OECD-FAO Agricultural Outlook 2021-2030

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Food and Agriculture Organization of the United Nations

OECD-FAO Agricultural Outlook 2021-2030

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Foreword

This year's *OECD-FAO Agricultural Outlook* comes at a critical juncture. The COVID-19 pandemic has placed unprecedented stress on the agricultural sector, requiring swift action to ensure the sector can remain resilient, efficient and sustainable, now and over the longer term. The 2021 UN Food Systems Summit in New York will be an excellent opportunity for the international community to chart a future vision for the agri-food systems, including to meet the Sustainable Development Goals (SDGs). With less than ten years until the 2030 target for achieving the SDGs, policy-makers need to reflect on the factors and forces driving performance in the agri-food systems. It is against this background that the 2021 *OECD-FAO Agricultural Outlook* identifies and analyses the drivers of performance in the agri-food markets over 2021-2030.

The annual *OECD-FAO Agricultural Outlook* provides decision makers with reliable information on future trends for agriculture and food and the factors driving global demand, supply, trade and prices. It provides a comprehensive medium-term baseline scenario for the expected evolution of agricultural commodity, fish and biofuel markets at national, regional and global levels. This baseline scenario represents the considered views of global experts from national governments and international commodity organisations around the world.

The *Outlook* suggests that some progress towards the SDGs will be made, assuming a fast recovery from the global COVID-19 pandemic and stable weather conditions and policy environments, although the past year of disruptions from COVID-19 has moved us further away from achieving the SDG targets. Without additional efforts, the Zero Hunger goal will be missed and greenhouse gas (GHG) emissions from agriculture will increase further.

Over the coming decade, diets in low-income countries are projected to remain largely based on staples, and ensuring food security for a growing population will remain a key challenge. Consumers in middle and high-income countries will consume higher shares of fats and animal products in their diets, underscoring the need for additional efforts to promote a transition towards healthier diets, as recommended by the WHO and FAO and as encouraged through FAO's Hand in Hand initiative. At this year's UN Food Systems Summit, we must all work together to transform the way the world produces, consumes and thinks about food. An agri-food systems transformation is urgently needed.

Productivity improvements are expected to account for most of the projected growth in agricultural production needed to feed a growing global population sustainably. However, these improvements will not happen without continuing investments in infrastructure and R&D, and an important acceleration on innovations in digitalisation, technology, better data, and on human capital

These investments are also critical for limiting the environmental impact of agriculture, enabling sustainable yield increases, and allowing production to be driven by productivity growth rather than expansion of agricultural land. While the carbon intensity of agricultural production is expected to decline further over the next ten years, more is needed for the sector to effectively contribute to the global reduction in GHG emissions targeted in the Paris Agreement. This again underscores the need for investments in, and the global implementation of, innovative solutions to improve the environmental sustainability of the agricultural sector.

Making these investments will be challenging, as projected productivity gains and slowing demand growth are expected to keep the baseline real prices of basic agricultural commodities flat over the medium-term to 2030. These medium-term price projections are subject to uncertainty, and they do not remove the reality of short-term price spikes and volatility – as evidenced by the current surge in global food commodity prices. The Agricultural Market Information System (AMIS) and FAO's *Food Outlook* both provide timely insights into current market developments and also form the basis of the medium-term outlook.

Lastly, trade will continue to be critical for food security, nutrition, farm incomes and tackling rural poverty. COVID-19 has underscored the importance of a fair, equitable, open, transparent and rules-based international trading system for the food security and well-being of populations in both exporting and importing countries. The COVID-related disruptions to transport and logistics highlighted the importance of intra-regional trade in agri-food products, particularly in Africa. And COVID-19 has again demonstrated that trade restrictions are counterproductive, undermining confidence in global markets and ultimately threatening global food security.

While policy makers are understandably focused on overcoming the immediate COVID-19-related challenges, decisions made now will shape the future of the agriculture sector. There is thus a unique opportunity at this juncture to "build back better", and to set the sector on a path of sustainability, efficiency and resilience. The *OECD-FAO Agricultural Outlook* provides insights and evidence to support countries as they shape the sector to be ready to navigate risks and seize new opportunities over the next ten years and, thus, contribute to achieving the SDGs.

Mathias Cormann
Secretary-General
Organisation for Economic
Co-operation and Development

QU Dongyu
Director-General
Food and Agriculture Organization
of the United Nations

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

At the OECD, the baseline projections and *Outlook* report were prepared by members of the Trade and Agriculture Directorate: Marcel Adenäuer, Annelies Deuss, Armelle Elasri (publication co-ordinator), Clara Frezal, Hubertus Gay (*Outlook* co-ordinator), Gaëlle Gouarin, Lee Ann Jackson (Head of Division), Tatsuji Koizumi, Claude Nenert, Daniela Rodriguez Niño, and Grégoire Tallard of the Agro-Food Trade and Markets Division, and for fish and seafood by Claire Delpeuch and Will Symes of the Agricultural Resources Policy Division. The OECD Secretariat is grateful for the contributions provided by the visiting expert Tamara Persaud (Agriculture & Agri-Food Canada). 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 Helia Mossavar-Rahmani and Michèle Patterson. Technical assistance in the preparation of the *Outlook* database was provided by Eric Espinasse, Karine Lepron, Samuel Pinto Ribeiro, and Marc Regnier. Many other colleagues in the OECD Secretariat and member country delegations provided useful comments on earlier drafts of the report.

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The complete *Agricultural Outlook*, including the fully documented *Outlook* database that includes historical data and projections, can be accessed through the OECD-FAO joint internet site www.agri-outlook.org.

The published *Agricultural Outlook 2021-2030* is available in the OECD's iLibrary and FAO Document Repository.

Table of contents

Tables

Figures

Boxes

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Abbreviations and acronyms

AfCFTA	African Continental Free Trade Area
AFOLU	Agriculture, Forestry and Other Land Use
AMIS	Agricultural Market Information System
ASF	African Swine Fever
bln	Billion
bln L	Billion litres
BRICS	Emerging economies of Brazil, Russian Federation, India, China and South Africa
bln t	Billion metric tonnes
CAP	Common Agricultural Policy (European Union)
CETA	Comprehensive Economic and Trade Agreement
CIF	Cost, insurance and freight
CPI	Consumer Price Index
COP21	21st Conference of the Parties to the 1992 United Nations Framework Convention on Climate Change
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
EBA	Everything-But-Arms Initiative (European Union)
EISA	Energy Independence and Security Act of 2007 (United States)
El Niño	Climatic condition associated with the temperature of major sea currents
EPA	US Environmental Protection Agency
EPAs	Economic Partnership Agreements
ERS	Economic Research Service of the US Department for Agriculture
est	Estimate
EU	European Union, except the United Kingdom
EVs	Electric vehicles
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign direct investment
FFV	Flex-fuel Vehicles
FOB	Free on board (export price)
FTA	Free Trade Agreement
g	grams
GDP	Gross domestic product
GHG	Greenhouse gas
GIEWS	Global Information and Early Warning System on Food and Agriculture
GM	Genetically modified
GMO	Genetically modified organism
GSSE	General Services Support Estimate
GtCO2-eq	Giga tons of CO_2 equivalents
ha	Hectare
HFCS	High fructose corn syrup
HORECA	Hotel, restaurant and catering
ICAC	International Cotton Advisory Committee
IEA	International Energy Agency
IFA	International Fertilizer Association
IFAD	International Fund for Agricultural Development

IFPRI	International Food Policy Research Institute
IGC	International Grains Council
ILUC	Indirect Land Use Change
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
ISO	International Sugar Organization
IUU	Illegal, unreported and unregulated (fishing)
kg	Kilogrammes
kha	Thousand hectares
kt	Thousand metric tonnes
kUSD	Thousand US dollars
LAC	Latin America and the Caribbean
lb	Pound (weight)
LDCs	Least Developed Countries
lw	Live weight
MBM	Meat and bone meal
MERCOSUR	Mercado Común del Sur / Common Market of South America
Mha	Million hectares
Mn	Million
Mn L	Million litres
MPS	Market Price Support
Mt	Million metric tonnes
Mt CO2-eq	Million metric tonnes of carbon dioxide equivalent
NAFTA	North American Free Trade Agreement
NENA	Near East and North Africa
NGO	Non-governmental organization
OECD	Organisation for Economic Co-operation and Development
OIE	World Organisation for Animal Health
OLS	Ordinary Least Squares
p.a.	Per annum
PCE	Private consumption expenditure
PPP	Purchasing power parity
PSA	Partial stochastic analysis
PSE	Producer Support Estimate
R&D	Research and development
RECC	Riz Economie Changement Climatique
RED	Renewable Energy Directive (European Union)
RFS / RFS2	Renewable Fuels Standard in the United States, part of the Energy Policy Act
RTA	Regional Trade Agreements
r.t.c.	Ready to cook
r.w.e.	Retail weight equivalent
SDG	Sustainable Development Goals
SDG 2	Sustainable Development Goal 2 (zero hunger)
SMP	Skim milk powder
SPS	Sanitary and Phyto sanitary measures (WTO agreement)
SSA	Sub-Saharan Africa
t	Metric tonnes
t/ha	Metric tonnes/hectare
tq	Tel quel basis (sugar)
TRQ	Tariff rate quota
UN	The United Nations
UNCTAD	United Nations Conference on Trade and Development
UNICEF	United Nations Children's Fund
US	United States
USDA	United States Department of Agriculture
USMCA	United States—Canada—Mexico Agreement
WFP	World Food Programme
WHO	World Health Organization
WMP	Whole milk powder
WTO	World Trade Organization

Currencies

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

Summary table for country grouping in the Statistical Annex

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

1. Refers to all current European Member states (excludes 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	Western Europe	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), Norway, Switzerland, United Kingdom
	Eastern Europe	Albania, Andorra, Belarus, Bosnia and Herzegovina, Faroe Islands, Iceland, Israel, Monaco, Montenegro, Republic of Moldova, San Marino, Serbia, Serbia and Montenegro, Republic of North Macedonia, Russian Federation, Turkey, Ukraine
	Central Asia	Armenia, Azerbaijan, Georgia, Kazakhstan, 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		Australia, China, India, Indonesia, Iran (Islamic Republic of), Japan, New Zealand, Malaysia, Pakistan, Philippines, Korea, Thailand, Viet Nam,
	Asia Least Developed	Afghanistan, Bangladesh, Bhutan, Myanmar, Cambodia, Lao People's Democratic Republic, Nepal, Timor-Leste
	Other Developing Asia	Brunei Darussalam, Democratic People's Republic of Korea, Hong Kong China, Macao China, Maldives, Federated States of Mongolia, Singapore, Sri Lanka, Chinese Taipei
	Oceania	American Samoa, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia, Nauru, New Caledonia, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna Islands

Executive Summary

The *OECD-FAO Agricultural Outlook 2021-2030* 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. The report is a collaborative effort of the OECD and FAO, prepared with input from Member governments and international commodity organisations. It highlights fundamental economic and social trends driving the global agri-food sector assuming no major changes to weather conditions or policies. Since this year's *Outlook* period ends in 2030, the report's projections also suggest areas where more attention is needed to achieve the Sustainable Development Goals (SDGs).

At the time of preparation of this publication, the agricultural and food sector has demonstrated high resilience in face of the global COVID-19 pandemic compared to other sectors of the economy, but the compounding effect of income losses and inflation in consumer food prices have made access to healthy diets more difficult for many people. After an initial economic contraction from the COVID-19 shock, the *Outlook* projections assume a widespread economic recovery beginning in 2021. However, the level of global GDP in 2030 is projected to remain below the pre-pandemic projections for 2030 as the lost GDP during the pandemic is not expected to be fully recovered. The *Outlook* projects that, following a business as usual path, it will be particularly challenging to achieve SDG 2 on zero hunger by 2030.

The challenges of eradicating hunger will vary among countries. According to the *Outlook*, average global food availability per person is projected to grow by 4% over the next ten years, reaching just over 3 025 kcal/day in 2030. However, this global average masks differences among regions. Consumers in middle-income countries are projected to increase their food intake most significantly, while diets in low-income countries will remain largely unchanged. In Sub-Saharan Africa, where 224.3 million people were undernourished in 2017-19, daily per capita calorie availability is projected to increase by only 2.5% over the next decade to 2500 kcal in 2030.

Some dietary changes are anticipated in the coming decade. In high-income countries, per capita consumption of animal protein is expected to level off. Due to growing health and environmental concerns, per capita meat consumption is not expected to increase and consumers will increasingly replace red meat by poultry and dairy products. In middle-income countries, the preference for livestock products and fish is expected to remain strong and per capita availability of animal protein is projected to increase by 11%, narrowing the consumption gap with high-income countries by 4% to 30 g/person/day in 2030.

The composition of diets also influences global health outcomes. At the global level fats and staples are expected to account for about 60% of additional calories over the next decade and provide 63% of available calories by 2030, whereas fruits and vegetables would continue to provide only 7% of available calories. Additional efforts are needed to achieve the World Health Organisation (WHO) recommended net intake of 400g of fruits and vegetables per person per day. This includes efforts to reduce food loss and waste, which are particularly high for perishable products.

The *Outlook* highlights the important influence of feed efficiency and disease outbreaks on future trends in animal production and agricultural markets. Lower growth in livestock production and improved feeding efficiency in high-income countries and some emerging economies should result in slower growth in feed demand compared to last decade. By contrast, several low and middle-income countries will experience strong growth in feed demand over the coming decade, as their livestock sectors expand and intensify. The development of animal husbandry in the People's Republic of China (hereafter "China"), the world largest feed consumer, will be central to the development of global feed markets. Following the outbreak of the African swine fever (ASF), China started to rebuild and restructure its pig herd in 2020, which is assumed to have little net effect on the average feed use per unit of livestock product.

The *Outlook* suggests that the biofuel sector would expand at a much slower pace than over the past two decades. Biofuel production is expected to use a falling share of the main feedstock commodities, except for sugarcane. In the European Union and the United States, policies increasingly support the transition to electric vehicles and favour waste products and residues as feedstock for biofuel production. Main producers of sugarcane and vegetable oil (e.g. Brazil, India, Indonesia), however, will continue to expand their biofuel production driven by increasing transport fuels use, environmental targets and efforts to strengthen their domestic farm sector.

The year's *Outlook* highlights the important role that public and private investments have in enhancing productivity. Over the coming decade, global agricultural production is projected to increase by 1.4% p.a., with the additional output to be predominantly produced in emerging economies and low-income countries. The *Outlook* assumes wider access to inputs as well as productivity-enhancing investments in technology, infrastructure and agricultural training as critical drivers of agricultural development. Prioritizing agriculture and, well-targeted public and private spending are especially critical for improving agricultural productivity, particularly for countries with limited public resources and strong economic reliance on the agricultural sector.

Investments in improving yields and improved farm management will drive growth in global crop production. Assuming continuing transition to more intensive production systems over the next decade, 87% of the projected global crop production growth are expected to come from yield improvements, 7% from increased cropping intensity and only 6% from the expansion of cropland. Regional yield gaps are expected to narrow over the coming decade, as yields of the main crops are projected to increase in India and Sub-Saharan Africa through better adapted seeds and improved crop management.

Similar to trends in crop production, a large share of the projected 14% production growth in livestock and fish production will come from productivity improvements. However, herd enlargements are also expected to significantly contribute to livestock production growth in emerging economies and low-income countries. Productivity improvements in the livestock sector will be mainly achieved through more intensive feeding methods, improved genetics and better herd management practices. Aquaculture production is expected to overtake capture fisheries production in 2027 and account for 52% of all fish production by 2030.

The *Outlook* highlights the significant contribution of agriculture to climate change. The carbon intensity of agricultural production is expected to decline over the coming decade as direct agricultural greenhouse gas (GHG) emissions are projected to grow at a lower rate than agricultural production. Nevertheless, global GHG emissions from agriculture are projected to increase by 4% over the next ten years, with livestock accounting for more than 80% of this increase. Thus, additional policy effort will be needed for the agricultural sector to effectively contribute to the global reduction in GHG emissions as set in the Paris Agreement. This includes large-scale implementation of climate smart production processes to mitigate GHG emissions, especially in the livestock sector.

Trade remains particularly important for resource-constrained countries, which are highly dependent on the import of basic and high-value food commodities. Globally, the share of imported calories in total consumption is expected to stabilise at about 20%, however, with regional differences. For instance, it is projected to reach as much as 64% in the Near East and North Africa region. Exports, in turn, play an important role in the development of agricultural production in many countries and regions. By 2030, 34% of the agricultural production of Latin America and the Caribbean is projected to be exported. Given growing regional imbalances, the use of trade restrictive policies (e.g. export and import restrictions) could have detrimental effects on global food security and nutrition and on farm livelihoods.

The *Outlook* price projections bring together global consumption and production developments for agricultural commodities based on expected market conditions. International prices of most commodities increased in the second half of 2020, fuelled by strong feed demand in China and constraints on global production growth. Consequently, an adjustment is assumed over the first years of the projection period. Thereafter, market fundamentals are expected to lead to slightly declining real prices driven by productivity improvements and slowing demand growth. Declining real prices can put pressure on the income of farmers, especially smallholders and family farmers, who are not able to lower their costs sufficiently by improving productivity. Over the coming decade, weather variability, animal and plant pests and diseases, changing input prices, macro-economic developments and other uncertainties will result in variations around the projected prices.

Assuming a fast recovery from the global COVID-19 pandemic and no major changes to weather conditions or the policy environment, the *Agricultural Outlook 2021-30* presents the major trends in food and agricultural markets over the coming decade. While it is expected that progress will be made in many respects, in order to realize the 2030 Agenda and achieve the SDGs by 2030, concerted actions and additional improvements are needed at all levels, requiring also more efforts by the agricultural sector.

1 Agricultural and food markets: Trends and prospects

Following a description of the macroeconomic and policy assumptions underlying the projections, this chapter presents the main findings of the *Agricultural Outlook*. It highlights key projections for consumption, production, trade, and prices for 25 agricultural products for the period 2021 to 2030. Agricultural demand growth is expected to slow down over the coming decade and to be mainly driven by population growth. Varying income levels and income growth projections, as well as cultural preferences around diets and nutrition, will underlie continuing differences in consumption patterns between countries. The slower demand growth for agricultural commodities is projected to be matched by efficiency gains in crop and livestock production, which will keep real agricultural prices relatively flat. International trade will remain essential for food security in food-importing countries, and for rural livelihoods in food-exporting countries. Over the coming decade, weather variability, animal and plant diseases, changing input prices, macro-economic developments and other uncertainties will result in variations around the projections

1.1. Introduction

The *OECD-FAO Agricultural Outlook 2021-2030* is a collaborative effort of the Organisation for Economic Co-operation and Development (OECD) and the Food and Agriculture Organization of the United Nations (FAO). The *Outlook* presents a consistent baseline scenario for the evolution of agricultural commodity and fish markets at national, regional and global levels for the period 2021 to 2030. This baseline scenario incorporates the commodity, policy and country expertise of both organisations, collaborating Members and international commodity bodies.

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

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

The *OECD-FAO Agricultural Outlook* publication contains four main parts.

- Part 1: **Agricultural and food markets: Trends and prospects**. Following the description of the macroeconomic and policy assumptions underlying the projections (Section 1.2), this chapter presents the main findings of the *Agricultural Outlook*. It highlights key projections and provides insights into the main achievements and challenges facing agri-food systems over the coming decade. The chapter presents trends and prospects for consumption (Section 1.3), production (Section 1.4), trade (Section 1.5), and prices (Section 1.6). A stochastic analysis is provided in Section 1.6 to assess uncertainties around the projected price paths.
- 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 (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 prices, production, consumption and trade for the commodities covered in the *Outlook*. Each chapter concludes with a discussion of the main issues and uncertainties that might affect markets over the next ten years. This part consists of nine chapters: cereals (Chapter 3), oilseeds and oilseed products (Chapter 4), sugar (Chapter 5), meat (Chapter 6), dairy and dairy products (Chapter 7), fish (Chapter 8), biofuels (Chapter 9), cotton (Chapter 10), and other products (Chapter 11).
- Part 4: **Statistical Annex**. The statistical annex presents projections for production, consumption, trade and prices for the different 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 (i.e. 2030) relative to a three-year base period (i.e. 2018-20). The statistical annex is not part of the printed version of the *OECD-FAO Agricultural Outlook* but can be accessed online.

Figure 1.1. Market conditions for key commodities

Current market conditions

Cereal: Globally, the impact of the COVID-19 pandemic on cereal markets in terms of supply and demand could be considered as relatively modest. Some logistical bottlenecks and temporary export restrictions coincided with a substantial rise in import demand, resulting in international grain prices to increase rapidly. The surge in prices contributed to higher food inflation in many countries, especially those adversely affected by the pandemic-driven economic hardship, further reducing access to food.

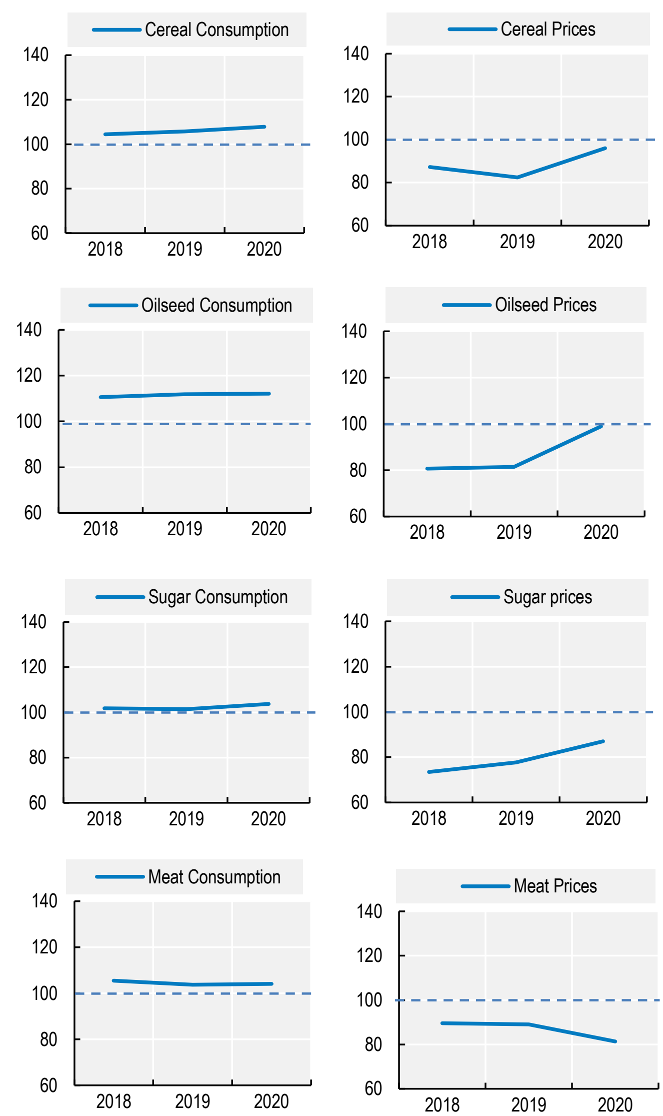
Oilseed: While the COVID-19 pandemic resulted in some market disruptions in early-2020, so far its overall impact on global oilcrop markets appears to have been limited. The steep rise in oilseed, oil and meal prices observed since mid-2020 was chiefly driven by the combined effect of a rebound in demand, notably for imported soybeans by China to feed the rebuilding pig herd, and limited growth in global supplies, especially of the key vegetable oils. The surge in prices contributed to food price inflation in numerous countries, aggravating food access problems stemming from pandemic-driven income losses.

Sugar: In almost all countries, a recovery in demand follows the drop in global consumption that took place in the midst of the Covid-19 pandemic which resulted in national lockdowns and/or closure of restaurants for several months. Unfavorable weather conditions in some key producing countries for a third consecutive season contribute to a rebound in prices in the current 2020/21 season.

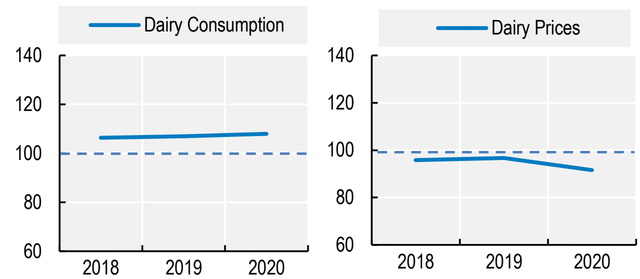
Meat: International meat prices declined in 2020 due to the impact of COVID-19, which temporarily curtailed meat demand by some leading consuming and importing countries given logistical hurdles, reduced food service and reduced household spending due to lower incomes. COVID-19-related market disturbances reduced incomes in net meat-importing, low-income countries, significantly eroding household purchasing power and compelling consumers to substitute the intake of meat and meat products with cheaper alternatives. The fall in international meat prices would have been larger if it were not for the sharp rise in meat imports by China, where ASF continues to limit local production.

Consumption index
Average 2011-2020 = 100

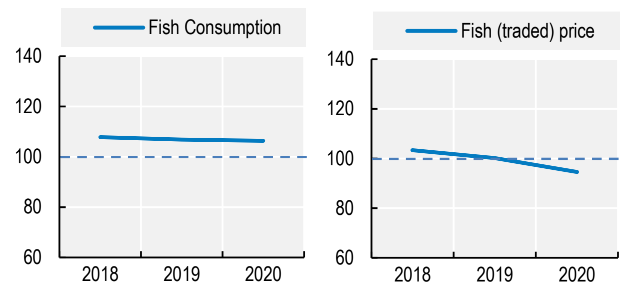
Real Price Index
Average 2011-2020 = 100



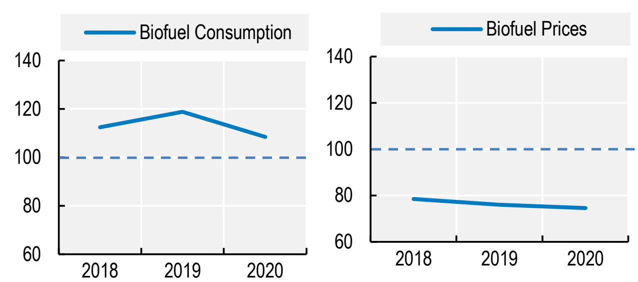
Dairy: The initial effects of the COVID-19 pandemic on the dairy sector varied regionally, with negative effects ranging from shipping container shortages to disposing of surplus products. Overall, the sector adapted quickly, and mitigated many of the initially drastic effects seen in the earlier months of the pandemic. Butter prices fell the most sharply in 2020, compared to WMP price which decreased by a smaller margin, and SMP and cheese prices which increased.



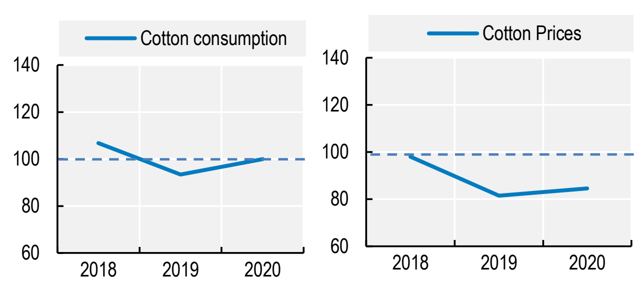
Fish: Fish production, trade, and consumption all contracted in 2020.The impact of COVID-19 during 2020 on the HORECA sector was particularly important, as fish are often consumed outside the home. Lower demand from out-of-home food services contributed to lower prices, particularly for high-value species. According to the FAO Fish Price Index, international fish prices were 7% lower on average in 2020 compared to 2019.



Biofuels: World biofuel consumption decreased in 2020 due to the impact of COVID-19 which curtailed the global transportation oil use. World consumption of biodiesel was less impacted than that of ethanol. Biofuel production decreased in all regions. Biofuel prices decreased, due to the lower ethanol demand in the United States and Brazil.



Cotton: Cotton consumption and trade recovered in 2020 from the 2019 low when the onset of the pandemic drove consumers from stores. However production fell to levels not seen since 2016 as production in the Americas was below expectations. As a consequence cotton prices increased and gained on the price of polyester.



Note: All graphs expressed as an index where the average of the past decade (2011-2020) is set to 100. Consumption refers to global consumption volumes. Price indices are weighted by the average global production value of the past decade as measured at real international prices. More information on market conditions and evolutions by commodity can be found in the commodity snapshot in the Annex and the online commodity chapters.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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1.2. Macroeconomic and policy assumptions

1.2.1. The main assumptions underlying the baseline projections

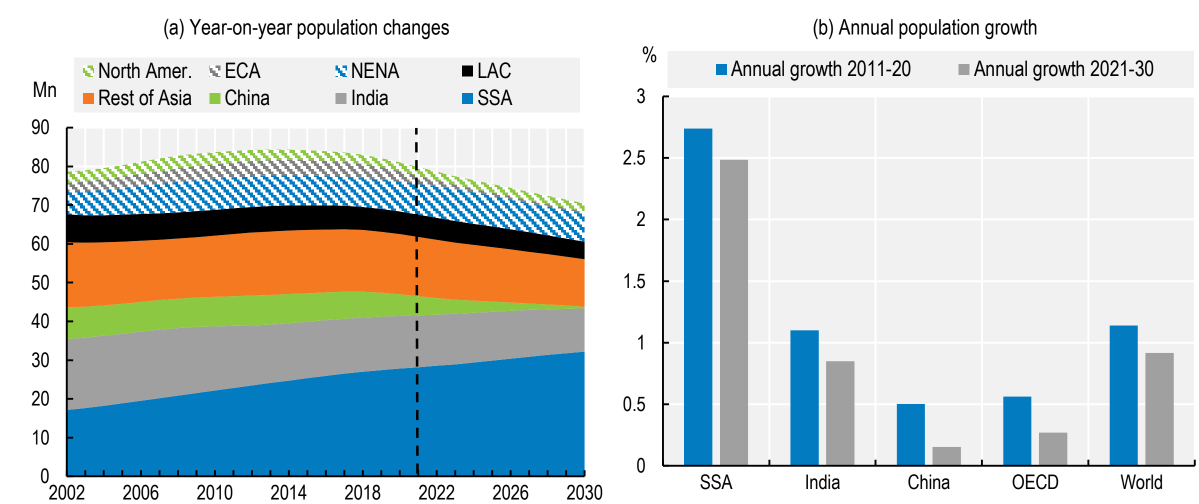
This *Outlook* presents a consistent baseline scenario for the medium-term evolution of agricultural and fish commodity markets, which is produced based on a set of macro-economic, policy and demographic assumptions. The main assumptions underlying the projections are highlighted in this section. Detailed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

1.2.2. Population growth

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

Over the projection period, world population is expected to grow from an average of 7.7 billion people in 2018-20 to 8.5 billion people in 2030. This corresponds to an annual growth rate of 0.9%, a slowdown compared to the 1.1% p.a. growth rate experienced over the last decade. Population growth is concentrated in developing regions, particularly Sub-Saharan Africa, which is expected to have the fastest growth rate at 2.5% p.a. (Figure 1.2). With an additional 137 million people by 2030, India is expected to overtake the People's Republic of China (hereafter "China") as the most populous country of the world.

Figure 1.2. World population growth



Note: SSA is Sub-Saharan Africa; LAC is Latin America and Caribbean; ECA is Europe and Central Asia; NENA stands for Near East and North Africa, and is defined as in Chapter 2; Rest of Asia is Asia Pacific excluding China and India.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

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1.2.3. GDP growth and per capita income growth

Estimates of GDP growth and per capita income growth are based on the *OECD Economic Outlook* No. 108 (December 2020) and the *IMF World Economic Outlook* (October 2020).[1] Per capita incomes are expressed in constant 2010 US dollars.

The COVID-19 pandemic has added an additional element of uncertainty to the macroeconomic assumptions underlying the projections of the *OECD-FAO Agricultural Outlook*. Although our assumptions suggest a widespread economic recovery beginning in 2021, the actual pace of recovery will largely depend on the success of national pandemic control measures (e.g. vaccination campaigns) and on policies that support the recovery of businesses and consumer demand.

After dropping by 4.7% in 2020, global GDP is expected to rebound in 2021-2022 and grow at an average rate of 2.9% over the next ten years. The world economy should recover to its pre COVID-19 level by 2022. However, the path of recovery is projected to be uneven among countries and regions. Recovery is expected to be the fastest in Asia. China is one of the rare countries that recorded positive GDP growth in 2020. In South East Asia and India, recovery is projected to be achieved by 2021 and 2022, respectively. In the OECD and in Sub-Saharan Africa, GDP is expected to recover to its 2019 level (i.e. its pre-COVID level) by 2022. In Near East and North Africa and Latin America and the Caribbean, recovery is projected to be slower and to be achieved by 2023.

National average per-capita income levels and growth rates are approximated in this *Outlook* using per capita 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 2018 report, however, national economic growth is unevenly distributed. In particular, in several Sub-Saharan African countries the incomes of the poorest 40% of the population have lagged average income growth. For this reason, national average agricultural demand projections in this *Outlook* can deviate from what might be expected based on average income growth. In addition, the COVID-19 pandemic especially impacted the income of the poorest households.

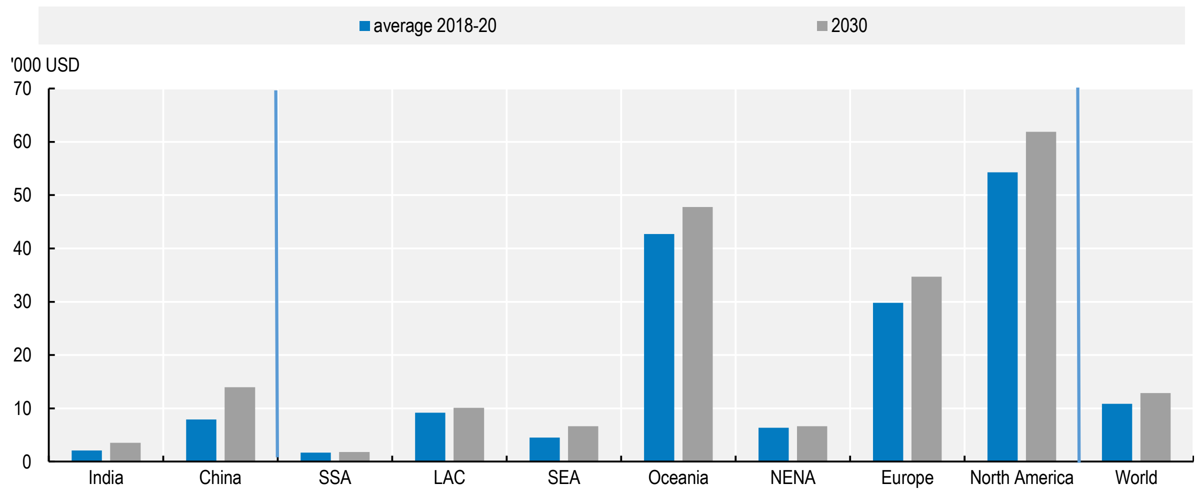
After dropping by 6% in 2020, global per capita income is expected to recover in 2021 and 2022. Over the coming decade, an average annual growth rate of 1.9% in real terms is projected. Strong growth is expected in Asia, with per capita income increasing by 5.8% p.a. in India and 5.3% p.a. in China (Figure 1.3). Growth in per capita income is also expected to be strong in Viet Nam, at 5.5% p.a. over the coming decade, and in the Philippines, Indonesia and Thailand at 4.7%, 3.8% and 3.6% p.a., respectively.

