1). Globally, there is a growing trend among consumers to become increasingly sensitive to animal welfare, environmental and health concerns, and poultry has the least carbon footprint. In some instances, these shifts in preferences may lead to shrinking per capita meat consumption, as in the case of the European Union, for which the *Outlook* foresees an ongoing substitution of beef and pigmeat by poultry meat.

Box 6.1. Edible retail weight

This *Outlook* introduces a new second-level conversion factor to standardise meat products at different levels of the food chain. The first level converts live animal weight (lw) to carcass weight equivalent (cwe), commonly used as a basis for meat statistics. The cwe unit only includes the meat, fat, and carcass bones. The live to carcass weight conversion factor can vary based on various factors such as age, sex, breed, environment, and diet of the live animal. National authorities typically use representative conversion factors for their production, consumption, and trade statistics, compiled by their national statistics institutes. A second-level conversion factor is employed to obtain a more accurate figure of the edible portion of the carcass, eliminating the non-edible parts. The carcass undergoes further trimming, deboning, and processing to calculate a boneless retail weight equivalent (rwe). However, the values for converting a carcass into edible equivalents can fluctuate significantly depending on the region, chosen methodology, processing techniques and the desired end product. The *Outlook* applies the following standardised conversion factor to the carcass weight equivalent to derive the relevant rwe.

	Carcass weight to boneless retail weight %
Beef	67
Pigmeat	73
Poultry	60
Sheep	66

Source: USDA, ERS - Loss-Adjusted Food Availability (LAFA).

Global poultry consumption is projected to increase to 91 Mt rwe, accounting for nearly half of the additional meat consumed. The global increase in protein from poultry consumption as a share of total protein from meat has been the main feature in the growth in meat consumption for decades, this trend is expected to continue (Figure 6.2). This is due to several factors, particularly the lower price of poultry compared to other types of meat and that it contains a healthy combination of protein and low fat.

Environmental considerations also contributed to the shift towards poultry meat, as the production of red meat is often resource-intensive and can lead to high greenhouse gas emissions. On the other hand, poultry production is generally considered more efficient and less resource-intensive, making it a more sustainable choice for meat.

The increase in poultry consumption in the last decade was driven by rising consumption in Asia, particularly in China, India and Indonesia, Pakistan and the Philippines. These trends will continue, but consumption is projected to grow rapidly in other regions, including Brazil, Sub-Saharan Africa and the United States, reflecting poultry's significant and increasing role in diets worldwide.

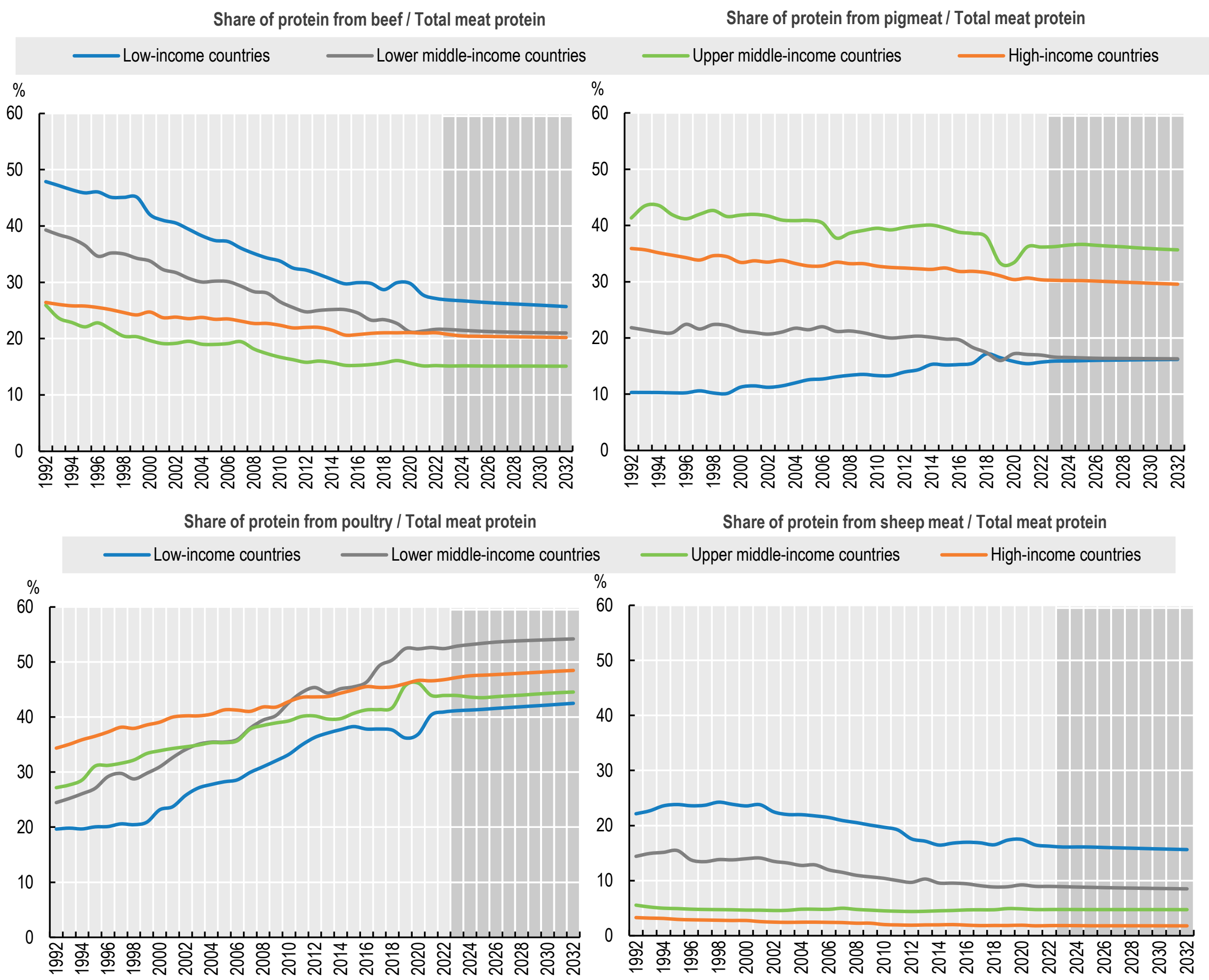
Over the next decade, global pigmeat consumption is also projected to grow globally, apart from Europe, where consumption is already high, and health, environmental and societal concerns significantly impact consumer choice. However, pigmeat will remain the most widely consumed meat in the European region. Pigmeat will be the second largest contributor to the total growth in meat consumption and is projected to reach 93 Mt rwe by 2032. However, in per capita terms, this growth will be stagnant over the projection period. In Latin American countries per capita consumption is projected to increase, due to favourable relative pigmeat/beef prices. Elsewhere, per capita demand is anticipated to be stagnant or decline.

Global beef consumption is projected to reach 51 Mt rwe over the next decade. Global per capita consumption has fluctuated around 6 kg per capita rwe for the last decade and is expected to remain stable over the outlook period. Most regions are projected to reduce their beef intake apart from the Asia-Pacific region, where per capita beef consumption is projected to increase by 0.4 kg/year rwe.

There are growing concerns about the environmental impact of beef production, which is perceived as a significant contributor to greenhouse gas emissions. In addition, deforestation caused by land-use changes for grazing and feed production is also concerning. As a result, many consumers have chosen to reduce their beef consumption in favour of poultry meat which has a smaller environmental footprint. North America and Oceania, which historically have strongly preferred beef, are expected to see the most significant decrease in per capita consumption. In contrast, China, the world's second-largest beef consumer although relatively low in per capita terms, is projected to see a further 0.8 kg/year rwe increase in its per capita consumption by 2032. This is partly due to a growing middle class in China, which has increased demand for meat, including beef.

While sheepmeat consumption is a relatively small part of the global meat market, it remains an essential source of protein for many consumers, particularly in the Middle East and North Africa. While some change is occurring in global dietary patterns, the contribution of sheepmeat to total protein from meat is projected to remain stable (Figure 6.2). It is mainly a traditional (cultural) food choice, although competition from beef and poultry ensures the latter are often more widely available and cheaper than sheepmeat.

Figure 6.2. Share of proteins for each meat type in total meat proteins consumption



Note: Per capita consumption. The 38 individual countries and 11 regional aggregates in the baseline are classified into 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/92gbvp

Will meat demand fall in the long term?

Rising meat consumption has raised concerns for long term sustainability, given its pressure on global resources and contribution to GHG emissions. The *Outlook* assumes that consumer preferences will evolve slowly and does not anticipate a significant change in the current trend over the next decade. The implications for GHG emissions are broadly consistent with those of the IPCC. Looking beyond the medium term into the longer term, demographic trends, human health, animal welfare, and environmental concerns may negatively impact meat consumption. Efforts to reduce food loss and waste (FLW), could also lead to a reduction in meat consumption and production (Box 6.2).

Box 6.2. Meat sector food loss and waste

Global perspectives for the meat sector point to the dilemma between meeting consumers' growing demands on the one hand and being environmentally sustainable on the other hand. The production of meat and meat products significantly impacts the environment, accounting for around 3.8 gigatons of CO2 equivalent[1] per annum. This has led to a growing concern over the sustainability of the meat sector and the need to balance consumer demand with environmental sustainability. One of the solutions to tackle the sustainability of the meat sector is to reduce food loss and waste, which applies to meat products across all regions. While estimates of food loss and waste differ depending on the methodology used, recent research suggests that this could be advanced by developing regional experience on loss and waste at the production and storage levels, especially as these losses are likely to vary across regions of the world. Compared to low-income countries, in industrialised areas, loss and waste occur towards the end of the food chain.

For example, in the European Union, 23% of production in the meat sector, taken together at all stages of the food chain, is estimated to be lost and wasted. The method for accounting is the mass flow analysis. The consumption level accounts for 64% of total food waste, followed by manufacturing (20%), distribution (12%), and primary production and post-harvest (3.5%). Aside the amount of food that can be saved from losses, there is a potential to reduce GHGs from the meat sector or to increase production with the same climate impact. For example, in 2020 Sweden beef, pigmeat and milk on farm losses represented 9% of GHGs from animal husbandry.[2]

Various measures have been adopted to address these issues, including promoting dietary solutions to reduce meat consumption and reducing loss and waste through technological improvements, product innovation, or the development of more differentiated sales channels to increase the value of different meat parts including their non-edible portions.[3] Such measures can lead to higher efficiency and reduce the need for more animal production to meet the increasing demand for meat, thus addressing both demand and sustainability issues.

Notes

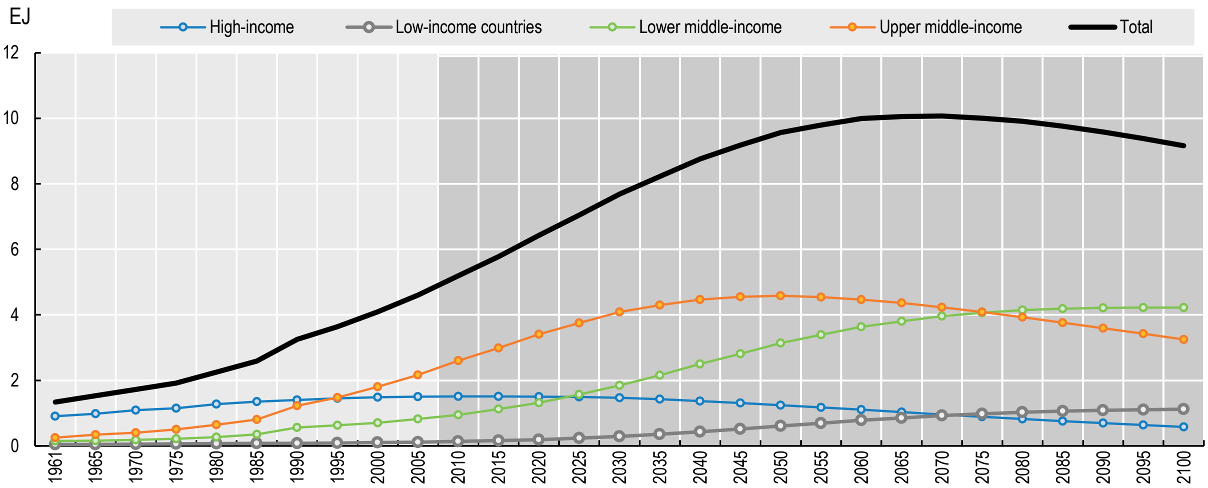
1. Gerber, P.J., H. Steinfeld, B. Henderson, A. Mottet, C. Opio, J. Dijkman, A. Falcucci, and G. Tempio (2013), *Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities*, Food and Agriculture Organization of the United Nations (FAO), Rome.
As indicated by Gerber et al., food animal production all over the world contributes 7.1 gigatons of CO2 equivalent. The largest share in the formation of greenhouse gases has beef production (35.3%), followed by swine (9.5%) and poultry (8.7%).
2. Lindow et al. Jordbruksverket, *Rapport 2022:19 Losses of pork, beef and milk at farm level.*
3. While these portions are not consumed directly by humans, they can still have value and uses within the broader food and agricultural industry.

Source: Karwowska, M., S. Łaba, K. Szczepanski (2021), "Food Loss and Waste in Meat Sector—Why the Consumption Stage Generates the Most Losses?" *Sustainability*, Vol. 13, 6227. https://doi.org/10.3390/su13116227.

As discussed in last year's meat chapter of the *Outlook,* empirical data on consumer behaviour in low-income countries indicates that when income rises beyond a certain level, the proportion of meat protein in the diet increases. As populations and incomes grow, global food demand analysis suggests that low-income groups will consume a greater share of animal-based calories. However, the relationship between income and animal product consumption becomes less clear for higher-income groups.

Long-term scenario analysis, as illustrated in Figure 6.3, reveals that upper middle-income countries will drive the increase in demand until 2040. After that, lower middle-income countries will lead, causing demand to grow until 2075. At some point during the remainder of the twenty-first century, global meat demand may begin to decline. Nevertheless, resource and environmental constraints could limit further growth in meat supply and demand, potentially causing the turning point to arrive earlier.

Figure 6.3. Total animal-based food energy demand projections per region over time in EJ



Notes: The Intergovernmental Panel developed the four Special Report on Emissions Scenarios on Climate Change (IPCC). The graph shows the B2 middle-of-the-road emissions scenario, which has a balanced approach of slow economic growth, modest population growth, some technological advances, and social and environmental sustainability.
EJ (Exajoule) is an energy unit. It's equivalent to 1 EJ = 10^{18} Joules per year
Source: Bodirsky B.L., S. Rolinski, A. Biewald, I. Weindl, A. Popp, H. Lotze-Campen (2015), "Global Food Demand Scenarios for the 21st Century", *PLoS ONE*, Vol.10 (11): e0139201, https://doi.org/10.1371/journal.pone.0139201.

StatLink https://stat.link/jrf829

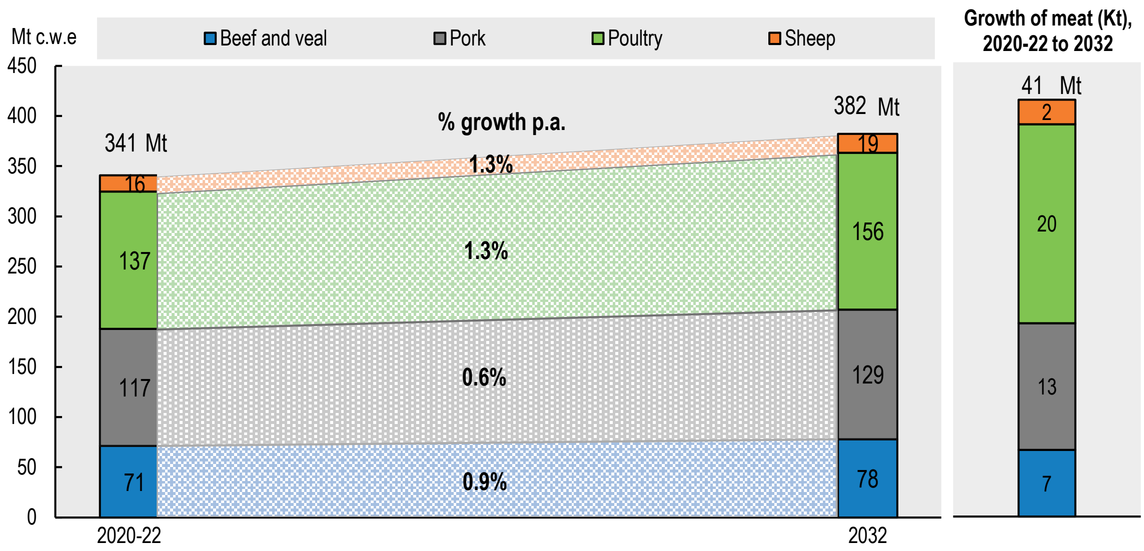
6.3.2. Production

High feed and labour costs are slowing growth

According to projections, world meat production is expected to increase by 41 Mt cwe to an estimated 382 Mt cwe by 2032, with most of the growth occurring in Asia, led by a 20 Mt increase in poultry production (Figure 6.4). In China, the rise in pigmeat production will offset the projected decline in European output, impacted by factors such as ASF outbreaks, stricter environmental laws, and animal welfare regulations in some EU countries. The ASF outbreak continues to impact Asia, mainly in the Philippines and Thailand and will continue to do so in the early years of the outlook period (Figure 6.7).

In recent years, high feed and labour costs have been significant challenges for meat producers worldwide. Feed costs are a significant share of the total cost of meat production, particularly for monogastric animals such as poultry and pigs[1] (Figure 6.5). This means that fluctuations in feed prices can have a marked impact on meat producers' profit margins. Similarly, rising labour costs[2] make it more difficult for meat producers to expand their operations increasing their financial risk, especially at the beginning of the outlook period, when inflation and interest rates are assumed to remain high.

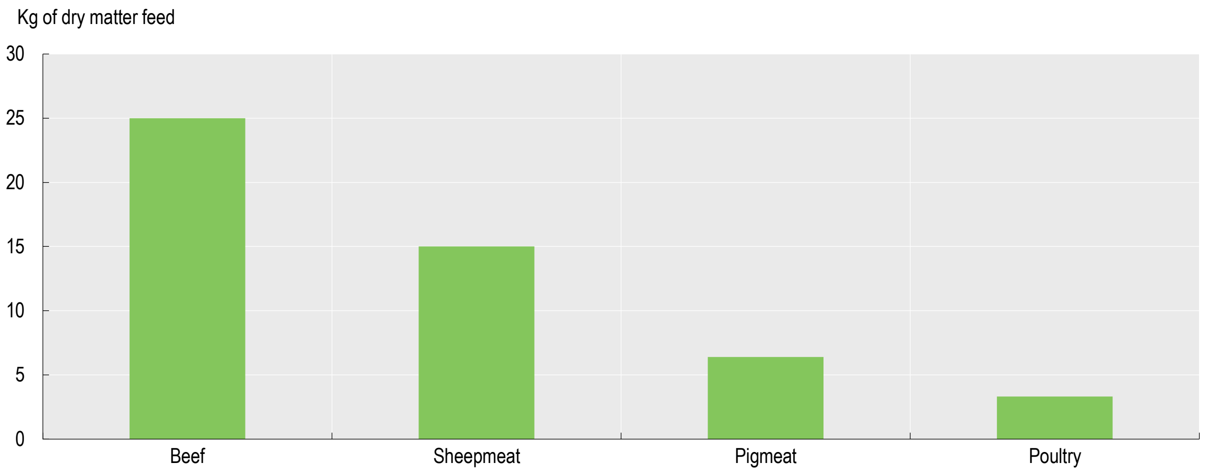
Figure 6.4. Growth of meat production by meat type, 2032 vs. 2020-22



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/e51q24

Figure 6.5. Kilogram of dry matter feed required per kilogram of edible weight, 2013



Note: The nutritional requirements of monogastric livestock (i.e. poultry and pigs) were assumed to be met solely from feed, while nutrients for ruminant species (e.g. cattle and sheep) come from feed and grazed pasture.
Source: Livestock conversion efficiencies are given as reported Alexander et al. (2016), "Human appropriation of land for food: The role of diet", *Global Environmental Change*, 41, pp. 88-98.

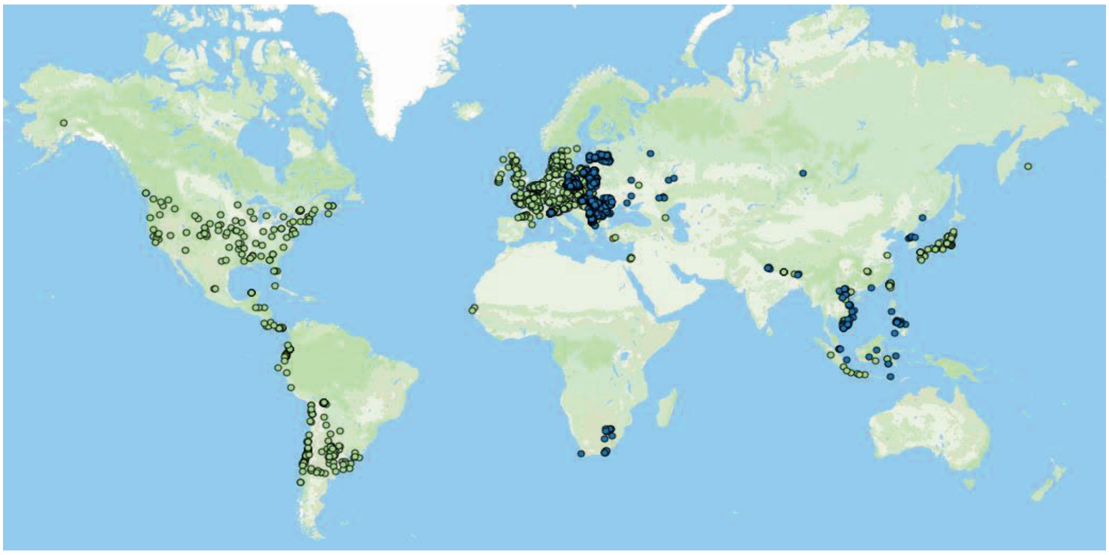
StatLink https://stat.link/zatln9

Poultry will increase its dominance within the meat complex, accounting for half of all additional meats produced in the next decade. Poultry production will expand rapidly in countries with a surplus of feed grains, such as Brazil and the United States. Expansion is also foreseen in Asia as the shift away from pigmeat triggered by ASF outbreaks has benefitted poultry, particularly in China in recent years. In India, Türkiye and Indonesia, the poultry industry remains one of the fastest growing segments of the agricultural sector, primarily driven by the expanding demand for animal protein and the rising utilisation of eggs for the bakery and confectionery sectors. Poultry has advantages over other meats in terms of production length, costs, feed conversion ratio, and proximity to growing urban markets.

However, a high density of poultry production may lead to disease issues. For example, ongoing outbreaks of highly pathogenic avian influenza (HPAI) affect poultry and egg production in many countries (Figure 6.6.). However, outbreaks are easily detected due to high mortality rates and clinical signs associated with the disease. This allows for the rapid implementation of control measures and effective vaccines to prevent their spread. In addition, once contained, the short poultry production cycle allows for quick recovery. As a result, the outlook does not assume that HPAI will impact the medium term projection.

Figure 6.6. Animal diseases around the world

January 2023-March 2023



Note: HPAI: Green dots; ASF: Blue dots.
Source: © FAO (2023) Animal disease [https://data.apps.fao.org/] (Accessed March 2023).

While a range of factors has driven the shift towards poultry, its production also faces environmental and health challenges, particularly regarding antibiotic use and animal welfare. Therefore, promoting sustainable and responsible poultry production practices will be critical to the long-term growth of the sector.

In several European countries, pigmeat output will decline throughout the outlook period. This is because ongoing cost pressures in feed, energy, disease outbreaks (Figure 6.6) and current and future environmental regulations and welfare standards are part of the European Commission's Farm to Fork Strategy (such as the "End the Cage Age").

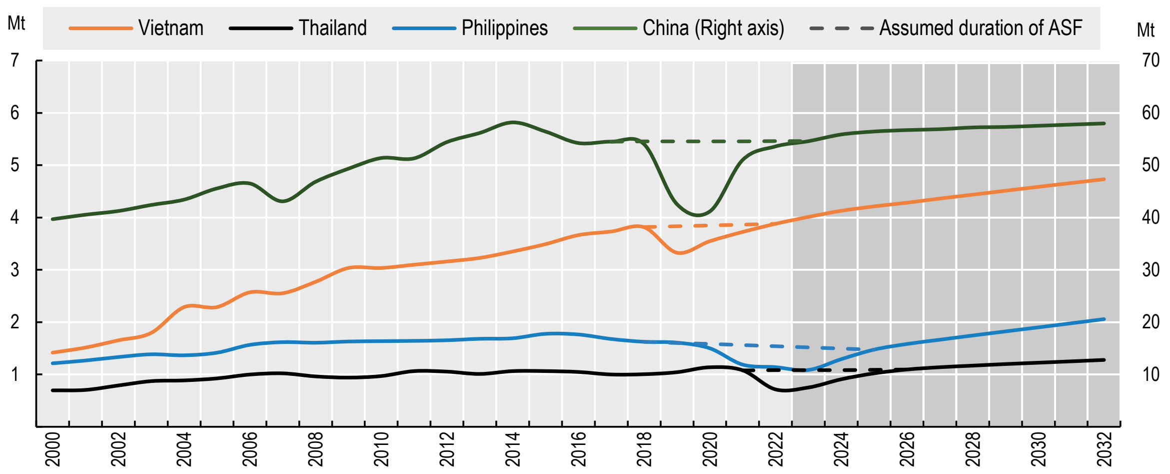
Asian ASF recovery is partly due to the modernisation of the sector

China's pigmeat production is assumed to recover, and its share of world production will return to the level of the last decade (45%) after reaching the pre-ASF level in 2023 (Figure 6.7). Viet Nam, which has suffered from ASF-reduced output since 2019, recovered faster as production was not as much affected, and it resumed its pre-ASF trajectory by 2022. As most ASF recovery in Asian countries affected by the disease is assumed to occur in the first half of the *Outlook* projection, global production is projected to increase by 0.6% p.a. during the next decade. Most of the increase in pigmeat production will occur in the

Asian ASF-affected regions where conversion from largely small-scale backyard holdings to large-scale commercial enterprises with higher biosecurity standards is taking place.[3]

Figure 6.7. Assumptions on the impact of African Swine Fever on meat production

Selected Asian countries



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/kcgsbt

Beef production will reach 78 Mt cwe by the end of the outlook period (Figure 6.3). The main contributors to this expansion are China's growth following technological improvements, better cattle management and genetics, and increasing milk production in Pakistan, where animals are used for milk and draft purposes. Türkiye will also be one of the main contributors to the production expansion as is expected from government intervention in the form of imports of livestock genetics, higher producer support, and interventions to offset high feed prices. In Australia, increasing slaughter capacity and profitability will trigger higher beef production over the outlook period.

Beef production will increase with higher carcass weights as feed costs decline and animal genetics are improved. Increased livestock slaughter numbers also contribute after multiple years of higher herd numbers in several African producing regions (particularly in Sub-Saharan) and Asia.

Sheepmeat production is anticipated to reach 19 Mt cwe by 2032 (Figure 6.4). Chinese production is projected to increase in response to high prices and contribute 17% of additional production. Increased availability in the global sheepmeat market will be due to flock rebuilding and increased lambing rates in Asia and Sub-Saharan Africa. Production in the European Union is projected to increase slightly from the current level due to production-coupled income support and favourable producer prices in the main sheep-producing Member States. The share of Africa in global sheepmeat production will slowly increase despite limitations linked to urbanisation, desertification, and feed availability in some countries. New Zealand's pledge to reduce GHG emissions is expected to constrain flock size as productive sheep land is converted into plantations for carbon credits.

6.3.3. Trade

Concentration of meat exports will decrease

Global meat exports are projected to rise 3% by 2032 from the base period, reaching 42 Mt cwe with almost 11% of meat output traded. Still, the growth in the meat trade is projected to decelerate compared to the past decade. Developed countries are still expected to account for more than half (55%) of global meat exports by 2032, a share which is 3% point lower than in the base period. However, the share of Brazil and the United States, each representing 20%, will remain stable over the projection period.

Australia and Türkiye are expected to record the most significant increase in world meat exports globally, benefiting from a favourable exchange rate and ample feed grain availability. Other traditional exporting countries, such as Argentina, Paraguay, and Thailand, are also expected to contribute to the increase in the global meat trade. On the other hand, the European Union export share will decline from 18% in the base year to 15% in 2032.

The most significant growth in import demand originates from Africa, which will account for the 78% of additional imports of all meat types. Asia, excluding China, is another fast-growing meat importing region. While Chinese meat imports remain high in the early part of the projection period, a gradual decline is projected as pigmeat production recovers from the ASF outbreak. In terms of composition, poultry will account for two third of the additional meat imports, bringing its share of total meat imports to 40% by 2032.

Australia and New Zealand will continue to lead global sheepmeat markets. Australia is expected to increase lamb exports (of higher value) to high end restaurants at the expense of mutton, while in New Zealand, exports will slowly decline as land use shifts from sheep farming. The source of higher import demand is the rising middle-class consumer in the Middle East.

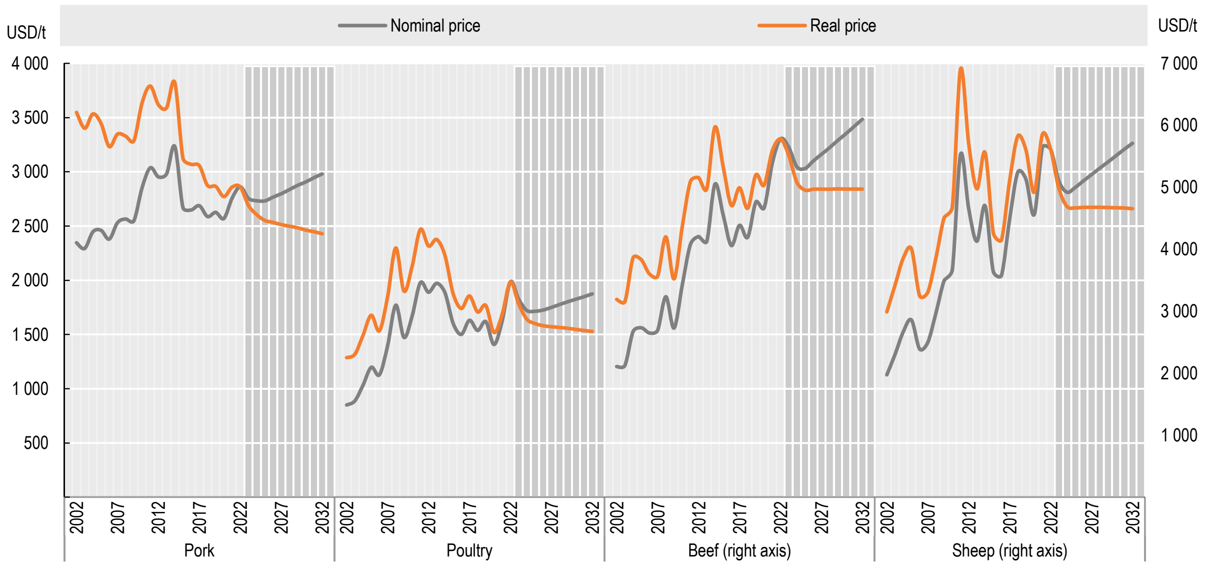
6.3.4. Prices

China is a key factor affecting meat prices

The *Outlook* projects that although meat prices are currently high, they are expected to decrease in both nominal and real terms at the start of the outlook period (Figure 6.8) under weaker demand and higher supplies as the impact of disease outbreaks wanes, particularly in China. The evolution of the situation in China impacts the world reference price of pigmeat and, to a lesser extent, that of other meats. In fact, at the start of the outlook period, the faster China recovers from ASF and lowers its meat imports, the lower prices will be in subsequent years.

As markets recover from these disruptions and consumer spending on meat in middle-income countries resumes, particularly for poultry and pigmeat, prices are expected to return to their long-term trend decline in real terms. As a result, by 2032, meat prices in real terms are projected to be 10% to 15% lower than their 2020-2022 averages. Moreover, red meat prices will be increasingly higher than pigmeat and poultry due to more limited productivity gains.

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 (2022=1). United States of America: Meat of Swine (Fresh, Chilled Or Frozen) export unit value USD/t, Brazil: Meat And Edible Offal Of Poultry (Fresh, Chilled Or Frozen), export unit value USD/t, Australia and New Zealand: Beef, mixed trimmings 85%, East Coast, FOB port of entry. USD/t, New Zealand: Lamb 17.5kg, USD/t cwe.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/m7gl3k

6.4. Risks and uncertainties

Animal disease outbreaks remain the most significant risk in the meat sector

The meat sector faces several uncertainties in meeting the increasing demand for meat products while addressing concerns about animal disease, environmental sustainability, consumer preferences, animal welfare, public health and trade policies.

The livestock and meat sector often face severe economic impacts due to disease outbreaks. These disruptions have socio-economic costs, depending on the country and situation, including the loss of export markets, reduced imports from affected countries, or decreased consumer purchases due to health concerns. While these costs can be high globally, they can be mitigated by supplies from alternative disease-free markets or by following World Organization for Animal Health (WOAH) protocols that localise disease impacts on trade[4] (Box 6.3).

The ASF outbreaks in Asia have illustrated how disease outbreaks can affect domestic and international markets. In the European Union, the other producing region most affected by ASF outbreaks, a study[5] has suggested that an ASF outbreak can reduce the production of pigmeat, export quantities and the national pig inventory in the short and medium term. On average, new cases of ASF reduced the exports of pigmeat by close to 15%, production by more than 4% in the year after the cases occurred, and the national pig inventory by 3-4% in the current and the following year. However, only indirect effects on pigmeat prices, (such as the amount received in compensation and the market value), were observed.

After discovering the ASF virus in wild boars in Germany, several countries decided to suspend imports of German products. Exports to the usual international markets were thus mainly redirected to the European market. The countries that accept German products have been unable to compensate for the loss in volume and value that occurred on the international markets. Germany's experience with the disease served as an object of study by the French Pork Institute (IFIP) to extrapolate the situation and estimate the potential economic impact of ASF on the French industry. The export market's estimated loss is between EUR 157 and EUR 364 million, underscoring the higher "market risks" associated with disease outbreaks.

The impact of climate change on livestock production, such the availability of feed, water, and other resources critical to livestock production, is gaining increased attention. Droughts, floods, and extreme weather events are expected to become more common, reducing productivity and increasing producer costs. A growing trend in consumer preferences is toward more healthy and environmentally conscious purchases, which may result in a shift away from traditional meat products and could have significant implications for the meat industry. Furthermore, public health concerns such as antibiotic resistance are increasing, and there are pressures to reduce the use of antibiotics in animal agriculture. International trade plays a vital role in the meat sector, and changes in trade policies – tariffs and trade bans can also significantly impact national and global markets.

Globally, the meat industry faces pressure to reduce greenhouse gas emissions due to their significant contribution to climate change. The FAO reports that the livestock sector is responsible for 14.5% of all anthropogenic GHG emissions (7.1 gigatonnes of Co2-equivalent per year),[6] with beef and dairy production being the main contributors. The production and consumption of meat, particularly red meat, require large amounts of resources, including land, water, and energy, resulting in emissions of greenhouse gases that can harm human health and the environment. The livestock industry needs to adopt sustainable practices such as improving feed, manure management and energy efficiency to reduce emissions. The Global Livestock Environmental Assessment Model (GLEAM) estimate the mitigation potential for the sector to be around 33%, or about 2.5 gigatonnes CO2-eq.[7] This figure arises from the assumption that producers in a given system, region and agroecological zone apply the practices of the 10th percentile of producers with the lowest emissions intensities while maintaining constant output. Achieving this will require investment in research, technology, and infrastructure and collaboration between the industry and government stakeholders to implement policies and regulatory frameworks that support a sustainable and climate-resilient livestock sector.

Box 6.3. Implications of Foot and Mouth Disease (FMD) and global meat market segmentation

The *Outlook* projections generally assume integrated global markets, where the "law-of-one-price" applies across national and international markets, subject to border measures which may weaken price linkages. In this respect, it is assumed that there is one integrated international market for a given commodity, and price shocks are transmitted spatially across borders. An important exception has been for the global markets of bovine and pigmeat due, among other things, to the significance of foot and mouth disease (FMD), which continues to be present in 77%[1] of the global livestock population in countries that hold some three quarters of the world's population. Segmentation arises from the application of sanitary barriers by countries free from FMD, given their concern for the disease's highly contagious nature that enables transmission readily via live animals, traded meat, or human movement. In 1927, the United States introduced sanitary legislation banning meat imports from countries where FMD was endemic, leading to the creation of two different beef markets, known as the Pacific and Atlantic markets.[2]

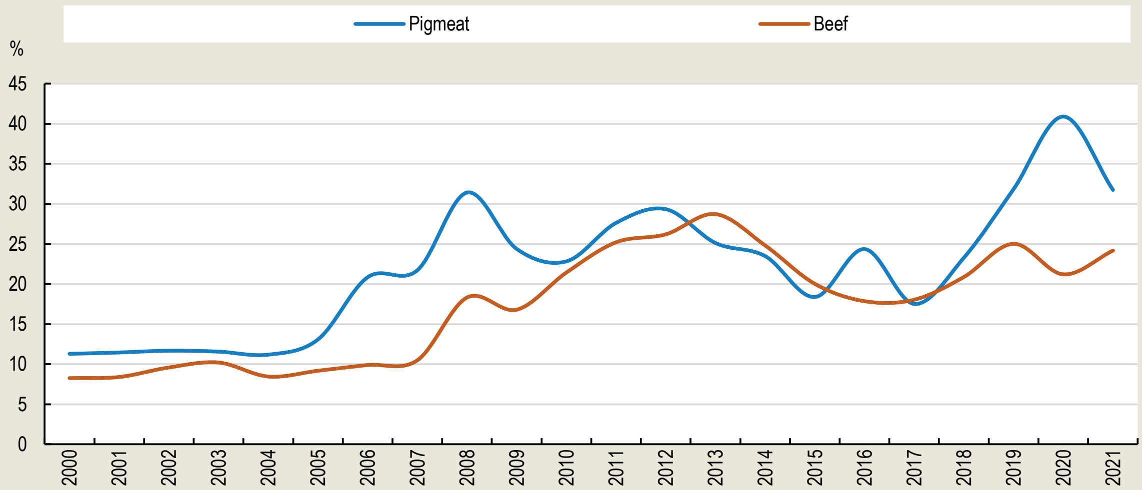
The Pacific area, free of FMD, experienced gradual expansion, while the Atlantic market, endemic to the disease, produced growing surpluses and was unable to access more wealthy FMD free markets, resulting in significant price differentials between the two zones, to the advantage of the Pacific traders. However, with changing technologies, institutional arrangements and market structures, some analysts have questioned whether the international bovine and pigmeat markets remain effectively segmented in product flow and price transmission.

The nature of FMD market segmentation has changed considerably over time. First, policy changes, such as status assessments and conditions established by the World Organization for Animal Health, have enabled FMD-free zones within FMD endemic countries adopting mitigation risk measures, allowing trade to occur (for more details, see https://www.woah.org/en/disease/foot-and-mouth-disease/#ui-id-2)[3]. For example, such zoning has allowed Brazil, the world's largest exporter of bovine meat and fourth largest pigmeat exporter, establish trade with the Pacific market.[4] Vaccines for FMD have also become more widely used in FMD infected countries, enabling tighter disease control and trade, and vaccination strategies have been widely pursued.

Second, from a market structure perspective, some FMD-free countries of the Pacific zone have been shipping large quantities of bovine and pigmeat into the FMD endemic market of the Atlantic zone (Figure 6.9), reaching at times 30-40% of their total shipments. Their participation in the FMD market has grown over time. Such a surplus situation is anticipated to continue for the foreseeable future, implying a considerably stronger connection between the two zones.

Figure 6.9. Increasing share of meat traded from FMD free zone to FMD markets

Beef and pigmeat, 2000-2021



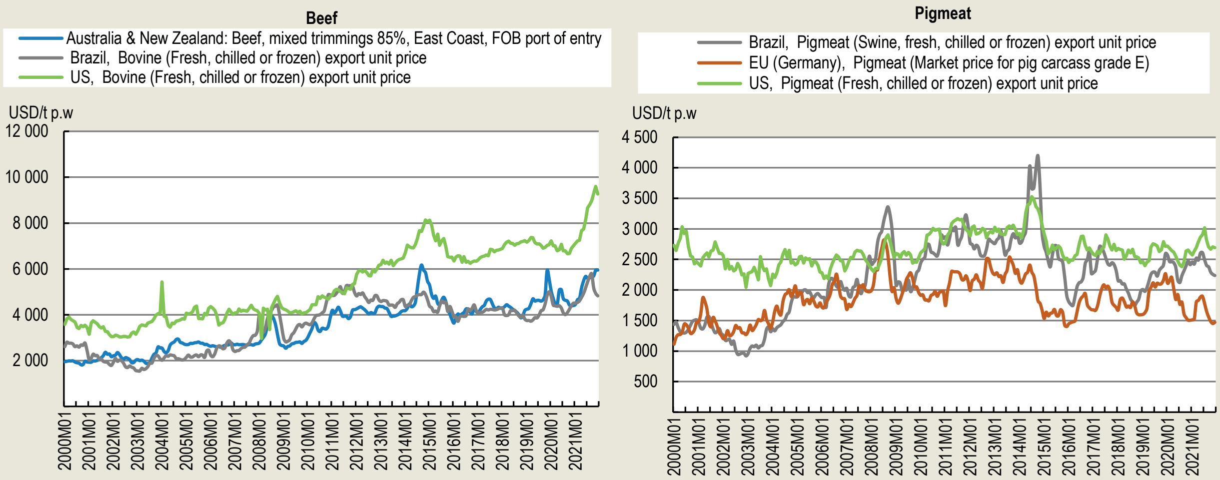
Note: Countries used as a proxy for FMD free region; Australia, Canada, Colombia, Indonesia, Japan, Korea, Mexico, New Zealand, Peru, and The Philippines.
Source: UN COMTRADE database.

StatLink https://stat.link/q4175w

Third, evidence of this connection can be seen in the co-movement of indicative prices of the two zones displayed in Figure 6.10 over the past two decades. Formal statistical tests using monthly data for unit export values of frozen boneless beef for Australia, Brazil, and the United States from 2000 to 2021 do not reject the hypothesis of co-integration between these series, with the Australian price influencing Brazil and US price movements. Similar tests using monthly export unit values for pigmeat for Brazil, Germany and US prices indicate co-integration between the United States and Brazil series only, with detection of causality between the US price influencing the Brazilian price.

Figure 6.10. Selected beef and pigmeat reference prices

2000-2021



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/ztgowy

In previous editions of the *Outlook*, it has been presumed that segmented markets between the Pacific or FMD free zone and the Atlantic or FMD zone exist for bovine and pigmeat. The Aglink-Cosimo model underlying the projections of the *Outlook* has specified such segmentation in the trade between the two regions. Supported by an updated analysis of markets (as described above), the projection of this Outlook presumes a high degree of integration of trade between these zones, such that quantity flows will bind common price movements as is the case for the other commodities. The underlying model assumption is that the law of one price applies across the two zones for both bovine and pigmeat. Should any of the conditions for such integration fail over the outlook period, such as a significant outbreak of FMD in a large FMD-free exporting country, market structures could change quickly and significantly affect the market assessment of this *Outlook*.

Notes

1. https://www.woah.org/en/disease/foot-and-mouth-disease.
2. Blackwell JH (1980), “Symposium: international challenges and perspectives: Internationalism and survival of foot-and-mouth disease virus in cattle and food products”, *J Dairy Sci.,* Jun;63(6):1019-30. doi: 10.3168/jds.s0022-0302(80)83040-2. PMID: 7400424.
3. Article 3.3 of the SPS agreement indicates that WTO Members may not follow the WOAH recommendations, leaving the final decision to accept or not the proposed zone on the side of the trading partners of the infected country.
4. “Zone means a clearly defined part of a country containing an animal subpopulation with a distinct health status with respect to a specific disease for which required surveillance, control and biosecurity measures have been applied for the purpose of international trade” OIE - Terrestrial Animal Health Code Twenty-ninth edition, 2021). For more information see Junker, F., J. Ilicic-Komorowska and F. van Tongeren (2009), “Impact of Animal Disease Outbreaks and Alternative Control Practices on Agricultural Markets and Trade: The case of FMD”, *OECD Food, Agriculture and Fisheries Papers*, No. 19, OECD Publishing, Paris, https://dx.doi.org/10.1787/221275827814.

Notes

[1] The proportion of feed costs in the cost of producing meat can vary depending on the type of meat and the specific production system. In major meat producing countries with intensive farming systems chicken feed costs can account for 60-70% of the total cost of production, while in pig production, it can account for 50-70% of the total cost. In ruminant animals such as cattle and sheep, feed costs are generally a lower proportion as these animals can graze on pasture and consume a wider range of feed sources. In the case of feedlot operations, it can represent around 25% of the total cost. However, the total cost of cattle production is much higher, as is total feed use per kg of meat produced.

[2] For example, in broiler chicken production, labour costs can account for around 5-10% of the total cost of production, while in pig production, it can be around 10-20%. In the case of ruminant animals, labour costs are generally lower as they require less intensive management, with some exceptions, such as feedlot operations, for which labour cost can represent around 8% (publications.gc.ca/pub?id=9.581110&sl=0).

[3] For more information on how ASF may impact agricultural markets and to compare various outcomes induced by the ASF outbreak in China see Frezal, C., H. Gay and C. Nenert (2021), "The Impact of the African Swine Fever outbreak in China on global agricultural markets", *OECD Food, Agriculture and Fisheries Papers*, No. 156, OECD Publishing, Paris, https://doi.org/10.1787/96d0410d-en.

[4] Currently, a country affected by ASF is not obliged to completely stop its exports if it takes the measures recommended by the WOAH.

[5]Niemi, J.K. (2020), "Impacts of African Swine Fever on Pigmeat Markets in Europe", *Front. Vet. Sci.*, Vol.7:634, doi: 10.3389/fvets.2020.00634.

[6] Gerber, P.J., H. Steinfeld, B. Henderson, A. Mottet, C. Opio, J. Dijkman, A. Falcucci, and G. Tempio (2013), *Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities*, Food and Agriculture Organization of the United Nations (FAO), Rome. (https://www.fao.org/3/i3437e/i3437e.pdf)

[7] Using 2015 as a reference year (https://www.fao.org/gleam/dashboard-old/en/).

7 Dairy and dairy products

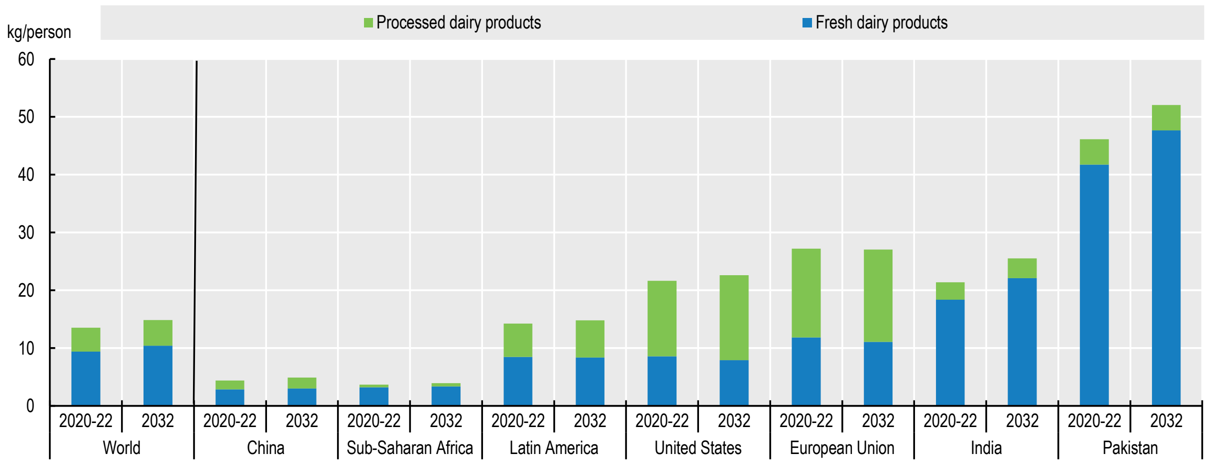
This chapter describes market developments and medium-term projections for world dairy markets for the period 2023-32. Projections cover consumption, production, trade and prices for milk, fresh dairy products, butter, cheese, skim milk powder and whole milk powder. The chapter concludes with a discussion of key risks and uncertainties which could have implications for world dairy markets over the next decade.

7.1. Projection highlights

Buoyant dairy sectors in South Asia and Africa

Milk and dairy products are vital sources of nutrition and provide livelihoods for millions of people in dairy value chains across the world. As income and population increase, more dairy products are expected to be consumed over the medium term. The key locations of this strong demand growth are India, Pakistan, and several African countries. Overall, per capita consumption is projected to increase 0.8% p.a. to 15.7 kg (milk solids equivalent, excluding the water content of milk or dairy products) by 2032. Most dairy production is consumed in the form of fresh dairy products, 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. 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 to consume more 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/nk2pvj

Cheese is the most important processed dairy product consumed in terms of milk solids, which primarily occurs in Europe and North America and is increasing 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 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 growth, although from a lower base.

World milk production (roughly 81% cow, 15% buffalo, and 4% for goat, sheep and camels combined) is projected to grow at 1.5% p.a. over the next decade (to 1 039 Mt in 2032), faster than most other main agricultural commodities. Over half of the increase in total milk production is anticipated to come from India and Pakistan, which will jointly account for over 32% of world production in 2032. Production in the second largest global milk producer, the European Union, is expected to decline slightly in response to stagnating domestic demand due to low population growth and declining per capita consumption of fresh dairy products, policies targeted to a transition to sustainable production, the expansion of organic production, and pasture-based production systems. Globally, the projected growth in the number of milk-producing animals is expected to be strong, 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 Asian countries.

Milk is traded internationally mainly in the form of processed dairy products. The People's Republic of China (hereafter "China") is expected to remain the most important importer of milk products despite a stronger increase in domestic milk production relative to the past decade. The projected increase in import demand for dairy products in Southeast Asian countries will be driven by population as well as income growth, which favours more livestock products in diets. However, their per capita consumption is projected to remain low relative to traditional dairy consumer markets. The Russian Federation (hereafter "Russia"), Mexico and countries in the Near East and North Africa (NENA), especially Saudi Arabia, 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, 70% of WMP, 70% of butter, and 80% of SMP exports in 2032.

Since 2015, the unit 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. It is expected that this gap will persist throughout the projection period. Overall, prices are expected to develop in line with other major agricultural commodities experiencing a slight nominal increase following a downward adjustment in the first years of the *Outlook*.

Although the growth rate of plant-based replacements is strong in many regions, including East Asia, Europe, Oceania and North America, contested views regarding their environmental impact and health benefits lead to uncertainties about their long-term impact on dairy demand. Over the projection period the per capita consumption of fresh dairy products is expected to decline in Europe, Oceania and North America, partly at the expense of an increasing consumption of plant-based replacements.

The introduction of new sustainable production policies or consumer acceptance issues of dairy products will impact the projections for the dairy sector. In some countries, dairy production accounts for a substantial share of overall greenhouse gas emissions (GHG), resulting in considerations of how adjustments to dairy production scale and technology could contribute to reducing such emissions.

Only a relatively small share of global milk production is traded internationally in the form of processed products, mainly powders and cheese. In addition, trade in dairy products is often covered specifically in regional trade agreements. Consequently, new or changed trade agreements tend to alter the global dairy trade. Any entry of India, the world's largest dairy producer and consumer, into the international market could have a strong impact. Currently, some Indian dairy companies are showing interest in exporting to neighbouring countries.

7.2. Current market trends

Dairy prices reached record highs in 2022 but then started to decline

In 2022 the FAO Dairy Price Index value increased by 20% across all dairy products, reaching a new record high. International dairy prices reached their peak around mid-2022 and have started to decline slowly since. Nevertheless, domestic milk prices peaked later and only started to decline towards the end of 2022. The main drivers of prices were energy and feed costs, both showing a similar pattern, but with larger swings compared to those for dairy and milk.

World milk production grew by 0.7% in 2022 to about 897 Mt. In India, production increased by 2.2% to 194 Mt., but with little impact on the world dairy market as they trade only marginal quantities of milk and dairy products. Focusing on the three major exporters, the production of the European Union remained unchanged during 2022 but declined in New Zealand and increased in the United States.

The world dairy trade in 2022 declined due to considerably smaller import demand from China, especially for whole milk powder (WMP). On the other hand, other major importers of dairy products – Saudi Arabia, Indonesia and Mexico - increased their imports. Of the large exporters, the United States would be a strong beneficiary of any additional exports.

7.3. Market projections

7.3.1. Consumption

Strong demand in India and Pakistan is leading increased global dairy consumption

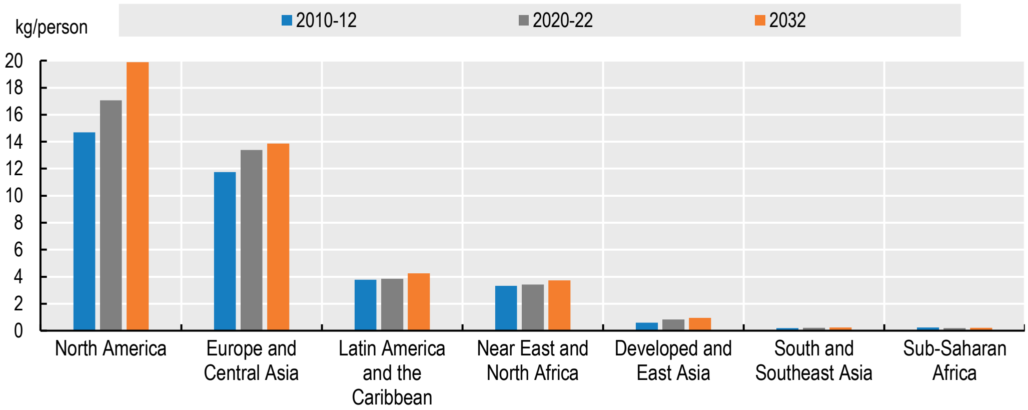
Although milk is a highly perishable product which must be processed shortly after collection, most milk is consumed in the form of fresh dairy products,[1] including those fermented and pasteurised. The share of fresh dairy products in global consumption is expected to increase over the coming decade 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 1.0% p.a. over the coming decade, slightly faster than over the past ten years, primarily driven by higher per-capita income growth.

Milk consumption per capita (in terms of milk solids) will vary largely worldwide (Figure 7.1), driven by varying growth in incomes and regional preferences. In low- and lower middle-income countries most of the production is consumed in the form of fresh dairy products. The consumption of fresh dairy products per capita is expected to be high in India and Pakistan, but low in China.

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. Plant-based dairy replacements are increasingly established and competing more with fresh dairy products than with processed dairy products.

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 urbanisation. 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 (Figure 7.2). Consumption of cheese will also increase in regions where it has not been 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.

Figure 7.2. Per capita consumption of cheese in selected regions



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/4cwymt

Butter consumption has seen a recovery in Europe and North America due to shifting preferences. Consumers may be influenced by recent studies that have shed a more positive light on the health impact from butter consumption, contrary to earlier messaging.

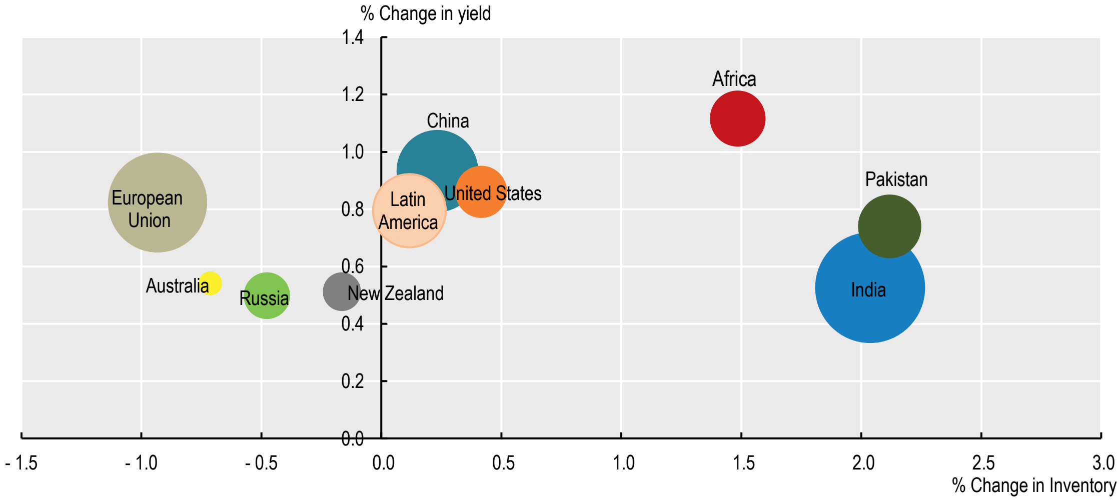
The dominant use of SMP and WMP will continue to be in the manufacturing sector, notably in confectionery, infant formula, and bakery products. A small share of dairy products, especially SMP and whey powder, are used in animal feed. Whey powders are gaining prominence globally because of their use in the processing of nutritional products, especially of clinical, infant, and elderly preparations.

7.3.2. Production

Greater efficiency in milk production from yield growth

World milk production is projected to grow at 1.5% p.a. (to 1 039 Mt by 2032) over the next decade, faster than most other main agricultural commodities. Growth in the number of milk-producing animals is expected to be strong (1.3% p.a.), especially in Sub-Saharan Africa and in major milk-producing countries such as India and Pakistan – where yields are low. Yields across the world are expected to grow steadily over the next decade. Nevertheless, in most regions of the world, yield growth is expected to contribute more to production increases than herd growth (Figure 7.3), the drivers of which include optimising milk production systems, improved animal health and feed efficiencies, and improved genetics.

Figure 7.3. Annual changes in inventories of dairy herd and yields between 2022 and 2032



Note: The size of the bubbles refers to the total milk production in the base period 2020-22.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

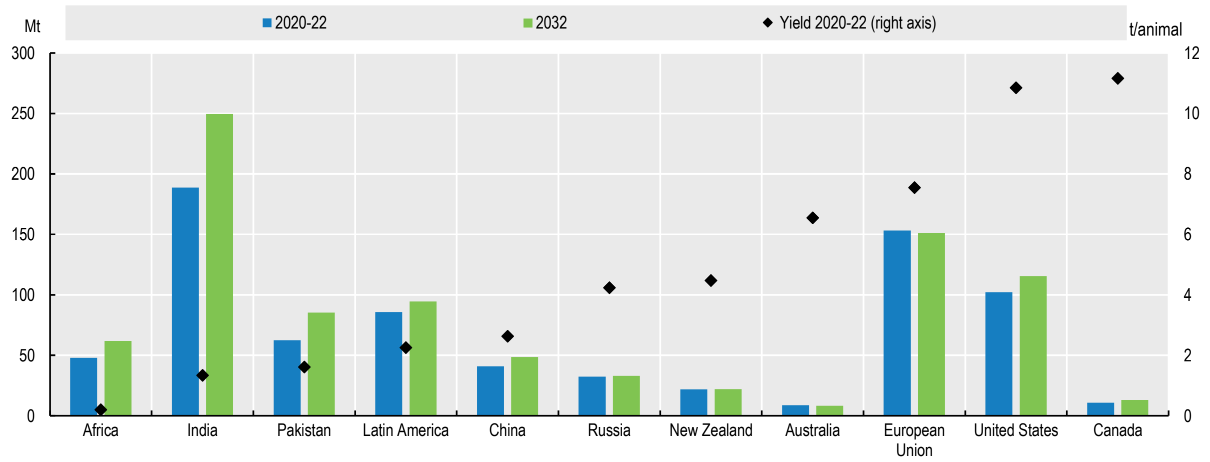
StatLink https://stat.link/duc1rw

India is the largest producer of milk and is expected to experience a continued strong production growth. Production is based on small households connected to cooperatives for processing and distribution. This integration into the wider supply chains is also important for the value attached to dairying in India. The growth is expected to come from more milking cows and buffaloes as well as from yield increases.

Production in the European Union is projected to decline with fewer dairy herds and slower yield growth. Production originates from a mix of grass- and feed-based production systems. In addition, a growing share of milk is expected to be organic or from 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, as organic yields are about a quarter lower than in conventional production systems, and higher production costs, they need to command a substantial price premium.

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 7.4). 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 continue to expand SMP exports.

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



Note: The yield is calculated per milking animal (mainly cows but also buffaloes, camels, sheep and goats).
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/pcnb83

Although the share of New Zealand in world milk production is only 2.5%, it is the most export-orientated country. After expanding milk production strongly over the last twenty years, milk output growth has stalled in recent years, and 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 cost efficiency of grass management, however, allows New Zealand to be competitive. The main constraining factors for growth are land availability and increasing environmental restrictions and the pricing of enteric methane from 2025 (Zero Carbon Amendment Act of 2019 to the Climate Change Response Act of 2002), 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 including 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 in Africa and to account for around 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 cheese, these presently account for a large share of consumption of milk solids in Europe and North America. SMP and WMP are largely produced for trade, for use 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 into fresh dairy products.

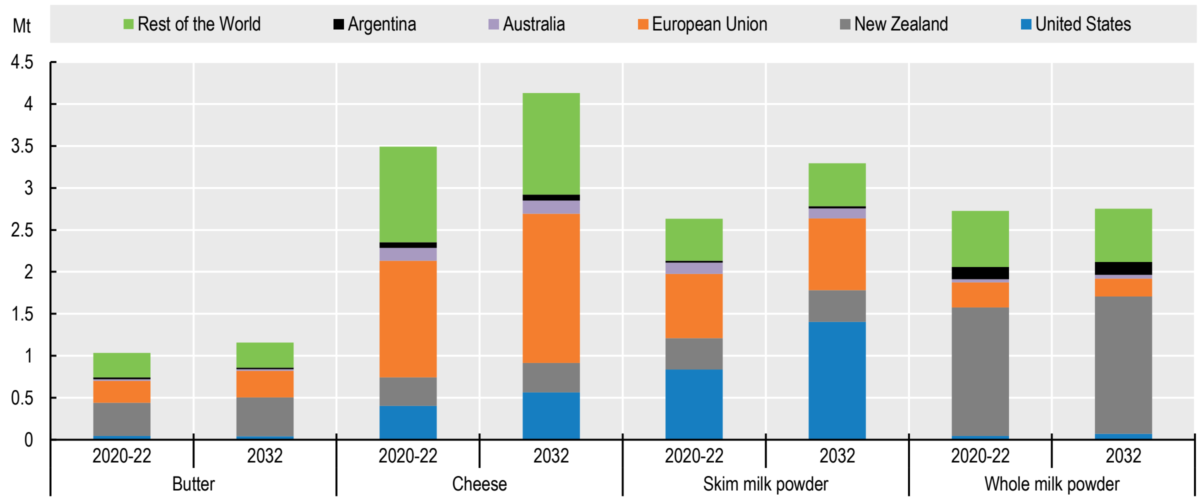
7.3.3. Trade

Trade will expand from a 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%). 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. Fresh dairy products are very lightly traded as small amounts of fermented milk products between neighbouring countries (Canada and the United States, the European Union and Switzerland). An exception is imports of liquid milk by China from the European Union and New Zealand, due to Ultra-High Temperature milk and cream products able 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 1.2 Mt, and this is not projected to increase much over the next decade.

World dairy trade is projected to expand over the next decade to reach 14.2 Mt in 2032, 11% higher than during the base period. 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, 70% of WMP, 70% of butter, and 80% of SMP exports in 2032 (Figure 7.5). Australia, another exporter, has lost market shares although it remains a notable exporter of cheese and SMP. In the case of WMP, Argentina is also an important exporter and is projected to account for 5% of world exports by 2032. In recent years, Belarus has become an important exporter, orienting its exports primarily to the Russian market due to the Russian embargo as of 2015 on several major dairy exporting countries.

Figure 7.5. Exports of dairy products by region



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/fcuezv

The European Union will continue to be the main world cheese exporter, followed by the United States and New Zealand. The United Kingdom, Japan, Russia, the European Union, and Saudi Arabia are projected to be the top five cheese importers in 2032. These countries are often also exporters of cheese and international trade is expected to increase the choice of cheeses for consumers.

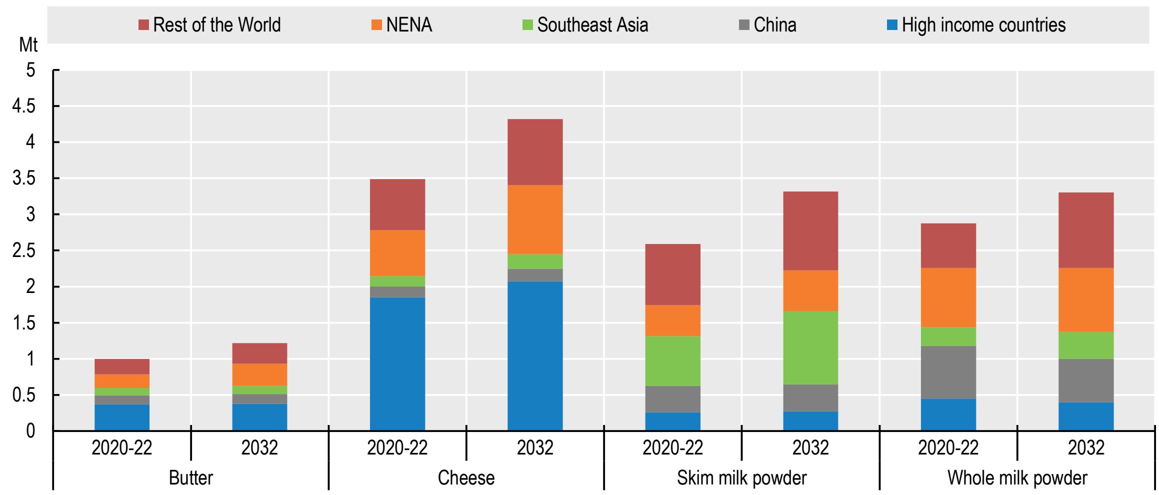
New Zealand remains the primary source for butter and WMP on the international market, and its market shares are projected to be around 40% and 60%, respectively, by 2032. China is the principal importer of WMP from New Zealand, but trade between the two countries is projected to be less dynamic over 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.

The United States is expected to be the most dynamic large exporter over the next decade and expand SMP exports especially. This would require growth in drying capacity which is beyond current investments. SMP imports are disperse globally as it is often the easiest dairy product to trade for use in food processing.

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 7.6). China is expected to continue to be the world's major dairy importer, especially for WMP with imports from China projected to represent 21% of global imports in 2032. 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.

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. Imports by NENA are expected to originate primarily from the European Union, while the United States and Oceania are expected to be the main suppliers of powders to Southeast Asia.

Figure 7.6. 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/3aiylt

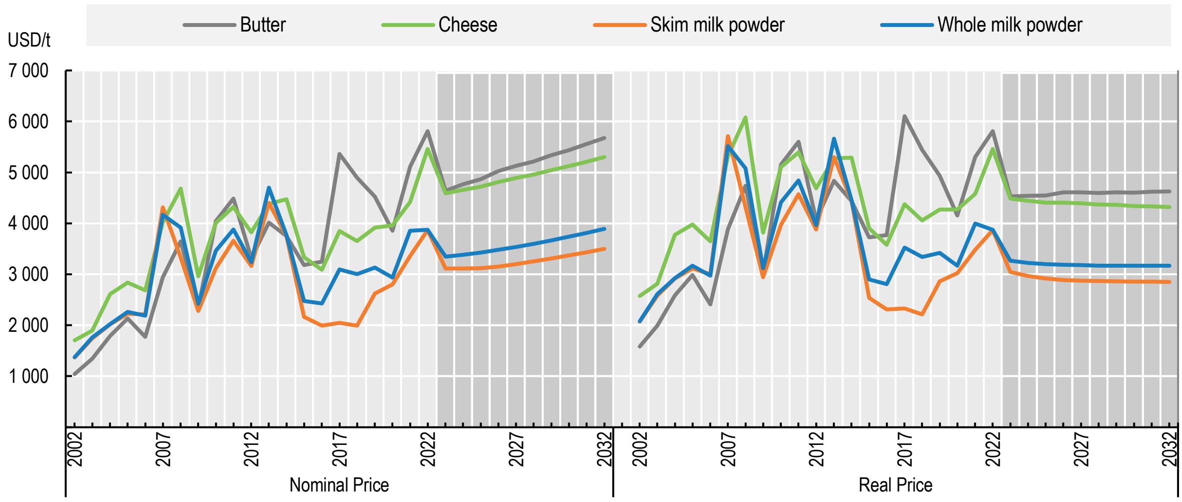
7.3.4. Prices

Real international dairy prices will trend downward

International dairy prices are of processed products of the main exporters in Oceania and Europe. The two main reference prices 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, the remainder being water.

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 (Figure 7.7). Prices of butter and SMP are foreseen to slightly 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 trends, in line with the respective content of fat and non-fat solids.

Figure 7.7. Dairy product prices, 2002-2032



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 (2022=1).
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/mqa0jk

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.

7.4. Risks and uncertainties

Environmental and health concerns are becoming more significant

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 sources from 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 replacements 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 sector could affect the level and nature of dairy production 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 on dairy. European dairy sector experts assume decreasing dairy exports caused by the European Union Farm-to-Fork-Strategy. 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.

Russia's war against Ukraine has significantly heightened the uncertainty of energy, fertiliser and other agricultural supplies and may slow down economic growth. Market impacts could be felt in related sectors such as dairy through increased input costs for these products. It could also increase the interest in circular agriculture with a focus on using fewer external inputs, an option available and widely used in dairy production.

Changes in domestic polices remain an uncertainty. 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 already had a considerable market impact in recent years.

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. In addition, 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 home demand. Future investment in cold chain infrastructure in these regions will contribute to an increase their degree of dairy self-sufficiency.

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 recent market developments and highlights the medium-term projections for world fish markets for the period 2023-32. Price, production, consumption and trade developments for fish from capture fisheries and aquaculture are discussed. The chapter concludes with a discussion of important risks and uncertainties that might affect world fish markets over the next ten years.