In Sub-Saharan Africa, average per capita incomes are projected to rise at a rate of 1.2% p.a. (Figure 1.3). A notable exception is the strong economic growth anticipated for Ethiopia at 7.4% p.a., while no per capita income growth is projected for Nigeria. In the Latin America and Caribbean region, average per capita income growth is projected at 1.5% p.a., with considerable differences between countries. While incomes in Brazil and Mexico will grow relatively slowly over the next decade (i.e. below 2% p.a.), countries such as Peru and Paraguay will see per capita incomes grow by around 2.8% p.a., and Colombia by 3.1% p.a. In the Near East and North Africa, average per capita income growth is projected at 1.1% p.a., led by Egypt at 3.4% p.a. and Israel at 2.5% p.a., while per capita income growth in Iran and other Near East countries is projected to be below 1% p.a.

Over the medium term, average per capita incomes are expected to rise by 1.7% p.a. and 1.4% p.a. in Europe and Oceania, respectively (Figure 1.3). These rates are close to the OECD average, where per capita income is projected to increase at around 1.5% p.a. over the coming decade. Among OECD countries, the highest growth is expected for Colombia, followed by Turkey and Korea at 2.8% and 2.6% p.a. respectively, while per capita incomes are expected to grow the slowest in Canada at 1% p.a.

Figure 1.4 decomposes the GDP growth assumptions 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 in China. By contrast, high population growth in Sub-Saharan Africa means that the relatively high rate of economic growth in the region (close to 3.8% p.a.) corresponds to only a modest growth in per capita terms (at around 1.2% p.a.). The same applies to a lesser extent to the Near East and North Africa region. By contrast, the modest economic growth in Europe at 1.6% p.a., where population is expected to decrease over the next ten years, would translate 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 South-East 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 (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

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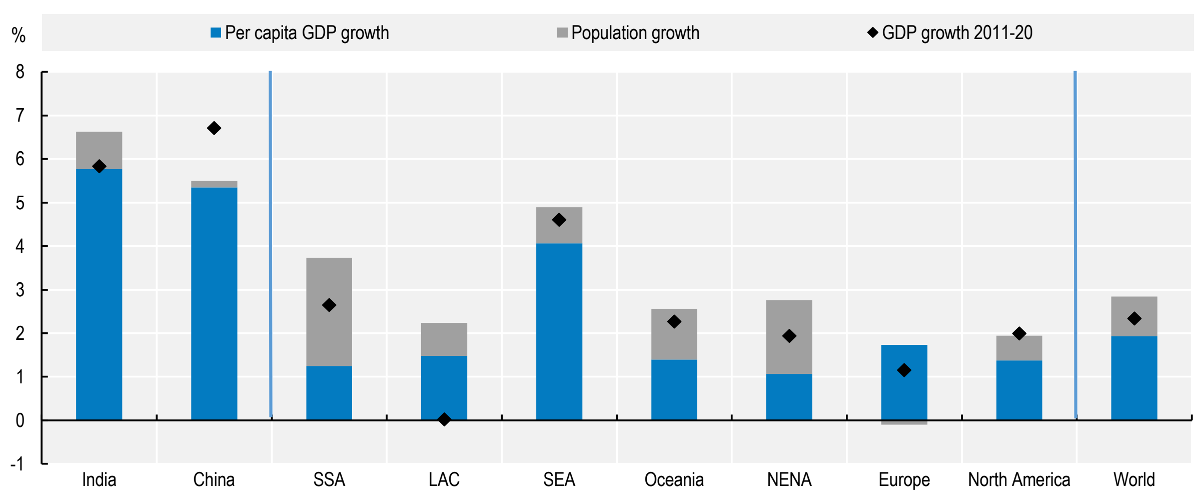
Figure 1.4. Annual GDP growth rates 2021-2030



Note: SSA is Sub-Saharan Africa; LAC is Latin America and Caribbean; SEA is South-East Asia; NENA stands for Near East and North Africa, and is defined as in Chapter 2.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

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1.2.4. Exchange rates and inflation

Exchange rate assumptions are based on the *OECD Economic Outlook* No. 108 (December 2020) and on the IMF *World Economic Outlook* (October 2020). Real exchange rates for the period 2021-30 are assumed to remain broadly unchanged, so that nominal exchange rates relative to the US dollar mostly reflect differences in inflation compared to the United States. Some currencies are expected to appreciate in real terms compared to the US dollar; this is the case for Argentina and Turkey, and to a lesser extent for New Zealand, Japan, China, Chile and Mexico. By contrast, a real depreciation is expected for Norway, the Russian Federation (hereafter “Russia”), Brazil, Colombia and Australia. In non-OECD countries, real appreciation is expected in many countries most pronounced in Nigeria, Ukraine, Kazakhstan, while real depreciation is highest in Ethiopia, India, Israel, and Peru.

Inflation projections are based on the private consumption expenditure (PCE) deflator from the *OECD Economic Outlook* No. 108 (December 2020) and the *IMF World Economic Outlook* (October 2020). In OECD countries, inflation is projected to be higher than in the previous decade, at 2.9% p.a., with an annual rate of 2.2% p.a. for the United States, 1.9% p.a. for Canada, and 1.7% p.a. for the Euro zone. Among emerging economies, consumer price inflation is expected to remain high at 9.7% p.a. in Turkey and at 11.5% p.a. in Argentina, despite a strong decrease compared to the previous decade. In Russia, inflation should ease from 6.7% p.a. in the last ten years to 3.9% p.a. over the coming decade, from 5.3% p.a. to 3.8% p.a. in India, and from 6.2% p.a. to 3.2% p.a. in Brazil. By contrast, China should experience a slight increase in consumer price inflation compared to the last decade, at 2.6% p.a. In some countries (e.g. Ethiopia, Pakistan, Saudi Arabia, and Nigeria) inflation has increased significantly in 2020 and remains high in 2021 but is expected to return to lower values thereafter.

1.2.5. Input costs

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

Historical data for world oil prices are based on Brent crude oil prices in 2019 obtained from the short-term update of the *OECD Economic Outlook* N°108 (December 2020). For 2020, the annual average daily spot price in 2020 was used. For the remainder of the projection period, the reference oil price used in the projections is assumed to follow the growth rate of the World Bank average oil price, which implies an increase from USD 43/barrel in 2020 to USD 74/barrel in nominal terms and USD 62/barrel in real terms in 2030.

1.2.6. Policy considerations

Policies play an important role in agricultural, biofuel and fisheries markets, for which policy reforms often change market structure. The *Outlook* assumes that policies currently in place will remain unchanged throughout the projection period providing a baseline for evaluation and analysis of future policies.

The United Kingdom officially left the European Union on 31 January 2020. On December 2020, the United Kingdom and the European Union concluded the EU-UK Trade and Cooperation Agreement, which is applicable since 1 January 2021 and sets out preferential arrangements for trade in goods and services. Data for the United Kingdom are thus reported separately from the European Union, but the *Outlook* takes the technical assumption of a stable and duty-free/quota-free trading relationship between the United Kingdom and the European Union.

The African Continental Free Trade Area (AfCFTA) officially came into force in May 2019 and trading under the agreement started on 1 January 2021. The agreement will effectively consolidate 55 countries into a single market. As of January 2021, these countries had a combined population of more than 1.3 billion people and a combined GDP of USD 3.4 trillion. The AfCFTA foresees a gradual elimination of tariffs over the next five years for non-least developed countries (LDCs) and over the next ten years for LDCs, for 90% of the tariff lines. However, the exact tariff schedules have not yet been finalised. Therefore, the *Outlook* does not consider any tariff reductions within AfCFTA signatory countries. However, it assumes improved market efficiency within the African region, although non-tariff barriers to trade together with weak transportation links may limit the extent of potential market integration.

The Regional Comprehensive Economic Partnership (RCEP) is a free trade agreement signed in November 2020 between the ten countries of ASEAN and five countries of Asia and Pacific (China, Japan, Korea, Australia and New Zealand). As of 2020, the 15 member countries accounted for about 30% of the world's population (2.2 billion people) and 30% (USD 26.2 trillion) of global GDP. The RCEP will provide a framework aimed at lowering trade barriers and securing improved market access for goods and services. As the RCEP is not yet ratified, it is not taken into account in the projections.

Similarly, the potential effects of the trade agreement between the European Union and Mercosur states (i.e. Argentina, Brazil, Paraguay, and Uruguay) are not taken into account in the projections as ratification is still pending.

No specific assumption was made regarding the potential impact of ongoing trade tensions, e.g. between the United States and China.

This *Outlook* assumes that the restrictive measures to contain the spread of the COVID-19 pandemic will not be permanent. They are assumed to be lifted as part of the economic recovery in 2021.

1.3. Consumption

The *OECD-FAO Agricultural Outlook* projects future trends in the use of the main crop commodities (cereals, oilseeds, roots and tubers, pulses, sugar cane and sugar beet, palm oil and cotton) and livestock products (meat, dairy, egg and fish) as food, animal feed, and raw materials for biofuels and other industrial applications.

Future demand for food is directly influenced by population and demographic changes, by income growth and income distribution, and by food prices. The *Outlook* assumes that food demand will be additionally shaped by socio-cultural and lifestyle-driven changes in consumption patterns, including continuing urbanisation and rising female participation in the workforce, as well as increasing consumer awareness of health and sustainability issues. These factors will determine the size of the consumer population, the composition of their desired food basket, and their ability to purchase it. Policies influencing the price of agricultural products (e.g. fiscal measures, border measures) and, as far as possible, policies influencing consumption patterns (e.g. food labelling, regulations), are also incorporated into the assessment of future consumer demand. Taken together, these elements will determine the level and structure of food demand over the coming decade.

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

Industrial uses of agricultural commodities (mostly for biofuel production and as input in the chemical industry) are shaped by general economic conditions, regulatory policies and technological change. Biofuel demand, for instance, is highly sensitive to changes in policies, as well as to overall demand for transport fuel, which in turn depends on the crude oil price.

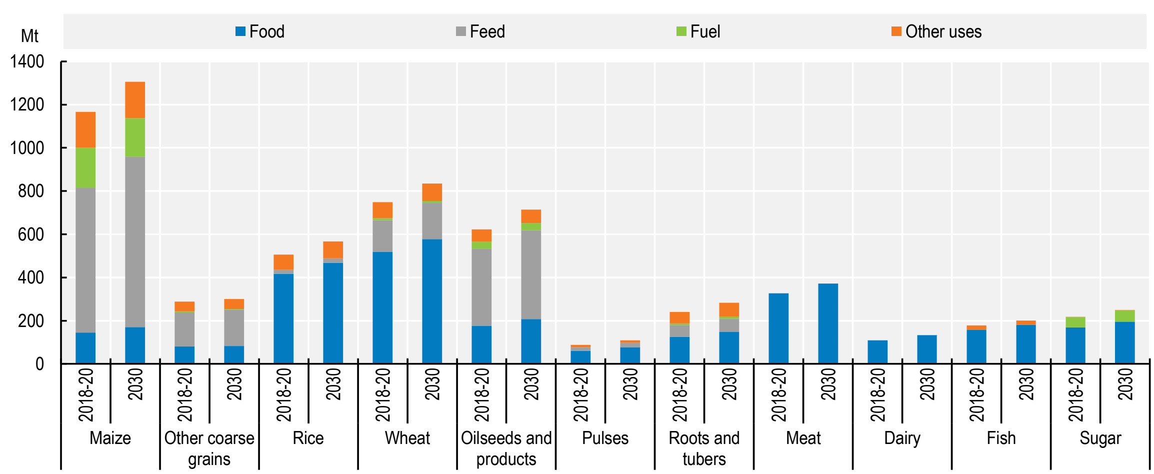
After an initial economic contraction from the COVID-19 shock, the *Outlook* assumes a widespread economic recovery beginning in 2021. However, per capita incomes in 2030 are expected to remain below pre-COVID projections for 2030. This is expected to affect demand in low-income households and have implications for food intake and the composition of diets over the next decade. The pandemic also induced a shift away from food services and restaurants towards home eating. This behavioural change is assumed to be reverted as the economy recovers and control measures are lifted. The evolution of COVID-19 pandemic, however, adds an additional element of uncertainty to the macroeconomic assumptions underlying these projections (Section 1.2). Although the *Outlook* assumptions imply a widespread economic recovery beginning in 2021, the actual pace of recovery will largely depend on the success of national pandemic control measures (e.g. vaccination campaigns) and of policies supporting the recovery of businesses and consumer demand.

1.3.1. Adjustments expected in the structure of agricultural commodity demand

Agricultural commodity demand includes both food and non-food uses. For most agricultural commodities, global demand for food use is the main component of overall demand. However, non-food uses, mainly feed and fuel, are important for several commodities, and have experienced faster growth than food use over the last decade(s).

Over the next ten years, the shares of the different uses by commodity are not projected to change significantly, as no major shift in consumption is expected. Food will remain the primary use for rice, wheat, pulses, roots and tubers, and sugar, as well as for all animal products. Feed will continue to be the dominant use for coarse grains and oilseeds (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 sugarbeet, converted into sugar equivalent units.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Growth in feed use of cereals is expected to continue exceeding the rate of expansion of food use. Feed use of cereals is projected to grow at 1.2% p.a. over the coming decade as livestock production expands and intensifies in low and middle-income countries, compared to a projected growth of 1% p.a. for food use.

By contrast, recent developments in biofuel policies combined with declining fuel use in some regions suggest lower growth in biofuel production from agricultural crops. As a result, biofuel use of cereals is projected to drop over the coming decade (-0.4% p.a.), and the share of biofuels in total use of cereals, oilseeds and sugar is expected to level off or decline (Section 1.3.7).

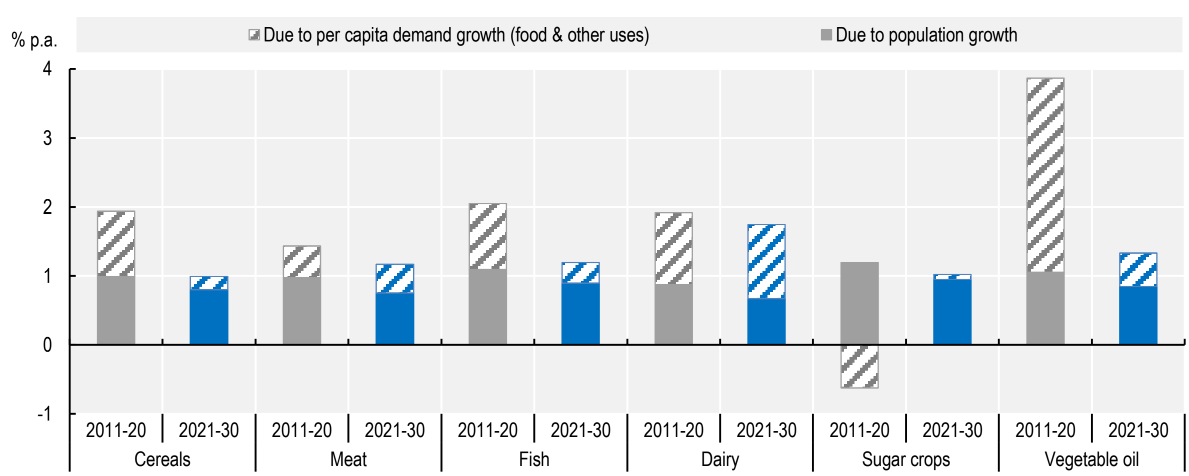
1.3.2. Agricultural demand growth is slowing and mostly driven by population growth

Global demand for agricultural commodities (including for non-food uses) is projected to grow at 1.2% p.a. over the coming decade; well below the growth experienced over the last decade (2.2% p.a.). This is mainly due to an expected slowdown in demand growth in China (0.8% p.a. compared to 2.7% p.a. over the last decade) and other emerging economies, and lower global demand for biofuels (Figure 1.6).

For cereals and fish, global demand will grow at half the rate of the past decade, while for vegetable oils less than a third of last decade's growth is expected. Vegetable oils was the fastest-growing commodity over the last ten years, partly driven by biofuel policies. Over the coming decade, the growth in demand for vegetable oils will be constrained by stagnant to declining biodiesel consumption in the two main markets, the United States and the European Union (Section 1.3.7). Food demand for vegetable oils is also projected to slow down as high-income countries and some emerging economies, including China, are approaching saturation levels.

Given the limited growth in per capita demand for most commodities, population growth will be the main determinant of overall demand growth over the coming decade. The bulk of additional demand will therefore originate in regions with high population growth such as Sub-Saharan Africa, South Asia, Near East, and North Africa. The only exception is dairy products, for which growth in demand will be mainly driven by rising per capita consumption of fresh dairy products in India.

Figure 1.6. Annual growth in demand for key commodity groups



Note: The population growth component is calculated assuming per capita demand remains constant at the level of the year preceding the decade. Growth rates refer to total demand (for food, feed and other uses).
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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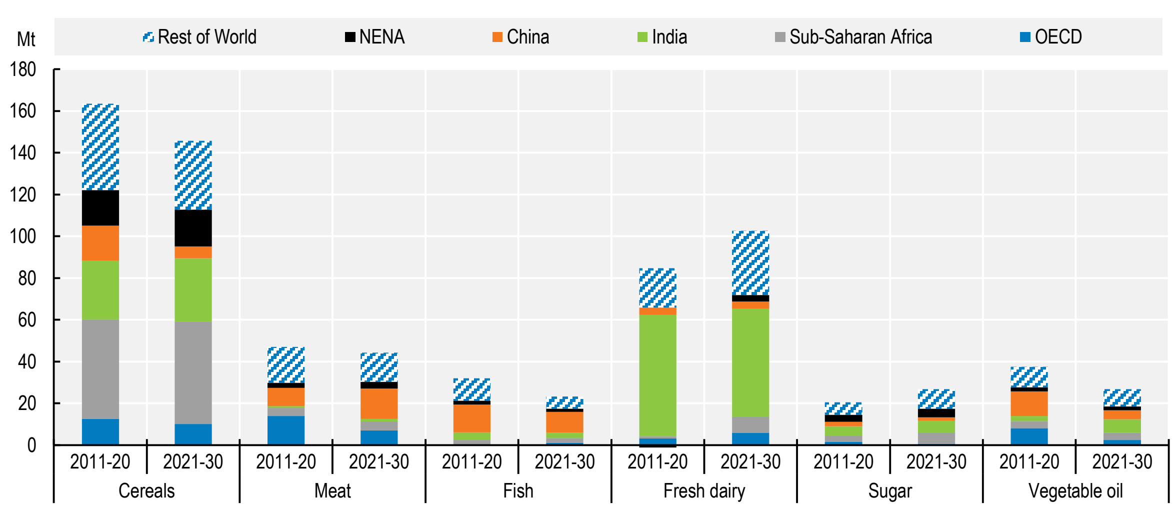
1.3.3. Low and middle income countries are the source of most food demand growth

Global food demand is projected to increase by 1.3% p.a. over the coming decade, driven by growing population and per capita incomes. Most additional demand for food will originate in low and middle-income countries, while in high-income countries it will be constrained by slow growth in population, and saturation in food consumption for several commodities.

The world population is projected to grow from an average of 7.7 billion in 2018-20 to 8.5 billion in 2030. Two-thirds of this increase is expected to occur in Sub-Saharan Africa, India and Near East and North Africa (Section 1.2). Given the significant expansion in their populations, these countries/regions will drive a large share of additional demand for food, in particular for cereals (two-thirds of additional demand), and other staples (i.e. roots and tubers, and pulses). Population growth is also expected to spur demand for sugar in Sub-Saharan Africa and Near East and North Africa, which are projected to account for 35% of additional demand over the coming decade (Figure 1.7).

Food demand is also influenced by per capita incomes. The macro-economic assumptions underlying this *Outlook* suggest growth in per capita GDP of 5.3% p.a. in China, 5.8% p.a. in India, and 4.1% p.a. in South East Asia over the coming decade (Section 1.2). With continued income growth and urbanisation, China should remain a key driver of demand for several commodities, including fish and meat. China is expected to account for 43% and 33% of additional demand for these commodities, respectively, over the next decade. In India, income growth will support growing demand for fresh dairy (50% of additional global demand) and vegetable oils. In India and South East Asia, income growth will also spur demand for sugar. This high demand growth will mainly stem from higher demand for sugar-rich confectionary products and soft drinks, mostly in urban areas.

Figure 1.7. Regional contributions to food demand growth, 2011-20 and 2021-30



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 (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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It should be noted that the figures presented in the *Outlook* for consumption are estimates of food availability and not of actual consumption. Quantities of food available for human consumption are higher than quantities consumed as some of the food that is potentially available to consumers is lost or wasted along the supply chain. This share is particularly high for perishable products such as dairy products and fruits and vegetables. The FAO estimates that globally about 14% of food produced is lost before reaching the retail level. An important share of food that is available to consumers is also wasted, estimated at 17% in 2019 (FAO, 2021[1]).[2] Reducing food loss and waste, as targeted by Sustainable Development Goal (SDG) 12.3, will contribute to improve food security and nutrition, and lower environmental pressures.

1.3.4. Limited convergence in diets expected over the coming decade

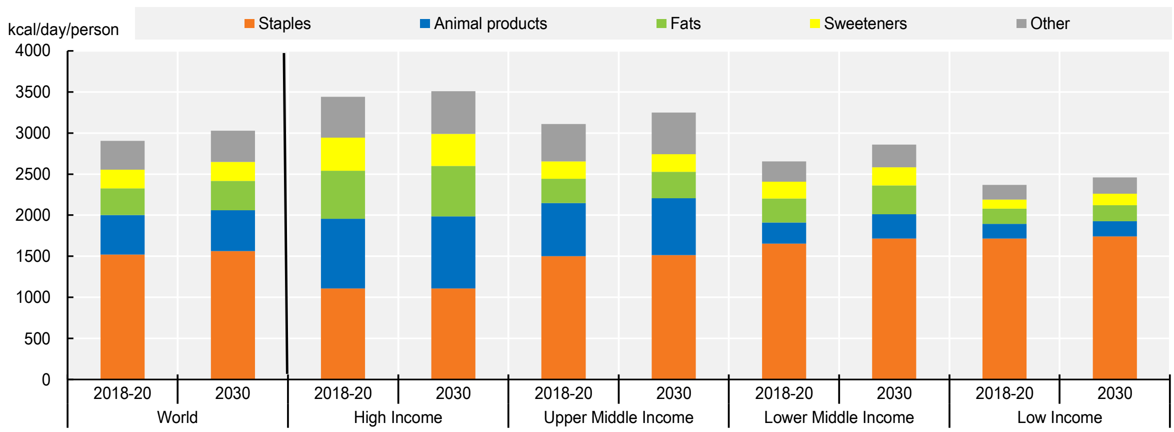
Varying income levels and income growth projections, as well as cultural preferences around diets and nutrition, will underlie continuing differences in consumption patterns between countries. By 2030, large discrepancies will continue to exist in terms of per capita availability of different commodities, as well as overall calorie and protein availabilities.

Globally, aggregate food availability is projected to grow by 4% over the projection period, reaching just over 3 025 kcal/person/day in 2030; fats and staples accounting for 60% of additional calories (Figure 1.8). By far the highest growth rate is projected for fats at 10% over the next ten years, indicating that additional efforts are needed to support a transition towards healthier diets (FAO, IFAD, UNICEF, WFP & WHO, 2020[2]). The increase in fat consumption is attributed to higher consumption of processed and convenience food, and an increasing tendency to eat outside the home. Ongoing urbanisation and rising female participation in the workforce as well as income shortages and food price inflation in the wake of the COVID-19 pandemic are assumed to underpin this development. Staples will remain the most significant food commodity group across all income groups. Nevertheless, on the account of the ongoing transition in global diets towards higher shares of fats, sugar, animal products and other foods, the share of staples in the food basket is projected to decline by 2030 for all income groups, albeit at different rates.

In high-income countries, per capita food availability will not expand significantly over the coming decade (Figure 1.8). Per capita availability of the different food groups is already at high levels and ageing populations and more sedentary lifestyles limit additional calorie requirements. However, income growth and changing consumer preferences will increase the substitution away from staples and sweeteners towards higher-value foods, including fruits and vegetables (Box 1.1), and to a lesser extent, animal products. The projected decline in per capita consumption of sweeteners reflects growing consumer concerns about the negative health effects of excessive sugar consumption. Several countries (e.g. France, United Kingdom, and Norway) have also implemented measures to discourage the consumption of caloric sweeteners over the last decade, which are assumed to remain in effect over the projection period, and to reduce demand for these products.

In upper-middle income countries, per capita food availability is expected to expand by 4.5% by 2030 (Figure 1.8). Given the foreseen high income growth and the strong preferences for meat in several of these countries, including China, 32% of additional calories will be provided by animal products, and 19% by fats. Food availability is projected to increase by almost 8% in lower-middle income countries over the coming decade (202 kcal/person/day), the largest gain of all income groups. Staples and fats will account for more than half of the increase. Per capita consumption of animal products is also expected to expand, mainly as a result of rising per capita consumption of dairy products in India (Section 1.3.5).

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



Note: Estimates are based on historical time series from the FAOSTAT Food Balance Sheets database which are extended with the *Outlook* database. Products not covered in the *Outlook* are extended by trends. The 38 individual countries and 11 regional aggregates in the baseline are classified into the four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower-middle: < USD 3 895, upper-middle: < USD 13 000, high: > USD 13 000. Staples includes cereals, roots and tubers and pulses. Animal products include meat, dairy products (excluding butter), eggs and fish. Fats include butter and vegetable oil. Sweeteners include sugar and HFCS. The category others include fruits, vegetables, and other crop and animal products.

Source: FAO (2021). FAOSTAT Food Balances Database, http://www.fao.org/faostat/en/#data/FBS; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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In low-income countries, food availability is projected to increase by 3.7% over the next ten years (89 kcal/person/day); sweeteners and staples accounting for 33% and 31% of additional calories, respectively (Figure 1.8). Average diets in low income-countries will remain heavily based on staples, which will continue to provide 70% of daily calories by 2030. Per capita consumption of sweeteners is projected to increase strongly (26%), albeit from a low base, keeping consumption levels well below those of middle and high-income countries by 2030. Growth in the consumption of animal products and other high-value foods (e.g. fruits and vegetables) will, however, remain limited due to income constraints, largely propelled by the COVID-19 pandemic. Given the higher cost of these food items, consumers in lower-middle and low-income countries will only be able to slightly increase the diversity of their diets (Box 1.1).

Box 1.1. The determinants of fruits and vegetables consumption

The United Nations has declared 2021 as the International Year of Fruits and Vegetables. The Year aims to raise awareness on the nutritional and health benefits of consuming more fruits and vegetables as part of a diversified, balanced and healthy diet and lifestyle; and to facilitate progress toward the Sustainable Development Goals.

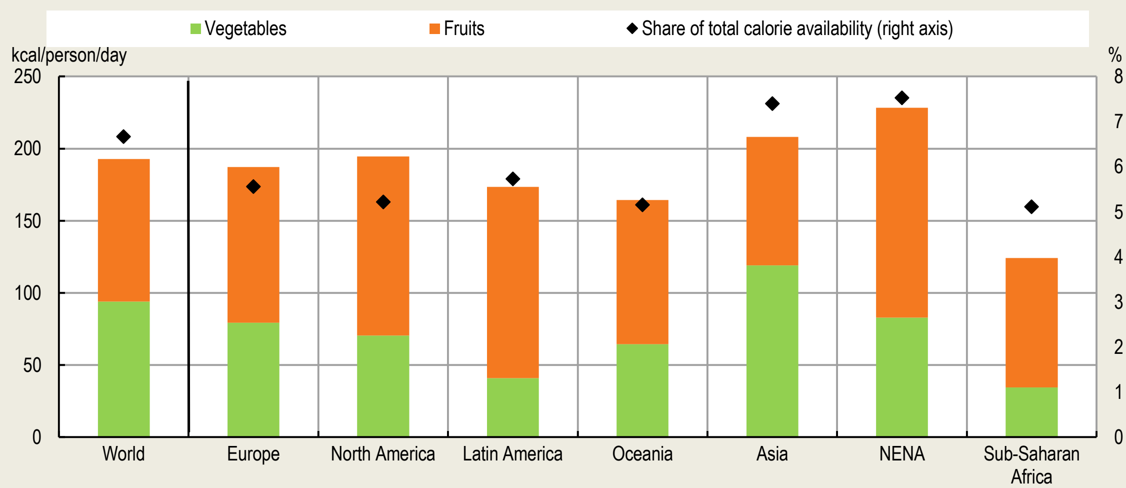
Fruits and vegetables are key constituents of a healthy diet, and their sufficient daily consumption could help prevent major diseases. In 2017, some 3.9 million deaths worldwide were attributable to not eating enough fruits and vegetables. Insufficient intake of these commodities is estimated to cause around 14% of deaths from gastro-intestinal cancer worldwide, about 11% of those due to ischemic heart disease, and about 9% of those caused by stroke.

The World Health Organization (WHO) recommends consuming at least 400 g of fruits and vegetables per day (or five portions) to reap their health and nutrition benefits. Yet, worldwide, available estimates suggest that we consume only about two-thirds of this recommended minimum amount. So why do people not eat enough fruits and vegetables?

A number of factors are influencing fruits and vegetables consumption, including availability.[1] Fruits and vegetables availability is a key factor underlying differences in the consumption of these products between countries and regions. Estimates of per capita availability of fruits and vegetables also enable the comparison of their relative importance in the diet with commodities covered in the *Outlook*.

According to the *FAO Food Balance Sheets*, globally, 580 g/person/day (or 193 kcal/person/day) of fruits and vegetables were available for human consumption in 2016-18; fruits and vegetables accounting for 6.6% of total calorie availability (Figure 1.9).

Figure 1.9. Per capita availability of fruits and vegetables in selected regions, 2016-18



Note: Vegetables do not include roots and tubers and pulses. NENA stands for Near East and North Africa, and is defined as in Chapter 2.
Source: FAO (2021). FAOSTAT Food Balances Database, http://www.fao.org/faostat/en/#data/FBS; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Fruits and vegetables availability is the highest in the Near East and North Africa and in Asia; at 228kcal/person/day and 208 kcal/person/day, respectively. In Asia, per capita availability of fruits and vegetables is particularly high in China (at 347 kcal/person/day) while it is lower in India (132 kcal/person/day); where most calories are obtained from roots and tubers, and pulses. In North America and Europe, fruits and vegetables availability is close to the world average, at 192 kcal/person/day and 187 kcal/person/day, respectively. However, regional averages also masks important differences between countries. In Europe, for instance, vegetables and especially fruits availability is higher in Southern European countries, while in Central and Eastern European countries cereals and potatoes are more available. Latin America, Oceania and Sub-Saharan Africa have lower availability of fruits and in particular of vegetables. Fruits and vegetables availability is particularly low in Sub-Saharan Africa, at 124 kcal/person/day in 2016-18; most calories available in the regions come from cereals and pulses. This mainly reflects production constraints (e.g. low productivity, lack of adequate pest control) as well as the lack of storage and packaging facilities.

Besides availability, other factors are influencing fruits and vegetables consumption and are underlying differences in consumption levels within countries. In addition to consumer preferences, several socio-economic factors such as income, education level, gender, and household composition appear to play a significant role. Higher incomes are generally associated with greater purchases of fruits and vegetables. Fruits and vegetables can be a relatively expensive part of the diet thus many of the poorer households spend what food money they have on cheaper, energy dense staples carbohydrate, which generally cost less per calorie. According to studies based on OECD countries and EU Member States, populations with higher levels of education are also more likely to consume the recommended daily amount of fruits and vegetables and have a generally healthier diet compared to those with medium or low levels of education. Women are also more likely than men to consume at least five fruits and vegetables per day. A study conducted on eleven countries in Sub-Saharan Africa also found that households headed by women tend to spend more on fruits and vegetables than those headed by men. However, increasing female participation in the workforce over the last century has led to a reduction in the time women spend on household tasks. Full time working mothers spend less time on meal preparation, prepare fewer meals for the whole family, and generally consume less fruits and vegetables.

Given the importance of fruits and vegetables for health and nutrition, several countries have implemented policies to promote their consumption. These mainly include school-based and other environmental policies that can influence children (e.g. promotion of fruits and vegetable eating in school cafeterias), and policies that modify the costs of health-related choice and are mainly targeted to low income households (e.g. fruits and vegetables subsidies). Efforts and investments to increase the production and productivity of the fruit and vegetable sectors and to reduce losses and waste along the supply chain, are also key to increase fruits and vegetables consumption.

1. The total quantity of foodstuffs produced in a country added to the total quantity imported and adjusted to any change in stocks that may have occurred since the beginning of the reference period gives the supply available during that period.
Sources: (FAO, 2020[3]), (Placzek, 2021[4]), (OECD, 2019[5]).

1.3.5. Increasing gap in animal protein consumption between low-income countries and middle and high-income countries

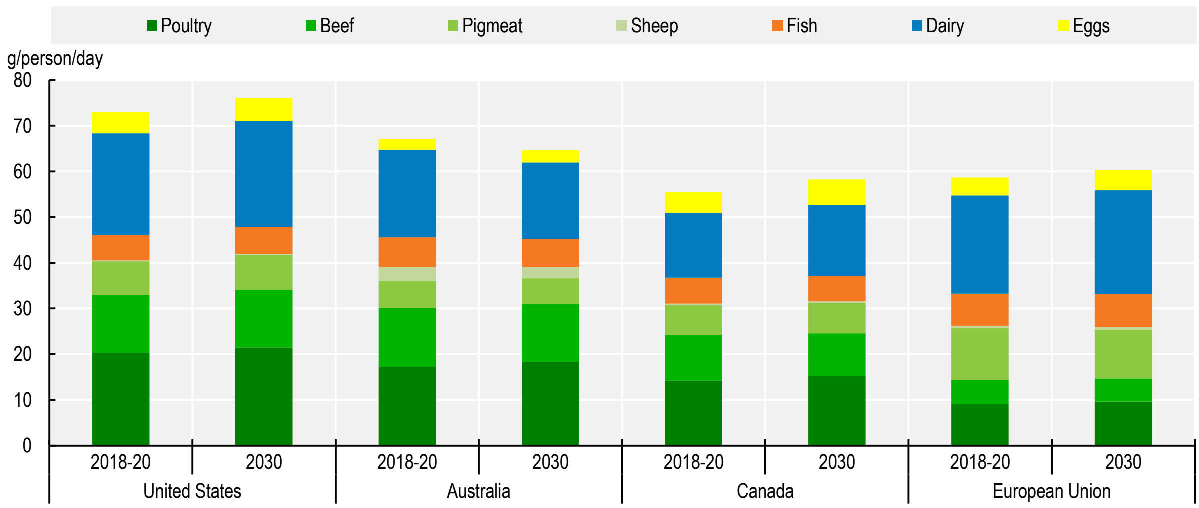
High-income countries: Near saturation levels, health and sustainability concerns limit growth in animal protein consumption

In high-income countries, per capita availability of animal protein (i.e. meat, fish, dairy, and eggs) is expected to grow slowly over the coming decade (+1.8 g/person/day or 3%). Moreover, due to health and environmental concerns, consumers are expected to increasingly replace red meat by poultry meat and dairy products. Consumers in high-income countries will also pay increasing attention to the production process, which could lead to increased consumption of local and certified organic products.

In high-income countries, the increase in poultry meat availability is projected to account for over half of additional animal protein availability over the coming decade. Demand for poultry meat is projected to grow steadily as consumers see it as a healthier and more environmentally sustainable product than beef and pigmeat. Poultry is also more affordable than other meat types, which will also contribute to growing poultry demand in middle and low-income countries.

By contrast, beef, pigmeat and sheepmeat consumption levels are expected to remain stable. Weakening demand for beef in high-income countries is due to several factors, including concerns about the climate impact of cattle production, and dietary recommendations by governments, which in several countries, advise limiting weekly intakes of red meat (OECD, 2021[6]). Most countries and regions with high per capita consumption of beef (e.g. Canada, Australia, and the European Union) will see these levels declining. Per capita consumption of pigmeat in the European Union, and of both pigmeat and sheepmeat in Australia, are also projected to decline, as consumers switch to cheaper and healthier alternatives (mostly poultry) (Figure 1.10).

Figure 1.10. Per capita availability of animal protein in selected high-income countries



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 (2021). FAOSTAT Food Balances Database, http://www.fao.org/faostat/en/#data/FBS; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Per capita availability of dairy products will continue increasing over the coming decade (+0.7 g/person/day). High-income countries mainly consume processed dairy products including cheese, which is projected to account for almost two-thirds of the increase in dairy protein availability.

Health and environmental concerns, together with animal welfare and ethical considerations regarding eating animals are also leading to an increase in the number of vegetarian, vegan or "flexitarian" lifestyles in high-income countries, and in particular among young consumers. The share of vegetarians in the overall population is currently low, with 5% of the population in the United States and 6% in Germany describing themselves as vegetarians, for instance (Hrynowski, 2019[7]) (Heinrich-Böll-Stiftung, 2021[8]). However, this dietary trend could affect global markets if adopted by an increasing share of the population in these regions. In particular meat and dairy markets could be affected by a shift away from animal protein towards alternative protein sources. The food industry has already responded to this emerging trend by developing a range of new products and ingredients using different plant-based proteins (e.g. soy, pea), new animal sources (e.g. insects), and biotechnological innovations (e.g. cultured meat or fungal protein) (McKinsey, 2019[9]). However, at the global level, this trend is expected to be offset by rising demand for animal protein in middle-income countries.

Middle-income countries: Growing per capita incomes spur animal protein consumption

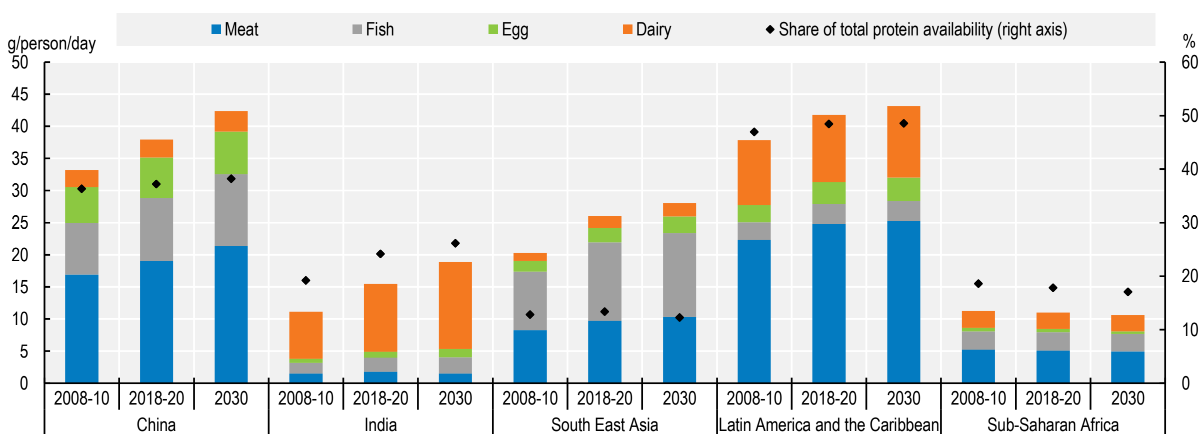
In middle-income countries, per capita availability of animal protein is projected to increase by 11% over the coming decade (+2.8 g/person/day), and to contribute to a growing share of total protein availability by 2030. However, income growth will result in higher demand for different animal products across countries and regions, depending on dietary preferences.

In China and South East Asia, meat and fish are expected to account for most of the increase in animal protein availability over the coming decade (+3.7 g/person/day and +1.4 g/person/day, respectively). The increase in meat consumption will be driven by both pigmeat and poultry in China, and entirely by poultry in South East Asia. Despite a 10% increase in per capita animal protein availability in South East Asia, the share of animal protein in overall protein availability will remain relatively low, at 12%, in 2030 (Figure 1.11).

In India, dairy products, which are an integral part of the diet, will account for 88% of the increase in animal protein availability over the coming decade (+3 g/person/day). Income growth in India will not result in higher meat consumption due to social and cultural factors; at least a quarter of the population is estimated to be vegetarian. The share of animal protein in overall protein availability will increase from 24% to 26%, over the coming decade (Figure 1.11). However, most protein will continue to come from crops, and in particular pulses, by 2030.

In Latin America, per capita consumption of animal protein is not expected to increase significantly as it is already at a high level; animal protein accounts for almost 50% of total protein availability in the region (Figure 1.11). Per capita consumption of dairy products, poultry meat and pigmeat will continue to expand over the coming decade, while beef consumption is projected to decline as consumers increasingly favour cheaper alternatives (poultry meat and to a lesser extent pigmeat).

Figure 1.11. Per capita availability of animal protein in selected middle and low-income countries/regions



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. South East Asia includes Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor Leste, and Viet Nam.
Source: FAO (2021). FAOSTAT Food Balances Database, http://www.fao.org/faostat/en/#data/FBS; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Low-income countries: Slow income growth prevents growth in animal protein consumption

Low-income countries have low per capita availability of animal protein, averaging 13.8 g/person/day in 2018-20. Over the coming decade, these levels are not expected to increase significantly (+0.2 g/person/day). While this stagnation is largely due to slow income growth following the COVID-19 pandemic, supply chain issues (e.g. lack of a cold chain infrastructure) remain a constraint in some areas, whereas dietary preferences for non-animal protein sources continue to limit demand growth in others. In Sub-Saharan Africa, the availability of animal protein is even projected to slightly decline over the coming decade, to 10.6 g/person/day in 2030 (Figure 1.11). The largest decline is expected for fish, as population growth is projected to outpace the expansion in fish supply.

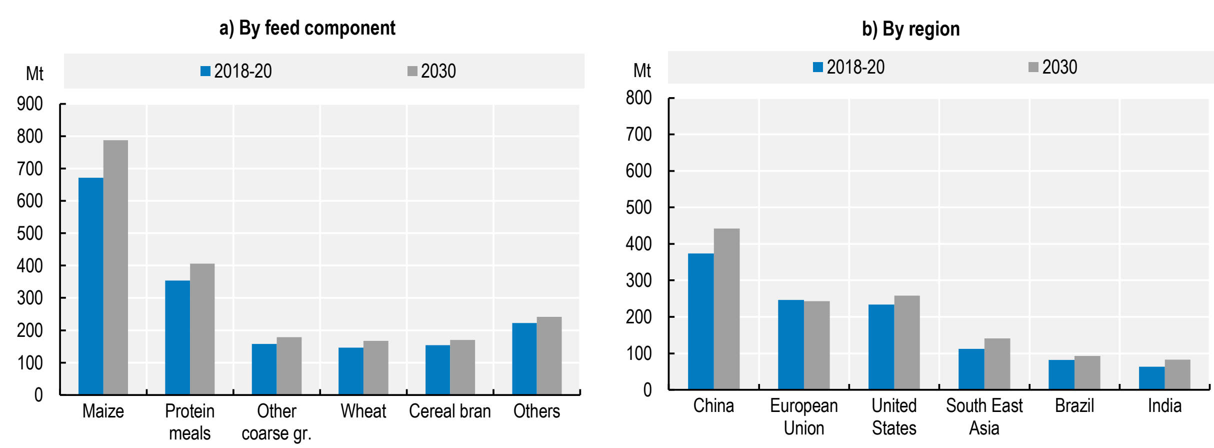
These developments in animal protein consumption will contribute to widen the gap in animal protein consumption between low-income countries and middle and high income countries over the coming decade. This gap is projected to increase by 3% to 48 g/person/day between low and high-income countries, and by 17% to 18.5 g/person/day between low and middle income countries. By contrast, the projections suggest that the gap in animal protein consumption between high and middle income countries will decline by 4%, to 30 g/person/day in 2030.

1.3.6. Feed use: Between efficiency gains and intensification

The ongoing evolution of global consumption patterns towards higher shares of animal products in diets has resulted in growing quantities of crops and other agricultural products being used as feed. In 2018-20, about 1.7 billion tonnes of cereals, protein meals and processing by products (e.g. cereals bran) were used as animal feed.[3] This amount is projected to increase by 14% over the coming decade, to reach 2 billion tonnes in 2030.

Maize and protein meal will remain the most important commodities used as feed, accounting for over 60% of total feed used by 2030 (Figure 1.12). Feed demand for maize and protein meal is projected to grow at 1.4% p.a. and 1.2% p.a., respectively, over the outlook period. Demand growth for protein meal is projected to slow down substantially compared to the last decade (+3.8% p.a. between 2011 and 2020), mainly reflecting efforts by large users (e.g. China, and the European Union) to lower the protein meal share in feed rations. In China, the liberalisation of the grain market since 2016 led to a drop in feed grain prices, which favours the use of maize (relative to protein meal) in the feed mix.

Figure 1.12. Demand for feed



Note: South East Asia includes Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor Leste, and Viet Nam

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Leading feed consumers (i.e. China, the United States and the European Union) will continue to account for half of total feed demand by 2030. Still, several low and middle income countries will experience stronger growth in feed demand over the coming decade, as their livestock sectors expand and intensify (Figure 1.12).

About 30% of the additional demand for feed will originate in China, where demand is expected to grow by 1% p.a. over the projection period. China's feed demand growth is projected to slow down compared to the last decade (3.8% p.a.) due slower growth in livestock production, and improvements in feeding efficiency owing to better management practices and animal genetics. The *Outlook* assumes that the average feed use per unit of livestock product will not change significantly following hog herd rebuilding from African Swine Fever (ASF), which started in 2020. While the move away from backyard production towards larger, modern production facilities could lead to intensification in compound feed use, these facilities also have better feeding efficiency than the first generation feed-based facilities, thus enabling a reduction in feed use per unit of output. The *Outlook* assumes that these two trends will offset each other.

Slow growth in feed demand is projected in the United States (0.6% p.a.) due to feed efficiency gains in the beef and pigmeat sectors, while in the European Union, feed demand is projected to slightly decline over the coming decade (-3 Mt between 2018-20 and 2030), mainly due to a drop in demand for protein meals (-0.6% p.a.). For the European Union, this rate reflects declining pig and other livestock herd, together with gains in feeding efficiency. However, the expansion of the poultry sector will sustain feed demand in the European Union up to 2030. The extensification and diversification of livestock production systems in some countries in the European Union (e.g. organic, pasture-based, GM free), however, could further reduce demand for protein meals in the future and stimulate demand for locally produced and/or non-GM feed, including pulses and other legumes (EC, 2020[10]).

In Brazil, feed demand is expected to grow in line with livestock production, at an annual rate of 1.3% over the coming decade. High feed demand growth is projected in South East Asia, at 2.2% p.a., with the region accounting for 10% of additional feed demand over the next ten years. Demand growth will mainly be on the account of high feed demand growth in Viet Nam (2.8% p.a.) and Indonesia (2.4% p.a.) due to fast expanding poultry production and based on the expected recovery of pigmeat production following the ASF outbreak. In India, strong growth in dairy production together with feed intensification will support a 2.4% p.a. growth in feed demand over the next ten years. In India and South East Asia, demand for protein meals is projected to rise over the coming decade, by 3% p.a. and 2.5% p.a., respectively, reflecting the intensification of livestock production as these countries move towards compound feed-based livestock production.

1.3.7. Asian middle-income countries drive biofuel demand growth

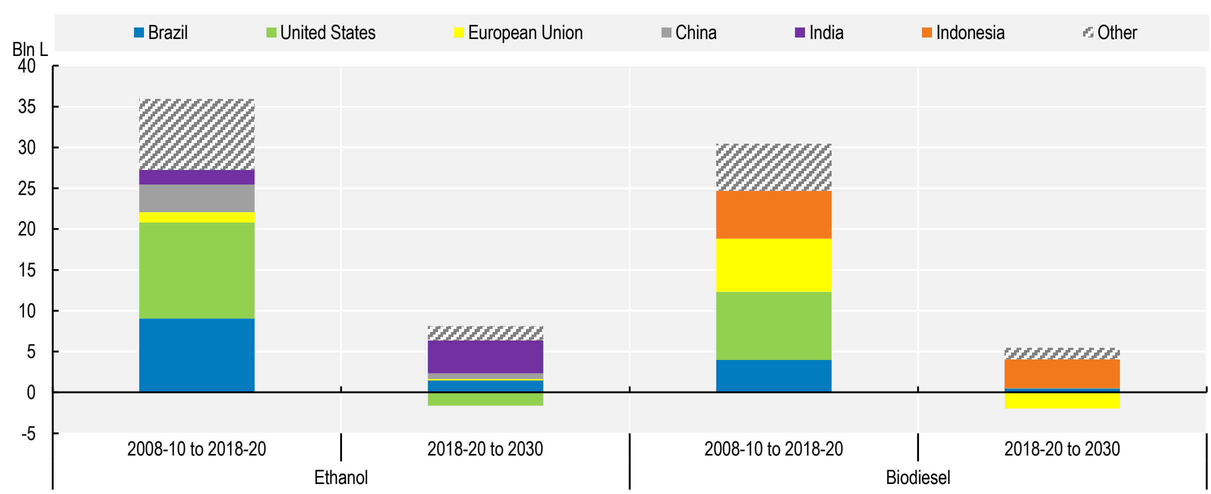
Since the early 2000s, demand for biofuels has increased significantly following the implementation of policies with three main objectives: (i) support countries' commitments to reduce their carbon dioxide (CO_2) emissions, (ii) reduce the dependency on imported fossil fuels and (iii) create additional demand for feedstock crops to support domestic producers.

While these drivers are assumed to persist over the coming decade, global demand for biofuels is expected to slow down considerably. Based on the expected recovery of the crude oil price following the COVID-19 pandemic, biofuel demand is projected to increase by 0.5% p.a. over the coming decade; well below the growth experienced over the last decade (4% p.a.). Most additional demand will originate in middle-income countries, mainly driven by higher blending rates, while in high-income countries, demand growth will be constrained by declining transport fuel demand and reduced policy incentives. As a result, global demand for feedstock crops is projected to slow down over the next decade.

Ethanol consumption is projected to increase by 5% over the next ten years; India accounting for over 60% of additional consumption (Figure 1.13). By 2030, India's ethanol blending rate is projected to reach 8%, supported by increasing domestic production of sugarcane-based ethanol. However, the *Outlook* assumes that the blending rate will remain below the E20 target set by the government for 2030, due to limited supply of feedstuff (mainly molasses). Ethanol consumption will also continue increasing in Brazil, although at a lower rate than over the last decade, driven by a high blend rate and growing fuel consumption. Together with Brazil's RenovaBio law, which aims to reduce fuel emissions by 10% by 2028, these factors are expected to support a 5% increase in ethanol consumption over the coming decade. Growing ethanol consumption will result in an increase in the use of sugarcane for biofuel production (+9%); biofuel maintaining its share of total sugar cane use at around 22% over the next decade. Biofuel use of molasses, the main feedstock for ethanol production in India and other Asian countries, is also projected to increase over the next ten years (+23%); with the biofuel sector increasing its share of total molasses use to 50% in 2030 (Figure 1.14).

In China and the United States, growth prospects for ethanol consumption are limited (Figure 1.13). In China, ethanol consumption will increase with higher fuel use; however, the growth rate will decrease significantly compared to the last decade. The government of China is not expected to implement a nationwide E10 mandate, as proposed in 2017, as this programme depends on maize stocks, which have been decreasing since 2017. Therefore, this *Outlook* assumes that China will maintain a lower 2% blending rate over the projection period. In the United States, declining gasoline use, together with the 10% ethanol blend wall, are projected to lead to a 3% decline (1.6 Mln L) in ethanol consumption over the next ten years. However, developments to promote higher blend rates in the United States could result in an increase in ethanol use. Biofuel use of maize –which is the main feedstock for ethanol production in China and the United States - will decrease over the coming decade (-3%), with the biofuel share of total maize use dropping from 15.8% in 2018-20 to 13.7% in 2030 (Figure 1.14).

Figure 1.13. Changes in biofuel consumption in key regions



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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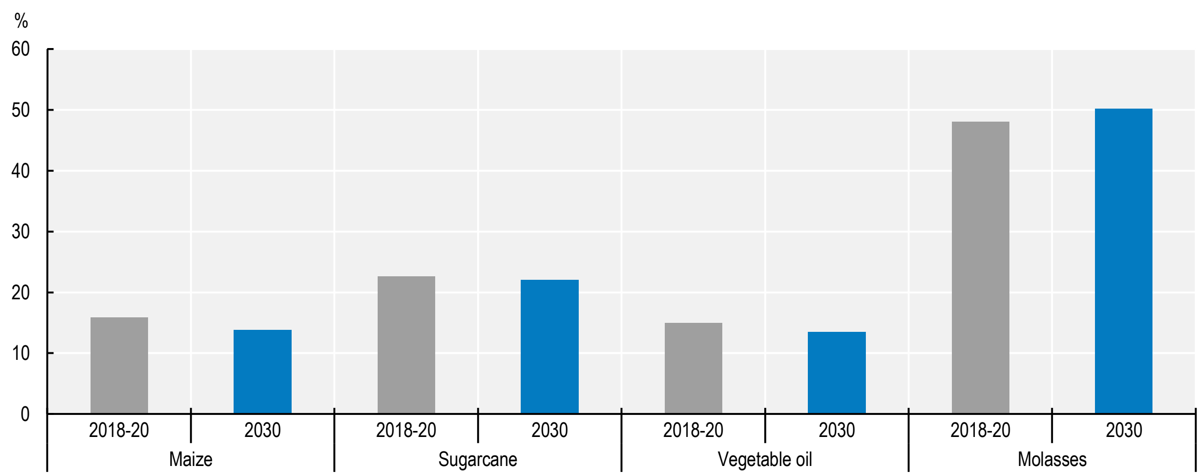
Biodiesel consumption is projected to increase by 7% over the coming decade; Indonesia accounting for two-thirds of additional consumption (Figure 1.13). The *Outlook* assumes that the government of Indonesia will successfully implement the B30 programme in 2020. The blending rate is assumed to remain fixed at 30% over the projection period, thus biodiesel demand is expected to increase along with total transportation fuel consumption. In the United States and the European Union, however, declining diesel use will constrain the growth in biodiesel consumption over the coming decade. In the European Union, biodiesel consumption will be further affected by the Renewable Energy Directive II, which sets limits on the use of biofuel feedstock (mostly palm oil) grown in carbon-capturing ecosystems such as forests, wetland and peatland. As a result, biodiesel consumption in the European Union is projected to decline by almost 2 Mln L over the next ten years. Based on projected developments in biodiesel consumption, biofuel use of vegetable oils is expected to increase by 5% over the coming decade; however, its share in total use is projected to drop from 15% in 2018-20 to 13.5% in 2030 (Figure 1.14).

The development of electric vehicle technology and policies supporting its adoption could further constrain the growth in biofuel consumption over the coming decade. This is especially true in high-income economies such as the United States, and the European Union as well as in China where green technologies are evolving rapidly and policies have been introduced to support the deployment of electric vehicles and charging infrastructure (IEA, 2020[11]).

Figure 1.14. Share of biofuel in total use



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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1.4. Production

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

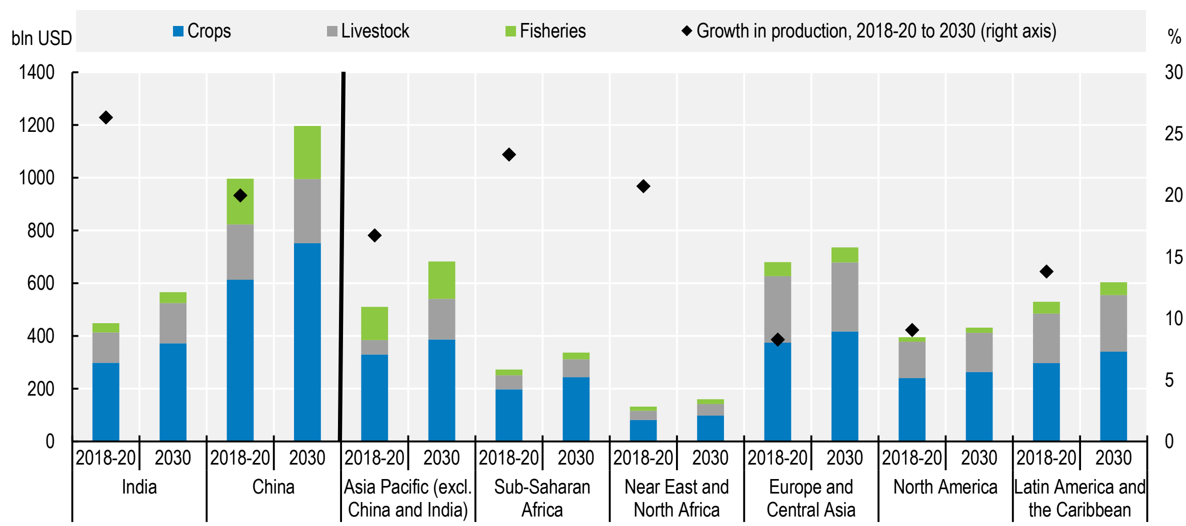
The *OECD-FAO Agricultural Outlook* projects future trends of production of the main livestock products (meat [beef, pork, sheet and poultry], dairy [butter, cheese, fresh dairy products, skim and whole milk powder] and eggs), fish (capture fisheries and aquaculture) and crop commodities (cereals, oilseeds, roots and tuber, pulses, sugar cane and sugar beet, palm oil and cotton). The *Outlook* projections break down agricultural output growth into its main determinants, namely growth in crop yields, area harvested intensification, cropland expansion, and growth in output per animal and herd expansion, across different sectors and regions.

Over the coming decade, global agricultural production[4] is projected to increase by 1.4% p.a.; a slowdown compared to the growth in output experienced over the last decade (1.7% p.a.).

The projections are based on the assumption that the measures on social distancing to contain the COVID-19 pandemic will mostly end in 2021. Specifically, thereafter, it is assumed that countries will not prolong restrictions on the movement of people, which limited the availability of agricultural labour resulting in increased production costs in several countries (International Labour Organization, 2020[12]), or the enforcement of strict health protocols, which had a strong negative effect on all labour intensive agricultural activities.

It is projected that production growth in agriculture will be predominantly located in emerging economies and low-income countries and will be driven by productivity-increasing investments in agricultural infrastructure and research and development, wider access to agricultural inputs and improved management skills in these regions. An additional driver of growth will be investments to mobilize production resources (e.g. land, irrigation water). On the other hand, growth in production in North America and in the Western European part of the Europe and Central Asia region is expected to be slower, largely due to constraints imposed by environmental policies (Figure 1.15).

Figure 1.15. Trends in global agricultural production



Note: Estimates are based on historical time series from the FAOSTAT Value of Agricultural Production domain which are extended with the *Outlook* database. Remaining products are trend-extended. The Net Value of Production uses own estimates for internal seed and feed use. Values are measured in constant 2014-2016 USD.
Source: FAO (2021). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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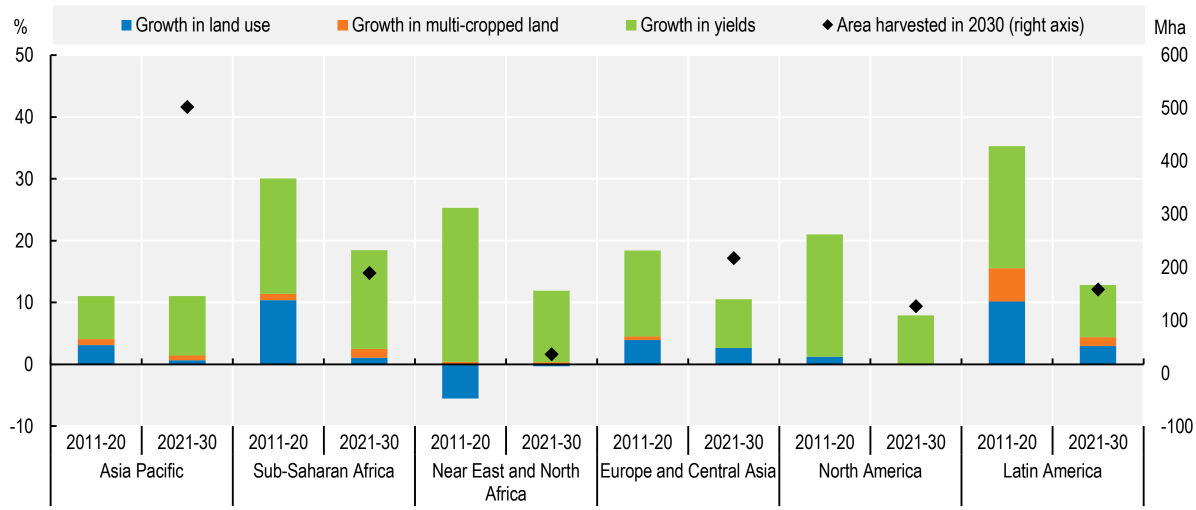
1.4.2. Yield increases drive crop production growth

Global growth in crop production is projected to total 18% over the coming decade.[5] The additional output is expected to originate mainly in the Asia and Pacific region (61%), due to developments in China (30%) and in India (16%). Latin America is expected to contribute to 10% of the additional output, while Europe and Central Asia are expected to contribute 9% together. The regional contributions of the Near East and North Africa and of Sub-Saharan Africa are expected to be around 5% each. Figure 1.16 shows the projected growth in yields, cropping intensities and total cropland for the crops covered in the *Outlook* in different regions.

Figure 1.16. Sources of growth in crop production



Note: Figure shows the decomposition of total production growth (2011-20 and 2021-30) into growth in land use, land intensification through growth in multi-cropped land, and growth in yields. It covers the following crops: cotton, maize, other coarse grains, other oilseeds, pulses, rice, roots and tubers, soybean, sugarbeet, sugarcane, wheat and palm oil.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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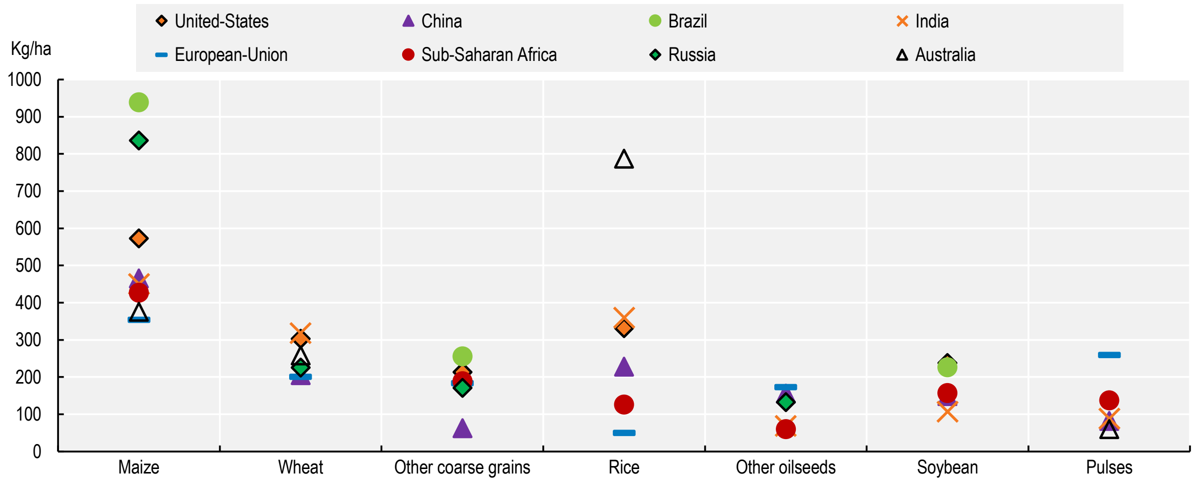
Yields

Globally, yield growth is expected to account for 88% of the overall expansion in crop production to 2030. Projected growth rates for the main agricultural commodities differ by country, due to differences in agro-climatic conditions and production technology, among others. It is generally assumed that yield gaps, which can be largely attributed to the latter are going to narrow. India and countries in Sub-Saharan Africa are expected to improve the yields of their key crops through better adapted seeds and improved crop management (Figure 1.17).

In high-income countries and emerging economies, the *Outlook* assumes that yield increases will come mainly from improvements in cultivated varieties and the adoption of precision farming technology to optimize the application of water, fertilizer and agri-chemicals (FAO, 2020[13]) (Figure 1.17). However, yield growth rates in high-income countries are expected to be on the low side. Yields in these countries are already at high levels and output growth is conditioned by environmental and food safety policies. Climate change will also affect the projected yield growth path over the coming decades; slowing it down in many regions while enhancing it in others.

In Sub-Saharan Africa, yield growth is expected to come from improved seeds and increased use of fertilizer and pesticides, as well as increased mechanisation, and from the use of extension services such as training to farmers (Figure 1.17). The assumed yield progress in the region depends critically on the continuation and expansion of government support programmes that provide farmers with services, as well as on the continuation of public and private investments in storage and transportation infrastructure to minimise on-farm losses.

Figure 1.17. Growth in projected yields for selected crops and countries 2021 to 2030



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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The production projections for Sub-Saharan Africa assume that public spending and private investments necessary to underpin this growth will occur. Any disruption of the later – for example, due to the continuation of the COVID-19 pandemic and related expenditures in sectors other than agriculture (e.g. health infrastructure) or deterioration of African countries' fiscal space due to domestic currency depreciation, increasing borrowing costs and falling tax revenues (United Nations Economic Commission for Africa, 2020[14]) – may have adverse effects on public expenditure for agriculture and as a result on the projected yields. Box 1.2 discusses the potential for growth in agricultural productivity in Africa.

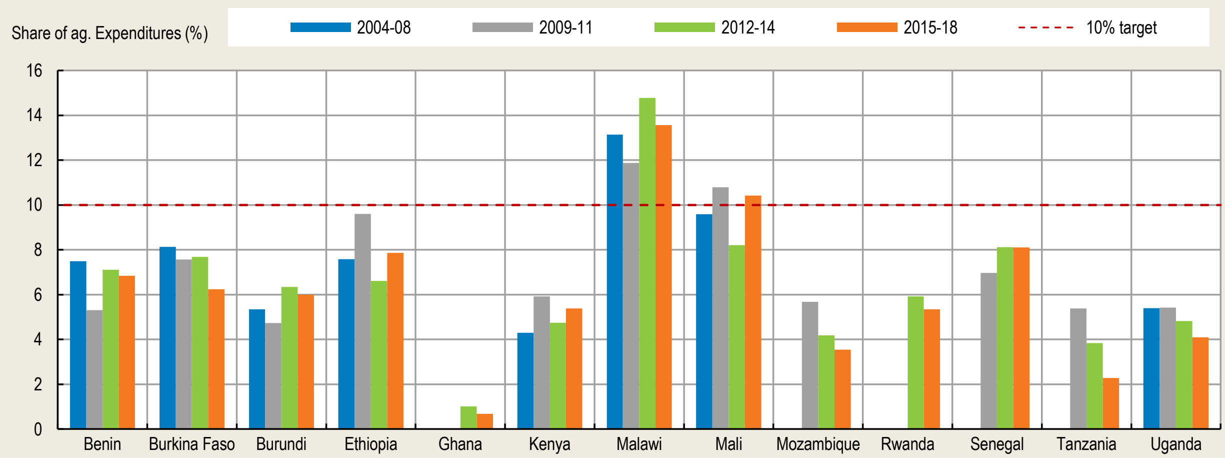
Box 1.2. Public expenditure and growth potential for agricultural productivity in Africa

Public expenditure in agriculture is a key tool to support agricultural transformation, alleviate poverty and increase food security. For countries with limited public resources and strong economic reliance on the agricultural sector, increasing public spending on agriculture is critical for improving agricultural productivity. The importance of increasing public spending on agriculture has been well acknowledged by member countries of the African Union (AU), which agreed in the 2003 Maputo Declaration to allocate at least 10% of overall public spending (i.e. national budget and private funds) to agriculture. This commitment was renewed in 2014 in the Malabo Declaration.

However, a review carried out by FAO's Monitoring and Analysing Agricultural Policies in Africa (MAFAP) programme of selected sub-Saharan African countries' expenditure trends in relation to the Comprehensive Africa Agriculture Development Programme (CAADP) commitments suggests that during 2004-2018, total public spending on agriculture in the studied countries averaged around 6% – well below the 10% target.[1] Only Malawi in all years and Mali in some years achieved the target set out by the Maputo and Malabo Declarations (Figure 1.18). Furthermore, for most of the analysed countries, public spending on agriculture has declined in recent years. This trend can be explained by the narrow fiscal space of countries to sustain increased spending on agriculture, competing development priorities, and by low budget implementation rates that led to lower actual spending compared to what had been budgeted for (during 2004-2018 approximately one-fifth of the total budget for agriculture went unspent).

Agricultural funding in Sub-Saharan Africa relies significantly on donor contributions, which accounted for an average 36% of the total agricultural expenditure in the analysed countries during 2004-2018. On average only 60% of donor funds are spent. Donor funded programmes are usually large and focused on capital investments, and they often require legislative approvals, procurement and management rules and plans that make their realization more complex.

Figure 1.18. Share of actual public expenditure on agriculture over total budget



Note: Expenditure on agriculture here is the aggregate closest to the CAADP definition and it corresponds to agricultural-specific expenditure as tracked by MAFAP, excluding transfers to food consumers (e.g. cash transfers and food aid).
Source: Pernechele, V., Fontes, F., Baborska, R., Nkuingoua, J., Pan, X. & Tuyishime, C. (2021). Public expenditure on food and agriculture: trends and challenges in Sub-Saharan Africa, FAO Publications, Rome.