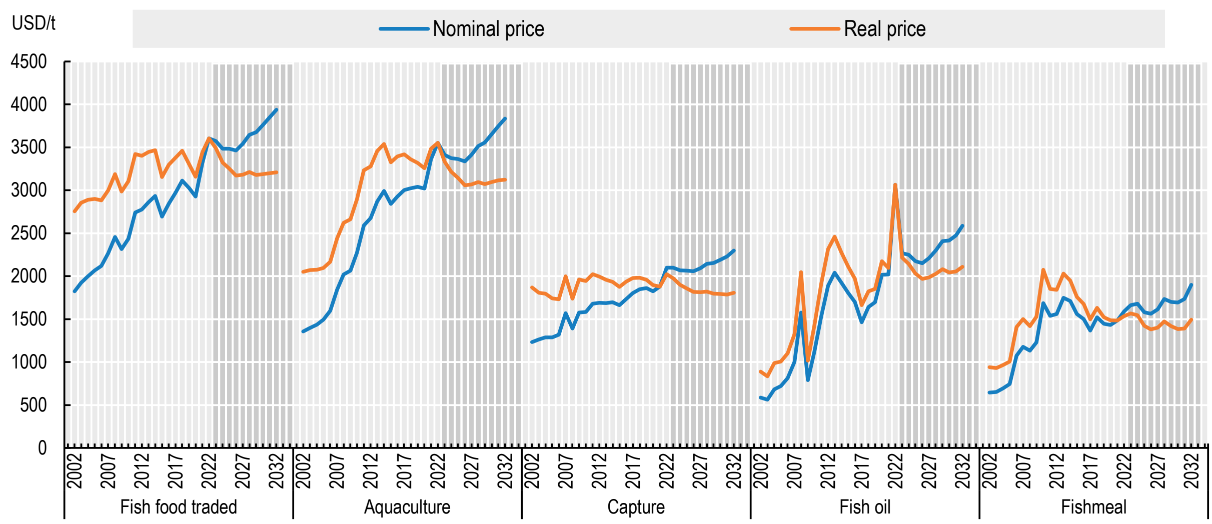
8.1. Projection highlights

Fish production, consumption and trade will grow slower than in last decade

Fish[1] consumption for food is expected to grow over the next decade but at a slower rate than in the previous decade, largely due to a softening of demand in Asian countries, the main consumers of aquatic food. The slow-down in Asian countries reflects the already high per capita fish consumption levels on average, and increased competition from meats with a recovery in pig meat consumption in the People's Republic of China (hereafter "China"). Apparent[2] food fish consumption per capita is expected to increase in all continents except Africa, the region with the fastest growing population. By 2032, apparent food fish consumption is projected to reach 21.2 kg per capita globally – up from 20.4 kg in the base period (average 2020-2022). Differences across continents will persist and increase, as the strongest growth is expected in Asia, which already has the highest per capita consumption. Conversely, a decline is projected in Africa where per capita consumption is the lowest. The share of food fish consumption in total fisheries and aquaculture production is expected to remain broadly stable at about 90% over the outlook period. The remaining 10% of production will be utilised for non-food purposes, primarily for fishmeal and fish oil.

Fish prices will all decrease in real terms over the outlook period, down from the high levels reached in the base period (Figure 8.1). However, the subdued growth in fish production will prevent prices from falling significantly. Fish oil prices are expected to experience the greatest decline over the period, reflecting a downward correction from the exceptionally high levels in 2022. Despite stable supplies, fish oil prices grew by over 50% in 2022 compared with 2021, supported by the high prices of vegetable oils. The decrease in fishmeal prices in real terms is expected to be marginal and less than other categories over the outlook period due the ongoing tight supplies and strong demand. The world prices for traded fish, aquaculture species, and capture species are all expected to decrease at similar rates in real terms over the next decade.

Figure 8.1. 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 (2022=1).

Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/4uz3ka

Global fish production will continue to expand to meet rising demand reaching 202 Mt by 2032, but at a slower rate than in the last decade. This slowdown in growth reflects the impact of policy changes in China, which have slowed the expansion of production, the higher costs for inputs, particularly energy, and the assumption that 2032 will be an *El Niño* year leading to lower production, mainly in South America. Most of the additional production will be generated by the aquaculture sector. By 2032, aquaculture production is projected to account for 55% of total fish production, compared with 50% in the base period. On average, the capture fisheries sector will provide about 92 Mt of fish every year, with lower levels in the years of *El Niño.*[3] World production of fishmeal is expected to expand over the next decade with the proportion of fishmeal obtained from fish residues as the main driver, reflecting an increased capacity of the sector to utilize by-products. World production of fish oil is projected to rise at a rate similar to total fish production.

Global trade of fish for human consumption is projected to continue growing over the coming decade, but at a slower rate than in the past decade. Asia, and to a lesser extent Europe, will be driving the expansion of exports. By 2032, Asia will account for 51% of all food fish exports compared with 47% in the base period. Exports from Africa, Oceania and America are projected to decline by 2032, reflecting the slowdown in production growth across these continents and the assumed *El Niño* in the case of the Americas. The European Union, the United States and China will remain the top three importers, with rising imports for the European Union and the United States, while Chinese imports are expected to decrease by 21% by 2032. This decline reflects the efforts China is making to meet increasing food demand through domestic production.

The fisheries and aquaculture sectors are expected to face significant uncertainties over the coming decade. Capture fisheries production and related prices might be impacted by the recently concluded negotiations of the World Trade Organization (WTO) on fisheries subsidies, but also by improved fisheries management. Climate change represents a source of both environmental and regulatory risk for the capture fisheries and aquaculture sectors. Finally, Russian Federation's (hereafter "Russia") war against Ukraine and the related sanctions will continue to impact fish trade given the Russia's position as an important capture fisheries producer.

8.2. Current market trends

Price surge supported by limited supply growth and increased demand from global recovery

After a strong recovery in 2021, world fish production rose marginally in 2022 to an estimated 183 Mt. The rise in Asian production was partly offset by a reduction in Peruvian catches after a high production year in 2021. Higher production costs (energy and fuel) hampered profitability in the aquaculture and capture fisheries sectors, despite a significant rise in fish prices.

Increased demand, driven by the global economic recovery following the COVID-19 recession, combined with supply disruptions, including geopolitical conflicts, and weather-related disasters, led to higher inflation in 2021 and 2022. According to the FAO Fish Price Index,[4] international fish prices were 19% higher in 2022 compared to 2021, following a 7% rise in 2021. The index peaked to 135 in June 2022 and since then has been on a downward trend.

World food fish exports were marginally down in 2022 compared with 2021 and are estimated to have reached 42 Mt. Higher exports from Chile, Korea and India were partly offset by reduced exports from Peru, the European Union and Norway.

8.3. Market projections

8.3.1. Consumption

Growth in fish consumption is expected to slow over the next decade

Fish can be consumed in different forms for either food or non-food uses. Fish not consumed as food is processed into fishmeal and fish oil or serves other non-food uses, such as for ornamental fish, culturing, fingerlings and fry, bait, pharmaceutical inputs, and as direct feed for aquaculture, livestock and other animals. Over the next decade, the bulk of fisheries and aquaculture production is expected to continue to be directed to human consumption. It is projected that 90% of fish production will be consumed as food in 2032, compared with 88% in the base period (2020-22 average). This mainly reflects a reduction in the quantities of fish used for fishmeal and fish oil production due to the *El Niño* phenomenon, assumed to occur in 2032.

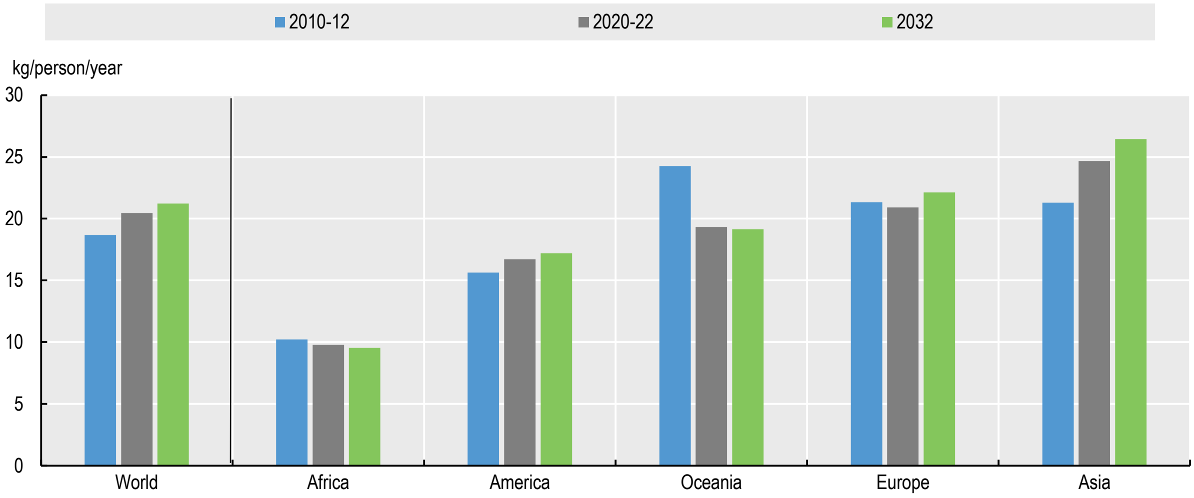
At the global level, fish for human consumption is projected to continue rising but at a slower pace than that experienced in previous decades. This slowdown in growth is mainly due to sluggish production expansion, higher fish prices, in particular in the first years of the projection period, and to a softening of demand in some Asian countries. Fish for human consumption is projected to increase by 14% to reach 182 Mt by 2032, expanding on all continents. However, the magnitude of the rise will vary from one continent to another, reflecting different consumption baseline levels and population growth rates. Africa is projected to experience the strongest growth rate in fish available for food consumption by 2032 (+25%), and Europe the lowest (+4.6%). At +14%, Asia does not have the highest growth rate but is, by far, the largest fish consumer. Consequently, Asia will account for 74% of the additional fish consumed by 2032. China on its own will account for 34% of that additional volume. Aquaculture will provide a growing share of the total fish available for human consumption rising from 57% in the base period to 61% by 2032.

World apparent food fish consumption is expected to increase over the next decade, reaching 21.2 kg in 2032 in per capita terms, up from an average of 20.4 kg in 2020-22 (Figure 8.2). The growth rate will be lower in the second half of the outlook period when fish prices will increase. In per capita terms, fish consumption will increase in all continents except Africa, where it is projected to decline from 9.8 kg in 2020-22 to 9.6 kg in 2032, with a larger decrease in Sub-Saharan Africa (down from 8.8 kg in 2020-22 to 8.3 kg in 2032). Nevertheless, rising incomes and near saturation in consumption levels of some Asian countries are leading to a more even evolution of fish consumption per capita across continents. The decline in the African per capita fish consumption will be relatively smaller than in the prior decade, while the rise in the Asian per capita fish consumption will be about half that of the prior decade.

Middle-income countries will drive growth in apparent food consumption per capita over the outlook period, followed by high-income countries. However, low-income countries are expected to experience negative growth over the outlook period.

Consumption of fishmeal and fish oil will be constrained by their generally stable production. Markets will 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. The reduction in fishmeal use in feed rations, due to its high price and major innovation efforts, will continue to expand the market for oilseed meals in the aquaculture industry, where oilseed meal use is anticipated to reach about 11.4 Mt in 2032. China will be the country utilizing the highest quantity of fishmeal as feed with a share of 42% of total consumption in 2032. Fish oil is still expected to predominantly be used in aquaculture, but direct human consumption will remain an important market, where prices are generally higher.

Figure 8.2. Per capita fish consumption



Note: data are expressed in live-weight equivalent.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/j05ncr

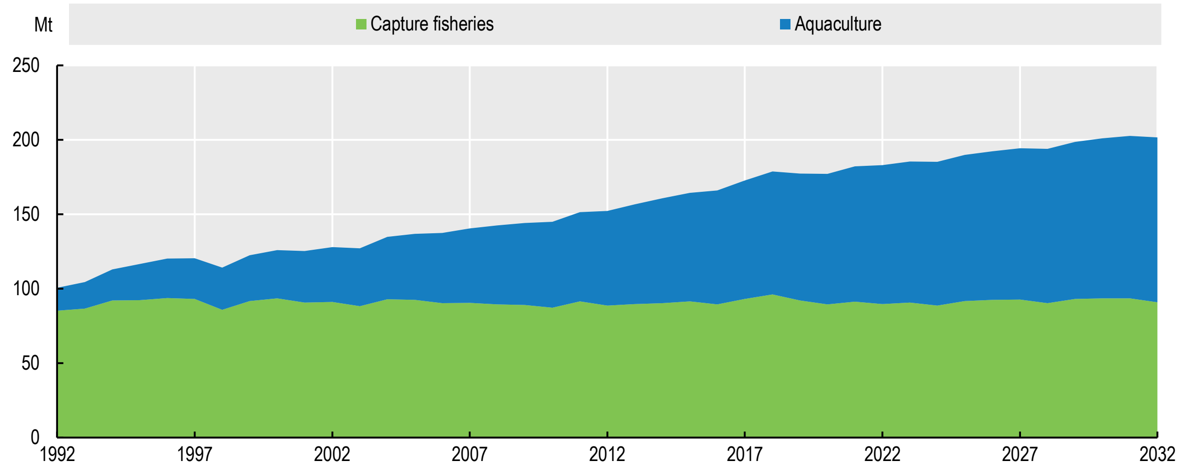
8.3.2. Production

Aquaculture to drive production growth

Global fish production (capture fisheries and aquaculture) is expected to increase to 202 Mt by 2032, up from 181 Mt in the base period (Figure 8.3). While global fish production is still increasing (+12% over the outlook period), the rate of growth is substantially lower than the 22% increase achieved over the previous decade. This is the consequence of a lower growth rate in the aquaculture sectors when compared to the previous decade. In general, the pattern of the previous decade where capture fisheries production remained broadly stable while aquaculture production grew is expected to continue.

Capture fisheries production is projected to grow marginally, reaching 91 Mt by 2032, an increase of just under one Mt. However, this slow growth is partly influenced by the assumed *El Niño* event in 2032, which reduces capture fishery production in South America, resulting in world capture production falling by about 2 to 3 Mt in these periods. Growth in capture fisheries production is expected to come largely from improved fisheries management, from technological improvements and reduction of discards and waste. The bulk of production will originate from Asian countries, which share in world capture fisheries is expected to rise slightly to 53% by 2032.

Figure 8.3. Aquaculture and capture fisheries production



Note: Data are expressed in live-weight equivalent.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

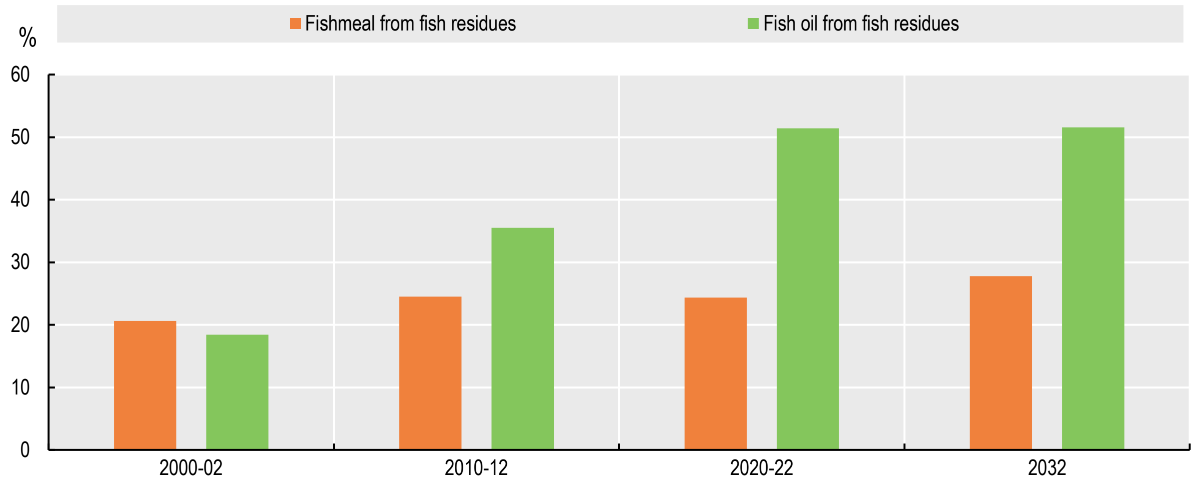
StatLink https://stat.link/2cx90j

The vast majority (96%) of additional growth in global fish production will originate from increasing aquaculture production. Aquaculture production is projected to be 111 Mt by 2032, an increase of 22% (or +20 Mt) relative to the base period, compared with 55% (or +33 Mt) in the previous decade. This anticipated slowdown in aquaculture production growth will be mainly caused by continued lower productivity gains related to environmental regulations, animal diseases related to high stocking densities and a reduced availability of optimal production locations. China, in particular, is expected to experience a substantial slowing of growth in farmed fish production due to regulations aimed at increasing the sustainability of the sector and targeting growth in species for domestic consumers. Nevertheless, China will continue dominating world aquaculture production with an expected share of 56% in 2032, representing a marginal decline to the base period.

The production of all species groups is projected to rise over the outlook period, though at different rates, resulting in a change in the composition of aquaculture production by 2032. The share of carp, the main farmed species, is expected to decline by 2032, while the share of all other species groups will rise. This represents the continuation of a downward trend that started in the late 1990's and corresponds, particularly in China, to the diversification of production largely in response to local demand. It is worth noting that the share of China in total carp production is projected to decline, reflecting stronger growth in other countries such as India. The shares of shrimps and prawns and of freshwater and diadromous fish (excluding tilapia and salmonoids the shares of which are projected to remain broadly stable) will increase.

Over the next decade, it is expected that the quantity of capture fisheries production for fishmeal and fish oil will fluctuate between lows of 15.9 Mt in *El Niño* years and highs of 18.3 Mt in the best fishing years. This represents a drop compared to an average quantity of wild fish used for reduction of 26 Mt in the 1990's. In parallel, the use of fish residue and by-products to produce fishmeal and fish oil is anticipated to continue increasing as growing market demand for fillets results in more residues being produced (Figure 8.4). The absolute level of world fishmeal and fish oil produced will reach 5.4 Mt and 1.3 Mt (in product weight) respectively in 2032, with a corresponding growth of 4.0% and 11%, compared to the base period. A notable consequence of the relatively limited ability for fishmeal production to increase and the continued growth of aquaculture is that oilseed meals are increasingly used to make up the shortfall in aquaculture feed. The observed price differential between fish and vegetable oil, and the increasing difference between fishmeal and oilseed meals suggest that crushing fish is likely to remain a profitable activity. Fishmeal and fish oil are expected to be used selectively at specific stages of production, such as for hatchery, brood stock and finishing diets as considered the most nutritious and most digestible ingredients for farmed fish.

Figure 8.4. Share of fishmeal and fish oil obtained from fish residues



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/n1p96o

8.3.3. Trade

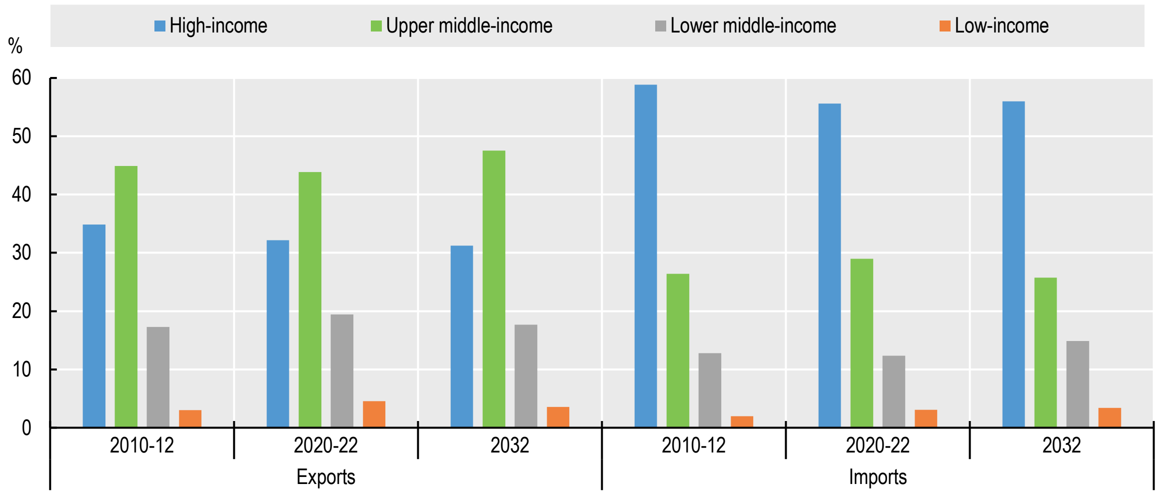
Over half of the food fish imports will continue to be concentrated in high-income countries

According to the projections, aquatic products (for food and non-food items) will remain highly traded, with about 33% of total fish production including intra-EU trade (30% excluding intra-EU trade) exported in 2032, reflecting the sector's degree of openness to, and integration in, international trade. The aquaculture and capture fisheries supply chain is expected to remain complicated as aquatic products often cross national borders several times before final consumption due to the outsourcing of processing to countries with relatively lower labour and production costs.

World trade of fish for human consumption is projected to be 5.0% higher in 2032 than in the base period. This represents a slowdown compared to the 10% growth observed in the previous decade. High transportation costs, slower expansion of fish production and desire to fulfil domestic demand with local production in some key countries, including China, are the main drivers behind this slowdown in growth. By 2032, exports of fish for human consumption are projected to reach 44 Mt, up from 42 Mt in the base period.

By 2032, upper middle-income countries are the only income class expected to experience an increase in its share of global food fish exports, increasing to 48% from 44% in the base period. High-income countries will account for 31% of total food fish exports by 2032, lower middle-income countries for 18%, and low-income countries for the remaining 4% (Figure 8.5). China will consolidate its leading role as the major exporter of fish for human consumption, with a share of 22% of world exports in 2032 (up from 17% in 2020-22), followed by Norway and Viet Nam (stable at 7% and 6%, respectively).

Figure 8.5. Trade of fish for human consumption by income regions



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/1lrkbn

The share of lower middle-income countries in global food fish imports is set to rise over the outlook period, while that of upper middle-income countries will decline. By 2032, the shares of food fish imports of lower middle-income and upper middle-income countries are expected to reach 15% and 26% of world food fish imports respectively, from 12% and 29% respectively in the base period. This trend reflects the rise in income in lower middle-income countries allowing them to increase their access to international markets. It also reflects the relocation of the fish processing industry from upper middle-income countries, such as China, to countries with relatively lower production costs, such as India, Indonesia or Viet Nam, thus leading to a rise in imports of raw material in lower middle-income countries. The share of high-income countries in world food fish imports will remain stable at 56% during the next decade. High-income countries will continue to be highly dependent on imports of fish for human consumption to meet their demand. By 2032, food fish imports are projected to account for 75% of total fish consumption in high-income countries.

In 2032, exports of fishmeal are projected to reach 3.3 Mt product weight, a quantity comparable to the one observed in the base period. However, it is worth noting that 2032 is assumed to be an *El Niño* year, leading to lower fishmeal production and trade. Peru will remain the leading exporter of fishmeal, with a share of global exports oscillating between 26% and 34% depending on the presence or not of the *El Niño* phenomenon. China is expected to have a 55% share of world fishmeal imports by 2032, increasing from 46% in 2020-22, to satisfy the needs of its aquaculture and pig industries. Fish oil exports are expected to increase slightly to 0.9 Mt product weight by 2032. With a combined share of 44%, the European Union and Norway will remain the main importers of fish oil, reflecting the use of fish oil for salmon farming and as a dietary supplement for human consumption.

8.3.4. Prices

Prices are expected to decline slightly but remain high over the projection period

Prices across all categories increased in 2022 as the ongoing economic recovery from the COVID-19 pandemic continued to drive strong demand combined with the general inflationary environment. In nominal terms, the prices of all product groups are expected to decline until 2026 before continuing to rise again as demand stabilises in the wake of the COVID-19 recovery. Prices will decline over the projection period but will remain high relative to historic levels across all product groups. Real prices, however, will fall across all product groups in the projection period, in part due to increased competition from other protein sources (Figure 8.1).

The prices of both capture fisheries and aquaculture products are impacted by increased competition from other protein sources, predominantly pig meat and poultry. Increased production and falling prices of other protein sources will lead to a softening of demand and reduced prices of both aquaculture and capture fisheries products in real terms. However, aquaculture production growth is expected to be slower than the previous decade (see production section), limiting the expected price decline across the projection period.

Capture fisheries prices are expected to grow 19% (+1.1% p.a.) in nominal terms. However, in real terms this equates to a decline of 6.6% (-0.9% p.a.). This differs from the previous decade where prices grew by 27% in nominal terms and 1.8% in real terms. As with other product groups the growth in prices over the previous decade is an artefact of strong growth in prices following the COVID-19 pandemic in the base period. In nominal terms, prices are expected to decline from the high point in 2022 until 2026 before returning to growth from 2027. In real terms, capture fisheries prices will follow a similar pattern, but will continue to decline after 2027, albeit at a slower rate than between 2022 and 2026.

Aquaculture prices are expected the follow similar patterns to capture fisheries, with nominal growth of 16% (+1.5% p.a.), and real declines of 9.0% (-0.5% p.a.). Growth in aquaculture prices is projected to be significantly lower than the previous decade when prices grew 41% in nominal terms and 13% in real terms. As with capture fisheries, the price trend is characterised by a decline between 2022 and 2026 as prices come down from COVID-19 recovery driven highs, followed by growth from 2027 to 2032. Unlike capture fisheries, growth in prices is expected in both nominal and real terms in the second half of the projection period.

Fish oil prices are expected to grow by 9.2% (+1.7% p.a.) in nominal terms but in real terms are expected to decline by 14% (-0.3% p.a.), the greatest decline seen in all product groups. This decline is in part due to the exceptionally high prices in the base period when the fish oil price grew by over 50% in 2022 compared with 2021, despite stable supplies and was caused by the very high price of vegetable oils. The exceptionally high prices in 2022, mean the price of fish oil in 2032 is projected to be below the 2022 price in both nominal and real terms, despite continued strong demand as a feed input for aquaculture and for human consumption. The decline in prices contrasts strongly with the previous decade where prices grew by 102% (+2.8% p.a.) in nominal terms and 63% (+0.9% p.a.) in real terms. Fishmeal prices are expected to grow by the largest amount in nominal terms, 26% (+1.3% p.a.), and experience the smallest decline in real terms, -0.6% (-0.7% p.a.). The marginal decline in fishmeal prices reflects ongoing tight supplies and strong demand, bolstered by an increase in demand for fishmeal relative to other protein meals in aquaculture production.

8.4. Risks and uncertainties

Environmental uncertainty and regulatory risks could significantly impact fish production

The fisheries and aquaculture sectors will continue to face significant uncertainties over the next decade, including challenges related to the environment, policy changes and effectiveness of governance. While much of the production growth is expected to come from aquaculture, shifting government policies, particularly related to environmental impacts could alter the distribution and rate of growth. Any policy shifts in China, the world's largest producer of both aquaculture and capture fisheries, will have significant impacts on global production and the 15th Five-Year plan 2026-2030 represents a source uncertainty for the second half of the projection period.

Climate change will have both direct and indirect impacts on both capture fisheries and aquaculture and is perhaps one of the largest sources of uncertainty for fish production over the next decade, which is difficult to capture in the projections. The direct impacts of climate change on capture fisheries include the shifting geographic distribution of stocks, and changes to species composition, turnover, abundance and diversity in marine ecosystems. Climate change will not only impact the resources available to fishers, but also complicate the job of fisheries managers, and increase the number of shared stocks heightening the need for co-operative management regimes. On aquaculture, climate-driven changes in temperature, precipitation, ocean acidification, incidence and extent of hypoxia and sea level rise, availability of wild seed as well as reducing precipitation leading to increasing competition for freshwater, amongst others, are expected to have long-term impacts. The impacts of climate change will not be evenly distributed, with larger changes expected in tropical regions when compared to temperate zones.

Climate change also creates several regulatory risks for both capture fisheries and aquaculture. As governments come under increasing pressure to reduce GHG emissions from the food system and transition to net zero, the prices of key energy inputs into capture fisheries (e.g. diesel fuel) and aquaculture (e.g. electricity) may change altering the profitability of some activities, with impacts on the types of production and the structure of the fleet. The impact of those policies on the agricultural markets is another source of uncertainty. The risks posed by the transition to net zero depends on both the energy intensity of production and the nature of the policies put in place, making them both hard to predict and heterogenous across countries and fleet segments. To help governments understand these challenges and share best practices the OECD has two new initiatives: one related to the impacts of climate change on policy making for capture fisheries and, another looking at the role of aquaculture can play in meeting the challenges faced by food systems globally.

To help vulnerable states mitigate the often-devastating effects of climate change, the FAO Blue Transformation can provide a pathway for hunger reduction and sustainable management of oceans, seas, and marine resources through reconciling environmental sustainability, food security and livelihood priorities. The Blue Transformation 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. It has three main objectives: sustainable aquaculture expansion and intensification; effective management of all fisheries; and upgraded value chains. Achieving the objectives of Blue Transformation requires holistic and adaptive approaches that consider the complex interaction between global and local components in food systems and support multi-stakeholder interventions to secure and enhance livelihoods, foster equitable distribution of benefits and provide for an adequate use and conservation of biodiversity and ecosystems.

In 2022, the international community agreed binding discipline on fisheries subsidies at the WTO, and its application represents another source of uncertainty for capture fisheries production. The agreement *inter alia* prohibits subsidies to fishing activity on overfished stocks, to illegal unreported and unregulated fishing and, to fishing on the high seas outside the area of competence of an RFMO. An analysis of government support to fisheries presented in the *OECD Review of Fisheries 2022* suggests that over 60% of support (2018-2020 average) presents a high or moderate risk of encouraging unsustainable fishing in the absence of effective management. This suggests that when the WTO agreement enters into force (once two-thirds of members have accepted the agreement), the impacts on capture fisheries production may be significant if governments are required to alter their subsidy programmes to ensure compliance. The agreement also contains provisions for adopting more comprehensive disciplines within four years of the initial agreement entering into force, potentially resulting in another, more stringent, set of disciplines being applied in the projection period, introducing further uncertainties.

Finally, from a trade perspective, future policy decisions could impact the projections. For example, while sanctions remain in place on Russia following the invasion of Ukraine, any changes to this situation are difficult to predict and may impact the expected trading relationships. Ongoing tensions between the United

States and China, may have increasing impacts on the trade in fisheries products, particularly if trade and fishing activities in the Pacific are affected. The imposition of sanctions, tariffs and trade restrictions over the long term could alter established markets, leading to reduction in trade and higher consumer prices in some regions.

Notes

[1] In this chapter and publication the term “fish”, “seafood”, “fisheries and aquaculture production/products” or “aquatic products” 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] The years of the *El Niño* are set in the model to occur in 2024, 2028 and 2032.

[4] Calculated in nominal terms, and covering fisheries and aquaculture products.

9 Biofuels

This chapter describes market developments and medium-term projections for world biofuel markets for the period 2023-32. 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 and global transport fuel are key drivers in biofuel markets

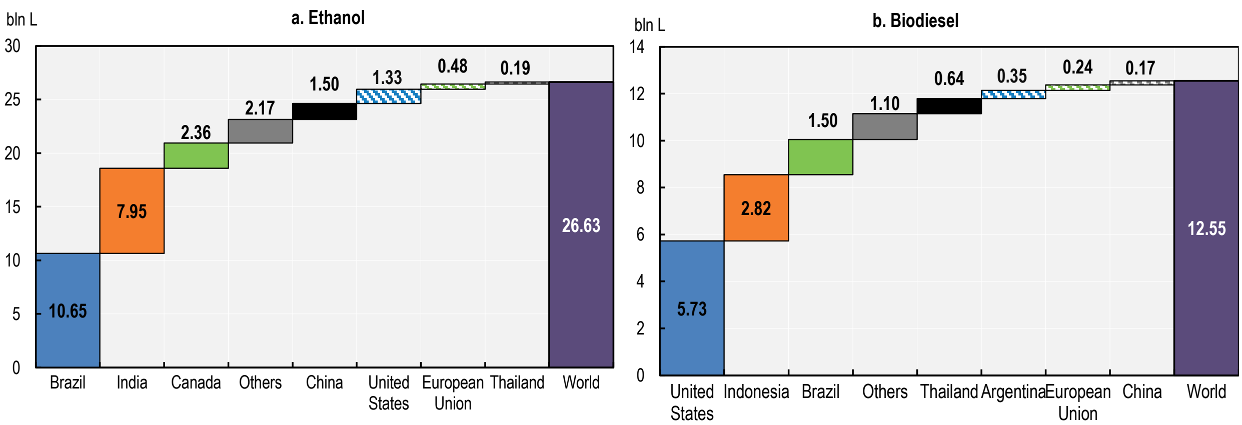
Biofuel use will continue to be largely driven by transport fuel demand and domestic support policies. Global transport fuel use in this *Outlook* is based on the *IEA World Energy Outlook* which foresees a reduction in many high-income countries, while increasing in low-income countries. Middle-income countries are predicted to take the lead in biofuel market expansion through the implementation of blending mandates and availability of subsidies for domestic production and blended fuel use.

Global biofuel use is projected to expand substantially over the next decade (Figure 9.1). In the United States, the largest biofuel producer, biofuel demand is expected to remain strong thanks to the Renewable Fuel Standard (RFS) regime. While ethanol consumption is anticipated to remain relatively flat over the projection period, biodiesel (including renewable diesel) is expected to be the major contributor to global growth, due to the increasing targets for state and federal renewable fuel programs and biomass-based diesel tax credits, which have been extended through 2024 under the Inflation Reduction Act of 2022. In the European Union, the RED II (Renewable Energy Directive) has classified palm oil-based biodiesel as a high ILUC (Indirect Land Use Change) risk category and as a result the use of palm oil-based biodiesel is expected to decrease slightly reducing total biodiesel use in the European Union. Nevertheless, the share of biodiesel in total diesel use is expected to grow over the coming decade. The Clean Fuel Regulations in Canada are projected to lead to biofuel consumption in the country being twice as high in 2032 compared to today.

Transport fuel consumption is expected to expand in Brazil, Argentina, Colombia and Paraguay over the coming years, with ethanol and biodiesel usage projected to increase accordingly. Indonesia's blending rate is assumed to stay above 30% (B30), while diesel and biodiesel use is set to rise. In South and Southeast Asian nations, biodiesel is expected to become more popular due to the growth in transport fuel demand and industrial use. In India sugarcane-based ethanol is projected to contribute significantly towards the goal of achieving an ethanol blend rate of 16% by 2025, whereas the E20 target would be met by 2032.

Figure 9.1. Regional contribution of growth in biofuel consumption

2032 to base period



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/gw6v2t

The production of biofuel is expected to remain largely reliant on first generation feedstocks such as maize and sugarcane to produce ethanol and vegetable oil for biodiesel. Used cooking oil (UCO) based biodiesel production is projected to gain importance in the European Union, United States, and Singapore. Governments have implemented policies mainly designed to reduce the national carbon footprint, decrease the dependency on fossil fuels, and support domestic agricultural producers. Production support and mandated use usually result in self-sufficient domestic markets, leaving only a small international market. The *Outlook* projects that by 2032, the amount of biodiesel traded internationally will decrease from 13% to 11% of total production, while the amount of ethanol traded internationally will drop slightly to 7% of total production.

The outlook for international biofuel prices expects an adjustment period of two years in which prices return from their peaks in 2022 back to normal levels. Thereafter, a rise in nominal terms throughout the forecast period is expected, with a slight decline in real terms for ethanol and a slight increase for biodiesel. Prices of biofuels continue to be determined by a mix of fundamental factors, such as feedstock costs, crude oil prices, distribution costs, and government policies, such as production subsidies, consumer tax credits, and blending regulations.

The policy context, largely determined by energy and environmental issues, is an important source of uncertainty in the projections for the transportation sector. The *Outlook* does not anticipate a significant increase in advanced biofuels, such as cellulose-based ethanol or HVO-based biodiesel, over the outlook period. Renewable diesel and Sustainable Aviation Fuel (SAF) production could potentially rise stronger than anticipated in this *Outlook* in the long run, yet its success depends on technological progress, mandated use, and the availability of sustainable feedstock. A long-run uncertainty is the global electric vehicle (EV) stock that has many underlying factors, including consumer preferences, technology, resource availability, policy or indirect fuel market effects. The use of these vehicles has been growing since the mid-2000s. To date, more than 20 countries have announced plans to gradually eliminate internal combustion engine (ICE) vehicle sales in the next 10-30 years. Numerous countries have introduced targets for EV deployment, as well as other initiatives to boost EV utilisation and research and development. In addition, the current instability in the energy and oil sectors is causing governments to prioritize self-sufficiency in energy supply, with biofuels seen as a key component to reduce vulnerability to global markets. As a result, uncertainty in the projections is influenced by the assumptions made about future developments in the transportation sector. Unexpected improvements in technology, together with potential changes in government regulations, could result in substantial variations from the current market projections for biofuels.

9.2. Current market trends

Biofuels (bioethanol and biodiesel[1]) are fuels produced from biomass. The *Outlook* defines biodiesel to also include renewable diesel SAF. Currently, about 60% of ethanol is produced from maize, 23% from sugarcane, 7% from molasses, 3% from wheat, and the remainder from other grains, cassava or sugar beets. About 70% of biodiesel is based on vegetable oils (14% rapeseed oil, 23% soybean oil, and 29% palm oil) and used cooking oils (25%). More advanced technologies based on cellulosic feedstock (e.g. crop residues, dedicated energy crops, or woody biomass) account for small shares of total biofuel production. 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.

In 2022, biofuels consumption increased, offsetting the decrease caused by the drop of global transport fuel use during the COVID-19 pandemic, which brought restrictions on people's movements, as well as disruptions in trade logistics all over the world. The ethanol market nearly came back to levels observed in 2019. The biodiesel market was less affected by the pandemic, due to the higher blending requirements, tax credits, direct subsidies and decarbonisation initiatives which made up for the lower total diesel consumption. While biofuels world prices increased owing to higher cost of production through higher costs of feedstock (vegetable oil, maize, sugarcane, and molasses) and labour, oil price increases exceeded those witnessed in the biofuels markets, thus sustaining the incentives to continue and even expand the use of biofuels.

Table 9.1. Biofuel production ranking and major feedstock

	Production ranking (base period)		Major feedstock	
	Ethanol	Biodiesel	Ethanol	Biodiesel
United States	1 (46.4%)	2 (18.3%)	Maize	Used cooking oils, soybean oil
European Union	4 (5.3%)	1 (32.2%)	Sugar beet / wheat / maize	Rapeseed oil /Palm oil/ used cooking oils
Brazil	2 (25.2%)	4 (12.3%)	Sugarcane / maize	Soybean oil
China	3 (7.9%)	5 (3.6%)	Maize / cassava	Used cooking oils
India	5 (4.3%)	15 (0.4%)	Molasses / sugarcane / maize / wheat / rice	Used cooking oils
Canada	6 (1.6%)	12 (0.7%)	Maize / wheat	Canola oil / used cooking oil/soybean oil
Indonesia	18 (0.1%)	3 (17.6%)	Molasses	Palm oil
Argentina	8 (1%)	6 (3.3%)	Maize / sugarcane/ molasses	Soybean oil
Thailand	7 (1.4%)	7 (3.0%)	Molasses / cassava/ sugarcane	Palm oil
Colombia	13 (0.4%)	10 (1.2%)	Sugarcane	Palm oil
Paraguay	10 (0.5%)	17 (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 2023-2032*, 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.

9.3. Market projections

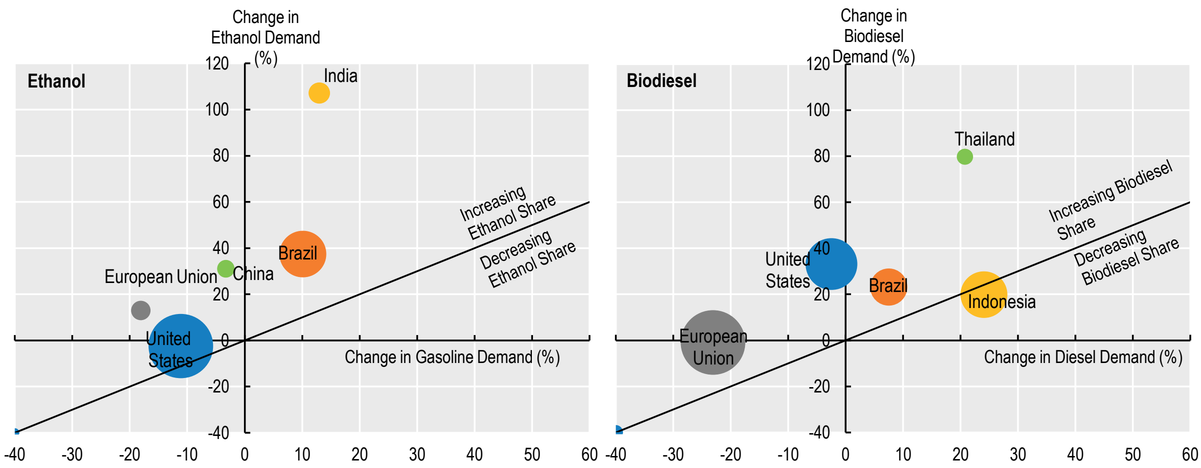
9.3.1. Consumption and Production

Asian countries are driving biofuel supply and demand

Globally, the *Outlook* expects biofuel consumption and production to increase at a much slower pace (1.3% p.a.) during the projection period than in previous decades primarily as result of policies not increasing support in developed countries. This slowdown is particularly significant for biodiesel consumption which grew by more than 7% p.a. over the past decade. Nonetheless, demand for biofuels is expected to increase due to developments in transportation fleets in some countries where total fuel consumption is still projected to increase and domestic policies that favour higher blends. Figure 9.2 shows that the share of biofuels in total transport fuels increases almost for all major producers except for biodiesel in Indonesia where it remains stagnant.

Five countries account for 80% to the increase in global biofuel consumption. For biodiesel, those are the United States, Indonesia, and Brazil, and for ethanol they are Brazil, India and Canada (Figure 1.1)

Figure 9.2. Biofuel demand trends in major regions

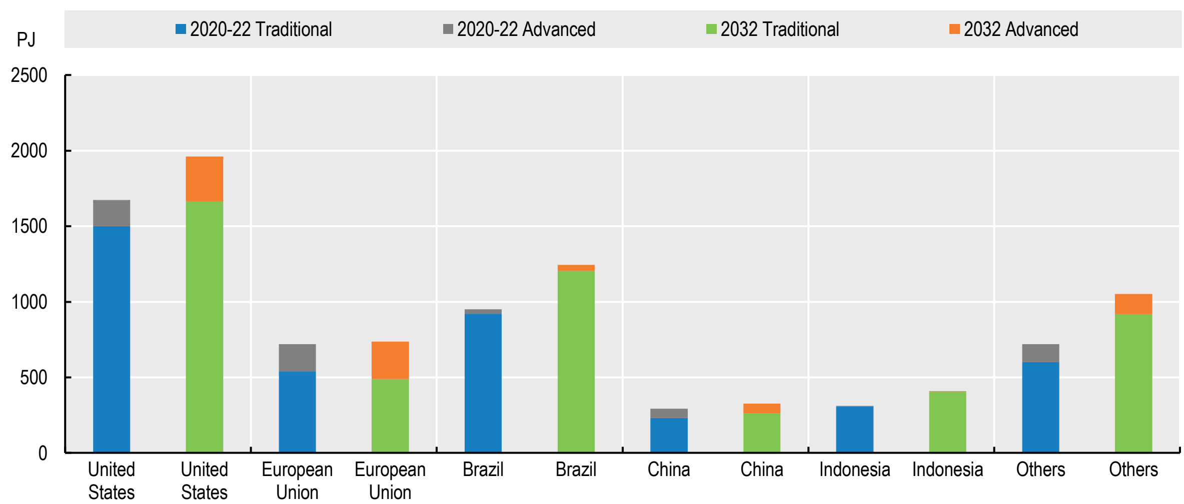


Note: Shares calculated on demand quantities expressed in volume. The size of each bubble relates to the consumption volume of the respective biofuel in 2022.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/ly0amv

Global ethanol and biodiesel production is projected to increase to 150.9 bln L and 66.9 bln L, respectively, by 2032 and 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).

Figure 9.3. 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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/atqgrb

United States

In the United States, biofuels are expected to be sustained by the Renewable Fuel Standard (RFS) regime administered by the EPA at recently announced levels in volume terms while a decrease in the use of transportation fuel is projected. Most of gasoline will continue to be used for 10% ethanol blend (E10). Some growth is projected in 15% ethanol blend (E15), but infrastructure, technology and other constrains limit the mid-high-level blending. The ethanol blend rate limit is projected to increase to 11% by 2032.

Ethanol production and consumption are expected to increase slightly relative to the base period (Figure 1.1). Maize is assumed to remain the main feedstock for ethanol production, accounting for 99% of production in 2032. Cellulosic ethanol production capacity is assumed to increase, albeit from a still low initial level. Although the United States should maintain its position as the world's largest ethanol producer, its share of global production should decrease from 46% to 40%. Biodiesel production is projected to increase by 2.7% p.a. in the coming decade. This is driven by increased renewable diesel consumption due to the higher targets for state and federal renewable fuel programs and biomass-based diesel tax credits, which have been extended through 2024 under the Inflation Reduction Act of 2022. The United States is projected to increase its share in global biodiesel production from 18% in the base period to 24% in 2032. This is also sustained by import demand for renewable diesel from Canada to comply with their clean fuel targets.

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 source as biodiesel feedstock is expected to decline.

For the European Union, total fuel transport use projections are taken from the *EU Agricultural Outlook* 2022-32 where fuel use is projected to decrease for both diesel and gasoline. However, this downward trend is not expected for biofuel consumption. Biodiesel use is assumed to remain at similar levels as in the base year and ethanol consumption is expected to increase. This implies that the share of biodiesel in total diesel increases from 10% in 2022 to 13% and the share of ethanol in gasoline use would reach 8.7% compared to 6.3% in 2022. As to consumption, biodiesel production remains overall stable, although the share that is produced from palm oil, in view of sustainability considerations, will decrease from 21% to 8% in 2032. Biodiesel production from used cooking oils is projected to increase by 1.5% p.a., albeit a much slower rate than the past decade given availability constraints of this feedstock. Responding to the demand projections for the biodiesel sector, the European Union is expected to remain the world's largest biodiesel producing region in 2032 although global production shares are expected to decrease from 32% to 26%.

Brazil

Brazil has a large fleet of flex-fuel vehicles that can run on either gasohol (a mix of gasoline and anhydrous ethanol, also called gasoline C) or on pure hydrous ethanol. For gasohol, the ethanol blend rate ranges between 18% and 27%, depending on the price relationship between domestic sugar and ethanol. The current percentage requirement for ethanol is legislated at 27%. Due to the fuel tax exemptions in 2022 as well as easing gasoline prices in the second half of the year, consumers have purchased more gasoline at the pump, benefiting anhydrous inclusion, but to the detriment of hydrous ethanol. The biodiesel blending target is 15% but has been reduced to 10% since 2021. For 2023 Brazil's National Energy Policy Council announced its gradual return to 15% by 2026, which the *Outlook* assumes to be maintained until 2032.

For the coming decade it is assumed that Brazilian ethanol consumption will increase by 2.5% 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. Brazilian ethanol production is projected to increase with a similar pace as consumption. While the *Outlook* assumes that sugarcane will remain the main feedstock for ethanol, maize, which increased over the past five years from below 0.3 bln L to over 4.4 bln L, is assumed to gain greater shares in the feedstock mix and reach almost 7 bln L by 2032.

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, the *Outlook* projects ethanol and biodiesel consumption increasing respectively by 2.5% p.a. and 1.6% p.a. in Brazil.

Indonesia

The implementation of B30 (Biodiesel 30% blend) aims at reducing the country's dependency on imported fossil fuels, stabilising palm oil prices, 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 which is fed by the levy imposed on CPO exports. In 2021, the CPO fund revenue stood at around USD 4.9 billion of which about USD 3.5 billion was allocated to subsidize biodiesel. Nonetheless, owing to external factors such as the economic crisis related to COVID-19, the government set rules restricting CPO exports aiming at alleviating domestic food price inflation. In the second half of 2022, such restrictions were lifted as CPO inventories were accumulating. To stimulate exports, the export levy was set up temporally at zero with a view to increase it once the reference price exceeds USD 800 per metric tonne. The *Outlook* assumes producer prices to stay above the reference price over the projection period, thus allowing the replenishment of the CPO fund that will not only allow to continue subsidizing domestic biodiesel production but to increase the blend at 35%. At the same time, the level of the subsidy relies to some extent on the cost of fossil fuels and oil prices increasing over the projection period will help to reduce the subsidy per unit of biodiesel.

Based on these assumptions, biodiesel production in Indonesia is projected to increase to 12.4 bln L by 2032. However, 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 feedstock supplies being able to increase biofuel production to reach the target levels over the outlook period. While the *Outlook* assumes molasses and sugar cane juice would remain as the primarily feedstocks, other crops such as rice, wheat and other coarse grains will help to accelerate domestic production. Sugar mills are investing and developing the capacity to produce ethanol from sugarcane juice as sugar cane is aided by soft loans. In 2022, it is estimated that about 25% of ethanol was produced by sugar cane, and this share could increase to nearly 55% by 2032. However, given accelerating gasoline demand, the blending rate could reach 16% in 2025 and 20% in 2032. Ethanol production is expected to be 13 bln L in 2032. The limited supply of vegetable oils, for which India is a net importer, in combination with high international prices will remain the main constrains to significantly increase biodiesel production.

China

The biofuel policies of the People's Republic of China (hereafter "China") have been volatile in the past years, which constrained significant consumption growth. Despite President Xi's pledge to achieve a peak in carbon dioxide emissions by 2030, no mention has been made of the role of biofuels in this context. The *Outlook* assumes that the ethanol blending rate which was around 1.2% in recent years will increase to 1.7% in 2032. This increase compensates for the projected decrease of total gasoline use sustaining an ethanol consumption growth of 1.1% p.a. over the next decade. Similarly, biodiesel consumption is projected to increase 2% p.a. The *Outlook* assumes most of the ethanol demand will be produced from domestic feedstock.

Argentina

In 2022, biodiesel production recovered further after the COVID-19 pandemic caused a decrease in diesel demand, with domestic utilization more than making up for decreases in exports to the European Union. There were no announcements made for new investments in biofuel capacities in 2022. However, in June 2022, the government resolved to increase the biodiesel mandate from B5 to B7.5 but allowing it to be temporarily increased as high as B12.5 to be able to respond to diesel shortages. The *Outlook* assumes B7.5 as blending target and with limited additional export possibilities, biodiesel production is projected to increase only marginally over the next decade.

Ethanol blending has been maintained at 12% despite a push from bioethanol producers to have the blending target increased to 15%. The *Outlook* assumes the rate to remain at this12% target and with total gasoline use projected to increase, ethanol fuel use is projected to increase 0.8% p.a.

Thailand

In spite of the targets set in the Alternative Energy Development Plan (AEDP) for sugar cane (and indirectly molasses) and cassava, limited domestic availability is expected to constrain biofuels production. In addition, stagnating demand for fossil fuels will limit increasing demand for ethanol. On average, blending is expected to reach 14% over the outlook period and production is projected to increase marginally to 2 bln L in 2032. Biodiesel demand is expected to be supported by mandatory blending. However, palm oil supply and high vegetable oil prices will constrain both domestic supply and demand to an increase of 2.2 bln L by 2032.

Colombia

Ethanol demand is projected to increase over the outlook period in line with the recovery of gasoline demand. Due to local supply shortages, the government decreased the ethanol blend rate to 4% between April and September 2021, with the average blending rate in 2022 about 8%. Over the medium term, the blending rate is projected to return to 10%. The *Outlook* assumes sugarcane to continue as the main feedstock. In 2032 biofuels use will account for about 35% of sugarcane production from 22% 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 in 2021 and 2022 the blending rate reached 12%. The *Outlook* assumes this level will continue and production is projected to reach 0.9 bln L by 2032.

Other countries

Other relatively important producers of ethanol include Paraguay, the Philippines, and Peru, where production could reach 0.8 bln L, 0.6 bln L and 0.3 bln L, respectively by 2032; 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 1.7 bln L, 0.3 bln L and 0.3 bln L, respectively, by 2032. In Malaysia, blending is projected to remain around 10%, whereas in Peru and the Philippines it will be around 5% and 4%, respectively. Other Asian countries, in particular Singapore, would increase production to reach around 1.4 bln L of biodiesel from used cooking oil in 2032. 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.

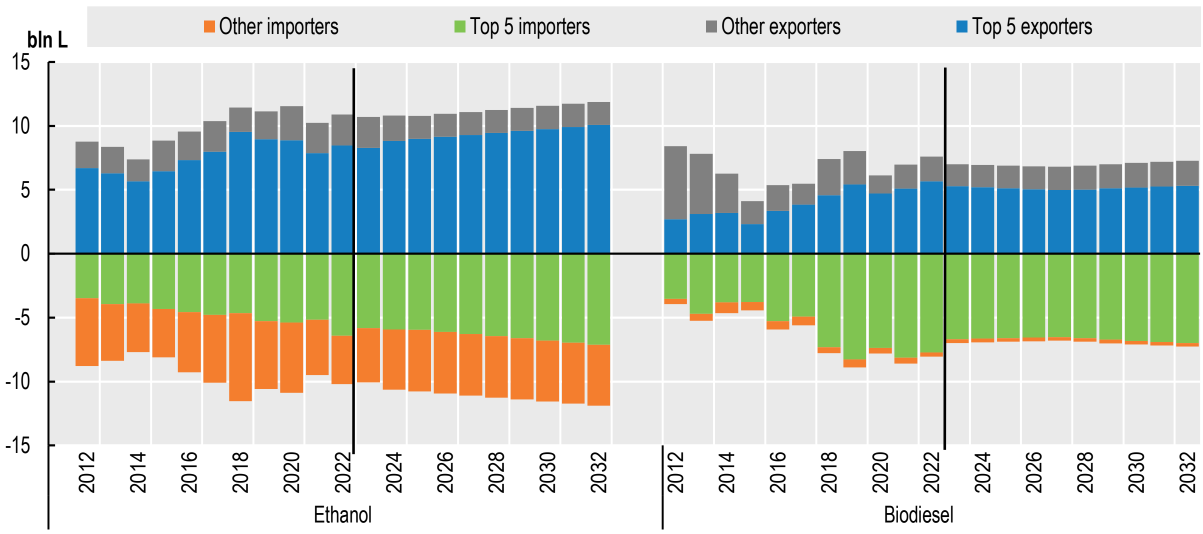
9.3.2. Trade

Global Biofuel trade is stagnating

World ethanol trade is projected to increase from 10 bln L in the base period to 12 bln L in 2032, while the total share of production will remain constant at 8%. The United States and Brazil are expected to remain the main exporters of maize- and sugarcane-based ethanol. The export share of both countries together is expected to remain at about 70%, but the United States will gain some export shares from Brazil where increases in domestic biofuel use hamper export growth.

Globally, biodiesel trade accounts for 13% of production and is projected to decrease from 7.6 bln L to 7.3 bln L by 2032 with its share in production falling to 11%. Indonesian biodiesel exports fell dramatically in 2020 and have since remained low. Reflecting high domestic demand, the *Outlook* does not expect Indonesia to return with biodiesel exports to international markets. The top 5 exporters of biodiesel, China, the European Union, Argentina, the United States and Malaysia, are projected to decrease their market share from 75% in the base period to 73% in 2032, with Argentina taking over second position from the European Union.

Figure 9.4. Biofuel trade dominated by a few global players



Note: Top five ethanol exporters in 2032: United States, Brazil, Pakistan, European Union, Paraguay. Top five ethanol importers in 2032: Canada, Japan, European Union, United Kingdom, India. Top five biodiesel exporters in 2032: China, Argentina, United States, European Union, Malaysia. Top five biodiesel importers in 2032: European Union, United States, United Kingdom, Canada, China. Classification of biofuels by domestic policies can result in simultaneous exports and imports of biofuels in several countries.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

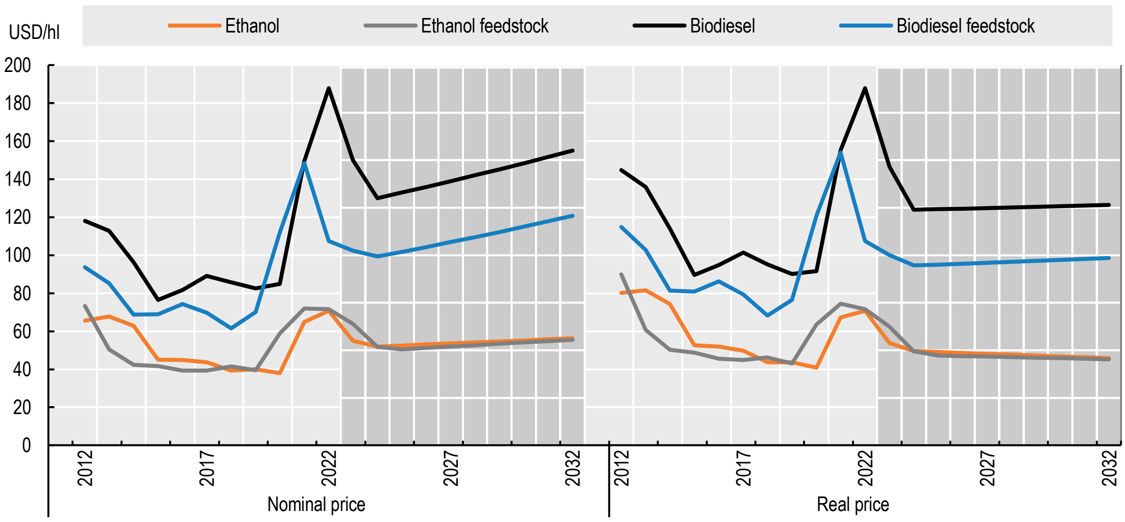
StatLink https://stat.link/08zeac

9.3.3. Prices

Prices in real terms are expected to decrease

Nominal biodiesel and ethanol prices reached historical high levels in 2021 and in 2022 increased further. Following the prices for feedstock commodities as well as the oil price, nominal and real biofuel prices are assumed to decrease in 2023 and 2024, but thereafter nominal prices are projected to slowly increase through to 2032. In real terms, both ethanol and biodiesel prices are expected to decrease over the coming decade.

Figure 9.5. 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 (2022=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 (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/fhungk

9.4. Risks and uncertainties

Evolution of policies and relative prices are key risks

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 thus linked to subsidies allocated to the biofuel sector. Oil markets have been very volatile in recent years and this tendency was further accentuated by the Russian Federation's war against Ukraine. Such extreme price swings in the energy markets have affected the structure of the biofuels market and could have a long-lasting effect. Another uncertainty arises from feedstuff supply. Traditionally, countries sought to use surplus commodities for biofuels so to not reduce food availability and threaten food security. As biofuels compete with food use and may require extra crop land, 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.

Recent price spikes in the cereal and vegetable oil markets have revived the discussion around the ethics of fuel versus food, while some people struggle to obtain enough food. One possibility would be to use biofuel policies as a buffer in food price crises by, for example, reducing mandates for a period of time.

The effectiveness of such an approach is yet to be proven but, even if implemented, would not alter the linear projections from the baseline.

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.[4] Many countries have introduced EV deployment targets, purchase incentives and other supporting programmes for increasing EV utilisation and promoting R&D for EV. However, recent events showed that policies supporting EV can be revoked or suspended. For example, China removed the effective subsidy for EV in January 2023. SAF consumption and production could increase in the long term but its success relies on technological advancements, ambitious policies and securing sustainable feedstock. 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 and as a consequence, future biofuel demand is related to the response of the private sector to these measures. Industries currently investing in EV and SAF could, depending on the uptake of this technology and the policies supporting its adoption, considerably alter the use of biofuels over the next decade and beyond.

Notes

[1] Biodiesel includes renewable diesel (also known as Hydrotreated Vegetable Oil or HVO), although these are different products.

[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] 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 2023-32. 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

Steady growth in the next decade

Over the next decade, world consumption of raw cotton is foreseen to grow 1.8% p.a. on account of population and income growth in middle- and low-income countries. Raw cotton consumption will continue to depend on developments of demand in the textiles and apparels sectors and on competition from substitutes. It is expected that Asian countries such as Bangladesh and Viet Nam will lead the growth in consumption of lint cotton.

The distribution of lint 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, and this trend is expected to persist during the next decade. Chinese consumption peaked in 2007, but has been declining since, as stricter labour and environmental regulations and rising labour costs have pushed the industry to other Asian countries, notably Viet Nam and Bangladesh. These countries have experienced strong growth of their textile industries in the past years and a further increase in their milling capacity is expected over the next decade, bolstered by large foreign investments. By contrast, Chinese mill consumption has remained constant since 2016 and the *Outlook* assumes stable consumption for the coming decade. In India, another major cotton consumer, the foreseen increase for textiles products is expected to result in continuous growth in cotton mill use.

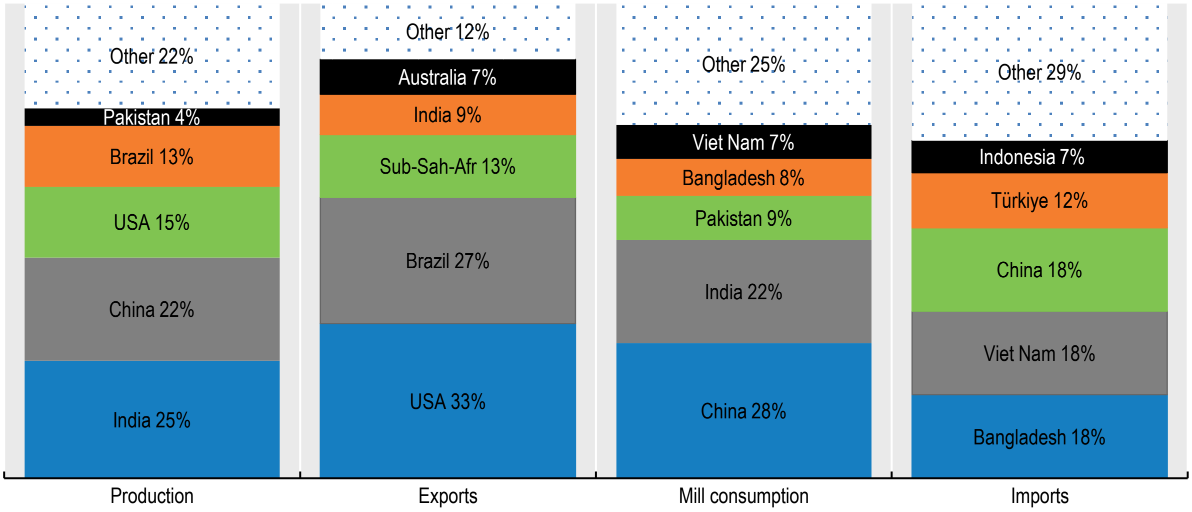
Over the next decade, global lint cotton production is projected to grow 1.81% p.a. to reach 28.1 Mt in 2032.This increase will be mostly dominated by higher yields (1.4% p.a.) and to a lesser extent on the expansion of area harvested (0. 4% p.a.). Yield growth is expected to be driven by improvements in genetics, better agricultural practices, new technologies, and digitalization supporting precision agriculture. These elements will significantly contribute to enhance productivity. Additionally, marginal increases in area harvested in the United States and Brazil will also contribute to enlarge cotton production. Overall, India and the People's Republic of China (hereafter "China") will continue to lead world cotton production, accounting for nearly 46% of the global output in 2032.

Raw cotton, or lint, is internationally shipped in the form of large bales (about 225 kg) of highly compressed fibres, easing transportation. The *Outlook* foresees growth in global trade of lint of 15.8% compared to the base period, surpassing 11.9 Mt by 2032. Additionally, world trade is expected to grow at a slightly higher pace than overall consumption, considering that countries with a strong textile industry such as Bangladesh and Viet Nam rely heavily on raw material imports. The growing gap will be filled mainly by top producing countries, such as Brazil and the United States, where the lint industry is primarily export oriented. Overall, it is expected that 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 2032, after United States and Brazil (Figure 10.1).

International cotton prices, in real terms, are foreseen to trend slightly downward in the medium term. Productivity enhancement, as well as expected low prices of synthetic fibres will likewise impact cotton prices and exert downward pressure.

Key uncertainties on the demand side can potentially impact outcomes. First, developments of the global economy might influence consumption of textile and apparel products, thus affecting the demand for cotton. Second, the stronger than expected competition from man-made fibres, notably polyester, can negatively affect demand for cotton. Third, the growing concerns by governments and consumers over the environmental impacts of the textile and clothing industry can result in tighter regulations and standards affecting cotton demand.

Figure 10.1. Global players in cotton markets in 2032



Note: Presented numbers refer to shares in world totals of the respective variable.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/mb4ow8

On the supply side, the main source of uncertainty is natural risks, including climate change and pest infestations. Policy also plays an important role in cotton markets. For example, changes in stockholding measures, input subsidies and market access can alter the performance of the sector.

10.2. Current market trends

Increases in yields and areas are contributing to steady production growth

Global raw cotton consumption is set to decline to its lowest level in ten years in the 2022/23 season (August/July). Major declines in lint demand are anticipated to be witnessed by some of the leading cotton consumers such as India and Pakistan. The expected drop in consumption reflects the global economic uncertainty and inflation surge, which is seen to decelerate global demand for cotton-related products. Furthermore, the US dollar appreciation against Asian currencies has exacerbated the drop in lint demand, considering that main raw-cotton consumers are highly dependent on imports.

International cotton prices experienced important fluctuations in the 2022/23 season. The global economic rebound along with the upsurge of textiles demand from the previous season kept prices high until May 2022, when prices reached an eleven-year high. As a consequence of a slowing global demand for cotton from June 2022, cotton prices dropped significantly. Despite the decline, prices in 2022 averaged 38% above their year-earlier levels, prompting an increase in planted area in India and Brazil.

Global cotton production slightly decreased in 2022 as a result of extreme weather conditions. In the United States, early season drought in Texas prompted a contraction of nearly 16% of lint production, whereas in Pakistan, late season flooding plunged local production to the lowest level in nearly 40 years. However, increases of cotton production in China and India, the world's foremost producers, did not offset the global shortfall.

World trade of raw cotton is foreseen to decrease compared to the previous season. On the supply side, exports are expected to be significantly lower due to the underperforming season in the United States, the worlds' larger exporter. On the demand side, weaker global textile consumption significantly reduced lint imports in Viet Nam, Bangladesh, and Türkiye. Furthermore, in Pakistan, a sharp depreciation of local currency against the US dollar has shrunk imports, while China's trade remained stable compared to the 2021/22 season.

10.3. Market projections

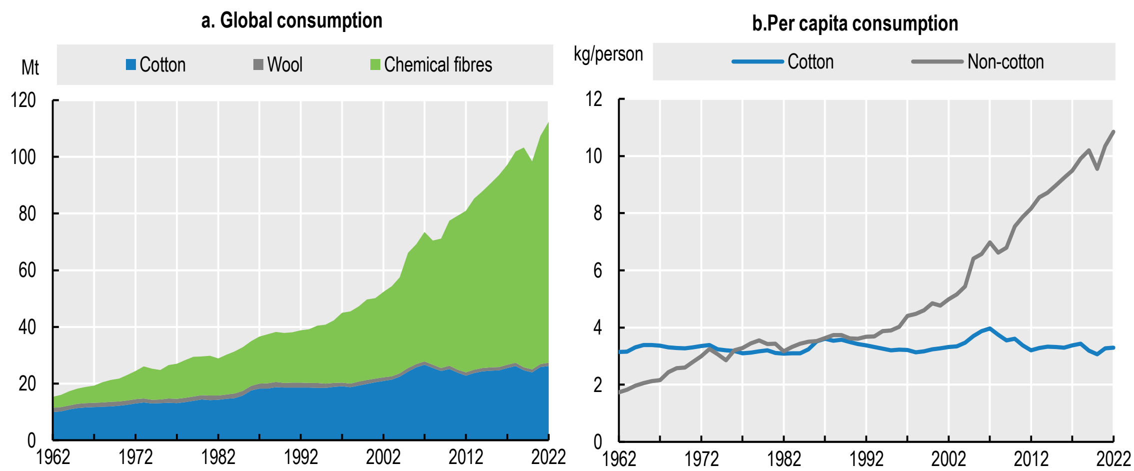
10.3.1. Consumption

Viet Nam and Bangladesh displacing China in leading growth in consumption

Cotton consumption refers to the use of cotton fibres by mills to transform it into yarn. Cotton mill-use depends largely on two major factors: global textile demand and competition from synthetic fibres. Over the past decades, global demand for textiles fibres has sharply increased, driven mainly by population and income growth, particularly in low- and middle-income countries. This expanding demand has been largely supplied by chemical fibres (Figure 10.2, panel a). The diverse advantages of synthetics compared to cotton including durability, wrinkle resistance, moisture-wicking, and/or competitive prices have boosted textile manufacture industry to favour synthetic over cotton fibres. As a result, global consumption of natural fibres peaked in 2007 at 26,5 Mt and shrank to around 24,4 Mt in 2020-22.

From the early 1990's, non-cotton fibres have gained solid ground in the textile industry. In 2022, the end-use market-share reached 76.7% for chemical fibres and only 23.3% for cotton. Likewise, per capita consumption of non-cotton fibres has strongly outpaced per capita consumption of cotton fibres and continues to strongly increase. In contrast, per capita consumption of cotton has remained stagnant over time and trended downwards in recent years (Figure 10.2, panel b)

Figure 10.2. Historical trends in consumption of textile fibres



Source: ICAC World Textile Demand estimates, 2023.

StatLink https://stat.link/7eosu9

The prospects for global cotton use relies mainly on its evolution in developing and emerging economies. Demand from these 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, the *Outlook* expects global growth consumption of cotton products to slightly overtake growth of global population in the coming decade. Correspondingly, global mill use is projected to grow by around 1.8% p.a. over the next decade.

The geographical distribution of demand for cotton fibres depends on the location of spinning mills, where natural and synthetic fibres are transformed into yarn. Traditionally, the spun yarn industry has been established predominantly in Asian countries, where conditions such as lower labour costs are favourable for the industry. China has been the world's leading cotton consumer since 1960. However, major changes in the geography of cotton production in China have reshaped global cotton markets in the last decade. With 90% of Chinese cotton currently produced in the region of Xianjiang and a tariff-rate quota binding mill-cotton imports, yarn production has gradually shifted to other Asian countries.