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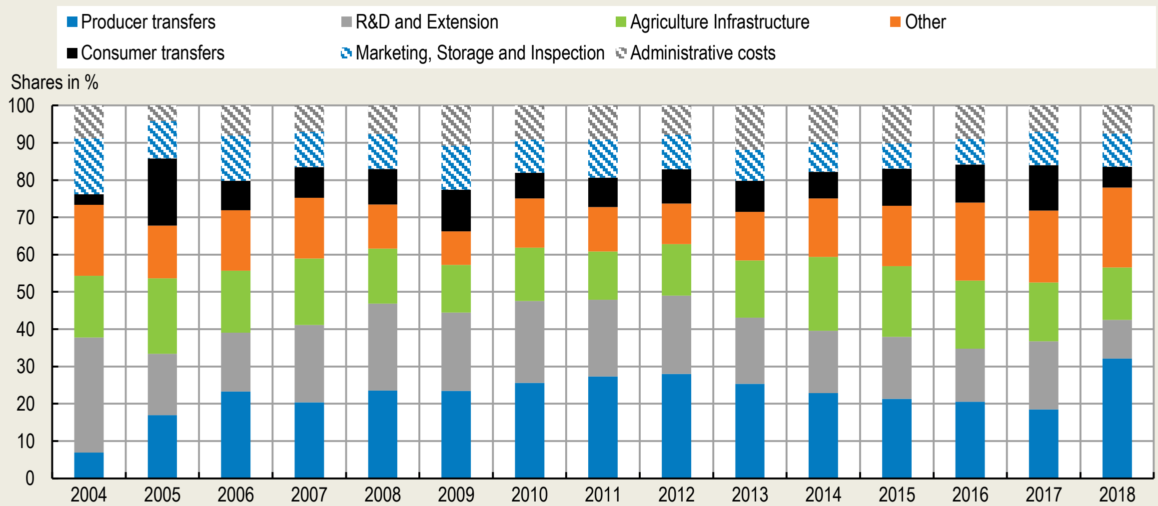
Across the analysed countries, public spending on agriculture consists mainly of transfers to agricultural producers (i.e. variable input subsidies, capital subsidies and other on-farm services) and to consumers (i.e. food aid, cash transfers and school meal programmes) (Figure 1.19). On average, during the period 2004-2018, these two types of expenditures accounted for over 30% of total spending on food and agriculture for the countries studied. Spending on research and knowledge dissemination (including extension, technical assistance and training) accounts for the second largest share, representing an average 18% of the total expenditures on food and agriculture. Investments in agricultural infrastructure, which mainly include feeder roads and off-farm irrigation, accounted for 16% of total expenditures and increased over the period 2004-2018 in Eastern and Southern African countries. Expenditures targeting other actors in the food and agricultural system, such as processors, traders or inputs suppliers, remained limited. Around 25% of the donor funding over the period 2004-2018 focused on agricultural infrastructure, such as roads and off-farm irrigation. Overall, lower execution rates and the higher volatility of donor-funded expenditures compared to national outlays have contributed to implementation issues of donor-funded projects.

The breakdown of these expenditures suggests that funding to factors that enhance land productivity the most, such as research and knowledge dissemination and agricultural infrastructure (particularly irrigation), is lagging behind. The fact that infrastructure and research outcomes require a longer-term strategy may help explain these limited expenditures, since political turnover usually occurs on a four-year cycle that leaves little time for long-term planning. The recent contraction of extension and research and development expenditures is especially worrying, given that these are recognized to have the strongest effect on agricultural growth and poverty reduction.

Figure 1.19. Trend of expenditure shares over total expenditures on food and agriculture, average for all countries by year



Source: Pernechele, V., Fontes, F., Baborska, R., Nkuingoua, J., Pan, X. & Tuyishime, C. (2021), *Public Expenditure on Food and Agriculture: Trends and Challenges in Sub-Saharan Africa*, FAO Publications, Rome.

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Increasing public agricultural expenditure in Sub-Saharan Africa and spending more on high-return investments in agricultural productivity are key challenges for the region. Major constraints include the accumulation of public debts, the effects of the COVID-19 pandemic on the global economy and on the financial space of African countries coupled with the potential contraction of donors funding and the need to increase resources allocated to healthcare and social safety nets. Regarding donor-funding, poor execution rates and slow and bureaucratic procedures are two important reasons behind donor funding variability and represent key bottlenecks in the implementation of donor projects.

These challenges can hinder prospects for agricultural production, productivity, and commercialization growth in Sub-Saharan Africa. As long as there is underinvestment in agricultural infrastructure needed for mobilizing new agricultural land (e.g. feeder and rural roads and irrigation), from both the public and private sectors, the expansion of cropland in Sub-Saharan Africa over the next decade in the *Outlook* would also be limited. Future yield increases in the *Outlook* are also constrained, as they are contingent on funding for research into new varieties, adequate training of farmers and access to agricultural extension services.

Note: 1 The MAFAP methodology is not the official tool to monitor country performance in achieving the CAADP target on agricultural public spending. In this analysis, data compiled by MAFAP is made comparable to the expenditure definition used by CAADP, by excluding certain spending categories. However, MAFAP and CAADP aggregates may still differ slightly, due to differences in the methodologies and the way these are implemented by countries to report their spending to CAADP.
Source: Pernechele, V., Fontes, F., Baborska, R., Nkuingoua, J., Pan, X. & Tuyishime, C. (2021), *Public Expenditure on Food and Agriculture: Trends and challenges in Sub-Saharan Africa*, FAO Publications, Rome.

Cropping intensity

Globally, the increase in cropping intensity is projected to account for 7% of the overall growth in global crop production to 2030. Such practices play an important role in increasing land productivity (Ray and Foley, 2013[15]).[6]

The increase in cropping intensity, shown in Figure 1.6, will be driven by the adoption of multi-cropping and new crop varieties and by investments to expand the growing season through technological improvements (e.g. irrigation systems that allow cultivation during the dry season). Particularly in Brazil and Argentina, double-cropping of soybeans and maize and of soybeans and wheat is utilized to maximize land productivity. In Asian countries, the increase in cropping intensity will be achieved by the expansion of double-cropping of paddy rice with cereals, pulses and vegetables as the second crop. The potential for increasing cropping intensity in North America and Europe will remain limited because of agro-ecological conditions.

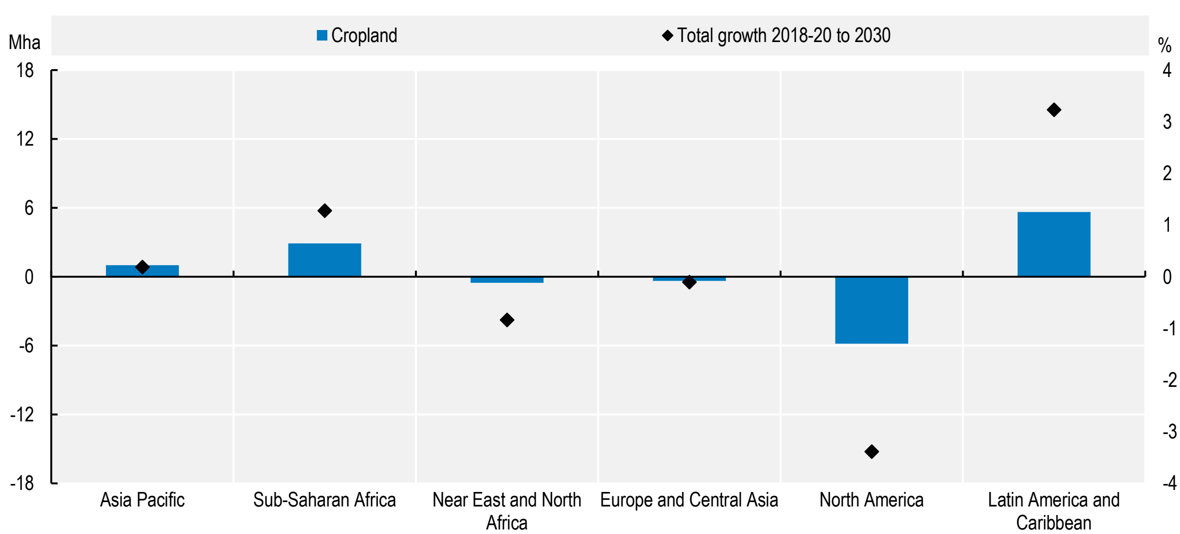
Land use

Expansion of cropland is projected to account for 6% of total growth in crop production over the next decade. The decreasing importance of cropland expansion relative to yield and cropping intensity is expected to continue in the coming decade as the transition to more intensive production systems is foreseen to continue.

Cropland is projected to expand mainly in Latin America, by 5.7 Mha over the coming decade (Figure 1.20). This is mostly because large-scale commercial farms in the region are expected to remain profitable, leading to investments in the cultivation of new land. In China, cropland is expected to expand by 1.5 Mha, mainly from conversion of pastureland into cropland.

By contrast, in regions such as the Near East and North Africa, the cultivation of additional cropland remains constrained by natural conditions. No expansion is foreseen in this region, owing to the lack, or the prohibitive cost of irrigation.

Figure 1.20. Change in cropland, 2018-20 to 2030



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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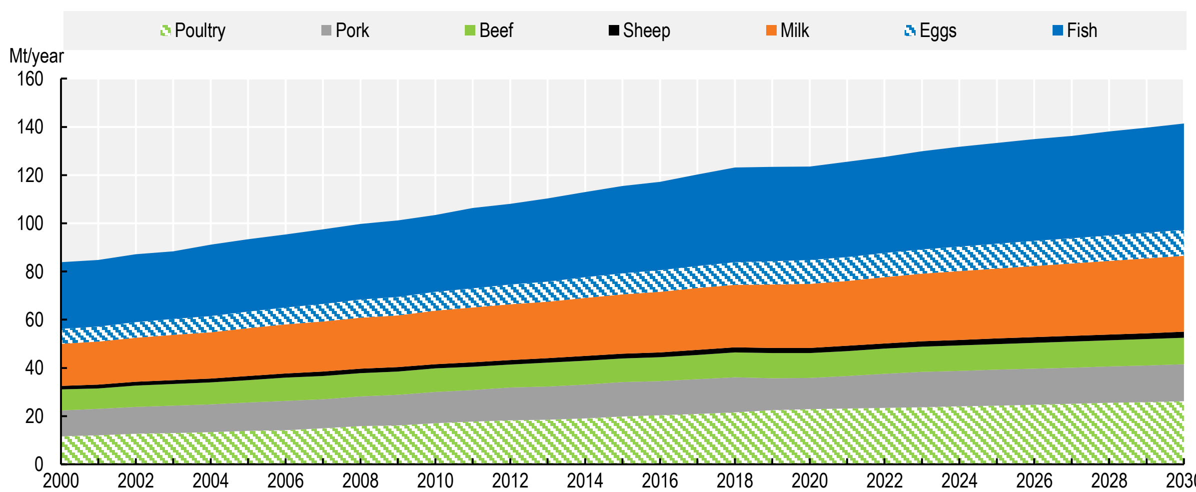
1.4.3. Livestock and fish production concentrated in a few countries

Over the outlook period, global livestock and fish production is expected to expand by 14%. Similar to growth in crop production, the majority of this growth (82%) is expected to originate in middle- and low-income countries, however, a few countries/regions will continue to dominate global livestock and fish production, namely China, India, Brazil, the United States, and the European Union.

Livestock production in Asian countries is expected to recover after the ASF outbreak subsides in 2021, while fisheries and aquaculture have already been benefitting from the supply gap in meat. Taken together, the livestock and fish sectors are projected to grow by a total of 17% over the next decade. China is expected to account for about half of the additional output of animal products in the Asia and Pacific region. Latin America is projected to expand its livestock and fish production by 15%, which accounts for 38% of global output growth, driven mostly by the expansion of Brazil's export-oriented livestock sector. Sub-Saharan Africa and the Near East and North Africa region are expected to increase their livestock and fish production by about 22% each, but from a low base, keeping their output share at about 10%.

Over the coming decade, milk and poultry outputs are projected to grow at the highest rates, at 22% and 17%, respectively (Figure 1.21). In most countries, the larger output of meat and milk will be achieved by increasing the number of animals and improving the output per animal per year. Higher output per animal in turn will be mainly achieved through more intensive feeding practices, improved genetics and better herd management practices. The following Sections highlight the projections for each livestock sub-sector.

Figure 1.21. Global livestock and fish production



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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

Over the coming decade, global meat production is expected to increase by 13% (44 Mt), due to increases in the number of animals and higher output per animal.[7]

Poultry meat production is expected to account for 52% of the global growth in meat production. Favourable market conditions support the increase in poultry meat production by 17% (23 Mt), with China accounting for 13% of overall growth. Brazil is expected to account for 10% of the growth in poultry meat production, while the United States, will contribute to 12%. In Europe, production is expected to remain stable in the coming decade as no expansion of the flock is foreseen and per-animal output is also not expected to grow further.

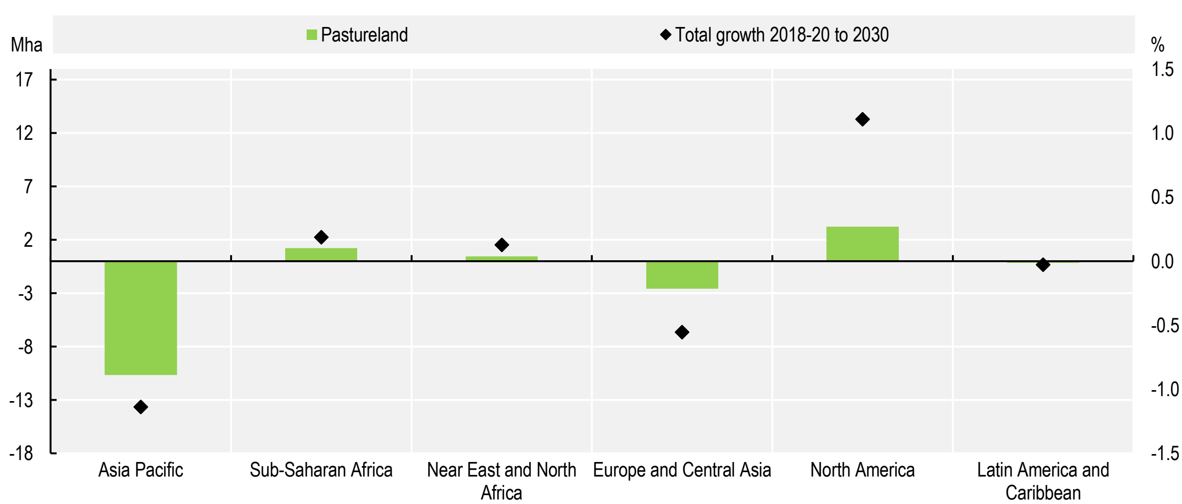
The recovery from the ASF disease, mainly in Asian countries, will lead to an increase in pigmeat production over the coming decade assuming no zoonotic outbreaks. Global pigmeat production is expected to increase by about 14 Mt, accounting for 33% of the growth in total meat production. More than 66% of it is expected to come from the production recovery in Asian countries by 2023, particularly China and Viet Nam. In other major producing regions, mainly the Americas, pigmeat production is expected to growth by about 8%, driven by improvements in animal breeding and further intensification of production systems.

Global beef production is projected to increase by only 6% (+4 Mt) over the next decade and account for 9% of the total growth in meat production. This slow growth will be mainly attributable to weak demand growth and the resulting limited growth potential, which is expected to depress investments in the Americas. Expected higher production costs are behind the projected supply reduction in suckler cows in Europe and Australia, curtailing or stalling their beef output by -7% (-0.5 Mt) and 14% (+0.3 Mt), respectively. The world's largest producing regions – North America and Latin America– will maintain their market shares throughout the next decade (at about 20% and 32% of the global beef meat production, respectively). Sub-Saharan Africa is projected to expand its pasture-based beef production by 15% over the next decade, albeit from a small base.

Finally, sheep and goat meat production is expected to expand by 16%, equivalent to 3 Mt, and accounts for 6% of the growth in total meat output over the next decade. China's production is expected to expand by 0.7 Mt. A significant production increase is expected in Sub-Saharan Africa (0.7 Mt), mainly for serving domestic demand, which is expected to account for 26% of global growth. The projected production growth in the region will be mainly driven by herd expansion, since production is based on extensive semi-nomadic systems. Herd rebuilding in New Zealand, the world's dominant sheep meat exporter, and the continuation of tight supplies in Australia, where sheep herds decreased from 2017-2020 due to adverse weather conditions, are expected to keep production at the same level as during the 2018-20 period.

Developments in the meat and dairy sectors determine the projected evolution of pastureland. In order to accommodate the increasing ruminant production (especially sheep and goats) in Sub-Saharan Africa, pastureland is expected to expand by 1.2 Mha. The projected expansion in livestock production in North America results in additional pastureland (+3.22 Mha), provided through the conversion of marginal cropland (Figure 1.22).

Figure 1.22. Change in pastureland, 2018-20 to 2030



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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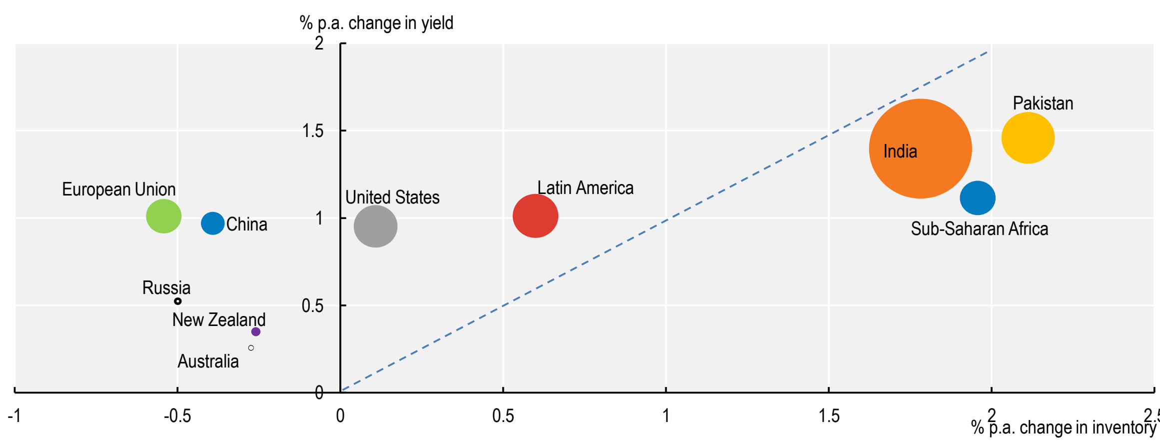
Pastureland is projected to decline by 10.7 Mha in Asia and Pacific due to the expected substitution from ruminant to non-ruminant production, particularly pigmeat (following the expected recovery from ASF) and poultry, as well as a shift of ruminant production to more feed-intensive production systems, which require less pastureland.

1.4.5. Dairy will be the fastest expanding livestock sector

Dairy is expected to be the fastest expanding livestock sector over the next decade, with global milk production projected to increase by 22%. Increased dairy production will be driven by expanding yields due to optimization of milk producing systems, improved animal health, better genetics and improved efficiencies in feeding, and expansions in the inventory of milking animals. The production increase will be largely supported by consumer demand for fresh dairy products in Asian countries. India and Pakistan are expected to account for more than 30% of global milk production by 2030. In these countries, milk is mainly produced by smallholders in extensive pastoral systems; thus, output growth will be mainly due to an increase in dairy herds (Figure 1.23). However, both countries are expected to see intensification of pasture use and as a result a limited expansion of pastureland.

Figure 1.23. Changes in inventories of dairy herds and yields, 2021 to 2030



Note: The size of the bubble reflects absolute growth in dairy production between 2018-20 and 2030.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Milk production growth among key dairy exporters, such as the European Union, the United States and New Zealand, will be constrained by tighter environmental regulations. Herds are expected to decline in the European Union and New Zealand and to remain unchanged in the United States, but milk yields are expected to grow due to improved efficiency in feeding and in grass management. In Latin America, dairy production will be driven by strong domestic demand. Output growth will be supported by strong growth in milk yields (more than 1% p.a. increase over the coming decade) together with expansion in the dairy herd (Figure 1.23).

In Sub-Saharan Africa, dairy production depends on small ruminants which implies lower milk yields. Hence, while production growth in Sub-Saharan Africa will be marked (33%), output will remain at much lower levels compared to other regions because an important share of milking animals in this region consists of small ruminants (e.g. goats), which are characterized by lower milk yields than cows. Production growth in Sub-Saharan Africa will be mainly due to herd expansion (Figure 1.23).

About 60% of fresh milk is projected to be consumed in the form of minimally processed dairy products such as fresh pasteurised milk or yoghurt. The remaining 40% will be further processed into butter, cheese, skim milk powders or whole milk powders. Production growth of butter is expected to be as high as the one of raw milk, while production of all other processed dairy products is expected to grow at lower rates. Lower cheese production growth will be driven by slower growth in food demand in Europe and North America, whereas lower production of whole milk powder (WMP) will be due to reduced demand in Asian countries.

1.4.6. Slowing growth in aquaculture limits growth of global fish production

Global fish production is projected to grow at 1.2% p.a. to 201 Mt by 2030, a relative slowdown compared to the 2.1% p.a. growth of the previous decade. The growth in fish production is primarily driven by continuing but slower progression in aquaculture production. This reflects the higher initial level of aquaculture production and the result of policies to reduce its environmental impacts in China. Aquaculture production is expected to reach 103 Mt by 2030 (+2% p.a.), while capture fisheries production is projected to total 97 Mt in 2030 (+0.4% p.a.). However, changes in government support to fisheries as a result of policy changes in China and negotiations at the World Trade Organization (WTO) may impact the growth in capture production (OECD, 2020[16]). Aquaculture production is expected to overtake capture fisheries production in 2027 and to account for 52% of all fish production by 2030.

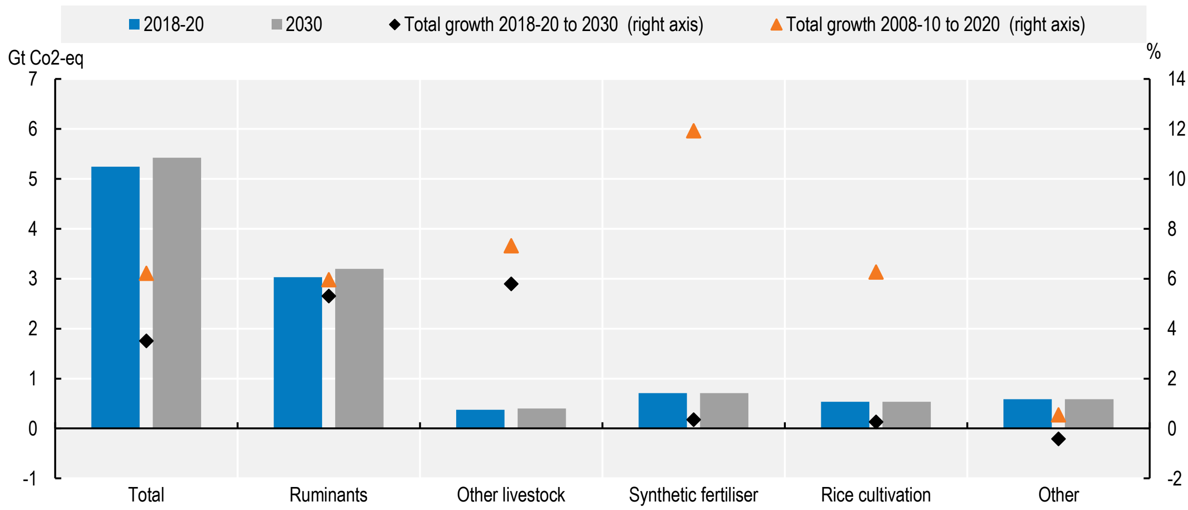
Fish production is projected to expand in all continents, with most of the growth occurring in Asia. With a projected annual growth of 1.4% p.a., the region is projected to experience the strongest growth in fish production between 2021 and 2030. Asia will consolidate its position as the main producing region, accounting for 88% of global aquaculture production and 71% of global fish production by 2030. Africa is projected to experience the second fastest growth in production, at 1.2% p.a. over the outlook period. Capture fisheries production will remain dominant in Africa but aquaculture production will expand strongly. America, Europe and Oceania, are all expected to experience growth rates under 1% p.a. by 2030. These slower growth rates reflect modest growth in capture fisheries production and the lower contribution of aquaculture to total fish production in these continents.

1.4.7. The carbon intensity of agricultural production is declining

Direct emissions from agriculture account for about 12% of global greenhouse gas (GHG) emissions. When taking into account the indirect effect of agriculture on land use change, agriculture's contribution to global GHG emissions increases from 12% to 21% (IPCC, 2019[17]). Given its large and potentially growing contribution to total emissions and the availability of cost effective mitigation options, the sector can make an important contribution, along with other sectors, to the climate stabilisation objectives of the Paris Agreement (Henderson et al., 2021[18]).

Assuming no changes in current policies and on-trend technological progress, direct agricultural GHG emissions are projected to grow by 4% between 2018-20 and 2030 (Figure 1.24).[8] Livestock will account for more than 80% of this global increase. Global land use change emissions are not projected in this *Outlook*.

Figure 1.24. Direct GHG emission from crop and livestock production, by activity



Note: Estimates are based on historical time series from the FAOSTAT Emissions Agriculture databases which are extended with the *Outlook* database. Emission types that are not related to any *Outlook* variable (organic soil cultivation and burning Savannahs) are kept constant at their latest available value. The category "other" includes direct GHG emissions from burning crop residues, burning savanna, crop residues, and cultivation of organic soils.
Source: FAO (2021). FAOSTAT Emissions-Agriculture Database, http://www.fao.org/faostat/en/#data/GT; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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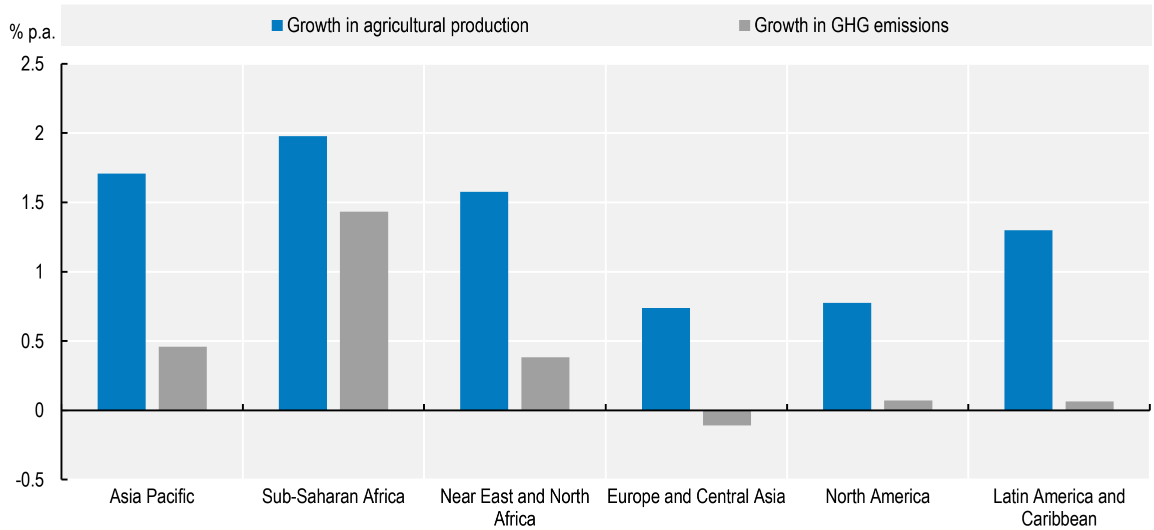
Most of the increase in direct emissions is projected to occur in middle and low-income regions due to higher output growth in production systems that are more emission intensive. In Sub-Saharan Africa, direct GHG emissions are projected to increase by 16% over the coming decade, and the region is expected to account for 62% of the total growth in direct GHG emissions from agriculture.

Global agricultural emissions are set to increase but the carbon intensity of agricultural production is expected to decrease over the next decade (Figure 1.25). In all regions, the growth in agricultural production is expected to exceed the growth in direct GHG emissions from agriculture. This development is driven by both yield improvements and a declining share of ruminant production in total agricultural production. In Europe and Central Asia, direct GHG emissions from agriculture are projected to decrease by 1% over the next decade, despite agricultural output growing by 8%. In most middle- and low-income countries slower growth in ruminant production will be the main driving factor of the reduction in the emission intensity. A further reduction in the carbon intensity of agricultural production could be achieved by large-scale adoption of emission-reducing policies, technologies and practices.

The *Outlook* assumes a continuation of current policies for mitigating GHG emissions from agriculture. However, some countries have recently set GHG emissions targets for agriculture and included the sector in national mitigation plans to help meet their commitments under the Paris Agreement (Henderson, Frezal and Flynn, 2020[19]). These targets and the policies being developed to achieve them could affect the GHG emissions projections.

Figure 1.25. Annual change in agricultural production and direct GHG emissions, 2021 to 2030



Note: This figure shows projected annual growth in direct GHG emissions from agriculture together with annual growth in the estimated net value of production of crop and livestock commodities covered in the *Outlook* (measured in constant USD 2014-16 prices). Estimates are based on historical time series from the FAOSTAT Emissions Agriculture databases which are extended with the *Outlook* database. Emission types that are not related to any *Outlook* variable (organic soil cultivation and burning Savannahs) are kept constant at their latest available value. The category "other" includes direct GHG emissions from burning crop residues, burning savanna, crop residues, and cultivation of organic soils. The Net Value of Production uses own estimates for internal seed and feed use.
Source: FAO (2021). FAOSTAT Emissions-Agriculture and Value of Agricultural Production databases, http://www.fao.org/faostat/en/#data ; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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1.5. Trade

Since the early 2000s, growth in agricultural trade has been facilitated by a lowering of agro-food tariffs, reforms to trade-distorting producer support, and the signing of multiple trade agreements. Agricultural trade has also been supported by strong economic growth in emerging countries, particularly in China, and by growing demand for biofuels as countries seek to reduce their CO_2 emissions and their dependence on fossil fuels. This expansion in trade has contributed to a more efficient allocation of agricultural production across countries and regions.

Over the coming decade, trade will increasingly reflect diverging demand and supply developments among trading partners. Some regions are projected to experience large population or income-driven increases in food demand but do not necessarily have the resources for a corresponding increase in agricultural output. Moreover, socio-cultural and lifestyle-driven changes in consumption patterns are transforming the profile of demand in most regions. Agricultural trade will therefore play an increasing role in ensuring global food security and nutrition over the next decade, by connecting producers to diversified consumer demand around the world.

Divergent productivity growth, climate change impacts on production, and developments in crop and animal diseases, on the other hand, will affect supply. Trade will help smooth food supply fluctuations and pool production risks across countries, acting as a buffer in case of domestic or external shocks.

In this context, a well-functioning, transparent and predictable international trading system will be essential to mitigate emerging regional imbalances and support sustainable global development, particularly with regard to meeting the SDGs. Trade has been identified as a means of implementation for achieving SDG 2, which aims to ‘’end hunger, achieve food security and improved nutrition and promote sustainable agriculture” (Gadhok et al., 2020[20]).

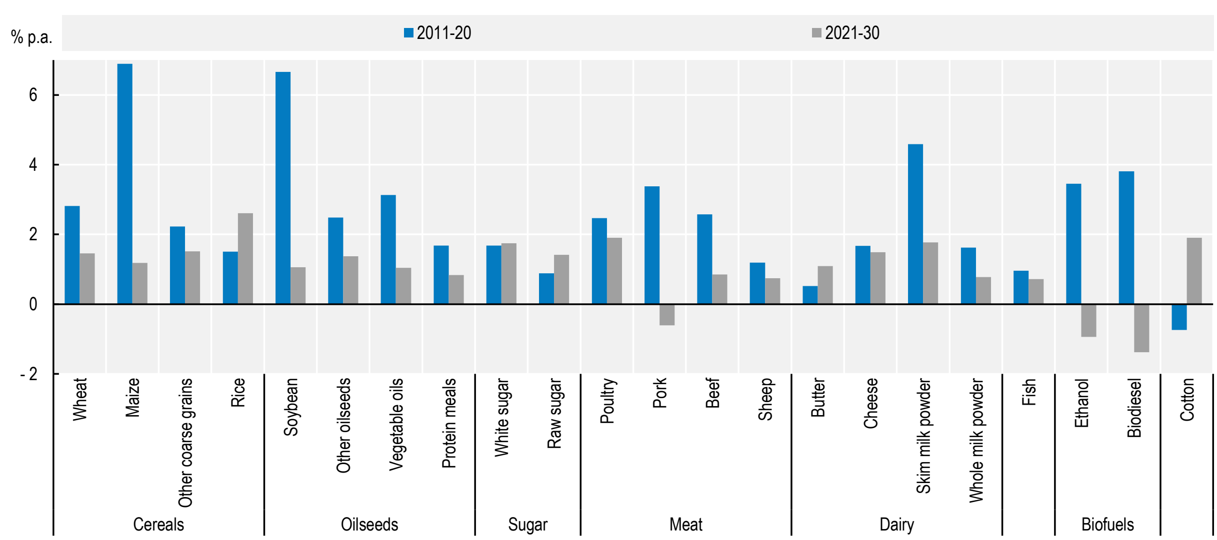
1.5.1. Growth in agricultural and fish trade is slowing

Over the coming decade, agricultural trade will continue to expand for most commodities, although at a slower pace than over the last decade due to a slowdown in demand growth in China and other emerging economies, and lower global demand for biofuels. Average trade volume for the commodities covered in this *Outlook* is projected to grow at 1.3% p.a. over the projection period, compared to 3% p.a. over the previous decade. The projections indicate a clear slowdown in trade across most commodities (Figure 1.26).

For biofuels and pigmeat, trade is expected to decline over the coming decade. The drop is biodiesel trade (-1.4% p.a.) mainly reflects declining import demand for palm oil biodiesel in the European Union and high domestic demand in Indonesia, as the country seeks to implement its B30 program. Ethanol trade is also expected to decline, albeit at a lower rate (-1% p.a.), mainly due to lower exports from the United States as its ethanol production is decreasing.

After peaking at 12 Mt in 2020, pigmeat trade is also projected to slightly decline over the coming decade (-0.6% p.a.). The outbreak of ASF in China and in several countries in Asia (e.g. Viet Nam) caused a surge in import demand for pigmeat in 2019-20, which was largely met by growing exports from the European Union, the United States, Canada, and Brazil. As China’s pigmeat production gradually recovers, pigmeat trade is expected to slow down (Frezal, Gay and Nenert, 2021[21]).

Figure 1.26. Growth in trade volumes, by commodity



Note: Annual growth rate of trade volumes as calculated from 2014-16 reference prices.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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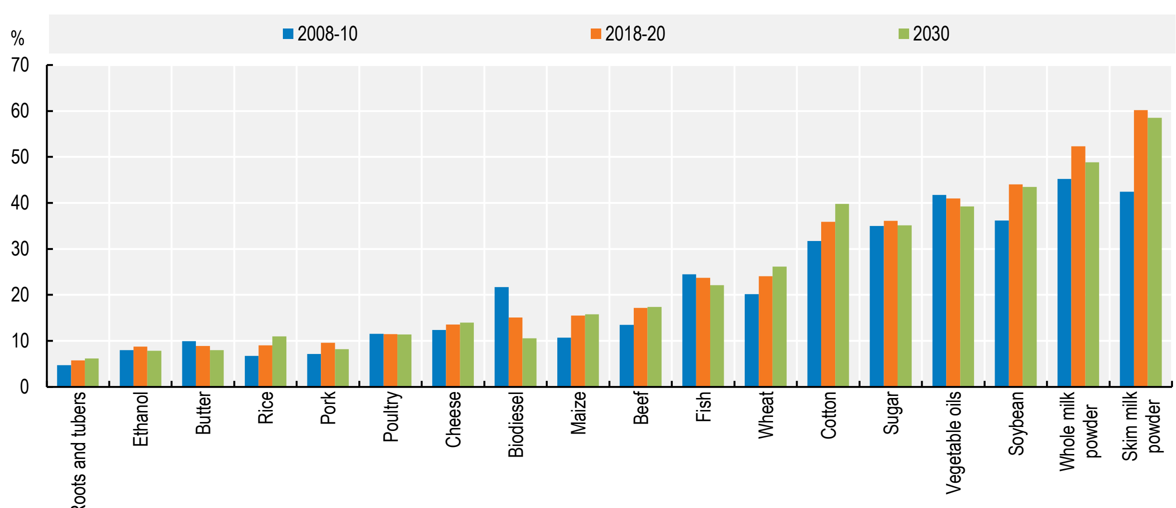
Notable exceptions to the overall slowdown in agricultural trade are rice and cotton. Rice trade is projected to grow at 2.6% p.a. over the coming decade, compared to 1.5% p.a. over the last ten years. The growth in global rice trade will be supported by production surplus in India, as output is expected to grow at a higher rate than domestic demand. India’s rice surplus will be mainly directed to Sub-Saharan Africa, where rice imports are projected to increase by 90% over the next ten years. Trade in cotton is also expected to expand faster than over the last decade (+1.9% p.a.), reflecting the growing demand for raw cotton by the textile industry, which is mostly located in countries with limited production potential (e.g. Bangladesh, Viet Nam). High import demand for raw cotton will be largely met by growing exports by the top exporters i.e. the United States, Brazil, and Sub-Saharan Africa.

1.5.2. Trade relative to output is stabilising

The share of production traded for the commodities covered in the *Outlook* has been gradually increasing over time, rising from an average of 15% in 2000, to 23% in 2018-20, and reflects a trade sector that has been growing at a faster pace than agricultural production. Assuming a diminishing impact of previous trade liberalisation that boosted global agricultural trade and no major changes in policies, trade relative to production will stabilise over the next decade, as growth in trade is expected to be more closely aligned with output growth.

However, this average masks important differences in the role of trade by commodity (Figure 1.27). For many agricultural commodities the share of production traded is actually low. Only for some commodities does trade represents at least one-third of global production. This is the case for cotton, sugar, soybean, vegetable oils and milk powders, which are demanded for further processing. The share of production traded for some of these commodities has been strongly increasing over the last decade. For milk powders, this mainly reflects growing import demand for WMP in China, and skim milk powder (SMP) production surplus in the European Union and the United States, which was mainly directed to developing countries. High feed demand in China, on the other hand, caused a rise in import demand for soybean which was largely met by growing exports from the United States and Brazil. This resulted in an increase in the share of production traded for soybean over the last decade.

Figure 1.27. Share of production traded, by commodity



Note: This share is computed as exports over production (in volume).
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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Over the coming decade, the share of production that is traded will not change significantly for the commodities covered in the *Outlook* as no major shifts in trading patterns are expected. A number of commodities may have their export ratio decline marginally over the outlook period, reflecting either weakness in import demand, or increasing domestic use, or both, in the case of biodiesel.

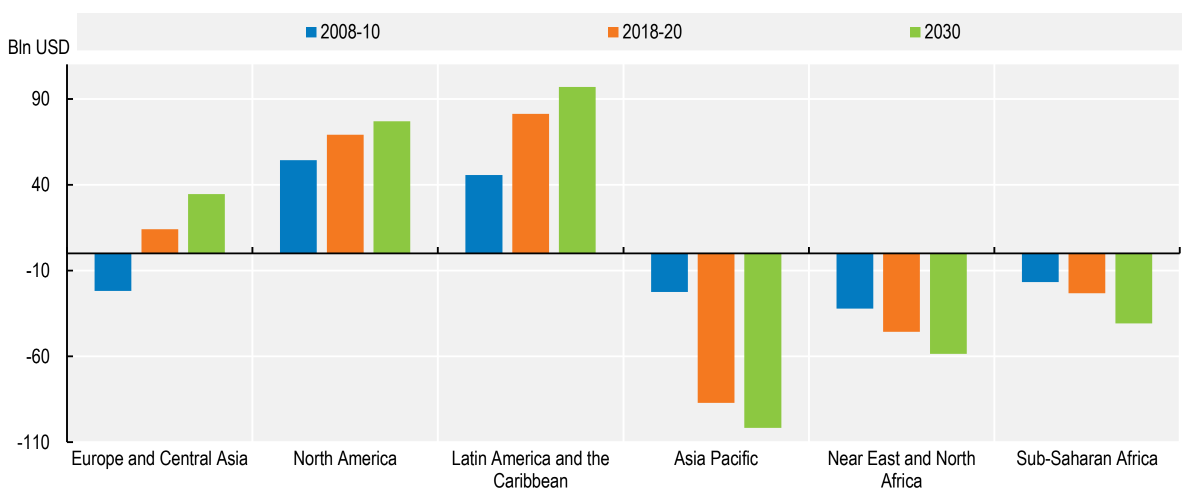
1.5.3. Increasing differentiation between net exporting and net importing regions

Differences in climate and geography, including the availability of productive agricultural land, determine the pattern of comparative advantage in producing different agricultural commodities. Comparative advantage, together with differences in population density and population growth, as well as policy factors, determine trade flows between regions. Countries with slow population growth, low population density and favourable natural endowments tend to become exporters of agricultural commodities, while countries with rapid population growth, greater population density, and less favourable natural endowments tend to become importers. Over the coming decade, the differentiation between net exporting and net importing regions is expected to intensify. Established net exporters of agricultural commodities are expected to increase their trade surpluses while regions with important population growth or land or other natural resources constraints are expected to see their trade deficit widening (Figure 1.28).

Traditional suppliers increase their trade surplus

Latin America and the Caribbean is expected to reinforce its position as the world's prime supplier of agricultural commodities, with a projected increase in its net exports of 19% between 2018-20 and 2030. Increasing production of maize, soybean, beef, poultry and sugar will facilitate this expansion. Net exports from North America, the second leading supplier of agricultural commodities to world markets, are expected to expand at slower pace (by 11% between 2018-20 and 2030), due to slower output growth. Exports growth of maize and soybeans, in particular, will significantly slowdown from a rate of 5.8% p.a. in the last decade to less than 1% p.a. over the coming decade.

Figure 1.28. 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.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Europe and Central Asia have moved over time from being net importers of agricultural commodities to net exporters in 2014, partly due to a stagnating population and flat per capita consumption, which limits domestic demand. Production growth has also contributed to the improved export performance, in particular for Ukraine and Russia, which have grown in the span of a few years into competitive exporters of maize and wheat, respectively, due to significant productivity gains. Over the coming decade, net exports from the region are projected to more than double, largely due to higher exports from Russia and Ukraine.

Rising trade deficits among countries with rapid population growth and/or natural resources constraints

Net imports by the largest net importing region, Asia and Pacific, are projected to increase by 17% between 2018-20 and 2030, largely due to increasing net imports by China (11%). The Chinese agricultural trade deficit has grown steadily over the last 20 years, from USD 2.6 bln in 2000 to USD 66 bln in 2019, and peaked at USD 86 bln in 2020 (in constant 2014-16 USD), as ASF outbreaks caused a surge in China import demand. Over the coming decade, net imports by China are expected to expand at a slower pace than over the last decade due to slower growth in population, saturation in food consumption for some commodities, and efficiency gains in production.

However, the large trade deficit of the Asia and Pacific region masks important differences between countries and sub-regions. Oceania and South East Asia, for instance, are traditional net exporters of agricultural commodities, but their trade surpluses are expected to be flat over the next decade. India, on the other hand, is neither a major importer nor a major exporter, despite its size. Over the coming decade, domestic production is expected to keep up with growing population and per capita incomes, with little change in its overall trade position. The strong growth in India's consumption and production of dairy products, for instance, is expected to have little effect on global trade.

Sub-Saharan Africa and Near East and North Africa are also large net importers of agricultural commodities, in particular of cereals, which support food security both directly and through use as animal feed. Net imports by Sub-Saharan Africa are projected to rise by 75% by 2030 due to higher imports of wheat, rice, maize and soybean. Agricultural productivity growth would help improve the region's self-sufficiency and reduce his trade deficit (Box 1.2). While Sub-Saharan Africa is a large net importer of commodities covered by the *Outlook*, it is a net exporter of other agricultural products including cocoa, coffee, tea, fruits and vegetables. Net imports by the Near East and North Africa region are expected to rise to over 28% by 2030, further deepening the region's dependence on international markets. The Near East and North Africa region will remain the largest importer of basic foods on a per capita basis.

Given growing regional imbalances, the use of trade restrictive policies (e.g. export restrictions), can have detrimental effects on global food security. During the COVID-19 pandemic, international cooperation and market transparency have prevented the widespread use of these policies (OECD, 2020[22]). It is important to remember the lessons of past shocks for future production shocks, transport or supply chain disruptions. Trade restrictions have negative effects on the short-term but also in the longer term by undermining supply capacity (Box 1.3).

1.5.4. Trade plays a growing role in ensuring food security and nutrition

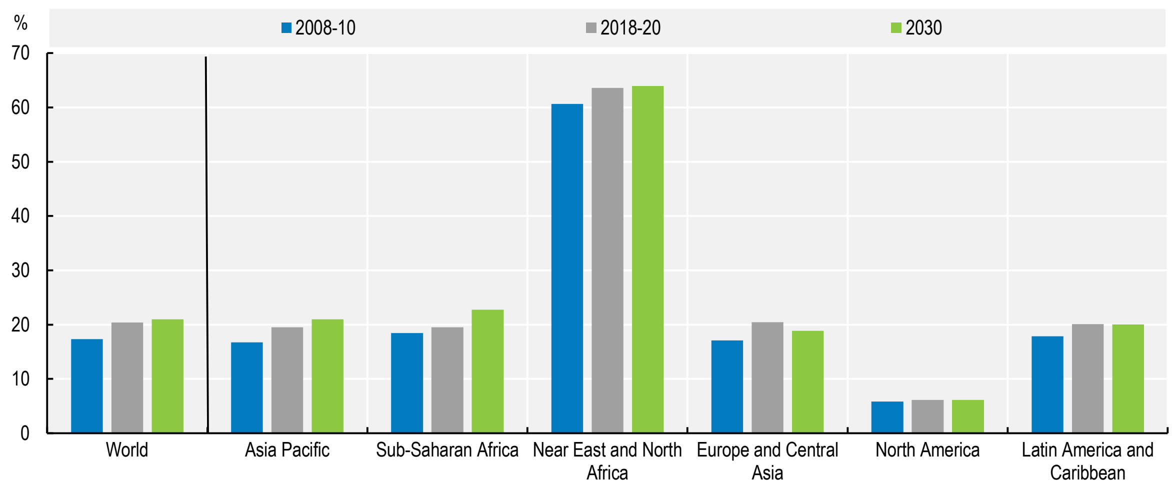
About 20% of calories consumed cross borders

Trade can improve the availability and affordability of different foods and add to a wider choice for consumers (FAO, 2018[23]). Trade is particularly important for resource-constrained countries, which are highly dependent on the import of basic and high-value food commodities. An enabling trade environment thus increases food availability in these countries and can moderate pressures on consumer prices. Trade can also help smooth food supply and buffer domestic production shocks. In a country experiencing declines in production due to a weather-induced shortfall, for instance, trade can contribute to food security.

Figure 1.29 shows the share of imports in total calorie availability for different regions. At the global level, this share rose from 17% in 2008-10 to 20% in 2018-20, and is projected to remain broadly stable over the coming decade. However, the share of imported calories varies significantly between regions and individual countries. This share tends to be lower in large producing regions like North America; where imports account for only 6% of total calorie availability. However, even large net exporting regions import some of their calories. In Latin America and the Caribbean, for instance, imports account for about 20% of total calorie availability. This estimate includes intra-regional trade, which is important in the region.

In Near East and North Africa, where population is growing strongly and water resource constraints limit production response, imports play a significant role in complementing domestic food production. Imports accounted for 63% of total calorie availability in the region in 2018-20; a share that is expected to slightly increase over the coming decade. In Sub-Saharan Africa, the share of imports in total calorie availability is lower, at 19% in 2018-20. However, this share is expected to reach 23% by 2030, as growth in domestic production growth will not keep up with high population growth.

Figure 1.29. Imports as a share of total calorie availability for selected regions



Note: Calculations using average calorie content of commodities included in the *Outlook*. Note that imports include feed, and availability includes processing of commodities which may be re-exported. Imports include intra-regional trade but exclude intra-EU trade.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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Diversified diets depend on trade

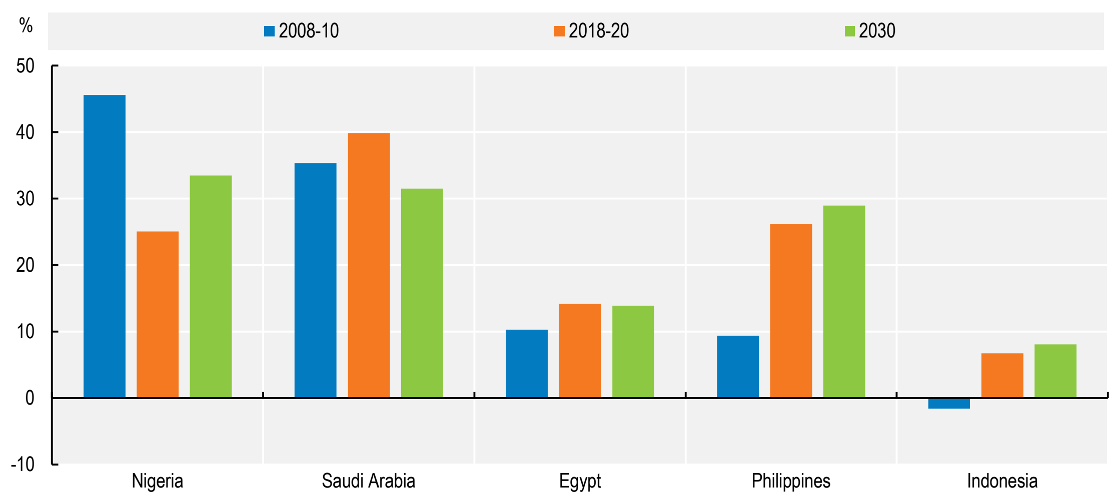
Beyond the importance of trade in facilitating global food security, trade is also central in ensuring nutrition security and in supporting diet diversification (FAO, 2018[23]). Over the coming decade, the growing demand for livestock products in low and middle-income countries will be partly met by suppliers in the developed world. Several countries in Near East and North Africa, Sub-Saharan Africa and South East Asia will see an increasing share of their demand for animal products being met by imports; particularly for commodities that cannot be produced domestically or not in sufficient quantities. In high and middle-income countries, income growth and changing consumer preferences are projected to spur imports of bananas and other tropical fruits from low-income countries, as detailed in Chapter 11.

Figure 1.30 presents the share of net imports in total animal protein availability for selected countries in Near East and North Africa, Sub-Saharan Africa and South East Asia. Selected countries have a high and/or increasing share of their demand for animal protein that is being met through imports.

Nigeria is a large net importer of animal products, particularly of dairy, but also of fish and meats. The share of net imports in total animal protein availability varies depending on the balance between domestic production and demand. Demand for animal protein is driven by developments in population and more importantly in income, which in oil exporting countries are closely linked to oil revenues. High oil prices in 2007-12 triggered additional import demand for animal protein. Lower oil prices thereafter reduced import demand for animal protein, lowering the share of net imports in total animal protein availability. Over the coming decade, this share is projected to increase again, due to the expected recovery of the oil price following the COVID-19 pandemic, and as growth in domestic production will not keep up with growing population and per capita incomes. Saudi Arabia is also highly dependent on imports of animal products (dairy in particular); net imports accounting for almost 40% of total animal protein availability in 2018-20. However, this share is expected to decline over the coming decade as Saudi Arabia has made large investments in domestic animal farming over the last 20 years to reduce its import dependency.

South East Asian countries are particularly dependent on dairy and beef imports, mainly from Oceania and the United States. The Philippines imports virtually all of its dairy products, while in Indonesia, net imports account for 60% and 50% of dairy and beef protein availability, respectively. In these two countries, the share of net imports in total animal protein availability is projected to continue increasing over the next ten years as demand growth, driven by income growth and urbanisation, will outpace the growth in domestic production. However, these countries are also investing in the expansion of domestic animal production, mostly poultry, largely supported by imported feed.

Figure 1.30. Net imports as a share of total animal protein availability for selected countries



Note: This share is computed as net imports of animal protein (in Kt/year) over total availability of animal protein (in Kt/year).
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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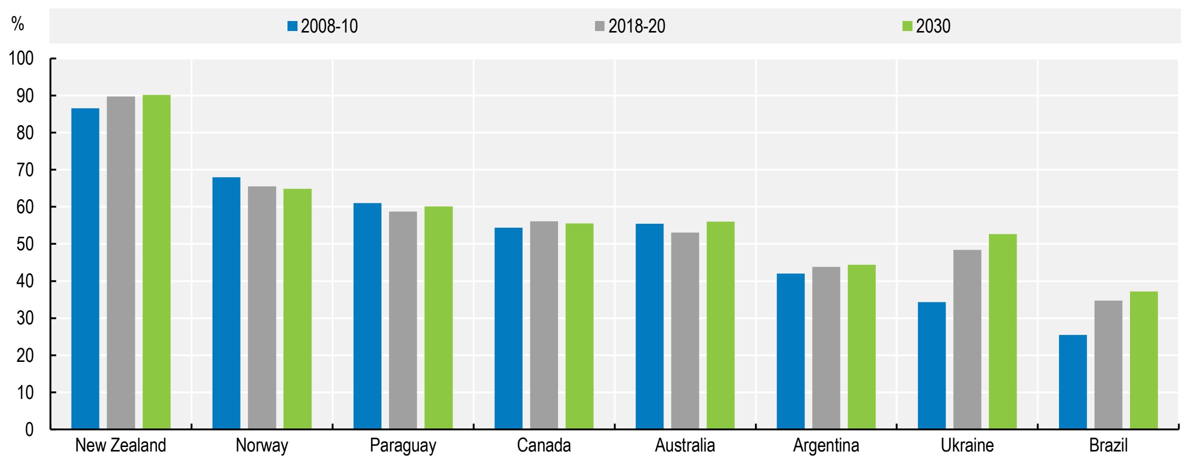
1.5.5. Exports are critical to livelihoods in many countries

For many countries, trade plays a central role in sectoral performance. Exports of some agricultural commodities account for a large share of domestic production and are therefore an important source of income and an opportunity to access growing markets without affecting local markets. However, high dependency on exports also increases exposure to international market fluctuations and shocks as well as changes in trade policies, which can adversely affect the rural or coastal sectors of these countries. Tariffs and other types of import restrictions at the international level, for instance, can affect their income prospects (Box 1.3).

As measured by the ratio of the net value of exports to net value of domestic production for the commodities included in the *Outlook*, eight countries will continue to have high dependency on international markets over the coming decade (Figure 1.31). While some of these countries, such as Canada and Brazil, export a wide set of commodities (cereals, oilseeds, animal products), some others such as New Zealand, Paraguay and Norway, depend on just a few commodities (dairy products, oilseed products and fish, respectively). Several low-income countries also have a large export dependence on a few tropical commodities (e.g. coffee, cacao, bananas and other tropical fruits) (Chapter 11). The export performance in these countries is thus highly tied to trends and fluctuations in the revenues from that commodity. Volatile and generally declining world commodity prices (Section 1.6) can cause instability in total export earnings in commodity-dependent economies.

Figure 1.31. Exporting countries with greater than 25% dependency on foreign markets



Note: This share is computed as export value over production value in current prices.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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1.5.6. Change in policies can affect trade projections

Trade has been an engine of transformation of the global agriculture and food sector. Changes in trade policies have been critical in facilitating this transformation by reducing both tariff and non-tariff barriers, which have limited the movement of goods and services. As a result of reducing trade barriers the welfare of both consumer and producers has increased through improved market efficiency.

Major developments in trade and other policies that will be negotiated and implemented over the coming decade could have important impact on agricultural trade. The *Outlook* only includes policies currently in place and holds them constant over the medium term, which constitutes a source of uncertainty, as change in policies could occur over the coming decade, thereby affecting the projections.

New trade agreements, for instance, will potentially increase intra-regional and inter-regional trade over the next ten years. The baseline only incorporates implemented and ratified bilateral trade agreements, including the African Continental Free Trade Agreement (AfCFTA), which came into force in January 2021. The AfCFTA will effectively consolidate 55 African countries into a single market. It foresees a gradual elimination of tariffs over the next five years for non-LDCs and over the next ten years for LDCs, for 90% of the tariff lines. However, the exact tariff schedules have not yet been finalised. This trade agreement offers opportunities to expand intra-African trade, which is currently very low. Only about 20% of African countries' food imports originate from other African countries, and one country – South Africa – accounts for over a third of this intra-African food trade (Fox and S. Jayne, 2020[24]). To realize the full potential of the AfCFTA, however, African countries will need to improve their agricultural productivity to compete effectively with low-cost imports from the international market. Reducing non-tariff barriers to trade, streamlining customs procedures and improving regional transportation links is also key to the success of the AfCFTA. This *Outlook* does not consider any tariff reduction within AfCFTA signatory countries over the projection period. However, it assumes improved market efficiency within the African region.

Another free trade agreement, the Regional Comprehensive Economic Partnership (RCEP), has been signed in November 2020 between the ten countries of ASEAN and five countries of Asia and Pacific (China, Japan, Korea, Australia, and New Zealand). The RCEP will provide a framework aimed at lowering trade barriers and securing improved market access for goods and services. However, as the RCEP is not yet ratified, it is not taken into account in the *Outlook* projections. This trade agreement could further reinforce existing trading relationships between signatories, which are already strong.

Similarly, the potential effects of the trade agreement between the European Union and Mercosur states (i.e. Argentina, Brazil, Paraguay and Uruguay) are not taken into account in the projections as ratification is still pending. The EU-Mercosur trade agreement will liberalise market access for agricultural goods. Mercosur duties will be gradually eliminated over the next ten years on 93% of tariff lines, while a liberalization of up to 15 years is planned for some sensitive products. In parallel, the European Union will liberalise 82% of its agricultural imports. Mercosur countries will likely benefit from lower EU tariffs and hence higher exports of meat products, fruit, orange juice, sugar and ethanol. The European Union, in turn, could benefit from higher exports of dairy products, pigmeat, wine and spirits. By contrast, some sensitive EU products such as beef, rice, poultry and sugar might see greater competition from Mercosur suppliers and increased downward pressure on prices. Following concerns about the potential negative environmental effects of this trade agreement, the European Union and Mercosur states committed to effectively implement the Paris Climate Agreement and agreed to cooperate on the climate aspects of trade between the two sides, including tackling deforestation.

While the signing of free trade agreements could boost agro-food trade over the coming decade, significant barriers to trade are expected to remain, as progress in reducing agricultural trade protection and distortive domestic support policies has largely stalled. Agricultural products in recent years still face average tariffs of around 15% (UNCTAD, 2019[25]). Moreover, several countries continue to provide income support to their farmers through measures that strongly distort farm business decisions – thereby distorting global agricultural production and trade. In 2018-20, farmers in 54 OECD and non-OECD countries received an estimated USD 540 billion per year in public support; two-thirds of this was provided through higher prices paid by consumers and payments that are coupled to production, including variable input subsidies (OECD, 2021[26]). Box 1.3 discusses the intended and unintended effects of border and beyond border policies measures for the achievement of SDG 2.

Environmental and climate policies will also impact agricultural trade over the coming decade. Carbon pricing policies (e.g. emissions taxes, emissions trading schemes and border carbon adjustments), in particular, could impose additional costs on producers and affect agricultural trade, potentially undermining food security and livelihoods. Therefore, these policies need to be designed carefully to balance competing objectives of GHG mitigation, food security and farm livelihoods (OECD, 2021[6]).

Box 1.3. Trade and the Sustainable Development Goals (SDGs)

With just under ten years to 2030, the SDG Summit in September 2019 called for a Decade of Action and delivery for sustainable development, recognizing that vulnerabilities are high and deprivations are becoming more entrenched. While some progress is being made in many places, the achievement of the Agenda 2030 is not advancing at the required speed and scale, including with regard to SDG 2, which aims to end hunger, achieve food security and improved nutrition and promote sustainable agriculture.

Recent estimates[1] indicate that nearly 690 million people – or 8.9% of the world's population – are undernourished, with the number of people facing severe food insecurity on the rise since 2015. The COVID-19 pandemic is expected to further exacerbate the situation, at a time when 1 in 10 people in the world live under on USD 1.90 a day[2] and food systems face a number of environmental challenges, including poor soil health, greenhouse gas (GHG) emissions, biodiversity loss, poor water management, and pollution.

Measures that affect agricultural trade and markets (both border measures and "behind-the-border" domestic support measures) can have very different implications for different SDG targets, depending on whether a country is a net exporter or importer, a small or big producer or consumer and on the way that policies are designed and implemented. In addition, the impact might be different in the short- and medium-to-long-term. It is therefore important to recognize areas in which trade-offs may exist between competing policy objectives and identify ways in which they can be addressed.

Competing priorities

Some measures generally have positive implications for the achievement of the SDG 2 targets on productivity and food security; for example, public investments in infrastructure, storage facilities or rural roads, and government support for research and extension services. On the other hand, the use of export restrictions is an example of competing priorities of a border measure, in particular between short- and longer-run objectives within the domestic market, but also between the policy objectives of two trading partners. When domestic food prices rise, governments sometimes ban or tax exports to help contain price increases. However, such measures can immediately harm poor consumers in food-importing countries, and over time, they can also create disincentives for agricultural investment in the country where the measure is applied. Similarly, cutting tariffs on foodstuffs could help diversify the supply of nutritious food and lower prices for poor consumers, but producer livelihoods could be undermined by competition from cheaper imported foods. Input and output subsidies and market price support can lower production costs, but can also disadvantage farmers in other countries, result in inefficient allocation of resources, and exacerbate environmental pressures.

Relationship with multilateral trade rules

Measures that do not typically involve transfers to individual producers, usually fall under the World Trade Organization (WTO) Green Box category and are not subject to any limitation. Such measures generally have positive implications for the achievement of SDG 2. Other measures that can have production and trade-distorting effects are subject to limits in the multilateral trading system. SDG Target 2.b calls upon countries to "*correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of export subsidies and all export measures with equivalent effect, in accordance with the Doha Development Round*". While progress has been made with the WTO Nairobi Ministerial Decision, achieving SDG 2 and resolving the trade-offs requires that governments go beyond a narrow focus on the elimination of export subsidies. Doing so could help ensure that trade policies contribute to fast-tracking progress on the food and agriculture components of the 2030 Agenda. Promoting coherence and alignment between different policies is essential in this effort and can ensure that trade supports the COVID-19 recovery.

Notes: 1. FAO, IFAD, UNICEF, WFP and WHO (2020), T*he State of Food Security and Nutrition in the World 2020: Transforming food systems for affordable healthy diets*, FAO, Rome, https://doi.org/10.4060/ca9692en
2. World Bank (2020), *Poverty and Shared Prosperity 2020: Reversals of Fortune*, World Bank, Washington, DC. doi: 10.1596/978-1-4648-1602-4. License: Creative Commons Attribution CC BY 3.0 IGO
Source: Gadhok et al. (2020[20]).

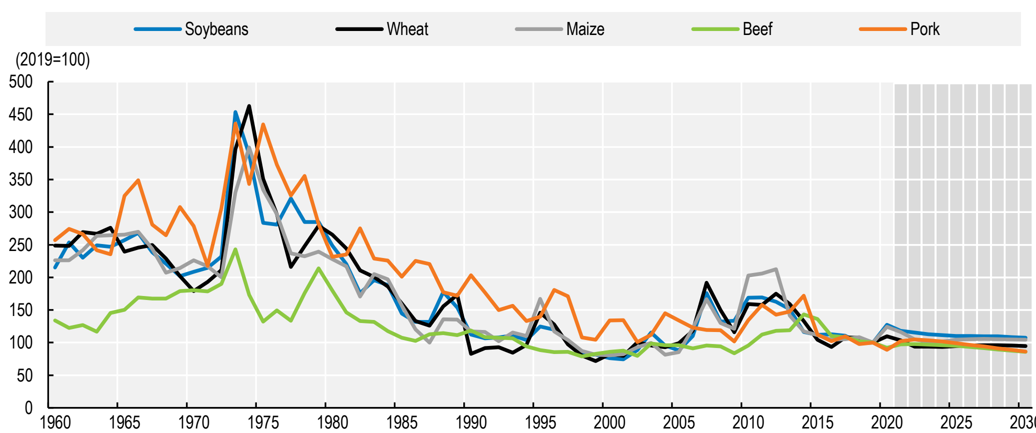
1.6. Prices

The *Outlook* uses prices observed at major markets as the international reference prices to characterise the market situation for each commodity. In addition to market fundamentals, current prices are influenced by the effects of a number of factors (diseases such as the COVID-19 pandemic, weather, natural disasters, policy changes, etc.) and are projected to adjust during the following years; whereas in the later years of the projection period, price projections are determined solely by fundamental supply and demand factors. Variability around the projected baseline prices is explored in a partial stochastic simulation analysis at the end of the section.

1.6.1. Historical price trends

Over the coming decade, real agricultural prices (i.e. adjusted for inflation) of most commodities covered in the *Outlook* are projected to decline (Figure 1.32). Prices of agricultural commodities have been following an overall declining trend since the 1960s. This has been the result of productivity improvements in agriculture and related industries, lowering the marginal production costs of the main food commodities. The green revolution during the 1960s and the emergence of new technologies during the 1990s resulted in substantial yield increases in major producing countries. Significantly reduced marginal production costs were bidding down prices despite global population- and income-induced food demand growth. Deviations from the general trend, such as the price spike during the oil crisis in the 1970s or a number of price peaks during 2007-14, were temporary and did not alter the long-term declining trend.

Figure 1.32. 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 (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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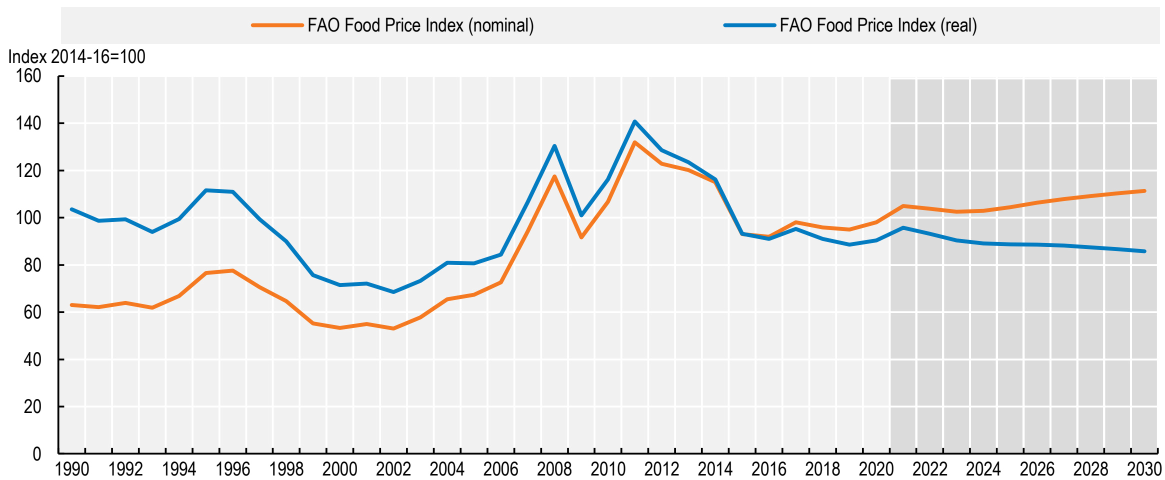
1.6.2. Main drivers of medium-term price trends

The FAO Food Price Index (FPI) summarizes developments in the international reference prices of major traded food commodities in a single indicator (Figure 1.33).[9]

The baseline projections of the FPI are consistent with fundamental supply and demand conditions expected over the coming decade, which consider income and population growth combined with the prevailing consumer preferences on the demand side, and continued productivity increases on the supply side. Over the medium term, it is further assumed that at the global level, the mobilization of natural resources will continue to be possible at declining real prices and the expansion and intensification of production capacity will not be permanently constrained from reaching the limits of projected demand. The assumptions on supply and demand include an efficient and sustainable global trading system over the medium-term. The impacts of deviations from these baseline assumptions on commodity prices are explored with the help of stochastic simulations.

Figure 1.33. 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 (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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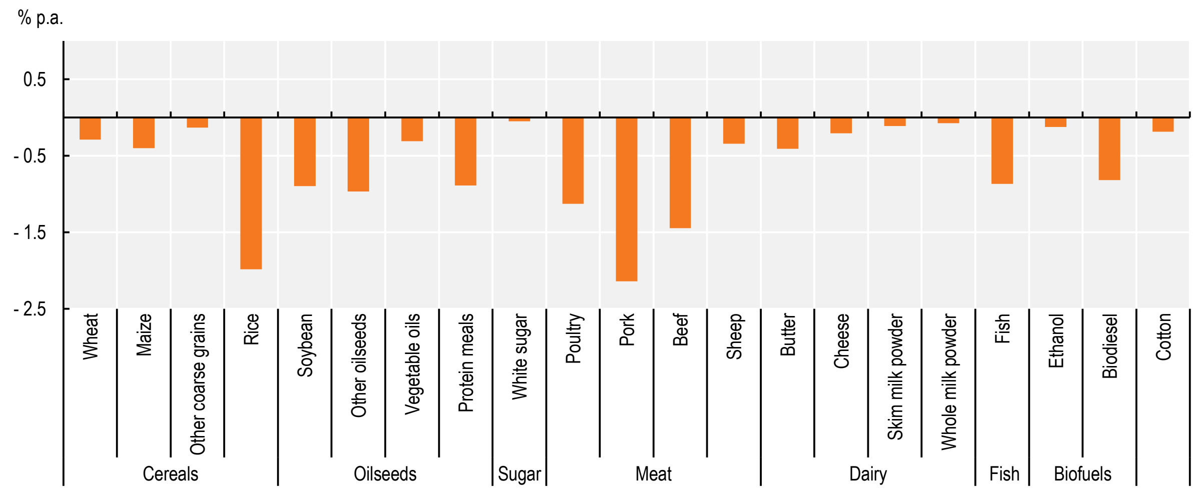
The cereal prices used in the *Outlook* are projected to maintain, or return to, their established ratios during the outlook period (Figure 1.35). Deviations are assumed to be temporary and fundamental relationships will be restored once the source of the shock (e.g. unfavourable weather in major rice producing countries) subsides. The expected increase in global maize production, supplemented by the release of stocks, will be sufficient to meet the growing global food, feed and biofuel demand at a declining real international reference price. The projected decline in the reference price for wheat is based on abundant supplies from the Black Sea region and slow growing global food demand. Due to unfavourable weather in some rice exporters, as well as temporary export restrictions and logistical bottlenecks, the starting real rice export price was significantly above trend. Assuming a return to normal growing and logistical conditions, it is expected to decrease to trend level by 2023, with declines thereafter promoted by ample global availabilities and intensifying competition for markets amongst exporters. Real prices of other coarse grains (rye, oats, barley, sorghum) are set to increase slightly, due to sustained import demand, mainly from China, where they are used to supplement TRQ-constrained maize imports. This demand is not fully offset by productivity growth in major producing regions over the medium-term, moving prices up.