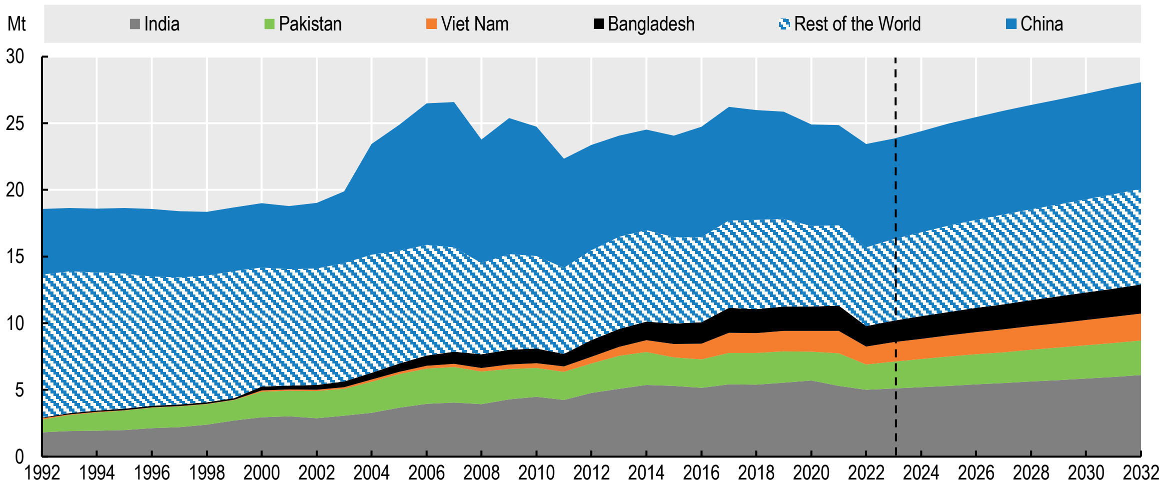
China's cotton mill consumption has been decreasing since the support price system was abolished in 2014. The artificially higher prices had caused a shift in demand from cotton to synthetic fibres. Likewise, the decline in cotton demand also reflects the structural change that took place as a result of 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 costs, 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, however, faces several challenges, including technological obsolescence, high input costs, and poor access to credit. The government is promoting investments in the sector and has launched several schemes over the past few years for the promotion of the textile industry and improving the livelihood of the people involved.

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), notably by Chinese entrepreneurs.

Structural changes in cotton production in China along with the surge of more robust textiles industries in Viet Nam, Bangladesh, and other central Asia economies, have boosted mill consumption growth in recent years and is foreseen to keep expanding over the coming decade. Viet Nam will take the lead in annual growth of mill use. The ratification of the Free Trade Agreement (FTA) with the European Union in mid-2020 is expected to contribute to this growth. In Bangladesh and Indonesia, growing demand for yarn and fabric from the domestic garment and textile industries is prompting investments in new spinning facilities or in enhancing production capacity of existing mills. Hence, cotton fibres consumption is expected to rise 3,4% p.a. and 3,2% p.a. accordingly.

Figure 10.3. Cotton mill consumption by region



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/doghcj

10.3.2. Production

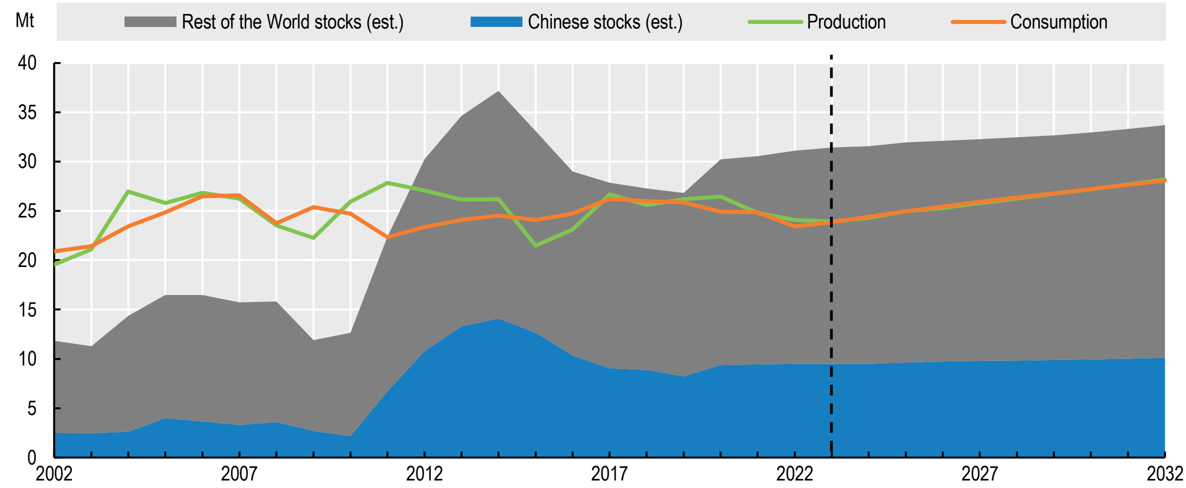
Improvements in yields drive growth, but sustainable production remains the main concern

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 leading producing countries are India, China, the United States, Brazil, and Pakistan. Jointly, these countries account for around 78% of global output in 2032 (Figure 10.1).

Global production of cotton is expected to grow steadily and reach 28.-15 Mt by 2032, 12% higher than in the base period (Figure 10.4). The foreseen increase will mostly come from growth in the main cotton producers: United States will account for about 29% of the global increase, followed by India (25%), and China (7%). Overall, gains in cotton production are predominantly driven by higher yields, and to a lesser extent, on expansion in area harvested.

Average global yields are projected to increase by 8% compared to the base period. Factors such as improvements in genetics, better agricultural practices, and digitalization supporting precision agriculture will significantly contribute to enhance productivity and sustainability. Over the past two decades, global average yields have been stagnant, suggesting static or decreasing yields in some of the major producers. For instance, in 2022, yields in China and Brazil were double the world average yields while India, the main cotton producer, remained well below (around 0.5 times global average yields). These differences are estimated to slightly broaden over the outlook period. (Figure 10.5, panel a). Cotton area is projected to expand by 4% compared to the base period.

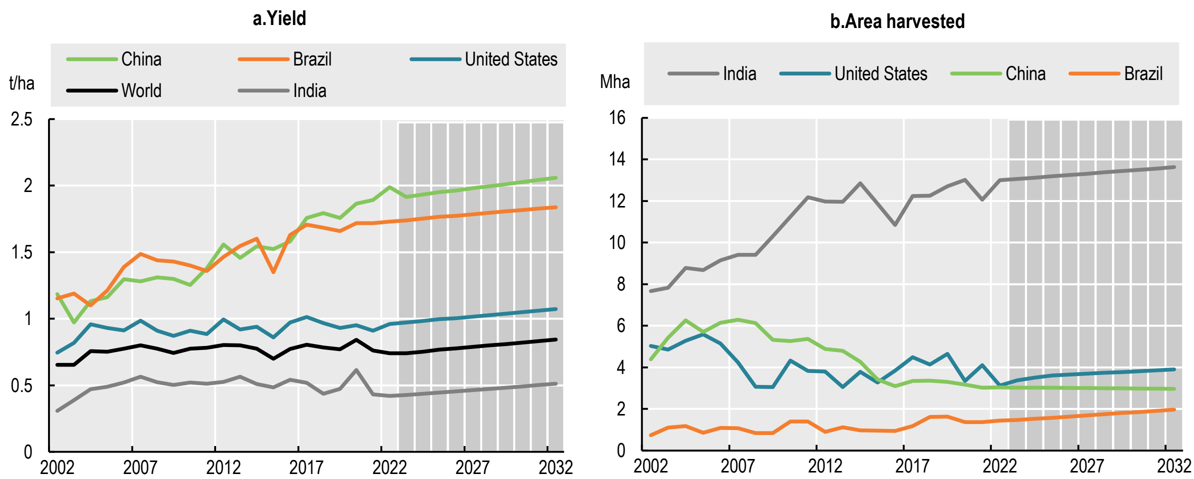
Figure 10.4. World cotton production, consumption, and stocks



Note: est. stands for estimate.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/5wu8yo

Figure 10.5. Cotton yields and area harvested in major producing countries



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/u84ks7

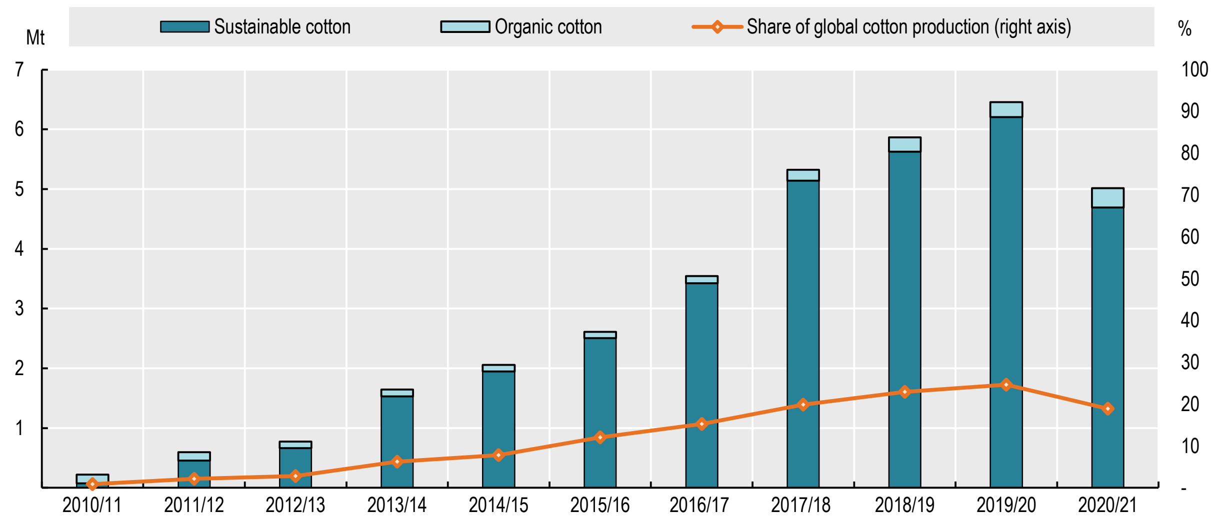
Production in India is estimated to grow by around 2.5% p.a. over the next decade, mainly on account of yield improvements rather than area expansion, since cotton already competes for acreage with other crops, such as soybeans and pulses. Raw cotton productivity has remained stagnant in recent years and is among the lowest globally. Cotton producers struggle with several obstacles such as adverse weather, pests, and diseases. Moreover, cotton is traditionally grown on small farms, which limits the adoption of intensive farming technologies. However, growing demand from the domestic apparel industry continues to spur investments in the sector and the *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 is currently produced with the highest global yield (1.90 t/ha average in 2020-22), which are more than double of the world's average. Over the past two decades, the cotton area in China has been declining, mostly due to changing government policies. Nevertheless, this trend seems to have slowed down since 2016. It is expected that the cotton area will decrease by 0.4% p.a. during the outlook period.

In Brazil, cotton is grown in part as a second crop in rotation with soybeans or maize. Recently, output has strongly grown in the main cultivation areas such as Mato Grosso, where 70% of Brazilian cotton is currently harvested. Cotton output is foreseen to increase by 3.9% p.a. Production gains are mostly coming from higher yields and the use of genetically engineered (GE) seeds and fertilisers. Recent investments in cotton-growing capacity and the acquisition of new equipment (planters, pickers, and ginning capacity) are expected to boost production in the coming years. Due to strong competition with other crops, mainly soybeans, the planted area depends widely on the profitability of cotton compared to other commodities.

Sustainability issues play an important role and will impact cotton markets in the medium term. In a context of growing concerns over the effects of climate change and socio-environmental considerations, new initiatives have been introduced to promote sustainability along the supply chain. Among the existing standards, *Better Cotton* dominates globally. In 2021, the combined cotton output from worldwide partners reached 20% of sustainable cotton with respect to global cotton production (Figure 10.6). Alternative strategies[1] promote better agricultural practices to mitigate climate change and provides guidance to textile brands and retailers to source their cotton inputs from recognized and certified sustainable producers. It is expected that demand for more sustainable cotton continues to rise, driven by commitments from brands and awareness among young populations. Therefore, growing trends towards consumption of more sustainable cotton products will likely boost cotton production in countries such as Brazil, where around 84% of total cotton output already complies with the sustainable standards. It is expected that Sub-Saharan Region also benefits, as programmes such as *Cotton Made in Africa (CMIA)* accounts for 13% of global sustainable output.

Figure 10.6. Evolution of global sustainable and organic cotton



Source: Author's calculations based on Organic cotton market report 2022 and better cotton annual report 2021.

StatLink https://stat.link/0awl19

10.3.3. Trade

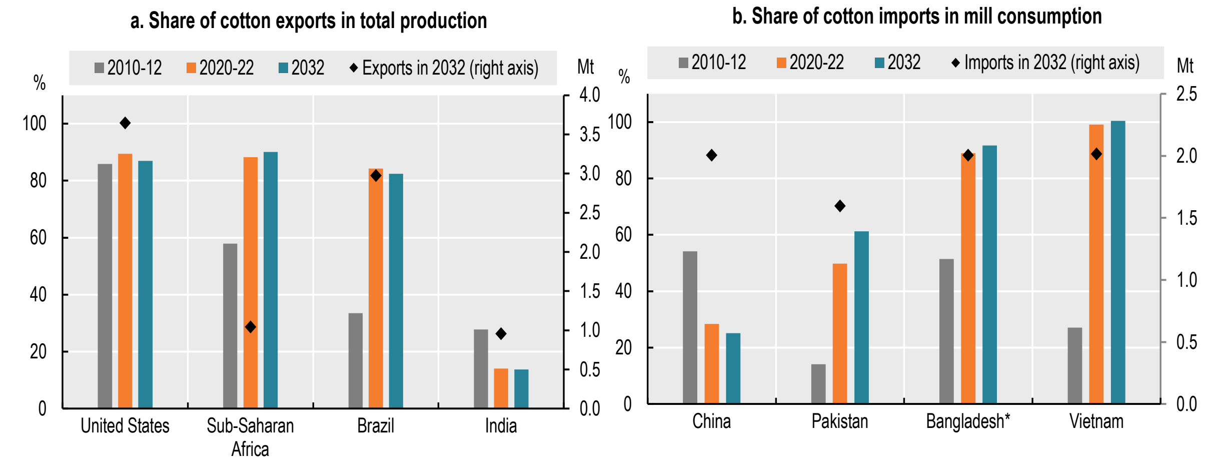
World cotton market relies strongly on trade, with Bangladesh and Viet Nam mill consumption depending on imports

World cotton trade is projected to expand steadily over the next decade and reach 11.2 Mt in 2032, 16% higher than in the base period. The increase mainly reflects the substantial growth in mill use in Asian countries, particularly Viet Nam and Bangladesh, which source virtually all their cotton from imports to support their growing domestic textiles sector. By 2032, imports in China are projected to decrease by 7% reaching 2.0 Mt. Shifts in the location of the planting area that took place in the last decade have reshaped the Chinese cotton market. Due to the physical distances between the spinning and the cotton fields along with imposed tariff-rate quota on imports, the Chinese textile industry has substituted raw-cotton imports by yarn imports and from 2012-21, the latter increased at 21,7% p.a. As a result, lint demand has been absorbed by other Asian economies (Figure 10.7, panel b).

The United States will remain the world's largest exporter throughout the outlook period. Exports from the United States exports have stabilised in recent years, recovering from the lows in 2016. It is projected that its share of world trade will reach 33% in 2032 (around 3.6 Mt). Despite the major changes in the Chinese textile industry, the United States remains its main trade partner. It is foreseen that in the medium-term export volumes to China will fall, while slightly gaining ground across other Asian economies.

Brazilian exports are expected to grow strongly over the next decade, consolidating the country's position as the second largest exporter by 2032, followed by Sub-Saharan Africa (Figure 10.7, panel a). In Sub-Saharan Africa, cotton is an essential export crop, accounting for around 13% of global exports. Overall, cotton production in the region has increased in the past several years due to area expansion and improvements in yields. The region will remain subject to pests and disease that adversely affect cotton harvests.

Figure 10.7. Trade as a percentage of cotton production and mill consumption



Note: * Includes mill consumption and imports from other countries such as Cambodia, Myanmar, Bhutan and Nepal.
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/1n7gru

Sub-Saharan African exports are projected to continue growing at around 1.9% p.a. in the coming decade, with South and Southeast Asia being the major export destinations. Moreover, the textile and apparel industry is expanding in countries such as Ethiopia, supported by favourable economic conditions, FDI flows, and government investments. In the long run, this could imply an increase in mill use and affect the net export status of Sub-Saharan Africa.

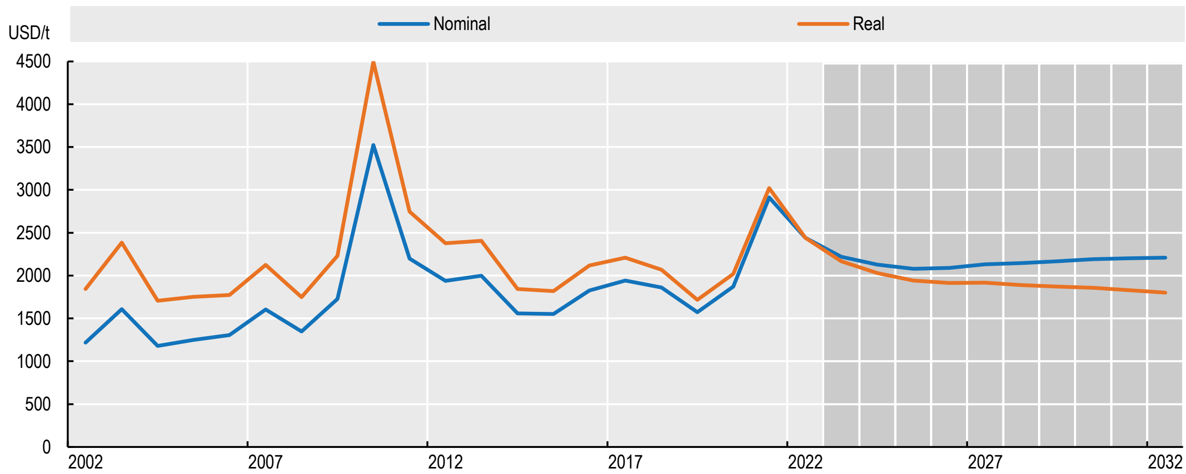
10.3.4. Prices

International cotton prices to decline in real terms over the medium-term

International cotton prices in real terms are foreseen to trend slightly downward in the medium term (Figure 10.8). Prices will continue to be influenced by competition from man-made fibres along with changes in consumers preferences.

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 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.

Figure 10.8. World cotton prices



Note : Real prices are nominal world prices deflated by the US GDP deflator (2022=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 (2023), "OECD-FAO Agricultural Outlook" OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/85muli

10.4. Risks and uncertainties

Policies and the role of genetics constitute major concerns

Economic growth and urbanisation will continue to be the main factors affecting the per capita demand for textiles in developing and emerging economies. Demand trends for textiles will significantly impact demand for cotton fibres. Since the consumption of textiles and apparel is more income responsive than the consumption of food commodities, deviations from the economic conditions assumed in the *Outlook* could lead to important changes in the global cotton consumption, production, and trade projections.

In the short term, projections are likely to be impacted by the increase in energy prices recorded in 2022. Additionally, current macroeconomic conditions are set to play an important role in short-term investment decisions, as current high inflation and increases in interest rates affect the cost of borrowing. Moreover, for Asian countries that are highly dependent on cotton imports, the appreciation of the US dollar against Asian currencies will also impact the cotton market in the near future.

Other demand trends affecting the projections include recycling by the textile industry that is creating a competitive secondary market providing raw material to producers of lower quality textiles and non-textile products. This trend, along with stronger than expected competition from man-made fibres, could negatively affect demand for cotton. Growing concerns by governments and consumers over the environmental impacts of the textile and clothing could also affect demand for cotton, However, on the other hand, greater adoption of sustainability standards in supply chains could provide a stimulus to the demand for cotton.

Like other crops, cotton production is sensitive to pests, disease, and climate change. The latter could lead to increasing frequency of droughts, floods, and other adverse weather conditions. As noted above, yield growth has been slow in several countries over the past two decades. 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 the *Outlook*. Such innovations, however, take time to develop and deploy, and in the case of genetically modified cotton are sometimes controversial. 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. Policies, beyond what is assumed in the *Outlook*, such as support for domestic textile industries or input subsidies might affect the resulting projections. Trade policies and geopolitical tensions also impact the development of lint markets. For instance, the current US-China dispute and the United States' Uyghur forced labour prevention act[2] that went into effect in June 2022 have significant consequences and caused disruptions along the supply chain in China. Finally, issues associated with social, economic, and environmental sustainability (e.g. Product Environmental Footprint (PEF) and the Strategy for Sustainable circular textiles in the European Union) are becoming increasingly important for consumers, industry, and policy makers in many countries.

Policy measures that affect consumption include, for example, the decision by several East African countries to increasingly discourage 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.

Notes

[1] See https://bettercotton.org/who-we-are/our-aims-strategy/2030-strategy/ and https://textileexchange.org/2025-sustainable-cotton-challenge/.

[2] The Uyghur Forced Labour Prevention Act forbids the import of goods produced in China's Xianjiang region. The importer must clearly prove that the merchandise coming from this region was not produced with forced labour.

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 (2023-32) 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. 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 (102 Mt) and Africa (100 Mt). In Sub Saharan Africa, roots play a significant role as a staple crop. Globally, about 130 Mt are used as food, 57 Mt as feed, and 33 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 15 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 251 Mt (dry matter) in the base period (2020-22); 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 again significantly in 2022 as demand was strong, in particular in China. Global quantities traded increased by 0.5 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.

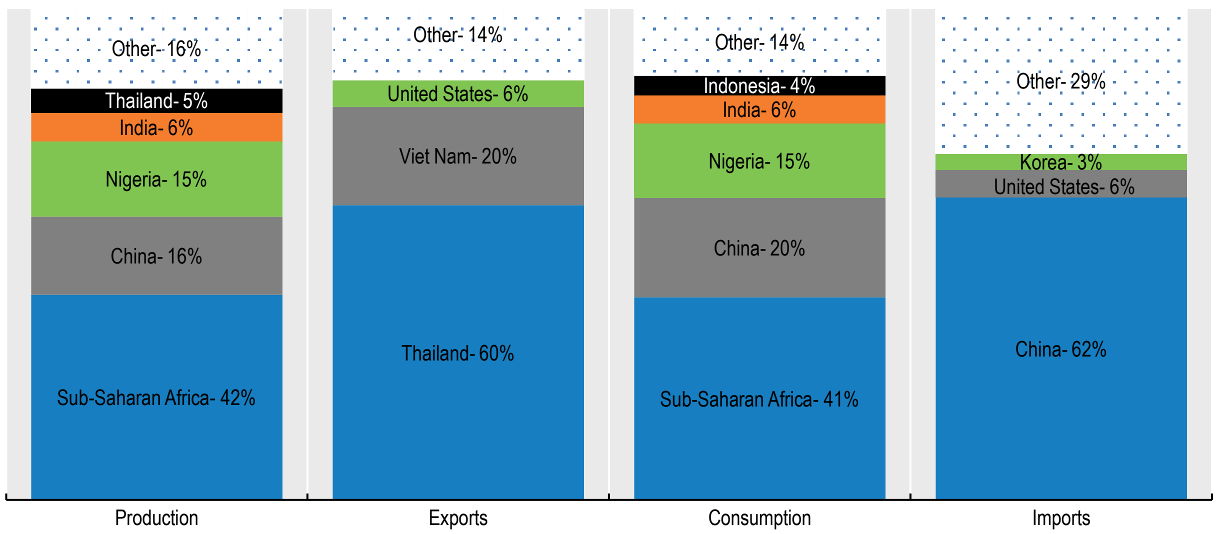
Potatoes are generally confined to food use and are a substantial component of diets in developed regions, particularly in Europe and North America. As overall food intake of potato in these regions is very high and may have reached saturation, the scope for consumption increases to outpace population 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 18% over the next decade. Production growth in low-income regions could reach 2.6% p.a. while supply in high-income countries should grow at only 0.3% annually. Global land use is projected to increase by 6 Mha to 71 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. Moreover, many farmers in Thailand shifted from Cassava to rice which had better production incentives. 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.

Figure 11.1. Global players in roots and tubers markets in 2032



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/w863k0

By 2032, an additional 1.4 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 41 kg per year. Biofuel use, albeit from a low basis (3% of use), is expected to grow by 37% 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 15% 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 15 Mt, mainly to supply the growing biofuel and starch industries in China.

After a moderate decrease expected in 2023 due to high pressure on cassava markets in Thailand and the shortfall of potato production in Ukraine, prices of roots and tubers are projected to follow a similar path to cereal prices in the medium term given the substitutability between roots and tubers and cereals on food and feed markets; namely, an increase in nominal prices but a decline in real terms.

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 high level of 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. 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 average annual increase of about 3% globally, led by Asia and Africa. These two regions combined accounted for more than half of the 12 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 food consumption has increased to about 7 kg/year to date. This growth has been driven mainly by income gains in countries where 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 (9%), China (6%) and the European Union (5%) are the next largest producing countries. The Asian market accounts for 52% of all consumption, but only about 43% of production, making it the most significant import destination. About 21% of global production is traded internationally with Canada (35% of global trade) by far the largest exporter and India the largest importer (19% of global trade). Africa has further expanded its production and consumption in the past decade and has remained largely self-sufficient.

In 2022, the global pulses market reached a volume of 93 Mt, after an average annual growth of 1.7% p.a. during the previous decade; this growth was led by Asia and Africa. World trade volumes were registered at 19.5 Mt, 0.5 Mt higher than in 2021.International prices for pulses, approximated by the Canadian field pea price, have started to fall from their peak value of 2021 to USD 359/Mt in 2022, following the production recovery in Canada.

11.2.3. Main drivers for projections

As pulses are associated with various health benefits and represent an important meat substitute due to their high protein content, health and environmentally 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 healthy 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 8.6 kg by 2032. Per capita food consumption is projected to increase in all regions over the coming decade, with the largest increase expected in Europe (+4% p.a.) (Figure 11.2).

Global supply is projected to increase by 29 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 11 Mt by 2032. 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.

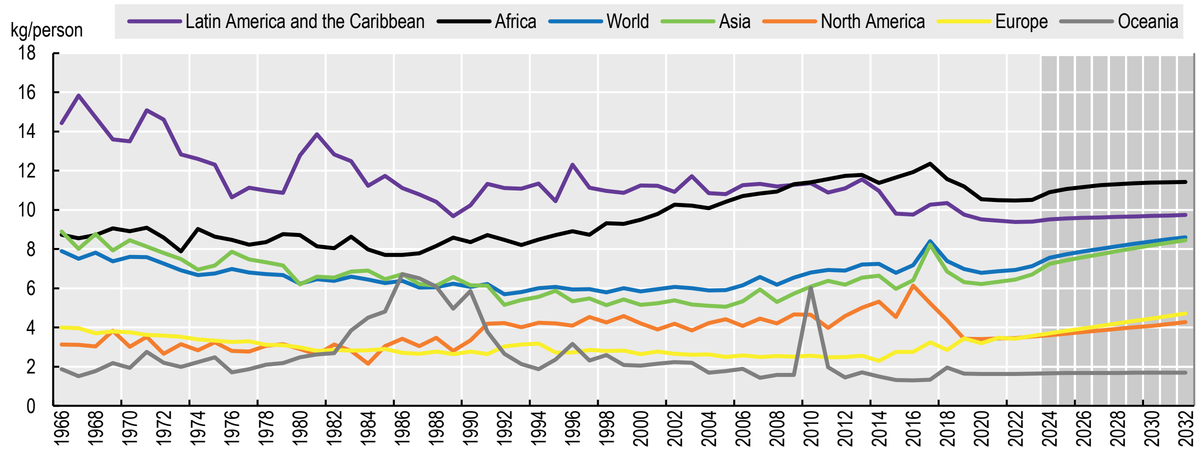
This expected production expansion is driven by the assumption of continued intensification of the pulses production systems due to improved yields and intensified land use. About 60% of production growth can be attributed to land use intensification during the projection period, and the remaining 40% to yield improvements.. 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 15 Mt to 19 Mt over the past decade and is projected to reach 23 Mt by 2032. Canada remains the main exporter of pulses, with volumes expected to grow from 6.8 Mt at present to 9.9 Mt by 2032, followed by Russia and Australia with 2 Mt and 1.9 Mt of exports by 2032, respectively.

International prices in nominal terms are expected to decrease further until 2025 then increase slightly over the coming decade, while real prices will decline.

Figure 11.2. Per capita food consumption of Pulses per continent



Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/q26uom

11.3. Bananas and major tropical fruits

Bananas and the four major fresh tropical fruits – mango, pineapple, avocado and papaya – play a vital role in world agricultural production, and especially in securing the nutrition and livelihoods of smallholders in producing countries. In recent decades, rising incomes and changing consumer preferences in both emerging and high-income markets, alongside improvements in transport and supply chain management, have facilitated fast growth in international trade in these commodities. Based on provisional 2022 figures, the global banana and major tropical fruit export industries respectively generate around USD 10 billion and USD 11 billion per year. Although only approximately 16% of global banana production and 7% of global major tropical fruit production are traded in international markets (provisional 2022 figures), in exporting countries, which are mostly low- or middle-income economies, revenue from production and trade can weigh substantially in agricultural GDP. For instance, bananas represented about 50% of agricultural export revenue in Ecuador in 2021, while combined exports of pineapples and bananas accounted for some 40% of agricultural export revenue in Costa Rica. As such, trade in bananas and major tropical fruits has the potential to generate significant export earnings in producing countries. For all these underlying reasons, it is important to assess the potential future market development of these agricultural commodities.

11.3.1. Market Situation: Overview

According to preliminary data and information, global trade in bananas and major tropical fruits continued to be negatively affected by several factors on the supply side in 2022, which induced rising producer costs and consequent supply shortages, against relatively stable demand in key import markets. Industry sources reported that the high prices for fertilisers and their reduced availability in 2021 and throughout the first half of 2022 resulted in a reduced application by farmers, hampering the productivity and quality of banana and major tropical fruit cultivation in key producing areas. Adverse weather conditions, including abnormally cold weather related to the *La Niña* phenomenon as well as the passing of yet another severe tropical storm through the Caribbean further impacted the quantities available for export. Shortages in refrigerated containers stemming from the prolonged lockdowns implemented in some Asian countries during 2022, alongside high global transportation costs in the first half of the year, posed additional obstacles to export growth.

The difficult operating environment in 2022 was further complicated by the depreciation of many currencies against the United States dollar, which affected operations all along the value chain since transactions in the banana and tropical fruits industries, including the purchasing of inputs, are habitually conducted in United States dollars. This exerted additional upward pressure on costs to producers, exporters and importers. Although prices along the respective value chains for bananas and major tropical fruits displayed a tendency to increase in response to firm demand in major import markets in 2022, in most cases this was not sufficient to compensate for the substantially higher costs. While producer costs reportedly ranged some 40-50% above their pre-pandemic levels, prices at export, import, wholesale and retail level rose by only some 10 to 20% on average, leaving concerns about heavily reduced profit margins a key topic for the industry in 2022.

11.3.2. Bananas

Market situation

Preliminary estimates indicate that global exports of bananas, excluding plantain, experienced a decline of 4% in 2022, marking another year of disruption to the fast-paced growth experienced in pre-pandemic years. Total export quantities were thereby estimated to have fallen from 20.5 Mt in 2021 to approximately 19.6 Mt in 2022. The persistently high costs of fertilisers, which had already led to a reduction in use in 2021, were quoted as the key obstacle affecting producers' ability to supply bananas in adequate quantities and to the quality standards expected in export markets in all regions. Adverse weather conditions affecting production and yields additionally continued to be of concern during the first nine months of 2022, while high costs for land transport and long-distance shipping impeded exporters' capacity to supply international markets. Severe concerns about the spread of plant diseases, importantly the devastating spread of the Banana Fusarium Wilt Tropical Race 4 (TR4) disease in the Philippines and its alarming presence in Peru and Colombia, further continued to cause substantial strain on the industry through the additional costs associated with disease prevention and production losses. Moreover, in view of the ongoing pandemic, the persisting necessity to apply elevated sanitary measures and physical distancing to protect workers from COVID-19 continued to cause additional costs to producers and operators along the supply chain, especially during the first half of 2022.

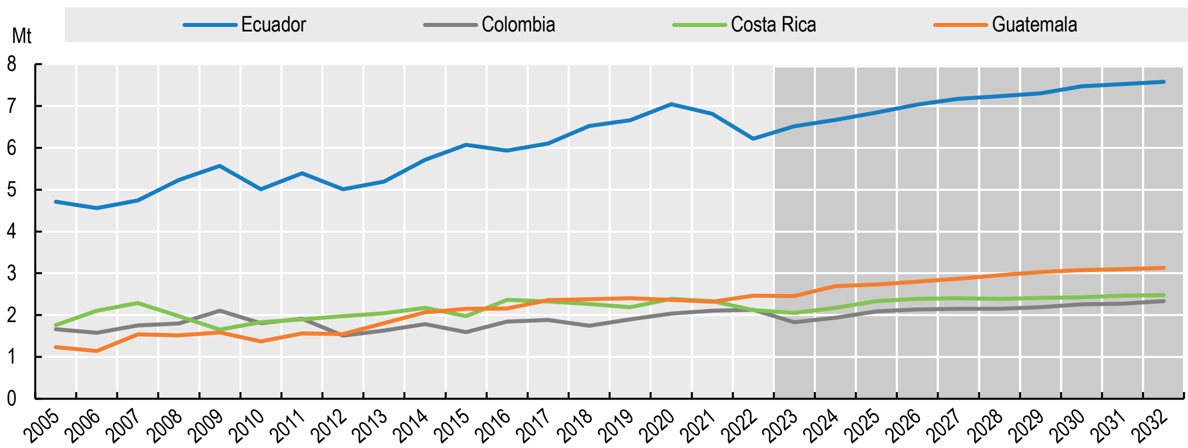
Global net import quantities of bananas, meanwhile, declined by an estimated 2.5% in 2022, a reduction of nearly 0.5 Mt from the previous year, to just below 19 Mt. While demand in most import markets reportedly remained constant, growth over the first seven months of the year was hindered by a reduced availability of export supplies as well as continuing bottlenecks in global shipping, which posed obstacles to supplies reaching their destination. These factors particularly affected the level of import quantities received over this period by the European Union, the United States, Japan, the United Kingdom and Canada, which jointly account for some 60% of global imports. On the other hand, imports by China, the third largest importer of bananas globally, continued to expand at a fast rate over the first seven months of 2022, facilitated by strong domestic demand and ample availability of export supplies from emerging producers in Southeast Asia.

Projection highlights

As per capita demand for bananas is becoming increasingly saturated in most regions, growth in global production and consumption is expected to be primarily driven by population dynamics. In line with slowing world population growth, the current baseline projections therefore expect world production and consumption of bananas to expand at a moderate 1.5% p.a. over the outlook period. Assuming normal weather conditions and no further spread of banana plant diseases, global banana production will reach 141 Mt by 2032. At the same time, in some rapidly emerging economies – principally in India and China – fast income growth is anticipated to stimulate changing health and nutrition perceptions and support demand for bananas beyond population growth. Accordingly, Asia which is already the leading producing region is anticipated to remain so at a quantity share of 50%, with India projected to reach an output of 35 Mt by 2032.

Production from the leading exporting region of Latin America and the Caribbean is projected to reach 37 Mt by 2032, encouraged by rising demand from key importing markets, most importantly the European Union and the United States. With inflationary pressures expected to continue in 2023 and potentially beyond, demand for bananas in these markets is likely to be supported by the fruit's relative affordability. Rising import demand from China, where domestic production is likely to continue to decline, is assumed to be an additional factor driving production growth in Latin America and the Caribbean. The largest exporters from the region – critically Ecuador, Guatemala, Colombia, and Costa Rica – all continue to be well positioned to benefit from this growth, assuming that it can be shielded from the adverse effects of erratic weather events and disease outbreaks. Rising import demand from the European Union and the United Kingdom is further expected to benefit some Caribbean exporters, most notably the Dominican Republic and Belize, as well as exports from Africa, which are projected to expand at 1.8% p.a. over the outlook period – led by Ivory Coast – to reach a total quantity of approximately 0.85 Mt in 2032. Against this background, world exports of bananas are projected to reach some 23.7 Mt by 2032.

Figure 11.3. Exports of bananas by the four major LAC exporters



Source: FAO data.

StatLink https://stat.link/qbwl2n

11.3.3. Mango, mangosteen and guava

Market situation

Preliminary data indicate that global exports of mango, mangosteen and guava declined to approximately 2.1 Mt in 2022, a decrease of 5%, or some 0.12 Mt, from the previous year. The main reasons behind this were a substantial drop in exports of mangosteen from Thailand, as well as lower exports of mangoes from Brazil and Peru, which could not be offset by higher exports from Mexico, the leading exporter of this commodity group. In terms of export quantities by type at the global level, mango accounted for around

83% of global shipments and mangosteen for around 16%. As previously, guava continued to display a low availability in import markets, in particular due to its lower suitability for transport.

Total global import quantities of fresh mangoes, mangosteens, and guavas fell by an estimated 1% in 2022, to some 2 Mt, as suggested by available monthly trade data up to August 2022. The United States and the European Union remained the two leading global importers, with approximate import shares of 26% and 18%, respectively. In both markets industry sources reported higher consumer demand for mangoes, despite prices and inflationary pressures being high, in line with a generally higher nutritional awareness of the assumed health benefits of these fruits. However, import growth in the United States over the first eight months of the year were somewhat constrained by the difficult supply situation in Peru and Brazil, the second and third leading origins for mangoes in the United States, which seemingly could not be fully offset by higher imports from Mexico. Overall, imports into the United States thereby remained largely at their previous year's level of approximately 0.56 Mt in 2022. Imports into the European Union, meanwhile, declined by an estimated 5% in 2022, to some 0.39 Mt, similarly on the back of supply shortages in Brazil and Peru, the two primary origins of mangoes imported to the European Union.

Projection highlights

Global production of mangoes, mangosteens and guavas is projected to increase at 3.3% p.a. over the next decade, to reach 84 Mt by 2032. As with most other tropical fruits, growth in mango production will mainly respond to income-driven demand growth in producing countries, additionally supported by population dynamics. Asia, the native region of mangoes and mangosteens, will continue to account for some 70% of global production in 2032. This will be primarily due to strong growth in domestic demand in India, the leading producer and consumer of mangoes globally, where rising incomes and associated shifts in dietary preferences will be the main drivers of production expansion. Mango production in India is accordingly projected to account for nearly 38 Mt in 2032, or 45% of global production, destined largely for local informal markets. As such, India is projected to experience increases in per capita consumption of 2.4% p.a. over the outlook period, reaching 24.8 kg in 2032, compared to 18.3 kg in the base period. By contrast, in Mexico and Thailand, the leading exporters of this commodity cluster to world markets, production growth will primarily be driven by expanding global import demand. Exports are accordingly anticipated to reach a 31% share of production in Mexico by 2032, and 26% in Thailand. However, at projected production quantities of 3.2 and 1.8 Mt in 2032, respectively, Mexico and Thailand will account only for comparatively small shares in global production.

Global exports of mangoes, mangosteens and guavas are projected to reach 2.8 Mt in 2032, compared to 2.2 Mt in the base period, on account of higher procurements from the United States, China, and the European Union. Mexico, the leading supplier of mangoes, is expected to benefit from further growth in import demand from its major market, the United States, and reach a 35% share of world exports in 2032. Shipments from Thailand, almost exclusively mangosteens, will cater mainly to rising import demand from China, while supplies from Peru and Brazil, two emerging exporters, will be mostly mangoes destined for the European Union. Both Thailand and Peru are projected to reach a share in global exports of 15% each by 2032, followed by Brazil at some 11%. China, whose per capita mango, mangosteen and guava consumption of 2.6 kg in the base period is relatively low compared to other Asian countries, is expected to experience a rise in imports of 3% p.a., to some 0.36 Mt in 2032. This will be mainly due to a strong income-driven increase in Chinese import demand for mangosteen, as domestic production of this fruit remains low in China.

11.3.4. Pineapple

Market situation

Based on preliminary trade data, global exports of pineapples fell by an estimated 1.5% in 2022, to just below 3.2 Mt, determined largely by reduced supplies from Costa Rica, the world's largest exporter at a market share of almost 70%. According to industry information, cold weather conditions, high energy costs and container problems negatively affected production and export supplies from Costa Rica in 2022. Shipments from the country were accordingly expected to fall by some 2% in 2022, equivalent to a drop of some 0.05 Mt, to just below 2.2 Mt, in strong contrast with the 11% expansion experienced in 2021. In terms of leading destinations, pineapple shipments from Costa Rica continued to be almost exclusively destined to the United States and the European Union.

Preliminary trade data point to a decline of global imports of pineapples to 2.9 Mt in 2022, a fall of an estimated 1% compared to 2021, on account of supply shortages from the main global supplier, Costa Rica. As demand in the United States and the European Union continued to be solid over the first nine months of the year, indicative average import unit values in both key destinations displayed a tendency to increase. Aided by a strong dollar and an upswing of sales in the hospitality sector, imports by the United States increased by an estimated 4% in 2022, to 1.1 Mt. Conversely, imports by the European Union, the second largest importer, fell by an estimated 8% as supply shortages and shipping issues reduced the quantities that could be received throughout at least the first nine months of the year. Weaker economic conditions and a lower value of the euro against the US dollar posed further difficulties. Over the full year, imports by the European Union were anticipated to drop to approximately 0.76 Mt, some 17% below their previous five-year average. Estimates thereby suggest that the United States procured about 39% of global export supplies over the full year 2022, and the European Union some 26%.

Projection highlights

Over the next decade, global production of pineapple is projected to grow at 2% p.a., to reach 32 Mt in 2032, on account of a 1.7% expansion in harvested area. Asia is expected to remain the largest producing region and account for some 44% of quantities produced globally, with pineapple production being sizeable in the Philippines, Thailand, India, Indonesia and China. Cultivation in Asia will continue to largely cater to domestic demand and is projected to grow solidly in response to changing demographics and income growth, especially in India, Indonesia and China. Similarly, pineapple production in Latin America and the Caribbean, the second largest producing region at a projected 34% of world production in 2032, will be primarily driven by the evolving consumption needs of the region's growing and increasingly affluent population. Only Costa Rica and the Philippines, two important global producers and leading exporters to world markets, are anticipated to see additional stimulation from rising import demand, with exports expected to account for approximately 68% of fresh pineapple production in Costa Rica and 18% in the Philippines in 2032.

Global exports of fresh pineapple are set to grow at 1.3% p.a., to 3.5 Mt in 2032, predominantly driven by import demand from the United States and the European Union. With projected imports of 1.1 Mt in 2032 – equivalent to a 34% global share – the United States are expected to remain the largest importer, ahead of the European Union, which is expected to account for some 26% of global imports. In both key import markets, demand for fresh pineapples is assumed to benefit from the fruit's continuously low unit prices and to some degree also from the introduction of more premium novelty varieties. Rising import demand from China, where consumption growth has been outpacing production expansion in recent years, is expected to additionally drive expansion in global exports. By 2032, China is projected to reach import quantities of some 0.39 Mt per year, with supplies likely to be primarily sourced in the Philippines.

11.3.5. Avocado

Market situation

Global exports of avocado declined by an estimated 6% in 2022, to below 2.4 Mt, on account of severe weather-induced supply shortages in Mexico, the world's leading exporter. Although preliminary data and information indicate that exports from most alternative origins continued to grow at comparatively fast rates, these increases seemingly did not fully offset the unprecedented shortfall in supplies from Mexico. Available monthly data for exports from Mexico for the period January to August 2022 indicate a year-on-year fall in shipments of 32%, pointing to a full-year estimate of 1 Mt, some 0.38 Mt below the previous year's level.

Global imports of avocados similarly fell by an estimated 6% in 2022, to approximately 2.3 Mt. Despite continuously strong demand in the two major import markets, the United States and the European Union, which were estimated to respectively account for 45% and 25% of global imports in 2022, overall growth in global imports was curtailed by the supply shortages experienced in Mexico. As such, imports by the United States declined by an estimated 11% in 2022, to approximately 1 Mt. The United States are particularly susceptible to changes in the supply situation in Mexico since they typically import some 90% of avocados from this origin. Meanwhile, imports into the European Union seemingly remained relatively stable at some 0.58 Mt, displaying only a very slight tendency to contract. Like the situation in the United States, consumption across the European Union continued to gain in popularity among an increasingly health-conscious population, with avocados widely perceived as a highly nutritious fruit.

Projection highlights

Avocado has the lowest production level among the major tropical fruits but has experienced the fastest expansion in output in recent decades and is expected to remain the most rapidly growing commodity of the major tropical fruits over the outlook period. Ample global demand, high returns per hectare and lucrative export unit prices continue to be the main drivers of this growth, stimulating investments in area expansion in both major and emerging production zones. By 2032, production is thereby projected to reach 12 Mt p.a. – more than three times its level in 2010. While new growing areas have been emerging rapidly in recent years, avocado production is likely to remain largely concentrated in a small number of regions and countries. The top four producing countries – Mexico, Colombia, Peru and the Dominican Republic – are projected to expand their production substantially over the coming decade, together accounting for over 50% of global production in 2032, with output in Colombia and Peru set to increase by some 60-70% from base period levels. As such, about 66% of avocado production is expected to remain in Latin America and the Caribbean, given the favourable growing conditions in this region.

In response to rapidly growing global demand, and facilitated by fast output expansion, avocado is on track to become the most traded major tropical fruit by 2032, reaching 3.8 Mt of exports and overtaking both pineapples and mangoes in quantity terms. Given the high average unit prices of avocado, the total value of global avocado exports would thus reach an estimated USD 8.7 billion in constant 2014-16 value terms, thereby placing avocado as one of the most valuable fruit commodities. Despite increasing competition from emerging exporters, Mexico is expected to retain its leading position in global exports at a 40% share in 2032. This will be supported by output growth of 3.6% p.a. over the coming decade and continued growth in demand in the United States, the key importer of avocados from Mexico. Exports from Peru, the second leading exporter, will reach some 24% of global shipments, with supplies mainly catering to rising demand from the European Union.

The United States and the European Union, where consumer interest in avocados is fuelled by the fruit's claimed health benefits, are expected to remain the main importers, with 44% and 27% of global imports in 2032, respectively. However, imports are also set to rise rapidly in many other countries such as in China and some countries in the Middle East, on account of rising incomes and changing consumer preferences in these markets. Similarly, in many producing countries, per capita consumption of avocados is expected to rise with income growth, notably in Colombia, the Dominican Republic and Indonesia. It is important to note, however, that in both domestic and import markets, demand for avocados may be susceptible to changes in the macroeconomic outlook. Given the typically high unit values of avocados, as well as their relatively high income and price elasticities of demand, changes in consumer incomes – or prices – may quickly affect demand. That said, import demand for avocados has exhibited relative resilience to changes in income in both major import markets, the United States and the European Union, where demand also appears determined by changes in consumer preferences, as demonstrated by the fruit's uninterrupted robust growth over the past decade.

11.3.6. Papaya

Market situation

Preliminary trade data indicate a rise in global exports of papayas by an estimated 1% in 2022, to some 0.37 Mt. Exports from Mexico, the largest global exporter of papayas, seemingly grew by some 4% over the full year, on account of further production expansion. Virtually all Mexican papaya exports are destined for the United States, which globally ranks as the largest importer of papayas, accounting for over half of global imports in 2022. The bulk of Mexican papaya production, however, is destined for domestic consumption, meaning that trade outcomes depend critically on developments in both domestic and foreign markets.

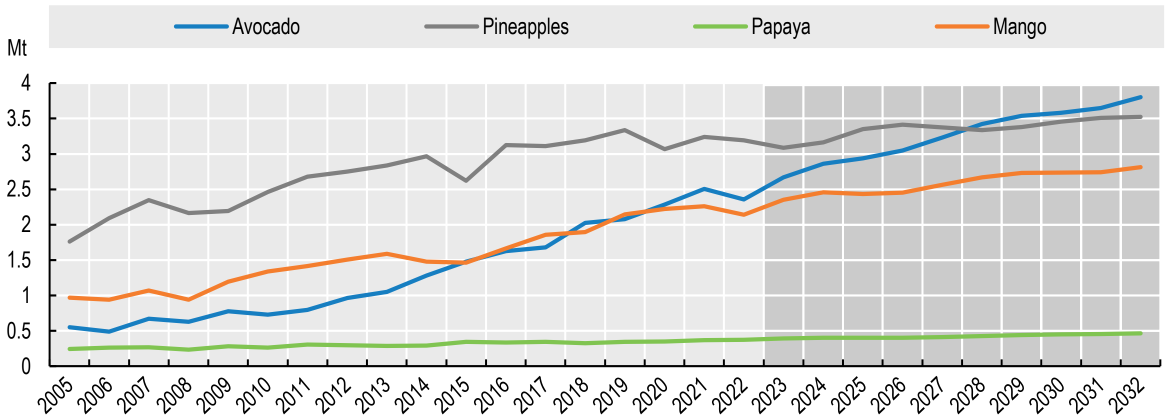
Global imports, meanwhile, remained largely stable at some 0.34 Mt in 2022, albeit displaying a slight tendency to contract by an estimated 0.3%. Available data indicate that imports by the United States grew by an approximate 1% in 2022, to some 0.19 Mt, facilitated by the ample supply situation in Mexico, the leading supplier of papayas to the United States. Although the estimated pace of growth was noticeably slower than in 2021, when imports by the United States grew by 5% year-on-year, industry sources stated that demand for papayas in the United States remained solid over the first nine months of 2022. The second leading importer globally continued to be the European Union, albeit with a much lower share in world imports of only 10%. Consumer awareness of papaya in the European Union remains low, mostly due to the fruit's fragility in transport, which renders a significant expansion in this market difficult to attain.

Projection highlights

Global papaya production is projected to rise by 1.9% p.a., to 18 Mt in 2032. As the share of exports in production is particularly low for papayas, at some 2.5% in the base period, production of this fruit is mostly driven by domestic demand due to population and income growth. Against this background, the strongest production expansion is expected to be experienced in Asia, the leading producing region globally, where both drivers are expected to have significant impact. Accordingly, Asia's share of world production is set to rise to 60% by 2032, from 58% in the base period. The world's largest producer, India, is projected to increase its papaya production at a rate of 1.6% p.a., thereby expanding its share of global output to 37% by 2032. Income and population growth will be the main factors behind this rise, with Indian per capita consumption of papayas expected to reach 4.4 kg in 2032, up from 4.1 kg in the base period. In Indonesia, meanwhile, production is projected to grow by 2.8% p.a. over the outlook period, primarily on account of increasing domestic demand as per-capita incomes are expected to expand at over 4% p.a.

Global exports will predominantly be shaped by production expansion in Mexico, the largest global exporter of papayas, and higher demand from the key importers, the United States and the European Union. At an expected average annual rate of 1.9%, global exports of papayas are projected to reach just over 0.46 Mt by 2032. However, a major obstacle to a significant expansion in international trade remains the fruit's high perishability and sensitivity in transport, which makes produce problematic to supply to far afield destinations. Innovations in cold chain, packaging and transport technologies promise to facilitate a broader distribution of papaya, particularly in view of rising consumer demand for tropical fruits in import markets.

Figure 11.4. Global exports of the four major tropical fruits



Source: FAO data.

StatLink https://stat.link/on2ldj

11.3.7. Uncertainties

With regard to the outlook, several significant threats to global production, trade and consumption of bananas and major fresh tropical fruits are present. On the demand side, prevailing high inflation rates, high interest expenses and exchange rate fluctuations threaten to hinder the demand for bananas and tropical fruits, especially for consumers in poorer economic strata who need to spend a higher proportion of their income on food. Some analysts have also been predicting a global recession, and while recently released forecasts now seem to rule out this scenario, at least for 2023, should it nevertheless materialize, this may further restrain demand growth. The uncertainties surrounding Russia's war against Ukraine with regard to its impact on global supply chains, fertiliser markets, transport routes and access to export markets add further risks for the outlook.

On the supply side, the effects of global warming are 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.

In the face of rising temperatures, more rapid and more severe spreads of plant pests and diseases are additionally being observed, as for example is the case with the fungus Banana Fusarium Wilt. The currently expanding strain of the disease, described as Tropical Race 4 (TR4), poses particularly high risks to global banana supplies as it can affect a much broader range of banana and plantain cultivars than other strains of Fusarium wilt. Furthermore, despite some recent breakthroughs in the engineering of resistant varieties, no effective fungicide or other eradication method is currently available. According to official information, TR4 is currently confirmed in 21 countries, predominantly in South and Southeast Asia, but also in the Middle East, Africa, Oceania and Latin America, with Colombia reporting the first infection in August 2019, Peru in April 2021, and Venezuela in January 2023. An indicative assessment of the potential economic impact of the TR4 disease on global banana production and trade showed that a further spread of TR4 would, *inter alia*, entail considerable loss of income and employment in the banana sector in the affected countries, as well as significantly higher consumer costs in importing countries, at varying degrees contingent on the actual spread of the disease.

Given the popularity particularly of bananas, pineapples and avocados in import markets, their global value chains have been characterised by intense competition among market actors all the way to the retail level. For bananas and pineapples, this has exerted downward pressure on prices at each stage, which has resulted in producer prices remaining at low levels, with little fluctuation. Combined with rising production costs, low prices and tight profit margins greatly hinder the adequate remuneration of workers and smallholder farmers in these industries and act as a major obstacle for producers in coping with emerging challenges and supply chain disruptions. The prospects for production are therefore further threatened by an elevated risk of industry contraction, with producers discouraged to continue their operations by low or even negative producer margins, reducing supplies to world markets and consequently causing higher food prices. Data on developments in world export and import markets over the course of 2022 already point to this direction, with all key regions being affected.

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: https://www.woah.org/en/disease/african-swine-fever/)
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 https://www.woah.org/en/disease/avian-influenza/)
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. There are two major forms of biodiesel: fatty acid methyl esters (FAME) and hydrogenated vegetable oil (HVO).
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 fibre 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 (milled).
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.
Fertiliser	Fertilisers provide essential nutrients for maintaining agricultural crop yields and quality, and for growth in production. The three most important nutrients are nitrogen (N), phosphorus (P), and potassium (K).
Flexible-fuel vehicles (FFVs)	Vehicles that can run on either gasohol or on hydrous ethanol.
Foot and Mouth Disease (FMD)	FMD is the most contagious disease of mammals and has a great potential for causing severe economic loss in susceptible cloven-hoofed animals (https://www.woah.org/en/disease/foot-and-mouth-disease/). International animal trade is linked to the FMD-status according to the World Organisation for Animal Health (WOAH).
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).
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 annex provides information on how the projections in the *Agricultural Outlook* are generated. First, it provides a general description of the different elements and timeline of the process leading to the agricultural baseline projections and the *OECD-FAO Agricultural Outlook* publication each year. Second, it discusses the consistent assumptions made on the projections of exogenous macroeconomic variables. Third, it provides reference to the underlying Aglink-Cosimo model. Finally, it explains how a partial stochastic analysis is performed with the Aglink-Cosimo model.

The generating process of the agricultural baseline projections

The projections presented in the *Agricultural Outlook* 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. Significant expert judgement, however, is applied at various stages of the *Outlook* process. The OECD and FAO Secretariats publish in the *Agricultural Outlook* a unified and plausible assessment of the future developments of the main agricultural commodity markets given the underlying assumptions and the information available at the time of writing.

The starting point: Creation of an initial baseline

The historical data series for the consumption, production, trade[1] and international prices of the various commodities covered in the *Outlook* are mainly drawn from OECD and FAO databases. These databases are largely based on national statistical sources. For each publication, the baseline generating process begins in November of the year preceding the projected decade and ends in April of the following year. 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 addressed to national administrations is circulated in November to obtain countries' expectations of the medium term developments of their agricultural sector , as well as insights on the current status or recent changes of domestic agricultural policies.
- On the FAO side, the starting values for the country and regional modules are developed through model-based projections and consultations with FAO commodity specialists.

Macroeconomic factors obtained from 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 macroeconomic and policy assumptions are summarised in the first section of the Trends and Prospects 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.

The initial baseline results are then reviewed:

- For the countries under the responsibility of the OECD Secretariat, 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 experts. 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 in March, 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 experts 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 *Agricultural Outlook* delves into the finale baseline projections to provide an overview as well as more detailed analyses of the world agricultural markets over the medium term. The report 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

The *Outlook* uses the Medium Variant set of estimates from the United Nations Population Prospects database for the population data used for all countries and regional aggregates. 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. 112 (December 2022). For other economies, historical macroeconomic data were obtained from the IMF, *World Economic Outlook* (October 2022). Assumptions for 2023 to 2032 are based on the projections of the IMF *World Economic Outlook*, October 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 2021 is taken from the short-term update of the *OECD Economic Outlook* No. 112 (December 2022). For 2022, the annual average daily spot price is used, while the December average daily spot price is used for 2023. For the remainder of the projection period, the reference oil price used in the projections is assumed to remain constant in real terms. .

The underlying Aglink-Cosimo model

Aglink-Cosimo is an economic model that analyses supply and demand of world agriculture. It is managed by the Secretariats of the OECD and the Food and Agriculture Organization of the United Nations (FAO), and used to generate consistent baseline projections presented in the *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 cover the whole world. The OECD and FAO Secretariats in conjunction with country experts and national administrations are responsible for developing and maintaining the projections. 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 affects 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 or dynamic yield expectations). Aglink-Cosimo models ten years into the future.

The modelling framework is regularly improved to develop the *Outlook's* capacity to reflect future markets developments and to provide an enhanced analysis of beyond market outcomes (e.g. food security, land use and environmental outcomes).

As of the 2022-2023 *Outlook* cycle, the Secretariats have explicitly incorporated the use of the three main mineral fertilisers (Nitrogen, Phosphorus and Potassium) into the yield equations that determine the supply of crop commodities. This new feature separates the costs of fertilisers from those of other production inputs (energy, seeds, machinery, labour and other tradable and non-tradable inputs). Historical data series for fertiliser use per crop has been developed by combining existing information on total use from FAOSTAT with per crop estimates from the International Fertilizer Association.

Food loss and waste has been incorporated in the *OECD-FAO Agricultural Outlook 2023-2032*. Box 1.1 provides a more detailed overview of the definitions, global estimates and drivers. In terms of implementation in the data and Aglink-Cosimo, two shares have been added: one for distribution losses and one for waste. Consequently, three different values for food use of agricultural commodities are available. Firstly, food availability which was the value used in previous *Agricultural Outlooks*. Secondly, after subtracting losses food consumption is obtained. Currently, this is the main reference value used throughout the report and tables. Thirdly, food intake is the quantity after accounting for waste. The current values of loss and waste are preliminary, and this integration is still in progress.

The latest detailed documentation of Aglink-Cosimo model is available on the official website of the *Agricultural Outlook* 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 Aglink-Cosimo model for each of the 1 000 alternative “uncertainty” scenarios generated in step 2. When both macroeconomic and yield uncertainty were included, this procedure yielded 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

ANNEX C

Table C.1. World cereal projections

Marketing year

		Average 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
WHEAT												
World												
Production	Mt	778.5	795.7	799.5	808.2	812.9	820.1	826.7	833.8	841.2	848.3	854.9
Area	Mha	221.8	223.6	223.1	222.7	222.8	223.2	223.4	223.8	224.2	224.5	224.8
Yield	t/ha	3.51	3.56	3.58	3.63	3.65	3.67	3.70	3.73	3.75	3.78	3.80
Consumption	Mt	771.4	794.3	800.5	805.6	811.4	818.8	826.1	832.9	840.0	846.7	853.7
Feed use	Mt	149.7	151.9	154.2	156.3	157.5	159.2	160.7	161.8	163.1	163.9	164.6
Food use	Mt	505.5	518.4	523.8	528.5	534.2	539.6	544.5	549.2	553.8	558.3	562.4
Biofuel use	Mt	9.0	9.4	9.7	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
Other use	Mt	65.7	72.4	70.2	68.0	66.3	66.2	66.7	67.3	68.4	69.4	71.2
Exports	Mt	193.8	192.8	195.1	197.2	199.0	202.2	204.7	207.0	209.3	211.6	213.4
Closing stocks	Mt	292.7	296.4	295.4	298.0	299.4	300.8	301.4	302.4	303.6	305.2	306.4
Price[1]	USD/t	339.2	315.5	272.8	263.2	268.0	271.5	276.1	281.4	285.5	289.2	293.9
Developed countries												
Production	Mt	404.6	410.6	411.9	414.5	416.2	419.4	422.2	425.5	428.9	432.2	434.9
Consumption	Mt	266.1	272.4	272.0	271.5	270.4	271.2	272.4	273.7	275.3	276.7	278.6
Net trade	Mt	137.1	139.6	141.9	143.8	145.0	147.5	149.4	151.1	152.8	154.5	155.6
Closing stocks	Mt	73.7	75.5	73.3	72.5	73.2	73.8	74.3	75.0	75.9	76.8	77.5
Developing countries												
Production	Mt	373.9	385.1	387.6	393.7	396.7	400.7	404.4	408.3	412.3	416.2	419.9
Consumption	Mt	505.3	521.9	528.5	534.1	540.9	547.5	553.7	559.2	564.7	570.0	575.1
Net trade	Mt	-133.2	-139.6	-141.9	-143.8	-145.0	-147.5	-149.4	-151.1	-152.8	-154.5	-155.6
Closing stocks	Mt	219.1	220.9	222.0	225.5	226.3	227.0	227.1	227.4	227.8	228.4	228.9
OECD[2]												
Production	Mt	284.4	292.4	292.4	292.8	293.1	294.6	295.8	297.3	299.1	300.6	301.7
Consumption	Mt	218.6	222.2	223.1	222.0	221.9	221.7	221.9	222.4	223.0	223.6	224.1
Net trade	Mt	69.5	70.5	69.9	69.8	70.1	72.2	73.4	74.3	75.3	76.3	77.0
Closing stocks	Mt	55.3	53.1	52.4	53.5	54.6	55.4	55.8	56.4	57.1	57.9	58.5
MAIZE												
World												
Production	Mt	1 190.4	1 220.3	1 236.6	1 253.5	1 264.5	1 280.7	1 295.2	1 311.4	1 326.7	1 341.8	1 355.4
Area	Mha	202.4	205.0	206.0	206.5	207.1	208.0	208.8	209.7	210.6	211.5	212.4
Yield	t/ha	5.88	5.95	6.00	6.07	6.10	6.16	6.20	6.25	6.30	6.34	6.38
Consumption	Mt	1 195.5	1 224.6	1 238.4	1 251.0	1 267.4	1 282.0	1 296.8	1 311.7	1 326.8	1 341.9	1 356.4
Feed use	Mt	684.0	703.7	716.5	727.1	735.2	744.9	754.7	764.3	774.4	784.5	794.5
Food use	Mt	141.7	145.2	149.0	151.9	154.3	156.6	158.8	161.0	163.1	165.2	167.2
Biofuel use	Mt	181.9	191.5	192.6	193.4	194.7	195.7	196.8	197.9	199.1	200.3	201.5
Other use	Mt	84.8	78.7	73.3	70.5	74.4	74.9	75.7	76.8	77.4	78.1	78.7
Exports	Mt	183.5	178.9	180.6	182.0	184.7	187.6	190.4	193.3	196.1	198.8	201.7
Closing stocks	Mt	303.7	299.1	301.7	308.6	310.1	313.2	316.0	320.1	324.4	328.7	332.1
Price[3]	USD/t	274.2	258.1	211.4	204.7	208.0	210.9	214.7	217.7	220.6	223.4	226.7
Developed countries												
Production	Mt	523.7	537.7	540.5	545.9	548.6	553.3	557.4	562.3	566.6	570.9	575.1
Consumption	Mt	466.7	477.2	482.5	487.9	491.7	494.6	498.2	502.0	505.6	509.2	512.6
Net trade	Mt	57.4	57.8	56.8	55.9	56.9	57.9	58.6	59.1	59.8	60.6	61.5
Closing stocks	Mt	90.6	93.0	94.1	96.3	96.4	97.2	97.8	99.0	100.2	101.3	102.3
Developing countries												
Production	Mt	666.7	682.6	696.0	707.6	715.8	727.4	737.8	749.1	760.1	770.9	780.3
Consumption	Mt	728.9	747.4	755.8	763.1	775.8	787.4	798.6	809.8	821.2	832.8	843.7
Net trade	Mt	-61.8	-62.2	-61.2	-60.2	-61.3	-62.3	-63.0	-63.5	-64.2	-65.0	-65.9
Closing stocks	Mt	213.0	206.1	207.5	212.3	213.7	216.0	218.2	221.1	224.2	227.4	229.8
OECD[2]												
Production	Mt	481.3	499.6	501.8	506.3	507.9	511.2	513.9	517.3	520.2	522.9	525.7
Consumption	Mt	501.5	512.3	517.7	523.2	526.8	529.8	533.6	537.4	541.1	544.8	548.5
Net trade	Mt	-13.2	-17.7	-18.8	-18.9	-19.3	-19.6	-20.3	-21.1	-22.0	-22.9	-23.6
Closing stocks	Mt	71.3	69.8	72.8	74.8	75.1	76.1	76.7	77.8	78.8	79.7	80.5

Table C.1. World cereal projections *(cont.)*

Marketing year

		Average 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OTHER COARSE GRAINS												
World												
Production	Mt	306.3	309.1	310.2	313.7	315.0	317.3	319.6	322.4	325.1	327.5	329.7
Area	Mha	149.3	149.5	149.5	149.3	149.3	149.2	149.2	149.2	149.3	149.3	149.3
Yield	t/ha	2.05	2.07	2.07	2.10	2.11	2.13	2.14	2.16	2.18	2.19	2.21
Consumption	Mt	302.9	303.6	306.2	310.1	312.5	314.6	316.7	319.0	321.4	323.8	326.1
Feed use	Mt	172.8	167.7	167.7	169.4	170.5	171.2	172.2	173.0	174.0	175.0	176.1
Food use	Mt	77.3	82.8	84.8	86.6	87.7	89.2	90.4	91.9	93.2	94.4	95.5
Biofuel use	Mt	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Other use	Mt	34.8	35.2	35.6	35.9	35.9	35.7	35.5	35.5	35.4	35.5	35.5
Exports	Mt	48.5	46.0	45.7	45.5	45.8	46.4	47.2	47.8	48.7	49.2	49.8
Closing stocks	Mt	61.9	62.5	63.6	64.5	64.1	63.9	64.0	64.5	65.3	66.2	66.9
Price[4]	USD/t	288.3	264.8	237.3	226.8	228.7	234.1	239.2	243.8	247.6	250.9	254.9
Developed countries												
Production	Mt	188.7	184.9	183.8	184.5	184.7	184.9	185.5	186.2	187.0	187.6	187.9
Consumption	Mt	151.7	151.9	151.7	152.3	152.6	152.0	151.8	151.5	151.4	151.5	151.4
Net trade	Mt	35.3	32.5	32.2	32.2	32.5	33.1	33.9	34.5	35.2	35.7	36.2
Closing stocks	Mt	33.7	35.8	35.8	35.8	35.3	35.1	34.9	35.1	35.4	35.8	36.0
Developing countries												
Production	Mt	117.6	124.1	126.4	129.2	130.2	132.4	134.1	136.2	138.1	140.0	141.8
Consumption	Mt	151.2	151.7	154.6	157.7	159.9	162.5	165.0	167.5	170.0	172.4	174.7
Net trade	Mt	-32.5	-29.7	-29.3	-29.4	-29.7	-30.3	-31.1	-31.7	-32.4	-32.9	-33.4
Closing stocks	Mt	28.2	26.7	27.8	28.7	28.7	28.9	29.1	29.4	29.9	30.4	30.8
OECD[2]												
Production	Mt	156.6	153.8	152.3	152.7	152.7	152.6	152.8	153.1	153.5	153.7	153.8
Consumption	Mt	132.2	132.6	132.5	133.1	133.4	132.7	132.6	132.3	132.3	132.3	132.3
Net trade	Mt	23.3	21.1	20.3	19.6	19.5	20.0	20.3	20.7	21.0	21.1	21.3
Closing stocks	Mt	25.4	25.8	25.3	25.2	25.0	24.9	24.8	25.0	25.3	25.5	25.7
RICE												
World												
Production	Mt	521.5	522.3	530.2	537.3	543.0	549.8	555.5	561.3	566.8	572.1	576.9
Area	Mha	165.8	165.9	166.4	166.6	166.8	167.0	167.1	167.2	167.3	167.3	167.4
Yield	t/ha	3.15	3.15	3.19	3.22	3.26	3.29	3.33	3.36	3.39	3.42	3.45
Consumption	Mt	519.9	521.0	528.2	535.0	542.3	549.0	554.8	560.6	566.5	571.9	576.9
Feed use	Mt	20.3	19.1	19.3	19.5	19.9	20.3	20.6	21.0	21.3	21.5	21.8
Food use	Mt	407.0	413.1	418.5	423.5	429.3	434.4	438.6	442.9	447.3	451.2	454.7
Exports	Mt	51.6	53.8	54.4	55.9	56.8	57.8	58.9	60.2	61.4	62.5	63.5
Closing stocks	Mt	201.0	201.5	203.5	205.8	206.5	207.3	208.0	208.7	209.0	209.2	209.2
Price[5]	USD/t	412.8	435.4	425.8	418.1	425.0	429.8	436.8	442.2	447.5	453.0	458.6
Developed countries												
Production	Mt	17.3	16.5	16.6	16.6	16.6	16.6	16.5	16.4	16.4	16.3	16.4
Consumption	Mt	20.8	20.8	20.9	21.0	21.0	21.1	21.2	21.2	21.2	21.3	21.3
Net trade	Mt	-4.1	-4.6	-4.5	-4.5	-4.4	-4.4	-4.4	-4.4	-4.5	-4.5	-4.5
Closing stocks	Mt	12.1	12.5	12.7	12.9	12.8	12.7	12.5	12.2	11.8	11.3	10.9
Developing countries												
Production	Mt	504.2	505.8	513.6	520.6	526.4	533.2	539.0	544.9	550.4	555.8	560.6
Consumption	Mt	499.0	500.1	507.3	514.0	521.3	527.9	533.6	539.4	545.2	550.6	555.6
Net trade	Mt	3.2	4.6	4.5	4.5	4.4	4.4	4.4	4.4	4.5	4.5	4.5
Closing stocks	Mt	188.9	189.0	190.8	192.9	193.7	194.6	195.5	196.5	197.2	197.9	198.3
OECD[2]												
Production	Mt	22.1	21.1	21.3	21.4	21.4	21.3	21.3	21.2	21.2	21.1	21.1
Consumption	Mt	25.9	25.8	25.9	26.1	26.1	26.2	26.3	26.3	26.3	26.4	26.4
Net trade	Mt	-4.5	-5.0	-4.9	-4.9	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8
Closing stocks	Mt	13.7	14.2	14.5	14.7	14.7	14.5	14.3	14.0	13.6	13.2	12.7