1.6.3. Commodity price trends

Figure 1.34. Average annual real price change for agricultural commodities, 2021-30



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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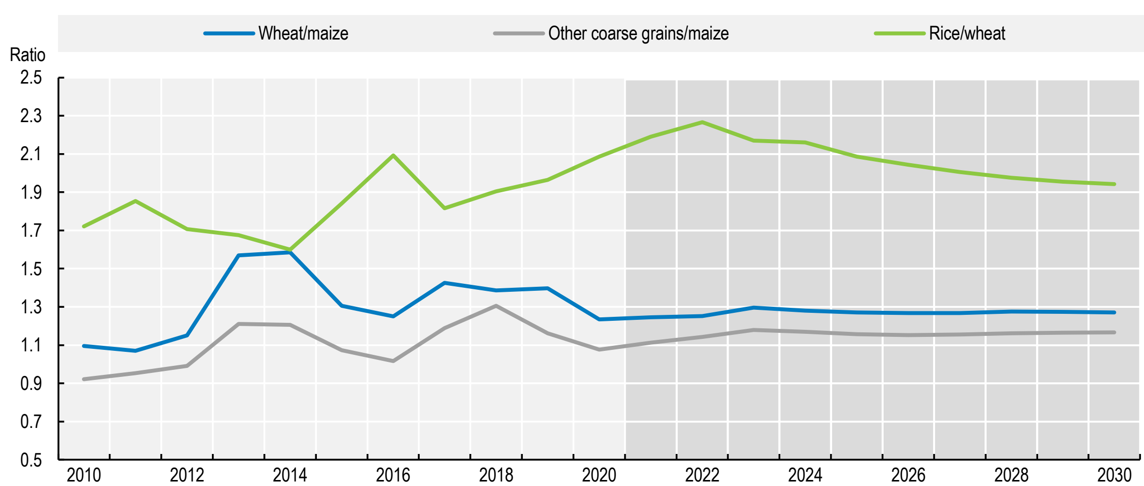
Figure 1.35. Cereals' price ratios



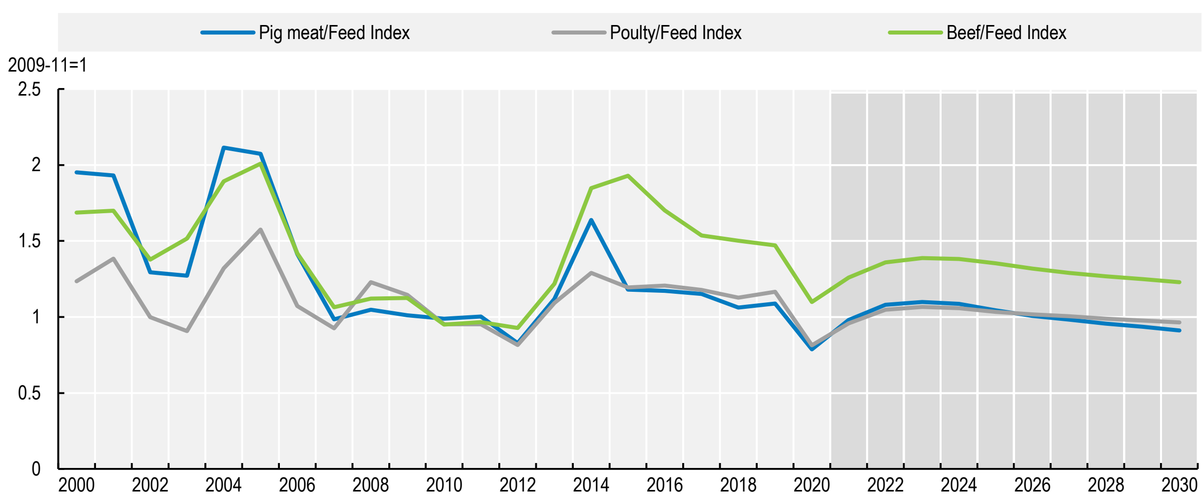
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/w29l4f

Real prices of oilseeds and oilseed products increased above trend in the second half of 2020 partly due to high import demand for soybeans related to the rebuilding of hog herds in China. They are expected to return to trend levels in the early years of the outlook period, reflecting an increase in global supply, based on average production prospects in major producing countries and the gradual elimination of COVID-19-related logistics constraints (FAO, 2021[27]). After this correction, the declining price trend is expected to slow. Prices of vegetable oils are going to strengthen relative to protein meal, mainly based on the expectation of a slowdown in the global production growth of palm oil.

The projected trends in real prices of the four different types of meat covered by the *Outlook* are driven by two distinct factors (Figure 1.36).[10] In the early years, the recovery of the industry from the ASF supply shock dominates. As supplies recover, pork prices in particular fall back to their trend levels. Prices of other meats had also been elevated due to substitution effects, but will decrease to a lesser extent. Once prices have returned to their long-term trends in 2023, fundamental market conditions will take over again. They are characterised by a combination of slowing global demand growth for meat, and in particular for red meats, and falling real feed prices due to continued productivity growth in the crop sector. The limited sheep meat exports from Australia and New Zealand are seen as the main factor supporting the international sheep meat price.

Figure 1.36. Meat to feed nominal price ratios



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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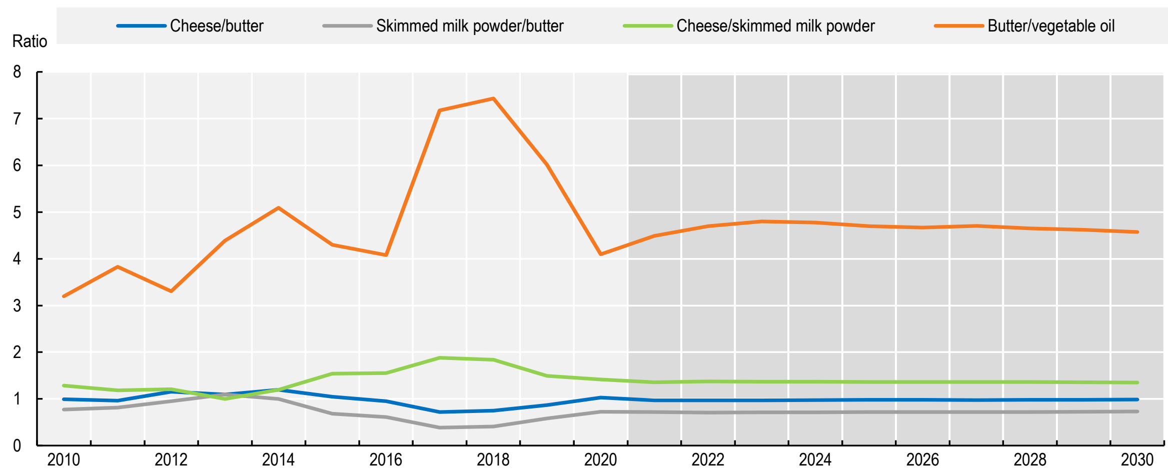
Global developments in the dairy sector are mainly characterised by the changes in the international prices of butter and SMP, which are seen as proxies for the value of milk fat and non-fat milk solids, respectively (Figure 1.37). SMP prices were not significantly affected by the pandemic in 2020 and they are expected to remain flat based on the projected market conditions for the next decade. Weakening demand combined with the effect of the supply response to the price peak in 2017 have led to a return of the butter price close to the historical relationships with SMP and vegetable oil. Both ratios are expected to remain stable throughout the projection period. Real prices of cheese and WMP reflect butter and SMP price developments.

Figure 1.37. Dairy price ratios



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

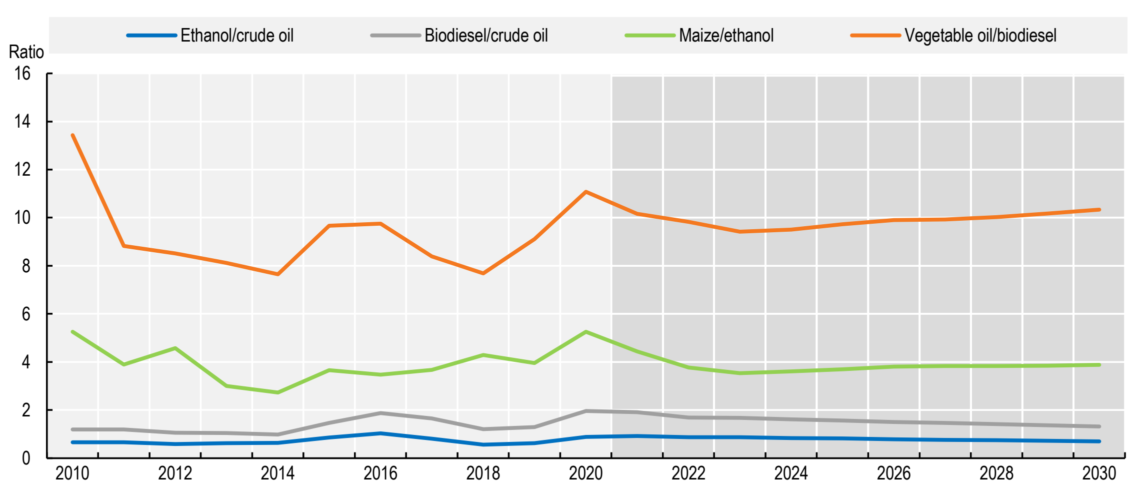
StatLink https://stat.link/qtfa92

Real sugar prices were elevated at the beginning of the outlook period, due to production shortfalls in recent years. Based on the assumed recovery in global production, prices are projected to drop in 2021. Expected productivity improvements in the following years are going to outweigh increases in global sugar demand and prices are projected to remain flat over the next decade (Figure 1.34).

The projected supply and demand situation for fish sees real fish prices decline (Figure 1.34). In the first years of the projection period, the decline is expected due to reduced demand for fish following the COVID-19 pandemic. Thereafter, the reduction is driven by policy changes in China, which will lead to strong growth in domestic production.

After lifting of the COVID-19 related movement restrictions assumed in 2021, the expected recovery of biofuel demand is going to support the recovery of biodiesel and ethanol prices in the early years of the outlook. Once global biofuel demand stabilizes, real prices are expected to resume their long-run declining trend interplaying with their major feedstocks (Figure 1.38).

Figure 1.38. Biofuel price ratios



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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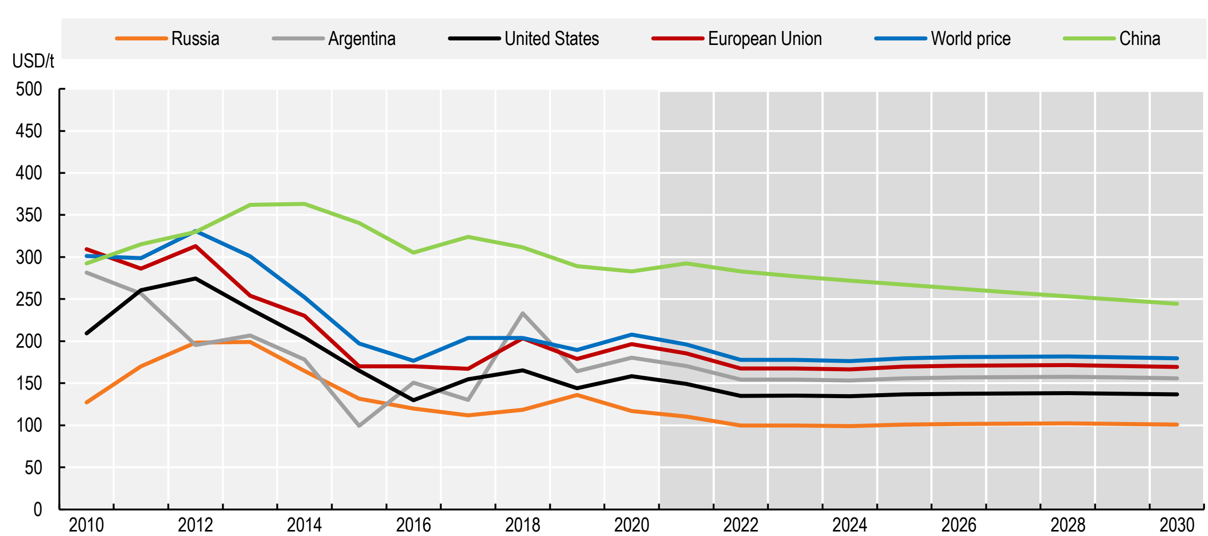
1.6.4. Transmission of price signals within the global food system

International reference prices are used in the *Outlook* to characterize global markets, but their actual impact on the decisions of producers and consumers is thought to be indirect. Production and food purchasing decisions are mainly made according to domestic producer and consumer prices. While each individual producer or consumer acts as a price taker, their aggregate behaviour in domestic markets determines the 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 well-developed trade infrastructure and/or high substitutability of traded for domestic products, domestic market shocks are absorbed quickly by the global market through trade, and domestic prices are not affected, as long as the country's global market share is small. Major producer and consumer countries transmit their domestic market trends and variability more directly into the global market. By contrast, countries with only very limited interaction with the global market, i.e. those with a high self-sufficiency rate, are mostly shielded from shocks that are transmitted by global price movements, but they are more exposed to domestic shocks.

The baseline projections are based on considerations of both situations. Market integration and the resulting price transmission varies significantly by commodity and country/region. Cereal and oilseeds markets tend to be more globalized than markets for livestock products. The trade section illustrated the differences in the role of trade between commodities and countries. Figure 1.39 illustrates differences in trends and levels between the global reference price and respective domestic producer prices.

Figure 1.39. International reference vs domestic producer real prices for wheat



Note: Real prices are nominal prices deflated by the US GDP deflator (2020=1).
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

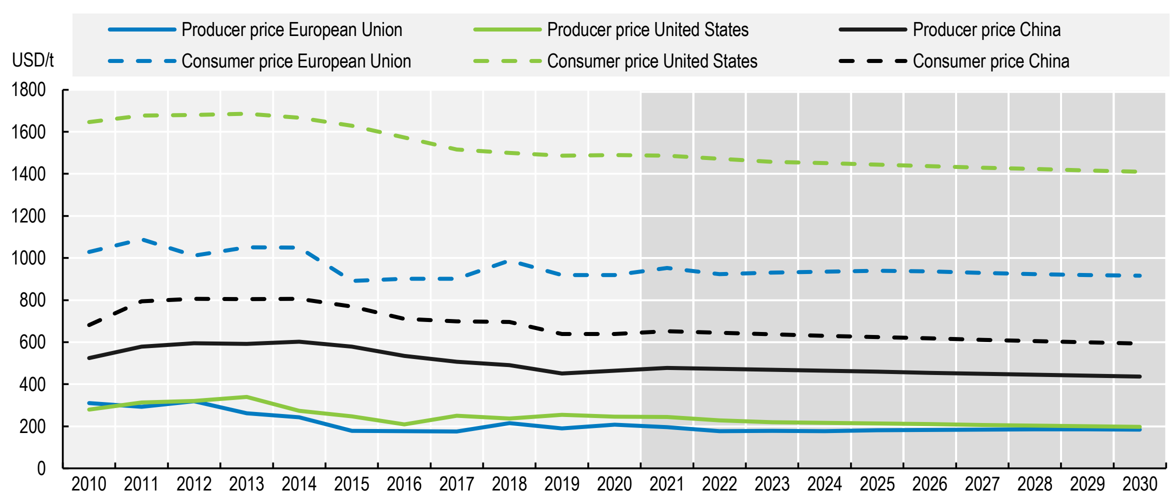
StatLink https://stat.link/bugqy6

In net exporting countries, e.g. Russia, domestic producer prices tend to be below the global level, as marketing and transportation costs have to be deducted from the port price. In net importing countries, e.g. China, these components are added. Producer support instruments, tariffs and other costs of trade may further widen the gap. As Figure 1.39 illustrates, the projected trajectories of global and domestic prices may differ, because the various components of domestic prices are driven by different factors.

Real exchange rate movements between the US dollar denominating the international reference prices and individual country currencies also influence the transmission of price signals from international to domestic markets. Countries with appreciating real currencies, like Argentina, Turkey, Nigeria, or Ukraine, will see real prices fall even stronger in their local currency, while in countries with real depreciation, like Norway, Russia or India, the declining real price trend will be mitigated.

Another aspect to consider is the wedge between producer and consumer prices. International commodity reference prices are more directly linked to the decision making process of producers than consumer prices, which contain additional components to account for processing and marketing margins. Their share varies by commodity and developmental status of a country. The larger these components are, the less responsive the consumer prices are to commodity price movements. Figure 1.40 illustrates the projected differences between real producer and consumer prices in selected markets. As these examples show, the projected price signals to consumers and producers may differ significantly.

Figure 1.40. Consumer and producer prices in selected rice markets



Note: Real prices are nominal prices deflated by the US GDP deflator (2020=1).
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/f1posj

1.6.5. Uncertainties

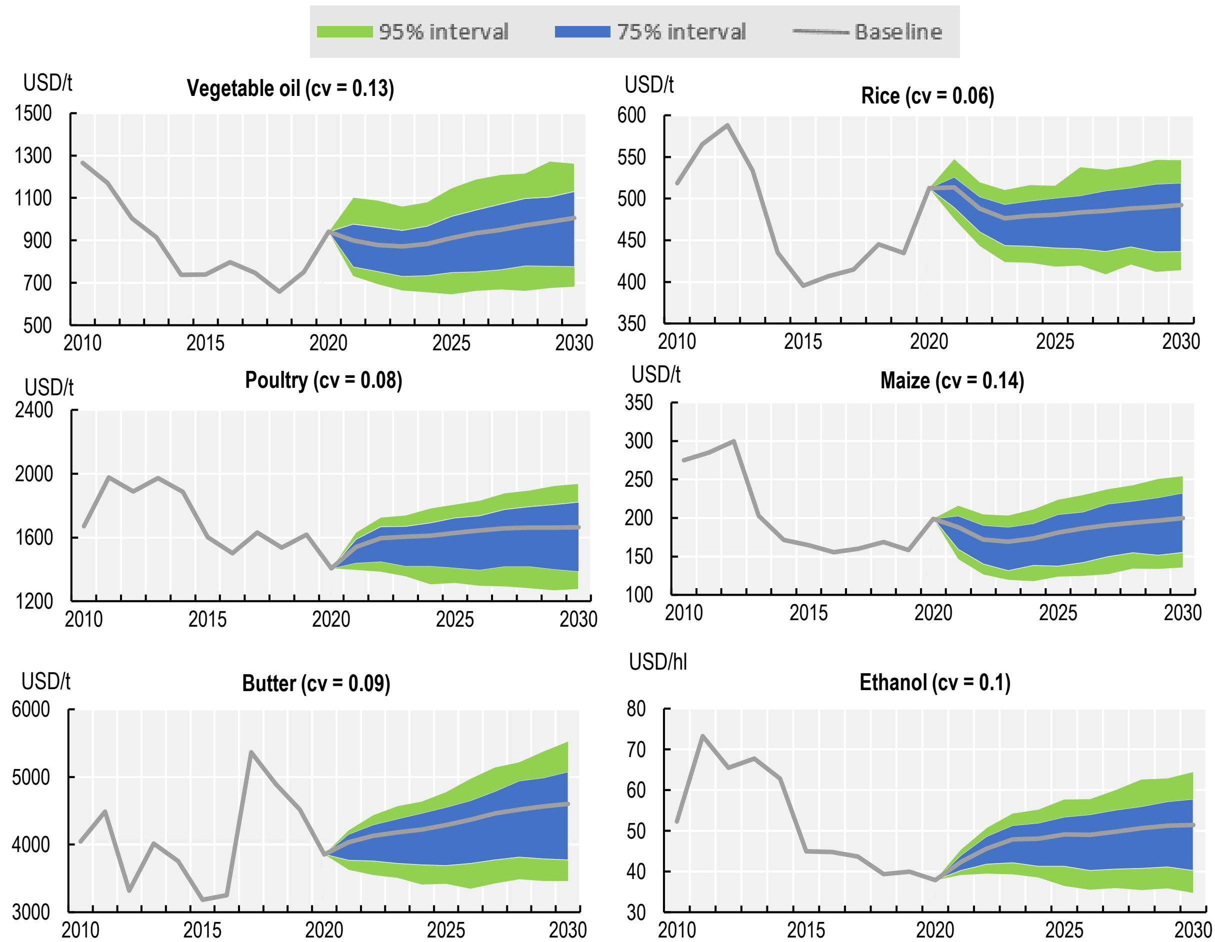
The deterministic baseline price projections presented in this *Outlook* result from the interplay of fundamental supply and demand factors under normal weather, macroeconomic and policy conditions. While the *Outlook* is based on the best information available, there is unavoidably a degree of uncertainty attached to the projections and to the underlying assumptions, particularly linked to emerging developments in demand and supply, summarised in Box 1.4. Furthermore, this assumption of 'normality' results in a smooth trajectory for most projected variables, deviations from the assumed trends result in price volatility. To assess the impact of such deviations, a partial stochastic analysis (PSA) was performed on the baseline projections. The PSA simulates the potential future variability of main price determinants using observed past variability. The analysis includes global macroeconomic drivers and specific agricultural crop yields. Variability related to animal diseases or policy changes is not considered. The aggregated results of multiple PSA simulations indicate the sensitivity of the baseline price paths (Figure 1.41). With a likelihood of 75%, prices will remain within the blue range in any given year, while they are expected to remain with a probability of 95% 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 tends to be larger around crops than livestock products, given the susceptibility of crop yields to weather conditions. The price of rice varies the least among the *Outlook* crops, as it is typically less prone to weather shocks than other crops. Crops that are grown in crop rotation systems, such as maize and soybeans in the Americas, show similar levels of variation.

In general, prices of livestock products are less susceptible to weather shocks because feed price variability is not fully transmitted, mainly due to substitutability between different feeds. Nevertheless, the pasture-based dairy sector in New Zealand does not benefit from this possibility and therefore shows a high price volatility. Due to the dominant role of New Zealand in international dairy markets, this volatility is transmitted to global markets.

The variability in ethanol and biodiesel prices is closely related to that of the crude oil price, because of the complementary consumption relationship. They are additionally influenced by the variability in feedstock prices, mainly maize, sugar cane and vegetable oils. The respective effects can offset or amplify each other.

Figure 1.41. Baseline and stochastic intervals for selected international reference prices



First years' evolution of nominal prices for selected commodities

Note: Expected evolution of nominal prices under the baseline scenario of the Outlook (solid line) in relation to the stochastic outcomes shown in the green (macro and yields) and blue (macro) 90% confidence intervals.

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/ckam34

Box 1.4. Beyond the conventional Outlook: Assessing agri-food systems transformation

The *Outlook* presents a plausible medium-term scenario, extending past supply and demand patterns and assuming normal weather and no change to policies for the next ten years. In addition, alternative developments to achieve access to safe, healthy, and nutritious food for a growing world population, while at the same time using natural resources more sustainably and making an effective contribution to climate change adaptation and mitigation is closely monitored.

While the *Outlook* assumes an evolution of consumption patterns along past trends, a number of developments may contribute to larger shifts in consumption patterns in the coming years. The projections account for emerging societal, health and environmental concerns advocating for lower consumption of animal-based products, in particular red meat, which are beginning to shape consumption patterns, especially among young consumers in high-income countries (Mensink, Lage Barbosa and Brettschneider, 2016[28]). Enhanced consumer awareness, but also policy measures promoting healthy diets, together with technology and innovation, are expected to further increase consumers' interest in alternative protein sources, such as plant-based proteins (soy, pea), new animal sources (insects), or biotechnological innovations (cultured meat or fungal protein) (Van Huis et al., 2013[29]; McKinsey, 2019[9]; Ismail et al., 2020[30]). However, expected consumption shares of these products over the coming decade are still very small (Witte et al., 2021[31]), so the *Outlook* does not specifically account for them. The complex implications of such developments for global agri-food systems are not yet clear (J. Vermeulen et al., 2020[32]) and the scope of the *Outlook* analyses would have to be broadened to incorporate drivers and impacts of such shifts.

On the production side, the *Outlook* also assumes technological developments to follow past trends. However, an array of alternative approaches currently under development might have potential for large-scale applications. Precision farming technology, biotechnology, hydroponics or vertical farming (FAO, 2021[33]) provide opportunities to increase the productivity of labour, land, water and other inputs, which could transform agricultural production. Most of these technologies are still in the niche or experimental stage and are not expected to significantly impact production trends in the coming decade. The *Outlook* analyses, however, do account for a trend reversal due to tightening resource constraints and policy induced technological restrictions expected to result in productivity declines in certain regions.

Emerging and alternative consumption and production trends are carefully monitored and their potential impact on global agri-food systems is continuously assessed, so relevant developments can be incorporated into future editions of the *Outlook*. OECD and FAO, in close collaboration with their partners, are preparing the empirical evidence base and modelling foundation necessary to expand the *Outlook* projections beyond the conventional food and agriculture sectors.

Sources: (FAO, IFAD, UNICEF, WFP & WHO, 2020[2]), (FAO, 2021[33]), (Van Huis et al., 2013[29]), (McKinsey, 2019[9]), (Witte et al., 2021[31]), (J. Vermeulen et al., 2020[32]), (Ismail et al., 2020[30]), (Mensink, Lage Barbosa and Brettschneider, 2016[28]).

References

EC (2020), *EU agricultural outlook for markets, income and environment, 2020-2030*, European Commission, DG Agriculture and Rural Development, Brussels., https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/markets/outlook/medium-term_en. [10]

FAO (2021), "Novel Coronavirus", *FAO recommendations on planting and harvesting tasks during the COVID-19 outbreak using crop calendars*, http://www.fao.org/2019-ncov/covid-19-crop-calendars/en/ (accessed on 24 May 2021). [33]

FAO (2021), *Oilseeds, Oils & Meals: Monthly Price and Policy Update, Vol. 140, March*, http://www.fao.org/3/cb3814en/cb3814en.pdf. [27]

FAO (2021), *Technical Platform on the Measurement and Reduction of Food Loss and Waste*, http://www.fao.org/platform-food-loss-waste/en/. [1]

FAO (2020), *Food Outlook - Biannual Report on Global Food Markets: June 2020*, FAO, Rome, https://doi.org/10.4060/ca9509en. [36]

FAO (2020), *Fruit and vegetables – your dietary essentials. The International Year of Fruits and Vegetables, 2021, background paper, Rome*, https://doi.org/10.4060/cb2395en. [3]

FAO (2020), *The State of Agricultural Commodity Markets 2020. Agricultural markets and sustainable development: Global value chains, smallholder farmers and digital innovation*, Rome, FAO, https://doi.org/10.4060/cb0665en. [13]

FAO (2018), *Trade and Nutrition Technical Note*, http://www.fao.org/3/a-i4922e.pdf. [23]

FAO (2013), *Food Outlook - Biannual Report on Global Food Markets: November 2013*, FAO, Rome. [37]

FAO, IFAD, UNICEF, WFP & WHO (2020), *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets.*, FAO, Rome, http://www.fao.org/3/ca9692en/ca9692en.pdf. [2]

FAO, R. (ed.) (2013), *Edible insects: future prospects for food and feed security*, FAO Forestry Paper 170, http://www.fao.org/3/i3253e/i3253e.pdf. [29]

Fox, L. and T. S. Jayne (2020), "Unpacking the misconceptions about Africa's food imports", *Brookings*, https://www.brookings.edu/blog/africa-in-focus/2020/12/14/unpacking-the-misconceptions-about-africas-food-imports/?preview_id=1297848. [24]

Frezal, C., S. 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://dx.doi.org/10.1787/96d0410d-en. [21]

Gadhok, I. et al. (2020), *Trade and Sustainable Development Goal 2 – Policy options and their trade-offs*, Rome, FAO, https://doi.org/10.4060/cb0580en. [20]

Heinrich-Böll-Stiftung (2021), *Fleischatlas 2021*, https://www.boell.de/de/de/fleischatlas-2021-jugend-klima-ernaehrung. [8]

Henderson, B. et al. (2021), “Policy strategies and challenges for climate change mitigation in the Agriculture, Forestry and Other Land Use (AFOLU) sector”, *OECD Food, Agriculture and Fisheries Papers, No. 149, OECD Publishing, Paris*, https://doi.org/10.1787/47b3493b-en. [18]

Henderson, B., C. Frezal and E. Flynn (2020), “A survey of GHG mitigation policies for the agriculture, forestry and other land use sector”, *OECD Food, Agriculture and Fisheries Papers*, No. 145, OECD Publishing, Paris, https://dx.doi.org/10.1787/59ff2738-en. [19]

Hrynowski, Z. (2019), *What Percentage of Americans Are Vegetarian?*, https://news.gallup.com/poll/267074/percentage-americans-vegetarian.aspx. [7]

IEA (2020), *Global EV Outlook 2020: Entering the decade of electric drive?*, OECD Publishing, Paris, https://dx.doi.org/10.1787/d394399e-en. [11]

International Labour Organization (2020), “COVID-19 and the impact on agriculture and food security”, https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/briefingnote/wcms_742023.pdf. [12]

International Monetary Fund (2021), *World Economic Outlook: Managing Divergent Recoveries*, Washington, DC, April. [34]

IPCC (2019), *IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse gas fluxes in Terrestrial Ecosystems: Summary for Policymakers, Approved Draft.*. [17]

Ismail, B. et al. (2020), “Protein demand: review of plant and animal proteins used in alternative protein product development and production”, *Animal Frontiers*, Vol. 10/4, pp. 53-63, https://doi.org/10.1093/af/vfaa040. [30]

J. Vermeulen, S. et al. (2020), “Changing diets and the transformation of the globalfood system”, *Annals of the New York Academy of Sciences*, https://doi.org/10.1111/nyas.14446. [32]

McKinsey (2019), *Alternative proteins: The race for market share is on*, https://www.mckinsey.com/industries/agriculture/our-insights/alternative-proteins-the-race-for-market-share-is-on. [9]

Mensink, G., C. Lage Barbosa and A. Brettschneider (2016), “Prevalence of persons following a vegetarian diet in Germany”, *Journal of Health Monitoring*, http://dx.doi.org/10.17886/RKI-GBE-2016-039. [28]

OECD (2021), *Agricultural Policy Monitoring and Evaluation 2021: Addressing the Challenges Facing Food Systems*, OECD Publishing, Paris, https://dx.doi.org/10.1787/2d810e01-en. [26]

OECD (2021), *Making Better Policies for Food Systems*, OECD Publishing, Paris, https://dx.doi.org/10.1787/ddfba4de-en. [6]

OECD (2021), *OECD Economic Outlook, Interim Report March 2021*, OECD Publishing, Paris, https://dx.doi.org/10.1787/34bfd999-en. [35]

OECD (2020), *OECD Review of Fisheries 2020*, OECD Publishing, Paris, https://dx.doi.org/10.1787/7946bc8a-en. [16]

OECD (2020), “The role of transparency in avoiding a COVID-19 induced food crisis”, *OECD Policy Responses to Coronavirus (COVID-19)*, https://www.oecd.org/coronavirus/policy-responses/the-role-of-transparency-in-avoiding-a-covid-19-induced-food-crisis-d6a37aeb/. [22]

OECD (2019), *The Heavy Burden of Obesity: The Economics of Prevention*, OECD Health Policy Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/67450d67-en. [5]

Placzek, O. (2021), “Socio-economic and demographic aspects of food security and nutrition”, *OECD Food, Agriculture and Fisheries Papers*, No. 150, OECD Publishing, Paris, https://dx.doi.org/10.1787/49d7059f-en. [4]

Ray, D. and J. Foley (2013), “Increasing global crop harvest frequency: recent trends and future directions”, *Environmental Research Letters*. [15]

UNCTAD (2019), *Key Statistics and Trends in Trade Policy*, https://unctad.org/system/files/official-document/ditctab2019d9_en.pdf. [25]

United Nations Economic Commission for Africa (2020), *COVID-19 in Africa: Protecting Lives and Economies*, UNECA, Addis Ababa, https://repository.uneca.org/handle/10855/43756. [14]

Witte, B. et al. (2021), *Food for Thought: The Protein Transformation*, Boston Consulting Group, Blue Horizon, https://web-assets.bcg.com/a0/28/4295860343c6a2a5b9f4e3436114/bcg-food-for-thought-the-protein-transformation-mar-2021.pdf. [31]

Notes

[1] The OECD and IMF have recently revised their global GDP projections for 2021 upward of more than 1 percentage point from the December and October projections (OECD, 2021[35]) (International Monetary Fund, 2021[34]).

[2] Food loss and waste is defined by the FAO as the decrease in quantity or quality of food along the food supply chain.

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

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

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

[6] Cropping intensity refers to the average number of harvests in a year, it is calculated as the ratio of area harvested to cropland.

[7] This includes higher slaughter weights, shorter finishing times and higher reproductive rates.

[8] The emissions counted refer to those from livestock production, use of synthetic fertilizers, rice cultivation, burning of crop residues and savannahs, use of crop residues and cultivation of organic soils. Land conversion, however, is the biggest emitter.

[9] For a description of the index and its components please refer to the special features on the FFPI in (FAO, 2013[37]) and (FAO, 2020[36]). The *Outlook* uses the US GDP deflator (2014-2016=1) to obtain the index in real terms. As a result, the real FFPI in the *Outlook* is different from what is published in (FAO, 2020[36]).

[10] The four types of meat covered by the *Outlook* are: beef meat, pig meat, poultry meat and sheep and goats meat.

2 Regional briefs

This chapter describes key trends and emerging issues facing the agricultural sector in the six FAO regions, i.e. Asia and Pacific, Sub-Saharan Africa, Near East and North Africa, Europe and Central Asia, North America, and Latin America and the Caribbean. It highlights the regional aspects of production, consumption, and trade projections for the period 2021-30 and provides background information on key regional issues.

2.1. Introduction

The *Outlook's* regional briefs highlight broad trends for the regions defined by the FAO in the implementation of its global workplan. Recognising the diversity across the regions, the intention is not to compare results across regions. Instead, these briefs illustrate some of the latest regional developments, highlighting responses to global challenges and emerging trends within them and relating these to the main messages of the *Outlook* publication. The assessments generally compare the end point of the *Outlook's* projection (2030) to the base period of 2018-20. These briefs acknowledge that the impact of the COVID-19 pandemic, which is still playing out globally, and the response to it differs across the regions. The briefs do not contain a specific quantitative assessment of the pandemic's impact, but they reflect the latest available macro-economic projections and the extent to which the actions imposed to curb the spread of COVID-19 influenced this environment. Consequently, the trends and issues presented in this chapter are those which are expected to underpin the *Outlook* as economies re-emerge from the unexpected shock of the novel corona virus, assuming that its effects on food production, consumption and trade will gradually moderate.

This chapter proceeds in six 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 to provide common charts and tables outlining the key aspects of the projection for the region.

2.2. Regional outlook: Asia and Pacific

2.2.1. Background

The Asia and Pacific region[1] is by far the largest of all regions covered in this chapter and is exceptionally diverse in terms of economic structure, phase of development, income levels and trade dependence for food products. For instance, on a per capita basis, income levels range from USD 1 157 in the least developed countries of Asia, to USD 61 375 in Australia. At 4.3 billion people, the Asia Pacific region comprises more than half of the world's population, yet constitutes only around 30% of agricultural land globally. Its considerable natural resource base is therefore increasingly strained. Over the coming decade, this will likely intensify, as the population expands at a rate of 0.6% p.a., adding 322 million people by 2030. Urbanisation has advanced rapidly across the region, to the extent that 50% of the population resided in urban settings in 2020. This is expected to rise to 55% by 2030. In the People's Republic of China (hereafter "China"), which represents the largest share of the region's population, the share of the population residing in urban settings is set to reach 70% by 2030. Such urbanisation contributes to dietary change, underpinning rising consumption of higher value, as well as more processed and conveniently packaged food.