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 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 (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
SOYBEAN												
World												
Production	Mt	363.3	384.0	388.0	392.2	395.1	399.2	402.7	405.8	408.8	411.7	414.8
Area	Mha	131.8	134.8	135.4	135.7	135.9	136.5	136.7	136.9	137.0	137.1	137.3
Yield	t/ha	2.76	2.85	2.87	2.89	2.91	2.93	2.95	2.97	2.98	3.00	3.02
Consumption	Mt	365.1	382.2	386.4	391.1	394.7	398.5	401.9	405.0	408.1	411.4	414.4
Crush	Mt	327.7	344.1	347.6	351.5	354.8	358.3	361.4	364.3	367.1	370.2	372.9
Closing stocks	Mt	41.6	43.6	45.2	46.4	46.8	47.5	48.4	49.1	49.9	50.2	50.7
Price[1]	USD/t	592.5	539.3	501.1	495.7	508.8	518.2	524.1	532.7	540.3	548.7	556.3
Developed countries												
Production	Mt	137.9	141.0	142.6	144.0	145.0	146.4	147.6	148.7	149.8	150.7	151.7
Consumption	Mt	99.1	104.0	104.9	106.3	107.1	107.9	108.7	109.5	110.2	110.9	111.4
Crush	Mt	90.4	94.7	95.6	96.8	97.7	98.4	99.2	100.0	100.7	101.2	101.7
Closing stocks	Mt	9.7	12.1	12.7	12.9	13.0	13.1	13.3	13.4	13.6	13.7	13.8
Developing countries												
Production	Mt	225.4	243.0	245.4	248.2	250.1	252.8	255.1	257.1	259.0	261.0	263.1
Consumption	Mt	266.0	278.2	281.5	284.8	287.5	290.6	293.1	295.5	297.8	300.5	303.0
Crush	Mt	237.3	249.4	252.0	254.7	257.1	259.9	262.2	264.4	266.5	268.9	271.2
Closing stocks	Mt	31.9	31.5	32.5	33.4	33.8	34.4	35.1	35.7	36.3	36.6	36.9
OECD[2]												
Production	Mt	127.4	129.6	131.0	132.3	133.2	134.4	135.5	136.5	137.4	138.3	139.1
Consumption	Mt	99.9	103.5	104.2	105.5	106.4	107.2	108.0	108.9	109.5	110.2	110.7
Crush	Mt	92.0	95.2	95.9	97.1	98.0	98.7	99.5	100.3	101.0	101.6	102.1
Closing stocks	Mt	8.8	10.4	11.0	11.3	11.4	11.5	11.7	11.8	12.0	12.1	12.2
OTHER OILSEEDS												
World												
Production	Mt	170.8	175.0	176.4	178.5	179.6	181.2	183.0	184.5	186.0	187.5	189.1
Area	Mha	94.1	94.1	94.2	94.8	94.9	95.0	95.2	95.3	95.5	95.6	95.8
Yield	t/ha	1.82	1.86	1.87	1.88	1.89	1.91	1.92	1.93	1.95	1.96	1.97
Consumption	Mt	170.1	174.5	175.8	178.3	179.5	181.1	182.9	184.4	185.9	187.5	189.1
Crush	Mt	143.1	147.6	148.9	151.2	152.5	154.1	155.8	157.3	158.8	160.2	161.8
Closing stocks	Mt	9.0	9.6	10.2	10.5	10.6	10.7	10.8	10.9	10.9	10.9	11.0
Price[3]	USD/t	672.0	568.3	550.5	556.9	579.0	593.7	601.3	614.9	627.2	641.0	652.8
Developed countries												
Production	Mt	96.9	98.3	99.1	100.3	100.7	101.5	102.5	103.3	104.1	104.8	105.7
Consumption	Mt	89.2	89.1	89.4	90.9	91.3	92.1	92.9	93.5	94.2	94.8	95.5
Crush	Mt	82.0	82.1	82.5	83.8	84.3	85.0	85.8	86.4	87.0	87.7	88.3
Closing stocks	Mt	6.6	6.8	7.4	7.7	7.8	7.9	8.0	8.1	8.1	8.1	8.1
Developing countries												
Production	Mt	74.0	76.7	77.3	78.3	78.9	79.8	80.5	81.2	81.9	82.6	83.3
Consumption	Mt	81.0	85.4	86.4	87.4	88.2	89.0	90.0	90.9	91.8	92.7	93.6
Crush	Mt	61.1	65.5	66.4	67.4	68.2	69.1	70.0	70.9	71.7	72.6	73.5
Closing stocks	Mt	2.4	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
OECD[2]												
Production	Mt	59.7	61.9	62.4	63.0	63.1	63.3	63.9	64.3	64.7	65.1	65.5
Consumption	Mt	60.4	60.0	60.2	61.3	61.6	62.0	62.4	62.7	63.0	63.3	63.6
Crush	Mt	54.8	54.6	54.8	55.9	56.1	56.5	57.0	57.2	57.5	57.8	58.1
Closing stocks	Mt	3.9	4.0	4.7	4.9	5.0	5.1	5.2	5.2	5.3	5.3	5.3
PROTEIN MEALS												
World												
Production	Mt	358.9	372.8	376.5	381.3	384.8	388.6	392.2	395.5	398.7	402.1	405.2
Consumption	Mt	360.5	371.6	376.3	381.2	384.8	388.6	392.2	395.4	398.7	402.0	405.2
Closing stocks	Mt	14.5	16.2	16.4	16.6	16.6	16.6	16.6	16.7	16.8	16.9	17.0
Price[4]	USD/t	466.8	447.7	408.9	404.7	411.0	416.4	420.8	425.7	430.0	434.6	439.4
Developed countries												
Production	Mt	114.6	117.4	118.3	120.1	121.0	122.0	123.0	124.0	124.9	125.7	126.5
Consumption	Mt	124.0	126.8	127.6	128.5	128.7	128.8	129.1	129.2	129.4	129.5	129.6
Closing stocks	Mt	2.9	3.1	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Developing countries												
Production	Mt	244.2	255.4	258.2	261.2	263.7	266.6	269.2	271.5	273.8	276.4	278.8
Consumption	Mt	236.5	244.8	248.7	252.6	256.1	259.8	263.1	266.2	269.3	272.6	275.6
Closing stocks	Mt	11.6	13.1	13.3	13.4	13.4	13.4	13.5	13.5	13.6	13.7	13.8
OECD[2]												
Production	Mt	105.8	108.0	108.8	110.4	111.4	112.2	113.2	114.1	114.9	115.5	116.1
Consumption	Mt	130.9	133.4	134.3	135.2	135.6	135.8	136.2	136.4	136.7	136.8	137.0
Closing stocks	Mt	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1

Table C.2. World oilseed projections *(cont.)*

Marketing year

		Average 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
VEGETABLE OILS												
World												
Production	Mt	217.3	224.9	226.9	229.7	231.6	233.9	236.0	238.0	239.9	241.9	243.9
of which palm oil	Mt	78.4	81.7	82.4	83.3	83.9	84.7	85.4	86.0	86.7	87.3	88.0
Consumption	Mt	216.9	224.6	227.0	229.5	231.5	233.6	235.8	237.8	239.8	241.8	243.7
Food	Mt	125.0	126.6	127.3	129.0	130.2	131.6	132.8	134.1	135.4	136.7	137.8
Biofuel	Mt	34.1	36.8	37.8	38.2	38.6	38.8	39.2	39.5	39.8	40.1	40.5
Exports	Mt	82.7	84.4	84.8	85.3	85.8	86.3	86.8	87.3	87.8	88.3	88.7
Closing stocks	Mt	19.2	20.6	20.5	20.6	20.7	20.9	21.2	21.4	21.5	21.7	21.8
Price[5]	USD/t	1 314.7	1 091.2	1 087.8	1 109.8	1 146.2	1 173.2	1 194.2	1 220.2	1 246.6	1 275.8	1 304.4
Developed countries												
Production	Mt	53.5	53.9	54.2	55.0	55.4	55.9	56.4	56.8	57.3	57.7	58.1
Consumption	Mt	56.5	57.2	57.1	57.2	57.2	57.2	57.2	57.3	57.3	57.4	57.5
Closing stocks	Mt	4.6	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Developing countries												
Production	Mt	163.8	171.0	172.7	174.6	176.2	178.0	179.6	181.2	182.7	184.3	185.8
Consumption	Mt	160.4	167.4	169.9	172.4	174.4	176.4	178.6	180.5	182.5	184.4	186.2
Closing stocks	Mt	14.7	16.2	16.2	16.3	16.4	16.6	16.9	17.0	17.2	17.4	17.5
OECD[2]												
Production	Mt	44.9	45.5	45.9	46.7	47.1	47.5	48.0	48.4	48.7	49.1	49.4
Consumption	Mt	59.6	60.2	60.2	60.4	60.4	60.4	60.5	60.5	60.5	60.6	60.7
Closing stocks	Mt	4.4	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2

Note: Average 2020-22est: Data for 2022 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 (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
WORLD												
SUGARBEET												
Production	Mt	264.3	271.0	272.5	276.0	276.3	276.7	278.0	279.6	281.3	282.8	284.0
Area	Mha	4.4	4.5	4.5	4.5	4.5	4.6	4.6	4.6	4.6	4.6	4.6
Yield	t/ha	59.82	60.07	60.32	60.81	60.82	60.82	60.96	61.13	61.31	61.47	61.60
Biofuel use	Mt	9.8	10.4	10.3	10.1	10.0	9.8	9.7	9.6	9.5	9.3	9.2
SUGARCANE												
Production	Mt	1 710.5	1 734.7	1 763.9	1 793.5	1 807.5	1 814.7	1 826.8	1 848.4	1 869.1	1 888.1	1 904.6
Area	Mha	24.0	24.1	24.3	24.6	24.8	24.8	25.0	25.2	25.4	25.5	25.7
Yield	t/ha	71.27	72.00	72.44	72.83	72.98	73.13	72.94	73.34	73.64	73.90	74.10
Biofuel use	Mt	363.6	401.9	426.3	442.7	458.5	471.6	485.0	496.0	506.4	515.8	525.0
SUGAR												
Production	Mt tq	175.5	181.2	184.8	187.3	187.0	187.0	188.3	191.1	193.7	196.1	197.8
Consumption	Mt tq	171.7	175.6	177.5	180.0	182.4	184.4	186.3	188.0	189.7	191.5	193.1
Closing stocks	Mt tq	89.2	92.3	96.1	99.7	100.8	99.8	98.2	97.7	98.2	99.2	100.4
Price, raw sugar[1]	USD/t	399.4	400.6	356.3	332.0	326.2	327.0	334.6	340.6	345.2	347.4	346.8
Price, white sugar[2]	USD/t	500.5	520.4	473.7	446.2	440.4	444.1	450.3	459.5	466.2	470.1	471.4
DEVELOPED COUNTRIES												
SUGARBEET												
Production	Mt	206.3	214.0	214.8	216.8	216.3	216.0	216.3	216.9	217.5	217.9	218.1
SUGARCANE												
Production	Mt	81.1	80.3	81.2	82.3	82.3	82.1	82.4	83.0	83.6	84.2	84.6
SUGAR												
Production	Mt tq	39.1	39.7	40.0	40.5	40.3	40.3	40.5	40.7	40.9	41.1	41.2
Consumption	Mt tq	45.7	45.3	45.2	45.3	45.3	45.4	45.4	45.3	45.3	45.3	45.3
Closing stocks	Mt tq	13.8	14.3	14.8	15.0	14.9	14.7	14.5	14.3	14.3	14.2	14.2
HFCS												
Production	Mt dw	8.5	8.3	8.2	8.1	8.1	8.0	8.0	7.9	7.9	7.9	7.8
Consumption	Mt dw	7.5	7.3	7.2	7.1	7.1	7.0	6.9	6.9	6.8	6.8	6.8
DEVELOPING COUNTRIES												
SUGARBEET												
Production	Mt	58.0	57.0	57.7	59.2	60.0	60.7	61.6	62.7	63.8	64.9	65.9
SUGARCANE												
Production	Mt	1 629.3	1 654.4	1 682.6	1 711.2	1 725.2	1 732.5	1 744.4	1 765.4	1 785.5	1 803.9	1 820.0
SUGAR												
Production	Mt tq	136.4	141.5	144.8	146.8	146.7	146.7	147.8	150.4	152.8	155.0	156.7
Consumption	Mt tq	126.0	130.3	132.2	134.7	137.0	139.1	141.0	142.6	144.4	146.2	147.8
Closing stocks	Mt tq	75.3	78.0	81.2	84.7	85.9	85.0	83.7	83.4	83.9	85.0	86.2
HFCS												
Production	Mt dw	5.4	5.4	5.5	5.5	5.6	5.6	5.7	5.7	5.8	5.9	5.9
Consumption	Mt dw	6.2	6.3	6.3	6.4	6.5	6.5	6.6	6.6	6.7	6.8	6.8
OECD[3]												
SUGARBEET												
Production	Mt	175.4	179.2	180.3	181.3	180.7	180.3	180.6	181.0	181.6	182.0	182.2
SUGARCANE												
Production	Mt	139.6	143.4	143.6	143.4	143.2	142.4	142.2	143.1	144.0	144.7	145.2
SUGAR												
Production	Mt tq	39.8	40.8	41.5	41.6	41.4	41.2	41.3	41.5	41.7	41.9	42.0
Consumption	Mt tq	44.9	44.8	44.8	44.8	44.8	44.8	44.8	44.7	44.7	44.6	44.6
Closing stocks	Mt tq	14.2	14.2	14.8	15.2	15.4	15.4	15.2	15.1	15.0	15.0	15.0
HFCS												
Production	Mt dw	9.3	9.1	9.1	9.0	8.9	8.9	8.8	8.7	8.7	8.7	8.7
Consumption	Mt dw	9.0	8.8	8.7	8.6	8.6	8.5	8.4	8.4	8.3	8.3	8.3

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

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. Excludes Iceland and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
WORLD												
BEEF AND VEAL												
Production	kt cwe	71 211	72 100	72 647	73 265	73 911	74 569	75 228	75 873	76 525	77 166	77 812
Consumption	kt cwe	70 499	71 948	72 468	73 067	73 732	74 390	75 049	75 693	76 344	76 986	77 631
PIGMEAT												
Production	kt cwe	116 806	122 072	123 833	125 088	125 798	126 388	127 070	127 542	128 132	128 750	129 377
Consumption	kt cwe	116 667	122 023	123 765	125 009	125 725	126 313	126 994	127 466	128 056	128 674	129 302
POULTRY MEAT												
Production	kt rtc	136 552	139 681	141 387	142 914	144 976	146 917	148 797	150 686	152 580	154 473	156 247
Consumption	kt rtc	135 413	139 677	141 366	142 892	144 980	146 916	148 793	150 667	152 576	154 462	156 237
SHEEP MEAT												
Production	kt cwe	16 206	16 649	16 890	17 077	17 310	17 540	17 763	17 985	18 206	18 425	18 644
Consumption	kt cwe	16 259	16 726	16 968	17 155	17 388	17 619	17 842	18 064	18 286	18 505	18 724
TOTAL MEAT												
Per capita consumption[1]	kg rwt	28.1	28.5	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8
DEVELOPED COUNTRIES												
BEEF AND VEAL												
Production	kt cwe	31 276	31 312	31 232	31 333	31 462	31 576	31 691	31 796	31 906	32 011	32 120
Consumption	kt cwe	29 847	29 935	29 701	29 757	29 829	29 888	29 941	29 989	30 043	30 094	30 147
PIGMEAT												
Production	kt cwe	47 100	46 046	45 986	46 012	45 970	45 940	45 887	45 851	45 816	45 813	45 806
Consumption	kt cwe	41 011	41 446	41 495	41 597	41 626	41 634	41 621	41 612	41 599	41 591	41 588
POULTRY MEAT												
Production	kt rtc	52 863	53 655	54 244	54 619	54 935	55 265	55 585	55 910	56 234	56 555	56 900
Consumption	kt rtc	49 600	51 089	51 536	51 852	52 154	52 446	52 726	52 990	53 281	53 547	53 845
SHEEP MEAT												
Production	kt cwe	3 383	3 462	3 493	3 491	3 516	3 539	3 559	3 579	3 598	3 617	3 635
Consumption	kt cwe	2 697	2 749	2 748	2 732	2 747	2 761	2 771	2 781	2 791	2 800	2 808
TOTAL MEAT												
Per capita consumption[1]	kg rwt	56.0	56.5	56.6	56.7	56.8	56.8	56.9	56.9	57.0	57.0	57.1
DEVELOPING COUNTRIES												
BEEF AND VEAL												
Production	kt cwe	39 935	40 789	41 414	41 932	42 450	42 993	43 537	44 078	44 620	45 155	45 692
Consumption	kt cwe	40 651	42 013	42 767	43 310	43 902	44 502	45 109	45 704	46 302	46 892	47 484
PIGMEAT												
Production	kt cwe	69 705	76 026	77 847	79 077	79 828	80 448	81 183	81 692	82 316	82 936	83 571
Consumption	kt cwe	75 656	80 578	82 270	83 412	84 099	84 679	85 373	85 854	86 457	87 083	87 714
POULTRY MEAT												
Production	kt rtc	83 689	86 027	87 143	88 295	90 041	91 652	93 212	94 776	96 346	97 918	99 347
Consumption	kt rtc	85 813	88 588	89 830	91 040	92 826	94 470	96 067	97 677	99 295	100 916	102 392
SHEEP MEAT												
Production	kt cwe	12 822	13 187	13 397	13 586	13 794	14 001	14 204	14 406	14 608	14 808	15 009
Consumption	kt cwe	13 561	13 977	14 220	14 422	14 641	14 858	15 071	15 283	15 495	15 705	15 915
TOTAL MEAT												
Per capita consumption[1]	kg rwt	21.8	22.3	22.5	22.5	22.6	22.7	22.7	22.8	22.8	22.9	22.9
OECD[2]												
BEEF AND VEAL												
Production	kt cwe	30 473	30 406	30 292	30 389	30 509	30 610	30 710	30 804	30 902	30 994	31 087
Consumption	kt cwe	29 330	29 454	29 168	29 220	29 281	29 329	29 368	29 406	29 447	29 484	29 523
PIGMEAT												
Production	kt cwe	44 784	43 845	43 772	43 826	43 796	43 768	43 718	43 681	43 647	43 646	43 639
Consumption	kt cwe	40 038	40 773	40 770	40 908	40 950	40 962	40 951	40 940	40 925	40 917	40 912
POULTRY MEAT												
Production	kt rtc	53 510	54 970	55 668	56 129	56 489	56 855	57 207	57 564	57 919	58 270	58 610
Consumption	kt rtc	50 253	52 148	52 650	53 022	53 372	53 718	54 043	54 347	54 678	54 985	55 292
SHEEP MEAT												
Production	kt cwe	2 782	2 947	2 999	3 009	3 045	3 076	3 099	3 117	3 133	3 149	3 164
Consumption	kt cwe	2 135	2 274	2 293	2 289	2 314	2 337	2 350	2 359	2 367	2 373	2 378
TOTAL MEAT												
Per capita consumption[1]	kg rwt	56.7	57.6	57.6	57.7	57.8	57.9	57.9	57.9	57.9	58.0	58.0

Note: Calendar Year; except year ending 30 June for New Zealand in aggregates. Average 2020-22est: Data for 2022 are estimated. Prices are in nominal terms.

1. Per capita consumption expressed in boneless retail weight. Carcass weight to boneless retail weight conversion factors are 0.67 for beef and veal, 0.73 for pig meat, 0.6 for poultry meat and 0.66 for sheep meat.
2. Excludes Iceland and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2023), “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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
MILK												
World												
Production	kt pw	888 412	910 964	925 166	938 077	952 326	966 819	981 706	995 842	1 010 318	1 024 868	1 039 320
Inventory	000 hd	719 741	745 900	756 334	764 822	774 130	785 660	797 002	808 143	819 249	830 106	840 875
Yield	t/head	1.23	1.22	1.22	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.24
Developed countries												
Production	kt pw	409 280	410 315	412 987	414 948	417 603	420 163	422 978	425 120	427 617	430 084	432 483
Inventory	000 hd	72 878	72 803	72 703	72 573	72 496	72 500	72 499	72 484	72 475	72 456	72 433
Yield	t/head	5.62	5.64	5.68	5.72	5.76	5.80	5.83	5.87	5.90	5.94	5.97
Developing countries												
Production	kt pw	479 131	500 649	512 179	523 128	534 723	546 656	558 728	570 722	582 701	594 784	606 837
Inventory	000 hd	646 864	673 098	683 631	692 249	701 634	713 161	724 503	735 659	746 774	757 650	768 442
Yield	t/head	0.74	0.74	0.75	0.76	0.76	0.77	0.77	0.78	0.78	0.79	0.79
OECD[1]												
Production	kt pw	372 557	373 357	375 527	377 128	379 586	382 032	384 759	386 808	389 244	391 654	394 010
Inventory	000 hd	80 849	82 017	82 067	82 118	82 305	82 757	83 228	83 670	84 137	84 593	85 051
Yield	t/head	4.61	4.55	4.58	4.59	4.61	4.62	4.62	4.62	4.63	4.63	4.63
FRESH DAIRY PRODUCTS												
World												
Consumption	kt pw	460 865	476 845	485 199	493 249	501 841	510 746	519 743	528 528	537 275	546 176	554 984
Developed countries												
Consumption	kt pw	141 204	141 533	141 414	141 446	141 495	141 555	141 515	141 443	141 390	141 518	141 533
Developing countries												
Consumption	kt pw	319 661	335 312	343 785	351 803	360 345	369 191	378 228	387 085	395 885	404 658	413 451
OECD[1]												
Consumption	kt pw	106 923	106 615	106 340	106 426	106 454	106 594	106 601	106 600	106 608	106 666	106 607
BUTTER												
World												
Production	kt pw	12 643	12 902	13 101	13 286	13 471	13 638	13 803	13 979	14 151	14 329	14 504
Consumption	kt pw	12 592	12 915	13 112	13 295	13 471	13 636	13 802	13 979	14 151	14 329	14 504
Stock changes	kt pw	18	-12	-10	-10	0	2	1	0	0	0	0
Price[2]	USD/t	4 925	4 637	4 765	4 866	5 027	5 130	5 213	5 336	5 433	5 557	5 673
Developed countries												
Production	kt pw	4 928	4 851	4 887	4 926	4 968	4 994	5 020	5 051	5 078	5 104	5 132
Consumption	kt pw	4 404	4 354	4 372	4 387	4 403	4 413	4 426	4 451	4 469	4 493	4 517
Developing countries												
Production	kt pw	7 715	8 051	8 215	8 360	8 503	8 644	8 783	8 928	9 074	9 224	9 372
Consumption	kt pw	8 189	8 561	8 740	8 908	9 068	9 223	9 376	9 527	9 682	9 836	9 988
OECD[1]												
Production	kt pw	4 835	4 780	4 820	4 859	4 900	4 931	4 962	4 997	5 027	5 057	5 089
Consumption	kt pw	4 289	4 254	4 282	4 305	4 322	4 333	4 347	4 372	4 390	4 415	4 440
Stock changes	kt pw	18	-12	-10	-10	0	2	1	0	0	0	0
CHEESE												
World												
Production	kt pw	25 227	25 702	26 048	26 335	26 663	27 013	27 368	27 664	27 995	28 317	28 647
Consumption	kt pw	25 218	25 633	26 014	26 321	26 653	27 002	27 354	27 659	27 986	28 308	28 638
Stock changes	kt pw	9	69	34	14	10	12	14	5	9	9	9
Price[3]	USD/t	4 611	4 590	4 658	4 719	4 808	4 892	4 960	5 046	5 123	5 211	5 300
Developed countries												
Production	kt pw	20 754	21 174	21 446	21 668	21 931	22 206	22 485	22 706	22 958	23 201	23 449
Consumption	kt pw	19 664	19 881	20 141	20 334	20 550	20 779	21 007	21 191	21 394	21 596	21 805
Developing countries												
Production	kt pw	4 473	4 528	4 602	4 667	4 732	4 807	4 883	4 958	5 036	5 115	5 198
Consumption	kt pw	5 555	5 752	5 873	5 987	6 103	6 223	6 347	6 468	6 591	6 712	6 833
OECD[1]												
Production	kt pw	20 032	20 439	20 681	20 878	21 108	21 358	21 623	21 829	22 068	22 299	22 536
Consumption	kt pw	19 123	19 360	19 617	19 809	20 009	20 222	20 436	20 606	20 798	20 987	21 186
Stock changes	kt pw	9	69	34	14	10	12	14	5	9	9	9

Note: Calendar Year; except year ending 30 June for New Zealand in aggregates. Average 2020-22est: Data for 2022 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 (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
SKIM MILK POWDER												
World												
Production	kt pw	4 541	4 593	4 718	4 817	4 918	5 015	5 110	5 206	5 300	5 393	5 488
Consumption	kt pw	4 486	4 594	4 717	4 816	4 918	5 015	5 110	5 206	5 300	5 393	5 489
Stock changes	kt pw	6	-1	0	1	0	0	0	0	0	-1	-1
Price[1]	USD/t	3 340	3 116	3 112	3 122	3 147	3 199	3 256	3 312	3 369	3 432	3 498
Developed countries												
Production	kt pw	3 807	3 802	3 905	3 985	4 068	4 148	4 224	4 302	4 378	4 453	4 530
Consumption	kt pw	1 673	1 652	1 680	1 691	1 706	1 721	1 733	1 747	1 761	1 772	1 786
Developing countries												
Production	kt pw	734	791	813	832	850	868	886	904	922	940	958
Consumption	kt pw	2 814	2 942	3 038	3 125	3 212	3 295	3 377	3 459	3 539	3 621	3 703
OECD[2]												
Production	kt pw	3 632	3 655	3 761	3 845	3 929	4 009	4 087	4 166	4 244	4 319	4 398
Consumption	kt pw	1 858	1 843	1 867	1 876	1 893	1 910	1 923	1 939	1 955	1 968	1 985
Stock changes	kt pw	6	-1	0	1	0	0	0	0	0	-1	-1
WHOLE MILK POWDER												
World												
Production	kt pw	5 055	5 091	5 191	5 292	5 386	5 471	5 562	5 652	5 742	5 835	5 929
Consumption	kt pw	5 084	5 089	5 190	5 292	5 385	5 470	5 561	5 651	5 742	5 835	5 928
Stock changes	kt pw	-3	2	1	1	1	1	1	1	1	1	1
Price[3]	USD/t	3 554	3 344	3 380	3 426	3 478	3 537	3 598	3 667	3 736	3 813	3 890
Developed countries												
Production	kt pw	2 540	2 411	2 428	2 443	2 455	2 463	2 473	2 485	2 493	2 504	2 514
Consumption	kt pw	665	597	589	593	593	583	581	577	575	575	576
Developing countries												
Production	kt pw	2 515	2 680	2 763	2 849	2 931	3 008	3 088	3 167	3 249	3 332	3 415
Consumption	kt pw	4 419	4 493	4 601	4 699	4 792	4 887	4 980	5 074	5 167	5 260	5 352
OECD[2]												
Production	kt pw	2 784	2 664	2 687	2 709	2 723	2 733	2 746	2 761	2 772	2 785	2 799
Consumption	kt pw	974	917	914	923	928	922	923	923	924	928	932
Stock changes	kt pw	-3	2	1	1	1	1	1	1	1	1	1
WHEY POWDER												
Price[4]	USD/t	1 143	1 003	1 014	1 025	1 032	1 047	1 061	1 078	1 093	1 108	1 124
CASEIN												
Price[5]	USD/t	9 234	9 279	8 971	8 914	8 983	9 122	9 263	9 406	9 551	9 697	9 847

Note: Calendar Year; except year ending 30 June for New Zealand in aggregates. Average 2020-22est: Data for 2022 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 (2023), “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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
FISH[1]												
World												
Production	kt	180 766	185 405	185 211	189 984	192 263	194 376	193 945	198 707	200 954	202 741	201 735
of which aquaculture	kt	90 606	94 715	96 456	98 285	99 667	101 645	103 623	105 489	107 508	109 110	110 734
Consumption	kt	182 809	187 655	187 361	192 034	194 213	196 246	195 715	200 377	202 524	204 241	203 135
of which for food	kt	159 784	164 846	166 365	169 151	171 320	173 332	174 656	177 360	179 546	181 257	181 979
of which for reduction	kt	17 694	17 649	15 886	17 822	17 881	17 958	16 157	18 170	18 186	18 246	16 473
Price												
Aquaculture[2]	USD/t	3 311.6	3 413.8	3 374.7	3 365.1	3 336.7	3 413.7	3 514.3	3 556.5	3 651.9	3 748.0	3 833.5
Capture[3]	USD/t	1 935.0	2 097.6	2 067.3	2 064.5	2 056.4	2 093.4	2 144.0	2 154.2	2 192.4	2 230.1	2 297.7
Product traded[4]	USD/t	3 284.1	3 575.2	3 483.9	3 483.2	3 462.0	3 543.1	3 644.9	3 676.1	3 761.6	3 848.0	3 937.5
Developed countries												
Production	kt	28 615	29 210	29 460	29 117	29 356	29 374	29 679	29 794	29 835	29 961	30 076
of which aquaculture	kt	5 178	5 417	5 480	5 563	5 628	5 674	5 723	5 799	5 875	5 949	6 017
Consumption	kt	37 124	37 631	37 661	37 740	38 000	38 068	38 365	38 535	38 707	38 922	39 100
of which for food	kt	31 278	31 762	31 702	31 799	32 020	32 056	32 243	32 377	32 553	32 733	32 798
of which for reduction	kt	5 082	5 129	5 217	5 196	5 232	5 265	5 377	5 415	5 413	5 450	5 565
Developing countries												
Production	kt	152 152	156 195	155 751	160 867	162 907	165 002	164 266	168 913	171 119	172 779	171 659
of which aquaculture	kt	85 428	89 298	90 977	92 722	94 039	95 970	97 900	99 690	101 633	103 161	104 717
Consumption	kt	145 685	150 024	149 700	154 294	156 213	158 178	157 350	161 842	163 817	165 319	164 035
of which for food	kt	128 506	133 083	134 663	137 353	139 301	141 276	142 413	144 982	146 993	148 524	149 181
of which for reduction	kt	12 612	12 520	10 669	12 626	12 650	12 692	10 780	12 756	12 773	12 796	10 908
OECD[5]												
Production	kt	28 184	29 057	28 460	28 663	28 999	29 020	28 527	29 156	29 357	29 523	28 921
of which aquaculture	kt	7 471	7 822	7 885	7 928	8 026	8 108	8 188	8 186	8 322	8 442	8 558
Consumption	kt	38 569	39 176	38 698	39 200	39 497	39 564	39 382	39 948	40 150	40 373	40 062
of which for food	kt	32 394	33 045	32 950	33 082	33 341	33 382	33 514	33 655	33 855	34 053	34 038
of which for reduction	kt	5 272	5 402	5 013	5 378	5 411	5 437	5 123	5 548	5 550	5 576	5 279
FISHMEAL[6]												
World												
Production	kt	5 157.8	5 254.4	4 874.6	5 409.6	5 482.0	5 546.2	5 139.4	5 684.4	5 733.4	5 782.5	5 361.7
from whole fish	kt	3 900.8	4 026.7	3 617.4	4 117.7	4 156.6	4 189.2	3 754.5	4 269.2	4 289.2	4 315.7	3 872.9
Consumption	kt	5 250.8	5 253.3	5 032.1	5 269.9	5 463.0	5 550.6	5 295.6	5 533.5	5 727.9	5 783.1	5 518.1
Variation in stocks	kt	-90.0	1.1	-157.5	139.7	19.0	-4.4	-156.1	150.9	5.5	-0.6	-156.4
Price[7]	USD/t	1 501.5	1 663.6	1 679.8	1 580.0	1 563.4	1 615.4	1 735.3	1 700.2	1 693.9	1 734.6	1 898.8
Developed countries												
Production	kt	1 685.7	1 706.1	1 747.4	1 765.0	1 795.7	1 816.0	1 854.2	1 874.6	1 883.5	1 901.1	1 936.7
from whole fish	kt	1 093.3	1 139.3	1 169.5	1 176.1	1 195.7	1 204.9	1 231.9	1 242.1	1 243.1	1 253.0	1 280.8
Consumption	kt	1 845.4	1 772.2	1 654.5	1 712.7	1 733.8	1 718.8	1 605.8	1 658.7	1 679.9	1 676.0	1 574.8
Variation in stocks	kt	-30.0	-3.9	-44.5	39.7	1.0	-4.4	-38.1	35.9	2.5	-0.6	-38.4
Developing countries												
Production	kt	3 472.1	3 548.3	3 127.2	3 644.6	3 686.3	3 730.2	3 285.2	3 809.7	3 849.9	3 881.4	3 425.0
from whole fish	kt	2 807.5	2 887.4	2 447.9	2 941.6	2 960.8	2 984.4	2 522.6	3 027.1	3 046.1	3 062.7	2 592.1
Consumption	kt	3 756.1	3 981.1	3 827.6	3 957.2	4 079.2	4 131.8	3 939.7	4 074.8	4 198.0	4 207.1	3 993.3
Variation in stocks	kt	-60.0	5.0	-113.0	100.0	18.0	0.0	-118.0	115.0	3.0	0.0	-118.0
OECD[5]												
Production	kt	1 579.8	1 613.0	1 547.3	1 647.9	1 676.7	1 693.9	1 637.0	1 741.2	1 749.8	1 763.8	1 707.3
from whole fish	kt	1 096.5	1 179.7	1 104.7	1 196.0	1 215.5	1 223.3	1 156.9	1 252.6	1 255.2	1 263.2	1 200.8
Consumption	kt	1 864.3	1 946.7	1 807.8	1 866.2	1 900.6	1 895.0	1 774.1	1 819.6	1 852.2	1 857.0	1 754.3
Variation in stocks	kt	-35.0	-8.9	-49.5	44.7	6.0	-4.4	-43.1	40.9	2.5	-0.6	-43.4

Table C.7. World fish and seafood projections *(cont.)*

Calendar year

		Average 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
FISH OIL[6]												
World												
Production	kt	1 188.9	1 247.5	1 201.3	1 291.0	1 307.9	1 325.4	1 267.3	1 361.6	1 371.3	1 382.7	1 315.5
from whole fish	kt	577.8	629.0	575.9	659.0	669.4	680.4	615.8	703.4	706.4	711.1	637.4
Consumption	kt	1 180.0	1 249.4	1 259.5	1 236.7	1 306.4	1 327.3	1 321.2	1 316.0	1 366.6	1 383.6	1 368.8
Variation in stocks	kt	8.9	-1.9	-58.2	54.3	1.5	-1.9	-53.9	45.5	4.6	-0.9	-53.3
Price[8]	USD/t	2 367.0	2 268.9	2 250.1	2 173.4	2 150.2	2 209.1	2 298.5	2 407.5	2 413.7	2 473.5	2 585.7
Developed countries												
Production	kt	490.5	517.7	528.2	532.4	537.3	542.0	550.3	554.7	557.4	561.8	569.3
from whole fish	kt	181.1	197.3	204.1	204.6	206.1	207.5	212.2	213.0	212.2	212.9	217.0
Consumption	kt	631.2	690.2	692.8	671.1	697.3	705.0	705.0	695.9	712.1	717.7	714.2
Variation in stocks	kt	8.4	-6.9	-26.2	22.3	-3.5	-1.9	-21.9	18.5	-0.4	-0.9	-21.3
Developing countries												
Production	kt	699.3	729.8	673.1	758.7	770.6	783.4	717.1	806.9	813.9	820.9	746.2
from whole fish	kt	397.6	431.7	371.9	454.4	463.3	472.9	403.6	490.3	494.2	498.2	420.5
Consumption	kt	512.4	559.3	566.7	565.7	609.0	622.4	616.2	620.1	654.5	665.8	654.6
Variation in stocks	kt	0.5	5.0	-32.0	32.0	5.0	0.0	-32.0	27.0	5.0	0.0	-32.0
OECD[5]												
Production	kt	698.8	730.7	720.8	741.7	746.3	750.4	739.7	761.5	764.8	769.1	759.3
from whole fish	kt	202.3	226.3	211.9	228.5	228.8	228.8	213.9	231.3	230.3	230.2	216.2
Consumption	kt	873.1	961.1	968.6	937.9	993.0	1 006.0	999.3	988.0	1 027.6	1 040.1	1 029.3
Variation in stocks	kt	15.0	-11.9	-31.2	27.3	1.5	-1.9	-26.9	18.5	4.6	-0.9	-26.3

Note: The term "fish" indicates fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, crocodiles, caimans, alligators and aquatic plants. Average 2020-22est: Data for 2022 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 (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
ETHANOL												
World												
Production	Bln L	124.3	133.5	136.3	138.2	140.4	142.2	144.2	145.9	147.6	149.3	150.9
Consumption	Bln L	124.4	133.5	136.2	138.4	140.6	142.5	144.4	146.2	147.8	149.4	151.0
Exports	Bln L	10.2	10.5	10.7	10.8	10.9	11.1	11.2	11.4	11.6	11.7	11.9
Price[1]	USD/hl	57.9	56.8	52.3	52.8	53.4	53.9	54.3	54.9	55.5	56.2	56.8
Developed countries												
Production	bln L	68.5	71.0	71.3	71.4	71.7	71.9	72.2	72.4	72.7	73.0	73.3
Consumption	bln L	68.1	70.6	70.6	70.7	71.0	71.3	71.7	71.9	72.1	72.4	72.6
Net trade	bln L	0.0	0.5	0.7	0.9	0.9	0.9	0.8	0.7	0.7	0.8	0.8
Developing countries												
Production	bln L	55.8	62.5	65.0	66.8	68.7	70.3	72.0	73.5	74.9	76.3	77.6
Consumption	bln L	56.2	62.9	65.7	67.7	69.6	71.2	72.8	74.2	75.7	77.1	78.4
Net trade	bln L	-0.7	-0.5	-0.7	-0.9	-0.9	-0.9	-0.8	-0.7	-0.7	-0.8	-0.8
OECD[2]												
Production	bln L	68.2	70.7	71.0	71.2	71.5	71.7	72.0	72.3	72.6	72.9	73.2
Consumption	bln L	69.4	71.8	71.8	72.0	72.4	72.6	73.0	73.3	73.5	73.7	74.0
Net trade	bln L	-1.6	-1.1	-0.9	-0.6	-0.7	-0.7	-0.8	-0.8	-0.8	-0.7	-0.7
BIODIESEL												
World												
Production	bln L	53.6	58.6	60.6	61.4	62.2	62.9	63.8	64.5	65.2	66.0	66.9
Consumption	bln L	54.4	58.6	60.7	61.4	62.3	63.0	63.8	64.5	65.3	66.0	66.9
Exports	bln L	6.9	7.0	6.9	6.9	6.8	6.8	6.9	7.0	7.1	7.2	7.3
Price[3]	USD/hl	140.8	150.5	129.9	134.7	137.5	141.1	144.2	146.7	149.7	152.8	156.1
Developed countries												
Production	bln L	28.1	30.5	31.9	32.3	32.8	33.3	33.7	34.0	34.2	34.5	35.0
Consumption	bln L	32.7	35.1	36.3	36.6	37.0	37.4	37.8	38.1	38.4	38.7	39.1
Net trade	bln L	-5.1	-4.5	-4.4	-4.2	-4.1	-4.0	-4.0	-4.1	-4.1	-4.1	-4.1
Developing countries												
Production	bln L	25.5	28.1	28.7	29.1	29.4	29.6	30.1	30.5	31.0	31.4	31.9
Consumption	bln L	21.6	23.6	24.3	24.9	25.3	25.5	26.0	26.5	26.9	27.3	27.8
Net trade	bln L	3.8	4.5	4.4	4.2	4.1	4.0	4.0	4.1	4.1	4.1	4.1
OECD[2]												
Production	bln L	29.5	31.9	33.3	33.7	34.2	34.8	35.1	35.4	35.7	36.0	36.5
Consumption	bln L	34.1	36.5	37.7	38.0	38.4	38.8	39.2	39.5	39.8	40.1	40.6
Net trade	bln L	-5.0	-4.5	-4.3	-4.2	-4.1	-4.0	-4.0	-4.1	-4.1	-4.1	-4.1

Note: Average 2020-22est: Data for 2022 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 (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
WORLD												
Production	Mt	25.1	23.9	24.3	25.0	25.3	25.8	26.3	26.7	27.2	27.7	28.2
Area	Mha	32.2	32.3	32.3	32.5	32.6	32.7	32.8	33.0	33.1	33.3	33.4
Yield	t/ha	0.78	0.74	0.75	0.77	0.78	0.79	0.80	0.81	0.82	0.83	0.84
Consumption[1]	Mt	24.4	23.8	24.4	25.0	25.5	25.9	26.4	26.8	27.2	27.7	28.1
Exports	Mt	9.7	9.0	9.3	9.6	9.8	10.0	10.3	10.5	10.7	11.0	11.2
Closing stocks	Mt	21.2	21.9	22.1	22.3	22.4	22.5	22.6	22.8	23.0	23.3	23.6
Price[2]	USD/t	2 407.7	2 219.1	2 127.8	2 079.1	2 090.5	2 132.2	2 144.3	2 167.8	2 190.9	2 203.0	2 208.3
DEVELOPED COUNTRIES												
Production	Mt	5.9	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5
Consumption	Mt	1.6	1.5	1.6	1.6	1.7	1.7	1.7	1.7	1.8	1.8	1.8
Exports	Mt	4.6	4.4	4.4	4.5	4.6	4.7	4.7	4.8	4.9	5.0	5.0
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	2.6	2.6	2.6	2.6	2.7	2.7	2.7
DEVELOPING COUNTRIES												
Production	Mt	19.2	18.3	18.6	19.1	19.4	19.8	20.2	20.5	20.9	21.3	21.6
Consumption	Mt	22.8	22.3	22.8	23.3	23.8	24.2	24.7	25.1	25.5	25.9	26.3
Exports	Mt	5.1	4.6	4.8	5.1	5.2	5.4	5.5	5.7	5.8	6.0	6.1
Imports	Mt	9.5	8.9	9.1	9.5	9.7	9.9	10.1	10.4	10.6	10.8	11.1
Closing stocks	Mt	18.9	19.5	19.6	19.8	19.8	19.9	20.0	20.2	20.3	20.6	20.8
OECD[3]												
Production	Mt	5.6	5.5	5.6	5.8	5.9	6.0	6.1	6.2	6.3	6.5	6.6
Consumption	Mt	2.8	2.9	3.0	3.1	3.2	3.2	3.3	3.3	3.3	3.3	3.4
Exports	Mt	4.4	4.4	4.5	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2
Imports	Mt	2.0	1.8	1.8	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Closing stocks	Mt	3.9	4.2	4.2	4.2	4.3	4.3	4.3	4.3	4.4	4.4	4.4

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 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 (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
REAL GDP[1]												
Australia	%	2.2	1.9	1.6	2.0	2.2	2.3	2.3	2.3	2.3	2.3	2.3
Canada	%	0.9	1.0	1.3	2.3	1.9	1.7	1.7	1.7	1.7	1.7	1.7
Chile	%	2.6	-1.0	2.0	2.3	2.4	2.5	2.1	2.1	2.0	2.0	1.9
European Union	%	0.7	0.8	1.7	1.6	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Japan	%	-0.5	1.8	0.9	0.9	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Korea	%	2.1	1.8	1.9	2.6	2.5	2.3	2.3	2.3	2.3	2.3	2.3
Mexico	%	-0.2	1.6	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
New Zealand	%	2.0	1.0	1.2	2.2	2.3	2.4	2.4	2.4	2.4	2.4	2.4
Norway	%	1.9	1.8	1.6	1.6	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Switzerland	%	1.3	0.6	1.4	1.2	1.8	1.2	1.2	1.2	1.2	1.2	1.2
Türkiye	%	6.1	3.0	3.0	3.0	3.0	3.0	2.4	2.5	2.6	2.7	2.7
United Kingdom	%	0.3	-0.4	0.2	2.3	2.2	1.5	1.5	1.5	1.5	1.5	1.5
United States	%	1.7	0.5	1.0	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Brazil	%	1.2	1.2	1.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
China	%	4.5	4.6	4.1	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Egypt	%	4.5	4.4	5.2	5.6	5.8	5.9	5.5	5.2	5.0	4.7	4.5
India	%	3.0	6.1	6.8	6.8	6.5	6.2	5.8	5.5	5.2	5.0	4.7
Indonesia	%	2.3	5.0	5.4	5.3	5.2	5.1	4.9	4.6	4.4	4.2	4.1
Iran	%	3.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Malaysia	%	1.0	4.4	4.9	4.4	4.4	3.9	3.8	3.7	3.5	3.4	3.3
Pakistan	%	3.6	3.5	4.2	4.6	5.0	5.0	4.8	4.5	4.3	4.2	4.0
Russia	%	-0.6	-5.6	-0.2	1.0	0.8	0.7	0.7	0.7	0.7	0.7	0.7
Saudi Arabia	%	2.2	3.7	2.9	2.9	2.9	3.0	2.9	2.9	2.8	2.7	2.6
South Africa	%	0.2	1.1	1.3	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3
Ukraine	%	1.0	3.4	3.8	4.0	4.0	3.8	3.7	3.6	3.4	3.3	3.2
OECD[2,3]	%	1.4	1.0	1.4	1.8	1.8	1.7	1.6	1.6	1.7	1.7	1.7
PCE DEFLATOR[1]												
Australia	%	2.4	4.3	2.5	2.8	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Canada	%	3.0	3.9	2.4	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Chile	%	6.4	8.7	4.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
European Union	%	3.5	4.3	1.9	2.1	2.0	2.1	2.2	2.1	2.1	2.0	2.0
Japan	%	0.7	2.0	1.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Korea	%	2.5	3.3	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Mexico	%	6.6	5.6	3.2	3.3	3.1	3.0	3.0	3.0	3.0	3.0	3.0
New Zealand	%	3.5	4.8	2.8	2.5	2.3	2.1	2.1	2.1	2.1	2.1	2.1
Norway	%	3.1	4.4	3.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Switzerland	%	0.6	2.0	1.4	1.3	1.0	1.0	0.9	0.8	0.7	0.6	0.5
Türkiye	%	35.0	51.2	24.2	17.2	15.4	15.0	7.0	5.6	5.3	5.3	5.3
United Kingdom	%	3.8	6.1	2.8	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0
United States	%	3.8	3.5	2.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Brazil	%	7.3	4.7	4.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
China	%	1.8	2.2	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Egypt	%	6.2	12.0	8.0	7.1	7.0	7.0	6.5	6.1	5.8	5.5	5.2
India	%	6.2	5.1	4.4	4.1	4.0	4.0	3.8	3.7	3.6	3.4	3.3
Indonesia	%	2.7	5.5	3.2	3.0	3.0	3.0	2.9	2.9	2.8	2.7	2.6
Iran	%	3.8	3.0	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Malaysia	%	1.5	2.8	2.4	2.4	2.4	2.5	2.4	2.4	2.3	2.2	2.2
Pakistan	%	10.6	19.9	10.0	7.7	6.5	6.5	6.1	5.8	5.4	5.2	4.9
Russia	%	7.9	5.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Saudi Arabia	%	3.1	2.2	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8
South Africa	%	4.9	5.1	4.7	4.5	4.5	4.5	4.3	4.1	4.0	3.8	3.7
Ukraine	%	6.5	5.8	5.2	5.0	5.0	4.7	4.5	4.3	4.2	4.0	3.8
OECD[2,3]	%	6.5	11.2	6.9	5.7	5.6	5.8	3.6	3.2	3.1	3.1	3.2

Table C.10. Economic assumptions *(cont.)*

Calendar year

		Average 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
GDP DEFLATOR[1]												
Australia	%	2.9	1.9	1.2	2.6	2.4	2.5	2.5	2.5	2.5	2.5	2.5
Canada	%	3.7	1.9	1.8	1.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Chile	%	8.2	8.5	3.4	3.3	2.8	2.8	2.9	2.9	3.0	3.1	3.1
European Union	%	3.8	4.3	2.3	1.8	2.0	1.9	2.0	1.9	1.8	1.8	1.7
Japan	%	0.3	0.7	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Korea	%	1.5	0.8	2.3	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Mexico	%	4.6	3.2	3.7	3.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0
New Zealand	%	2.9	2.5	3.6	3.8	3.4	3.1	3.1	3.1	3.1	3.1	3.1
Norway	%	5.7	1.3	0.1	0.5	0.6	0.8	0.8	0.8	0.8	0.8	0.8
Switzerland	%	0.7	1.0	1.4	1.5	1.4	1.4	1.1	1.1	1.1	1.1	1.1
Türkiye	%	43.9	51.0	24.9	17.1	15.1	14.7	5.5	5.3	5.0	4.9	4.9
United Kingdom	%	3.0	2.2	3.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
United States	%	3.0	2.4	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Brazil	%	7.4	3.6	4.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
China	%	2.2	1.4	2.2	2.1	2.0	2.2	2.2	2.2	2.2	2.2	2.2
Egypt	%	6.7	13.1	8.2	7.4	7.1	7.1	6.6	6.2	5.9	5.5	5.2
India	%	7.9	5.9	4.6	4.4	4.2	4.2	4.0	3.9	3.7	3.6	3.5
Indonesia	%	3.9	5.5	3.2	3.0	3.0	3.0	2.9	2.9	2.8	2.7	2.6
Iran	%	3.8	3.0	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Malaysia	%	2.9	2.8	2.6	2.8	2.6	2.7	2.6	2.5	2.5	2.4	2.4
Pakistan	%	11.3	20.8	10.2	7.8	6.5	6.4	6.0	5.7	5.4	5.1	4.9
Russia	%	6.8	5.0	2.1	2.4	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Saudi Arabia	%	6.3	-4.9	-0.9	-0.2	0.2	0.5	0.5	0.5	0.5	0.5	0.5
South Africa	%	5.6	3.7	4.6	4.6	4.6	4.6	4.4	4.2	4.1	3.9	3.8
Ukraine	%	11.0	6.7	5.6	5.3	5.0	4.8	4.5	4.3	4.2	4.0	3.8
OECD[3]	%	7.1	11.2	7.6	6.1	5.9	6.1	3.2	3.1	3.0	3.0	3.0
WORLD INPUT PRICES												
Brent crude oil[4]	USD/barrel	70.2	81.7	83.7	85.4	87.1	88.8	90.5	92.3	94.1	96.0	97.9
Fertiliser[5]	USD/t	129.5	159.6	105.2	108.5	109.9	112.1	114.2	116.7	119.2	121.6	123.9
EXCHANGE RATES												
Australia	AUD/USD	1.41	1.57	1.57	1.58	1.58	1.59	1.60	1.60	1.61	1.62	1.62
Canada	CAD/USD	1.30	1.37	1.37	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30
Chile	CLP/USD	801.47	819.78	837.60	847.30	856.30	864.44	872.58	880.72	888.85	896.99	905.13
European Union	EUR/USD	0.89	1.02	1.02	1.02	1.01	1.01	1.00	0.99	0.99	0.98	0.97
Japan	JPY/USD	116.47	147.33	147.33	141.63	137.01	133.62	130.32	127.10	123.97	120.90	117.92
Korea	KRW/USD	1 210.62	1 422.10	1 422.10	1 422.81	1 423.27	1 423.28	1 423.30	1 423.31	1 423.32	1 423.33	1 423.34
Mexico	MXN/USD	20.57	19.64	19.64	19.92	20.14	20.33	20.53	20.73	20.93	21.13	21.33
New Zealand	NZD/USD	1.52	1.73	1.73	1.75	1.76	1.77	1.78	1.78	1.79	1.80	1.80
Brazil	BRL/USD	5.23	5.13	5.13	5.14	5.15	5.15	5.15	5.14	5.14	5.14	5.14
China	CNY/USD	6.71	7.30	7.30	7.31	7.30	7.29	7.28	7.26	7.25	7.24	7.23
Egypt	EGP/USD	16.11	19.38	20.35	21.12	21.95	22.81	23.68	24.55	25.41	26.28	27.15
India	INR/USD	75.84	80.39	82.28	84.11	85.81	87.54	89.27	91.00	92.73	94.46	96.19
Indonesia	'000 IDR/USD	14.52	15.14	15.17	15.21	15.27	15.33	15.39	15.44	15.50	15.56	15.62
Malaysia	MYR/USD	4.08	3.88	3.88	3.88	3.89	3.90	3.90	3.91	3.91	3.92	3.92
Pakistan	PKR/USD	165.43	195.42	213.02	230.62	248.22	265.81	283.41	301.01	318.61	336.20	353.80
Russia	RUB/USD	71.89	62.28	62.28	64.06	65.73	67.37	69.05	70.76	72.52	74.33	76.18
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	15.78	16.44	16.76	17.12	17.51	17.89	18.28	18.67	19.06	19.45	19.83
Ukraine	UAH/USD	27.31	27.66	27.80	27.80	27.80	27.80	27.80	27.80	27.80	27.80	27.80
United Kingdom	GBP/USD	0.78	0.89	0.89	0.88	0.87	0.85	0.83	0.82	0.80	0.79	0.77

Table C.10. Economic assumptions *(cont.)*

Calendar year

		2022est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
POPULATION[1]												
Australia	%	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8
Canada	%	0.7	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7
Chile	%	0.5	0.0	-0.1	0.0	0.1	0.2	0.2	0.3	0.3	0.4	0.4
European Union	%	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
Japan	%	-0.5	-0.5	-0.5	-0.5	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Korea	%	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.3
Mexico	%	0.6	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6
New Zealand	%	1.4	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6
Norway	%	0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6
Switzerland	%	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.4
Türkiye	%	0.8	0.5	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6
United Kingdom	%	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
United States	%	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Argentina	%	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5
Brazil	%	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4
China	%	0.1	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2
Egypt	%	1.9	1.8	1.7	1.7	1.6	1.6	1.6	1.6	1.5	1.5	1.5
India	%	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7
Indonesia	%	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7
Iran	%	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7
Malaysia	%	1.3	1.2	1.2	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.8
Pakistan	%	2.0	1.9	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.5	1.5
Russia	%	-0.4	-0.2	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Saudi Arabia	%	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0	1.0	1.0	0.9
South Africa	%	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9	0.9
Ukraine	%	-0.6	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
OECD[3]	%	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
World	%	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8

		Average 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
PER CAPITA GDP in constant 2010 US dollars[1]												
Australia	%	1.2	0.9	0.7	1.0	1.2	1.3	1.4	1.4	1.4	1.4	1.5
Canada	%	0.0	0.2	0.5	1.5	1.1	0.9	0.9	0.9	0.9	0.9	1.0
Chile	%	2.0	-0.9	2.0	2.3	2.3	2.4	1.9	1.8	1.7	1.6	1.5
European Union	%	0.7	0.5	2.2	2.0	1.8	1.7	1.6	1.6	1.6	1.6	1.6
Japan	%	0.0	2.4	1.4	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Korea	%	2.1	1.8	2.0	2.7	2.6	2.5	2.5	2.5	2.5	2.6	2.6
Mexico	%	-0.9	0.9	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.5
New Zealand	%	0.5	0.2	0.4	1.4	1.5	1.6	1.7	1.7	1.7	1.7	1.8
Norway	%	1.3	1.1	0.8	0.9	0.6	0.6	0.6	0.6	0.6	0.6	0.7
Switzerland	%	0.6	0.0	0.8	0.6	1.2	0.6	0.7	0.7	0.7	0.7	0.8
Türkiye	%	5.2	2.6	2.6	2.5	2.5	2.5	1.8	1.9	2.0	2.1	2.1
United Kingdom	%	-0.1	-0.7	-0.1	2.0	1.9	1.2	1.2	1.2	1.2	1.2	1.3
United States	%	1.3	0.0	0.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Brazil	%	0.6	0.7	0.8	1.5	1.4	1.5	1.5	1.5	1.6	1.6	1.6
China	%	4.4	4.6	4.2	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8
Egypt	%	2.5	2.6	3.4	3.8	4.1	4.2	3.9	3.6	3.4	3.2	3.0
India	%	2.0	5.1	5.9	5.8	5.6	5.3	5.0	4.7	4.4	4.2	4.0
Indonesia	%	1.3	4.0	4.4	4.4	4.3	4.2	4.0	3.8	3.6	3.5	3.3
Iran	%	2.4	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.3
Malaysia	%	-0.3	3.1	3.7	3.3	3.3	2.9	2.8	2.7	2.6	2.5	2.4
Pakistan	%	1.6	1.6	2.3	2.8	3.2	3.2	3.1	2.9	2.7	2.6	2.5
Russia	%	-0.4	-5.4	0.1	1.3	1.1	1.0	1.0	1.0	1.0	1.0	1.0
Saudi Arabia	%	0.7	2.3	1.6	1.6	1.7	1.9	1.8	1.8	1.8	1.7	1.7
South Africa	%	-1.0	0.0	0.1	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Ukraine	%	1.6	4.1	4.5	4.7	4.7	4.6	4.4	4.3	4.2	4.1	4.0
OECD[3]	%	0.9	0.6	1.0	1.4	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. 112, December 2022. For other economies, historical macroeconomic data were obtained from the IMF, World Economic Outlook, October 2022. 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,2022 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 2020-22est and 2022est: Data for 2022 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°112 (December 2022). For 2022, the annual average daily spot price is used and the December 2022 average spot price is used for 2023. The oil prices are constant in real term during the projection period.
5. World Bank. Data for 2022 are estimated, projections by OECD and FAO Secretariats.

Source: OECD/FAO (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
CEREALS												
Wheat[1]	USD/t	339.2	315.5	272.8	263.2	268.0	271.5	276.1	281.4	285.5	289.2	293.9
Maize[2]	USD/t	274.2	258.1	211.4	204.7	208.0	210.9	214.7	217.7	220.6	223.4	226.7
Other coarse grains[3]	USD/t	288.3	264.8	237.3	226.8	228.7	234.1	239.2	243.8	247.6	250.9	254.9
Rice[4]	USD/t	412.8	435.4	425.8	418.1	425.0	429.8	436.8	442.2	447.5	453.0	458.6
Distiller's dry grains[5]	USD/t	207.7	215.4	168.1	154.7	157.3	159.7	162.4	164.8	167.1	169.3	171.8
OILSEEDS												
Soybean[6]	USD/t	592.5	539.3	501.1	495.7	508.8	518.2	524.1	532.7	540.3	548.7	556.3
Other oilseeds[7]	USD/t	672.0	568.3	550.5	556.9	579.0	593.7	601.3	614.9	627.2	641.0	652.8
Protein meals[8]	USD/t	466.8	447.7	408.9	404.7	411.0	416.4	420.8	425.7	430.0	434.6	439.4
Vegetable oils[9]	USD/t	1 314.7	1 091.2	1 087.8	1 109.8	1 146.2	1 173.2	1 194.2	1 220.2	1 246.6	1 275.8	1 304.4
SWEETENERS												
Raw sugar[10]	USD/t	399.4	400.6	356.3	332.0	326.2	327.0	334.6	340.6	345.2	347.4	346.8
Refined sugar[11]	USD/t	500.5	520.4	473.7	446.2	440.4	444.1	450.3	459.5	466.2	470.1	471.4
Molasses[12]	USD/t	217.5	199.0	166.1	160.2	167.9	174.5	179.2	180.7	182.1	183.4	185.0
MEAT												
Beef and Veal[13]	USD/t	5 277.7	5 650.8	5 331.5	5 303.6	5 423.4	5 531.6	5 638.5	5 755.8	5 864.6	5 981.0	6 098.0
Pigmeat[14]	USD/t	2 728.8	2 754.6	2 732.9	2 731.5	2 765.7	2 797.3	2 835.3	2 874.5	2 906.0	2 944.9	2 980.0
Poultry meat[15]	USD/t	1 672.8	1 826.2	1 721.5	1 713.9	1 725.4	1 749.1	1 775.8	1 801.5	1 824.9	1 848.4	1 874.2
Sheepmeat[16]	USD/t	5 273.2	5 104.8	4 920.9	4 996.8	5 102.7	5 204.6	5 307.4	5 407.4	5 509.6	5 613.1	5 709.8
FISH AND SEAFOOD												
Product traded[17]	USD/t	3 284.1	3 575.2	3 483.9	3 483.2	3 462.0	3 543.1	3 644.9	3 676.1	3 761.6	3 848.0	3 937.5
Aquaculture[18]	USD/t	3 311.6	3 413.8	3 374.7	3 365.1	3 336.7	3 413.7	3 514.3	3 556.5	3 651.9	3 748.0	3 833.5
Capture[19]	USD/t	1 935.0	2 097.6	2 067.3	2 064.5	2 056.4	2 093.4	2 144.0	2 154.2	2 192.4	2 230.1	2 297.7
Meal[20]	USD/t	1 501.5	1 663.6	1 679.8	1 580.0	1 563.4	1 615.4	1 735.3	1 700.2	1 693.9	1 734.6	1 898.8
Oil[21]	USD/t	2 367.0	2 268.9	2 250.1	2 173.4	2 150.2	2 209.1	2 298.5	2 407.5	2 413.7	2 473.5	2 585.7
DAIRY PRODUCTS												
Butter[22]	USD/t	4 925.0	4 636.7	4 765.1	4 866.3	5 027.0	5 129.8	5 212.9	5 336.1	5 432.7	5 557.2	5 673.0
Cheese[23]	USD/t	4 610.6	4 589.7	4 658.0	4 718.8	4 807.6	4 891.6	4 960.5	5 046.1	5 123.0	5 210.8	5 300.0
Skim milk powder[24]	USD/t	3 340.1	3 115.6	3 112.0	3 122.2	3 147.2	3 199.0	3 256.4	3 312.1	3 368.7	3 432.3	3 497.6
Whole milk powder[25]	USD/t	3 554.2	3 343.9	3 380.3	3 425.8	3 478.3	3 536.9	3 598.0	3 667.3	3 735.6	3 813.2	3 890.5
Whey powder[26]	USD/t	1 143.1	1 002.5	1 014.2	1 024.5	1 032.5	1 046.7	1 061.5	1 078.0	1 093.1	1 108.5	1 124.2
Casein[27]	USD/t	9 233.9	9 278.6	8 970.9	8 914.0	8 983.0	9 122.2	9 263.2	9 406.0	9 550.7	9 697.3	9 847.2
BIOFUEL												
Ethanol[28]	USD/hl	57.9	56.8	52.3	52.8	53.4	53.9	54.3	54.9	55.5	56.2	56.8
Biodiesel[29]	USD/hl	140.8	150.5	129.9	134.7	137.5	141.1	144.2	146.7	149.7	152.8	156.1
COTTON												
Cotton[30]	USD/t	2 407.7	2 219.1	2 127.8	2 079.1	2 090.5	2 132.2	2 144.3	2 167.8	2 190.9	2 203.0	2 208.3
ROOTS AND TUBERS												
Roots and tubers[31]	USD/t	440.7	448.5	462.7	468.4	479.3	483.9	492.7	499.0	506.5	513.1	520.5
USA GDP Deflator (2022=1)	**Index**	**0.964**	**1.024**	**1.049**	**1.071**	**1.092**	**1.113**	**1.135**	**1.157**	**1.180**	**1.203**	**1.227**

Table C.11. World prices *(cont.)*

Real price

		Average 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
CEREALS												
Wheat[1]	USD/t	350.9	308.2	260.1	245.9	245.5	243.9	243.3	243.2	242.0	240.4	239.6
Maize[2]	USD/t	284.1	252.1	201.5	191.2	190.6	189.5	189.2	188.2	187.0	185.7	184.8
Other coarse grains[3]	USD/t	298.4	258.7	226.2	211.9	209.5	210.3	210.7	210.6	209.8	208.5	207.8
Rice[4]	USD/t	428.8	425.3	406.0	390.6	389.4	386.2	384.9	382.1	379.2	376.5	373.8
Distiller's dry grains[5]	USD/t	214.8	210.4	160.2	144.5	144.1	143.5	143.1	142.4	141.6	140.7	140.0
OILSEEDS												
Soybean[6]	USD/t	615.1	526.7	477.8	463.1	466.1	465.6	461.8	460.3	457.9	456.0	453.4
Other oilseeds[7]	USD/t	697.7	555.2	524.8	520.3	530.5	533.5	529.8	531.4	531.5	532.7	532.1
Protein meals[8]	USD/t	484.4	437.3	389.8	378.1	376.6	374.1	370.8	367.9	364.4	361.2	358.2
Vegetable oils[9]	USD/t	1 365.8	1 065.9	1 037.0	1 036.7	1 050.1	1 054.1	1 052.3	1 054.4	1 056.4	1 060.3	1 063.2
SWEETENERS												
Raw sugar[10]	USD/t	414.1	391.3	339.7	310.2	298.8	293.8	294.9	294.3	292.5	288.7	282.7
Refined sugar[11]	USD/t	518.7	508.3	451.6	416.8	403.5	399.0	396.8	397.1	395.1	390.8	384.2
Molasses[12]	USD/t	225.1	194.4	158.3	149.7	153.8	156.8	157.9	156.2	154.3	152.4	150.8
MEAT												
Beef and Veal[13]	USD/t	5 466.7	5 519.7	5 082.7	4 954.5	4 968.7	4 970.1	4 968.4	4 973.9	4 970.2	4 971.1	4 970.6
Pigmeat[14]	USD/t	2 830.2	2 690.7	2 605.4	2 551.7	2 533.9	2 513.3	2 498.3	2 484.0	2 462.8	2 447.6	2 429.0
Poultry meat[15]	USD/t	1 729.8	1 783.8	1 641.2	1 601.1	1 580.8	1 571.6	1 564.7	1 556.7	1 546.6	1 536.3	1 527.7
Sheepmeat[16]	USD/t	5 462.5	4 986.3	4 691.3	4 667.9	4 674.9	4 676.2	4 676.6	4 672.9	4 669.3	4 665.3	4 654.1
FISH AND SEAFOOD												
Product traded[17]	USD/t	3 401.9	3 492.3	3 321.4	3 254.0	3 171.8	3 183.4	3 211.7	3 176.7	3 187.9	3 198.2	3 209.5
Aquaculture[18]	USD/t	3 432.4	3 334.6	3 217.2	3 143.6	3 057.0	3 067.2	3 096.7	3 073.4	3 095.0	3 115.1	3 124.7
Capture[19]	USD/t	2 006.0	2 049.0	1 970.8	1 928.6	1 884.0	1 880.9	1 889.2	1 861.6	1 858.0	1 853.5	1 872.9
Meal[20]	USD/t	1 557.4	1 625.0	1 601.5	1 476.0	1 432.3	1 451.4	1 529.1	1 469.3	1 435.5	1 441.7	1 547.7
Oil[21]	USD/t	2 444.8	2 216.3	2 145.1	2 030.3	1 969.9	1 984.9	2 025.3	2 080.4	2 045.6	2 055.8	2 107.7
DAIRY PRODUCTS												
Butter[22]	USD/t	5 089.3	4 529.1	4 542.7	4 546.0	4 605.6	4 609.1	4 593.3	4 611.2	4 604.2	4 618.8	4 624.1
Cheese[23]	USD/t	4 769.0	4 483.2	4 440.6	4 408.2	4 404.6	4 395.1	4 370.9	4 360.6	4 341.7	4 330.9	4 320.1
Skim milk powder[24]	USD/t	3 454.9	3 043.3	2 966.8	2 916.7	2 883.4	2 874.3	2 869.4	2 862.2	2 854.9	2 852.7	2 850.9
Whole milk powder[25]	USD/t	3 678.9	3 266.3	3 222.6	3 200.3	3 186.7	3 177.9	3 170.4	3 169.1	3 165.9	3 169.3	3 171.2
Whey powder[26]	USD/t	1 181.2	979.3	966.9	957.1	945.9	940.5	935.3	931.6	926.4	921.3	916.4
Casein[27]	USD/t	9 535.7	9 063.3	8 552.3	8 327.3	8 229.9	8 196.2	8 162.3	8 128.3	8 094.1	8 059.8	8 026.5
BIOFUEL												
Ethanol[28]	USD/hl	59.7	55.5	49.8	49.3	48.9	48.5	47.9	47.4	47.1	46.7	46.3
Biodiesel[29]	USD/hl	144.8	147.0	123.8	125.8	125.9	126.7	127.0	126.8	126.9	127.0	127.2
COTTON												
Cotton[30]	USD/t	2 492.8	2 167.6	2 028.5	1 942.2	1 915.2	1 915.8	1 889.4	1 873.3	1 856.8	1 831.0	1 800.0
ROOTS AND TUBERS												
Roots and tubers[31]	USD/t	456.9	438.1	441.1	437.6	439.1	434.7	434.1	431.2	429.3	426.4	424.2

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 2020-22est: Data for 2022 are estimated. Real prices are deflated using USA GDP base year 2022=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. Unit import price, Europe (October/September).
13. Australia and New Zealand: Beef, mixed trimmings 85%, East Coast, FOB port of entry. USD/t.
14. United States of America: Meat of Swine (Fresh, Chilled Or Frozen), export unit value USD/t.
15. Brazil: Meat And Edible Offal Of Poultry (Fresh, Chilled Or Frozen), export unit value USD/t.
16. New Zealand: Lamb 17.5kg, USD/t.
17. World unit value of trade (sum of exports and imports).
18. World unit value of aquaculture fisheries production (live weight basis).
19. FAO estimated value of world ex-vessel value of capture fisheries production excluding for reduction.
20. Fishmeal, 64-65% protein, Hamburg, Germany.
21. Fish oil any origin, N.W. Europe.
22. FOB export price, butter, 82% butterfat, Oceania.
23. FOB export price, cheddar cheese, 39% moisture, Oceania.
24. FOB export price, non-fat dry milk, 1.25% butterfat, Oceania.
25. FOB export price, WMP 26% butterfat, Oceania.
26. FOB export price, sweet whey non-hygroscopic, Western Europe.
27. Export price, New Zealand.
28. Wholesale price, United States, Omaha.
29. Producer price Germany net of biodiesel tariff and energy tax.
30. Cotlook A index, Middling 1 1/8”, c.f.r. far Eastern ports (August/July).
31. Thailand, Bangkok, Cassava (flour), wholesale.