At regional level, per capita GDP declined by 3.2% in 2020, but this impact differs greatly within the region. Australia and Japan reflected declines of 5%, but China still realised growth of 1.4%. The recovery from the recession induced by the COVID-19 pandemic is the strongest in Asia and Pacific amongst the various regions, with average per capita incomes anticipated to grow at almost 4% p.a. over the next decade. China is projected to grow at 5% p.a., India and Viet Nam at 5-6% p.a., and Thailand and Indonesia at around 3-4% p.a. The share of primary agriculture and fish value added in the economy has declined to about 7.5% and is expected to reach 6% by 2030. Rapid economic growth has reduced the share of food in household expenditures to around 15%, which is still large enough for changes in incomes or prices to have a notable impact on consumers. [2] Within the least developed countries in the region, this share is considerably higher, which makes the food security of many consumers in these countries highly vulnerable to prices spikes and income shocks induced by the COVID-19 pandemic.

The region encompasses a range of important exporters and importers of various agricultural and food products, many of which face major uncertainties in the *Outlook*. Ongoing trade disputes are not fully resolved and weather conditions remain volatile, with Australia in particular facing a prolonged period of drought. The COVID-19 pandemic exposed vulnerabilities in global trade logistics and animal disease remains a risk. African Swine Fever (ASF) in China and parts of Southeast Asia critically impacted pig-meat production in recent years and while herd rebuilding has advanced rapidly, new cases are still being recorded, implying ever present risks to future production prospects.

2.2.2. Production

As the largest producer of agricultural and fish commodities, the region is anticipated to account for 53% of global agriculture and fish output by 2030. The total value of production expands 20% by 2030 relative to the 2018-20 base level. This rate exceeds that of population growth, implying that the value of agricultural production per capita is set to rise over the coming decade, driven by productivity gains, as total agricultural land use declines over the same period.

Crop production, which represents roughly 60% of total agricultural production value, is projected to grow by 22%, while that for livestock will increase by 19% over the ten-year period. In the pork sector, this recovery is from a small base due to the impact of ASF, which reduced regional production by 18% in 2019 and a further 4% in 2020. In China and Viet Nam, the ASF outbreak was so severe that it wiped out about 23% and 13% respectively of pig inventories in these countries. Both countries have made significant progress in rebuilding herds, with Viet Nam reflecting an increase of 12% in inventory in 2020 and China expecting a 10% increase in inventory in 2021. The shortages of pork resulted in higher livestock product prices in the region, inducing investments to expand production in other meat types that will support further growth over the next ten years. Poultry meat production, with its shorter production cycle, grew by 8% in 2019. Together with growth in bovine meat, sheep meat and milk production, this resulted in only a modest contraction in total livestock production, despite the sharp decline in pork output. The value of fish production is projected to increase by 15% over the projection period, due to the continued expansion in aquaculture. These rates of growth are considerably less than a decade ago when regional agricultural and fish output growth often averaged 3-4% p.a. (Figure 2.1). Growth has slowed as domestic markets have matured, policies have changed, markets have opened, and trade competition has strengthened.

The region is a major contributor to global grain output, notably in rice with a 90% production share. Its contribution to global output of wheat and maize is less, at 40% and 30% respectively, but still significant. The region's share in global maize production is expected to grow marginally over the outlook, while its role in other cereals remains similar to the base period. Almost 60% of the region's rice production occurs in China and India. While China's rice production is expected to increase by only 4% by 2030, India is expected to add 17% to its current production volumes, growing its share in regional production to 27%. Similarly, the same two countries account for more than 75% of the region's wheat production. Growth will however be driven by India and Australia, who account for 58% and 19% of additional wheat production in the Asia Pacific region by 2030 relative to the base period. In the case of Australia, this reflects an assumed recovery in yields following multiple years of drought impact which resulted in below average production levels.

The Asia Pacific region accounts for 58% of global vegetable oil production, much of which is obtained from palm oil output in Malaysia and Indonesia. The spread of COVID-19 and the associated restrictions on movement of people brought challenges to this sector, which relies strongly on foreign labour, exacerbating structural constraints that already reduced supply in 2019. The slowdown in the expansion of mature oil palm area implies that production growth in both Indonesia and Malaysia will remain slower in the coming decade.

Due to land scarcity within countries across the region, crop production growth will result from productivity enhancements and intensification. Irrigation expansion and improved seed varieties account for much of production gains, but there are mounting environmental and food safety concerns, associated with water scarcity and the heavy use of chemical inputs. Multiple harvests and double cropping will contain expansion in crop land use to an additional 1 Mha, compared to 15 Mha increase in area harvested, which will be allocated mostly to maize, wheat, oilseeds and pulses.

Livestock production over the outlook period will also come largely from productivity gains associated with increased feed intensity and breeding improvements. Animal numbers will grow at a slower rate than total meat production, despite the initial recovery in pig inventory following the ASF induced herd reductions in the base period. Feed use will grow at a marginally slower rate to meat production, with increased feed use intensity in some countries offset by gains in feed use efficiency in others. Meat production growth is expected to accelerate over the *Outlook*, with significant contributions from poultry and pork, where a heightened focus on biosecurity results in a larger share of pork production coming from large, modern production units. The share of pork in total livestock production recovers only marginally from the base period and does not reach pre-ASF levels by 2030.

Nearly 70% of global fish output is produced by the Asia and Pacific region, most coming from a combination of capture fisheries and aquaculture production in China. The efficiency and sustainability changes set out in China’s 14th Five Year Plan are expected to constrain growth, but the Asia Pacific region will nonetheless account for 80% of global production growth in the sector.

Total GHG emissions by the region are projected to increase by 2.7% by 2030. Emissions from animal sources are projected to increase by 5.6%, whereas those from crops decline by 0.8%.

2.2.3. Consumption

The Asian region has made immense progress in reducing the prevalence of undernourishment in its developing and least developed nations. In 2020, however, this regressed, largely due to the impact of the COVID-19 pandemic on income and food affordability. The prevalence of undernourishment as well as food insecurity in the region increased in 2020 and could remain under pressure in the short term. As the recovery from the COVID-19 pandemic gathers momentum, medium term income growth in the region is positive. Combined with the slowdown in population expansion and continued urbanisation, this supports the continued evolution of dietary patterns, resulting in rising demand for calorie and nutrient dense foods (Law, Fraser and Piracha, 2020[1]) (Kelly, 2016[2]) (Reardon et al., 2014[3]). By 2030, average calorie availability in the region is projected to increase by almost 200 kcal/person/day to average just over 3 000 kcal, mainly due to increases in the consumption of vegetable oils, sugar and animal products, particularly dairy products. Average protein intake will rise by 10 g/person/day to 109 g/person/day, thanks to increased consumption of dairy and meat products.

Populations in many parts of the region are aging, with dependency ratios[3] in Japan and Korea set to increase to 53.2% and 38.2% by 2030, respectively. The ratio in China will increase to 27.3%, which is higher than the world average (18.3%) in 2030 (United Nations, 2019). It is generally assumed that the aging population trend will have a negative impact on growth rates of overall food consumption in these countries. Within the broader region, urbanised lifestyles will lead to growth in consumption of sugars and fats that will outpace that of most other food groups. Consumption of vegetable oil will exceed the global average by 2030, reaching 21 kg/capita per year. Paired with stronger population growth in several countries, such as India, this implies that the region will account for 71% of global vegetable oil consumption growth over the next ten years. The share of calories obtained from animal products, sugars and fats will increase across most of the region by 2030, at the expense of basic food staples.

Rice consumption per capita, which is so important in many countries of the region, often accounting for as much as 50% or more of calorie availability, is projected to stagnate at regional level, with higher per capita consumption in India offset by a decline in countries such as Indonesia. By contrast, wheat consumption is set to increase by 2.1 kg per capita at regional level, with substantial gains in Korea, Viet Nam, Indonesia, Thailand, and many other LDC's in the region.

Meat consumption will rise by 2.6 kg/capita to an average annual consumption of 29 kg/capita, but there is divergence within the region. In countries such as Korea, Viet Nam and China, demand is rising by 5-10 kg, whereas in India, per capita consumption growth will remain less than half a kilogram. The Asia Pacific region is a major consumer of fish, with the highest per capita intake of all regions. Consumption is expected to grow by a further 1.7 kg/capita to an average consumption of 25 kg/capita per year, mainly driven by China, India, and Indonesia. Dairy product consumption will also expand by 24%, largely driven by consumption in India, Pakistan, Iran, and China, as well as rapid growth in Viet Nam, albeit from a much smaller base.

With increasing livestock and dairy production, intensification through higher use of feed grains, and efficiency gains over time, feed use is projected to increase 20% by 2030. Feed use of maize and protein meals are projected to increase 17% and 21% respectively. Such growth in feed is also associated with increased commercialisation of farms, and less backyard production which may use non-grain inputs as feed.

Given increasing mandates, mainly in India, the Asia and Pacific region is projected to increase its share in global ethanol use to 19% by 2030, from 16% in the base period. Similarly, the region's share in global biodiesel use is expected to grow from 23% in the base period, to more than 30% by 2030, underpinned by gains in Indonesia.

This *Outlook* assumes that China does not fully implement the ambitious nationwide E10 mandate by 2030. Based on decreasing maize stocks, its increasing demand for animal feed and industrial uses that cannot be met entirely by domestic production, a 2% blend of gasoline-type fuels is projected. By contrast, the government of Indonesia is assumed to continue implementing the B30 programme nationwide as planned, but reaching the intended target to increase biofuel demand will largely depend on the relationship between domestic and international palm oil prices, as well as palm oil exports. Rising production costs could put the target into jeopardy. By 2030, biodiesel demand would reach about 9.5 bln L.

In Indonesia, the blending mandate is expected to direct domestic palm oil supplies to the biodiesel market. Together with strong short-term price support for vegetable oil on the back of current supply constraints, this could help catalyse investment in the sector. However, land availability remains a constraint and a key contributing factor to the replanting delays in oil palm in recent years. This also underpins slower growth in the Asia Pacific region's vegetable oil production over the outlook period, with production set to expand 18% by 2030, compared to 47% over the last ten years.

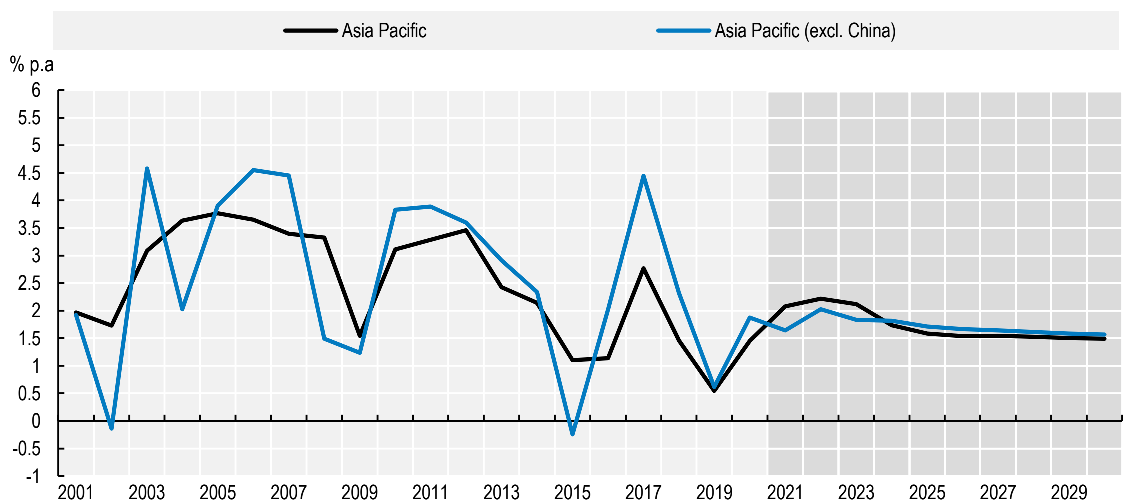
2.2.4. Trade

In terms of primary agricultural commodities, the Asia Pacific region is the largest net importer, accounting for over 30% of global imports. Net imports are trending higher over the medium term as demand outpaces supply. China represents one of the largest importers in the region, with soybeans a major contributor to its total import bill. Having declined in 2018 and 2019, due to a combination of trade actions and reduced demand from its diminished pig herd, Chinese soybean imports recovered to record levels in 2020. This was driven by the rapid expansion of its poultry sector, as well as the recovery of its pig breeding herd, and comes despite the logistical challenges and constraints associated with the ongoing COVID-19 pandemic, from which China was amongst the fastest countries to recover. With demand factors remaining firm and the trade environment less restrictive, soybean imports are set to rise by a further 17% by 2030 relative to the base period, to account for just over 60% of global soybean trade. Maize imports, which are smaller but still significant, also increased sharply in 2020, but are set to decline towards 2030, on the back of stronger domestic production growth.

Net imports of livestock products into the Asia Pacific region are set to increase further over the next ten years, despite reduced import demand from China. Chinese imports peaked during the base period as a result of ASF-related supply constraints and the projected decline in pork imports will only be partly offset by rising beef and sheep meat imports over the coming decade. While total meat imports are set to decline in China and Viet Nam, they are expected to rise in the Philippines, Malaysia, and Korea. This is partly offset by growing exports of bovine meat from Australia and poultry from Thailand. In the case of dairy products, net imports into the region expand, owing to rising import demand from South East Asia.

The Asia Pacific is also a major exporting region contributing 26% of global exports. The largest primary export commodity is rice, which is projected to rise to 54 Mt, led mainly by India, Viet Nam, Myanmar and Thailand. Net exports of vegetable oil from the region is however projected to contract 28% by 2030, as growth in imports exceeds that of exports. Being the main fish producer, the region is a net exporter of fish and fish products. Despite a slowdown in export growth, it will still constitute 47% of global export volumes by 2030. A significant share of this trade occurs within the region, as it also contributes 36% of global imports by 2030.

Figure 2.1. Slowing growth of agriculture and fish output in Asia Pacific 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 (2021). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

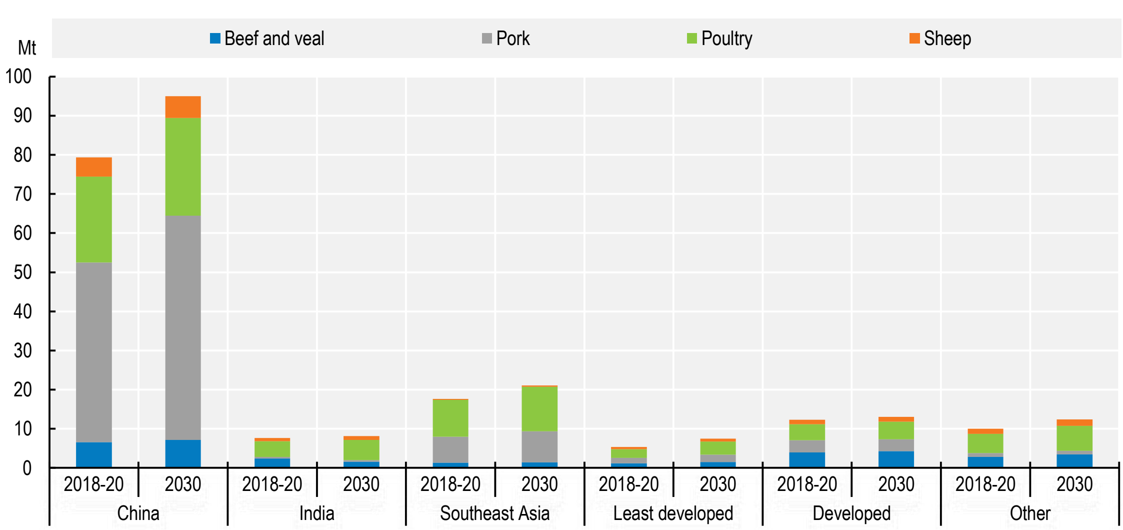
StatLink https://stat.link/0ok5h9

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

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/409xw3

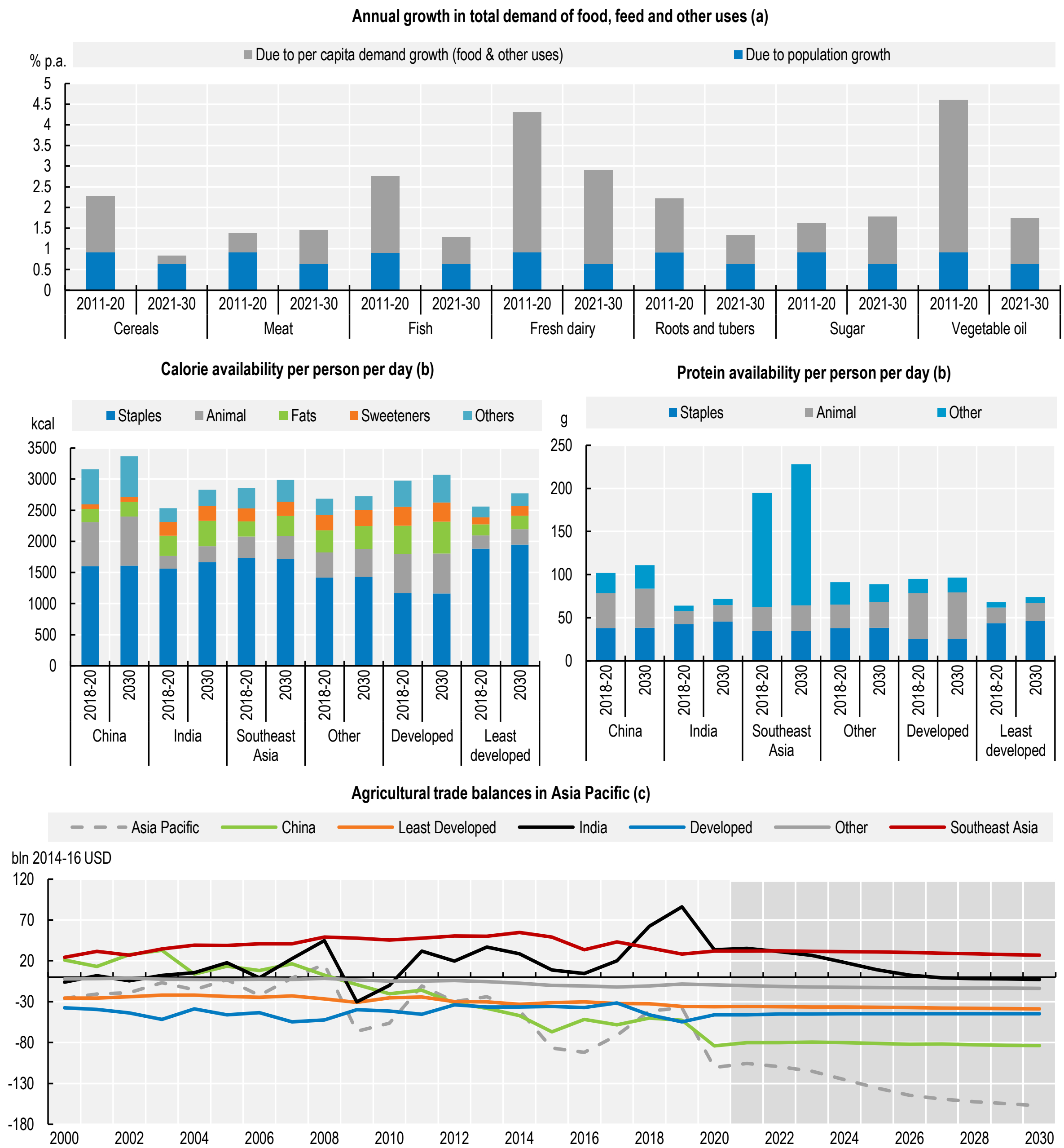
Figure 2.3. Livestock production in Asia Pacific



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/w043gv

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



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 (2021). FAOSTAT Food Balance Sheets and trade indices databases, http://www.fao.org/faostat/en/#data; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/qn2b8h

Table 2.1. Regional Indicators: Asia and Pacific

	Average			%	Growth [2]	
	2008-10	2018-20 (base)	2030	Base to 2030	2011-20	2021-30
Macro assumptions						
Population ('000)	3 885 796	4 268 075	4 590 121	7.55	0.91	0.63
Per capita GDP[1] (kUSD)	4.80	6.70	9.55	42.64	3.15	3.61
Production (bln USD)						
Net value of agricultural and fisheries[3]	1737.0	2141.6	2572.3	20.11	1.75	1.66
Net value of crop production[3]	1032.0	1295.6	1578.5	21.83	1.83	1.68
Net value of livestock production[3]	438.2	502.7	600.0	19.36	1.10	1.78
Net value of fish production[3]	266.8	343.3	393.8	14.72	2.43	1.38
Quantity produced (kt)						
Cereals	963 946	1157 083	1 300 538	12.40	1.17	0.97
Pulses	29 523	40 109	50 312	25.44	2.55	2.03
Roots and tubers	73 723	94 781	110 444	16.53	2.26	1.36
Oilseeds[4]	42 159	47 844	54 322	13.54	1.07	0.84
Meat	114 569	132 284	156 981	18.67	0.80	1.64
Dairy[5]	35 751	50 620	66 878	32.12	3.54	2.69
Fish	95 195	122 718	140 710	14.66	2.46	1.37
Sugar	54 287	70 073	83 348	18.94	0.71	1.51
Vegetable oil	83 118	122 492	145 105	18.46	3.72	1.31
Biofuels production (mln L)						
Biodiesel	2395.00	13201.60	16868.41	27.78	12.79	1.43
Ethanol	11 172	17 600	23 113	31.32	3.70	2.02
Land use (kha)						
Total agricultural land use	1 495 093	1469 641	1 459 978	-0.66	-0.29	-0.07
Total land use for crop production[6]	525 121	533 056	534 051	0.19	-0.07	0.19
Total pasture land use[7]	969 972	936 584	925 927	-1.14	-0.42	-0.21
GHG Emissions (Mt CO2-eq)						
Total	2 202	2 296	2 358	2.69	-0.04	0.46
Crop	994	1 051	1 043	-0.76	-0.46	0.06
Animal	1 176	1 212	1 280	5.61	0.35	0.80
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2 669	2 824	3 020	6.93	0.45	0.63
Daily per capita protein availability[8](g)	87.3	98.7	108.8	10.3	1.1	1.0
Per capita food availability (kg)						
Staples[9]	170.5	174.5	179.0	2.59	0.32	0.10
Meat	24.7	26.6	29.2	9.69	0.25	0.65
Dairy[5]	9.2	11.9	14.7	23.59	2.69	2.05
Fish	19.3	22.8	24.6	7.50	1.46	0.73
Sugar	16.2	17.7	19.9	12.50	0.49	1.14
Vegetable oil	14.2	18.1	20.6	13.95	2.76	1.33
Trade (bln USD)						
Net trade[3]	- 36	- 63	- 157	149.02	..	..
Net value of exports[3]	259.7	362	365	0.76	2.58	0.25
Net value of imports[3]	295.3	425	522	22.77	4.19	1.49
Self-sufficiency ratio[10]						
Cereals	95.7	92.3	93	0.5	-0.62	0.11
Meat	97.6	94.1	95	0.8	-0.57	0.18
Sugar	90.6	92.2	90	-2.0	-0.14	-0.32
Vegetable oil	114.5	109.3	105	-3.5	-0.49	-0.37

Notes: 1 Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports) * 100.
Source: OECD/FAO (2021), "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

Among the six regions[4] presented in this chapter, the demographic and economic growth profile of Sub-Saharan Africa[5] stands out. Population growth is the highest and despite rapid progress, urbanisation remains by far the slowest among the regions. It is anticipated that SSA will add some 329 million people by 2030 compared to the 2018-20 base period, reflecting growth of 2.5% p.a. Although almost two thirds of that addition will be urban, 53% of the population will still live in rural areas by 2030. This makes it the only region with more than half of the population still residing in rural areas by 2030 and one of only two (along with Near East and North Africa) where the absolute size of the rural population is still expected to increase over the coming decade.

Economies in the region typically have a high dependency on resource-based commodities, such as agriculture, oil and metals. Agriculture, fish and forestry account for about 14% of GDP, and this is expected to decline to 12% by 2030. Economic growth, in per capita terms, is expected to be less robust than other emerging developing regions, expanding by 1.3% p.a. over the outlook period. This follows a contraction of 6% in 2020, followed by a recovery of merely 0.5% in 2021, reflecting the prolonged impact of economic restrictions to curb the spread of the pandemic, limited resources to support a recovery as well as a the strong reliance on commodity exports and tourism. Economic performance varies considerably within the region, with least developed economies growing faster, albeit from a lower base level. Average per capita incomes in the region are the lowest globally, at USD 1 675, and are assumed to rise to USD 1793 by 2030 in real 2010 terms; however, average per capita incomes in least developed countries (LDCs) of the region are expected to reach just USD 1 064 per year. Households in the region spend on average about 38% of their incomes on food, but this share varies considerably by country, from as low as 16% in South Africa to about 50% in Nigeria.[6] Per capita calorie availability in the region is significantly lower relative to most others, which implies that food security and economic welfare is particularly vulnerable to food price or income shocks. This also magnifies the impact of the COVID-19 pandemic, which has significantly impacted food affordability and, hence, food security in the region.

Sub-Saharan Africa houses 14% of the global population and is an agro-ecologically diverse, land abundant region that accounts for 15% of global crop land and 20% of pasture. In many countries however, high population density in rural areas has resulted in the agricultural sector facing land shortages. Much of the land still available in the region is concentrated in few countries and/or is largely under forest cover. The region thus produced only 7% of the global value of agricultural and fish production in 2018-20. By contrast, the large population with its high consumption requirement and unique dietary composition resulted in the region accounting for 37% of global roots and tuber consumption, compared to only 7% of global cereal consumption, and 6% of global sugar, vegetable oil and fish consumption. The region's comparatively small share in global meat (4%) and fresh dairy (5%) consumption reflects weaker purchasing power and poor dietary diversity. Overall, Sub-Saharan Africa's self-sufficiency for major food commodities is decreasing, as the region's population is expanding quickly, beyond the pace of growth in domestic supply.

2.3.2. Production

Agricultural and fish production in SSA is expected to grow by 23% over the next ten years in net value added terms, implying that per capita production in the region will continue the decline that that has been ongoing since 2015 (Figure 2.6). Crop production is projected to account for over 72% of total output by 2030, while the share of livestock products will advance to 20% and the share of fish production decline to 7%. Food and feed staples, namely cereals, pulses, roots and tubers, will be the main sources of growth for the region. In all of these commodities, the region's global market share will rise over the outlook period. By 2030, the SSA region may account for almost 40% of global roots and tubers output, 21% of pulses production and 6% of cereal output. Area expansion in West Africa, coupled with support to the cotton sector, will sustain cotton production at regional level of nearly 22% by 2030, to comprise 7% of global production.

Total area harvested is expected to expand by almost 6 Mha by 2030. Due to cropping intensification this net growth is expected despite a smaller 4 Mha rise in agricultural land use. Intercropping with beans and cereals occurs in many countries. Double-cropping is also prevalent in tropical regions with bimodal rainfall, as well as irrigated systems in Southern Africa, where soybeans and wheat are often produced consecutively in a single year. The expansion of rice cultivation in the region, notably in Nigeria, is also expected to be based upon multiple harvests per year.

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

Average cereal yields across the region are projected to grow 21% over the outlook period, a similar rate to the past decade. Continued yields gains for most major crops stem from investments in locally adapted, improved crop varieties, and better management practices. Yield growth for most crops exceeds the rates projected at a global level, but occurs from a base which is typically less than half of the global average. Consequently, the region’s substantial gap relative to yields achieved in the rest of the world will narrow, but still remain significant by 2030. Although productivity improvements will be central to output growth in the medium term, efforts to fully close the yield gap are challenged by the limited use of inputs, irrigation and farm infrastructure.

The net value of livestock production is projected to expand by 26% over the next ten years, with the fastest increases coming from poultry and milk production. The region will add 2.9 Mt of meat output by 2030, comprising almost 1.3 Mt of poultry, 740 Kt of bovine meat, 650 Kt of ovine meat and 260 Kt of pig meat. Bovine and ovine production systems in the region remain fairly extensive and growth in the coming decade is fuelled by herd expansion more than productivity gains. In the 2018-2020 base period, SSA accounts for 7% of global bovine meat output, but 17% of the global bovine herd. The region’s share in the global bovine herd is projected to expand to almost 20% by 2030. Similarly, the region constitutes 14% of global ovine meat output, with 24% of the global ovine herd. Ovine meat production is expected to increase by 30% in the coming decade, allowing SSA to grow its share of global output to 15%. These herd expansions will occur despite land used for pasture purposes remaining almost unchanged by 2030. While extensive poultry production systems are still common in the region, a greater degree of intensification has been evident in this sector, particularly in countries such as South Africa, that produce surplus feed grains. Feed intensity is expected to continue increasing in the broader SSA region as supply chains modernise in countries such as Zambia and Tanzania. This increase comes from a small base and many smaller producers continue to use non-grain, often informally procured feed inputs. In countries that already use feed more intensively, genetic improvements and better feed conversion over time reduce the amount of feed required per animal. At the regional level, this results in feed use growing marginally slower than meat production. Some feed use also accrues to fish production, which is expected to increase 13% by 2030. The projected expansion of 28% in the aquaculture sector is faster than that of captured fisheries at 12%, but occurs from a small base and by 2030, aquaculture will represent only 9% of the fish production in the region, compared to 8% in the base period.

Based on these production projections, direct greenhouse gas (GHG) emissions from agriculture are expected to grow by 16% by 2030 compared to the base period. Sub-Saharan Africa will account for 62% of the global increase in direct emissions from agriculture and will reach a share of 16% of global direct emissions by 2030.

2.3.3. Consumption

The SSA region concentrates most of the world's poor. Similarly, the prevalence of undernourished individuals in the region is the highest in the world. Poor food security in the region was further exacerbated by the COVID-19 pandemic. Supply chain disruptions, particularly in informal sectors, influenced accessibility, while income and employment shocks weakened affordability. Food security and undernourishment will likely remain a challenge and even as income levels start to recover, a sustained recovery will require improvements in the availability, accessibility, affordability and utilisation of food supplies in the future.

Average income levels recover slowly following the economic contraction in 2020, thus population growth remains the biggest driver of rising food consumption (Figure 2.10). This combination of rapid population growth and gains in per capita calorie availability, make the region one of the largest sources of additional demand for the global agricultural sector in the coming decade. The region's share in global food calorie consumption is anticipated to rise from 10% in the base period to 11% by 2030.

The contribution of staples to total calorie availability is higher in SSA than any other region and per capita consumption of food staples is set to increase further by 2030. For most other commodity groups, including meat, dairy, fish, sugar and vegetable oils, per capita consumption levels are currently the lowest in the world. With the exception of fish, per capita consumption of all of the aforementioned commodity groups will increase over the coming decade, resulting in substantial growth in total consumption, but dietary diversification remains slow and staples still contribute the bulk of total calorie intake by 2030.

Gains of 61 kcal/day over the outlook period enables the region to reach an average calorie availability of almost 2 500 kcal/capita per day by 2030. This is well below the global average of 3 025 kcal/day and implies that calorie intake in the region will still be the lowest in the world by 2030. An increasing share of calories will come from cereals and sugar, and while meat consumption will increase marginally, this is more than offset by the decline in per capita fish consumption over the next decade, limiting gains in vital nutrients.

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

2.3.4. Trade

Most basic food commodities in the region are produced for domestic consumption rather than exports as the region as a whole increasingly relies on imports to close the gap between domestic production and consumption. At the same time, many countries benefit from counter seasonality in the northern hemisphere and competitive labour costs, enabling net exports of high value fresh produce.

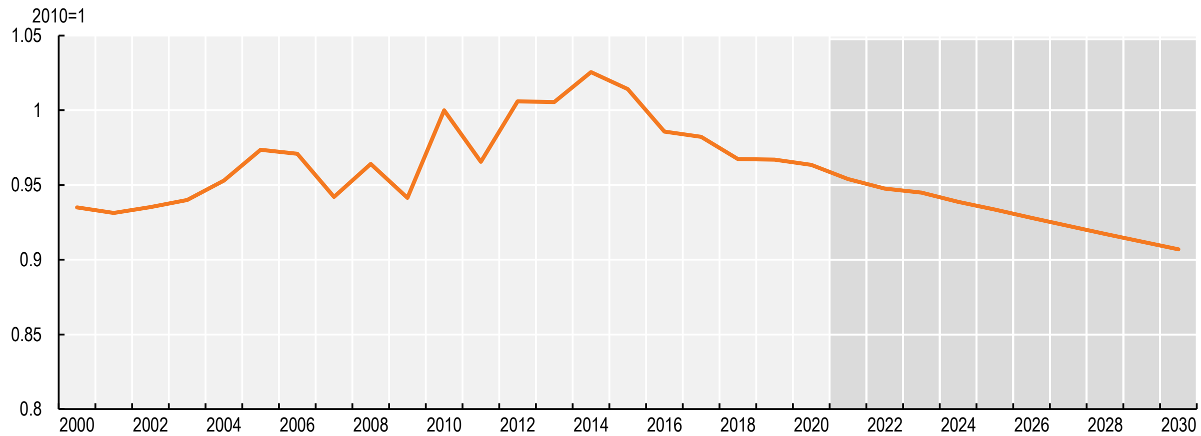
The region's trade deficit in major food items is anticipated to widen over the coming decade. Evaluated at constant (2014-16) global reference prices, the deficit is anticipated to grow from about USD 7 billion to USD 18 billion by 2030.

Amidst the pandemic related challenges in 2020, cereal and vegetable oil import volumes increased, while meat and sugar imports declined. At the height of the pandemic's first wave, intraregional trade in particular faced many logistical challenges, causing long delays at land border posts (Njiwa and Marwusi, 2020[4]). Over the course of the next decade, import volumes of cereals, meat, fish, sugar and oils rise substantially, at a faster rate than production. Apart from cereals and fresh produce, export volumes tend to decrease over time. The region as a whole is not self-sufficient in basic food staples and its import dependence is expected to deepen over the next ten years.

In contrast to basic food crops, the bulk of cotton production is sold on global markets and almost 90% of cotton production from the region will be exported by 2030. Most of this comes from the least-developed countries of the region. The region's share in global exports is expected to remain fairly constant over the outlook period.

Improving internal trade in the SSA region is an important policy objective. The African Continental Free Trade Agreement entered into force on 30 May 2019 and after initial delays due to the pandemic, trade under the agreement officially started on 1 January 2021. The ambition of the agreement was for 90% of tariff lines to be phased to zero in a linear form over a period of ten years for LDC's and five years for others. In reality however, rules of origin agreements have only been reached on 81% of tariff lines and while trade has officially started based on this 81%, many countries have not yet submitted tariff reduction offers. Furthermore, in some customs unions, all members of the union have not ratified the agreement, thus prohibiting the union from trading under preferential terms unless concessions can legally be implemented on individual basis. Despite the slow start and the need to conclude further engagements regarding rules of origin, the agreement will ultimately only exclude three percent of tariff lines and therefore has significant potential to increase intra-Africa trade in the medium term. According to recent estimates by the UN Economic Commission for Africa, the agreement is projected to increase intra-African trade of agriculture and food products by 20-35% (or USD 10-17 bln). Intra-trade gains are expected to be particularly pronounced for meat products, fish, milk and dairy products, sugar, beverages and tobacco, vegetables/fruit/nuts and paddy and processed rice. However, trade within the region is hampered by high non-tariff barriers and while 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 remain more difficult to remove or reduce. A major contributor in this regard is the high cost of road transportation, which emanates from poor infrastructure, as well as inefficiencies at border posts. This increases costs and weakens logistical performance, as illustrated by the presence of only six SSA countries in the top half of the World Bank's logistical performance index ranking, which covers 160 countries in total. Further to the logistical performance, the imposition of discretionary export controls weakens market integration. Based on the regulations implemented to date and the need to finalise tariff reduction schedules and sensitive product lists, no discernible impact was included in the baseline projection this year.