Source: OECD/FAO (2023), “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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Wheat												
World Trade	**kt**	**189 817**	**192 766**	**195 075**	**197 239**	**199 014**	**202 239**	**204 703**	**206 977**	**209 296**	**211 638**	**213 431**
OECD[1]	kt	39 529	39 007	39 182	39 148	39 146	39 303	39 397	39 413	39 458	39 513	39 614
Developing countries	kt	159 923	164 170	166 445	168 661	170 413	173 387	175 711	177 861	180 037	182 246	183 905
Least Developed Countries	kt	19 593	22 816	23 638	23 389	23 878	24 627	25 376	26 065	26 620	27 154	27 611
Maize												
World Trade	**kt**	**187 870**	**183 282**	**185 039**	**186 364**	**189 132**	**191 963**	**194 842**	**197 700**	**200 477**	**203 229**	**206 138**
OECD[1]	kt	82 177	78 656	81 187	82 108	82 386	83 037	84 044	85 147	86 137	87 038	87 879
Developing countries	kt	144 701	144 288	144 657	145 694	148 307	150 822	153 033	155 074	157 243	159 469	161 948
Least Developed Countries	kt	4 980	5 503	5 920	5 298	5 335	5 307	5 407	5 412	5 247	5 057	4 905
Other coarse grains												
World Trade	**kt**	**45 614**	**43 148**	**42 857**	**42 705**	**42 935**	**43 549**	**44 341**	**44 999**	**45 809**	**46 403**	**46 963**
OECD[1]	kt	9 010	9 224	9 257	9 295	9 330	9 261	9 369	9 331	9 466	9 530	9 608
Developing countries	kt	38 594	35 970	35 644	35 689	35 988	36 648	37 429	38 066	38 775	39 341	39 884
Least Developed Countries	kt	1 124	1 500	1 417	1 239	1 205	1 267	1 367	1 499	1 574	1 617	1 611
Rice												
World Trade	**kt**	**52 482**	**53 847**	**54 446**	**55 927**	**56 751**	**57 766**	**58 906**	**60 206**	**61 379**	**62 454**	**63 487**
OECD[1]	kt	7 805	7 965	7 965	8 008	8 025	8 068	8 114	8 173	8 235	8 290	8 370
Developing countries	kt	44 834	46 161	46 730	48 137	48 912	49 846	50 907	52 118	53 206	54 200	55 132
Least Developed Countries	kt	11 889	12 326	13 037	13 639	14 104	14 656	15 311	16 024	16 674	17 322	17 976
Soybean												
World Trade	**kt**	**160 631**	**162 187**	**163 261**	**165 142**	**165 779**	**166 766**	**167 626**	**168 331**	**169 112**	**169 827**	**170 674**
OECD[1]	kt	31 120	30 713	30 624	30 619	30 451	30 333	30 259	30 156	30 060	29 954	29 859
Developing countries	kt	137 863	139 551	140 695	142 501	143 414	144 667	145 751	146 686	147 662	148 611	149 670
Least Developed Countries	kt	1 679	1 889	1 976	2 019	2 063	2 106	2 155	2 201	2 249	2 298	2 349
Other oilseeds												
World Trade	**kt**	**22 536**	**23 936**	**24 028**	**24 078**	**24 133**	**24 045**	**24 246**	**24 400**	**24 545**	**24 671**	**24 799**
OECD[1]	kt	13 953	14 201	14 198	14 183	14 105	13 980	13 970	13 916	13 871	13 817	13 752
Developing countries	kt	10 404	11 793	11 972	12 094	12 261	12 317	12 545	12 744	12 927	13 100	13 287
Least Developed Countries	kt	306	285	290	291	296	292	297	301	303	304	305
Protein meals												
World Trade	**kt**	**92 250**	**95 026**	**96 581**	**97 398**	**98 362**	**99 231**	**100 121**	**100 971**	**101 723**	**102 509**	**103 222**
OECD[1]	kt	46 706	48 222	48 458	48 194	48 158	48 007	47 876	47 754	47 601	47 453	47 332
Developing countries	kt	53 730	55 196	56 734	57 845	58 888	59 985	61 097	62 176	63 190	64 213	65 165
Least Developed Countries	kt	1 503	1 638	1 701	1 749	1 849	1 937	2 026	2 119	2 211	2 340	2 415
Vegetable oils												
World Trade	**kt**	**83 184**	**84 376**	**84 782**	**85 272**	**85 774**	**86 285**	**86 780**	**87 255**	**87 754**	**88 264**	**88 728**
OECD[1]	kt	23 691	23 384	23 086	22 776	22 527	22 296	22 035	21 791	21 543	21 408	21 281
Developing countries	kt	61 438	62 869	63 519	64 283	64 987	65 703	66 415	67 092	67 803	68 414	68 976
Least Developed Countries	kt	6 945	7 368	7 607	7 806	8 016	8 251	8 502	8 755	9 032	9 274	9 513
Sugar												
World Trade	**kt**	**60 725**	**61 267**	**63 590**	**65 640**	**66 655**	**66 968**	**67 234**	**68 364**	**69 484**	**70 703**	**71 614**
OECD[1]	kt	12 014	11 774	11 557	11 433	11 547	11 581	11 565	11 535	11 446	11 390	11 367
Developing countries	kt	48 568	49 549	52 043	54 299	55 261	55 539	55 735	56 855	58 035	59 286	60 219
Least Developed Countries	kt	9 365	9 334	9 816	10 370	10 755	11 060	11 188	11 502	11 825	12 176	12 564
Beef[2]												
World Trade	**kt**	**11 293**	**11 963**	**12 196**	**12 365**	**12 511**	**12 673**	**12 825**	**12 976**	**13 135**	**13 290**	**13 448**
OECD[1]	kt	4 538	4 662	4 640	4 651	4 643	4 650	4 652	4 658	4 666	4 672	4 679
Developing countries	kt	7 298	8 065	8 312	8 475	8 635	8 797	8 953	9 107	9 266	9 423	9 584
Least Developed Countries	kt	94	174	178	176	201	235	262	279	298	320	346
Pigmeat[2]												
World Trade	**kt**	**11 748**	**10 417**	**10 292**	**10 291**	**10 285**	**10 291**	**10 285**	**10 297**	**10 317**	**10 364**	**10 399**
OECD[1]	kt	5 411	5 879	5 886	5 919	5 953	5 980	6 004	6 031	6 058	6 084	6 105
Developing countries	kt	7 981	6 328	6 200	6 169	6 133	6 119	6 094	6 082	6 079	6 104	6 121
Least Developed Countries	kt	145	170	173	190	212	226	240	259	276	293	310
Poultry meat												
World Trade	**kt**	**14 577**	**15 600**	**15 569**	**15 493**	**15 603**	**15 738**	**15 885**	**16 049**	**16 218**	**16 384**	**16 544**
OECD[1]	kt	4 070	4 543	4 432	4 373	4 363	4 388	4 412	4 433	4 456	4 477	4 499
Developing countries	kt	10 355	10 928	10 984	10 954	11 093	11 236	11 388	11 557	11 732	11 908	12 079
Least Developed Countries	kt	1 296	1 620	1 685	1 765	1 846	1 929	2 015	2 106	2 201	2 299	2 398
Sheep meat[2]												
World Trade	**kt**	**1 091**	**1 131**	**1 135**	**1 138**	**1 142**	**1 145**	**1 149**	**1 153**	**1 157**	**1 162**	**1 166**
OECD[1]	kt	436	442	426	418	416	413	411	409	406	404	402
Developing countries	kt	671	700	720	730	736	742	748	755	761	767	774
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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Butter												
World Trade	**kt**	**1 002**	**1 079**	**1 083**	**1 090**	**1 096**	**1 111**	**1 125**	**1 131**	**1 143**	**1 150**	**1 158**
OECD[1]	kt	295	310	308	307	302	303	303	300	300	300	300
Developing countries	kt	585	653	666	678	689	701	713	721	731	738	746
Least Developed Countries	kt	11	18	20	20	22	25	27	29	31	32	33
Cheese												
World Trade	**kt**	**3 491**	**3 630**	**3 659**	**3 702**	**3 762**	**3 826**	**3 888**	**3 950**	**4 013**	**4 074**	**4 131**
OECD[1]	kt	1 723	1 765	1 770	1 789	1 809	1 831	1 841	1 854	1 869	1 883	1 896
Developing countries	kt	1 642	1 753	1 789	1 826	1 871	1 914	1 962	2 010	2 056	2 102	2 145
Least Developed Countries	kt	27	34	41	44	49	55	62	69	75	81	88
Whole milk powder												
World Trade	**kt**	**2 752**	**2 605**	**2 630**	**2 650**	**2 666**	**2 684**	**2 699**	**2 715**	**2 729**	**2 741**	**2 753**
OECD[1]	kt	160	153	149	153	155	158	159	159	160	160	160
Developing countries	kt	2 619	2 484	2 511	2 525	2 542	2 559	2 574	2 590	2 603	2 616	2 628
Least Developed Countries	kt	262	257	268	279	289	299	309	319	328	338	348
Skim milk powder												
World Trade	**kt**	**2 583**	**2 693**	**2 768**	**2 839**	**2 905**	**2 969**	**3 035**	**3 099**	**3 163**	**3 229**	**3 295**
OECD[1]	kt	510	523	523	526	530	533	536	539	542	546	550
Developing countries	kt	2 345	2 449	2 518	2 581	2 647	2 710	2 774	2 837	2 900	2 964	3 029
Least Developed Countries	kt	122	135	143	151	159	167	175	183	191	198	206
Fish												
World Trade	**kt**	**43 953**	**44 084**	**44 402**	**44 991**	**45 100**	**45 284**	**45 331**	**45 595**	**45 722**	**45 884**	**45 659**
OECD[1]	kt	23 503	23 547	23 588	24 119	24 196	24 289	24 316	24 412	24 475	24 557	24 558
Developing countries	kt	21 139	21 371	21 750	21 858	21 885	21 995	22 098	22 296	22 315	22 411	22 244
Least Developed Countries	kt	1 353	1 394	1 453	1 482	1 531	1 551	1 549	1 574	1 586	1 587	1 550
Fishmeal[3]												
World Trade	**kt**	**3 723**	**3 869**	**3 577**	**3 795**	**3 846**	**3 830**	**3 475**	**3 691**	**3 747**	**3 715**	**3 348**
OECD[1]	kt	1 197	1 205	1 062	1 150	1 132	1 112	957	1 032	1 035	1 031	895
Developing countries	kt	2 756	2 907	2 736	2 863	2 940	2 949	2 740	2 879	2 941	2 920	2 685
Least Developed Countries	kt	87	87	69	85	98	102	91	102	108	109	95
Fish oil[3]												
World Trade	**kt**	**919**	**915**	**892**	**927**	**945**	**959**	**932**	**968**	**979**	**992**	**959**
OECD[1]	kt	733	728	715	730	750	760	741	758	770	780	758
Developing countries	kt	322	317	314	332	345	353	345	360	371	378	367
Least Developed Countries	kt	7	7	7	7	7	7	7	7	7	7	7
Ethanol												
World Trade	**kt**	**10 893**	**10 490**	**10 735**	**10 754**	**10 907**	**11 067**	**11 240**	**11 398**	**11 551**	**11 709**	**11 863**
OECD[1]	kt	7 443	7 219	7 402	7 394	7 532	7 677	7 844	7 996	8 143	8 296	8 444
Developing countries	kt	4 675	4 449	4 520	4 533	4 534	4 540	4 540	4 541	4 542	4 545	4 548
Least Developed Countries	kt	221	224	224	224	224	224	224	224	224	224	224
Biodiesel												
World Trade	**kt**	**8 147**	**6 987**	**6 919**	**6 865**	**6 825**	**6 797**	**6 870**	**6 999**	**7 094**	**7 180**	**7 266**
OECD[1]	kt	7 806	6 648	6 578	6 543	6 504	6 483	6 558	6 685	6 780	6 865	6 950
Developing countries	kt	341	339	341	322	321	314	312	314	313	315	316
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Cotton												
World Trade	**kt**	**9 895**	**9 233**	**9 502**	**9 833**	**10 047**	**10 276**	**10 497**	**10 717**	**10 944**	**11 192**	**11 422**
OECD[1]	kt	2 024	1 764	1 832	1 899	1 925	1 958	1 959	1 963	1 970	1 982	2 001
Developing countries	kt	9 549	8 870	9 138	9 468	9 685	9 914	10 133	10 352	10 578	10 825	11 055
Least Developed Countries	kt	1 560	1 467	1 543	1 614	1 671	1 726	1 787	1 845	1 903	1 962	2 024
Roots and tubers												
World Trade	**kt**	**18 728**	**19 179**	**19 523**	**19 957**	**20 302**	**20 647**	**20 947**	**21 295**	**21 632**	**21 988**	**22 352**
OECD[1]	kt	3 760	3 926	3 886	3 920	3 921	3 921	3 947	3 957	3 962	3 969	3 959
Developing countries	kt	15 584	15 851	16 244	16 654	16 998	17 336	17 612	17 946	18 277	18 623	18 992
Least Developed Countries	kt	240	333	327	331	325	337	366	410	462	508	528

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 2020-22est: Data for 2022 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 (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Wheat												
OECD[1]	kt	108 983	109 469	109 074	108 937	109 295	111 470	112 768	113 762	114 787	115 790	116 571
Developing countries	kt	26 769	24 613	24 504	24 815	25 401	25 839	26 317	26 811	27 280	27 773	28 303
Least Developed Countries	kt	211	173	167	169	166	162	159	155	153	151	150
Maize												
OECD[1]	kt	68 935	60 983	62 355	63 229	63 113	63 438	63 756	64 036	64 172	64 187	64 292
Developing countries	kt	82 921	82 122	83 440	85 446	87 003	88 512	90 030	91 532	93 007	94 484	96 025
Least Developed Countries	kt	3 003	3 104	2 949	3 053	3 035	3 006	2 953	2 933	2 947	2 980	3 016
Other coarse grains												
OECD[1]	kt	32 272	30 320	29 538	28 931	28 849	29 212	29 694	30 010	30 453	30 679	30 924
Developing countries	kt	6 114	6 300	6 299	6 317	6 324	6 358	6 368	6 390	6 413	6 444	6 489
Least Developed Countries	kt	522	343	357	380	384	375	355	334	323	317	317
Rice												
OECD[1]	kt	3 284	2 936	3 053	3 131	3 224	3 286	3 337	3 394	3 455	3 491	3 546
Developing countries	kt	48 029	50 755	51 221	52 611	53 330	54 267	55 339	56 563	57 658	58 680	59 640
Least Developed Countries	kt	4 446	4 623	4 517	4 550	4 734	4 841	4 902	4 913	5 010	5 156	5 341
Soybean												
OECD[1]	kt	61 371	55 558	56 740	57 113	57 161	57 404	57 561	57 635	57 823	57 922	58 146
Developing countries	kt	94 058	103 878	103 627	105 031	105 575	106 323	107 040	107 669	108 255	108 862	109 482
Least Developed Countries	kt	18	17	17	17	17	17	17	16	16	16	16
Other oilseeds												
OECD[1]	kt	14 471	15 701	15 685	15 595	15 495	15 183	15 344	15 453	15 540	15 602	15 685
Developing countries	kt	3 264	2 929	2 925	2 960	2 984	3 041	3 039	3 035	3 042	3 047	3 050
Least Developed Countries	kt	478	360	321	336	330	343	341	337	336	334	333
Protein meals												
OECD[1]	kt	21 586	22 737	22 866	23 379	23 962	24 456	24 947	25 425	25 796	26 165	26 423
Developing countries	kt	61 369	64 660	66 039	66 270	66 568	66 848	67 132	67 406	67 681	67 983	68 314
Least Developed Countries	kt	361	320	305	305	285	273	262	250	239	220	216
Vegetable oils												
OECD[1]	kt	8 891	8 729	8 792	9 057	9 240	9 374	9 561	9 702	9 808	9 915	9 985
Developing countries	kt	64 123	66 056	66 344	66 455	66 738	67 045	67 257	67 516	67 823	68 135	68 422
Least Developed Countries	kt	565	536	515	499	481	463	446	429	413	397	383
Sugar												
OECD[1]	kt	6 956	7 834	7 599	7 733	7 921	8 004	8 294	8 461	8 546	8 652	8 656
Developing countries	kt	58 555	58 809	61 368	62 909	63 698	63 933	63 936	64 930	65 963	67 024	67 887
Least Developed Countries	kt	2 442	1 965	1 933	1 959	2 058	2 130	1 986	1 940	1 871	1 825	1 814
Beef[2]												
OECD[1]	kt	5 225	5 318	5 427	5 463	5 535	5 599	5 668	5 735	5 803	5 870	5 936
Developing countries	kt	6 623	6 933	7 010	7 112	7 202	7 308	7 400	7 496	7 598	7 701	7 807
Least Developed Countries	kt	13	11	11	12	12	12	13	13	13	13	14
Pigmeat[2]												
OECD[1]	kt	10 143	8 934	8 849	8 785	8 754	8 740	8 724	8 725	8 733	8 766	8 785
Developing countries	kt	1 907	1 723	1 629	1 662	1 676	1 679	1 689	1 700	1 712	1 726	1 741
Least Developed Countries	kt	1	2	2	2	2	2	2	2	2	1	1
Poultry meat												
OECD[1]	kt	7 355	7 376	7 439	7 462	7 483	7 525	7 574	7 634	7 695	7 755	7 810
Developing countries	kt	8 215	8 352	8 286	8 205	8 309	8 417	8 531	8 653	8 781	8 908	9 031
Least Developed Countries	kt	45	32	31	30	28	27	26	25	24	23	23
Sheep meat[2]												
OECD[1]	kt	1 021	1 063	1 076	1 084	1 094	1 102	1 110	1 119	1 127	1 135	1 143
Developing countries	kt	86	86	84	84	85	85	86	86	86	86	86
Least Developed Countries	kt	4	5	5	5	5	4	4	4	4	4	4
Butter												
OECD[1]	kt	824	848	856	871	880	900	917	924	937	943	949
Developing countries	kt	111	144	141	129	124	122	121	122	123	126	130
Least Developed Countries	kt	3	1	1	1	1	0	0	0	0	0	0
Cheese												
OECD[1]	kt	2 623	2 775	2 801	2 844	2 897	2 955	3 014	3 072	3 130	3 186	3 236
Developing countries	kt	561	529	519	506	500	498	498	499	501	505	510
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Whole milk powder												
OECD[1]	kt	1 972	1 899	1 921	1 938	1 949	1 967	1 981	1 996	2 007	2 016	2 026
Developing countries	kt	715	670	672	675	680	680	681	682	685	687	689
Least Developed Countries	kt	6	6	6	6	5	5	5	5	5	5	4
Skim milk powder												
OECD[1]	kt	2 278	2 335	2 417	2 495	2 566	2 633	2 700	2 767	2 832	2 897	2 962
Developing countries	kt	265	298	293	288	285	283	282	282	282	283	284
Least Developed Countries	kt	13	13	13	12	12	11	11	10	10	10	10

Table C.12.2. World trade projections, exports *(cont.)*

		Average 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Fish[3]												
OECD[1]	kt	13 165	13 408	13 330	13 563	13 678	13 746	13 460	13 620	13 681	13 706	13 417
Developing countries	kt	27 775	27 512	27 772	28 402	28 549	28 789	28 984	29 337	29 586	29 871	29 868
Least Developed Countries	kt	1 928	1 770	1 805	1 716	1 667	1 659	1 670	1 616	1 586	1 562	1 583
Fishmeal[4]												
OECD[1]	kt	948	880	851	887	902	916	863	913	930	938	892
Developing countries	kt	2 532	2 469	2 148	2 450	2 530	2 547	2 204	2 499	2 590	2 594	2 235
Least Developed Countries	kt	180	201	193	199	205	207	202	207	209	210	204
Fish oil[4]												
OECD[1]	kt	544	510	499	507	501	506	508	513	502	510	514
Developing countries	kt	508	482	452	493	502	514	478	520	525	533	490
Least Developed Countries	kt	44	43	43	43	42	42	42	42	41	41	41
Ethanol												
OECD[1]	kt	5 877	6 138	6 529	6 763	6 880	7 008	7 092	7 228	7 377	7 556	7 731
Developing countries	kt	3 938	3 979	3 834	3 618	3 654	3 686	3 776	3 798	3 802	3 782	3 760
Least Developed Countries	kt	36	44	44	44	44	44	44	44	44	44	44
Biodiesel												
OECD[1]	kt	2 766	2 169	2 243	2 317	2 390	2 465	2 541	2 619	2 699	2 780	2 836
Developing countries	kt	4 159	4 841	4 698	4 572	4 458	4 356	4 352	4 403	4 418	4 424	4 453
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Cotton												
OECD[1]	kt	4 438	4 403	4 473	4 538	4 616	4 700	4 797	4 890	4 983	5 074	5 162
Developing countries	kt	5 084	4 635	4 848	5 076	5 231	5 387	5 534	5 680	5 826	5 993	6 145
Least Developed Countries	kt	1 144	983	1 030	1 141	1 142	1 149	1 149	1 155	1 166	1 176	1 185
Roots and tubers												
OECD[1]	kt	1 861	1 905	1 937	1 959	1 986	2 007	2 036	2 067	2 094	2 124	2 155
Developing countries	kt	12 754	13 177	13 492	13 903	14 222	14 548	14 822	15 141	15 453	15 782	16 119
Least Developed Countries	kt	141	107	112	110	111	108	102	96	92	90	91

Note: Average 2020-22est: Data for 2022 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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**778 550**	**854 859**	**0.85**	**0.82**	**189 817**	**213 431**	**2.14**	**1.17**	**193 795**	**213 431**	**2.15**	**1.17**
NORTH AMERICA	77 052	88 547	-2.12	0.54	3 002	3 132	-4.07	1.06	45 157	52 014	-1.41	0.77
Canada	30 519	37 048	-0.93	1.23	142	151	10.22	1.87	21 866	27 755	-0.84	1.44
United States	46 533	51 500	-2.87	0.07	2 860	2 981	-4.52	1.02	23 291	24 259	-1.96	0.06
LATIN AMERICA	32 119	39 498	3.28	1.22	22 380	24 817	0.07	0.50	14 777	19 847	8.02	1.88
Argentina	17 933	23 739	5.96	1.42	3	3	0.00	-0.05	12 312	17 020	15.96	1.91
Brazil	7 348	8 605	3.14	1.23	5 184	4 963	-4.05	-1.34	579	589	-5.04	0.00
Chile	1 204	1 052	-3.04	0.02	1 287	1 523	6.26	0.49	0	0	..	..
Colombia	5	6	-15.70	1.18	1 959	2 102	2.58	0.30	20	17	24.41	-0.30
Mexico	3 288	3 470	-1.18	0.45	4 949	5 825	2.06	1.37	729	1 292	-3.53	3.98
Paraguay	891	978	-0.66	1.10	1	1	-37.43	-0.82	410	302	0.79	3.98
Peru	195	203	-1.66	1.00	2 136	2 545	2.17	1.11	4	3	-7.42	-0.35
EUROPE	265 108	282 539	1.31	0.72	8 824	8 081	-2.96	-0.45	87 000	102 343	3.34	1.57
European Union[1]	133 279	137 548	-0.34	0.15	4 806	5 313	-2.04	0.07	31 842	36 858	0.04	1.43
United Kingdom	13 073	16 095	-0.72	1.03	1 656	584	-5.86	-5.02	637	1 215	-6.85	3.04
Russia	84 651	96 226	5.17	1.44	190	377	-14.96	3.89	36 272	48 126	7.36	1.78
Ukraine	25 676	22 515	0.55	0.80	27	15	-12.09	-0.22	16 481	12 856	4.43	0.87
AFRICA	26 686	31 823	-0.13	0.79	51 031	64 309	1.18	2.02	812	569	-3.16	-1.00
Egypt	9 233	10 448	-0.26	1.24	11 815	14 922	0.97	1.76	195	92	-1.95	-0.69
Ethiopia	5 241	5 563	3.05	1.12	1 350	2 827	5.06	4.16	0	0	..	..
Nigeria	66	66	-1.89	0.84	5 663	7 837	3.00	2.68	1	1	-10.10	-0.59
South Africa	2 208	2 165	2.93	-0.21	1 537	1 746	-1.13	1.43	150	77	-5.77	2.71
ASIA	342 214	382 446	0.87	0.98	103 664	111 936	4.04	0.98	19 847	18 310	1.18	1.06
China[2]	136 307	136 176	0.88	0.14	10 025	7 446	14.89	-0.56	168	222	-2.47	1.33
India	108 096	130 578	2.21	1.84	4	2	-39.42	-7.19	5 489	1 783	6.15	9.62
Indonesia	0	0	..	..	10 805	12 458	4.55	0.54	70	67	-5.75	-0.54
Iran	12 480	13 324	2.40	0.41	4 953	5 109	-1.89	2.69	50	49	3.29	-0.27
Japan	1 011	1 120	2.39	0.28	5 424	5 374	-0.99	0.00	0	0	..	..
Kazakhstan	13 091	16 821	-1.11	1.17	1 200	717	65.01	-0.79	8 092	10 001	1.22	0.80
Korea	20	28	-3.05	0.31	4 178	4 070	0.17	0.16	53	56	0.95	0.65
Malaysia	0	0	..	..	1 655	1 886	1.85	0.94	148	158	5.26	-0.93
Pakistan	26 223	31 331	0.52	1.19	2 741	2 730	41.44	7.84	68	79	-29.15	-0.68
Philippines	0	0	..	..	6 371	7 455	5.55	1.31	63	59	249.06	-1.29
Saudi Arabia	550	479	16.11	0.86	3 158	3 876	-0.65	1.30	0	0	..	..
Thailand	1	1	-3.71	0.82	2 895	3 485	-0.30	1.17	19	12	2.84	-1.15
Türkiye	19 233	22 847	-1.45	1.20	9 019	8 157	10.94	-0.57	4 222	4 651	1.68	0.58
Viet Nam	0	0	..	..	4 073	5 167	6.00	2.07	43	36	0.01	-2.02
OCEANIA	35 370	30 005	3.37	0.06	917	1 156	2.65	0.39	26 201	20 349	3.57	-0.20
Australia	34 945	29 507	3.43	0.04	33	28	13.15	-0.40	26 201	20 349	3.57	-0.20
New Zealand	425	499	-0.69	1.33	488	600	1.40	0.64	0	0	..	..
DEVELOPED COUNTRIES	**404 630**	**434 912**	**0.59**	**0.67**	**29 894**	**29 526**	**-0.54**	**0.39**	**167 026**	**185 129**	**1.82**	**1.09**
DEVELOPING COUNTRIES	**373 920**	**419 946**	**1.12**	**0.98**	**159 923**	**183 905**	**2.72**	**1.30**	**26 769**	**28 303**	**4.23**	**1.70**
LEAST DEVELOPED COUNTRIES (LDC)	8 652	9 289	-1.28	0.85	19 593	27 611	3.82	2.22	211	150	1.41	-1.59
OECD[3]	**284 443**	**301 655**	**-0.55**	**0.38**	**39 529**	**39 614**	**1.28**	**0.16**	**108 983**	**116 571**	**0.20**	**0.84**
BRICS	**338 610**	**373 750**	**2.31**	**1.06**	**16 940**	**14 535**	**2.44**	**-0.53**	**42 659**	**50 796**	**6.47**	**1.90**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**771 357**	**853 707**	**1.16**	**0.81**	**505 481**	**562 448**	**1.04**	**0.92**	**64.7**	**65.6**	**-0.05**	**0.08**
NORTH AMERICA	39 091	39 089	-0.85	0.26	27 635	28 498	0.25	0.32	73.6	71.8	-0.45	-0.20
Canada	8 962	9 450	0.25	0.64	2 829	3 030	1.14	0.59	74.1	72.8	0.06	-0.20
United States	30 129	29 639	-1.16	0.14	24 806	25 469	0.15	0.29	73.6	71.7	-0.50	-0.20
LATIN AMERICA	40 343	44 426	1.03	0.76	33 201	36 272	0.80	0.72	50.7	51.5	-0.09	0.06
Argentina	6 091	6 723	0.64	0.82	5 032	5 466	0.94	0.77	111.2	113.4	0.14	0.20
Brazil	12 170	12 968	0.93	0.51	10 557	11 221	0.68	0.49	49.3	49.7	-0.06	0.03
Chile	2 474	2 571	0.81	0.51	2 018	2 062	1.19	0.22	105.2	105.1	0.09	0.01
Colombia	1 933	2 091	2.70	0.42	1 707	1 841	2.60	0.36	33.3	34.1	1.35	-0.13
Mexico	7 390	8 003	1.25	0.61	6 150	6 619	1.59	0.70	48.5	48.6	0.64	0.05
Paraguay	526	655	1.54	1.98	360	435	1.36	1.63	49.8	53.7	0.07	0.61
Peru	2 327	2 743	1.84	1.25	1 920	2 221	1.42	1.12	57.6	60.7	-0.04	0.27
EUROPE	181 516	188 250	0.10	0.07	76 003	78 807	-0.22	0.37	101.7	106.8	-0.33	0.53
European Union[1]	105 287	106 084	-0.43	-0.35	47 389	49 358	0.06	0.39	106.3	111.6	-0.06	0.54
United Kingdom	14 610	15 458	-0.06	0.61	5 531	5 851	-2.58	0.69	82.2	84.2	-3.11	0.40
Russia	45 134	48 445	2.76	0.55	13 997	13 846	0.20	-0.10	96.4	98.5	0.11	0.20
Ukraine	8 255	9 615	-4.34	1.49	4 400	5 173	-1.37	1.73	101.2	128.4	-0.84	2.45
AFRICA	78 510	95 216	1.61	1.70	67 659	82 805	2.32	1.71	49.7	47.4	-0.23	-0.55
Egypt	21 332	25 247	0.81	1.60	19 298	23 026	2.12	1.59	185.1	184.8	0.06	0.00
Ethiopia	6 766	8 381	4.04	2.10	5 548	7 004	4.69	2.05	47.1	46.4	1.98	-0.18
Nigeria	5 661	7 891	3.21	2.73	5 173	7 268	3.65	2.76	24.5	26.4	1.01	0.33
South Africa	3 531	3 830	1.29	0.64	3 300	3 566	0.99	0.64	55.0	53.1	-0.39	-0.34
ASIA	422 076	475 928	1.75	1.00	298 230	332 902	1.20	0.93	64.4	67.4	0.29	0.37
China[2]	141 287	144 082	1.80	0.10	88 204	87 649	0.61	-0.14	61.9	62.2	0.20	-0.02
India	104 944	128 404	1.88	1.81	79 853	95 512	0.96	1.70	57.3	62.6	-0.09	0.90
Indonesia	10 519	12 383	4.36	0.80	7 345	8 175	2.54	0.37	26.6	26.9	1.37	-0.46
Iran	16 233	18 337	1.94	1.00	14 009	15 759	1.38	0.99	164.8	167.6	0.05	0.13
Japan	6 417	6 494	-0.69	0.05	4 878	4 809	-0.62	-0.13	39.1	41.1	-0.29	0.45
Kazakhstan	6 322	7 524	-1.65	1.47	2 646	2 919	1.13	0.85	139.3	139.2	-0.21	-0.01
Korea	4 178	4 036	-0.13	0.11	2 345	2 359	0.27	-0.07	45.2	46.2	-0.09	0.09
Malaysia	1 424	1 724	1.02	1.13	1 111	1 296	2.58	0.98	33.9	35.3	1.23	-0.02
Pakistan	27 863	33 969	1.76	1.65	25 203	30 321	1.64	1.63	111.9	111.9	-0.40	-0.03
Philippines	6 108	7 381	5.16	1.34	3 149	4 122	4.00	1.88	28.4	32.6	2.53	0.72
Saudi Arabia	3 797	4 325	1.61	1.15	3 391	3 864	1.89	1.10	96.0	96.4	-0.05	0.01
Thailand	3 077	3 465	0.68	1.17	1 146	1 371	1.09	1.23	16.4	19.5	0.78	1.23
Türkiye	24 273	26 273	1.52	0.72	17 750	18 895	1.68	0.56	208.9	209.4	0.30	0.01
Viet Nam	3 750	5 119	4.51	2.11	1 657	2 353	2.42	2.69	16.9	22.4	1.43	2.08
OCEANIA	9 822	10 797	2.50	0.75	2 753	3 163	1.37	1.24	64.5	65.5	-0.22	0.13
Australia	8 483	9 176	2.74	0.69	2 011	2 271	1.28	1.15	77.6	79.2	-0.15	0.24
New Zealand	913	1 098	0.23	0.95	406	478	1.35	1.48	79.2	85.9	-0.45	0.78
DEVELOPED COUNTRIES	**266 077**	**278 631**	**0.01**	**0.26**	**128 656**	**134 463**	**0.08**	**0.43**	**89.4**	**91.7**	**-0.31**	**0.28**
DEVELOPING COUNTRIES	**505 281**	**575 076**	**1.81**	**1.09**	**376 825**	**427 985**	**1.38**	**1.08**	**59.1**	**60.2**	**0.13**	**0.09**
LEAST DEVELOPED COUNTRIES (LDC)	28 760	36 659	3.11	2.06	23 933	31 275	3.15	2.20	26.3	27.2	0.79	0.06
OECD[3]	**218 564**	**224 094**	**-0.08**	**0.07**	**119 974**	**125 288**	**0.33**	**0.41**	**85.6**	**87.2**	**-0.17**	**0.21**
BRICS	**307 065**	**337 729**	**1.92**	**0.80**	**195 911**	**211 795**	**0.73**	**0.70**	**60.5**	**62.9**	**0.03**	**0.36**

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

ANNEX C

Table C.14.1. Maize projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**1 190 406**	**1 355 409**	**1.58**	**1.17**	**187 870**	**206 138**	**5.54**	**1.36**	**183 477**	**201 745**	**4.64**	**1.39**
NORTH AMERICA	379 091	417 543	0.22	0.64	4 639	4 163	10.75	1.24	63 518	58 637	2.23	0.37
Canada	14 029	15 234	0.83	0.90	3 409	3 126	17.09	1.73	1 642	1 542	4.01	-0.04
United States	365 062	402 309	0.20	0.63	1 230	1 037	1.93	-0.11	61 876	57 095	2.24	0.38
LATIN AMERICA	213 615	253 404	4.59	1.52	39 980	45 449	5.59	1.13	74 394	88 800	8.00	1.77
Argentina	60 023	68 299	7.77	1.17	4	4	-2.17	0.02	37 918	39 581	10.54	0.80
Brazil	109 071	133 586	4.89	1.82	1 934	1 235	10.43	-0.11	34 008	45 467	6.74	2.57
Chile	664	460	-9.59	-0.91	2 333	3 133	7.38	2.63	27	21	-2.48	-2.10
Colombia	1 441	1 990	-3.01	3.01	6 048	5 790	5.97	-0.75	1	1	-13.31	0.06
Mexico	27 152	30 255	1.82	0.84	16 810	20 310	8.52	1.66	502	1 368	-6.52	7.05
Paraguay	4 940	6 577	2.73	1.94	30	10	6.97	-0.44	1 886	2 318	-1.63	1.73
Peru	1 566	1 931	-0.28	2.25	3 756	4 703	5.13	1.65	11	11	3.85	-0.22
EUROPE	124 731	135 796	0.76	1.15	20 900	21 385	5.24	2.25	33 596	44 359	2.70	2.30
European Union[1]	65 231	66 617	-0.60	0.00	17 614	17 649	6.02	2.39	4 411	3 909	1.26	0.97
United Kingdom	0	0	..	..	2 460	2 978	2.95	1.67	0	0	..	..
Russia	14 706	18 240	2.62	2.16	51	129	-0.54	6.10	3 419	6 030	-0.15	3.65
Ukraine	33 467	37 104	2.61	2.90	33	39	-3.04	-0.15	23 165	29 784	3.61	2.27
AFRICA	93 657	118 531	2.97	2.51	21 208	25 798	0.47	1.44	5 078	3 479	3.76	-0.71
Egypt	7 526	8 005	-1.57	0.42	9 549	12 547	2.04	2.62	0	0	..	..
Ethiopia	10 406	10 969	5.53	3.98	0	1	-66.59	..	934	0	2.37	-2.67
Nigeria	12 283	15 354	3.70	2.85	2	1	-44.20	-4.48	1	1	1.27	4.86
South Africa	16 270	18 114	4.11	0.93	0	0	-84.54	..	3 306	2 569	12.54	-1.70
ASIA	378 720	429 542	1.43	1.17	101 027	109 256	6.75	1.28	6 825	6 397	4.46	1.49
China[2]	270 140	301 540	0.90	1.01	24 722	19 257	28.71	2.08	15	61	1.16	14.67
India	32 589	38 884	4.28	1.80	25	31	11.11	0.43	3 143	3 333	7.41	4.66
Indonesia	23 080	28 162	2.39	1.76	996	100	-10.23	-20.56	61	106	5.32	2.55
Iran	1 276	1 294	-3.05	-0.05	9 554	11 042	8.94	1.23	0	0	..	..
Japan	0	0	..	..	15 552	15 652	0.87	0.09	0	0	..	..
Kazakhstan	1 013	1 107	6.40	1.78	6	5	61.33	-1.24	70	82	19.25	9.41
Korea	81	85	0.29	-0.21	11 767	11 827	2.04	0.05	0	0	..	..
Malaysia	69	79	-0.33	1.32	3 702	4 073	-0.02	0.92	9	9	2.66	-0.91
Pakistan	9 367	10 869	8.87	2.32	25	280	10.59	22.70	260	9	10.96	-7.87
Philippines	8 240	9 488	1.34	1.39	674	1 178	0.97	3.14	0	0	..	..
Saudi Arabia	86	82	-0.03	0.99	3 467	4 904	3.01	3.11	0	0	..	..
Thailand	4 936	6 060	0.44	1.56	1 652	1 823	38.26	-0.03	55	19	-32.67	0.01
Türkiye	6 767	7 910	1.42	0.79	2 766	3 756	7.33	2.62	370	242	-0.63	-2.42
Viet Nam	4 447	4 560	-2.28	0.83	11 079	17 939	10.79	2.69	453	241	27.93	-2.62
OCEANIA	593	593	-1.79	0.54	115	86	26.16	-0.49	65	73	-0.67	-2.39
Australia	380	373	-2.17	0.63	4	4	94.93	0.00	63	70	0.27	-2.50
New Zealand	198	204	-1.28	0.31	110	80	32.37	0.13	2	4	-16.59	0.00
DEVELOPED COUNTRIES	**523 728**	**575 121**	**0.45**	**0.76**	**43 168**	**44 190**	**3.40**	**1.30**	**100 556**	**105 721**	**2.67**	**1.07**
DEVELOPING COUNTRIES	**666 678**	**780 287**	**2.53**	**1.48**	**144 701**	**161 948**	**6.26**	**1.37**	**82 921**	**96 025**	**7.24**	**1.76**
LEAST DEVELOPED COUNTRIES (LDC)	46 236	64 773	3.03	2.83	4 980	4 905	10.88	-1.28	3 003	3 016	1.30	-0.29
OECD[3]	**481 265**	**525 658**	**0.17**	**0.57**	**82 177**	**87 879**	**4.77**	**1.12**	**68 935**	**64 292**	**2.09**	**0.49**
BRICS	**442 776**	**510 364**	**2.17**	**1.31**	**26 732**	**20 651**	**22.10**	**1.94**	**43 890**	**57 459**	**6.30**	**2.56**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**1 195 528**	**1 356 374**	**2.33**	**1.15**	**684 006**	**794 453**	**2.83**	**1.32**	**18.1**	**19.5**	**0.41**	**0.68**
NORTH AMERICA	324 800	362 276	0.61	0.80	133 504	158 417	0.73	1.42	16.2	16.0	-0.45	-0.22
Canada	15 850	16 800	2.98	1.07	8 571	8 323	2.86	0.79	27.6	26.4	-2.29	-0.88
United States	308 950	345 476	0.50	0.79	124 933	150 094	0.59	1.46	14.9	14.7	-0.07	-0.10
LATIN AMERICA	181 212	209 614	4.15	1.40	117 557	135 064	4.10	1.39	48.0	49.9	0.06	0.31
Argentina	21 995	28 637	5.12	1.71	17 220	20 963	7.00	1.88	34.4	35.4	1.36	0.20
Brazil	77 730	89 081	4.56	1.53	50 610	58 315	2.61	1.36	22.4	22.7	-0.02	0.11
Chile	2 970	3 568	1.34	2.16	2 483	3 031	1.52	2.44	20.5	20.9	0.18	0.34
Colombia	7 655	7 779	3.88	0.15	6 662	6 734	4.44	0.12	17.3	17.3	0.30	-0.12
Mexico	44 143	49 158	4.73	1.08	24 121	26 573	8.19	1.15	132.5	138.5	0.34	0.40
Paraguay	3 436	4 261	12.18	2.05	724	1 083	6.65	3.46	50.0	52.5	-0.94	0.42
Peru	5 311	6 614	3.47	1.91	4 609	5 819	4.00	2.02	14.9	15.4	0.79	0.19
EUROPE	108 401	112 826	1.02	0.63	84 272	85 485	1.23	0.37	8.4	8.9	0.06	0.50
European Union[1]	80 175	80 416	1.25	0.39	62 363	60 049	1.41	-0.01	10.2	10.7	0.06	0.54
United Kingdom	2 468	2 978	4.20	1.67	1 357	1 788	4.84	2.67	8.2	9.4	-0.11	0.41
Russia	10 606	12 298	2.96	1.43	8 842	10 389	4.61	1.43	1.3	1.5	1.31	1.73
Ukraine	6 659	7 365	-3.63	0.93	4 942	5 469	-4.08	0.87	10.6	10.9	-0.01	0.27
AFRICA	109 607	140 291	2.68	2.53	37 428	46 772	2.01	2.50	41.7	43.6	0.18	0.44
Egypt	17 108	20 518	0.70	1.78	12 122	14 952	0.50	2.05	40.4	37.8	-0.55	-0.53
Ethiopia	9 255	10 844	5.60	3.56	1 767	1 851	6.07	2.24	49.3	48.7	2.48	2.07
Nigeria	12 350	15 350	3.63	2.86	2 750	3 870	8.73	3.72	32.2	28.2	-0.45	-0.20
South Africa	12 625	15 444	1.42	1.84	5 502	7 710	0.53	3.26	87.2	83.4	-0.19	-0.45
ASIA	470 872	530 761	3.23	1.08	310 770	368 289	3.98	1.35	8.9	8.7	-0.16	-0.17
China[2]	292 473	319 301	3.14	0.87	186 500	217 028	3.53	1.14	9.4	9.4	0.14	0.00
India	29 829	35 544	4.55	1.63	15 393	19 383	6.13	2.33	5.8	5.4	-0.78	-0.74
Indonesia	24 033	28 147	1.10	1.38	12 255	15 751	6.50	2.28	25.8	24.3	-1.32	-0.56
Iran	10 955	12 322	6.58	1.09	10 730	12 072	6.76	1.09	0.9	0.8	-1.35	-0.22
Japan	15 503	15 668	0.92	-0.07	11 977	11 781	1.07	0.03	0.8	0.9	1.13	0.58
Kazakhstan	816	1 010	4.26	2.15	648	814	4.80	2.39	0.5	0.5	-1.00	-0.10
Korea	11 677	11 908	2.19	-0.03	9 417	9 597	2.69	-0.02	1.9	2.0	0.86	0.26
Malaysia	3 775	4 140	0.01	0.98	3 438	3 784	-0.50	1.02	5.9	6.2	9.54	-0.06
Pakistan	9 065	11 116	8.79	2.61	5 883	7 329	15.07	2.51	8.4	8.3	1.71	1.87
Philippines	8 997	10 663	1.74	1.56	5 967	7 395	1.32	2.01	19.2	18.6	1.03	-0.42
Saudi Arabia	3 519	4 970	3.14	3.19	3 313	4 706	3.13	3.26	0.2	0.1	-1.91	-1.04
Thailand	6 582	7 863	6.61	1.16	6 225	7 443	7.20	1.20	1.2	1.2	-0.31	-0.23
Türkiye	9 246	11 422	3.63	1.44	7 299	9 548	5.27	1.79	15.5	14.7	-0.28	-0.39
Viet Nam	15 219	22 245	5.52	2.40	11 638	17 565	5.35	2.54	7.9	8.1	2.42	0.15
OCEANIA	636	606	-0.11	0.92	474	425	1.54	1.12	2.1	1.8	-1.10	-1.20
Australia	317	308	-2.56	1.51	179	154	-1.19	2.76	2.8	2.5	-1.07	-1.26
New Zealand	307	281	2.46	0.26	292	268	3.21	0.27	1.3	1.2	-1.72	-0.68
DEVELOPED COUNTRIES	**466 656**	**512 648**	**0.75**	**0.77**	**239 764**	**268 876**	**0.95**	**1.06**	**12.5**	**12.9**	**0.10**	**0.24**
DEVELOPING COUNTRIES	**728 872**	**843 727**	**3.46**	**1.39**	**444 242**	**525 577**	**3.98**	**1.46**	**19.4**	**20.8**	**0.40**	**0.68**
LEAST DEVELOPED COUNTRIES (LDC)	48 590	66 437	3.90	2.77	13 496	17 391	7.26	2.46	29.7	35.0	0.37	1.07
OECD[3]	**501 511**	**548 471**	**1.19**	**0.73**	**261 686**	**290 395**	**1.75**	**0.97**	**22.1**	**23.4**	**0.37**	**0.52**
BRICS	**423 263**	**471 667**	**3.42**	**1.09**	**266 847**	**312 824**	**3.44**	**1.31**	**9.8**	**9.6**	**-0.10**	**-0.19**

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**306 297**	**329 659**	**0.09**	**0.74**	**45 614**	**46 963**	**0.92**	**1.11**	**48 458**	**49 808**	**0.29**	**1.05**
NORTH AMERICA	27 004	28 650	-1.47	0.13	1 718	1 726	-2.17	-0.74	10 066	8 858	-4.08	0.46
Canada	14 126	15 141	1.66	0.42	213	79	7.11	0.24	6 383	5 981	4.08	1.23
United States	12 878	13 509	-4.47	-0.18	1 504	1 647	-2.95	-0.79	3 684	2 877	-18.59	-0.99
LATIN AMERICA	21 982	24 873	0.25	0.86	1 996	2 263	-1.45	1.56	4 851	5 903	3.34	0.59
Argentina	8 579	10 368	0.68	0.88	1	1	0.03	0.00	4 518	5 613	3.11	0.60
Brazil	4 055	4 952	5.18	1.44	500	620	1.65	1.75	6	6	-20.32	6.85
Chile	782	741	0.57	-0.51	140	301	-8.68	8.82	29	20	-11.35	-6.02
Colombia	18	21	-10.30	3.37	335	375	-4.03	0.72	0	0	..	..
Mexico	5 659	5 952	-3.59	0.41	783	659	3.22	0.43	23	34	31.39	0.32
Paraguay	108	121	1.06	1.91	0	0	..	125.62	2	0	-2.73	-6.54
Peru	261	258	-0.37	1.32	156	212	6.13	0.60	0	0	..	..
EUROPE	136 801	136 489	-0.27	0.17	2 680	2 368	3.31	-0.01	21 652	25 244	1.12	2.05
European Union[1]	86 180	83 760	-0.25	-0.23	1 836	1 538	5.27	-0.50	10 771	11 941	-0.13	1.49
United Kingdom	8 416	7 887	0.77	-0.12	167	243	-6.01	3.83	1 346	1 458	1.37	-0.65
Russia	26 722	28 014	0.20	0.53	135	128	-5.74	-1.01	4 834	6 930	4.00	1.72
Ukraine	9 262	9 639	-1.93	2.37	28	17	-0.59	0.05	4 457	4 469	0.72	5.34
AFRICA	52 225	69 516	0.42	1.85	4 688	4 184	2.32	1.50	911	351	-3.50	-1.83
Egypt	990	1 176	0.53	1.30	19	51	-13.86	4.34	0	0	..	..
Ethiopia	11 858	17 022	0.21	1.63	0	1	-77.40	..	355	0	-3.58	-33.57
Nigeria	8 598	9 993	1.81	1.94	10	8	0.00	-3.48	6	7	0.00	3.69
South Africa	658	649	2.79	1.14	74	162	-9.09	-2.05	8	9	-14.59	0.52
ASIA	49 814	54 194	0.33	1.19	34 421	36 288	0.96	1.22	1 075	939	-2.24	0.16
China[2]	10 293	10 171	1.30	0.38	19 327	18 562	4.43	1.13	69	86	-0.64	1.03
India	18 214	20 562	-0.15	1.58	74	203	47.40	5.69	151	54	-15.55	-7.71
Indonesia	0	0	..	..	73	85	-2.99	1.18	0	0	..	..
Iran	3 014	3 361	-0.13	0.68	2 567	3 621	11.11	1.62	0	0	..	..
Japan	236	226	1.85	-0.52	1 727	1 457	-5.19	-1.55	0	0	..	..
Kazakhstan	3 367	3 873	1.77	1.42	61	39	26.18	0.25	715	695	2.21	1.17
Korea	207	149	4.65	-1.33	114	113	-0.39	-0.10	0	0	..	..
Malaysia	0	0	..	..	13	18	73.96	2.11	0	0	..	..
Pakistan	467	548	-0.43	1.68	147	237	9.20	6.57	0	0	..	..
Philippines	1	1	0.93	-0.72	41	45	2.93	0.83	0	0	..	..
Saudi Arabia	211	219	2.65	1.06	5 309	5 541	-8.00	1.21	0	0	..	..
Thailand	160	143	-0.57	-0.30	600	584	50.75	0.93	2	2	0.00	-0.18
Türkiye	8 350	9 194	0.57	1.58	1 400	2 198	21.30	1.96	131	96	34.11	-0.83
Viet Nam	3	2	8.61	-1.16	100	121	3.57	1.35	0	0	..	..
OCEANIA	18 471	15 936	4.08	0.68	110	136	0.42	0.27	9 903	8 512	2.79	-0.45
Australia	18 112	15 530	4.27	0.68	0	0	..	..	9 903	8 512	2.79	-0.45
New Zealand	358	405	-2.68	0.50	25	31	2.51	-0.43	0	0	..	..
DEVELOPED COUNTRIES	**188 723**	**187 886**	**-0.03**	**0.23**	**7 020**	**7 080**	**-0.79**	**-0.16**	**42 344**	**43 319**	**0.20**	**1.16**
DEVELOPING COUNTRIES	**117 574**	**141 772**	**0.27**	**1.46**	**38 594**	**39 884**	**1.29**	**1.36**	**6 114**	**6 489**	**1.05**	**0.32**
LEAST DEVELOPED COUNTRIES (LDC)	24 936	33 003	0.10	2.13	1 124	1 611	5.14	2.14	522	317	-2.81	-1.69
OECD[3]	**156 559**	**153 759**	**-0.09**	**0.06**	**9 010**	**9 608**	**0.17**	**0.41**	**32 272**	**30 924**	**-0.49**	**0.51**
BRICS	**59 942**	**64 348**	**0.59**	**0.90**	**20 110**	**19 676**	**4.17**	**1.14**	**5 069**	**7 084**	**1.92**	**1.60**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**302 944**	**326 149**	**0.21**	**0.78**	**172 795**	**176 113**	**0.17**	**0.56**	**9.9**	**11.1**	**-0.21**	**0.72**
NORTH AMERICA	18 642	21 421	-0.95	0.02	10 176	12 667	-0.60	-0.11	7.4	7.5	1.94	-0.13
Canada	7 734	9 212	0.38	-0.02	6 285	7 677	0.04	-0.07	11.0	10.8	5.13	-0.79
United States	10 908	12 209	-1.78	0.06	3 891	4 990	-1.42	-0.17	7.0	7.1	1.46	-0.03
LATIN AMERICA	19 139	21 224	-0.65	1.03	13 328	14 392	-1.40	0.86	2.2	2.3	-1.25	0.44
Argentina	4 011	4 750	-1.38	1.26	2 486	2 557	-1.23	0.91	13.2	12.7	-1.64	-0.28
Brazil	4 532	5 566	4.74	1.44	3 141	3 835	5.57	1.20	1.7	2.1	1.94	2.04
Chile	900	1 020	-0.80	1.67	620	688	-2.12	2.20	3.7	3.8	0.74	0.22
Colombia	354	395	-4.53	0.85	10	11	-27.90	0.97	0.5	0.4	-13.14	0.44
Mexico	6 419	6 578	-3.49	0.45	5 573	5 843	-4.03	0.44	0.2	0.2	-0.93	-0.64
Paraguay	106	120	2.46	1.96	89	99	1.21	2.00	0.0	0.0	-2.50	0.15
Peru	420	470	1.70	1.01	5	7	0.98	2.04	6.6	6.6	0.58	0.18
EUROPE	117 451	113 552	-0.28	-0.18	86 690	82 474	-0.18	-0.03	13.0	13.7	-0.13	0.19
European Union[1]	77 288	73 327	-0.12	-0.46	57 383	53 296	-0.15	-0.28	10.1	11.0	0.05	0.50
United Kingdom	7 354	6 671	1.53	0.21	4 575	3 545	3.24	0.09	31.5	34.8	-0.04	0.41
Russia	21 427	21 225	-0.60	0.09	16 563	16 709	-0.33	0.23	11.7	10.7	-0.28	-0.96
Ukraine	4 972	5 173	-2.76	0.73	3 263	3 375	-3.40	0.83	16.6	15.4	-1.64	-0.70
AFRICA	56 657	72 996	0.88	2.00	7 898	8 291	-1.20	1.60	29.7	31.9	-0.78	-0.14
Egypt	1 008	1 224	0.02	1.45	653	801	0.01	1.37	2.8	2.8	-1.99	0.04
Ethiopia	12 017	16 873	1.40	1.83	390	383	-6.37	1.55	82.0	97.3	-0.58	-0.34
Nigeria	8 702	9 985	1.21	2.01	250	259	-7.74	3.02	36.9	32.4	-0.60	-0.49
South Africa	721	798	2.18	0.93	83	99	-4.72	3.58	2.5	2.3	-1.36	-0.48
ASIA	83 463	89 397	0.74	1.29	48 790	52 577	1.39	1.47	4.9	5.0	-1.19	0.62
China[2]	29 199	28 696	3.18	0.87	17 683	17 379	6.03	1.28	3.0	2.9	-0.57	-0.32
India	18 407	20 705	0.30	1.67	1 650	1 941	12.87	2.51	11.2	11.5	-1.33	0.79
Indonesia	73	85	-2.99	1.18	0	0	0.00	0.00	0.3	0.3	-4.12	0.35
Iran	5 648	6 964	3.96	1.28	5 471	6 768	4.11	1.29	0.3	0.3	-1.35	-0.24
Japan	1 956	1 692	-5.14	-1.58	1 257	1 360	-7.36	-1.28	1.6	1.7	-1.98	0.48
Kazakhstan	2 668	3 205	1.32	1.69	1 727	2 164	1.20	2.15	2.4	2.2	-1.33	-0.78
Korea	320	263	2.43	-0.82	69	69	1.38	-0.02	4.6	3.6	2.56	-0.93
Malaysia	13	18	70.01	2.19	12	17	78.10	2.25	0.0	0.0	135.43	-0.09
Pakistan	614	785	0.99	2.94	186	255	-0.42	2.62	1.7	1.7	-0.03	1.63
Philippines	42	46	2.89	0.80	31	33	2.31	0.51	0.0	0.0	1.71	0.73
Saudi Arabia	5 587	5 723	-7.00	1.51	5 391	5 512	-7.21	1.54	2.5	2.2	-1.91	-1.04
Thailand	758	725	19.02	0.79	434	270	30.63	1.04	1.4	1.4	-0.36	0.05
Türkiye	9 452	11 246	1.67	1.67	8 406	10 110	2.05	1.77	3.4	3.1	-1.35	-0.39
Viet Nam	103	124	3.68	1.30	0	0	0.00	0.00	0.0	0.0	-2.46	-2.53
OCEANIA	7 591	7 559	3.23	0.58	5 914	5 712	3.65	0.73	6.3	6.1	-0.59	-0.68
Australia	7 121	7 018	3.68	0.57	5 572	5 313	4.21	0.74	7.6	7.3	-0.31	-0.78
New Zealand	383	436	-2.40	0.43	323	375	-2.81	0.49	1.5	1.3	-1.72	-0.68
DEVELOPED COUNTRIES	**151 735**	**151 417**	**-0.22**	**-0.05**	**108 236**	**107 308**	**-0.07**	**0.07**	**9.1**	**9.4**	**0.08**	**-0.03**
DEVELOPING COUNTRIES	**151 208**	**174 732**	**0.67**	**1.57**	**64 559**	**68 805**	**0.62**	**1.38**	**10.1**	**11.5**	**-0.29**	**0.84**
LEAST DEVELOPED COUNTRIES (LDC)	25 337	34 135	0.33	2.30	1 544	1 689	-4.25	2.05	21.2	23.8	-0.84	0.30
OECD[3]	**132 191**	**132 276**	**-0.17**	**-0.06**	**95 622**	**95 139**	**-0.10**	**0.08**	**7.5**	**7.9**	**0.33**	**0.18**
BRICS	**74 286**	**76 991**	**1.28**	**0.89**	**39 120**	**39 962**	**2.82**	**0.88**	**6.8**	**7.1**	**-0.91**	**0.69**

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**521 534**	**576 943**	**0.79**	**1.10**	**52 482**	**63 487**	**2.38**	**1.90**	**51 554**	**63 487**	**1.87**	**1.90**
NORTH AMERICA	6 098	6 215	-1.26	0.69	1 655	2 090	5.90	1.70	2 548	2 503	-3.18	1.43
Canada	0	0	..	..	426	484	1.72	1.11	0	0	..	..
United States	6 098	6 215	-1.26	0.69	1 229	1 606	7.66	1.88	2 548	2 503	-3.18	1.43
LATIN AMERICA	18 521	18 718	-0.19	0.33	4 364	5 071	1.79	0.59	3 557	3 346	1.50	-0.96
Argentina	818	768	-3.61	-0.43	5	5	-4.42	0.12	263	135	-7.60	-4.89
Brazil	7 647	6 926	-0.98	-0.72	759	872	3.77	1.40	1 040	853	3.71	-2.19
Chile	93	80	-0.70	0.62	188	197	6.16	0.54	0	0	-33.03	..
Colombia	1 909	2 248	4.17	2.69	128	86	-12.64	-12.43	2	3	157.72	1.64
Mexico	272	284	3.22	0.96	771	863	2.20	1.01	18	17	33.93	0.00
Paraguay	763	976	5.11	1.38	1	1	-5.64	0.58	698	894	8.25	1.40
Peru	2 344	2 486	1.79	0.92	240	349	0.95	0.78	57	32	37.05	-0.36
EUROPE	2 724	2 814	-0.84	0.35	3 666	3 873	3.88	0.92	677	988	0.90	4.09
European Union[1]	1 596	1 587	-1.55	-0.55	2 504	2 649	6.37	1.19	429	681	0.36	3.19
United Kingdom	0	0	..	..	622	660	0.06	0.35	0	0	-0.58	-4.73
Russia	1 088	1 198	0.82	1.66	234	237	-1.08	-0.06	234	296	1.78	6.80
Ukraine	29	15	-10.92	1.47	72	84	-1.03	1.42	7	5	10.34	-1.40
AFRICA	25 071	31 678	2.11	1.88	17 888	28 717	2.65	4.70	499	218	-5.04	-3.47
Egypt	3 800	3 964	-4.33	0.52	393	881	36.92	10.12	0	0	-87.86	..
Ethiopia	170	187	11.86	1.35	605	1 029	12.99	4.96	0	0	..	..
Nigeria	4 963	6 600	3.34	2.53	2 423	3 994	-2.61	3.28	0	0	..	..
South Africa	2	2	0.01	0.24	923	949	-0.24	0.51	0	0	..	..
ASIA	468 619	516 967	0.81	1.09	24 119	22 880	1.77	-0.37	44 157	56 279	2.49	2.10
China[2]	147 745	150 904	0.38	0.40	5 005	4 033	-3.31	0.52	2 303	1 475	29.10	-2.31
India	126 444	147 808	2.47	1.94	6	3	19.99	1.31	19 190	25 205	7.00	3.17
Indonesia	35 155	37 323	-0.94	0.44	560	183	-4.77	-11.53	2	1	-0.36	3.35
Iran	2 400	2 481	6.05	0.77	1 439	1 883	0.78	1.13	2	1	15.87	-0.09
Japan	7 273	6 050	-1.07	-1.50	775	776	0.15	-0.09	89	115	-0.25	3.31
Kazakhstan	347	363	4.61	1.51	19	27	0.28	-2.62	94	88	6.17	2.69
Korea	3 731	3 466	-1.80	-0.64	431	428	1.67	-0.14	53	50	62.65	-0.39
Malaysia	1 566	1 712	-1.60	0.76	1 295	1 511	3.33	1.34	86	92	17.70	-1.25
Pakistan	8 582	9 565	2.92	0.52	9	5	-17.38	0.19	4 302	4 510	1.70	-0.97
Philippines	12 987	16 005	0.92	1.78	3 028	2 968	13.38	0.53	0	0	-20.58	..
Saudi Arabia	0	0	..	..	1 280	1 328	-1.36	0.83	0	0	..	..
Thailand	21 905	25 800	0.06	1.02	147	167	-7.51	1.48	7 277	11 447	-4.19	1.95
Türkiye	606	683	2.02	1.05	172	100	-10.28	-3.48	27	22	-4.30	3.86
Viet Nam	27 954	31 503	-0.44	1.17	1 330	1 162	10.53	-1.73	6 582	7 660	-2.34	1.76
OCEANIA	499	552	-8.26	1.72	790	856	5.17	0.68	117	153	-18.08	8.66
Australia	486	535	-8.63	1.73	235	175	4.84	-1.80	116	152	-18.16	8.76
New Zealand	0	0	..	..	57	62	3.45	1.72	0	0	..	..
DEVELOPED COUNTRIES	**17 335**	**16 384**	**-1.16**	**-0.19**	**7 648**	**8 355**	**3.20**	**0.95**	**3 525**	**3 847**	**-3.17**	**2.36**
DEVELOPING COUNTRIES	**504 199**	**560 560**	**0.86**	**1.14**	**44 834**	**55 132**	**2.24**	**2.05**	**48 029**	**59 640**	**2.33**	**1.87**
LEAST DEVELOPED COUNTRIES (LDC)	79 829	94 164	1.29	1.53	11 889	17 976	4.08	4.22	4 446	5 341	3.96	1.73
OECD[3]	**22 064**	**21 148**	**-0.93**	**-0.07**	**7 805**	**8 370**	**3.02**	**0.56**	**3 284**	**3 546**	**-3.38**	**2.02**
BRICS	**282 926**	**306 838**	**1.23**	**1.09**	**6 927**	**6 094**	**-2.19**	**0.61**	**22 768**	**27 829**	**8.10**	**2.63**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**519 886**	**576 931**	**0.93**	**1.14**	**52.1**	**53.0**	**-0.12**	**0.24**
NORTH AMERICA	5 170	5 785	2.48	0.85	11.9	12.7	1.75	0.33
Canada	426	484	1.72	1.11	10.5	11.0	0.56	0.33
United States	4 744	5 301	2.55	0.83	12.1	12.9	1.88	0.33
LATIN AMERICA	19 486	20 425	0.00	0.62	25.7	25.1	-0.63	-0.02
Argentina	590	637	1.64	0.86	10.6	11.1	1.83	0.41
Brazil	7 284	6 944	-1.78	-0.28	28.8	26.2	-2.27	-0.75
Chile	284	276	4.21	0.58	12.0	11.9	2.83	0.36
Colombia	2 092	2 327	3.71	1.48	35.8	37.9	2.13	0.99
Mexico	1 024	1 130	1.65	1.02	7.6	7.8	0.71	0.37
Paraguay	81	83	-0.98	1.28	6.0	6.0	-0.58	0.41
Peru	2 540	2 799	1.71	0.93	65.9	66.9	0.31	0.09
EUROPE	5 729	5 699	1.90	0.17	7.2	7.2	1.78	0.33
European Union[1]	3 669	3 556	3.04	0.04	7.9	7.7	2.90	0.18
United Kingdom	622	660	0.12	0.35	8.2	8.4	-1.04	0.06
Russia	1 103	1 137	0.56	0.31	7.0	7.5	0.49	0.57
Ukraine	96	94	-4.52	1.59	2.0	2.0	-4.94	2.33
AFRICA	42 301	59 969	2.67	3.17	26.5	30.0	0.38	1.01
Egypt	4 260	4 842	-1.03	1.67	37.2	36.1	-1.97	0.09
Ethiopia	761	1 212	13.20	4.36	5.6	7.1	9.40	2.28
Nigeria	7 353	10 583	1.18	2.87	29.1	32.6	-1.37	0.51
South Africa	925	950	-0.69	0.51	14.9	13.7	-1.52	-0.47
ASIA	445 959	483 800	0.78	0.95	74.2	75.5	-0.13	0.27
China[2]	151 513	154 126	0.80	0.44	72.2	72.2	-0.07	0.01
India	105 025	122 173	1.22	1.70	66.6	71.1	-0.07	0.90
Indonesia	36 130	37 498	-0.88	0.38	119.0	111.2	-0.51	-0.58
Iran	3 943	4 357	4.19	0.93	40.1	40.4	2.52	0.09
Japan	7 314	7 169	-1.03	-0.31	50.2	52.5	-1.00	0.38
Kazakhstan	287	302	4.22	0.75	13.4	12.9	2.74	-0.14
Korea	3 961	3 838	-1.58	-0.41	66.2	64.7	-1.68	-0.28
Malaysia	2 761	3 128	0.10	1.10	77.3	77.9	-0.51	0.10
Pakistan	4 163	5 037	4.19	2.45	13.8	15.2	1.05	1.02
Philippines	16 000	18 945	2.67	1.67	120.8	127.4	0.92	0.54
Saudi Arabia	1 202	1 325	-1.52	0.84	32.5	31.6	-3.41	-0.25
Thailand	13 668	14 484	-0.40	0.50	103.1	104.4	0.32	0.10
Türkiye	761	761	-0.17	0.31	8.4	7.9	-1.16	-0.26
Viet Nam	22 535	24 992	0.78	0.92	140.4	139.3	-1.28	0.01
OCEANIA	1 241	1 253	5.91	0.96	19.7	20.1	3.14	0.05
Australia	655	557	6.41	0.38	11.6	11.3	2.74	-0.35
New Zealand	57	62	3.45	1.72	10.4	10.5	1.67	1.02
DEVELOPED COUNTRIES	**20 849**	**21 330**	**0.92**	**0.25**	**12.7**	**12.8**	**0.38**	**0.15**
DEVELOPING COUNTRIES	**499 037**	**555 601**	**0.93**	**1.18**	**61.0**	**61.3**	**-0.27**	**0.13**
LEAST DEVELOPED COUNTRIES (LDC)	87 283	106 316	1.62	1.93	74.7	75.0	-0.17	0.03
OECD[3]	**25 876**	**26 402**	**0.78**	**0.24**	**16.1**	**16.1**	**0.17**	**0.07**
BRICS	**265 849**	**285 331**	**0.88**	**0.94**	**62.9**	**64.8**	**-0.14**	**0.41**

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
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	95.2	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5
Rice[5]	mln EUR	61.3	115.7	115.7	115.7	115.8	114.4	114.4	114.4	114.4	114.4	114.4
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	42.3	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	3 805.8	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	4 446.0	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	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	9 733.3	10 000.0	10 000.0	10 000.0	10 000.0	10 000.0	10 000.0	10 000.0	10 000.0	10 000.0	10 000.0
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	126.2
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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
INDIA												
Minimum support price												
Rice	INR/t	18 902	20 681	21 464	22 042	22 616	23 287	23 933	24 580	25 210	25 843	26 467
Wheat	INR/t	20 186	22 840	23 738	24 416	24 906	25 465	26 042	26 667	27 294	27 930	28 533
Wheat tariff	%	54.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5
Rice tariff	%	72.2	72.4	72.4	72.4	72.4	72.4	72.4	72.4	72.4	72.4	72.4
RUSSIA												
Wheat export tax	%	21.9	25.6	18.7	16.8	17.8	18.4	19.3	20.2	21.0	21.6	22.4
Maize export tax	%	17.1	19.8	8.7	6.7	7.7	8.6	9.7	10.5	11.3	12.0	12.9
Other coarse grains export tax	%	19.2	21.1	15.4	12.9	13.4	14.7	15.9	16.9	17.7	18.4	19.2

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 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.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**363 337**	**414 821**	**2.17**	**0.86**	**160 631**	**170 674**	**4.38**	**0.55**	**157 936**	**170 674**	**3.13**	**0.55**
NORTH AMERICA	123 941	134 496	1.71	0.74	928	889	-7.23	1.19	61 118	57 845	1.55	0.38
Canada	6 395	9 258	1.06	2.91	466	477	3.28	2.17	4 452	5 760	1.92	2.15
United States	117 546	125 237	1.75	0.60	463	412	-12.59	0.14	56 666	52 085	1.52	0.21
LATIN AMERICA	190 288	223 254	1.90	0.85	10 999	10 952	8.59	0.55	93 564	109 107	4.26	0.63
Argentina	42 067	50 713	-4.24	0.85	3 001	3 022	461.42	0.09	8 945	8 017	-4.77	-0.69
Brazil	134 524	153 496	5.18	0.76	410	412	-0.86	0.04	77 303	90 955	6.77	0.66
Chile	0	0	..	..	177	182	-4.13	0.65	2	2	0.00	-0.64
Colombia	75	84	0.97	0.92	537	633	-1.83	0.90	0	0	-49.13	..
Mexico	274	515	-2.79	4.95	5 619	5 511	5.86	0.98	7	6	58.06	0.00
Paraguay	7 933	11 958	-2.42	1.80	33	0	-37.24	1.12	4 867	7 270	-1.29	1.90
Peru	5	5	0.00	1.28	367	375	-0.15	0.82	0	0	..	..
EUROPE	11 659	14 645	5.99	1.55	17 805	16 092	1.50	-1.17	2 730	3 326	3.13	0.88
European Union[1]	2 592	3 441	6.24	2.24	14 579	12 720	1.57	-1.42	236	284	9.17	1.69
United Kingdom	0	0	..	..	760	784	0.54	0.30	0	0	..	..
Russia	5 020	6 632	12.09	1.81	1 815	1 874	0.91	-0.58	1 026	1 033	31.96	0.00
Ukraine	3 226	3 669	-0.33	0.70	7	6	18.06	0.21	1 458	1 999	-3.19	1.26
AFRICA	3 397	3 789	5.33	0.76	5 624	6 727	12.05	1.10	179	158	5.52	-0.81
Egypt	33	33	-0.52	0.58	4 383	5 164	15.14	0.82	0	0	-62.95	..
Ethiopia	120	130	7.92	0.76	0	0	-50.36	..	78	78	11.18	0.04
Nigeria	700	802	1.88	1.49	70	113	77.05	3.51	10	9	13.38	-0.82
South Africa	1 765	1 931	10.32	0.21	46	36	-14.15	-1.20	28	17	10.78	-2.32
ASIA	34 004	38 557	3.99	1.03	125 270	136 006	4.41	0.74	342	235	-10.81	-0.40
China[2]	18 762	21 103	5.88	1.01	95 977	101 847	4.01	0.66	167	100	-9.20	0.00
India	12 832	14 659	2.44	1.11	640	1 014	86.14	2.02	55	42	-16.99	-0.32
Indonesia	707	872	-2.55	0.27	2 600	2 989	3.03	1.36	5	5	-4.70	-0.18
Iran	220	201	2.76	-0.22	2 150	2 542	13.48	1.38	27	36	1.39	-1.36
Japan	240	260	0.97	0.23	3 238	3 092	1.39	-0.57	0	0	..	..
Kazakhstan	267	303	3.41	1.17	45	39	14.41	-1.61	0	0	47.98	..
Korea	110	112	-1.88	0.21	1 297	1 332	0.26	0.03	0	0	..	..
Malaysia	0	0	..	..	933	1 214	6.03	1.25	10	8	-15.13	-1.23
Pakistan	2	2	-11.93	0.17	2 383	2 800	21.47	1.60	0	0	..	..
Philippines	1	1	0.00	-0.58	217	276	13.55	1.59	0	0	..	..
Saudi Arabia	0	0	..	..	770	956	6.72	1.30	0	0	..	..
Thailand	43	45	-3.17	0.59	3 833	4 820	8.05	1.13	3	3	-19.92	-1.07
Türkiye	141	150	-2.22	0.53	2 917	3 472	5.83	0.87	5	5	-25.03	-0.58
Viet Nam	61	59	-12.88	0.33	1 977	2 426	4.47	1.58	35	2	36.40	-1.56
OCEANIA	48	80	2.92	1.31	5	6	16.17	0.26	3	4	-8.94	0.48
Australia	48	80	2.92	1.31	4	5	25.56	0.31	3	4	-8.95	0.48
New Zealand	0	0	..	..	1	1	-0.01	0.00	0	0	..	..
DEVELOPED COUNTRIES	**137 935**	**151 731**	**2.12**	**0.81**	**22 768**	**21 003**	**0.96**	**-0.90**	**63 879**	**61 192**	**1.62**	**0.41**
DEVELOPING COUNTRIES	**225 402**	**263 090**	**2.19**	**0.88**	**137 863**	**149 670**	**5.06**	**0.77**	**94 058**	**109 482**	**4.16**	**0.63**
LEAST DEVELOPED COUNTRIES (LDC)	899	1 012	1.75	1.18	1 679	2 349	14.57	2.32	18	16	-3.79	-0.92
OECD[3]	**127 426**	**139 143**	**1.77**	**0.79**	**31 120**	**29 859**	**1.95**	**-0.32**	**61 371**	**58 146**	**1.56**	**0.39**
BRICS	**172 902**	**197 822**	**5.22**	**0.84**	**98 889**	**105 184**	**3.98**	**0.64**	**78 578**	**92 146**	**6.81**	**0.66**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**365 134**	**414 372**	**2.83**	**0.89**	**327 744**	**372 933**	**2.90**	**0.89**
NORTH AMERICA	66 246	77 412	2.42	1.15	61 664	72 206	2.72	1.21
Canada	2 500	3 966	0.91	4.12	1 798	3 248	0.81	4.66
United States	63 747	73 447	2.49	1.01	59 866	68 958	2.78	1.07
LATIN AMERICA	107 243	125 034	0.88	1.02	98 505	114 720	0.80	0.98
Argentina	36 456	45 717	-2.29	1.21	35 430	44 631	-2.39	1.23
Brazil	56 797	62 898	3.26	0.81	49 892	54 525	3.45	0.69
Chile	185	180	-3.87	0.66	184	180	-3.90	0.66
Colombia	612	717	-1.13	0.90	604	709	-1.13	0.91
Mexico	5 900	6 019	6.04	1.38	5 564	5 717	6.29	1.42
Paraguay	3 100	4 680	-3.19	1.65	2 995	4 540	-3.10	1.67
Peru	372	380	0.50	0.82	371	378	0.49	0.83
EUROPE	26 561	27 401	3.12	-0.09	23 526	24 209	2.95	-0.13
European Union[1]	17 035	15 877	2.37	-0.87	15 009	13 854	2.20	-1.00
United Kingdom	760	784	0.54	0.30	709	691	0.92	-0.02
Russia	5 840	7 474	6.34	1.41	5 429	6 947	6.11	1.43
Ukraine	1 460	1 665	0.59	0.72	1 315	1 509	0.59	0.82
AFRICA	8 790	10 354	9.03	1.02	8 130	9 527	10.54	0.92
Egypt	4 433	5 194	14.67	0.84	4 423	5 194	14.71	0.84
Ethiopia	43	52	3.66	2.03	21	25	3.40	1.61
Nigeria	760	906	2.98	1.75	656	786	11.03	1.57
South Africa	1 704	1 951	9.03	0.21	1 538	1 740	8.91	0.10
ASIA	156 243	174 088	4.23	0.84	135 875	152 197	4.38	0.85
China[2]	111 705	122 638	4.15	0.74	95 076	104 669	4.07	0.75
India	13 513	15 629	3.06	1.17	11 857	13 890	4.16	1.21
Indonesia	3 228	3 854	1.50	1.16	2 600	3 155	3.03	1.21
Iran	2 323	2 704	11.90	1.33	2 306	2 694	12.04	1.34
Japan	3 534	3 351	1.59	-0.52	2 771	2 452	2.14	-1.14
Kazakhstan	302	342	3.47	0.81	173	192	4.17	0.80
Korea	1 410	1 445	0.02	0.04	1 369	1 404	0.08	0.04
Malaysia	950	1 205	7.05	1.27	948	1 205	7.03	1.27
Pakistan	2 392	2 797	21.50	1.65	2 387	2 797	21.49	1.65
Philippines	218	276	13.34	1.75	214	276	13.51	1.75
Saudi Arabia	773	956	6.75	1.30	768	951	6.67	1.30
Thailand	3 857	4 860	7.94	1.22	3 817	4 860	7.94	1.22
Türkiye	3 089	3 612	6.40	1.01	3 003	3 575	6.21	1.02
Viet Nam	1 995	2 478	3.82	1.64	1 976	2 446	4.22	1.66
OCEANIA	50	82	5.66	1.26	45	74	5.97	1.29
Australia	49	81	5.82	1.28	45	74	5.97	1.29
New Zealand	1	1	-0.01	0.00	0	0	0.00	0.00
DEVELOPED COUNTRIES	**99 123**	**111 403**	**2.68**	**0.77**	**90 432**	**101 730**	**2.86**	**0.80**
DEVELOPING COUNTRIES	**266 011**	**302 969**	**2.89**	**0.94**	**237 312**	**271 203**	**2.92**	**0.93**
LEAST DEVELOPED COUNTRIES (LDC)	2 572	3 343	8.30	2.00	2 125	2 818	10.28	1.95
OECD[3]	**99 899**	**110 723**	**2.58**	**0.77**	**91 987**	**102 099**	**2.79**	**0.80**
BRICS	**189 559**	**210 590**	**3.86**	**0.81**	**163 791**	**181 771**	**3.95**	**0.78**

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

ANNEX C

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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**170 836**	**189 088**	**2.56**	**0.86**	**22 536**	**24 799**	**2.11**	**0.39**	**23 982**	**24 799**	**2.64**	**0.39**
NORTH AMERICA	21 874	25 423	-0.08	1.07	989	952	-1.39	0.07	8 836	10 716	-2.59	1.91
Canada	17 237	20 342	-0.64	1.18	244	260	1.16	0.55	8 200	10 048	-2.78	1.94
United States	4 637	5 080	2.33	0.65	745	692	-2.07	-0.10	637	668	-0.12	1.53
LATIN AMERICA	6 626	7 072	3.57	0.74	1 829	2 360	1.42	0.83	1 102	1 255	6.54	1.47
Argentina	4 623	4 644	3.45	0.37	1	1	0.00	0.00	594	596	2.47	0.77
Brazil	585	778	4.11	2.65	4	2	-9.50	0.00	172	210	15.47	2.95
Chile	200	201	1.15	0.41	34	39	13.81	-0.49	9	8	5.53	0.42
Colombia	2	2	0.01	0.09	7	7	0.02	0.02	0	0	..	..
Mexico	112	115	-0.79	0.56	1 756	2 286	1.33	0.89	2	3	-1.36	0.00
Paraguay	218	233	-1.35	0.72	0	0	..	..	27	30	-1.63	2.09
Peru	6	7	0.00	0.71	1	1	0.00	0.75	0	0	..	..
EUROPE	66 177	72 077	2.10	1.06	8 362	7 636	8.16	-0.90	6 677	6 316	7.21	1.34
European Union[1]	27 561	29 943	-0.58	0.99	6 922	6 306	7.07	-0.97	790	824	-4.49	0.31
United Kingdom	1 239	1 670	-7.61	0.19	801	743	18.11	-0.26	58	23	-26.67	-2.52
Russia	18 288	21 681	7.42	1.41	247	220	5.35	-0.88	1 744	1 447	35.46	-0.90
Ukraine	16 736	16 159	3.00	0.89	29	26	1.32	-0.50	3 363	3 176	9.01	2.96
AFRICA	9 542	10 994	0.95	1.41	403	578	-2.30	1.98	568	415	16.14	-0.48
Egypt	118	111	0.24	0.51	87	197	4.18	2.59	22	17	4.67	-2.52
Ethiopia	120	144	1.70	1.45	0	0	..	55.00	27	34	111.37	0.77
Nigeria	2 163	2 592	-0.12	2.05	0	0	..	..	14	11	-9.29	-1.70
South Africa	1 047	1 154	3.58	0.04	14	10	-23.14	0.41	6	11	-1.41	-0.34
ASIA	60 180	68 188	3.91	0.87	10 925	13 247	-0.63	1.09	2 052	2 015	3.37	0.39
China[2]	35 888	39 915	3.66	0.77	3 694	5 389	-3.46	2.47	680	670	3.00	0.00
India	16 385	18 913	5.18	0.94	220	238	-4.47	-0.78	756	574	7.88	0.08
Indonesia	465	519	-6.43	1.21	262	288	4.08	0.26	1	1	0.30	-0.02
Iran	399	410	6.46	0.30	142	154	6.18	-0.13	1	1	0.02	0.01
Japan	23	25	0.93	0.67	2 399	2 514	-0.59	-0.03	0	0	..	..
Kazakhstan	1 152	1 547	6.21	1.28	13	7	-0.12	0.01	423	596	9.14	1.38
Korea	14	14	-2.77	-0.06	30	31	2.86	-0.08	0	0	..	..
Malaysia	5	5	0.00	0.21	44	47	0.80	0.53	3	3	0.01	-0.53
Pakistan	983	1 128	3.18	1.33	1 030	1 469	-1.51	1.18	0	0	-60.24	..
Philippines	20	22	0.00	1.56	95	105	6.82	0.72	0	0	..	..
Saudi Arabia	3	3	0.00	0.98	4	4	0.01	0.52	0	0	..	..
Thailand	90	95	-0.03	0.64	58	60	1.39	0.25	4	3	-0.31	-0.18
Türkiye	2 046	2 653	3.40	1.36	846	701	0.18	-0.95	12	12	-8.56	0.12
Viet Nam	311	343	0.77	1.34	189	202	2.62	0.35	35	33	4.06	-0.35
OCEANIA	6 437	5 334	6.80	-3.14	27	26	3.47	-0.03	4 747	4 083	6.80	-4.04
Australia	6 424	5 321	6.81	-3.15	23	22	4.55	0.00	4 746	4 083	6.80	-4.04
New Zealand	10	10	0.00	-0.14	4	4	0.01	0.06	0	0	..	..
DEVELOPED COUNTRIES	**96 872**	**105 743**	**1.93**	**0.80**	**12 132**	**11 512**	**4.76**	**-0.59**	**20 719**	**21 749**	**2.29**	**0.37**
DEVELOPING COUNTRIES	**73 964**	**83 345**	**3.43**	**0.93**	**10 404**	**13 287**	**-0.52**	**1.32**	**3 264**	**3 050**	**5.20**	**0.51**
LEAST DEVELOPED COUNTRIES (LDC)	6 855	7 799	1.68	1.39	306	305	3.85	0.73	478	333	22.25	-0.20
OECD[3]	**59 668**	**65 536**	**0.18**	**0.61**	**13 953**	**13 752**	**3.75**	**-0.38**	**14 471**	**15 685**	**-0.36**	**-0.04**
BRICS	**72 193**	**82 440**	**4.87**	**0.98**	**4 179**	**5 859**	**-3.29**	**2.16**	**3 359**	**2 911**	**14.43**	**-0.27**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**170 110**	**189 061**	**2.66**	**0.89**	**143 117**	**161 787**	**2.51**	**1.03**
NORTH AMERICA	14 903	15 658	2.89	0.67	12 666	13 277	3.00	0.79
Canada	10 161	10 554	3.57	0.78	9 810	10 244	3.74	0.87
United States	4 742	5 104	1.53	0.44	2 856	3 034	0.73	0.52
LATIN AMERICA	7 443	8 177	3.08	0.66	6 960	7 610	3.62	0.60
Argentina	4 125	4 049	4.52	0.31	3 978	3 863	5.40	0.26
Brazil	408	570	1.11	2.53	335	461	0.87	2.34
Chile	225	232	2.39	0.25	206	212	2.51	0.25
Colombia	9	10	0.02	0.03	8	8	0.02	-0.05
Mexico	1 869	2 399	1.24	0.87	1 758	2 298	1.49	0.89
Paraguay	191	203	-2.32	0.54	158	166	-2.49	0.45
Peru	7	7	0.00	0.71	3	3	0.00	0.53
EUROPE	68 010	73 387	2.39	0.85	63 881	69 128	2.59	0.88
European Union[1]	34 070	35 425	0.96	0.70	31 585	32 865	0.93	0.75
United Kingdom	1 982	2 390	-0.53	0.07	1 982	2 390	-0.53	0.07
Russia	16 571	20 442	6.19	1.57	15 808	19 507	6.55	1.56
Ukraine	13 369	13 012	2.11	0.43	12 728	12 486	2.77	0.45
AFRICA	9 337	11 156	0.28	1.52	5 620	6 215	0.39	0.72
Egypt	182	291	1.58	2.13	131	234	2.83	2.27
Ethiopia	93	111	-2.00	1.66	60	69	-1.95	1.24
Nigeria	2 149	2 582	-0.03	2.07	752	643	-0.04	-0.36
South Africa	1 021	1 153	2.01	0.07	915	1 022	1.87	-0.04
ASIA	68 777	79 406	3.10	0.93	52 795	64 396	2.38	1.34
China[2]	38 675	44 632	2.81	0.97	26 331	33 771	1.14	1.78
India	15 822	18 573	4.88	0.97	14 064	16 533	5.08	0.99
Indonesia	727	806	-3.59	0.86	295	334	2.34	0.84
Iran	540	563	6.26	0.19	499	517	6.25	0.14
Japan	2 402	2 539	-0.58	-0.03	2 384	2 521	-0.58	-0.03
Kazakhstan	716	955	4.72	1.29	563	771	4.74	1.42
Korea	44	44	0.67	-0.07	40	40	0.85	-0.08
Malaysia	46	49	0.76	0.56	45	47	0.79	0.55
Pakistan	1 985	2 594	0.62	1.25	1 833	2 422	0.50	1.23
Philippines	115	127	5.50	0.87	102	113	6.38	0.83
Saudi Arabia	7	7	0.00	0.72	5	5	0.00	0.58
Thailand	144	152	0.49	0.51	88	95	0.86	0.82
Türkiye	2 926	3 341	2.73	0.87	2 701	3 088	2.74	0.89
Viet Nam	465	512	1.53	1.05	355	396	1.73	1.19
OCEANIA	1 640	1 277	6.61	0.37	1 194	1 161	3.67	0.40
Australia	1 623	1 260	6.70	0.37	1 182	1 149	3.71	0.40
New Zealand	14	14	-0.01	-0.08	11	11	-0.01	0.00
DEVELOPED COUNTRIES	**89 153**	**95 492**	**2.48**	**0.79**	**82 001**	**88 325**	**2.58**	**0.83**
DEVELOPING COUNTRIES	**80 958**	**93 568**	**2.85**	**1.01**	**61 116**	**73 462**	**2.41**	**1.28**
LEAST DEVELOPED COUNTRIES (LDC)	6 675	7 769	1.10	1.44	4 607	5 120	1.08	1.03
OECD[3]	**60 355**	**63 601**	**1.52**	**0.64**	**54 787**	**58 123**	**1.41**	**0.70**
BRICS	**72 497**	**85 370**	**3.94**	**1.11**	**57 453**	**71 294**	**3.39**	**1.51**

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**358 869**	**405 248**	**2.49**	**0.93**	**92 250**	**103 222**	**1.63**	**0.89**	**90 293**	**103 222**	**0.17**	**0.89**
NORTH AMERICA	57 703	66 769	2.45	1.22	5 113	4 777	1.10	-0.88	18 333	23 041	2.89	1.91
Canada	6 979	8 358	3.10	1.89	1 320	1 006	5.78	-3.79	5 267	5 847	4.26	1.05
United States	50 723	58 412	2.37	1.13	3 793	3 771	-0.24	0.06	13 065	17 194	2.40	2.22
LATIN AMERICA	82 830	96 754	0.85	1.03	10 383	12 199	2.14	1.39	47 426	56 034	-1.29	0.94
Argentina	29 562	36 737	-2.19	1.18	0	0	..	..	25 657	31 878	-2.82	1.37
Brazil	40 707	45 201	3.38	0.85	5	5	6.84	0.00	17 886	19 545	1.43	0.40
Chile	262	262	-1.59	0.47	1 143	1 326	-0.05	1.36	1	1	0.00	-0.13
Colombia	681	832	-0.11	1.34	1 814	2 328	6.25	2.08	160	131	7.07	-2.04
Mexico	5 635	6 012	5.00	1.16	1 828	2 034	-0.57	0.72	22	22	0.63	0.00
Paraguay	2 413	3 607	-3.29	1.64	2	2	-0.18	0.42	1 749	2 550	-5.14	1.24
Peru	315	320	0.10	0.84	1 503	2 100	5.47	3.42	5	5	0.00	-0.84
EUROPE	48 812	51 476	2.37	0.49	26 480	24 986	-0.93	-1.11	10 299	11 596	3.06	1.28
European Union[1]	29 045	28 845	1.19	0.05	21 449	20 099	-0.93	-1.32	2 192	2 285	1.49	1.74
United Kingdom	1 691	1 882	0.93	0.87	2 857	2 651	-0.64	-0.74	521	640	17.19	1.79
Russia	9 568	12 022	6.30	1.51	367	307	-5.82	0.25	2 759	3 938	4.32	2.27
Ukraine	6 720	6 771	2.47	0.52	27	25	-6.71	-0.17	4 417	4 311	1.91	0.31
AFRICA	10 997	12 443	6.04	0.95	4 179	5 980	-3.88	3.67	709	510	2.46	-3.08
Egypt	3 612	4 275	13.87	0.88	307	731	-18.76	11.55	5	5	10.79	-0.96
Ethiopia	107	129	1.56	2.63	20	26	22.34	-0.40	0	0	..	..
Nigeria	1 052	1 155	4.98	1.01	700	815	16.26	1.23	189	162	1.10	-1.22
South Africa	1 659	1 868	6.74	0.07	619	941	-4.87	5.16	52	48	6.91	-3.07
ASIA	157 390	176 651	3.27	0.90	42 874	51 392	4.18	1.74	13 452	11 964	0.31	-1.12
China[2]	92 127	102 158	3.27	0.76	5 132	6 444	27.64	1.77	852	798	-10.68	-0.44
India	22 886	26 504	2.91	1.43	628	754	14.81	3.66	2 537	1 614	1.55	-3.53
Indonesia	8 227	9 281	3.90	0.82	5 585	6 164	4.28	0.71	5 566	5 321	4.14	-0.71
Iran	2 174	2 495	10.42	1.18	2 155	2 266	0.63	0.91	7	5	-29.44	-0.09
Japan	3 573	3 396	1.02	-0.68	2 011	1 933	0.41	0.00	4	0	-27.29	0.00
Kazakhstan	461	568	4.50	1.24	78	81	48.25	0.02	202	194	11.62	-0.02
Korea	1 183	1 211	-0.04	0.04	3 325	3 435	-0.90	0.24	23	30	-22.06	0.00
Malaysia	3 297	3 766	0.71	0.87	1 426	1 505	0.79	0.36	2 541	2 479	-0.11	-0.36
Pakistan	3 828	4 483	2.15	1.51	467	1 241	-7.77	11.68	66	50	-12.38	-3.30
Philippines	1 195	1 341	3.94	0.66	3 242	4 009	4.02	1.49	396	365	0.40	-1.47
Saudi Arabia	609	754	6.64	1.30	1 630	2 009	8.29	2.19	14	24	33.66	-0.80
Thailand	3 558	4 467	8.12	1.22	3 368	4 018	0.81	1.82	12	12	8.12	-0.17
Türkiye	4 540	5 321	4.44	1.08	2 240	2 909	3.27	2.87	203	144	7.50	-2.48
Viet Nam	1 797	2 192	4.00	1.60	6 076	7 754	4.28	2.42	70	51	-2.69	-1.84
OCEANIA	1 137	1 154	1.19	0.41	3 221	3 888	2.71	1.47	75	77	-4.90	-0.61
Australia	1 005	1 007	1.18	0.34	956	1 294	4.94	2.92	21	25	-12.24	0.00
New Zealand	8	8	-0.01	0.00	2 255	2 584	1.84	0.81	0	0	..	..
DEVELOPED COUNTRIES	**114 619**	**126 461**	**2.39**	**0.83**	**38 520**	**38 057**	**-0.24**	**-0.53**	**28 924**	**34 908**	**2.96**	**1.68**
DEVELOPING COUNTRIES	**244 250**	**278 787**	**2.54**	**0.97**	**53 730**	**65 165**	**3.17**	**1.83**	**61 369**	**68 314**	**-0.97**	**0.51**
LEAST DEVELOPED COUNTRIES (LDC)	5 097	5 879	3.75	1.45	1 503	2 415	11.62	4.56	361	216	2.73	-4.46
OECD[3]	**105 827**	**116 118**	**2.14**	**0.82**	**46 706**	**47 332**	**0.15**	**-0.24**	**21 586**	**26 423**	**2.86**	**1.83**
BRICS	**166 947**	**187 753**	**3.42**	**0.91**	**6 751**	**8 451**	**14.45**	**2.19**	**24 085**	**25 943**	**0.77**	**0.32**

.. Not available

Note: Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32
WORLD	**360 530**	**405 164**	**2.90**	**0.95**
NORTH AMERICA	**44 470**	**48 503**	**2.13**	**0.69**
Canada	3 008	3 515	2.16	1.21
United States	41 462	44 988	2.13	0.65
LATIN AMERICA	**46 118**	**52 899**	**3.82**	**1.34**
Argentina	4 206	4 859	1.88	1.21
Brazil	22 826	25 661	5.33	1.21
Chile	1 401	1 587	-0.58	1.25
Colombia	2 329	3 026	4.15	2.14
Mexico	7 439	8 024	3.36	1.05
Paraguay	712	1 050	3.10	2.95
Peru	1 806	2 412	4.40	3.10
EUROPE	**64 832**	**64 859**	**0.81**	**-0.28**
European Union[1]	48 301	46 660	0.19	-0.64
United Kingdom	4 027	3 892	-1.32	-0.38
Russia	7 002	8 391	6.15	1.13
Ukraine	2 341	2 479	3.41	0.89
AFRICA	**14 502**	**17 907**	**2.44**	**1.94**
Egypt	3 922	4 999	4.95	1.95
Ethiopia	127	156	3.33	2.04
Nigeria	1 562	1 807	9.53	1.35
South Africa	2 216	2 759	1.89	1.62
ASIA	**186 337**	**216 030**	**3.73**	**1.22**
China[2]	96 072	107 802	4.19	0.83
India	20 834	25 633	3.55	1.91
Indonesia	8 211	10 120	3.71	1.65
Iran	4 318	4 755	4.36	1.05
Japan	5 583	5 329	0.84	-0.44
Kazakhstan	333	454	4.24	1.64
Korea	4 488	4 616	-0.31	0.19
Malaysia	2 197	2 790	1.77	1.79
Pakistan	4 234	5 670	1.12	3.14
Philippines	4 015	4 983	4.43	1.51
Saudi Arabia	2 254	2 739	8.04	1.97
Thailand	6 911	8 471	3.70	1.52
Türkiye	6 602	8 074	3.99	1.78
Viet Nam	7 816	9 892	4.26	2.27
OCEANIA	**4 272**	**4 966**	**2.43**	**1.31**
Australia	1 928	2 276	3.38	1.88
New Zealand	2 263	2 592	1.72	0.81
DEVELOPED COUNTRIES	**124 021**	**129 599**	**1.38**	**0.21**
DEVELOPING COUNTRIES	**236 509**	**275 565**	**3.78**	**1.31**
LEAST DEVELOPED COUNTRIES (LDC)	**6 226**	**8 074**	**5.28**	**2.53**
OECD[3]	**130 942**	**137 009**	**1.29**	**0.27**
BRICS	**148 950**	**170 246**	**4.30**	**1.07**

Note: Average 2020-22est: Data for 2022 are estimated.
1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**217 271**	**243 867**	**2.80**	**0.91**	**83 184**	**88 728**	**1.66**	**0.57**	**82 676**	**88 728**	**1.45**	**0.57**
NORTH AMERICA	18 407	20 842	2.74	1.15	5 360	5 665	3.20	0.53	4 368	5 116	1.59	2.59
Canada	4 571	4 995	3.17	1.25	377	297	4.01	-2.86	3 326	3 513	3.32	0.89
United States	13 836	15 847	2.60	1.12	4 982	5 367	3.15	0.75	1 042	1 603	-3.62	7.55
LATIN AMERICA	27 837	32 955	1.91	1.21	4 806	4 940	0.83	0.23	10 537	12 483	0.13	1.11
Argentina	8 177	9 775	-1.14	1.06	17	17	0.00	-0.02	5 600	6 646	-0.72	1.18
Brazil	10 835	12 366	3.81	1.09	675	713	4.07	0.74	1 304	1 487	-2.94	1.41
Chile	112	114	0.27	0.37	475	511	2.54	0.46	1	1	0.00	-0.07
Colombia	2 074	2 911	4.95	2.62	549	401	-0.60	-2.64	748	1 101	8.05	2.71
Mexico	2 206	2 530	3.96	1.24	1 001	1 077	1.96	0.53	79	92	6.21	0.00
Paraguay	605	886	-2.99	1.58	13	10	0.00	-1.48	510	761	-3.36	1.50
Peru	290	318	2.76	1.05	648	772	5.12	1.50	1	0	0.06	-0.12
EUROPE	31 183	33 204	2.75	0.73	13 753	11 110	1.04	-2.10	13 820	14 876	5.66	0.77
European Union[1]	16 314	16 618	1.35	0.44	10 123	7 459	0.63	-3.12	2 454	2 372	0.59	-0.01
United Kingdom	1 105	1 274	0.80	1.09	1 129	1 042	0.74	0.09	256	294	-0.31	2.08
Russia	6 910	8 474	6.75	1.50	1 238	1 291	3.67	0.44	5 318	6 532	14.00	1.47
Ukraine	5 934	5 851	2.64	0.47	276	281	-0.13	-0.30	5 260	5 135	2.70	0.30
AFRICA	9 054	10 210	3.46	1.03	10 979	14 952	0.70	2.67	1 558	1 257	1.78	-2.28
Egypt	883	1 071	12.48	0.97	1 708	2 129	-1.52	1.56	131	112	-8.35	-1.54
Ethiopia	58	70	0.93	2.56	494	702	1.42	3.02	0	0	..	..
Nigeria	2 060	2 356	4.82	1.14	1 169	2 087	-3.29	4.46	39	56	-11.07	-1.43
South Africa	623	696	4.36	0.04	797	1 005	0.05	1.86	18	17	-16.49	-1.09
ASIA	129 240	144 997	2.98	0.84	47 927	51 677	2.00	0.71	51 428	53 955	0.74	0.30
China[2]	28 273	32 296	2.75	0.91	9 911	7 497	2.20	-1.56	167	175	-5.73	0.00
India	10 948	12 675	2.70	1.43	14 278	17 500	0.83	1.50	215	197	10.09	-0.69
Indonesia	52 473	58 154	4.85	0.68	134	130	6.75	-0.01	29 955	31 717	1.50	0.43
Iran	647	726	8.89	0.97	1 776	1 867	3.60	0.66	93	53	-15.34	-0.66
Japan	1 515	1 518	0.21	-0.36	820	743	0.46	-0.49	6	5	13.15	0.00
Kazakhstan	314	402	4.53	1.36	111	99	3.84	-0.98	109	83	16.19	0.99
Korea	293	299	-0.04	0.03	1 292	1 267	5.18	-0.54	3	3	-0.75	0.00
Malaysia	20 577	22 688	-0.54	0.74	2 038	1 884	5.50	-0.50	17 065	18 411	-0.76	0.50
Pakistan	1 621	1 942	-1.09	1.43	3 269	3 527	2.24	0.29	33	20	-17.02	-0.13
Philippines	2 010	2 206	2.85	0.47	1 392	1 594	6.86	1.82	986	854	2.59	-1.79
Saudi Arabia	140	173	6.54	1.29	810	986	5.02	1.52	36	30	-4.57	-1.50
Thailand	4 128	4 884	6.42	1.23	301	487	2.43	4.76	815	525	13.95	-4.54
Türkiye	2 087	2 416	3.63	1.07	1 748	1 834	1.67	0.30	629	660	-0.13	-0.30
Viet Nam	713	832	3.52	1.41	1 178	1 408	5.03	1.29	141	112	1.50	-1.27
OCEANIA	1 550	1 658	3.42	0.63	359	384	2.20	0.81	965	1 041	2.62	0.49
Australia	569	561	2.09	0.36	246	265	2.75	0.92	204	191	3.03	0.00
New Zealand	5	5	-0.01	0.00	85	93	1.82	0.92	0	0	..	..
DEVELOPED COUNTRIES	**53 454**	**58 060**	**2.64**	**0.84**	**21 746**	**19 752**	**1.61**	**-0.97**	**18 553**	**20 306**	**4.52**	**1.19**
DEVELOPING COUNTRIES	**163 817**	**185 807**	**2.86**	**0.93**	**61 438**	**68 976**	**1.67**	**1.05**	**64 123**	**68 422**	**0.68**	**0.39**
LEAST DEVELOPED COUNTRIES (LDC)	4 005	4 457	1.85	1.18	6 945	9 513	1.81	2.90	565	383	5.66	-3.67
OECD[3]	**44 932**	**49 364**	**2.21**	**0.92**	**23 691**	**21 281**	**1.72**	**-1.06**	**8 891**	**9 985**	**1.64**	**1.60**
BRICS	**57 589**	**66 507**	**3.37**	**1.10**	**26 899**	**28 005**	**1.47**	**0.54**	**7 023**	**8 408**	**7.68**	**1.37**

.. Not available

Note: Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**216 937**	**243 701**	**2.90**	**0.90**	**16.0**	**16.1**	**0.80**	**0.14**
NORTH AMERICA	19 331	21 397	3.24	0.66	39.8	36.6	1.22	-0.40
Canada	1 564	1 786	4.14	0.94	35.5	35.6	2.86	-0.32
United States	17 766	19 611	3.16	0.63	40.3	36.8	1.08	-0.41
LATIN AMERICA	22 120	25 406	2.44	1.07	17.6	18.2	-0.09	0.26
Argentina	2 595	3 145	-2.18	0.80	19.0	20.5	0.75	0.67
Brazil	10 223	11 591	4.73	1.02	22.6	22.6	-0.91	-0.09
Chile	588	624	2.14	0.45	8.6	8.9	1.04	0.38
Colombia	1 858	2 209	2.15	1.41	13.1	14.7	-0.05	0.90
Mexico	3 128	3 515	3.30	1.05	23.4	24.6	2.30	0.40
Paraguay	103	134	-3.94	1.84	12.2	14.8	-4.96	0.94
Peru	941	1 089	4.39	1.37	10.1	10.8	1.92	0.83
EUROPE	31 074	29 437	0.99	-0.45	21.9	21.4	0.94	-0.05
European Union[1]	24 000	21 704	1.23	-0.89	24.1	21.7	1.59	-0.69
United Kingdom	1 978	2 022	0.94	0.43	28.9	28.6	0.85	0.14
Russia	2 777	3 232	-1.96	1.13	18.5	22.3	-2.07	1.43
Ukraine	938	996	2.00	1.20	9.2	10.5	3.20	1.94
AFRICA	18 509	23 897	1.89	2.26	7.7	8.3	-1.94	0.79
Egypt	2 465	3 086	2.60	1.48	5.6	6.6	-1.68	0.91
Ethiopia	552	773	1.38	2.98	2.6	3.1	-2.63	1.72
Nigeria	3 185	4 385	1.51	2.64	9.4	10.4	-1.77	0.61
South Africa	1 404	1 684	2.31	1.10	14.5	16.1	-3.50	0.60
ASIA	124 994	142 565	3.62	1.00	15.3	16.1	1.59	0.47
China[2]	38 236	39 593	2.75	0.39	26.0	27.2	2.38	0.52
India	24 954	29 968	1.59	1.48	9.9	11.0	0.90	1.01
Indonesia	22 058	26 488	10.90	0.97	10.3	12.2	5.19	1.09
Iran	2 295	2 538	5.03	0.79	13.6	14.1	5.35	0.30
Japan	2 304	2 256	0.34	-0.40	18.2	19.0	0.67	0.17
Kazakhstan	322	418	2.61	0.86	14.1	16.6	2.16	0.12
Korea	1 592	1 563	4.26	-0.40	17.9	18.4	4.34	0.21
Malaysia	5 298	6 138	2.30	1.06	9.6	9.9	0.88	0.12
Pakistan	4 875	5 448	1.26	0.69	4.2	4.2	-7.17	0.24
Philippines	2 330	2 940	4.75	2.05	13.7	15.5	4.05	1.19
Saudi Arabia	911	1 128	5.94	1.61	19.7	22.1	3.62	0.81
Thailand	3 713	4 845	5.70	2.47	11.0	12.1	4.77	1.06
Türkiye	3 175	3 588	3.22	0.93	16.5	17.9	0.02	0.85
Viet Nam	1 763	2 127	4.84	1.50	5.0	6.2	4.35	1.81
OCEANIA	911	1 000	3.41	0.92	17.0	16.6	0.29	-0.11
Australia	603	636	2.01	0.77	22.8	22.2	0.55	-0.13
New Zealand	90	98	1.72	0.87	16.8	16.8	-0.06	0.19
DEVELOPED COUNTRIES	**56 516**	**57 509**	**1.77**	**0.07**	**25.3**	**24.5**	**0.94**	**-0.10**
DEVELOPING COUNTRIES	**160 422**	**186 192**	**3.32**	**1.18**	**13.9**	**14.3**	**0.88**	**0.33**
LEAST DEVELOPED COUNTRIES (LDC)	10 385	13 584	1.75	2.55	7.0	7.8	-1.30	1.24
OECD[3]	**59 616**	**60 663**	**2.19**	**0.07**	**26.6**	**25.4**	**1.41**	**-0.18**
BRICS	**77 594**	**86 067**	**2.39**	**0.89**	**18.3**	**19.1**	**1.27**	**0.46**

Note: Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
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	37	36	36	36	37	38	39	40	41	41	41
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	1 200	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	132
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	%	51.1	50.5	50.5	50.8	51.2	51.2	50.8	50.5	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	229.8
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	%	40.1	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	%	24.5	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
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 2020-22est: Data for 2022 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.

Source: OECD/FAO (2023), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.23.1. Sugar projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**175 491**	**197 849**	**0.55**	**0.88**	**60 725**	**71 614**	**0.58**	**1.53**	**64 287**	**75 176**	**0.74**	**1.46**
NORTH AMERICA	7 820	8 510	0.98	0.72	4 177	3 663	-0.06	-0.73	159	121	-0.76	0.00
Canada	121	119	3.36	0.08	1 323	1 278	1.86	0.56	120	91	21.72	0.00
United States	7 699	8 390	0.95	0.73	2 854	2 384	-0.85	-1.35	39	30	-16.35	0.00
LATIN AMERICA	56 249	64 632	-0.40	1.14	2 254	2 756	0.40	0.75	34 482	41 061	0.14	1.84
Argentina	1 559	1 826	-2.40	1.70	0	0	..	..	229	532	0.55	7.61
Brazil	37 194	45 066	0.16	1.69	0	0	-74.20	..	28 038	34 293	1.00	2.16
Chile	122	121	-9.17	0.96	589	619	2.99	-0.82	0	0	..	..
Colombia	2 149	2 012	-1.01	-1.07	214	249	8.91	2.79	566	446	-3.34	-2.72
Mexico	5 800	6 181	-0.73	-0.04	44	34	20.22	0.52	1 637	2 031	-1.24	0.28
Paraguay	142	96	-3.07	-1.60	83	117	236.52	1.58	86	65	4.07	-1.55
Peru	1 168	1 008	0.53	-0.86	286	620	1.95	3.80	108	44	0.23	-3.65
EUROPE	24 358	25 271	0.51	0.19	3 485	3 089	-8.64	0.23	1 658	2 905	-7.15	6.86
European Union[1]	15 270	15 532	0.84	-0.19	1 864	1 856	-9.65	1.20	847	1 652	-10.46	10.05
United Kingdom	893	1 018	-3.65	-0.05	652	579	-4.66	-0.84	43	64	-24.31	-2.14
Russia	5 780	6 101	2.67	0.61	191	47	-18.14	-1.37	324	730	59.14	6.32
Ukraine	1 242	1 223	-4.82	3.11	64	0	-24.92	-21.75	82	29	5.04	0.84
AFRICA	10 828	12 206	0.71	1.56	14 922	19 810	2.49	2.23	5 102	4 283	1.54	-0.89
Egypt	2 480	2 585	1.71	1.88	1 061	1 654	-3.94	1.79	342	147	3.78	-1.76
Ethiopia	413	468	0.58	1.88	319	532	20.89	4.23	37	33	173.99	-1.71
Nigeria	19	0	9.62	..	1 572	2 221	1.44	2.04	0	0	-41.96	..
South Africa	1 925	2 237	1.03	1.35	319	293	-7.67	-2.98	561	719	8.83	3.07
ASIA	71 896	82 672	1.44	0.86	35 573	41 965	1.37	1.61	19 664	23 355	3.40	1.00
China[2]	10 037	10 606	-1.75	0.66	6 368	7 146	2.17	3.10	88	70	2.97	0.00
India	34 352	37 900	4.43	0.72	703	612	-13.29	2.47	8 250	7 858	17.68	1.48
Indonesia	2 391	2 839	-0.27	1.93	5 316	7 855	5.58	2.61	86	0	25.62	..
Iran	1 354	1 199	-1.16	0.24	1 094	1 337	7.10	0.58	0	0	-78.37	..
Japan	705	646	-0.31	0.07	1 350	1 137	0.59	-0.91	4	5	19.37	0.00
Kazakhstan	49	0	35.80	..	457	559	0.01	0.70	5	0	-38.66	..
Korea	0	0	..	..	1 921	2 053	0.51	-0.02	309	463	-0.08	-0.05
Malaysia	0	0	-73.41	..	2 128	2 349	0.85	0.63	184	132	-4.98	-0.62
Pakistan	6 672	7 107	2.66	1.05	171	178	23.96	11.12	399	146	-9.86	-10.01
Philippines	2 005	2 293	-2.44	2.08	308	389	691.41	-1.44	114	143	-3.61	1.40
Saudi Arabia	0	0	..	..	1 714	1 911	3.97	0.40	460	457	11.20	-0.39
Thailand	9 703	14 687	-1.50	0.61	0	0	..	..	6 901	11 821	0.28	1.22
Türkiye	2 704	3 334	2.51	2.33	228	143	24.55	-6.09	282	506	43.81	6.50
Viet Nam	811	877	-8.40	0.80	1 606	1 865	28.63	1.85	216	121	7.53	-1.81
OCEANIA	4 340	4 559	-1.43	0.25	314	331	-2.69	0.12	3 222	3 451	-3.13	-0.06
Australia	4 146	4 360	-1.30	0.23	17	20	-22.53	0.00	3 082	3 341	-2.96	-0.03
New Zealand	0	0	..	..	229	222	-0.87	-0.15	22	20	-1.55	0.00
DEVELOPED COUNTRIES	**39 123**	**41 151**	**0.42**	**0.37**	**12 156**	**11 395**	**-3.45**	**-0.15**	**5 732**	**7 289**	**-4.09**	**2.54**
DEVELOPING COUNTRIES	**136 367**	**156 698**	**0.60**	**1.02**	**48 568**	**60 219**	**1.85**	**1.89**	**58 555**	**67 887**	**1.33**	**1.34**
LEAST DEVELOPED COUNTRIES (LDC)	3 883	4 964	1.11	2.09	9 365	12 564	1.51	3.11	2 442	1 814	-5.76	-0.96
OECD[3]	**39 825**	**41 958**	**0.17**	**0.21**	**12 014**	**11 367**	**-2.22**	**-0.25**	**6 956**	**8 656**	**-3.74**	**1.55**
BRICS	**89 288**	**101 910**	**1.52**	**1.14**	**7 580**	**8 098**	**-1.99**	**2.72**	**37 262**	**43 670**	**3.63**	**2.10**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated. Sugar data are expressed on a tel quel basis.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**171 723**	**193 144**	**0.67**	**1.07**	**21.7**	**22.2**	**-0.42**	**0.23**
NORTH AMERICA	11 753	12 045	0.53	0.24	30.9	29.9	-0.20	-0.29
Canada	1 301	1 305	1.37	0.21	31.6	29.3	0.08	-0.57
United States	10 452	10 739	0.43	0.24	30.8	30.0	-0.23	-0.25
LATIN AMERICA	25 297	26 140	-0.61	0.28	38.3	36.7	-1.50	-0.38
Argentina	1 339	1 301	-2.97	0.07	29.1	26.6	-3.80	-0.50
Brazil	10 342	10 673	-1.07	0.32	47.8	46.9	-1.81	-0.14
Chile	741	734	-0.51	-0.04	38.4	37.2	-1.61	-0.25
Colombia	1 775	1 813	0.54	0.03	34.4	33.4	-0.70	-0.46
Mexico	4 151	4 173	-0.47	-0.26	32.3	30.3	-1.41	-0.89
Paraguay	138	148	0.84	0.81	19.0	18.1	-0.42	-0.21
Peru	1 403	1 570	2.13	1.06	41.8	42.6	0.65	0.22
EUROPE	26 495	25 567	-0.63	-0.22	35.1	34.3	-0.70	-0.06
European Union[1]	16 576	15 770	-0.47	-0.42	36.8	35.3	-0.55	-0.28
United Kingdom	1 534	1 534	-1.47	-0.06	22.5	21.8	-1.72	-0.35
Russia	5 766	5 551	0.67	-0.40	39.4	39.2	0.59	-0.10
Ukraine	1 065	1 145	-7.26	3.17	24.3	28.2	-6.79	3.90
AFRICA	20 577	27 458	1.89	2.62	14.9	15.5	-0.65	0.33
Egypt	3 233	4 022	-0.26	2.17	30.8	32.0	-2.27	0.57
Ethiopia	665	931	5.11	3.61	5.5	6.0	2.46	1.34
Nigeria	1 580	2 207	1.51	2.53	7.2	7.7	-1.18	0.11
South Africa	1 697	1 787	-1.87	0.56	28.1	26.5	-3.23	-0.42
ASIA	86 159	100 510	1.25	1.36	18.3	20.0	0.32	0.79
China[2]	15 520	17 697	0.15	1.41	10.4	12.0	-0.25	1.53
India	26 850	30 326	1.20	0.97	18.9	19.5	0.06	0.17
Indonesia	7 639	10 673	3.11	2.38	27.4	34.8	1.95	1.54
Iran	2 393	2 524	-0.30	0.65	27.9	26.6	-1.62	-0.21
Japan	1 945	1 778	-1.40	-0.57	15.5	15.1	-1.08	0.00
Kazakhstan	493	554	0.47	0.96	25.8	26.3	-0.87	0.10
Korea	1 594	1 606	0.56	-0.05	30.5	31.2	0.19	0.11
Malaysia	1 914	2 184	1.97	1.17	58.3	59.4	0.63	0.17
Pakistan	5 688	7 030	2.44	1.94	25.1	25.8	0.38	0.28
Philippines	2 168	2 534	-0.13	1.41	19.3	19.9	-1.59	0.26
Saudi Arabia	1 269	1 441	1.54	1.07	35.7	35.8	-0.39	-0.02
Thailand	2 775	2 820	-0.17	0.12	39.6	40.1	-0.49	0.11
Türkiye	2 556	2 927	1.83	1.09	29.8	32.2	0.45	0.53
Viet Nam	2 183	2 605	4.59	1.82	22.0	24.5	3.56	1.22
OCEANIA	1 441	1 424	0.73	0.26	33.5	29.2	-0.86	-0.83
Australia	1 097	1 031	0.65	-0.08	42.0	35.5	-0.78	-0.97
New Zealand	210	203	-0.64	-0.12	40.6	36.2	-2.41	-0.81
DEVELOPED COUNTRIES	**45 710**	**45 306**	**-0.30**	**0.01**	**31.4**	**30.6**	**-0.68**	**-0.14**
DEVELOPING COUNTRIES	**126 012**	**147 839**	**1.05**	**1.42**	**19.5**	**20.5**	**-0.23**	**0.43**
LEAST DEVELOPED COUNTRIES (LDC)	10 816	15 560	3.57	3.40	11.8	13.4	1.20	1.23
OECD[3]	**44 878**	**44 638**	**-0.09**	**-0.05**	**31.7**	**30.8**	**-0.58**	**-0.26**
BRICS	**60 175**	**66 033**	**0.37**	**0.84**	**18.2**	**19.2**	**-0.37**	**0.50**

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.Sugar data are expressed on a tel quel basis.

1. Refers to all current European Union member States.
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 (2023), “OECD-FAO Agricultural Outlook”, *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

ANNEX C

Table C.24. Main policy assumptions for sugar markets

Marketing year

		Average 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
ARGENTINA												
Tariff, sugar	ARS/t	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
BRAZIL												
Tariff, raw sugar	%	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Tariff, white sugar	%	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
CANADA												
Tariff, raw sugar	CAD/t	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7
Tariff, white sugar	CAD/t	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9
CHINA[1]												
TRQ sugar	kt	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0
In-quota tariff, raw sugar	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Tariff, over-quota	%	57.8	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	169.3	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	420.0
INDIA												
Tariff, sugar	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
INDONESIA												
Tariff, sugar	%	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6
JAPAN												
Minimum stabilisation price, raw sugar	JPY/kg	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2
Tariff, raw sugar	JPY/kg	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8
Tariff, white sugar	JPY/kg	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1
KOREA												
Tariff, raw sugar	%	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Tariff, white sugar	%	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	150.3	171.0	203.0	240.0	240.0	240.0	240.0	240.0	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	1 518	1 477	1 481	1 484	1 487	1 491	1 494	1 498	1 498	1 499	1 500
Raw sugar 2nd tier WTO tariff	USD/t	338.7	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	%	83.4	83.4	83.4	83.4	83.4	83.4	83.4	83.4	83.4	83.4	83.4

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 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.
3. Implemented in 11 Member States.

Source: OECD/FAO (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**340 775**	**382 080**	**1.34**	**0.95**	**38 709**	**41 557**	**3.83**	**0.71**	**40 392**	**41 554**	**3.05**	**0.69**
NORTH AMERICA	52 927	55 780	2.03	0.44	2 979	3 200	2.16	0.14	10 435	10 435	2.46	0.55
Canada	5 240	5 440	1.84	0.40	666	728	-0.82	1.08	2 305	2 239	3.19	0.48
United States	47 687	50 339	2.05	0.44	2 313	2 472	3.18	-0.12	8 130	8 196	2.27	0.57
LATIN AMERICA	55 817	63 302	1.63	1.16	5 309	5 908	3.99	0.50	11 445	12 564	4.51	1.27
Argentina	6 136	6 695	2.23	0.83	51	51	6.34	0.02	1 122	1 352	14.08	1.65
Brazil	28 267	30 555	1.31	0.79	94	84	1.13	-0.02	7 848	8 360	3.06	1.17
Chile	1 597	1 930	1.28	1.87	704	677	9.11	-0.10	474	505	6.66	1.18
Colombia	2 991	3 756	2.66	1.81	246	283	10.05	-0.03	54	71	10.60	3.97
Mexico	7 403	8 347	2.73	1.03	2 349	2 673	4.12	0.69	688	794	11.89	1.60
Paraguay	669	917	4.13	3.52	41	50	5.13	-0.10	407	574	2.47	3.50
Peru	2 152	2 799	3.48	2.38	115	126	12.66	1.66	1	2	-22.17	-0.16
EUROPE	64 378	63 119	1.40	-0.01	4 525	4 564	-3.54	-0.47	9 947	8 712	4.68	-0.08
European Union[1]	44 236	41 979	1.01	-0.28	1 365	1 483	-1.63	-0.80	7 368	6 184	3.97	-0.37
United Kingdom	4 151	4 275	1.72	0.33	1 494	1 727	-1.55	0.67	856	889	1.54	0.62
Russia	10 916	11 388	3.56	0.35	599	264	-14.16	-4.88	677	609	26.70	0.00
Ukraine	2 150	2 256	-0.46	1.52	384	322	3.73	-1.43	480	446	12.65	1.18
AFRICA	17 979	22 570	1.86	2.30	3 341	5 560	2.71	3.95	320	355	0.55	1.78
Egypt	2 093	2 919	0.64	3.26	346	507	-3.39	1.75	3	1	-8.73	-1.02
Ethiopia	795	931	3.12	2.25	1	1	0.11	7.44	15	14	-0.44	1.83
Nigeria	1 205	1 469	0.59	2.13	8	16	15.83	5.69	0	0	..	..
South Africa	3 530	4 272	1.76	1.64	487	478	-0.23	-0.46	154	235	-0.42	4.87
ASIA	143 372	170 404	0.97	1.26	22 013	21 656	6.70	0.38	5 304	6 074	1.63	0.79
China[2]	84 428	96 211	-0.11	0.63	8 733	6 652	21.62	-0.26	850	674	-0.86	-2.08
India	7 353	9 640	1.48	2.36	2	3	7.50	3.72	1 339	1 521	-3.68	0.32
Indonesia	4 581	5 731	7.21	2.08	271	418	17.80	2.06	3	3	-5.37	0.67
Iran	3 060	3 525	0.85	2.07	149	176	5.74	-6.92	61	36	-8.69	5.71
Japan	3 456	3 372	0.80	-0.23	3 056	3 023	2.15	-0.25	19	19	6.74	0.10
Kazakhstan	1 034	1 290	3.96	2.02	335	373	3.06	1.12	33	35	22.41	-0.50
Korea	2 738	2 793	2.19	0.30	1 444	1 621	5.79	0.17	70	53	10.03	-2.93
Malaysia	1 956	2 532	0.34	2.66	395	537	3.98	0.54	237	288	5.65	2.09
Pakistan	4 945	6 855	6.56	2.82	2	3	-12.63	0.60	79	64	3.89	-0.14
Philippines	2 873	4 201	-1.68	4.50	840	932	11.66	-0.21	8	9	-7.17	-0.34
Saudi Arabia	958	1 358	6.88	2.90	819	707	-4.64	-0.43	64	80	-0.66	0.82
Thailand	3 001	3 706	0.04	2.76	36	40	-3.71	-0.46	1 339	1 640	6.33	1.90
Türkiye	4 331	5 789	5.32	1.84	82	93	-4.48	0.29	818	1 289	6.72	2.43
Viet Nam	5 724	7 234	3.20	1.86	664	748	-4.75	2.47	24	21	0.90	0.44
OCEANIA	6 301	6 905	-0.33	0.72	542	669	1.89	1.67	2 941	3 415	-1.30	0.76
Australia	4 692	5 260	-0.78	0.83	334	408	1.02	1.88	1 834	2 321	-2.49	1.00
New Zealand	1 473	1 491	1.14	0.30	84	97	3.49	0.90	1 104	1 091	0.99	0.28
DEVELOPED COUNTRIES	**134 623**	**138 461**	**1.58**	**0.32**	**12 405**	**13 000**	**-0.24**	**-0.02**	**23 561**	**22 889**	**2.76**	**0.37**
DEVELOPING COUNTRIES	**206 152**	**243 619**	**1.18**	**1.33**	**26 305**	**28 557**	**6.38**	**1.06**	**16 831**	**18 665**	**3.46**	**1.09**
LEAST DEVELOPED COUNTRIES (LDC)	11 601	15 033	2.79	2.48	1 537	3 056	4.48	5.17	63	41	9.48	-1.97
OECD[3]	**131 549**	**136 500**	**1.64**	**0.35**	**14 455**	**15 685**	**2.22**	**0.19**	**23 745**	**23 674**	**2.73**	**0.47**
BRICS	**134 493**	**152 066**	**0.58**	**0.77**	**9 915**	**7 481**	**11.14**	**-0.48**	**10 868**	**11 398**	**2.22**	**0.83**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), “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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**338 837**	**381 894**	**1.40**	**0.95**	**28.1**	**28.8**	**0.17**	**0.08**
NORTH AMERICA	45 711	48 734	1.94	0.39	78.6	79.1	1.21	-0.14
Canada	3 272	3 619	1.21	0.56	54.9	55.6	0.01	-0.26
United States	42 439	45 114	2.00	0.38	81.3	81.9	1.32	-0.12
LATIN AMERICA	49 245	56 186	1.24	1.07	49.0	51.9	0.38	0.39
Argentina	5 065	5 394	0.63	0.63	71.2	71.2	-0.18	0.04
Brazil	20 406	22 159	0.72	0.65	65.0	67.2	0.08	0.20
Chile	1 807	2 082	2.44	1.37	61.3	69.0	1.32	1.15
Colombia	3 104	3 891	2.85	1.67	38.3	45.5	1.63	1.16
Mexico	8 887	10 025	2.71	0.88	44.1	46.3	1.77	0.22
Paraguay	299	388	6.63	3.04	27.1	31.4	5.54	2.00
Peru	2 266	2 922	3.88	2.35	41.2	48.4	2.35	1.47
EUROPE	58 682	58 752	0.45	-0.02	52.1	52.7	0.27	0.12
European Union[1]	37 937	37 032	0.39	-0.28	57.0	55.9	0.19	-0.15
United Kingdom	4 789	5 113	0.62	0.40	46.0	47.4	-0.17	0.09
Russia	10 848	11 058	0.80	0.20	48.9	51.5	0.75	0.49
Ukraine	2 053	2 136	-1.76	1.08	30.7	34.3	-1.26	1.78
AFRICA	21 019	27 860	2.05	2.63	9.6	9.9	-0.55	0.34
Egypt	2 478	3 475	-0.07	2.97	14.3	16.8	-2.23	1.33
Ethiopia	756	893	3.49	2.31	3.7	3.4	0.54	0.07
Nigeria	1 273	1 560	0.65	2.13	3.5	3.3	-2.20	-0.28
South Africa	3 786	4 440	1.24	1.28	39.6	41.5	-0.13	0.29
ASIA	160 547	186 371	1.58	1.16	22.3	24.3	0.43	0.54
China[2]	92 361	102 113	0.92	0.59	43.0	48.3	0.27	0.70
India	6 003	8 109	2.99	2.80	1.9	2.3	0.62	1.91
Indonesia	4 985	6 309	7.61	2.05	10.5	12.0	6.40	1.20
Iran	3 133	3 653	1.36	1.38	22.3	23.5	-0.02	0.51
Japan	6 484	6 379	1.40	-0.24	34.3	35.9	1.71	0.32
Kazakhstan	1 340	1 630	3.49	1.86	45.6	50.1	2.00	0.96
Korea	4 113	4 361	3.17	0.27	53.2	57.2	2.76	0.40
Malaysia	2 133	2 801	0.44	2.25	40.3	47.2	-0.86	1.21
Pakistan	4 858	6 785	6.58	2.85	13.4	15.6	4.51	1.17
Philippines	3 713	5 132	0.53	3.45	21.8	26.5	-1.20	2.33
Saudi Arabia	1 874	2 167	0.48	1.61	32.2	32.8	-1.42	0.50
Thailand	1 463	1 824	-4.72	3.05	13.9	17.2	-4.92	3.11
Türkiye	3 608	4 603	4.46	1.64	26.2	31.5	3.23	1.09
Viet Nam	6 381	7 979	2.02	1.92	44.4	51.8	0.91	1.29
OCEANIA	3 635	3 991	1.24	0.88	55.0	53.3	-0.39	-0.24
Australia	2 961	3 212	1.27	0.85	73.8	72.3	-0.20	-0.07
New Zealand	417	464	0.70	0.71	52.3	53.3	-1.15	0.00
DEVELOPED COUNTRIES	**123 156**	**128 388**	**1.17**	**0.28**	**56.0**	**57.1**	**0.71**	**0.11**
DEVELOPING COUNTRIES	**215 682**	**253 506**	**1.53**	**1.31**	**21.8**	**22.9**	**0.10**	**0.28**
LEAST DEVELOPED COUNTRIES (LDC)	13 073	18 102	3.12	2.91	9.2	10.1	0.75	0.75
OECD[3]	**121 755**	**128 105**	**1.52**	**0.31**	**56.7**	**58.0**	**0.94**	**0.08**
BRICS	**133 404**	**147 879**	**0.98**	**0.70**	**27.0**	**28.8**	**0.06**	**0.31**

Note: Calendar year; except year ending 30 June for New Zealand. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 boneless retail weight. Carcass weight to boneless retail weight conversion factors are 0.67 for beef and veal, 0.73 for pig meat, 0.6 for poultry meat and 0.66 for sheep meat.

Source: OECD/FAO (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**71 211**	**77 812**	**0.97**	**0.86**	**11 293**	**13 448**	**3.74**	**1.27**	**11 798**	**13 563**	**2.66**	**1.26**
NORTH AMERICA	13 833	14 195	1.91	0.33	1 726	1 674	1.85	-0.42	2 039	2 178	4.57	1.07
Canada	1 560	1 592	1.99	0.23	204	219	-3.41	1.00	589	640	7.34	0.88
United States	12 274	12 603	1.91	0.34	1 521	1 455	2.79	-0.62	1 450	1 539	3.61	1.15
LATIN AMERICA	17 881	19 552	0.17	0.90	874	916	1.05	0.27	4 965	5 961	7.03	1.68
Argentina	3 074	3 233	1.75	0.63	7	7	0.00	-0.15	868	1 055	23.60	1.55
Brazil	8 415	8 935	-1.32	0.49	65	62	-0.89	0.00	2 507	2 993	4.46	1.72
Chile	231	274	0.04	1.81	391	420	7.77	0.79	24	24	19.69	-0.79
Colombia	825	842	-0.91	0.91	9	13	11.77	2.80	54	71	14.74	3.98
Mexico	2 103	2 174	2.01	0.72	124	112	-1.07	-0.38	374	457	11.30	2.42
Paraguay	554	767	3.52	3.62	7	7	14.09	-3.46	394	565	2.16	3.59
Peru	188	208	-0.37	0.82	10	8	6.98	-1.47	0	0	..	..
EUROPE	10 718	10 268	0.41	-0.33	1 115	972	-3.83	0.16	1 085	1 068	3.16	1.22
European Union[1]	7 104	6 708	0.58	-0.43	315	377	-0.52	0.06	574	647	2.74	1.88
United Kingdom	909	880	0.66	-0.31	310	335	-0.55	0.74	144	141	1.68	-0.87
Russia	1 663	1 672	0.33	-0.01	323	95	-10.24	-0.72	89	0	40.00	0.00
Ukraine	322	253	-3.43	-1.56	9	8	11.68	-1.06	29	16	-0.62	1.07
AFRICA	6 278	7 646	0.61	2.16	498	947	-1.98	4.24	88	162	-5.05	7.28
Egypt	538	699	-4.98	2.75	328	489	3.31	1.69	1	0	8.60	-0.08
Ethiopia	447	473	1.59	1.26	0	0	..	72.17	0	0	44.62	..
Nigeria	277	334	-1.82	1.84	2	2	-0.01	0.73	0	0	..	..
South Africa	1 125	1 350	1.71	1.62	5	6	-21.62	2.55	60	137	2.25	9.56
ASIA	19 536	22 963	2.08	1.36	7 043	8 902	7.24	1.58	1 654	1 850	-2.39	0.31
China[2]	6 925	7 772	1.74	0.92	2 953	3 916	32.11	1.73	16	18	-8.43	0.08
India	2 443	2 822	-0.41	0.61	0	0	..	..	1 325	1 507	-3.60	0.33
Indonesia	301	290	-5.00	1.65	265	408	19.04	2.08	0	0	-3.53	-0.14
Iran	550	673	3.85	1.63	54	85	-6.80	1.77	7	6	9.24	-0.61
Japan	476	446	-0.51	-0.24	815	777	1.51	-0.42	9	10	31.29	0.00
Kazakhstan	535	646	4.30	1.46	64	66	0.83	0.16	12	16	25.43	-0.07
Korea	306	337	-1.00	0.23	593	639	7.49	0.32	5	5	-1.82	0.00
Malaysia	29	39	-0.43	2.02	213	276	1.14	1.49	13	13	0.51	-1.47
Pakistan	2 379	3 183	4.91	2.73	1	1	-1.24	-0.02	67	60	6.38	0.01
Philippines	193	200	-6.56	0.35	180	264	5.57	2.88	4	4	3.36	-1.02
Saudi Arabia	40	49	-0.63	1.35	182	216	1.83	1.11	11	11	-6.80	-1.10
Thailand	171	193	-1.89	1.08	32	35	0.83	-0.61	49	56	0.67	0.61
Türkiye	1 431	1 736	8.92	1.46	5	4	-10.40	-0.12	33	58	8.54	6.35
Viet Nam	471	559	4.86	1.44	245	479	-15.01	5.18	1	1	28.30	-0.43
OCEANIA	2 965	3 188	-1.99	0.73	37	37	0.04	0.24	1 967	2 343	-1.99	0.90
Australia	2 200	2 429	-3.18	0.83	19	18	6.36	0.00	1 299	1 690	-3.82	1.03
New Zealand	756	752	2.34	0.43	9	9	-4.11	-0.06	666	652	2.65	0.58
DEVELOPED COUNTRIES	**31 276**	**32 120**	**0.99**	**0.32**	**3 995**	**3 864**	**-0.05**	**-0.09**	**5 174**	**5 756**	**1.42**	**1.16**
DEVELOPING COUNTRIES	**39 935**	**45 692**	**0.96**	**1.26**	**7 298**	**9 584**	**6.36**	**1.87**	**6 623**	**7 807**	**3.72**	**1.34**
LEAST DEVELOPED COUNTRIES (LDC)	3 868	4 696	1.83	2.16	94	346	-3.30	8.87	13	14	-0.49	2.10
OECD[3]	**30 473**	**31 087**	**1.18**	**0.29**	**4 538**	**4 679**	**2.48**	**0.06**	**5 225**	**5 936**	**1.84**	**1.19**
BRICS	**20 570**	**22 551**	**0.03**	**0.68**	**3 345**	**4 079**	**15.43**	**1.64**	**3 996**	**4 656**	**1.26**	**1.40**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), “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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**70 499**	**77 631**	**1.08**	**0.86**	**5.9**	**5.9**	**-0.05**	**0.02**
NORTH AMERICA	13 728	13 900	1.51	0.12	24.3	23.2	0.81	-0.41
Canada	995	1 019	0.41	0.22	17.2	16.1	-0.68	-0.57
United States	12 732	12 881	1.60	0.12	25.1	24.0	0.95	-0.38
LATIN AMERICA	13 338	14 037	-1.78	0.55	13.4	13.1	-2.64	-0.13
Argentina	2 214	2 185	-1.95	0.21	32.1	29.8	-2.73	-0.37
Brazil	5 865	5 885	-3.14	-0.08	18.0	17.1	-3.84	-0.57
Chile	579	650	3.93	1.30	20.0	22.0	2.79	1.08
Colombia	701	708	-2.30	0.78	9.0	8.7	-3.50	0.28
Mexico	1 660	1 618	0.96	0.11	8.5	7.7	0.06	-0.55
Paraguay	162	204	7.41	3.47	14.7	16.6	6.18	2.42
Peru	198	216	-0.08	0.72	3.9	3.9	-1.51	-0.12
EUROPE	10 554	10 031	-0.50	-0.39	9.3	9.0	-0.63	-0.24
European Union[1]	6 637	6 281	0.25	-0.56	9.9	9.4	0.12	-0.42
United Kingdom	1 076	1 074	0.17	0.08	10.5	10.2	-0.59	-0.21
Russia	1 914	1 784	-3.01	-0.05	8.7	8.4	-3.08	0.24
Ukraine	297	242	-3.56	-1.71	4.5	4.0	-3.05	-1.02
AFRICA	6 748	8 553	0.48	2.30	3.2	3.2	-2.03	0.04
Egypt	906	1 239	-2.38	2.20	5.6	6.4	-4.32	0.60
Ethiopia	423	447	1.96	1.31	2.1	1.7	-0.97	-0.91
Nigeria	329	402	-1.70	1.95	0.9	0.8	-4.47	-0.45
South Africa	993	1 145	0.10	1.10	11.0	11.3	-1.25	0.11
ASIA	25 350	30 392	3.75	1.45	3.5	4.0	2.75	0.88
China[2]	9 979	11 694	6.16	1.12	4.5	5.4	5.70	1.24
India	1 118	1 315	5.11	0.94	0.4	0.4	2.73	0.14
Indonesia	715	872	2.27	1.69	1.6	1.8	1.36	0.85
Iran	598	753	2.58	1.66	4.6	5.2	1.20	0.79
Japan	1 273	1 218	0.72	-0.36	6.8	6.9	1.06	0.21
Kazakhstan	590	698	3.64	1.36	20.6	22.1	2.28	0.50
Korea	893	971	3.59	0.29	11.4	12.6	3.24	0.44
Malaysia	246	320	0.60	1.60	5.0	5.8	-0.72	0.60
Pakistan	2 303	3 116	4.86	2.79	6.6	7.5	2.90	1.12
Philippines	377	468	-1.51	1.71	2.2	2.4	-2.94	0.55
Saudi Arabia	212	254	2.00	1.26	4.0	4.2	0.05	0.17
Thailand	116	135	-3.37	0.78	1.1	1.3	-3.70	0.78
Türkiye	1 415	1 692	8.12	1.32	10.8	12.2	6.68	0.77
Viet Nam	730	1 054	-6.60	2.95	5.0	6.7	-7.50	2.34
OCEANIA	781	718	-1.15	0.31	12.1	9.9	-2.70	-0.78
Australia	694	632	-0.70	0.35	17.8	14.6	-2.10	-0.55
New Zealand	72	71	-4.15	0.04	9.3	8.4	-5.85	-0.65
DEVELOPED COUNTRIES	**29 847**	**30 147**	**0.74**	**0.13**	**13.7**	**13.6**	**0.34**	**-0.02**
DEVELOPING COUNTRIES	**40 651**	**47 484**	**1.34**	**1.35**	**4.1**	**4.3**	**0.03**	**0.36**
LEAST DEVELOPED COUNTRIES (LDC)	3 980	5 096	1.96	2.51	2.9	2.9	-0.37	0.37
OECD[3]	**29 330**	**29 523**	**1.28**	**0.09**	**13.9**	**13.6**	**0.77**	**-0.12**
BRICS	**19 869**	**21 823**	**1.36**	**0.67**	**3.9**	**4.2**	**0.52**	**0.31**

Note: Calendar year; except year ending 30 June for New Zealand. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 boneless retail weight. Carcass weight to boneless retail weight conversion factors is 0.67 for beef and veal.

Source: OECD/FAO (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**116 806**	**129 377**	**-0.14**	**0.59**	**11 748**	**10 399**	**5.94**	**0.03**	**11 754**	**10 210**	**4.68**	**-0.11**
NORTH AMERICA	14 590	15 077	2.21	0.49	807	1 035	2.76	1.17	4 705	4 600	3.94	0.71
Canada	2 193	2 135	1.48	0.00	261	280	2.41	1.06	1 584	1 447	2.95	0.19
United States	12 396	12 942	2.35	0.57	546	755	2.76	1.21	3 121	3 154	4.46	0.96
LATIN AMERICA	9 102	10 338	3.12	1.24	1 969	2 233	7.97	0.43	1 653	1 391	8.68	0.04
Argentina	692	788	6.45	0.97	35	30	14.34	0.01	27	9	15.32	-0.01
Brazil	4 679	4 903	4.08	0.83	22	15	10.20	-0.08	1 036	784	8.60	-0.43
Chile	585	689	1.34	1.53	141	81	15.27	-0.99	256	245	6.22	1.00
Colombia	465	620	8.02	2.11	137	182	12.00	0.81	0	0	..	..
Mexico	1 488	1 754	2.07	1.02	1 154	1 384	6.67	0.67	306	328	12.80	0.59
Paraguay	65	85	9.56	2.46	5	6	7.92	1.26	5	3	8.31	-1.27
Peru	176	231	3.94	2.12	12	19	6.03	2.00	0	0	..	..
EUROPE	30 245	28 375	1.15	-0.37	1 144	1 340	-5.77	0.39	5 074	3 799	5.13	-1.25
European Union[1]	23 122	21 008	0.60	-0.62	127	154	-2.21	0.69	4 547	3 281	5.19	-1.38
United Kingdom	961	981	2.20	0.42	679	736	-0.96	-0.06	253	253	2.42	-0.20
Russia	4 328	4 507	5.47	0.21	44	49	-30.39	0.04	193	200	26.75	0.00
Ukraine	675	701	-1.45	2.01	58	66	7.24	-2.65	5	1	-15.83	0.53
AFRICA	1 601	1 997	3.08	2.08	275	514	0.39	6.29	31	31	1.31	0.12
Egypt	1	1	6.10	-1.40	2	4	31.77	6.11	0	0	..	..
Ethiopia	2	3	1.86	2.58	0	1	..	..	0	0	..	..
Nigeria	291	342	1.70	1.94	6	14	33.51	6.89	0	0	..	..
South Africa	317	398	4.80	1.61	30	34	-0.41	-0.52	26	26	1.21	0.52
ASIA	60 685	72 956	-1.71	0.87	7 155	4 789	10.45	-1.09	259	357	-5.09	2.10
China[2]	48 578	58 009	-2.20	0.55	3 938	1 537	21.14	-2.82	128	165	-9.23	0.48
India	331	363	-0.95	1.05	1	2	6.65	2.32	2	1	36.32	-10.01
Indonesia	326	410	-0.69	1.76	4	6	1.09	0.73	0	0	..	..
Iran	0	0	..	..	0	0	63.98	..	0	0	29.83	..
Japan	1 309	1 245	0.25	-0.53	1 306	1 268	2.13	-0.31	3	4	14.64	0.51
Kazakhstan	85	95	-2.15	1.33	46	60	2.02	1.92	1	1	3.98	-0.27
Korea	1 407	1 372	1.93	0.03	621	727	4.19	0.08	8	3	12.52	-10.97
Malaysia	218	236	0.17	0.81	28	65	5.73	3.94	3	2	-8.40	-4.31
Pakistan	0	0	..	..	0	0	..	..	0	0	..	..
Philippines	1 276	2 057	-4.23	6.56	274	157	12.27	-8.12	2	3	-1.48	0.72
Saudi Arabia	0	0	..	..	18	18	10.60	0.00	2	2	-0.72	0.00
Thailand	975	1 275	-1.62	5.13	1	1	-19.03	1.78	43	100	3.87	13.33
Türkiye	0	0	..	..	26	32	9.67	0.00	26	32	9.67	0.00
Viet Nam	3 718	4 732	1.35	1.79	208	38	70.12	-9.76	11	12	-7.76	1.03
OCEANIA	582	635	2.13	0.65	397	489	1.52	1.81	32	31	1.19	-0.01
Australia	438	481	2.65	0.66	315	390	0.76	1.98	30	30	0.68	0.00
New Zealand	45	43	-0.49	-0.49	71	84	5.23	1.05	1	1	20.28	0.00
DEVELOPED COUNTRIES	**47 100**	**45 806**	**1.46**	**-0.06**	**3 767**	**4 278**	**-0.92**	**0.53**	**9 846**	**8 469**	**4.52**	**-0.22**
DEVELOPING COUNTRIES	**69 705**	**83 571**	**-1.13**	**0.96**	**7 981**	**6 121**	**11.55**	**-0.31**	**1 907**	**1 741**	**5.53**	**0.42**
LEAST DEVELOPED COUNTRIES (LDC)	2 280	3 163	4.51	2.81	145	310	-0.69	7.30	1	1	2.76	-0.60
OECD[3]	**44 784**	**43 639**	**1.29**	**-0.06**	**5 411**	**6 105**	**3.15**	**0.44**	**10 143**	**8 785**	**4.71**	**-0.16**
BRICS	**58 233**	**68 181**	**-1.31**	**0.56**	**4 036**	**1 636**	**11.82**	**-2.67**	**1 385**	**1 176**	**6.14**	**-0.24**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**116 667**	**129 302**	**-0.07**	**0.58**	**10.8**	**10.9**	**-1.12**	**-0.24**
NORTH AMERICA	10 704	11 503	1.55	0.46	20.6	20.9	0.85	-0.06
Canada	719	813	-0.40	-0.02	13.5	14.0	-1.49	-0.81
United States	9 985	10 690	1.71	0.49	21.4	21.8	1.05	0.00
LATIN AMERICA	9 433	11 189	3.19	1.23	11.8	12.9	2.29	0.55
Argentina	700	809	6.44	0.95	11.1	12.0	5.59	0.37
Brazil	3 665	4 134	3.10	1.10	16.8	18.0	2.35	0.63
Chile	470	525	1.68	1.34	17.7	19.4	0.56	1.12
Colombia	601	802	8.88	1.80	8.4	10.7	7.55	1.30
Mexico	2 351	2 820	3.05	0.89	13.1	14.7	2.13	0.25
Paraguay	65	88	9.47	2.53	6.5	7.8	8.21	1.50
Peru	188	250	4.09	2.11	4.0	4.9	2.60	1.26
EUROPE	26 299	25 896	0.13	-0.20	25.4	25.3	0.01	-0.03
European Union[1]	18 666	17 832	-0.30	-0.47	30.2	29.1	-0.42	-0.32
United Kingdom	1 387	1 464	0.50	0.28	14.8	15.1	-0.26	0.00
Russia	4 176	4 356	2.27	0.21	20.7	22.3	2.19	0.51
Ukraine	733	772	-1.61	1.49	12.2	13.8	-1.09	2.21
AFRICA	1 843	2 475	2.63	2.86	1.0	1.0	0.06	0.59
Egypt	3	4	23.31	4.42	0.0	0.0	20.86	2.79
Ethiopia	2	3	0.70	4.79	0.0	0.0	-2.19	2.49
Nigeria	298	357	1.96	2.09	0.9	0.8	-0.91	-0.32
South Africa	322	406	4.50	1.49	3.9	4.4	3.08	0.50
ASIA	67 440	77 146	-0.87	0.71	10.3	11.1	-1.78	0.15
China[2]	52 321	59 282	-1.38	0.45	26.0	29.8	-1.81	0.58
India	330	363	-1.02	1.10	0.1	0.1	-3.27	0.30
Indonesia	316	404	-0.53	1.84	0.8	0.9	-1.40	1.01
Iran	0	0	..	..	0.0	0.0	33.31	-0.86
Japan	2 606	2 510	1.07	-0.42	15.1	15.5	1.42	0.15
Kazakhstan	130	154	-0.81	1.56	5.0	5.3	-2.12	0.70
Korea	2 021	2 096	2.51	0.02	28.1	29.6	2.16	0.18
Malaysia	242	299	0.95	1.46	5.4	5.9	-0.38	0.45
Pakistan	0	0	..	..	0.0	0.0	23.98	-1.63
Philippines	1 547	2 211	-2.20	4.41	10.0	12.6	-3.62	3.23
Saudi Arabia	16	16	13.64	0.00	0.3	0.3	11.47	-1.08
Thailand	751	934	-3.39	3.98	7.7	9.6	-3.73	3.98
Türkiye	0	0	..	..	0.0	0.0	-1.36	-0.55
Viet Nam	3 917	4 760	2.11	1.61	28.9	32.9	1.13	1.01
OCEANIA	948	1 092	1.89	1.18	16.0	16.3	0.29	0.08
Australia	723	841	1.87	1.28	20.2	21.2	0.43	0.37
New Zealand	115	126	2.62	0.51	16.2	16.3	0.80	-0.18
DEVELOPED COUNTRIES	**41 011**	**41 588**	**0.59**	**0.03**	**20.6**	**20.5**	**0.19**	**-0.12**
DEVELOPING COUNTRIES	**75 656**	**87 714**	**-0.42**	**0.86**	**8.6**	**8.9**	**-1.62**	**-0.11**
LEAST DEVELOPED COUNTRIES (LDC)	2 432	3 480	4.08	3.14	1.9	2.2	1.69	0.98
OECD[3]	**40 038**	**40 912**	**0.79**	**0.03**	**20.6**	**20.5**	**0.27**	**-0.17**
BRICS	**60 814**	**68 540**	**-0.89**	**0.48**	**13.6**	**14.8**	**-1.53**	**0.16**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 boneless retail weight. Carcass weight to boneless retail weight conversion factors is 0.73 for pig meat.

Source: OECD/FAO (2023), “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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**136 552**	**156 247**	**2.89**	**1.27**	**14 577**	**16 544**	**2.81**	**0.74**	**15 728**	**16 544**	**2.51**	**0.74**
NORTH AMERICA	24 419	26 413	2.01	0.46	271	327	-0.19	0.38	3 689	3 655	-0.07	0.06
Canada	1 471	1 696	2.23	1.08	178	205	-1.89	1.30	132	152	-5.92	1.59
United States	22 948	24 717	1.99	0.42	92	123	3.68	-1.00	3 558	3 502	0.20	0.00
LATIN AMERICA	28 368	32 907	2.19	1.31	2 454	2 748	2.67	0.64	4 796	5 179	1.37	1.17
Argentina	2 316	2 620	1.89	1.06	9	14	-4.71	0.12	223	284	-0.74	2.13
Brazil	15 031	16 566	2.24	0.94	5	4	379.72	0.00	4 305	4 583	1.38	1.12
Chile	766	953	1.69	2.19	172	176	8.26	-1.60	188	230	6.27	1.63
Colombia	1 701	2 290	3.48	2.08	100	89	7.31	-1.87	0	0	-40.82	..
Mexico	3 705	4 309	3.48	1.21	1 069	1 176	2.64	0.82	5	6	4.76	-0.08
Paraguay	47	61	6.37	3.91	29	37	3.22	0.40	7	6	197.71	-0.40
Peru	1 749	2 321	4.05	2.61	93	98	14.65	1.91	1	2	-22.06	-0.16
EUROPE	22 158	23 189	2.35	0.59	2 052	2 053	-1.68	-1.22	3 644	3 682	4.83	0.79
European Union[1]	13 380	13 620	2.02	0.33	783	829	-1.81	-1.28	2 198	2 191	2.09	0.58
United Kingdom	1 993	2 114	2.40	0.56	440	594	-1.90	1.69	374	409	2.38	1.66
Russia	4 709	5 000	3.37	0.63	232	120	-8.88	-8.30	393	408	24.58	0.00
Ukraine	1 145	1 302	1.31	1.97	316	244	4.84	-1.17	446	428	15.14	1.19
AFRICA	6 713	8 655	2.82	2.46	2 558	4 087	5.09	3.63	165	129	4.60	-1.84
Egypt	1 492	2 135	4.41	3.45	16	12	-24.19	1.95	2	1	-12.86	-1.06
Ethiopia	66	77	-0.59	1.83	1	1	..	1.07	0	0	..	..
Nigeria	237	279	2.41	1.73	0	0	..	..	0	0	..	..
South Africa	1 915	2 342	1.59	1.74	451	436	0.91	-0.48	66	66	-3.16	0.34
ASIA	53 281	63 204	3.99	1.72	7 158	7 213	3.78	-0.02	3 366	3 835	5.23	0.91
China[2]	23 829	24 909	4.09	0.73	1 456	802	14.92	-3.20	704	488	1.98	-2.87
India	3 728	5 485	3.11	3.72	1	1	16.98	6.91	4	1	-7.20	-15.54
Indonesia	3 837	4 891	10.18	2.14	0	0	-41.74	..	2	3	-6.05	0.78
Iran	2 154	2 465	0.62	2.43	91	89	9.75	-11.23	54	30	-10.43	7.44
Japan	1 671	1 680	1.67	0.00	915	959	2.82	0.00	7	5	-5.67	0.00
Kazakhstan	240	353	9.21	4.01	225	247	4.02	1.22	17	13	19.01	-1.18
Korea	1 024	1 082	3.80	0.68	212	236	6.05	0.04	56	44	11.36	-2.30
Malaysia	1 708	2 257	0.39	2.88	119	149	11.24	-2.29	220	274	6.45	2.35
Pakistan	1 801	2 691	8.82	3.13	1	2	-17.02	1.07	8	2	0.40	-3.75
Philippines	1 371	1 899	2.51	3.15	386	510	14.78	2.48	2	2	-19.85	-0.20
Saudi Arabia	918	1 310	7.35	2.97	596	438	-6.05	-1.30	50	66	2.18	1.24
Thailand	1 853	2 236	1.06	1.76	3	3	-18.24	0.31	1 247	1 484	6.68	1.52
Türkiye	2 419	3 302	3.37	1.83	51	57	-6.08	0.51	757	1 194	6.55	2.35
Viet Nam	1 514	1 917	8.54	2.16	211	226	12.38	1.44	12	9	44.20	-0.21
OCEANIA	1 614	1 878	2.51	1.22	84	115	7.01	2.14	67	64	3.12	-1.28
Australia	1 361	1 577	2.48	1.22	0	0	..	..	53	49	3.83	-1.91
New Zealand	225	266	2.89	1.11	1	1	4.30	0.00	14	16	0.98	1.00
DEVELOPED COUNTRIES	**52 863**	**56 900**	**2.17**	**0.62**	**4 222**	**4 465**	**0.29**	**-0.39**	**7 513**	**7 513**	**2.09**	**0.40**
DEVELOPING COUNTRIES	**83 689**	**99 347**	**3.37**	**1.66**	**10 355**	**12 079**	**4.01**	**1.19**	**8 215**	**9 031**	**2.90**	**1.03**
LEAST DEVELOPED COUNTRIES (LDC)	3 368	4 526	3.23	2.68	1 296	2 398	6.17	4.49	45	23	16.67	-3.82
OECD[3]	**53 510**	**58 610**	**2.26**	**0.68**	**4 070**	**4 499**	**1.09**	**0.08**	**7 355**	**7 810**	**1.45**	**0.62**
BRICS	**49 213**	**54 302**	**3.25**	**1.09**	**2 144**	**1 364**	**5.73**	**-3.06**	**5 471**	**5 547**	**2.18**	**0.60**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), “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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**135 413**	**156 237**	**2.93**	**1.27**	**10.1**	**10.6**	**1.78**	**0.41**
NORTH AMERICA	21 025	23 080	2.42	0.52	33.3	34.5	1.71	0.00
Canada	1 519	1 747	2.68	1.07	23.5	24.8	1.57	0.28
United States	19 506	21 333	2.40	0.48	34.4	35.7	1.74	-0.01
LATIN AMERICA	26 027	30 477	2.40	1.27	23.4	25.4	1.51	0.60
Argentina	2 103	2 350	2.25	0.93	27.3	28.7	1.44	0.36
Brazil	10 731	11 987	2.62	0.87	29.5	31.3	1.87	0.41
Chile	750	899	1.91	1.47	23.2	27.3	0.80	1.25
Colombia	1 801	2 379	3.72	1.90	20.8	26.1	2.45	1.40
Mexico	4 769	5 478	3.29	1.13	21.9	23.4	2.37	0.48
Paraguay	69	92	3.67	2.66	5.7	6.7	2.48	1.63
Peru	1 841	2 417	4.50	2.58	32.6	38.9	3.01	1.72
EUROPE	20 564	21 559	1.49	0.37	16.3	17.3	1.36	0.53
European Union[1]	11 965	12 258	1.71	0.16	15.9	16.4	1.58	0.31
United Kingdom	2 059	2 298	1.34	0.65	18.1	19.5	0.58	0.36
Russia	4 547	4 711	1.48	0.30	18.6	19.8	1.41	0.60
Ukraine	1 015	1 118	-1.19	1.49	13.9	16.5	-0.66	2.20
AFRICA	9 106	12 613	3.41	2.88	3.9	4.2	0.84	0.59
Egypt	1 506	2 146	3.23	3.44	8.3	10.0	1.18	1.82
Ethiopia	66	78	-0.54	1.82	0.3	0.3	-3.39	-0.41
Nigeria	237	279	2.41	1.73	0.6	0.5	-0.48	-0.67
South Africa	2 300	2 712	1.61	1.37	22.8	24.1	0.24	0.38
ASIA	57 061	66 578	3.88	1.57	7.0	7.7	2.88	0.95
China[2]	24 581	25 223	4.58	0.66	10.0	10.4	4.12	0.79
India	3 725	5 486	3.14	3.73	1.1	1.5	0.80	2.91
Indonesia	3 835	4 888	10.17	2.15	7.8	9.0	9.20	1.30
Iran	2 191	2 525	1.50	1.40	15.1	15.7	0.13	0.53
Japan	2 584	2 633	2.11	0.01	12.3	13.4	2.46	0.59
Kazakhstan	448	587	6.15	2.88	14.0	16.7	4.76	2.00
Korea	1 179	1 274	3.92	0.68	13.5	14.8	3.56	0.84
Malaysia	1 606	2 132	0.32	2.49	29.2	34.6	-1.00	1.48
Pakistan	1 795	2 690	8.80	3.14	4.6	5.8	6.77	1.46
Philippines	1 755	2 407	4.43	3.01	9.3	11.3	2.92	1.84
Saudi Arabia	1 464	1 681	0.33	1.74	24.5	24.8	-1.59	0.64
Thailand	593	752	-6.49	2.42	5.0	6.3	-6.81	2.42
Türkiye	1 713	2 165	1.60	1.52	11.7	14.0	0.25	0.97
Viet Nam	1 712	2 134	8.84	2.09	10.4	12.1	7.80	1.49
OCEANIA	1 630	1 929	2.68	1.36	22.6	23.7	1.07	0.26
Australia	1 307	1 529	2.43	1.34	30.0	31.7	0.99	0.43
New Zealand	212	251	3.04	1.11	24.5	26.7	1.21	0.43
DEVELOPED COUNTRIES	**49 600**	**53 845**	**2.02**	**0.57**	**20.5**	**21.8**	**1.62**	**0.42**
DEVELOPING COUNTRIES	**85 813**	**102 392**	**3.49**	**1.66**	**7.8**	**8.3**	**2.16**	**0.65**
LEAST DEVELOPED COUNTRIES (LDC)	4 619	6 902	3.91	3.31	3.0	3.5	1.54	1.15
OECD[3]	**50 253**	**55 292**	**2.30**	**0.64**	**21.2**	**22.8**	**1.78**	**0.43**
BRICS	**45 884**	**50 119**	**3.49**	**1.01**	**8.1**	**8.5**	**2.67**	**0.59**

Note: Calendar year; except year ending 30 June for New Zealand. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 boneless retail weight. Carcass weight to boneless retail weight conversion factors is 0.6 for poultry meat.

Source: OECD/FAO (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**16 206**	**18 644**	**1.99**	**1.27**	**1 091**	**1 166**	**-0.52**	**0.34**	**1 113**	**1 238**	**-0.17**	**0.76**
NORTH AMERICA	85	95	-1.49	1.49	176	164	7.25	-0.61	2	2	-8.06	-0.02
Canada	17	17	0.06	-0.02	22	24	1.11	0.46	0	0	..	..
United States	69	78	-1.84	1.84	154	140	8.42	-0.78	1	1	-8.04	-0.02
LATIN AMERICA	466	505	1.50	0.56	11	11	-12.51	0.07	31	32	4.12	-0.03
Argentina	54	55	-1.02	0.00	0	0	..	..	4	5	11.33	-0.07
Brazil	142	150	2.69	0.48	2	3	-14.69	-0.09	0	0	..	..
Chile	14	14	-0.34	-0.17	0	0	..	..	6	6	0.35	0.26
Colombia	1	3	6.96	7.23	0	0	..	..	0	0	..	..
Mexico	106	110	1.27	0.19	2	1	-22.96	-0.02	2	3	62.59	0.00
Paraguay	3	4	-3.65	2.31	0	0	..	..	0	0	..	..
Peru	38	39	-0.84	-0.03	0	0	..	..	0	0	..	..
EUROPE	1 256	1 288	0.28	0.26	214	198	-4.93	-0.92	144	163	-0.90	2.09
European Union[1]	630	644	0.55	0.27	139	124	-2.81	-1.60	50	66	3.98	3.45
United Kingdom	288	301	-0.71	0.42	65	62	-7.86	0.10	85	86	-3.58	1.05
Russia	216	210	1.19	-0.20	1	0	-48.71	-2.54	2	0	59.55	..
Ukraine	8	0	-12.98	-1.90	0	4	..	7.07	0	0	..	..
AFRICA	3 388	4 272	1.91	2.36	10	13	-24.09	2.07	37	34	1.14	-0.60
Egypt	62	84	-10.17	2.94	0	2	-36.48	16.10	0	0	..	..
Ethiopia	279	378	7.32	3.73	0	0	..	..	15	14	-0.73	1.90
Nigeria	400	515	0.72	2.69	0	0	..	49.49	0	0	..	..
South Africa	173	182	-0.49	0.73	2	2	-21.66	-1.18	3	6	9.79	1.86
ASIA	9 871	11 282	2.64	1.17	657	751	2.46	0.93	25	32	-6.28	1.84
China[2]	5 096	5 521	2.59	0.64	386	396	6.61	0.30	2	2	-9.61	-0.07
India	850	970	1.64	1.27	0	0	..	..	8	12	-11.88	3.60
Indonesia	118	141	1.66	1.64	2	4	-0.46	2.19	0	0	..	..
Iran	357	387	-1.78	0.66	4	2	0.54	0.03	0	0	..	..
Japan	0	0	..	..	21	19	0.86	-1.28	0	0	..	..
Kazakhstan	175	196	1.18	1.02	0	0	..	..	3	5	111.61	0.09
Korea	2	2	2.46	0.00	19	18	15.03	-0.11	0	0	..	..
Malaysia	1	0	-10.27	..	35	47	2.25	1.52	0	0	..	..
Pakistan	765	982	7.15	2.27	0	0	..	..	5	3	-11.26	0.58
Philippines	33	45	-6.89	2.29	0	1	-6.45	7.49	0	0	..	..
Saudi Arabia	0	0	..	..	24	35	-11.34	2.19	0	0	-15.59	-2.14
Thailand	2	2	0.15	0.63	1	1	-5.57	0.92	0	0	..	..
Türkiye	481	751	6.64	2.76	0	0	..	..	1	5	30.08	3.55
Viet Nam	21	26	11.61	1.89	0	4	-23.88	31.13	0	0	..	..
OCEANIA	1 140	1 204	-0.43	-0.01	23	28	-2.90	-0.29	876	976	0.00	0.60
Australia	693	773	0.09	0.16	0	0	..	..	452	553	1.27	1.26
New Zealand	446	431	-1.24	-0.31	3	3	-3.75	0.00	424	423	-1.25	-0.19
DEVELOPED COUNTRIES	**3 383**	**3 635**	**0.06**	**0.54**	**420**	**392**	**-0.94**	**-0.84**	**1 027**	**1 152**	**-0.05**	**0.80**
DEVELOPING COUNTRIES	**12 822**	**15 009**	**2.56**	**1.45**	**671**	**774**	**-0.20**	**1.00**	**86**	**86**	**-1.52**	**0.24**
LEAST DEVELOPED COUNTRIES (LDC)	2 085	2 648	2.20	2.31	2	2	-6.68	-0.03	4	4	0.44	-2.30
OECD[3]	**2 782**	**3 164**	**0.75**	**0.77**	**436**	**402**	**-0.36**	**-0.86**	**1 021**	**1 143**	**-0.13**	**0.79**
BRICS	**6 477**	**7 032**	**2.32**	**0.69**	**391**	**401**	**5.28**	**0.29**	**15**	**20**	**-6.56**	**2.62**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), “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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**16 259**	**18 724**	**1.97**	**1.26**	**1.3**	**1.4**	**0.80**	**0.41**
NORTH AMERICA	254	250	4.08	0.12	0.4	0.4	3.36	-0.41
Canada	38	41	0.68	0.28	0.7	0.6	-0.42	-0.51
United States	216	209	4.79	0.09	0.4	0.4	4.12	-0.41
LATIN AMERICA	447	483	0.72	0.57	0.5	0.5	0.03	-0.12
Argentina	50	50	-1.68	0.00	0.7	0.7	-2.46	-0.57
Brazil	145	153	2.01	0.40	0.7	0.7	1.26	-0.06
Chile	9	8	-0.76	-0.45	0.3	0.3	-1.85	-0.66
Colombia	1	3	7.24	7.10	0.0	0.0	5.93	6.57
Mexico	107	109	-0.35	0.19	0.5	0.5	-1.24	-0.45
Paraguay	3	4	-3.64	2.31	0.3	0.3	-4.75	1.28
Peru	38	39	-0.84	-0.03	0.7	0.7	-2.25	-0.86
EUROPE	1 265	1 266	-0.87	-0.08	1.1	1.1	-1.02	0.08
European Union[1]	669	660	-0.67	-0.25	1.0	1.0	-0.80	-0.11
United Kingdom	269	277	-1.98	0.16	2.6	2.6	-2.72	-0.13
Russia	211	207	0.32	-0.20	0.9	1.0	0.25	0.10
Ukraine	8	4	-12.34	4.54	0.1	0.1	-11.88	5.27
AFRICA	3 322	4 218	1.60	2.44	1.5	1.5	-0.99	0.15
Egypt	63	85	-14.92	3.11	0.4	0.4	-16.61	1.50
Ethiopia	265	364	7.94	3.81	1.3	1.4	4.84	1.54
Nigeria	409	522	0.93	2.53	1.1	1.1	-1.92	0.11
South Africa	172	177	-1.85	0.68	1.9	1.7	-3.18	-0.30
ASIA	10 696	12 255	2.58	1.16	1.4	1.6	1.59	0.59
China[2]	5 480	5 915	2.84	0.61	2.5	2.7	2.39	0.74
India	830	945	1.79	1.26	0.3	0.3	-0.52	0.46
Indonesia	119	144	1.63	1.65	0.3	0.3	0.73	0.82
Iran	344	375	-1.33	0.69	2.6	2.6	-2.66	-0.17
Japan	21	19	0.86	-1.28	0.1	0.1	1.21	-0.71
Kazakhstan	172	191	0.85	1.04	5.9	6.0	-0.48	0.18
Korea	20	19	12.53	-0.10	0.2	0.2	12.14	0.06
Malaysia	39	51	1.65	1.38	0.8	0.9	0.31	0.38
Pakistan	760	979	7.39	2.28	2.2	2.3	5.38	0.61
Philippines	34	46	-6.88	2.35	0.2	0.2	-8.23	1.19
Saudi Arabia	183	216	-0.65	1.16	3.4	3.5	-2.55	0.07
Thailand	3	3	-1.89	0.73	0.0	0.0	-2.24	0.72
Türkiye	480	746	6.57	2.76	3.6	5.3	5.15	2.20
Viet Nam	22	30	8.22	3.55	0.1	0.2	7.19	2.94
OCEANIA	275	252	-1.02	-1.95	4.2	3.4	-2.57	-3.02
Australia	237	210	-0.09	-2.22	6.0	4.8	-1.51	-3.10
New Zealand	17	16	-8.35	-0.52	2.2	1.8	-9.98	-1.20
DEVELOPED COUNTRIES	**2 697**	**2 808**	**-0.08**	**0.29**	**1.2**	**1.2**	**-0.50**	**0.14**
DEVELOPING COUNTRIES	**13 561**	**15 915**	**2.42**	**1.44**	**1.3**	**1.4**	**1.09**	**0.45**
LEAST DEVELOPED COUNTRIES (LDC)	2 042	2 624	2.60	2.41	1.4	1.5	0.26	0.27
OECD[3]	**2 135**	**2 378**	**1.06**	**0.53**	**1.0**	**1.1**	**0.51**	**0.31**
BRICS	**6 837**	**7 397**	**2.46**	**0.67**	**1.3**	**1.4**	**1.62**	**0.30**

Note: Calendar year; except year ending 30 June for New Zealand. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 boneless retail weight. Carcass weight to boneless retail weight conversion factors is 0.66 for sheep meat.

Source: OECD/FAO (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
ARGENTINA												
Beef export tax[2]	%	7.1	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	105.0	110.4	113.0	114.4	117.1	119.7	122.2	124.8	127.4	130.0	132.5
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	1 606	1 751	1 733	1 713	1 694	1 646	1 646	1 646	1 646	1 646	1 646
Sheep and goat meat[6]	mln EUR	528	615	614	612	609	605	605	605	605	605	605
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	3.2
Beef tariff-quota	kt cwe	335.9	325.6	327.1	328.7	329.2	329.7	330.2	330.7	331.2	331.2	331.2
Pig tariff-quota	kt cwe	213.7	213.0	213.9	214.8	215.7	216.6	217.5	218.4	219.3	220.2	220.2
Poultry tariff-quota	kt rtc	878.4	811.3	813.3	815.4	817.4	819.5	821.6	823.6	825.7	825.7	825.7
Sheep meat tariff-quota	kt cwe	207.5	163.3	163.5	163.7	163.9	164.1	164.3	164.5	164.7	164.9	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	%	25.0	23.5	22.7	21.8	21.0	20.2	18.6	16.8	15.0	13.1	11.3
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	%	1.7	1.3	1.0	0.8	0.5	0.3	0.1	0.0	0.0	0.0	0.0
Standard import price	JPY/kg dwt	398.4	430.1	409.7	391.5	379.9	370.8	362.6	357.9	353.6	349.4	345.3
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	%	13.3	8.0	5.3	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pigmeat tariff	%	13.3	8.0	5.3	2.6	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-quota tariff	%	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	10.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-quota tariff	%	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	%	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Poultry tariff-quota	kt pw	364.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0	364.0
In-quota tariff	%	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Out-of-quota tariff	%	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
UNITED STATES												
Beef tariff-quota	kt pw	696.6	696.6	696.6	696.6	696.6	696.6	696.6	696.6	696.6	696.6	696.6
In-quota tariff	%	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Out-of-quota tariff	%	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4

Table C.30. Main policy assumptions for meat markets *(cont.)*

		Average 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
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	%	8.0	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	%	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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	%	36.6	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2

Note: Average 2020-22est: Data for 2022 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.
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 (2023), “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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**12 643**	**14 504**	**2.02**	**1.29**	**1 002**	**1 158**	**0.59**	**0.85**	**1 035**	**1 158**	**-0.10**	**0.85**
NORTH AMERICA	1 055	1 148	1.76	1.21	67	60	20.27	-3.02	43	40	-1.82	-1.86
Canada	116	143	4.13	2.19	23	28	15.30	-1.33	0	0	-38.26	..
United States	939	1 004	1.50	1.08	44	33	23.75	-4.25	43	40	-1.45	-1.86
LATIN AMERICA	445	512	0.52	1.19	57	72	-1.58	1.21	42	45	-2.27	-0.50
Argentina	31	34	-5.37	1.25	0	0	..	..	16	20	4.74	0.40
Brazil	107	111	2.53	0.42	2	9	5.62	5.49	1	1	-3.39	-4.54
Chile	24	30	1.33	2.12	5	5	4.78	-3.67	2	2	-11.44	3.61
Colombia	22	29	0.29	2.99	0	1	..	64.73	1	0	..	..
Mexico	207	244	1.17	1.50	28	36	-4.09	0.99	4	2	-8.00	0.00
Paraguay	1	1	-0.01	2.22	0	0	..	..	1	1	12.26	1.74
Peru	6	8	5.59	1.89	8	7	1.80	0.50	0	0	..	..
EUROPE	3 098	3 171	1.62	0.39	249	243	-2.10	0.23	434	501	2.45	1.90
European Union[1]	2 332	2 361	1.62	0.31	34	36	-0.80	-0.05	273	318	2.68	2.28
United Kingdom	208	224	5.36	0.45	67	67	-5.97	0.26	57	61	2.42	0.49
Russia	305	317	3.30	0.33	125	122	-0.92	0.46	4	4	-0.56	0.00
Ukraine	55	60	-9.19	2.87	7	1	-1.75	-4.48	11	19	5.73	4.69
AFRICA	324	368	0.02	1.28	78	142	-7.18	4.64	8	7	-8.61	2.12
Egypt	99	98	-2.92	-0.24	28	68	-9.21	7.24	1	1	-7.10	-1.44
Ethiopia	18	25	1.73	3.23	0	0	..	..	0	3	..	22.61
Nigeria	12	16	-0.60	2.78	3	3	-9.85	-0.46	0	0	..	..
South Africa	14	16	-1.38	1.56	6	6	7.33	1.37	3	2	-7.41	-1.35
ASIA	7 195	8 763	2.84	1.70	510	601	2.41	0.80	72	85	8.38	-1.68
China[2]	91	104	-1.10	1.47	125	127	8.99	-0.19	2	2	3.74	1.00
India	4 889	6 025	3.23	1.77	0	0	-22.55	49.60	30	2	21.85	-31.64
Indonesia	0	0	..	..	22	31	0.19	0.81	0	1	..	0.00
Iran	212	243	0.88	1.25	6	1	-27.10	-10.89	2	4	-4.36	3.38
Japan	70	66	0.85	-0.50	14	10	6.68	-0.31	0	0	..	..
Kazakhstan	21	30	3.97	3.87	7	4	-4.71	-8.88	2	3	31.09	9.73
Korea	59	55	-2.56	-0.44	23	34	20.83	1.61	0	0	..	..
Malaysia	0	0	..	..	21	24	3.16	0.82	4	4	-4.60	0.00
Pakistan	1 197	1 452	2.31	1.65	0	1	0.45	7.68	0	0	..	..
Philippines	0	0	..	..	32	34	8.04	1.13	1	1	..	0.00
Saudi Arabia	8	10	1.89	1.65	53	59	-0.97	0.79	11	13	14.16	-0.78
Thailand	3	3	5.06	0.95	13	15	0.85	0.00	1	1	-1.54	2.80
Türkiye	269	326	3.43	1.68	5	1	-25.11	-4.94	7	47	21.24	9.39
Viet Nam	0	0	..	..	14	13	0.35	0.59	0	0	..	..
OCEANIA	527	543	-2.42	0.63	42	40	6.92	0.32	437	480	-2.49	0.68
Australia	74	55	-6.59	-1.80	38	35	7.95	0.00	18	18	-10.31	1.27
New Zealand	452	488	-1.56	0.94	1	1	2.39	12.35	419	462	-1.97	0.66
DEVELOPED COUNTRIES	**4 928**	**5 132**	**1.23**	**0.62**	**417**	**412**	**1.32**	**-0.23**	**924**	**1 028**	**-0.41**	**1.13**
DEVELOPING COUNTRIES	**7 715**	**9 372**	**2.54**	**1.68**	**585**	**746**	**0.11**	**1.49**	**111**	**130**	**2.31**	**-1.23**
LEAST DEVELOPED COUNTRIES (LDC)	298	343	2.79	1.60	11	33	-6.29	7.46	3	0	-13.78	-6.88
OECD[3]	**4 835**	**5 089**	**1.23**	**0.69**	**295**	**300**	**1.76**	**-0.37**	**824**	**949**	**-0.70**	**1.35**
BRICS	**5 406**	**6 572**	**3.11**	**1.67**	**258**	**264**	**2.91**	**0.29**	**39**	**11**	**11.33**	**-17.41**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**12 592**	**14 504**	**2.10**	**1.28**	**1.6**	**1.7**	**0.99**	**0.44**
NORTH AMERICA	1 078	1 167	2.59	1.06	2.9	2.9	1.88	0.53
Canada	143	171	5.92	1.49	3.7	4.1	4.79	0.69
United States	935	997	2.14	0.99	2.8	2.8	1.48	0.49
LATIN AMERICA	460	538	0.56	1.34	0.7	0.8	-0.33	0.68
Argentina	15	14	-12.82	2.55	0.3	0.3	-13.52	1.96
Brazil	109	119	2.76	0.74	0.5	0.5	2.01	0.28
Chile	28	33	3.40	0.95	1.4	1.7	2.26	0.73
Colombia	22	30	-0.06	3.28	0.4	0.6	-1.31	2.77
Mexico	230	278	0.59	1.44	1.8	2.0	-0.35	0.80
Paraguay	0	0	..	..	0.0	0.0	-68.08	0.00
Peru	13	15	3.37	1.24	0.4	0.4	1.89	0.39
EUROPE	2 913	2 913	1.16	0.14	3.9	3.9	1.07	0.30
European Union[1]	2 093	2 079	1.47	0.04	4.7	4.7	1.35	0.18
United Kingdom	218	231	1.36	0.38	3.2	3.3	1.04	0.09
Russia	426	435	1.89	0.36	2.9	3.1	1.81	0.66
Ukraine	51	42	-10.84	1.92	1.2	1.0	-10.37	2.64
AFRICA	394	503	-1.54	2.12	0.3	0.3	-4.02	-0.15
Egypt	125	166	-4.61	2.24	1.2	1.3	-6.57	0.64
Ethiopia	19	23	1.87	2.24	0.2	0.1	-0.85	0.00
Nigeria	15	19	-2.76	2.13	0.1	0.1	-5.75	-0.28
South Africa	17	20	2.55	1.92	0.3	0.3	1.13	0.92
ASIA	7 628	9 279	2.75	1.68	1.6	1.9	1.82	1.11
China[2]	214	229	3.65	0.52	0.1	0.2	3.29	0.64
India	4 859	6 023	3.15	1.86	3.5	3.9	2.06	1.05
Indonesia	22	30	-0.02	0.83	0.1	0.1	-1.07	0.00
Iran	216	240	-1.46	1.15	2.5	2.5	-2.78	0.29
Japan	79	76	1.19	-0.48	0.6	0.6	1.52	0.10
Kazakhstan	26	32	0.55	0.70	1.3	1.5	-0.79	-0.16
Korea	81	89	0.96	0.29	1.5	1.7	0.60	0.45
Malaysia	17	20	5.90	1.00	0.5	0.5	4.54	0.00
Pakistan	1 198	1 454	2.31	1.65	5.3	5.4	0.26	0.00
Philippines	32	34	7.89	1.15	0.3	0.3	6.54	0.00
Saudi Arabia	50	56	-2.53	1.33	1.4	1.4	-4.38	0.24
Thailand	16	17	1.68	0.01	0.2	0.2	1.38	0.00
Türkiye	267	280	2.02	0.78	3.1	3.1	0.65	0.23
Viet Nam	14	13	0.29	0.59	0.1	0.1	-0.56	0.00
OCEANIA	119	103	0.74	-0.93	2.8	2.1	-0.83	-2.00
Australia	92	72	0.14	-1.67	3.5	2.5	-1.27	-2.55
New Zealand	24	27	11.87	0.91	4.7	4.9	9.89	0.22
DEVELOPED COUNTRIES	**4 404**	**4 517**	**1.63**	**0.39**	**3.0**	**3.1**	**1.25**	**0.25**
DEVELOPING COUNTRIES	**8 189**	**9 988**	**2.35**	**1.71**	**1.3**	**1.4**	**1.07**	**0.72**
LEAST DEVELOPED COUNTRIES (LDC)	306	376	2.56	2.03	0.3	0.3	0.22	-0.11
OECD[3]	**4 289**	**4 440**	**1.70**	**0.45**	**3.0**	**3.1**	**1.20**	**0.24**
BRICS	**5 625**	**6 826**	**3.05**	**1.69**	**1.7**	**2.0**	**2.31**	**1.35**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**25 227**	**28 647**	**1.61**	**1.21**	**3 491**	**4 131**	**2.82**	**1.51**	**3 491**	**4 131**	**2.07**	**1.51**
NORTH AMERICA	6 675	8 289	2.52	2.03	188	224	1.36	0.37	412	570	2.85	2.01
Canada	496	600	2.70	2.01	48	65	9.89	0.50	9	8	-4.20	0.43
United States	6 179	7 689	2.51	2.03	140	159	-0.61	0.32	403	562	3.05	2.03
LATIN AMERICA	2 322	2 711	0.15	1.55	419	508	4.73	1.69	185	179	2.07	-0.64
Argentina	451	539	-1.26	1.58	3	1	2.99	0.00	65	69	2.52	-0.16
Brazil	775	909	0.67	2.01	31	30	2.12	1.90	4	6	6.22	2.92
Chile	103	120	1.95	1.19	62	69	12.74	1.05	7	6	0.90	-1.02
Colombia	63	70	0.29	1.18	6	9	11.71	2.31	1	1	19.93	-0.59
Mexico	324	394	-0.77	1.34	132	169	3.15	2.22	12	13	14.18	0.00
Paraguay	0	0	..	..	4	5	9.68	0.98	0	0	..	..
Peru	27	30	2.50	1.12	9	17	15.15	4.31	0	0	..	..
EUROPE	12 555	13 473	1.63	0.68	1 186	1 187	1.14	0.35	2 000	2 524	2.89	2.19
European Union[1]	10 685	11 235	1.53	0.49	206	214	1.85	1.00	1 391	1 782	2.20	2.47
United Kingdom	500	577	2.85	1.11	462	447	-0.24	-0.18	174	188	3.75	0.02
Russia	556	660	2.08	1.48	322	338	0.17	1.25	34	23	4.44	-3.02
Ukraine	103	105	-7.85	3.78	47	37	21.33	-2.04	6	6	-17.52	1.99
AFRICA	923	1 100	-1.10	1.77	133	253	-2.28	6.79	66	20	-13.79	-1.94
Egypt	522	605	-2.42	1.52	21	89	-7.84	13.10	50	2	-16.37	-11.58
Ethiopia	5	7	-0.17	3.23	0	0	..	..	0	1	..	29.45
Nigeria	9	9	-0.86	-0.50	1	7	7.80	11.12	0	0	..	..
South Africa	54	65	-2.01	1.97	8	7	-3.34	-0.74	11	12	3.06	0.75
ASIA	1 966	2 232	1.47	1.33	1 453	1 839	4.78	1.91	334	331	3.41	-0.10
China[2]	191	227	-0.88	1.70	151	164	13.04	1.11	0	0	..	..
India	6	3	8.13	-7.07	2	4	6.46	2.57	8	6	10.25	-2.50
Indonesia	0	0	..	..	31	47	6.03	2.87	2	2	15.32	-2.79
Iran	305	322	-0.47	0.47	0	0	..	..	97	84	8.66	-1.52
Japan	166	180	2.62	1.28	287	331	2.72	1.46	1	0	15.34	..
Kazakhstan	34	40	5.05	1.32	33	40	5.73	1.76	3	3	21.68	-1.71
Korea	44	44	3.37	0.49	153	183	6.62	1.74	1	1	23.32	0.00
Malaysia	0	0	..	..	37	52	10.32	2.29	1	1	24.42	-2.24
Pakistan	0	0	..	..	2	2	-5.38	1.96	0	0	..	..
Philippines	0	0	..	..	46	73	11.90	4.30	1	1	1.28	-4.12
Saudi Arabia	135	164	-2.07	2.03	197	239	3.90	0.71	83	74	-3.75	-0.70
Thailand	2	2	-9.45	0.95	19	20	8.50	0.00	1	1	..	2.00
Türkiye	255	319	2.97	2.59	9	5	-3.88	-6.98	47	80	1.17	7.50
Viet Nam	0	0	..	..	10	11	11.91	0.54	1	1	..	0.00
OCEANIA	786	842	2.45	0.20	112	120	2.71	0.57	493	507	1.03	-0.04
Australia	410	452	3.13	-0.06	97	103	1.93	0.40	154	157	-0.49	-1.14
New Zealand	376	390	1.78	0.51	13	15	11.13	1.68	340	350	1.81	0.52
DEVELOPED COUNTRIES	**20 754**	**23 449**	**2.01**	**1.14**	**1 849**	**1 986**	**1.60**	**0.71**	**2 930**	**3 621**	**2.57**	**1.80**
DEVELOPING COUNTRIES	**4 473**	**5 198**	**-0.07**	**1.54**	**1 642**	**2 145**	**4.39**	**2.31**	**561**	**510**	**-0.22**	**-0.34**
LEAST DEVELOPED COUNTRIES (LDC)	442	537	1.83	1.87	27	88	4.81	10.86	0	0	..	..
OECD[3]	**20 032**	**22 536**	**1.90**	**1.09**	**1 723**	**1 896**	**2.31**	**0.84**	**2 623**	**3 236**	**2.16**	**1.81**
BRICS	**1 582**	**1 864**	**0.81**	**1.76**	**514**	**543**	**2.55**	**1.22**	**57**	**47**	**4.96**	**-1.45**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**25 218**	**28 638**	**1.72**	**1.23**	**3.2**	**3.3**	**0.62**	**0.39**
NORTH AMERICA	6 428	7 933	2.47	2.05	17.1	19.9	1.76	1.52
Canada	536	656	3.50	1.87	14.0	15.7	2.39	1.07
United States	5 892	7 277	2.38	2.07	17.4	20.4	1.72	1.56
LATIN AMERICA	2 556	3 040	0.67	1.72	3.9	4.3	-0.22	1.05
Argentina	389	470	-1.75	1.86	8.5	9.6	-2.55	1.28
Brazil	802	933	0.68	2.00	3.7	4.1	-0.06	1.53
Chile	157	183	5.23	1.22	8.1	9.3	4.07	1.00
Colombia	68	78	0.82	1.33	1.3	1.4	-0.43	0.83
Mexico	444	550	0.04	1.63	3.4	4.0	-0.90	0.98
Paraguay	4	4	11.42	1.02	0.6	0.5	9.92	0.00
Peru	36	46	4.59	2.19	1.1	1.2	3.10	1.33
EUROPE	11 760	12 136	1.41	0.36	15.7	16.4	1.30	0.52
European Union[1]	9 521	9 667	1.49	0.17	21.3	21.8	1.37	0.32
United Kingdom	788	836	0.78	0.65	11.7	12.0	0.23	0.36
Russia	844	976	0.91	1.53	5.8	6.9	0.83	1.83
Ukraine	144	137	-1.86	1.90	3.3	3.4	-1.34	2.62
AFRICA	991	1 333	-0.05	2.64	0.7	0.7	-2.57	0.36
Egypt	493	692	-1.11	2.59	4.7	5.5	-3.15	0.99
Ethiopia	5	7	-0.27	2.24	0.0	0.0	-2.93	0.00
Nigeria	11	16	-0.13	3.31	0.0	0.1	-3.20	0.87
South Africa	51	60	-3.18	1.86	0.8	0.9	-4.51	0.87
ASIA	3 084	3 741	2.71	1.75	0.7	0.7	1.79	1.18
China[2]	341	391	3.41	1.45	0.2	0.3	3.05	1.58
India	0	0	..	..	0.0	0.0	-67.82	4.34
Indonesia	29	45	5.55	3.25	0.1	0.1	4.45	2.40
Iran	207	238	-3.01	1.28	2.4	2.5	-4.31	0.41
Japan	450	510	2.62	1.40	3.6	4.3	2.96	1.98
Kazakhstan	64	78	4.89	1.66	3.4	3.7	3.50	0.80
Korea	195	226	5.76	1.50	3.7	4.3	5.39	1.66
Malaysia	36	51	9.99	2.46	1.1	1.4	8.58	1.45
Pakistan	2	2	-5.39	1.96	0.0	0.0	-7.28	0.30
Philippines	45	72	12.84	4.43	0.4	0.6	11.44	3.25
Saudi Arabia	249	328	3.25	1.71	7.0	8.2	1.29	0.61
Thailand	20	22	4.83	0.01	0.3	0.3	4.52	0.00
Türkiye	217	244	2.99	1.18	2.5	2.7	1.61	0.62
Viet Nam	9	10	11.00	0.59	0.1	0.1	10.06	0.00
OCEANIA	400	454	3.61	0.57	9.3	9.4	1.99	-0.52
Australia	349	398	3.67	0.54	13.4	13.8	2.20	-0.36
New Zealand	49	54	3.30	0.79	9.6	9.7	1.47	0.11
DEVELOPED COUNTRIES	**19 664**	**21 805**	**1.89**	**1.02**	**13.6**	**14.8**	**1.50**	**0.87**
DEVELOPING COUNTRIES	**5 555**	**6 833**	**1.11**	**1.93**	**0.9**	**0.9**	**-0.15**	**0.94**
LEAST DEVELOPED COUNTRIES (LDC)	469	624	1.97	2.77	0.5	0.5	-0.36	0.63
OECD[3]	**19 123**	**21 186**	**1.91**	**0.99**	**13.6**	**14.7**	**1.40**	**0.78**
BRICS	**2 039**	**2 359**	**1.06**	**1.71**	**0.6**	**0.7**	**0.34**	**1.37**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**4 541**	**5 488**	**1.01**	**1.96**	**2 583**	**3 295**	**2.58**	**2.24**	**2 632**	**3 295**	**2.46**	**2.24**
NORTH AMERICA	1 286	1 895	2.05	3.84	8	9	10.46	1.09	864	1 438	5.98	4.63
Canada	86	148	0.06	3.90	5	7	9.65	1.53	29	36	11.28	0.02
United States	1 199	1 747	2.21	3.84	2	2	12.37	0.00	834	1 402	5.80	4.78
LATIN AMERICA	294	347	-0.18	1.51	484	553	5.67	1.02	70	83	2.23	0.11
Argentina	39	44	1.35	1.05	0	0	..	..	24	27	-0.30	2.06
Brazil	161	201	0.64	2.06	21	20	-3.57	0.00	0	0	..	2.03
Chile	16	15	-4.25	-0.56	11	14	5.93	2.98	1	1	9.95	-2.43
Colombia	0	0	..	..	31	34	28.33	0.49	0	0	..	..
Mexico	45	48	-0.32	0.69	337	387	6.08	0.89	22	32	17.87	0.00
Paraguay	0	0	..	..	0	0	0.55	0.00	0	0	..	0.00
Peru	0	0	..	..	22	25	1.10	2.25	0	0	..	..
EUROPE	1 825	1 957	1.30	0.95	130	150	-5.53	0.92	976	1 063	3.50	1.39
European Union[1]	1 441	1 590	2.09	1.10	33	27	-1.45	-0.51	763	856	4.51	1.61
United Kingdom	55	66	-5.63	1.95	24	24	-6.71	-0.46	61	66	-0.98	1.73
Russia	90	76	4.16	-1.15	60	74	-8.06	0.57	2	2	-3.66	0.00
Ukraine	66	42	-8.09	0.15	3	13	14.60	20.94	15	1	-5.45	-17.31
AFRICA	14	13	3.22	0.32	417	572	1.93	3.26	23	19	3.73	-2.02
Egypt	0	0	..	..	70	100	-0.67	3.13	0	0	-33.02	..
Ethiopia	0	0	..	..	3	4	43.97	2.24	0	0	..	..
Nigeria	0	0	..	..	81	100	9.45	6.60	0	0	..	-4.05
South Africa	3	1	-6.15	-1.89	13	10	6.60	0.20	9	9	0.53	-0.20
ASIA	590	757	3.78	1.89	1 524	1 990	2.78	2.45	187	194	-0.29	-0.59
China[2]	22	36	-11.58	4.18	364	371	7.08	1.26	2	3	8.58	0.00
India	301	412	5.07	2.75	0	0	-2.40	..	33	3	-10.35	-20.41
Indonesia	0	0	..	..	202	301	4.38	3.07	1	1	-5.01	-2.98
Iran	45	83	20.41	1.15	5	5	-4.60	0.00	50	88	17.74	1.08
Japan	149	149	1.94	-0.23	25	15	-6.07	-3.19	0	0	..	..
Kazakhstan	1	0	-4.81	..	23	29	1.73	1.24	1	1	16.51	-1.22
Korea	14	18	-5.27	1.15	16	13	-3.46	-0.73	0	0	..	..
Malaysia	0	0	..	..	124	177	0.17	2.44	2	1	-32.76	-2.38
Pakistan	0	0	..	..	18	21	-5.48	3.17	0	0	..	..
Philippines	0	0	..	..	189	366	6.87	4.65	1	1	..	-4.44
Saudi Arabia	0	0	..	..	16	19	-17.95	0.47	9	8	-8.78	-0.47
Thailand	0	0	..	..	65	68	0.29	0.03	5	6	26.88	0.25
Türkiye	47	52	15.07	2.54	3	3	17.26	0.00	41	54	23.63	2.40
Viet Nam	0	0	..	..	103	96	4.91	0.59	1	1	-0.29	0.00
OCEANIA	533	519	-3.43	0.27	22	21	9.01	0.68	512	497	-2.48	0.01
Australia	151	134	-5.95	-0.75	14	13	11.85	0.18	135	118	-3.11	-1.84
New Zealand	382	385	-2.24	0.65	4	3	-4.01	0.00	377	379	-2.24	0.65
DEVELOPED COUNTRIES	**3 807**	**4 530**	**0.75**	**1.93**	**238**	**266**	**-2.87**	**0.81**	**2 367**	**3 010**	**2.66**	**2.53**
DEVELOPING COUNTRIES	**734**	**958**	**2.44**	**2.12**	**2 345**	**3 029**	**3.30**	**2.37**	**265**	**284**	**0.52**	**-0.48**
LEAST DEVELOPED COUNTRIES (LDC)	6	7	25.37	0.70	122	206	1.20	4.80	13	10	11.94	-3.37
OECD[3]	**3 632**	**4 398**	**0.86**	**2.03**	**510**	**550**	**3.87**	**0.58**	**2 278**	**2 962**	**3.04**	**2.64**
BRICS	**578**	**726**	**2.33**	**2.12**	**458**	**475**	**2.96**	**1.06**	**47**	**17**	**-7.08**	**-8.92**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**4 486**	**5 489**	**1.53**	**1.96**	**0.5**	**0.6**	**0.27**	**1.10**
NORTH AMERICA	432	467	-3.14	1.66	1.1	0.9	-3.79	0.20
Canada	64	119	-1.32	5.26	0.9	0.7	0.89	0.48
United States	368	347	-3.45	0.68	1.1	1.0	-4.08	0.18
LATIN AMERICA	708	817	3.18	1.32	0.8	0.9	3.17	0.42
Argentina	16	18	6.57	-0.30	0.3	0.4	5.71	-0.87
Brazil	182	220	0.04	1.86	0.1	0.1	-2.89	-0.44
Chile	26	28	-1.40	1.17	1.4	1.4	-2.48	0.95
Colombia	31	34	28.44	0.50	0.6	0.6	26.84	0.00
Mexico	360	403	4.56	0.94	2.8	2.9	3.58	0.29
Paraguay	0	0	..	..	0.0	0.0	-13.15	0.00
Peru	22	25	1.10	2.26	0.6	0.7	-0.35	1.40
EUROPE	978	1 044	0.02	0.51	1.1	1.3	-1.26	0.86
European Union[1]	710	761	1.89	0.49	1.2	1.5	0.37	0.90
United Kingdom	18	24	-17.12	0.04	0.3	0.3	-17.57	-0.25
Russia	148	148	-2.09	-0.36	1.0	1.0	-2.17	-0.06
Ukraine	54	54	-8.11	3.53	1.2	1.3	-7.62	4.25
AFRICA	408	566	1.85	3.41	0.3	0.3	-0.87	1.06
Egypt	70	100	-0.49	3.13	0.7	0.8	-2.53	1.52
Ethiopia	3	4	46.61	2.24	0.0	0.0	42.71	0.00
Nigeria	81	100	9.42	6.61	0.3	0.3	6.05	4.09
South Africa	7	3	3.78	0.34	0.1	0.0	2.35	-0.64
ASIA	1 919	2 552	3.46	2.55	0.4	0.5	2.56	1.99
China[2]	384	404	4.92	1.49	0.3	0.3	4.56	1.62
India	269	409	11.22	3.54	0.2	0.3	10.05	2.72
Indonesia	201	300	4.47	3.09	0.7	0.9	3.37	2.24
Iran	0	0	-72.05	..	0.0	0.0	-74.87	0.00
Japan	167	164	-0.19	-0.54	1.1	1.1	-0.32	-0.52
Kazakhstan	23	28	0.89	1.38	1.2	1.3	-0.45	0.52
Korea	29	31	0.12	0.31	0.5	0.6	-0.23	0.47
Malaysia	122	175	4.48	2.49	3.7	4.7	3.14	1.48
Pakistan	18	21	-5.19	3.23	0.1	0.1	-7.09	1.55
Philippines	188	365	6.82	4.69	1.6	2.8	5.49	3.50
Saudi Arabia	7	11	-23.22	1.26	0.2	0.3	-24.67	0.17
Thailand	60	62	-0.67	0.01	0.8	0.9	-0.96	0.00
Türkiye	9	1	22.50	0.55	0.1	0.0	23.05	0.00
Viet Nam	102	95	5.02	0.59	1.0	0.9	4.13	0.00
OCEANIA	42	43	-9.80	3.91	1.0	0.9	-11.23	2.77
Australia	29	29	-13.40	5.30	1.1	1.0	-14.62	4.36
New Zealand	9	9	-2.61	0.64	1.8	1.6	-4.33	-0.05
DEVELOPED COUNTRIES	**1 673**	**1 786**	**-1.10**	**0.82**	**1.0**	**1.1**	**-2.24**	**0.53**
DEVELOPING COUNTRIES	**2 814**	**3 703**	**3.42**	**2.56**	**0.4**	**0.5**	**2.32**	**1.58**
LEAST DEVELOPED COUNTRIES (LDC)	115	204	1.00	5.22	0.1	0.2	-1.31	3.01
OECD[3]	**1 858**	**1 985**	**0.24**	**0.81**	**1.2**	**1.2**	**-0.82**	**0.47**
BRICS	**990**	**1 183**	**3.58**	**1.96**	**0.2**	**0.3**	**3.55**	**1.60**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**5 055**	**5 929**	**-0.40**	**1.69**	**2 752**	**2 753**	**0.69**	**0.60**	**2 726**	**2 753**	**0.93**	**0.60**
NORTH AMERICA	71	83	16.70	1.28	13	14	-3.85	0.00	45	72	19.71	4.37
Canada	8	7	-2.24	-1.68	3	3	-0.46	0.00	1	1	3.41	1.26
United States	62	76	23.34	1.60	10	11	-4.57	0.00	44	71	20.25	4.41
LATIN AMERICA	1 370	1 646	0.65	1.68	295	293	-4.51	0.67	342	359	1.07	1.17
Argentina	187	213	-2.93	1.17	0	0	..	..	146	154	-0.89	2.36
Brazil	578	735	0.00	2.30	66	52	2.59	-1.10	4	15	-20.73	8.46
Chile	104	119	2.15	0.97	7	3	-1.81	-2.63	4	12	-17.08	2.12
Colombia	45	41	0.57	-0.76	20	43	17.82	5.09	2	0	-8.11	-4.70
Mexico	229	272	1.04	1.41	31	36	-3.25	0.17	17	18	7.73	0.00
Paraguay	0	0	..	..	7	7	25.11	0.00	7	7	25.16	0.00
Peru	0	0	..	..	27	33	8.15	1.81	0	0	..	..
EUROPE	801	678	-1.44	-0.71	61	67	-7.08	1.51	389	304	-2.78	-1.29
European Union[1]	650	517	-1.08	-1.09	17	12	-9.53	0.00	299	213	-3.72	-2.00
United Kingdom	33	38	-6.92	1.18	15	12	-7.90	-0.02	33	28	-4.65	0.58
Russia	58	60	-0.26	0.18	25	37	-6.32	2.71	20	21	54.42	0.00
Ukraine	6	3	-7.46	-1.60	1	2	..	8.14	3	1	15.38	-7.52
AFRICA	23	22	-4.42	0.03	558	702	-0.22	2.62	18	13	-8.06	-1.65
Egypt	0	0	..	..	31	52	-8.70	4.11	5	1	-1.06	-3.95
Ethiopia	0	0	..	..	2	2	22.58	2.21	0	0	..	..
Nigeria	0	0	..	..	57	55	-4.36	1.46	0	0	-4.53	..
South Africa	6	7	-2.99	0.86	4	3	6.45	-0.23	6	6	-4.22	0.23
ASIA	1 193	1 801	-3.16	3.72	1 779	1 647	2.32	-0.15	360	323	2.92	-0.51
China[2]	1 017	1 596	-3.92	3.90	731	578	4.56	-1.84	2	4	-8.45	0.31
India	4	5	0.51	1.22	0	0	..	3.78	2	2	-5.41	1.78
Indonesia	94	137	3.82	3.10	63	94	3.95	2.16	1	1	-20.02	-0.41
Iran	1	1	-0.85	0.64	4	5	11.76	0.00	5	6	17.60	0.08
Japan	35	13	-0.83	0.23	2	3	57.80	0.00	0	0	..	..
Kazakhstan	28	33	4.40	1.17	2	5	-8.25	2.39	0	0	..	..
Korea	1	1	-9.41	0.94	6	6	14.61	-0.57	0	0	..	..
Malaysia	0	0	..	..	45	46	6.79	0.89	29	19	8.09	-0.88
Pakistan	0	0	..	..	0	0	-25.74	3.23	0	0	-38.08	..
Philippines	0	0	..	..	20	16	-4.32	1.38	8	6	-8.58	-1.36
Saudi Arabia	0	0	..	..	124	118	1.78	0.63	11	15	-7.08	-0.63
Thailand	0	0	..	..	64	70	7.35	0.03	3	3	-1.99	0.46
Türkiye	2	2	288.23	2.54	0	0	-26.80	0.00	2	2	10.16	2.16
Viet Nam	0	0	..	..	40	39	-0.76	0.40	14	12	27.85	0.00
OCEANIA	1 598	1 698	1.41	0.89	47	30	14.70	-1.44	1 571	1 682	1.42	0.98
Australia	45	35	-10.78	-1.18	39	22	22.11	-2.31	40	45	-9.00	2.31
New Zealand	1 553	1 664	2.04	0.94	3	3	6.45	0.00	1 530	1 636	1.86	0.94
DEVELOPED COUNTRIES	**2 540**	**2 514**	**0.68**	**0.45**	**132**	**125**	**-0.96**	**0.46**	**2 011**	**2 064**	**0.68**	**0.71**
DEVELOPING COUNTRIES	**2 515**	**3 415**	**-1.39**	**2.71**	**2 619**	**2 628**	**0.78**	**0.61**	**715**	**689**	**1.66**	**0.30**
LEAST DEVELOPED COUNTRIES (LDC)	8	5	-7.47	-2.28	262	348	2.34	3.38	6	4	-14.76	-3.27
OECD[3]	**2 784**	**2 799**	**0.82**	**0.52**	**160**	**160**	**1.00**	**0.71**	**1 972**	**2 026**	**0.54**	**0.71**
BRICS	**1 664**	**2 403**	**-2.56**	**3.26**	**826**	**671**	**3.65**	**-1.58**	**35**	**49**	**-0.60**	**2.12**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**5 084**	**5 928**	**-0.51**	**1.69**	**0.6**	**0.7**	**-1.55**	**0.84**
NORTH AMERICA	39	25	4.91	-5.30	0.1	0.1	4.19	-5.79
Canada	10	9	-3.74	-1.43	0.3	0.2	-4.77	-2.20
United States	29	16	9.16	-7.06	0.1	0.0	8.45	-7.52
LATIN AMERICA	1 322	1 579	-0.76	1.60	2.0	2.2	-1.62	0.93
Argentina	40	59	-7.65	-1.45	0.9	1.2	-8.40	-2.01
Brazil	641	772	0.56	1.95	3.0	3.4	-0.18	1.48
Chile	107	110	3.64	0.72	5.5	5.6	2.50	0.51
Colombia	63	84	4.27	1.86	1.2	1.5	2.97	1.35
Mexico	243	290	0.04	1.33	1.9	2.1	-0.90	0.68
Paraguay	0	0	..	..	0.0	0.0	-23.59	0.00
Peru	27	33	8.16	1.81	0.8	0.9	6.61	0.96
EUROPE	472	441	-1.19	0.04	0.6	0.6	-1.30	0.20
European Union[1]	368	316	0.90	-0.37	0.8	0.7	0.79	-0.23
United Kingdom	15	22	-12.84	1.26	0.2	0.3	-13.31	0.97
Russia	63	75	-6.15	1.39	0.4	0.5	-6.22	1.69
Ukraine	3	4	-15.55	3.53	0.1	0.1	-15.10	4.26
AFRICA	562	711	-0.06	2.63	0.4	0.4	-2.57	0.36
Egypt	26	51	-13.66	4.29	0.2	0.4	-15.44	2.66
Ethiopia	2	2	23.09	2.24	0.0	0.0	19.80	0.00
Nigeria	56	55	-4.27	1.47	0.2	0.2	-7.22	-0.93
South Africa	4	4	14.11	0.95	0.1	0.1	12.54	-0.04
ASIA	2 611	3 124	-0.59	1.95	0.5	0.6	-1.43	1.37
China[2]	1 746	2 170	-1.20	2.03	1.2	1.4	-1.54	2.16
India	3	3	11.87	0.80	0.0	0.0	10.69	0.00
Indonesia	156	230	4.43	2.72	0.5	0.7	3.34	1.87
Iran	0	0	-66.54	..	0.0	0.0	-69.92	0.00
Japan	37	16	0.03	0.19	0.3	0.1	0.36	0.76
Kazakhstan	30	37	2.86	1.32	1.6	1.8	1.50	0.46
Korea	6	6	4.84	0.60	0.1	0.1	4.47	0.76
Malaysia	16	27	4.22	2.34	0.5	0.7	2.88	1.33
Pakistan	0	0	3.39	3.24	0.0	0.0	1.33	0.00
Philippines	12	9	5.02	3.76	0.1	0.1	3.72	2.59
Saudi Arabia	113	103	3.44	0.83	3.2	2.6	1.47	-0.26
Thailand	61	66	8.04	0.01	0.9	0.9	7.73	0.00
Türkiye	0	0	..	0.55	0.0	0.0	-1.76	0.00
Viet Nam	26	27	-4.74	0.59	0.3	0.2	-5.54	0.00
OCEANIA	77	47	7.30	-3.12	1.8	1.0	5.64	-4.18
Australia	44	12	4.87	-9.88	1.7	0.4	3.39	-10.69
New Zealand	29	30	20.33	0.52	5.6	5.4	18.24	-0.17
DEVELOPED COUNTRIES	**665**	**576**	**0.27**	**-0.44**	**0.5**	**0.4**	**-0.12**	**-0.59**
DEVELOPING COUNTRIES	**4 419**	**5 352**	**-0.63**	**1.94**	**0.7**	**0.7**	**-1.83**	**0.95**
LEAST DEVELOPED COUNTRIES (LDC)	264	349	2.78	3.38	0.3	0.3	0.41	1.22
OECD[3]	**974**	**932**	**1.35**	**0.15**	**0.7**	**0.6**	**0.84**	**-0.06**
BRICS	**2 456**	**3 025**	**-0.90**	**1.99**	**0.7**	**0.9**	**-1.54**	**1.65**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**3 383**	**3 699**	**1.79**	**0.77**	**1 615.2**	**1 844.5**	**2.62**	**1.47**	**1 979.5**	**2 169.9**	**1.14**	**1.23**
NORTH AMERICA	479	549	-1.19	1.28	6.4	6.8	0.96	0.21	222.0	281.0	-2.03	2.18
Canada	40	48	2.62	2.01	6.4	6.8	0.96	0.21	43.2	48.5	3.56	1.48
United States	439	500	-1.48	1.22	0.0	0.0	..	..	178.7	232.4	-3.05	2.33
LATIN AMERICA	161	191	0.26	1.42	101.1	173.8	-1.36	2.16	151.5	233.5	-2.62	2.06
Argentina	74	89	0.74	1.58	0.5	0.5	-18.12	0.00	50.8	60.6	-4.17	1.57
Brazil	0	0	..	..	17.5	19.0	-1.94	0.00	0.5	0.5	..	0.00
Chile	11	13	2.70	1.19	10.6	21.2	20.19	1.95	17.0	28.0	6.93	1.50
Colombia	0	0	..	..	13.2	15.7	5.80	1.41	13.2	15.7	5.80	1.41
Mexico	58	71	0.66	1.34	27.3	66.1	-7.95	3.79	27.3	65.9	-7.95	3.66
Paraguay	0	0	..	..	0.8	0.8	28.31	0.00	0.0	0.0	..	..
Peru	0	0	..	..	11.3	15.7	3.39	2.94	11.3	15.7	3.39	2.94
EUROPE	2 409	2 574	2.31	0.60	158.9	167.4	-3.02	0.55	962.1	1 043.6	1.74	0.79
European Union[2]	2 144	2 262	2.38	0.51	46.0	51.1	-4.43	1.32	688.2	728.0	3.20	0.60
United Kingdom	73	84	1.74	0.75	53.3	47.0	6.01	-1.51	59.0	54.9	2.89	-0.96
Russia	1	1	0.91	0.00	39.0	38.0	-8.93	0.00	39.0	38.0	-8.93	0.00
Ukraine	24	27	-1.76	1.11	5.1	13.9	20.60	8.99	26.7	38.5	1.16	3.39
AFRICA	4	5	6.71	1.97	80.8	119.6	8.30	3.57	46.6	69.7	4.73	3.87
Egypt	0	0	..	..	20.8	30.3	3.85	3.44	20.8	30.3	3.85	3.44
Ethiopia	0	0	..	..	0.9	0.9	18.84	0.00	0.0	0.0	..	..
Nigeria	0	0	..	..	3.4	0.4	-4.99	-18.08	3.4	0.4	-4.99	-18.09
South Africa	4	5	6.72	1.97	21.3	32.9	12.92	3.85	0.4	0.0	-25.56	..
ASIA	183	219	5.12	1.54	1 236.9	1 345.6	3.65	1.38	551.2	499.3	2.68	1.08
China[3]	85	100	1.20	1.10	641.0	810.1	5.40	1.80	0.8	0.8	2.15	0.00
India	1	2	5.16	1.31	13.0	17.9	10.28	2.68	0.3	0.8	..	8.68
Indonesia	0	0	..	..	114.2	113.6	1.48	-0.16	114.2	113.6	1.48	-0.16
Iran	9	9	0.94	0.47	5.3	5.9	9.67	-0.59	6.3	6.3	-2.95	-1.30
Japan	19	19	486.75	0.00	49.8	51.0	-0.47	0.00	0.4	0.0	..	..
Kazakhstan	0	0	..	..	10.6	16.3	6.95	3.94	10.6	16.3	6.95	3.94
Korea	0	0	..	..	35.7	34.7	1.02	-0.13	0.1	0.0	..	..
Malaysia	0	0	..	..	88.0	111.8	1.78	2.10	88.0	111.8	1.78	2.10
Pakistan	0	0	..	..	18.5	0.0	-1.50	-61.80	18.5	0.0	-1.50	-64.57
Philippines	0	0	..	..	57.1	97.2	9.82	4.97	57.1	97.2	9.82	4.97
Saudi Arabia	0	0	..	..	8.4	15.1	11.54	5.54	8.4	15.1	11.55	5.54
Thailand	0	0	..	..	68.3	0.0	1.97	..	68.3	0.0	1.97	..
Türkiye	69	89	7.34	2.59	1.3	2.2	4.71	5.08	68.0	88.3	10.91	2.67
Viet Nam	0	0	..	..	42.5	0.0	2.37	..	42.5	0.0	2.37	..
OCEANIA	148	161	2.58	0.05	31.1	31.3	4.38	0.09	46.2	42.8	1.05	0.17
Australia	116	128	2.57	-0.06	12.7	12.7	0.72	0.00	33.0	30.0	-0.36	0.05
New Zealand	31	32	2.64	0.51	18.2	18.4	8.09	0.15	13.2	12.8	6.92	0.43
DEVELOPED COUNTRIES	**3 059**	**3 308**	**1.79**	**0.68**	**289.8**	**322.3**	**-0.42**	**0.95**	**1 244.8**	**1 388.3**	**0.96**	**1.08**
DEVELOPING COUNTRIES	**325**	**391**	**1.74**	**1.56**	**1 325.4**	**1 522.2**	**3.40**	**1.58**	**734.8**	**781.6**	**1.46**	**1.52**
LEAST DEVELOPED COUNTRIES (LDC)	0	0	..	..	24.0	32.2	8.25	2.59	12.3	16.9	5.07	2.90
OECD[4]	**3 028**	**3 272**	**1.89**	**0.68**	**283.2**	**335.8**	**-0.13**	**0.80**	**1 154.6**	**1 318.8**	**1.65**	**1.11**
BRICS	**91**	**107**	**1.44**	**1.13**	**731.8**	**918.0**	**3.98**	**1.76**	**41.0**	**40.0**	**-8.90**	**0.11**

.. Not available

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2020-22est: Data for 2022 are estimated.

1. Least-squares growth rate (see glossary).
2. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**461 674**	**554 996**	**1.94**	**1.70**	**58.3**	**63.9**	**0.85**	**0.87**
NORTH AMERICA	25 015	23 865	-1.28	-0.39	66.2	59.7	-1.95	-0.91
Canada	2 735	2 658	-1.03	-0.19	72.1	64.4	-2.03	-0.97
United States	22 280	21 207	-1.31	-0.42	65.5	59.2	-1.95	-0.91
LATIN AMERICA	45 183	47 783	0.13	0.43	67.7	66.6	-0.76	-0.22
Argentina	1 618	1 692	-0.03	0.39	28.5	28.1	-0.26	-0.12
Brazil	24 747	25 506	0.31	0.07	114.4	112.3	-0.45	-0.37
Chile	170	113	-13.92	-0.96	8.8	5.7	-14.86	-1.18
Colombia	5 663	6 388	-0.01	1.27	109.7	117.6	-1.25	0.77
Mexico	3 460	3 286	-0.26	-0.46	26.7	23.6	-1.37	-1.10
Paraguay	540	694	0.85	2.20	73.5	84.3	-0.51	1.17
Peru	1 896	2 207	2.03	1.42	56.1	59.5	0.57	0.57
EUROPE	86 247	80 267	-0.03	-0.68	113.8	107.3	-0.11	-0.51
European Union[1]	40 745	36 946	0.66	-1.06	88.4	80.9	0.35	-0.89
United Kingdom	8 576	8 002	-2.26	-0.13	127.8	115.2	-1.68	-0.44
Russia	22 773	21 867	0.90	-0.74	158.1	156.5	0.79	-0.44
Ukraine	6 480	5 847	-2.58	0.41	148.6	144.7	-2.06	1.11
AFRICA	37 028	49 208	1.58	2.86	26.7	27.7	-0.96	0.57
Egypt	1 329	1 804	-0.46	2.95	12.6	14.3	-2.50	1.34
Ethiopia	4 622	6 427	4.78	3.45	38.2	41.5	1.98	1.19
Nigeria	221	286	-0.71	2.46	0.9	0.9	-3.77	0.04
South Africa	3 101	3 390	2.85	0.96	51.2	50.0	1.44	-0.03
ASIA	264 472	350 288	3.45	2.55	56.5	70.2	2.55	1.99
China[2]	31 808	34 919	4.38	0.35	21.8	24.3	4.38	0.51
India	125 164	170 995	3.98	2.92	89.0	111.1	2.88	2.10
Indonesia	1 001	1 391	0.44	3.55	3.4	4.3	-0.62	2.69
Iran	2 410	2 802	2.78	1.46	27.9	29.3	1.40	0.59
Japan	4 643	4 456	-0.99	-0.51	37.0	37.8	-0.66	0.06
Kazakhstan	5 392	6 737	2.84	1.89	283.4	320.7	1.48	1.02
Korea	446	508	-0.66	1.12	8.7	9.8	-0.47	1.04
Malaysia	52	63	-5.60	1.64	1.6	1.7	-6.81	0.64
Pakistan	48 268	68 208	3.62	3.14	213.8	251.1	1.55	1.46
Philippines	17	20	-2.58	1.69	0.1	0.2	-3.79	0.54
Saudi Arabia	2 067	2 353	7.11	1.11	58.2	58.5	5.07	0.01
Thailand	1 149	1 304	1.32	0.89	16.3	18.4	1.02	0.88
Türkiye	14 595	19 029	1.96	2.84	171.1	210.0	0.59	2.28
Viet Nam	1 141	1 971	9.77	4.79	11.4	18.4	8.85	4.17
OCEANIA	3 729	3 585	2.14	0.70	68.1	63.8	-1.37	-0.93
Australia	3 142	2 973	1.89	0.78	102.8	98.7	-0.91	-0.72
New Zealand	576	597	3.57	0.24	45.7	42.5	-4.71	-0.82
DEVELOPED COUNTRIES	**142 938**	**142 792**	**0.06**	**0.00**	**97.6**	**95.9**	**-0.36**	**-0.15**
DEVELOPING COUNTRIES	**318 736**	**412 204**	**2.88**	**2.37**	**49.4**	**57.3**	**1.64**	**1.38**
LEAST DEVELOPED COUNTRIES (LDC)	22 022	30 540	1.48	3.16	23.9	26.2	-0.84	1.00
OECD[3]	**108 934**	**108 122**	**-0.05**	**0.02**	**76.0**	**73.9**	**-0.59**	**-0.19**
BRICS	**207 594**	**256 678**	**3.15**	**1.85**	**63.5**	**75.5**	**2.46**	**1.51**

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**888 412**	**1 039 320**	**1.77**	**1.48**	**719 741**	**840 875**	**1.10**	**1.35**	**1.23**	**1.24**	**0.66**	**0.12**
NORTH AMERICA	113 168	128 478	1.46	1.24	10 392	10 607	0.24	0.24	10.89	12.11	1.22	0.99
Canada	10 910	13 104	2.86	1.70	977	982	0.43	0.10	11.17	13.35	2.42	1.59
United States	102 258	115 375	1.32	1.19	9 415	9 626	0.22	0.26	10.86	11.99	1.09	0.93
LATIN AMERICA	85 833	94 612	0.60	0.91	37 945	38 655	-2.75	0.10	2.26	2.45	3.45	0.81
Argentina	10 873	12 143	-0.36	1.01	1 715	1 697	-0.59	-0.10	6.34	7.16	0.24	1.10
Brazil	36 829	40 188	0.48	0.81	16 117	15 758	-4.51	-0.19	2.29	2.55	5.23	1.00
Chile	2 037	2 304	-0.56	1.23	848	852	-3.22	-0.13	2.40	2.70	2.74	1.37
Colombia	6 826	7 718	0.06	1.31	3 508	3 506	-5.18	-0.04	1.95	2.20	5.52	1.35
Mexico	13 215	14 008	1.99	0.60	2 638	2 692	1.15	0.30	5.01	5.20	0.83	0.30
Paraguay	556	713	0.84	2.20	219	259	-0.36	1.48	2.54	2.75	1.20	0.71
Peru	2 186	2 566	2.23	1.43	1 181	1 330	0.04	0.83	1.85	1.93	2.19	0.59
EUROPE	226 854	226 982	0.70	0.06	38 910	35 927	-1.30	-0.69	5.83	6.32	2.03	0.75
European Union[2]	153 372	151 160	0.94	-0.11	19 983	17 999	-0.97	-0.94	7.55	8.24	1.97	0.83
United Kingdom	15 101	16 066	0.89	0.45	1 855	1 822	0.09	-0.17	8.14	8.82	0.80	0.62
Russia	32 533	33 089	1.21	0.02	7 673	7 246	-1.04	-0.48	4.24	4.57	2.27	0.50
Ukraine	8 328	7 790	-4.21	1.02	2 391	2 104	-4.41	-1.02	3.48	3.70	0.21	2.05
AFRICA	47 996	62 040	1.29	2.58	234 632	278 183	1.69	1.43	0.20	0.22	-0.39	1.13
Egypt	5 134	5 982	-0.78	1.46	4 305	4 562	-6.37	0.60	1.19	1.31	5.97	0.86
Ethiopia	5 021	6 977	4.49	3.43	13 243	17 016	-1.84	2.21	0.38	0.41	6.46	1.20
Nigeria	529	664	-0.68	2.31	2 258	2 704	-0.24	1.61	0.23	0.25	-0.44	0.69
South Africa	3 786	4 190	1.72	1.10	1 014	1 084	0.64	0.48	3.74	3.87	1.08	0.62
ASIA	383 749	496 819	3.06	2.33	391 563	471 493	1.53	1.64	0.98	1.05	1.51	0.68
China[3]	40 934	48 692	2.06	1.16	13 983	14 628	0.08	0.42	2.63	3.05	2.40	0.86
India	188 931	249 558	3.78	2.54	140 316	175 235	1.57	2.01	1.35	1.42	2.18	0.52
Indonesia	1 579	2 236	1.62	3.38	14 807	19 803	1.96	2.49	0.11	0.11	-0.33	0.86
Iran	8 488	9 620	1.06	1.15	20 259	20 033	-0.19	0.01	0.42	0.48	1.25	1.14
Japan	7 589	7 265	0.36	-0.25	834	790	-0.76	-0.47	9.11	9.19	1.13	0.22
Kazakhstan	6 234	7 838	3.02	1.99	3 033	3 407	1.70	1.06	2.06	2.30	1.30	0.92
Korea	1 968	1 939	-1.28	0.01	307	293	-0.82	-0.29	6.40	6.62	-0.47	0.31
Malaysia	52	63	-5.60	1.64	49	47	-5.07	-0.24	1.06	1.35	-0.56	1.89
Pakistan	62 533	85 511	3.34	2.82	38 650	49 029	2.35	2.11	1.62	1.74	0.97	0.70
Philippines	17	20	-2.58	1.69	5	6	-0.02	0.22	3.15	3.64	-2.56	1.47
Saudi Arabia	3 062	3 565	3.53	1.39	5 537	6 039	1.42	0.84	0.55	0.59	2.08	0.54
Thailand	1 225	1 389	1.31	0.89	222	226	-0.50	-0.09	5.53	6.13	1.82	0.99
Türkiye	21 555	27 518	2.40	2.54	32 994	39 292	4.41	1.44	0.65	0.70	-1.93	1.08
Viet Nam	1 141	1 971	9.77	4.79	368	538	5.34	3.40	3.10	3.66	4.21	1.34
OCEANIA	30 810	30 390	0.06	0.29	6 299	6 010	-0.96	-0.19	4.89	5.06	1.03	0.48
Australia	8 806	8 243	-1.66	-0.07	1 344	1 174	-2.82	-0.38	6.55	7.02	1.19	0.31
New Zealand	21 984	22 126	0.82	0.43	4 903	4 786	-0.45	-0.14	4.48	4.62	1.27	0.57
DEVELOPED COUNTRIES	**409 280**	**432 483**	**0.98**	**0.59**	**72 878**	**72 433**	**-0.64**	**-0.05**	**5.62**	**5.97**	**1.63**	**0.64**
DEVELOPING COUNTRIES	**479 131**	**606 837**	**2.48**	**2.17**	**646 864**	**768 442**	**1.31**	**1.50**	**0.74**	**0.79**	**1.15**	**0.66**
LEAST DEVELOPED COUNTRIES (LDC)	30 200	40 092	1.70	2.79	225 418	266 868	1.80	1.43	0.13	0.15	-0.09	1.34
OECD[4]	**372 557**	**394 010**	**1.06**	**0.61**	**80 849**	**85 051**	**0.91**	**0.43**	**4.61**	**4.63**	**0.15**	**0.17**
BRICS	**303 013**	**375 716**	**2.78**	**1.90**	**179 103**	**213 950**	**0.64**	**1.62**	**1.69**	**1.76**	**2.13**	**0.28**

Note: Calendar year; except year ending 30 June for New Zealand and Australia. Average 2020-22est: Data for 2022 are estimated.

1. Least-squares growth rate (see glossary).
2. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
CANADA												
Milk target price[2]	CADc/litre	90.0	94.3	96.5	98.5	100.5	102.7	104.7	106.8	109.0	111.1	113.3
Butter support price	CAD/t	8 461.5	8 952.6	9 151.0	9 370.1	9 546.6	9 754.4	9 946.3	10 140.4	10 349.2	10 549.2	10 756.6
Cheese tariff-quota	kt pw	48.0	60.9	63.2	65.4	65.7	65.9	66.2	66.5	66.8	67.1	67.4
In-quota tariff	%	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
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	722	814	817	823	827	813	813	813	813	813	813
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	72.5	63.6	63.7	63.7	63.8	63.8	63.9	63.9	64.0	64.0	64.0
Cheese tariff-quotas	kt pw	109.3	104.7	105.0	105.3	105.6	106.0	106.3	106.6	106.9	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	%	242.6	199.5	194.9	198.0	198.1	198.9	200.4	200.7	201.9	202.3	203.1
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	1 240.7	1 240.7	1 240.7	1 240.7	1 240.7	1 240.7	1 240.7	1 240.7	1 240.7	1 240.7	1 240.7
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	%	2.6	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.3	2.3	2.2
Out-of-quota tariff	%	32.2	32.6	32.2	32.0	31.4	30.8	30.2	29.6	29.0	28.5	27.9
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	%	33.1	32.6	32.4	32.1	31.6	31.1	30.6	30.1	29.6	29.1	28.6
INDIA												
Butter tariff	%	36.7	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Cheese tariff	%	32.5	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8
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 2020-22est: Data for 2022 are estimated.
1. Refers to all current European Union member States.
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 (2023), “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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**180 766**	**201 735**	**1.76**	**1.08**	**43 953**	**45 659**	**1.36**	**0.40**	**42 140**	**44 259**	**0.81**	**0.65**
NORTH AMERICA	5 647	5 695	-1.72	-0.23	6 751	7 445	2.58	1.05	2 416	2 443	-2.45	-0.44
Canada	913	1 001	-1.74	0.99	706	780	1.27	0.56	773	828	-0.59	0.66
United States	4 734	4 694	-1.72	-0.47	6 045	6 665	2.75	1.11	1 643	1 615	-3.23	-0.96
LATIN AMERICA	16 869	15 204	2.69	0.05	2 377	2 666	-0.42	0.42	5 301	5 150	3.25	0.04
Argentina	850	904	0.23	0.59	67	70	1.13	0.00	595	627	-0.53	0.43
Brazil	1 396	1 547	1.21	0.97	508	561	-6.07	0.51	64	115	6.49	6.54
Chile	3 381	3 092	2.20	0.16	189	192	7.77	0.08	1 754	1 967	3.17	1.13
Colombia	316	355	9.26	0.13	260	301	0.97	1.05	56	54	-2.99	-0.16
Mexico	1 846	1 786	1.15	0.13	506	546	1.94	-0.54	255	228	6.24	-0.27
Paraguay	32	32	3.78	0.00	5	8	2.08	4.03	0	0	..	..
Peru	6 017	4 245	3.48	-0.64	155	350	1.53	6.69	659	363	0.51	-1.99
EUROPE	17 449	19 019	0.44	0.69	11 642	11 279	0.30	-0.09	10 462	10 544	0.69	0.27
European Union[1]	4 844	5 450	-1.90	0.66	8 198	8 265	0.82	0.22	2 483	2 439	-0.24	0.33
United Kingdom	857	911	-0.98	0.47	1 141	1 111	-1.35	-0.17	756	713	-2.35	-0.55
Norway	4 049	4 396	2.11	0.65	256	278	0.21	-0.56	3 082	3 097	1.13	-0.18
Russia	5 412	5 881	2.52	0.90	840	545	-3.29	-4.26	2 287	2 386	1.49	1.02
Ukraine	74	77	-11.62	2.83	515	450	1.41	0.88	30	23	-5.27	-0.36
AFRICA	12 537	13 987	2.71	0.90	4 730	6 375	0.62	2.44	3 122	2 650	3.90	-1.58
Egypt	2 006	2 349	4.35	1.98	457	1 038	-3.23	4.39	36	36	1.69	0.00
Ethiopia	61	72	4.69	1.66	4	6	6.14	4.20	1	0	-19.87	..
Nigeria	1 069	1 208	0.61	0.94	860	1 107	-2.53	2.14	4	4	-23.92	0.00
South Africa	533	549	-0.28	-0.22	282	381	3.42	2.07	161	132	-0.56	-2.05
ASIA	126 541	146 069	1.92	1.33	17 789	17 166	2.19	-0.23	19 845	22 543	0.31	1.46
China[2]	63 796	75 010	1.35	1.46	4 949	3 918	4.48	-1.45	7 235	9 714	-0.85	3.07
India	14 305	17 834	5.78	1.94	83	102	15.80	3.47	1 328	1 262	4.65	0.85
Indonesia	12 524	14 462	2.53	1.35	189	210	1.25	0.20	1 344	1 279	0.56	-0.12
Iran	1 262	1 308	4.40	0.28	32	20	-12.60	0.00	139	134	8.02	-0.04
Japan	3 738	3 378	-1.62	-0.88	3 283	3 376	-1.09	0.15	831	800	2.23	-0.62
Kazakhstan	48	49	3.42	0.42	64	65	-1.17	-0.03	36	35	-0.18	0.04
Korea	1 916	1 939	-1.05	-0.14	1 934	1 981	2.85	0.66	777	825	2.64	0.42
Malaysia	1 584	1 615	-1.35	-0.17	731	939	3.24	2.28	427	540	5.52	1.56
Pakistan	659	686	0.32	0.36	9	10	3.68	0.00	199	166	2.67	-2.91
Philippines	2 782	3 124	-1.04	1.15	569	504	7.66	-2.45	323	397	-2.96	2.69
Saudi Arabia	179	242	9.98	2.43	298	321	-1.15	0.11	41	47	1.45	0.00
Thailand	2 478	2 669	-0.90	0.93	2 225	1 993	3.45	-0.95	1 900	1 976	-1.76	0.73
Türkiye	820	1 071	4.89	2.24	130	127	4.66	-1.70	318	439	10.67	2.03
Viet Nam	8 251	8 812	4.46	0.78	502	565	8.00	0.26	2 619	2 725	0.18	0.29
OCEANIA	1 724	1 761	2.16	0.51	662	728	-0.63	0.61	995	931	1.01	0.19
Australia	282	311	2.55	1.43	465	528	-0.19	0.87	74	51	2.71	-2.58
New Zealand	468	515	-1.94	1.18	62	51	2.43	-0.65	360	360	-2.43	1.08
DEVELOPED COUNTRIES	**28 615**	**30 076**	**-0.18**	**0.34**	**22 813**	**23 415**	**0.75**	**0.36**	**14 365**	**14 391**	**0.09**	**0.08**
DEVELOPING COUNTRIES	**152 152**	**171 659**	**2.16**	**1.21**	**21 139**	**22 244**	**2.06**	**0.45**	**27 775**	**29 868**	**1.20**	**0.94**
LEAST DEVELOPED COUNTRIES (LDC)	14 058	16 259	2.83	1.55	1 353	1 550	2.02	1.21	1 928	1 583	7.10	-1.50
OECD[3]	**28 184**	**28 921**	**-0.29**	**0.20**	**23 503**	**24 558**	**1.11**	**0.46**	**13 165**	**13 417**	**0.42**	**0.13**
BRICS	**85 442**	**100 820**	**2.06**	**1.49**	**6 661**	**5 507**	**2.09**	**-1.31**	**11 075**	**13 609**	**0.22**	**2.41**

.. 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 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**17 694**	**16 473**	**2.42**	**0.24**	**159 784**	**181 979**	**1.71**	**1.16**	**20.4**	**21.2**	**0.61**	**0.32**
NORTH AMERICA	1 092	1 093	1.93	0.08	8 570	9 290	1.65	0.80	22.8	23.4	0.94	0.27
Canada	7	9	-18.74	0.74	825	930	0.12	0.93	21.6	22.3	-0.96	0.14
United States	1 085	1 084	2.30	0.07	7 745	8 360	1.82	0.78	23.0	23.5	1.16	0.29
LATIN AMERICA	6 495	4 525	2.97	-0.85	6 940	7 762	1.08	0.92	10.6	11.0	0.19	0.25
Argentina	0	0	0.00	0.00	322	347	2.00	0.77	7.1	7.2	1.19	0.20
Brazil	98	116	1.85	1.64	1 742	1 876	-1.54	0.53	8.1	8.3	-2.27	0.07
Chile	1 265	849	0.49	-1.74	287	319	3.20	0.87	15.0	16.2	2.07	0.65
Colombia	0	0	0.00	0.00	519	602	6.23	0.61	10.1	11.2	4.93	0.11
Mexico	246	196	-1.11	0.00	1 850	1 909	1.13	0.00	14.6	14.0	0.19	-0.63
Paraguay	0	0	0.00	0.00	37	40	3.53	0.65	5.1	4.9	2.21	-0.36
Peru	4 599	3 112	4.22	-0.73	914	1 121	3.49	1.97	27.4	30.6	1.99	1.12
EUROPE	2 824	3 222	3.58	1.33	15 621	16 334	-0.08	0.33	20.9	22.1	-0.19	0.49
European Union[1]	698	770	0.28	0.77	9 817	10 437	-0.11	0.41	22.0	23.6	-0.23	0.56
United Kingdom	0	0	0.00	0.00	1 241	1 307	-0.50	0.50	18.4	18.8	-1.04	0.21
Norway	911	1 235	6.88	2.73	300	327	1.58	0.76	55.4	56.1	0.84	0.07
Russia	658	755	9.58	0.69	3 177	3 185	0.10	-0.20	21.9	22.7	0.02	0.10
Ukraine	0	0	0.00	0.00	559	504	-0.86	1.21	12.9	12.5	-0.34	1.92
AFRICA	684	753	-0.14	0.47	13 311	16 691	1.63	2.00	9.8	9.6	-0.90	-0.27
Egypt	0	0	0.00	0.00	2 427	3 351	2.67	2.68	23.3	26.9	0.60	1.08
Ethiopia	0	0	0.00	0.00	64	77	5.41	1.84	0.5	0.5	2.68	-0.39
Nigeria	0	0	0.00	0.00	1 925	2 311	-1.58	1.50	9.1	8.4	-4.10	-0.90
South Africa	266	310	1.69	1.22	388	488	1.48	1.17	6.5	7.3	0.10	0.18
ASIA	6 493	6 752	2.20	0.67	114 355	130 747	2.05	1.20	24.7	26.5	1.13	0.63
China[2]	1 515	1 721	-5.78	0.66	57 961	65 493	1.86	1.11	40.7	46.4	1.44	1.23
India	814	864	9.20	1.62	11 874	15 516	5.95	2.18	8.5	10.2	4.85	1.37
Indonesia	110	120	18.45	0.00	11 259	13 272	2.68	1.48	40.7	43.7	1.51	0.64
Iran	132	125	1.82	-0.19	1 022	1 068	3.38	0.37	12.0	11.4	2.02	-0.49
Japan	748	768	0.66	-0.09	5 375	5 087	-1.89	-0.42	43.1	43.4	-1.57	0.16
Kazakhstan	4	4	8.23	0.00	72	75	0.24	0.22	3.8	3.6	-1.09	-0.63
Korea	57	60	-11.58	0.00	2 869	2 946	0.61	0.23	55.4	57.7	0.25	0.39
Malaysia	70	63	-9.96	-0.03	1 806	1 931	0.49	0.49	55.1	52.6	-0.84	-0.50
Pakistan	91	90	-2.68	0.00	377	440	0.04	1.90	1.7	1.6	-1.97	0.24
Philippines	0	0	0.00	0.00	3 028	3 231	0.50	0.33	27.3	25.6	-0.92	-0.81
Saudi Arabia	0	0	0.00	0.00	436	517	2.03	1.14	12.3	12.9	0.09	0.05
Thailand	426	315	-0.88	-1.33	2 209	2 241	3.27	-0.06	31.6	31.9	2.95	-0.07
Türkiye	173	201	8.07	3.98	456	555	1.35	0.81	5.4	6.2	-0.02	0.26
Viet Nam	1 802	1 875	14.40	1.24	4 065	4 676	4.20	1.31	41.4	44.5	3.19	0.71
OCEANIA	105	128	-3.77	0.70	985	1 155	0.24	1.44	23.1	23.9	-1.33	0.34
Australia	35	41	-1.20	0.21	638	747	0.69	1.43	24.6	26.1	-0.73	0.52
New Zealand	48	66	-0.03	1.24	122	139	1.14	0.67	23.7	25.0	-0.66	-0.02
DEVELOPED COUNTRIES	**5 082**	**5 565**	**2.66**	**0.83**	**31 278**	**32 798**	**0.13**	**0.41**	**21.7**	**22.4**	**-0.26**	**0.26**
DEVELOPING COUNTRIES	**12 612**	**10 908**	**2.36**	**-0.03**	**128 506**	**149 181**	**2.13**	**1.33**	**20.2**	**21.0**	**0.87**	**0.35**
LEAST DEVELOPED COUNTRIES (LDC)	326	317	0.26	0.00	12 772	15 508	2.09	2.04	14.0	13.5	-0.25	-0.10
OECD[3]	**5 272**	**5 279**	**1.43**	**0.43**	**32 394**	**34 038**	**0.29**	**0.39**	**23.1**	**23.7**	**-0.21**	**0.18**
BRICS	**3 351**	**3 766**	**-0.35**	**0.95**	**75 142**	**86 557**	**2.25**	**1.23**	**23.2**	**25.7**	**1.53**	**0.89**

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 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2023-32	Average 2020-22est	2032	2023-32	Average 2020-22est	2032	2023-32
WORLD	**124 336**	**150 934**	**1.34**	**124 351**	**150 983**	**1.35**	**100 932**	**125 053**	**1.48**
NORTH AMERICA	59 571	63 495	0.26	56 735	60 431	0.29	54 184	57 076	0.20
Canada	1 927	2 410	1.96	3 277	5 645	4.45	2 958	5 254	4.66
United States	57 644	61 085	0.20	53 458	54 787	-0.06	51 226	51 822	-0.16
LATIN AMERICA	35 237	46 834	2.32	33 777	45 579	2.41	30 589	41 143	2.56
Argentina	1 196	1 515	1.18	1 165	1 487	1.18	954	1 196	0.77
Brazil	31 287	41 682	2.37	29 553	40 201	2.51	27 890	37 560	2.63
Chile	5	9	8.80	53	52	1.09	0	0	0.00
Colombia	467	725	6.13	747	1 035	3.19	636	922	3.65
Mexico	157	228	0.11	463	496	0.56	264	301	1.05
Paraguay	642	846	1.89	442	579	1.91	404	539	2.07
Peru	237	301	2.27	290	357	1.88	185	250	2.00
EUROPE	8 151	8 944	1.00	9 135	9 840	0.80	5 775	6 603	1.14
European Union[1]	6 616	7 229	1.09	6 999	7 476	0.83	4 821	5 442	1.15
United Kingdom	657	822	0.23	1 180	1 379	0.62	847	1 044	0.83
Russia	620	593	0.12	537	522	0.15	0	0	0.00
Ukraine	141	171	4.66	187	222	3.39	75	104	5.51
AFRICA	1 138	1 206	2.60	1 380	1 680	1.80	123	106	0.35
Egypt	10	13	2.60	10	13	2.68	0	0	0.00
Ethiopia	117	135	1.34	118	138	1.31	55	53	-1.09
Nigeria	49	102	7.30	307	413	1.40	0	0	0.00
South Africa	331	351	0.23	132	125	0.66	5	5	0.17
ASIA	19 904	30 121	2.42	23 051	33 211	2.19	10 068	19 940	3.59
China[2]	9 867	11 181	1.08	10 026	11 527	1.12	3 434	4 853	2.62
India	5 373	13 326	4.37	5 790	13 739	4.25	3 413	11 373	5.35
Indonesia	179	220	2.00	152	186	2.41	0	0	0.00
Iran	151	169	0.99	148	164	1.02	0	0	0.00
Japan	54	47	-0.02	1 738	1 770	-0.10	920	970	-0.19
Kazakhstan	60	70	1.35	59	68	1.39	0	0	0.00
Korea	158	124	-1.66	660	559	-1.03	5	3	-4.96
Malaysia	0	3	25.14	17	17	1.95	0	0	0.00
Pakistan	543	693	0.27	22	23	0.08	0	0	0.00
Philippines	383	604	3.13	857	1 081	1.63	588	783	1.20
Saudi Arabia	0	15	24.49	99	107	1.44	0	0	0.00
Thailand	1 733	1 910	0.11	1 753	1 936	0.21	1 453	1 623	0.24
Türkiye	141	184	2.11	334	349	1.05	92	100	0.29
Viet Nam	252	322	2.10	278	356	1.66	162	235	2.55
OCEANIA	335	335	-0.50	273	241	-0.64	193	186	-0.88
Australia	325	324	-0.55	265	231	-0.72	193	186	-0.88
New Zealand	3	3	0.00	0	0	..	0	0	0.00
DEVELOPED COUNTRIES	**68 545**	**73 302**	**0.35**	**68 147**	**72 565**	**0.35**	**61 077**	**64 840**	**0.29**
DEVELOPING COUNTRIES	**55 791**	**77 632**	**2.38**	**56 204**	**78 418**	**2.37**	**39 855**	**60 213**	**2.94**
LEAST DEVELOPED COUNTRIES (LDC)	667	669	3.54	652	850	2.68	0	0	0.00
OECD[3]	**68 153**	**73 191**	**0.38**	**69 352**	**73 957**	**0.37**	**61 994**	**66 057**	**0.32**
BRICS	**47 478**	**67 134**	**2.47**	**46 038**	**66 113**	**2.56**	**34 743**	**53 791**	**3.15**

.. Not available

Note: Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	Average 2020-22est	2032	2023-32	Average 2020-22est	2032	2023-32
WORLD	**..**	**..**	**10 893**	**11 863**	**1.35**	**10 187**	**11 863**	**1.35**
NORTH AMERICA	..	..	2 212	3 776	5.13	5 071	6 826	2.39
Canada	6.6	12.2	1 444	3 325	6.50	90	90	-0.03
United States	9.9	11.0	768	451	-1.64	4 981	6 736	2.43
LATIN AMERICA	..	..	1 621	1 393	-0.05	2 954	2 645	-0.20
Argentina	11.1	12.0	2	5	5.22	27	34	1.75
Brazil	46.5	55.9	566	275	0.76	2 176	1 752	-0.55
Chile	..	..	49	43	0.00	1	1	0.00
Colombia	..	..	285	312	-1.59	5	3	0.29
Mexico	0.7	0.8	307	269	0.96	1	1	-0.07
Paraguay	..	..	1	1	0.12	200	268	1.82
Peru	..	..	208	198	0.00	155	141	0.00
EUROPE	..	..	2 229	1 760	-0.38	866	929	1.36
European Union[1]	6.4	8.4	1 263	813	-1.48	529	631	2.08
United Kingdom	5.6	8.0	723	718	0.92	163	160	-0.02
Russia	0.0	0.0	1	2	-1.72	93	73	-0.10
Ukraine	..	..	69	59	0.00	22	8	0.00
AFRICA	..	..	724	776	0.00	282	302	0.00
Egypt	..	..	4	1	0.00	5	2	0.00
Ethiopia	..	..	2	2	0.00	0	0	..
Nigeria	..	..	259	311	0.00	0	1	0.00
South Africa	..	..	11	11	0.00	210	237	0.00
ASIA	..	..	4 082	4 150	0.14	920	1 060	0.05
China[2]	1.7	2.5	303	438	1.68	135	93	-0.81
India	..	..	523	519	0.71	108	106	-0.29
Indonesia	..	..	39	34	0.00	65	68	0.00
Iran	..	..	3	3	0.00	6	8	0.00
Japan	2.1	2.5	1 702	1 725	-0.11	1	2	-0.01
Kazakhstan	..	..	1	1	0.00	2	3	0.00
Korea	0.0	0.0	493	435	-0.83	0	0	..
Malaysia	..	..	17	14	0.00	0	0	..
Pakistan	..	..	0	0	1.16	521	670	0.27
Philippines	..	..	475	477	0.00	0	1	0.00
Saudi Arabia	..	..	99	93	0.00	0	0	..
Thailand	..	..	32	44	4.27	14	18	-1.81
Türkiye	..	..	200	169	0.00	7	3	0.00
Viet Nam	..	..	50	55	-0.83	24	21	0.83
OCEANIA	..	..	24	7	-0.81	95	101	-0.17
Australia	1.2	1.3	22	4	-1.25	90	97	-0.18
New Zealand	0.0	0.0	2	2	0.00	4	4	0.00
DEVELOPED COUNTRIES	**..**	**..**	**6 218**	**7 315**	**2.18**	**6 249**	**8 103**	**2.15**
DEVELOPING COUNTRIES	**..**	**..**	**4 675**	**4 548**	**0.15**	**3 938**	**3 760**	**-0.13**
LEAST DEVELOPED COUNTRIES (LDC)	..	..	221	224	0.00	36	44	0.00
OECD[3]	**..**	**..**	**7 443**	**8 444**	**1.77**	**5 877**	**7 731**	**2.26**
BRICS	**..**	**..**	**1 404**	**1 244**	**1.04**	**2 722**	**2 260**	**-0.49**

.. Not available

Note: Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2023-32	Average 2020-22est	2032	2023-32
WORLD	**53 587**	**66 903**	**1.35**	**54 391**	**66 939**	**1.35**
NORTH AMERICA	10 210	16 861	2.80	11 626	17 840	2.47
Canada	388	685	5.23	446	934	7.18
United States	9 822	16 176	2.71	11 180	16 906	2.26
LATIN AMERICA	9 279	11 576	1.48	8 307	10 385	1.65
Argentina	1 792	2 247	0.55	681	1 026	1.17
Brazil	6 602	8 119	1.62	6 601	8 098	1.62
Chile	0	0	..	0	0	..
Colombia	662	862	2.35	662	862	2.35
Mexico	0	0	..	0	0	..
Paraguay	12	32	10.11	12	32	10.11
Peru	212	317	1.90	351	367	1.62
EUROPE	17 877	18 071	0.12	21 096	21 289	0.04
European Union[1]	17 271	17 328	0.04	19 409	19 649	-0.10
United Kingdom	606	744	2.25	1 435	1 412	2.25
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	16 195	20 375	1.31	13 351	17 421	1.80
China[2]	1 907	1 940	-2.01	562	728	1.96
India	189	207	0.74	162	195	0.75
Indonesia	9 418	12 385	1.52	9 277	12 103	1.48
Iran	0	0	..	0	0	..
Japan	23	22	-0.71	15	17	0.39
Kazakhstan	0	0	..	0	0	..
Korea	692	646	-1.09	669	623	-1.14
Malaysia	1 250	1 679	1.86	872	1 205	2.20
Pakistan	0	0	..	0	0	..
Philippines	201	321	2.36	201	321	2.36
Saudi Arabia	0	0	..	0	0	..
Thailand	1 620	2 279	4.88	1 594	2 229	4.65
Türkiye	0	0	..	0	0	..
Viet Nam	0	0	..	0	0	..
OCEANIA	26	19	0.59	11	4	3.13
Australia	26	19	0.59	11	4	3.14
New Zealand	0	0	..	0	0	..
DEVELOPED COUNTRIES	**28 136**	**34 973**	**1.33**	**32 749**	**39 150**	**1.07**
DEVELOPING COUNTRIES	**25 451**	**31 930**	**1.37**	**21 643**	**27 789**	**1.74**
LEAST DEVELOPED COUNTRIES (LDC)	0	0	..	0	0	..
OECD[3]	**29 490**	**36 481**	**1.30**	**34 079**	**40 635**	**1.06**
BRICS	**8 697**	**10 265**	**0.82**	**7 325**	**9 021**	**1.62**

.. Not available

Note: Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	Average 2020-22est	2032	2023-32	Average 2020-22est	2032	2023-32
WORLD	**..**	**..**	**8 147**	**7 266**	**0.52**	**6 901**	**7 266**	**0.52**
NORTH AMERICA	..	..	2 662	2 588	0.86	1 246	1 609	3.12
Canada	2.4	5.5	366	699	6.47	308	450	3.50
United States	6.5	10.0	2 296	1 889	-0.66	938	1 159	2.98
LATIN AMERICA	..	..	139	50	0.00	1 119	1 239	0.11
Argentina	8.1	10.4	0	0	..	1 105	1 218	0.05
Brazil	13.9	16.1	0	0	..	14	21	4.10
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	..	..	139	50	0.00	0	0	..
EUROPE	..	..	5 142	4 360	0.44	1 471	1 182	3.14
European Union[1]	9.8	12.5	3 776	3 250	0.11	1 186	969	3.54
United Kingdom	5.4	6.5	1 114	882	2.07	285	213	1.50
Russia	0.0	0.0	0	0	..	0	0	..
Ukraine	..	..	0	0	..	0	0	..
AFRICA	..	..	0	0	..	0	0	..
Egypt	..	..	0	0	..	0	0	..
Ethiopia	..	..	0	0	..	0	0	..
Nigeria	..	..	0	0	..	0	0	..
South Africa	..	..	0	0	..	0	0	..
ASIA	..	..	203	267	-0.99	3 050	3 221	-1.18
China[2]	0.6	0.9	200	265	-1.00	1 545	1 476	-3.39
India	..	..	1	1	0.05	28	13	0.49
Indonesia	..	..	0	0	..	144	282	3.29
Iran	..	..	0	0	..	0	0	..
Japan	0.1	0.1	1	1	-0.12	9	6	-3.16
Kazakhstan	..	..	0	0	..	0	0	..
Korea	0.0	0.0	0	0	..	24	23	0.13
Malaysia	..	..	0	0	..	379	475	1.04
Pakistan	..	..	0	0	..	0	0	..
Philippines	..	..	0	0	..	0	0	..
Saudi Arabia	..	..	0	0	..	0	0	..
Thailand	..	..	0	0	22.34	25	50	45.13
Türkiye	..	..	0	0	..	0	0	..
Viet Nam	..	..	0	0	..	0	0	..
OCEANIA	..	..	1	1	-0.08	16	16	0.00
Australia	0.1	0.0	1	1	-0.08	16	16	0.00
New Zealand	0.0	0.0	0	0	..	0	0	..
DEVELOPED COUNTRIES	**..**	**..**	**7 806**	**6 950**	**0.59**	**2 742**	**2 813**	**3.09**
DEVELOPING COUNTRIES	**..**	**..**	**341**	**316**	**-0.84**	**4 159**	**4 453**	**-0.83**
LEAST DEVELOPED COUNTRIES (LDC)	..	..	0	0	..	0	0	..
OECD[3]	**..**	**..**	**7 806**	**6 950**	**0.59**	**2 766**	**2 836**	**3.06**
BRICS	**..**	**..**	**201**	**266**	**-1.00**	**1 587**	**1 510**	**-3.29**

.. Not available

Note: Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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

		2022est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
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	32.0	33.4	34.9	36.3	37.8	39.2	40.7	42.1	43.6	45.0
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]	%	3.4	3.6	3.8	4.1	4.3	4.5	4.7	4.9	5.2	5.4	5.6
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]	%	9.5	9.9	10.2	10.6	11.0	11.5	12.0	12.4	12.9	13.4	13.9
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	20.2
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	20.0	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	75 423	79 452	81 832	80 973	81 438	82 444	82 940	83 448	83 967	84 497	85 094
advanced mandate	mln L	20 221	24 358	26 794	25 990	26 510	27 571	28 122	28 685	29 258	29 843	30 440
cellulosic ethanol	mln L	2 012	2 172	2 172	2 172	2 172	2 172	2 172	2 172	2 172	2 172	2 172
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	26.40	26.40	26.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: 2022est: Data for 2022 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.
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 (2023), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

ANNEX C

Table C.43.1. Cotton projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**25 100**	**28 154**	**0.14**	**1.83**	**9 895**	**11 422**	**2.14**	**2.34**	**9 664**	**11 191**	**1.79**	**2.39**
NORTH AMERICA	3 307	4 190	1.15	2.59	1	1	0.32	0.77	2 959	3 645	3.07	2.92
Canada	0	0	..	..	0	0	..	..	0	0	..	..
United States	3 307	4 190	1.15	2.59	1	1	17.92	1.01	2 959	3 645	3.07	2.92
LATIN AMERICA	3 036	4 317	6.07	3.35	327	360	-3.81	0.40	2 290	3 291	16.42	3.91
Argentina	348	365	5.03	0.73	0	0	-70.99	..	151	187	15.60	0.73
Brazil	2 405	3 611	7.04	3.93	3	3	-24.35	0.04	2 027	2 975	16.55	4.27
Chile	0	0	..	..	0	0	..	..	0	0	..	..
Colombia	17	16	-2.70	0.00	13	11	-11.32	0.00	0	0	-71.94	..
Mexico	232	292	2.11	0.92	190	205	-3.16	0.02	106	123	18.56	1.46
Paraguay	4	4	-3.79	1.81	2	2	13.08	-0.69	5	5	4.80	0.69
Peru	19	18	-4.47	1.06	43	42	-3.01	-0.97	1	0	-8.34	..
EUROPE	283	295	-1.18	0.25	289	310	-5.02	0.25	401	421	-2.25	-0.06
European Union[1]	282	294	-1.19	0.25	251	270	-4.02	0.24	399	419	-2.25	-0.06
United Kingdom	0	0	..	..	0	0	..	..	0	0	..	..
Russia	0	0	..	..	27	27	-11.23	0.00	1	1	-4.64	0.00
Ukraine	0	0	..	..	1	1	-10.12	2.12	0	0	..	..
AFRICA	1 930	1 937	4.03	1.36	130	160	-2.97	1.66	1 644	1 645	3.86	1.59
Egypt	66	76	-0.99	1.01	92	115	1.24	2.72	68	42	13.25	-2.65
Ethiopia	62	78	3.78	3.75	0	2	17.53	48.14	2	0	-29.60	..
Nigeria	92	93	6.34	0.00	1	1	0.00	0.00	55	65	3.86	0.00
South Africa	14	13	4.05	1.10	13	13	-5.15	-2.01	16	9	12.14	2.05
ASIA	15 589	16 591	-1.47	1.47	9 146	10 590	2.82	2.49	1 566	1 368	-8.27	1.64
China[2]	5 890	6 114	-0.70	0.58	2 163	2 006	1.49	1.30	19	27	6.67	-0.27
India	6 224	6 977	-1.20	2.49	259	91	1.83	-4.51	878	957	-8.48	4.73
Indonesia	3	2	-9.19	1.37	538	767	-2.90	2.96	1	1	-19.81	-2.87
Iran	80	85	3.88	0.90	86	103	5.59	1.50	0	0	..	..
Japan	0	0	..	..	38	37	-7.04	-0.33	0	0	..	..
Kazakhstan	80	74	4.05	1.35	0	0	..	..	62	56	4.75	2.52
Korea	0	0	..	..	133	151	-9.40	0.74	1	1	-20.98	0.00
Malaysia	0	0	..	..	140	169	8.49	1.40	55	47	10.60	-1.38
Pakistan	1 025	1 042	-8.56	1.59	1 081	1 598	19.88	3.19	11	10	-23.24	-0.56
Philippines	0	0	..	..	7	11	-4.01	3.06	0	0	..	..
Saudi Arabia	0	0	..	..	0	0	..	..	0	0	..	..
Thailand	2	1	3.12	1.07	140	197	-9.85	1.82	0	0	..	..
Türkiye	819	940	3.16	1.66	1 395	1 324	5.13	1.69	160	146	17.06	-1.67
Viet Nam	2	2	-0.05	1.29	1 519	2 016	8.13	3.54	0	0	..	..
OCEANIA	956	825	1.73	0.05	1	1	-0.05	0.00	805	821	-0.63	-0.58
Australia	955	824	1.73	0.05	0	0	..	..	804	820	-0.63	-0.58
New Zealand	1	1	0.00	0.00	1	1	0.00	0.00	1	1	0.00	0.00
DEVELOPED COUNTRIES	**5 865**	**6 518**	**0.69**	**1.72**	**346**	**367**	**-5.19**	**0.12**	**4 580**	**5 046**	**-0.29**	**1.63**
DEVELOPING COUNTRIES	**19 235**	**21 636**	**-0.01**	**1.87**	**9 549**	**11 055**	**2.50**	**2.42**	**5 084**	**6 145**	**4.14**	**3.07**
LEAST DEVELOPED COUNTRIES (LDC)	1 486	1 493	3.55	1.30	1 560	2 024	3.04	3.54	1 144	1 185	3.99	1.68
OECD[3]	**5 621**	**6 563**	**1.54**	**1.90**	**2 024**	**2 001**	**0.58**	**1.18**	**4 438**	**5 162**	**2.51**	**1.82**
BRICS	**14 533**	**16 716**	**0.17**	**2.02**	**2 464**	**2 139**	**0.57**	**0.93**	**2 942**	**3 968**	**3.86**	**4.33**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32
WORLD	**24 396**	**28 078**	**0.09**	**1.80**
NORTH AMERICA	**517**	**521**	**-6.11**	**0.90**
Canada	0	0	..	..
United States	517	521	-6.11	0.90
LATIN AMERICA	**1 294**	**1 327**	**-2.25**	**0.41**
Argentina	110	112	-2.16	0.18
Brazil	685	647	-1.65	0.32
Chile	0	0	..	..
Colombia	27	27	-8.51	0.00
Mexico	321	373	-2.94	0.23
Paraguay	1	1	-11.36	2.60
Peru	65	60	-3.01	0.02
EUROPE	**159**	**184**	**-6.30**	**1.35**
European Union[1]	129	145	-4.23	0.93
United Kingdom	0	0	..	..
Russia	18	25	-14.80	4.03
Ukraine	1	1	-10.25	2.35
AFRICA	**339**	**416**	**-1.06**	**2.60**
Egypt	113	149	-1.65	3.88
Ethiopia	56	78	2.45	3.88
Nigeria	30	30	5.29	0.00
South Africa	19	18	-2.15	0.22
ASIA	**22 084**	**25 628**	**0.52**	**1.89**
China[2]	7 616	7 993	0.01	0.69
India	5 336	6 102	0.21	2.01
Indonesia	519	762	-3.56	3.18
Iran	153	186	3.47	1.79
Japan	39	37	-7.25	-0.28
Kazakhstan	16	17	1.21	1.88
Korea	133	151	-9.47	0.78
Malaysia	84	121	9.52	2.85
Pakistan	2 171	2 609	-1.26	2.73
Philippines	7	10	-3.35	3.66
Saudi Arabia	0	0	..	..
Thailand	157	199	-8.78	1.89
Türkiye	1 614	2 103	1.61	1.88
Viet Nam	1 533	2 009	8.76	3.64
OCEANIA	**3**	**3**	**-14.02**	**0.01**
Australia	2	2	-17.91	0.02
New Zealand	1	1	0.00	0.00
DEVELOPED COUNTRIES	**1 603**	**1 795**	**-0.59**	**1.70**
DEVELOPING COUNTRIES	**22 793**	**26 283**	**0.14**	**1.81**
LEAST DEVELOPED COUNTRIES (LDC)	**1 837**	**2 303**	**2.63**	**3.30**
OECD[3]	**2 784**	**3 359**	**-2.00**	**1.40**
BRICS	**13 674**	**14 786**	**-0.06**	**1.20**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2020-22est: Data for 2022 are estimated.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
ARGENTINA												
Export tax equivalent of export barriers	%	0.0	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	7 168.3	11 079.0	11 079.0	11 079.0	11 079.0	11 079.0	11 079.0	11 079.0	11 079.0	11 079.0	11 079.0
Tariff equivalent of import barriers	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
RUSSIA												
Tariff equivalent of import barriers	%	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNITED STATES												
Economic Adjustment Assistance payment level	USD/t	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 2020-22est: Data for 2022 are estimated.
Source: OECD/FAO (2023), “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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**251 088**	**295 913**	**2.23**	**1.68**	**15.7**	**17.2**	**0.63**	**1.02**
NORTH AMERICA	5 706	5 968	1.23	0.33	12.6	12.5	0.92	-0.22
Canada	971	1 016	0.44	0.40	17.1	16.7	1.89	-0.50
United States	4 735	4 952	1.40	0.31	12.1	12.0	0.76	-0.19
LATIN AMERICA	14 084	15 040	0.02	0.84	11.6	12.1	-0.17	0.49
Argentina	638	709	1.62	0.93	9.2	9.0	0.28	-0.28
Brazil	5 703	5 249	-2.99	-0.51	11.0	10.6	-3.38	-0.18
Chile	298	320	3.00	0.68	12.8	14.2	2.03	0.77
Colombia	1 448	1 737	2.42	2.20	20.9	23.4	1.22	1.25
Mexico	406	447	0.40	0.92	3.4	3.5	-0.12	0.31
Paraguay	1 080	1 347	3.00	1.98	38.6	39.8	0.05	0.03
Peru	1 799	2 013	3.00	1.59	32.9	33.9	2.32	0.50
EUROPE	28 028	29 493	1.54	0.41	14.6	14.8	-1.26	0.12
European Union[1]	11 990	12 298	0.57	-0.01	8.7	8.0	-4.88	-0.86
United Kingdom	1 184	1 297	0.50	0.86	22.0	22.9	1.37	0.34
Russia	7 653	8 261	3.00	0.48	25.4	27.2	1.68	0.50
Ukraine	5 641	6 109	3.00	1.10	27.9	32.7	1.47	2.21
AFRICA	100 232	127 761	2.81	2.65	39.3	41.1	0.44	0.87
Egypt	1 241	1 615	3.00	2.33	6.7	7.5	0.99	0.91
Ethiopia	2 638	3 408	3.00	2.89	17.8	18.2	-0.21	0.81
Nigeria	34 528	45 225	3.00	3.04	67.9	76.7	0.60	2.28
South Africa	513	503	1.59	0.44	4.9	4.7	-0.48	-0.23
ASIA	101 947	116 443	2.28	1.22	9.8	10.1	0.41	0.35
China[2]	44 981	47 098	1.69	0.29	15.4	15.4	0.03	0.00
India	14 615	17 318	3.00	2.11	6.4	6.9	0.95	1.38
Indonesia	10 154	11 835	2.84	1.23	16.9	18.3	1.98	0.33
Iran	995	1 102	1.00	0.88	9.0	9.2	-0.47	0.11
Japan	706	683	-1.81	-0.14	6.2	6.2	-0.72	0.06
Kazakhstan	847	1 092	3.00	2.28	20.4	23.0	1.09	0.97
Korea	281	294	2.49	0.20	5.5	6.3	2.79	0.85
Malaysia	42	38	3.00	0.31	3.1	3.5	1.78	1.16
Pakistan	1 121	1 302	3.00	2.15	3.0	3.1	0.75	1.02
Philippines	1 134	1 445	2.91	2.12	8.4	9.6	1.52	1.00
Saudi Arabia	77	90	-0.66	2.26	4.0	4.4	1.11	0.69
Thailand	11 626	14 849	3.00	2.13	4.9	5.7	1.17	1.37
Türkiye	740	748	-0.81	0.80	5.5	5.1	-2.53	-0.38
Viet Nam	4 367	5 465	3.33	1.99	3.2	3.5	0.45	0.62
OCEANIA	1 091	1 208	0.56	1.38	20.0	19.4	-1.28	0.12
Australia	243	264	-1.10	1.00	9.6	8.9	-2.10	-0.60
New Zealand	145	151	2.73	0.50	11.1	10.8	-1.15	0.01
DEVELOPED COUNTRIES	**37 891**	**40 175**	**1.44**	**0.49**	**12.6**	**12.7**	**-0.66**	**0.00**
DEVELOPING COUNTRIES	**213 197**	**255 738**	**2.38**	**1.88**	**16.4**	**18.1**	**0.85**	**1.14**
LEAST DEVELOPED COUNTRIES (LDC)	51 025	65 896	2.82	2.58	32.9	34.9	0.80	0.53
OECD[3]	**23 411**	**24 484**	**0.73**	**0.33**	**9.9**	**9.8**	**-1.23**	**-0.10**
BRICS	**73 465**	**78 430**	**1.63**	**0.63**	**11.5**	**11.5**	**-0.01**	**0.18**

Note: Calendar year. Average 2020-22est: Data for 2022 are estimated. Production and consumption are expressed on dry weight basis.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**91 540**	**120 551**	**1.71**	**2.34**	**6.9**	**8.6**	**-0.34**	**1.88**
NORTH AMERICA	10 432	14 519	0.95	2.13	3.4	4.3	-4.38	2.09
Canada	7 819	11 053	1.24	2.00	10.3	11.7	3.44	1.00
United States	2 613	3 466	0.13	2.58	2.7	3.4	-6.65	2.47
LATIN AMERICA	7 212	7 944	-0.25	1.18	9.5	9.7	-1.45	0.33
Argentina	904	1 093	7.43	1.61	3.7	4.2	4.94	1.10
Brazil	2 853	3 010	-1.65	0.72	12.1	12.5	-3.08	0.51
Chile	70	59	5.78	-0.74	3.3	3.6	1.35	0.45
Colombia	228	268	0.69	2.48	6.9	7.1	4.85	-0.01
Mexico	1 320	1 577	-2.25	1.80	9.4	9.4	-2.71	0.00
Paraguay	93	107	2.61	1.78	9.9	10.2	1.61	0.77
Peru	273	297	0.44	1.38	8.0	8.4	0.21	0.36
EUROPE	10 209	13 452	4.06	2.53	3.4	4.7	2.40	3.13
European Union[1]	4 344	6 461	4.00	3.89	3.8	5.7	2.67	3.97
United Kingdom	995	1 145	5.11	1.10	3.3	3.4	0.63	0.10
Russia	3 549	4 432	4.98	1.74	2.5	2.9	2.53	1.29
Ukraine	773	798	5.98	0.49	1.8	2.3	2.58	1.99
AFRICA	22 144	28 589	1.70	2.62	10.5	11.4	-1.66	0.77
Egypt	281	268	0.23	0.22	2.8	2.8	-8.12	0.49
Ethiopia	2 960	3 291	-0.40	1.89	20.0	21.1	-2.38	0.89
Nigeria	3 870	4 764	1.03	2.21	10.5	10.1	-0.86	0.02
South Africa	88	111	0.22	2.32	0.9	0.9	-8.70	-0.28
ASIA	39 001	53 142	2.03	2.43	6.3	8.4	0.20	2.29
China[2]	5 333	5 918	2.68	0.75	1.6	1.8	3.14	0.74
India	22 837	33 884	2.90	3.03	13.6	19.1	-0.53	2.61
Indonesia	155	155	-7.17	0.24	0.6	0.6	-7.05	0.84
Iran	408	366	-6.67	-0.68	4.5	4.3	-3.89	-0.09
Japan	122	122	-0.49	0.23	1.4	1.6	-1.78	1.08
Kazakhstan	643	924	28.18	3.80	9.2	9.3	28.67	-0.05
Korea	15	23	-3.95	4.92	1.2	1.3	-0.97	0.16
Malaysia	0	0	..	..	2.2	2.2	-2.56	0.10
Pakistan	775	837	-0.53	0.43	4.7	5.2	0.49	0.94
Philippines	57	59	-2.70	0.81	1.0	1.1	-2.45	1.09
Saudi Arabia	18	18	2.96	1.01	4.9	4.8	-0.48	-0.08
Thailand	209	238	-0.63	0.94	2.4	2.6	-1.35	0.44
Türkiye	1 375	1 538	2.16	1.26	11.1	11.3	-0.40	0.14
Viet Nam	339	393	0.87	1.43	3.3	4.3	4.61	2.21
OCEANIA	2 542	2 905	-0.55	1.42	1.6	1.7	1.38	0.30
Australia	2 508	2 869	-0.48	1.43	1.5	1.6	10.39	0.29
New Zealand	20	21	-5.01	0.75	2.5	2.7	-6.10	1.11
DEVELOPED COUNTRIES	**24 683**	**32 847**	**2.46**	**2.27**	**3.0**	**3.9**	**-0.22**	**2.47**
DEVELOPING COUNTRIES	**66 857**	**87 705**	**1.50**	**2.36**	**7.7**	**9.6**	**-0.45**	**1.74**
LEAST DEVELOPED COUNTRIES (LDC)	17 050	23 504	1.38	2.88	10.7	12.5	-0.30	1.26
OECD[3]	**21 487**	**28 661**	**1.24**	**2.30**	**4.4**	**5.3**	**-0.65**	**1.82**
BRICS	**34 659**	**47 356**	**2.59**	**2.43**	**7.5**	**10.4**	**-0.29**	**2.60**

.. Not available

Note: Calendar year. Average 2020-22est: Data for 2022 are estimated. Production and consumption are expressed on dry weight basis.

1. Refers to all current European Union member States.
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 (2023), "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 2020-22est	2032	2013-22	2023-32	Average 2020-22est	2032	2013-22	2023-32
WORLD	**92 549**	**103 016**	**3.01**	**1.12**	**10.8**	**11.3**	**1.90**	**0.33**
NORTH AMERICA	6 349	7 223	1.75	0.93	15.9	17.1	1.26	0.45
Canada	629	716	3.89	0.80	16.3	16.6	3.53	-0.07
United States	5 720	6 507	1.53	0.94	15.9	17.2	1.02	0.51
LATIN AMERICA	10 227	11 268	3.23	1.00	14.0	14.9	2.50	0.36
Argentina	888	954	3.04	0.65	17.7	17.9	2.23	0.08
Brazil	2 938	3 314	4.12	0.91	12.8	13.7	3.30	0.46
Chile	235	224	1.21	0.75	9.8	10.9	0.18	0.56
Colombia	1 013	1 029	5.34	1.04	15.2	17.4	4.10	0.64
Mexico	3 098	3 470	2.66	0.91	23.4	24.4	2.34	0.25
Paraguay	115	140	-1.11	1.72	15.7	17.2	-2.10	0.68
Peru	513	555	5.06	1.24	11.3	12.6	3.95	0.65
EUROPE	11 473	12 146	0.94	0.46	14.8	15.8	0.94	0.56
European Union[1]	6 365	6 685	1.01	0.37	13.7	14.4	1.04	0.41
United Kingdom	986	1 114	2.27	0.48	16.0	16.5	0.97	0.05
Russia	2 649	2 668	1.75	-0.02	18.1	18.8	1.25	0.28
Ukraine	911	1 071	-2.22	1.85	17.2	22.6	-0.22	2.92
AFRICA	3 603	4 101	1.46	2.00	2.1	2.1	-1.26	-0.08
Egypt	442	526	0.82	2.55	3.1	3.5	-1.99	1.48
Ethiopia	51	74	1.76	4.78	0.3	0.4	-0.55	2.68
Nigeria	645	770	-0.14	1.86	2.7	2.6	-2.72	-0.42
South Africa	601	560	3.41	0.51	7.4	7.3	2.19	-0.41
ASIA	60 566	67 879	3.67	1.24	11.8	12.9	2.69	0.73
China[2]	34 442	36 438	2.20	0.53	23.1	24.7	2.06	0.66
India	6 493	8 807	6.98	3.11	3.8	5.2	5.69	2.62
Indonesia	5 567	6 801	19.72	2.72	16.2	21.3	19.03	2.03
Iran	733	761	-1.31	0.77	8.1	7.8	-2.49	-0.06
Japan	2 655	2 568	0.80	-0.42	20.7	21.3	0.34	0.16
Kazakhstan	261	259	1.42	0.74	7.4	8.1	-1.47	0.27
Korea	790	854	2.19	0.38	12.7	13.9	0.66	0.52
Malaysia	847	969	1.45	1.38	17.7	20.4	-0.37	0.82
Pakistan	988	1 252	5.08	2.19	3.6	4.1	3.14	0.77
Philippines	679	904	5.36	2.97	5.2	6.5	3.94	2.13
Saudi Arabia	362	369	5.34	0.62	8.7	8.4	7.20	-0.41
Thailand	1 119	1 167	0.18	1.24	12.2	14.6	-0.09	1.42
Türkiye	1 274	1 300	2.78	0.47	9.5	10.1	2.17	0.12
Viet Nam	472	769	1.65	5.04	4.1	6.8	0.79	4.85
OCEANIA	331	398	1.11	1.40	7.6	8.1	-0.35	0.29
Australia	245	295	0.73	1.41	9.5	10.3	-0.58	0.47
New Zealand	69	85	2.43	1.36	12.8	14.4	0.94	0.67
DEVELOPED COUNTRIES	**22 564**	**24 131**	**1.36**	**0.55**	**14.6**	**15.5**	**0.86**	**0.39**
DEVELOPING COUNTRIES	**69 985**	**78 886**	**3.60**	**1.31**	**9.9**	**10.4**	**2.37**	**0.38**
LEAST DEVELOPED COUNTRIES (LDC)	2 258	2 999	4.50	3.20	2.0	2.4	1.73	1.34
OECD[3]	**23 372**	**25 172**	**1.77**	**0.58**	**15.5**	**16.4**	**1.24**	**0.36**
BRICS	**47 123**	**51 787**	**2.87**	**0.92**	**13.6**	**14.5**	**2.25**	**0.60**

Note: Calendar year. Average 2020-22est: Data for 2022 are estimated. Production and consumption are expressed on dry weight basis.

1. Refers to all current European Union member States.
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 (2023), "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)[2]		Expenditure share of food		Food contribution to total change in inflation[3]	
	2022	2023	2022	2023	2022	2023	2022	2023
OECD								
Australia[1]	5.1	..	4.8	..	12.8	12.8	0.6	..
Austria	5.0	11.2	4.9	17.0	12.0	12.0	0.6	2.0
Belgium	7.6	8.0	2.4	16.4	17.4	17.4	0.4	2.9
Canada	5.1	5.9	6.5	11.4	11.5	11.5	0.7	1.3
Chile	7.7	12.3	6.0	23.9	18.9	18.9	1.1	4.5
Colombia	6.9	13.3	19.9	26.2	34.7	34.7	1.3	8.7
Czech Republic	9.9	17.5	5.4	24.8	17.0	17.0	3.4	4.5
Denmark	4.3	7.7	4.0	14.5	11.5	11.5	0.6	2.9
Estonia	11.3	18.6	9.3	27.4	21.7	21.7	0.9	3.1
Finland	4.4	8.4	3.2	15.4	13.4	13.4	1.2	3.7
France	2.9	6.0	1.7	14.2	14.7	14.7	0.5	2.3
Germany	4.2	8.7	4.9	19.2	10.4	10.4	0.2	1.5
Greece	6.2	7.0	5.2	15.4	17.1	17.1	0.8	3.3
Hungary	7.9	25.7	10.1	46.9	19.6	19.6	1.0	3.0
Iceland	5.7	9.9	3.5	10.8	14.9	14.9	1.5	7.0
Ireland	5.0	7.8	2.1	12.8	11.7	11.7	0.4	1.3
Israel	3.1	5.4	4.2	4.9	14.3	14.3	0.3	1.8
Italy	4.8	10.0	3.6	12.6	16.3	16.3	0.7	0.8
Japan	0.5	4.3	2.4	7.5	19.0	19.0	0.7	2.4
Korea	3.6	5.2	5.5	5.8	14.4	14.4	0.3	1.1
Luxembourg	3.6	4.8	2.8	11.8	11.1	11.1	0.6	0.6
Mexico	7.1	7.9	11.9	12.8	18.9	18.9	0.5	2.2
Netherlands	6.4	7.6	4.4	17.3	11.3	11.3	1.3	1.4
New Zealand[1]	6.9	..	7.4	..	17.4	17.4	0.8	..
Norway	3.2	7.0	-1.6	12.0	13.3	13.3	-0.2	1.6
Poland	8.7	11.7	9.3	12.7	27.0	27.0	-0.4	3.2
Portugal	3.3	8.4	3.7	20.6	18.1	18.1	1.7	2.3
Slovak Republic	8.4	15.2	8.1	27.5	18.4	18.4	0.7	3.8
Slovenia	5.8	10.0	4.6	19.3	17.0	17.0	1.4	4.7
Spain	6.1	5.9	4.8	15.4	18.2	18.2	0.8	3.5
Sweden	3.7	11.7	1.9	19.6	13.9	13.9	0.7	2.1
Switzerland	1.6	3.3	-1.5	5.6	10.8	10.8	0.2	2.1
Türkiye	48.7	57.7	55.6	71.0	25.0	25.0	-0.4	1.4
United Kingdom	4.9	8.8	4.4	16.8	11.8	11.8	6.6	8.4
United States	7.5	6.4	7.3	11.4	7.8	7.8	0.3	1.3
OECD Total	7.2	9.2	7.6	15.2	..	..	..	..
Enhanced Engagement								
Brazil	10.4	5.8	8.0	11.7	22.5	22.5	1.3	3.1
China	0.9	2.1	-3.8	6.2	33.6	33.6	2.7	3.9
India	2.2	5.3	5.4	5.9	35.4	35.4	2.7	5.4
Indonesia	5.8	6.2	3.5	3.5	19.6	19.6	0.7	0.7
Russia	8.7	11.8	12.7	10.2	32.8	32.8	4.2	3.3
South Africa	5.7	7.2	5.7	13.6	18.3	18.3	1.0	2.5

Table C.48. Information on food price changes *(cont.)*

	Total inflation % change (year-on-year)		Food inflation % change (year-on-year)[2]		Expenditure share of food		Food contribution to total change in inflation[3]	
	2022	2023	2022	2023	2022	2023	2022	2023
Non OECD								
Algeria	9.0	9.3	13.3	13.7	43.1	43.1	-1.6	2.7
Bangladesh	5.9	8.6	5.6	7.8	28.6	28.6	3.8	3.9
Bolivia	0.7	3.1	0.5	6.8	27.1	27.1	1.5	2.1
Botswana	10.6	9.3	7.0	7.1	13.6	13.6	0.1	0.9
Bulgaria	4.1	16.7	3.7	25.0	37.2	37.2	2.6	2.6
Costa Rica	3.5	7.7	3.2	18.5	21.4	21.4	0.7	4.0
Dominican Republic	8.5	6.6	9.3	11.4	29.2	29.2	2.7	3.3
Ecuador	2.6	3.6	0.5	5.6	23.0	23.0	0.1	1.3
Egypt	7.3	25.8	12.5	48.0	32.7	32.7	4.1	15.7
El Salvador	6.5	7.0	4.5	13.7	26.0	26.0	1.2	3.6
Ethiopia	34.5	33.9	39.9	36.2	57.0	57.0	22.7	20.6
Ghana	13.9	53.6	13.7	47.9	56.9	56.9	7.8	27.3
Guatelama	2.9	3.2	3.1	13.3	28.6	28.6	0.9	3.8
Haiti	24.0	24.0	25.0	25.5	48.8	48.8	12.2	12.4
Honduras	6.2	8.9	7.5	16.1	31.8	31.8	2.4	5.1
Iraq	5.3	7.1	8.4	9.6	35.0	35.0	2.9	3.4
Jordan	2.5	3.7	4.0	-0.4	35.2	35.2	1.4	-0.1
Kenya	5.4	9.0	8.9	12.8	36.0	36.0	3.2	4.6
Madagascar	5.9	11.4	7.3	14.0	60.0	60.0	4.4	8.4
Malawi	12.1	25.4	14.2	31.3	50.0	50.0	7.1	15.7
Malaysia	2.3	3.7	3.6	6.7	56.3	56.3	2.0	3.8
Moldavia	16.6	27.3	21.1	28.6	37.0	37.0	7.8	10.6
Morocco	4.3	8.9	4.2	17.4	40.4	40.4	1.7	7.0
New Caledonia	2.3	4.3	3.3	9.4	21.0	21.0	3.3	4.3
Nicaragua	7.7	10.9	10.3	15.7	26.1	26.1	2.7	4.1
Niger	5.3	2.0	11.1	1.3	47.0	47.0	5.2	0.6
Nigeria	15.6	21.8	17.1	24.3	51.8	51.8	8.9	12.6
Pakistan	13.0	27.6	12.5	42.9	37.5	37.5	4.7	16.1
Panama	3.0	2.1	2.2	5.2	33.6	33.6	0.7	1.7
Paraguay	7.9	7.8	5.8	7.7	39.1	39.1	2.3	3.0
Peru	5.7	8.9	8.0	15.9	25.0	25.0	2.0	4.0
Philippines	3.0	8.6	6.4	12.1	39.0	39.0	2.5	4.7
Romania	8.4	15.1	7.2	22.5	37.4	37.4	2.7	8.4
Rwanda	1.3	31.1	1.0	57.3	39.0	39.0	0.4	22.3
Senegal	5.5	10.5	9.1	13.7	53.4	53.4	4.9	7.3
Singapore	2.6	6.6	4.0	8.1	21.7	21.7	0.9	1.8
Sri Lanka	14.2	53.2	25.0	53.6	41.0	41.0	10.3	22.0
Chinese Taipei	2.8	2.7	3.8	4.8	27.0	27.0	1.0	1.3
Tanzania	4.0	4.9	6.3	5.9	28.2	28.2	1.8	1.7
Thailand	3.2	5.0	2.4	7.7	40.0	40.0	1.0	3.1
Tunisia	6.7	10.4	7.6	15.6	28.7	28.7	2.2	4.5
Uganda	2.7	10.4	5.3	22.7	27.2	27.2	1.4	6.2
Zambia	15.1	9.4	16.0	11.6	52.5	52.5	8.4	6.1

.. Not available

1. No data available for January 2023 in Australia and New Zealand.
2. CPI food: definition based on national sources.
3. Contribution is food inflation multiplied by expenditure share, expressed in %.

Source: OECD and national sources.

OECD-FAO Agricultural Outlook 2023-2032

The *OECD-FAO Agricultural Outlook 2023-2032* 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. Recent surges in agricultural input prices experienced over the last two years have raised concerns about global food security. This year's *Outlook* demonstrates that rising fertiliser costs can lead to higher food prices. A new feature of the OECD-FAO Aglink-Cosimo model allows the impact of changing costs of the main mineral fertilisers to be analysed separately from costs of other production inputs. Based on this new feature, a scenario analysis estimates that for each 1% increase in fertiliser prices, agricultural commodity prices would increase by 0.2%. Global food consumption – the main use of agricultural commodities – is projected to increase by 1.3% per year over the next decade, a slower pace than the previous decade due to the foreseen slowdown in population and per capita income growth. This year's *Outlook* also provides improved estimates for food consumption by incorporating for the first time calculation methods to estimate food loss and waste.

This report is a collaborative effort between the Organisation for Economic Co-operation and Development (OECD) and the Food and Agriculture Organization of the United Nations (FAO), prepared with inputs from Member countries and international commodity organisations. It highlights fundamental economic and social trends that drive the global agri-food sector, assuming there are no major changes to weather conditions or policies.

More information can be found at www.agri-outlook.org.

PRINT ISBN 978-92-64-61933-3
PDF ISBN 978-92-64-45854-3

9 789264 619333