Figure 2.5. 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 (2021). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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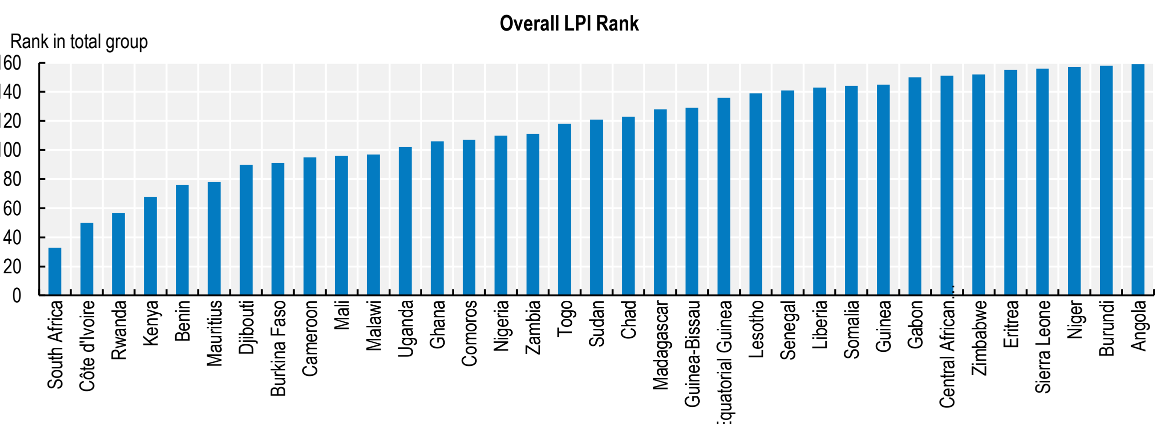
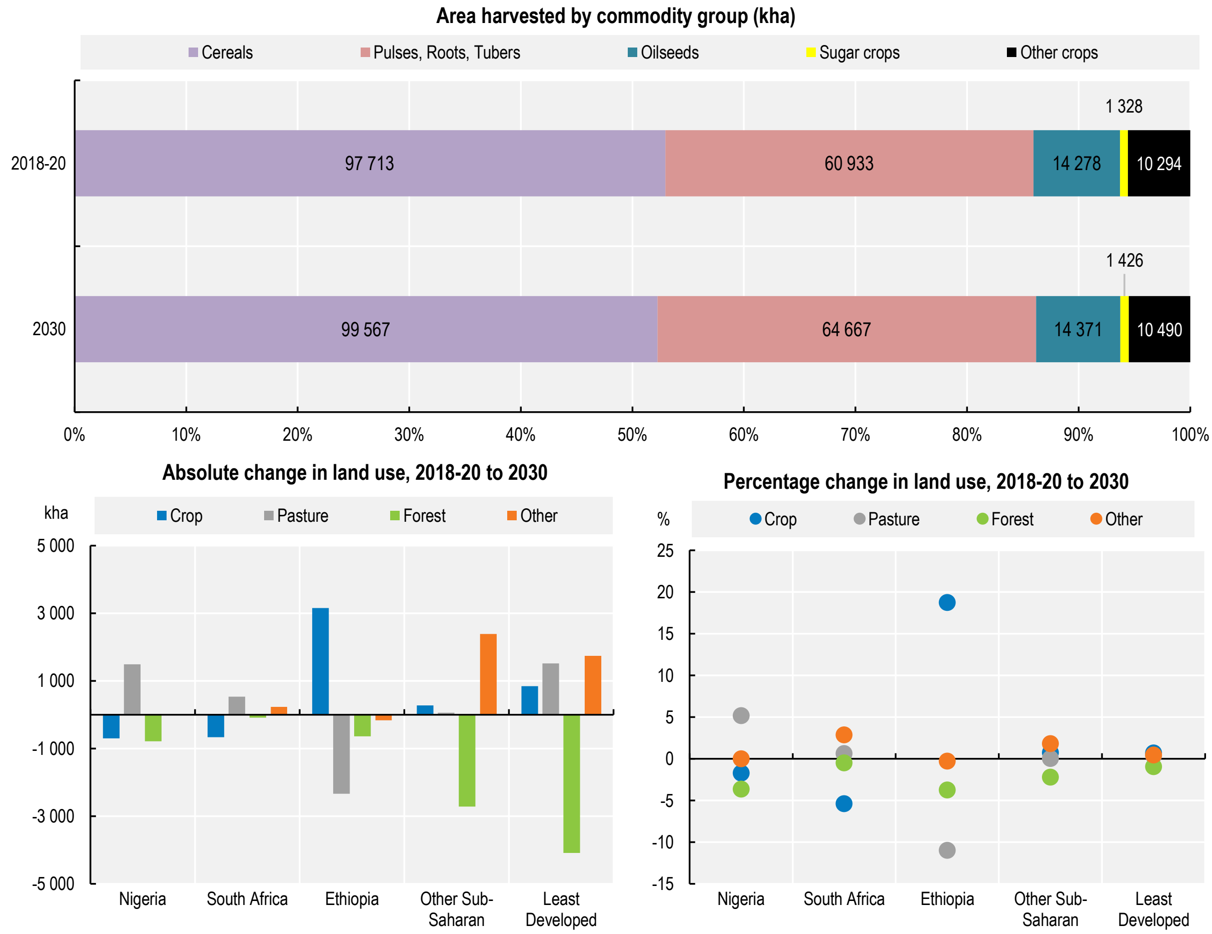
Figure 2.6. World Bank Logistical Performance Index – Few SSA countries in the top half (80) of the global sample



Source: World Bank.

StatLink https://stat.link/1b5xw9

Figure 2.7. Change in area harvested and land use in Sub Saharan Africa



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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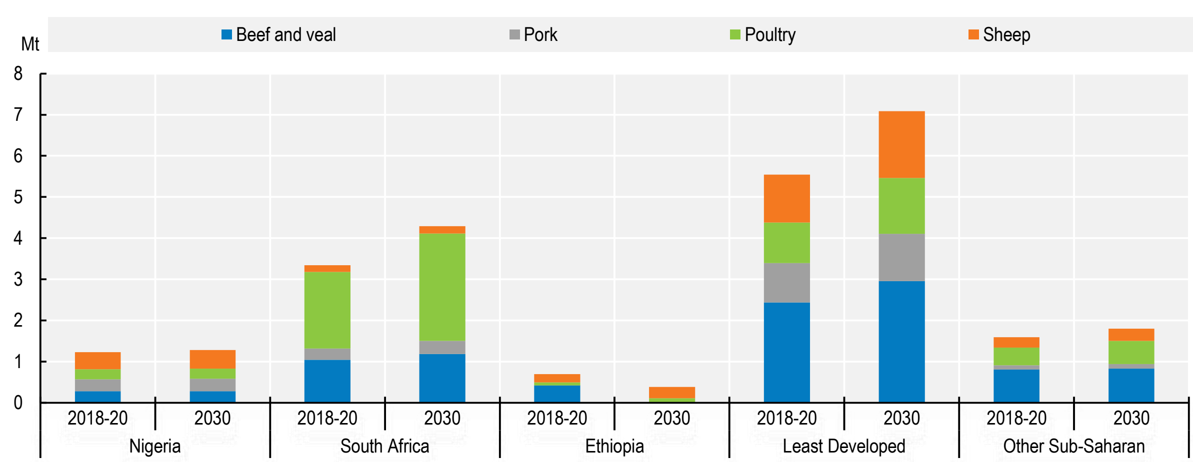
Figure 2.8. Livestock production in Sub Saharan Africa



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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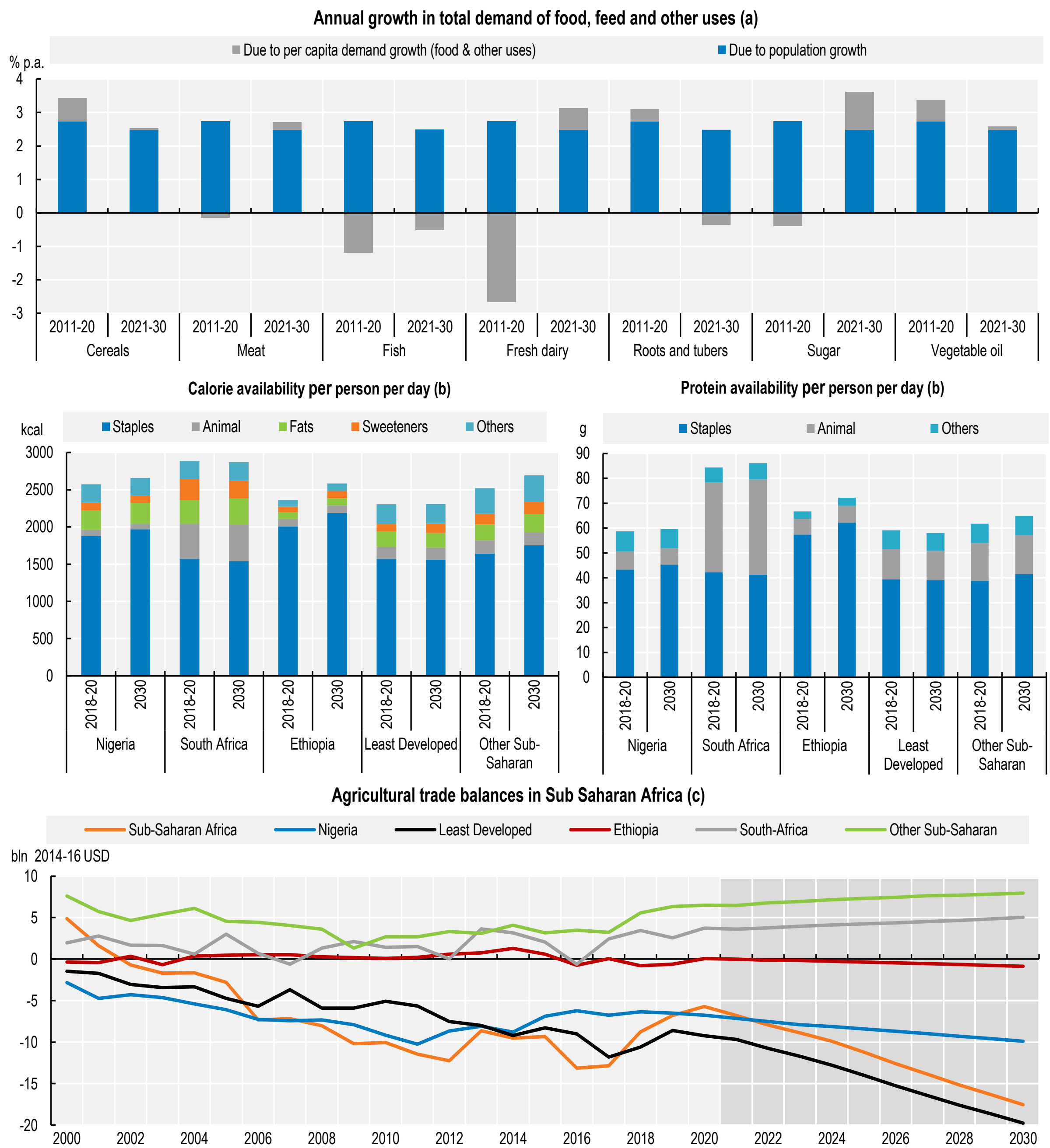
Figure 2.9. Demand for key commodities, food availability and agricultural trade balance in Sub Saharan Africa



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 (2021). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/4jl0za

Table 2.2. Regional indicators: Sub Saharan Africa

	Average			%	Growth [2]	
	2008-10	2018-20 (base)	2030	Base to 2030	2011-20	2021-30
Macro assumptions						
Population ('000)	800 857	1 050 243	1 379 515	31.35	2.74	2.48
Per capita GDP[1] (kUSD)	1.57	1.67	1.79	7.08	-0.09	1.25
Production (bln USD)						
Net value of agricultural and fisheries[3]	208.8	273.0	336.6	23.33	2.34	1.91
Net value of crop production[3]	147.2	197.0	243.9	23.77	2.54	1.92
Net value of livestock production[3]	45.4	54.0	68.0	26.00	1.48	2.19
Net value of fish production[3]	16.2	22.0	24.8	12.75	2.73	1.07
Quantity produced (kt)						
Cereals	115 275	153 779	190 157	23.66	3.47	1.77
Pulses	13 338	18 246	23 141	26.83	3.08	2.23
Roots and tubers	58 798	88 322	110 487	25.09	2.82	2.16
Oilseeds[4]	7 081	8 253	9 120	10.51	1.01	0.89
Meat	9 568	12 391	15 323	23.66	2.51	2.01
Dairy[5]	3 325	3 582	4 783	33.53	0.29	3.10
Fish	5 784	7 878	8 887	12.81	2.78	1.08
Sugar	6 455	7 565	9 854	30.26	0.90	2.73
Vegetable oil	4 909	7 213	8 277	14.76	2.67	1.23
Biofuel production (mln L)						
Biodiesel	0.04	0.04	0.07	49.87	0.00	4.02
Ethanol	541	766	948	23.82	3.50	2.39
Land use (kha)						
Total agricultural land use	858 750	886 843	890 984	0.47	0.24	0.03
Total land use for crop production[6]	206 447	226 437	229 332	1.28	0.54	0.07
Total pasture land use[7]	652 303	660 406	661 652	0.19	0.14	0.01
GHG Emissions (Mt CO2-eq)						
Total	628	739	857	15.94	1.38	1.43
Crop	199	185	187	1.05	-1.29	0.07
Animal	429	553	669	20.95	2.42	1.85
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2 395	2 429	2 489	2.51	-0.05	0.32
Daily per capita protein availability[8] (g)	60. 444	61. 65	62. 206	. 903	-0.09	0.18
Per capita food availability (kg)						
Staples[9]	177.5	193.3	197. 565	2.21	0.21	0.26
Meat	10.7	10.8	10. 965	1.07	-0.31	0.29
Dairy[5]	4.6	3.7	3. 829	4.06	-2.38	0.54
Fish	8.2	7.8	7. 446	-5.02	-1.12	-0.35
Sugar	10.4	10.4	11. 626	11.32	-0.59	1.12
Vegetable oil	7.7	8.7	9. 172	5.87	0.03	0.61
Trade (bln USD)						
Net trade[3]	-9.43	-7.09	-17.54	147.5	..	..
Net value of exports[3]	28.61	48.64	64.23	32.05	4.78	2.40
Net value of imports[3]	38.04	55.72	81.77	46.73	2.93	3.78
Self-sufficiency ratio[10]						
Cereals	84.8	82.7	77.5	-6.3	-0.02	-0.64
Meat	88.9	86.4	81.8	-5.4	-0.03	-0.70
Sugar	75.8	64.9	60.4	-7.0	-1.29	-0.81
Vegetable oil	58.9	54.7	47.8	-12.7	-0.14	-1.25

Notes: 1. Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports) * 100.
Source: OECD/FAO (2021), "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

The Near East and North Africa[7] region is a challenging environment for agriculture and fish production. Its endowment of land and water resources is limited, with less than 5% of land considered arable. All countries in the region, except for Iraq and Mauritania face water scarcity, and for some countries this water scarcity is extreme, at less than one quarter of sustainable levels on a per capita basis.

The region encompasses a broad range of countries, exhibiting diverse income and resource profiles. Among them are least developed, middle income, and high income oil exporting nations in the Gulf. As one of the highest net food importing regions, self-sufficiency rates for most commodities are low, but particularly for cereals, vegetable oils and sugar (Figure 2.11). Uncertainties abound on both the supply and demand side, which raises concern regarding reliable access to basic foods. The COVID-19 pandemic and related restrictions on economic activity revealed vulnerabilities in global trade logistics, while policy responses to curtail exports from some key suppliers influenced cereal prices in the short term. Within the region, the limited land and water resources that are characteristic of most countries constrain growth and have been further stretched in some countries by policy incentives that sought to increase production and limit the deficit in cereal trade. Cereal production often competes with higher value crops for water. Geopolitical conflict further hinders agriculture and fish production, reduces needed investments and induces displacement of populations. Furthermore, in a region where oil export revenues represent the main source of income, unstable energy markets affect economic activity, including consumption and investment. With average food expenditures around 13% of total household expenditures, income and price shocks can have a meaningful impact on welfare.[8]

Population growth exceeded 23% in the past decade and constitutes a key source of additional demand. Growth of 1.7% annually over the next ten years will see the region's population approach 500 million people by 2030. More than half 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 contain vegetable oil and sugar. The strong reliance on oil export revenue implies that economies in the region were some of the most affected by the pandemic in 2020, with per capita GDP contracting by 8%. Activity is expected to remain constrained in 2021 and on average, over the coming decade, will only grow by 1.1% p.a. Consequently, it is unlikely to constitute a major driver of demand over the next ten years.

Egypt produces almost 30% of the net value of agriculture and fish production in the region, with a further 49% attributed to the rest of North Africa (15% from LDC's and 34% from other North Africa). These shares are expected to increase in the coming decade, such that North Africa will constitute almost 80% of net agricultural output value in the broader region by 2030. Gross domestic product in the agriculture, forestry and fishery sector is currently about 6% of total GDP in the region, and is expected to remain fairly stable over time.

Fish production is about 12% of total net agricultural and fish production. Capture in coastal areas has grown most recently, but fish stocks are under pressure. The contribution of aquaculture to total fish production is growing, with Egypt the major contributor.

2.4.2. Production

Agricultural and fish production in the Near East and North Africa region is projected to expand by 1.5% p.a. over the next ten years, slightly slower than population growth of 1.7%. The region will therefore become increasingly dependent on global markets (Figure 2.10). Crop production contributes the bulk of total value, but average annual growth of 1.3% will see its share decline by 1 percentage point to 61% of total net value by 2030. Livestock production growth is stronger at 2.2% p.a., which will see its share in total net value increase to just over 27% by 2030. The value of fish production is set to expand by 1.2% p.a., the slowest of the three sub sectors over the coming decade.

Land use under crops will decline by 2030 relative to the base period, with the greatest share in Saudi Arabia, where conditions are not conducive to large scale cropping. Land utilized for cereal production is projected to account for almost 50% of total cropland by 2030, a minor increase from the base period. This increase comes primarily from coarse grains and wheat, which is expected to contribute 60% and 35% respectively to total land used for cereal production by 2030. Total area harvested in the region remains almost unchanged, increasing by merely 3% by 2030 due to higher crop intensity. Yield improvements will account for the majority of crop production gains, with wheat, maize, other coarse grains and rice yields growing at 0.9%, 0.7%, 1.3% and 1.1% p.a. respectively. Wheat yields will remain at 77% of the global average, while other coarse grain yields improve somewhat to almost 50% of the global average.

Growth in poultry production, at 3% p.a., will outpace all other meat products. Favourable progress is also expected for ovine meat production, at 1.5% p.a, while bovine meat production gains are slower at 1.1% p.a. Expansion in the poultry sector slows from the previous decade, whereas ovine meat production growth accelerates. Bovine meat production gains reflect a turnaround from the decline evident over the past decade. These rates of growth will help to curb the longer term decline in meat self-sufficiency (Figure 2.11).

With average annual growth of 2.3% and 2.0% for meat and dairy products respectively over the coming decade, GHG emissions from livestock activities in the region will expand by 4% by 2030 compared to the base period. Total GHG emissions in the region are projected to expand 3.5% by 2030.

2.4.3. Consumption

Food policies in the region have traditionally focused on food security by supporting consumption of basic foodstuffs, primarily cereals. In recent years, some policies have been expanded to include animal products. Since 2005 however, the prevalence of undernourishment has only declined modestly from 11% to 9% and even prior to the impact of the COVID-19 pandemic, the absolute number of undernourished people in the region has increased since 2015. This accelerated as a result of the pandemic in 2020, with increases in both the prevalence of undernourishment and the number of undernourished people in the region. As the economic recovery strengthens in the medium term, per capita calorie availability in the region is set to increase by 41 kcal/day by 2030 relative to the base period. This would enable the region to exceed 3050 kcal/person/day on average by 2030, marginally higher than the global average of 3 025 kcal/person/day. There is however great diversity within the region and despite gains of 106 kcal per person and day by 2030, the LDC's only reach 2700 kcal/person/day, roughly 11% below the global average.

The projection for the average diet in the region indicates about 55% of calories will come from cereals by 2030, down 1% from the base period. This compares to the world average of 44%. A similar phenomenon applies to sugar consumption, where the region's share of total calories derived from sugar will be 10% compared to a global average of 7%. This diet which relies on starchy foods and sugar is associated with a rising incidence of over-weight and obesity, and various non-communicable diseases such as diabetes. Combined with the prevalence of undernourishment in certain countries, this suggests that the "triple burden" of malnutrition will be a policy challenge over the medium term.

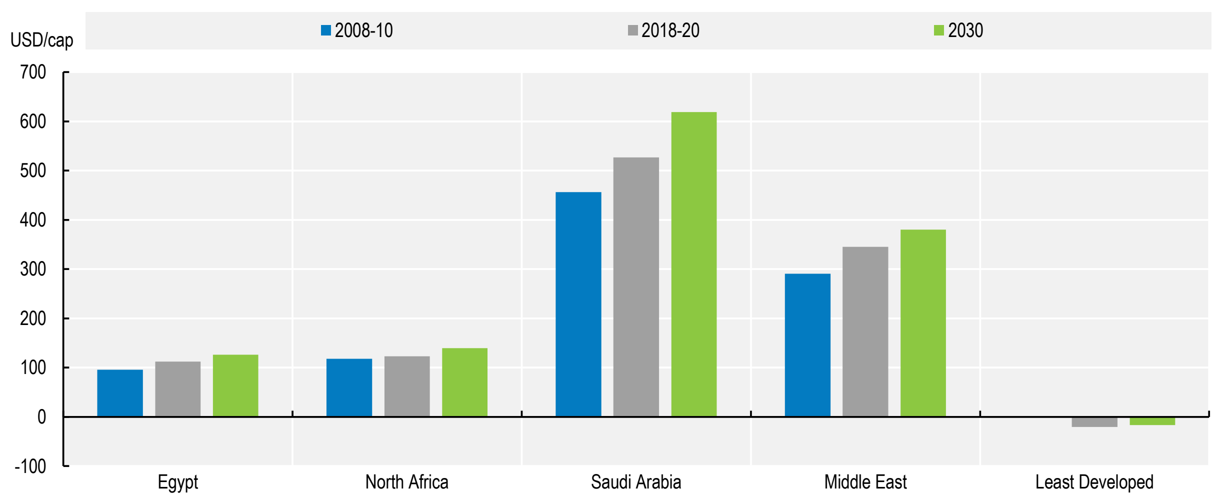
The average level of protein availability in the region is projected to reach 85 g/day in 2030, up only 0.6 g/day from the base period. A fall in protein from cereal consumption is expected to be more than offset by growth from meat and fish sources, as well as pulses. Protein availability in the region increases at a slower rate than the global average and by 2030, will be 13% below the average levels available globally.

The growth of the livestock sector will increase feed use by 24% over the coming decade. Three commodities, namely maize, barley and protein meals, are expected to account for almost 80% of the total feed use. The bulk of feed materials will continue to be imported, with maize imports for example reaching 37 Mt by 2030 compared to 28 Mt in the base period. This trend reflects policies that prioritise the production of food crops over feed crops in an environment that has limited production potential.

2.4.4. Trade

The region's strong population growth together with limited production capacity will drive higher food imports over the projection period. The region is expected to become the second largest net importer of food, following the Asia and Pacific region but on a per capita basis will be the largest. Within the region, food imports per person are highest in Saudi Arabia and the Other Middle East area which includes the Gulf States, followed by Egypt and other North African countries (Figure 2.10).

Figure 2.10. Value of net food imports per capita in Near East and North Africa (including processed products)

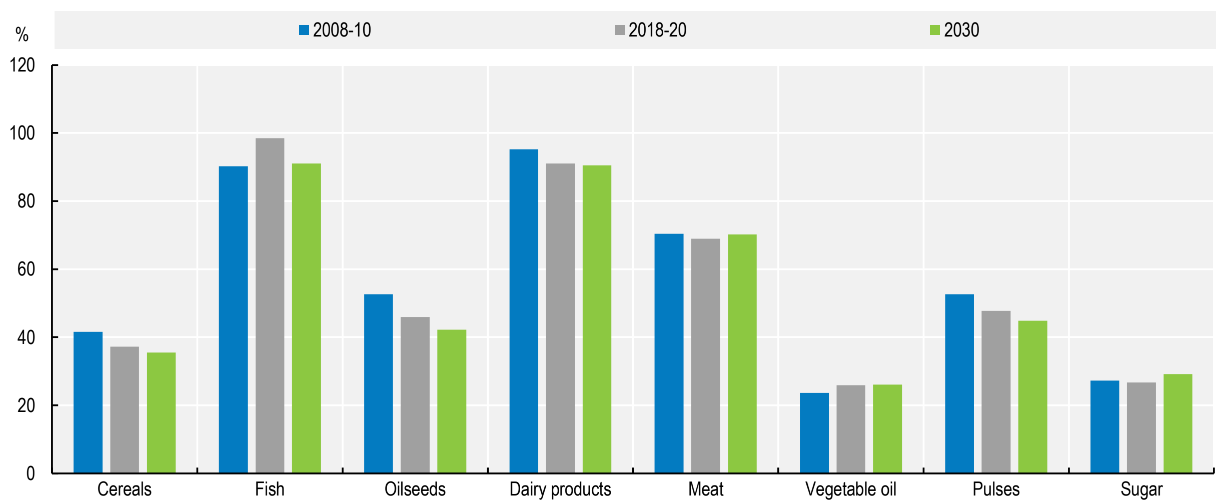


Note: Estimates are based on historical time series from the FAOSTAT Trade indices domain which are extended with the *Outlook* database. Products not covered by the *Outlook* are extended by trends. Total trade values include also processed products, usually not covered by the Outlook variables. Trade 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 (2021). FAOSTAT Trade Indices Database, http://www.fao.org/faostat/en/#data/TI; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/aico87

Amidst the logistical and economic challenges of the pandemic, the region's total import bill, expressed in real terms, increased further in 2020 relative to 2019. This trend is expected to continue over the coming decade. In line with growing demand, the region's imports will increase for almost all commodities and self-sufficiency ratios will continue their long term decline with the exception of meat products, vegetable oil and sugar (Figure 2.11). In the case of vegetable oil, this reflects increased processing of imported oilseeds, as the oilseed self-sufficiency ratio still deteriorates. The region's imports will maintain high shares of certain global markets such as maize, other coarse grains and wheat which will reach 18%, 32% and 27% respectively by 2030. The region's imports will also account for 37% of global trade in sheep meat, as well as 18% of cheese and 17% poultry meat traded globally by 2030.

Figure 2.11. 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 (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/zg7h1t

Figure 2.12. Change in area harvested and land use in Near East and North Africa

Source: OECD/FAO (2021), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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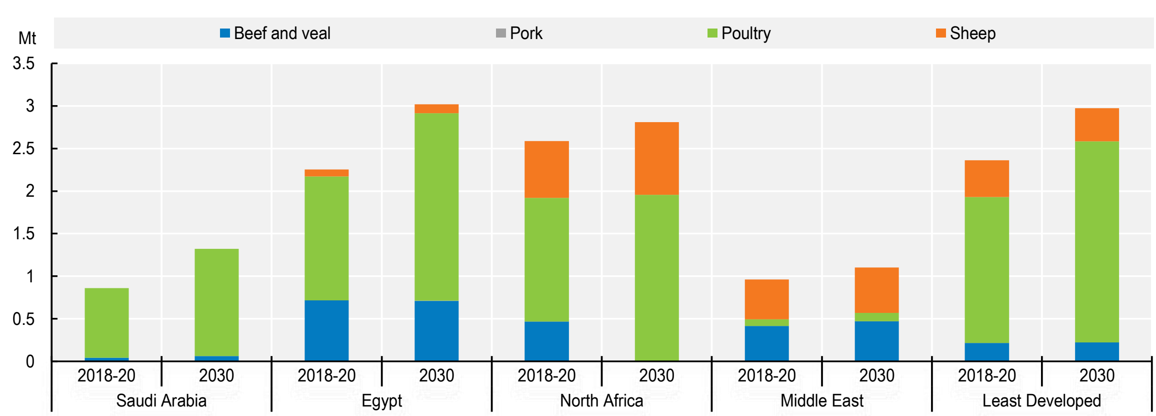
Figure 2.13. Livestock production in Near East and North Africa



Source: OECD/FAO (2021), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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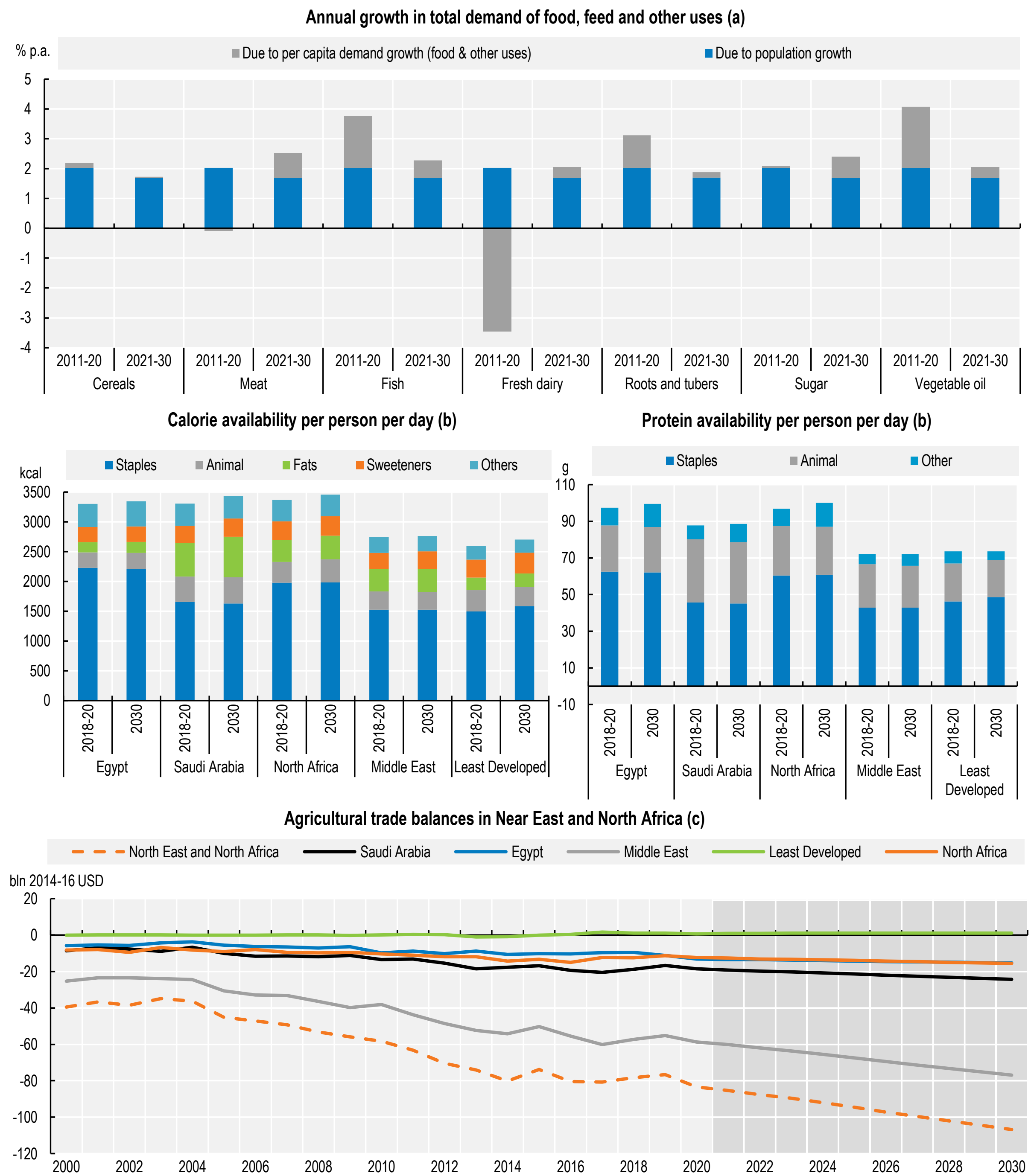
Figure 2.14. Demand for key commodities, food availability and agricultural trade balance in North East and North Africa



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.

Source: FAO (2021). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV ; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/pz5a0i

Table 2.3. Regional indicators: Near East and Northern Africa

	Average			%	Growth [2]	
	2008-10	2018-20 (base)	2030	Base to 2030	2011-20	2021-30
Macro assumptions						
Population ('000)	333 439	410 958	496 138	20.73	2.02	1.69
Per capita GDP[1] (kUSD)	6.14	6.35	6.67	5.03	-0.08	1.07
Production (bln USD)						
Net value of agricultural and fisheries[3]	109.2	132.4	159.9	20.74	1.39	1.54
Net value of crop production[3]	68.1	81.5	97.8	19.92	1.24	1.30
Net value of livestock production[3]	31.4	35.1	43.6	24.36	0.22	2.24
Net value of fish production[3]	9.6	15.8	18.5	16.93	5.42	1.24
Quantity produced (kt)						
Cereals	48 346	54 659	63 907	16.92	0.44	0.98
Pulses	1 442	1 651	1 944	17.79	0.76	1.70
Roots and tubers	2 533	3 778	4 701	24.43	2.66	2.09
Oilseeds[4]	1 022	1 066	1 181	10.85	0.16	1.27
Meat	6 552	8 164	10 501	28.62	2.23	2.30
Dairy[5]	3 528	3 150	3 770	19.68	-1.47	1.92
Fish	3 421	5 684	6 645	16.91	5.56	1.24
Sugar	2 895	3 664	5 218	42.43	2.03	3.29
Vegetable oil	1 415	2 325	2 892	24.40	6.13	1.88
Biofuel production (mln L)						
Biodiesel	0.02	0.02	0.02	15.39	0.00	1.35
Ethanol	256	161	188	16.64	-5.95	2.40
Land use (kha)						
Total agricultural land use	432 038	430 915	430 848	-0.02	0.02	0.00
Total land use for crop production[6]	64 517	63 636	63 102	-0.84	0.16	-0.06
Total pasture land use[7]	367 521	367 279	367 746	0.13	-0.01	0.01
GHG Emissions (Mt CO2-eq)						
Total	199	218	226	3.52	0.88	0.38
Crop	47	52	54	2.10	1.60	-0.10
Animal	151	166	172	3.97	0.65	0.54
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2 956	3 013	3 054	1.37	-0.20	0.24
Daily per capita protein availability[8](g)	83.3	84.6	85.2	0.7	-0.3	0.2
Per capita food availability (kg)						
Staples[9]	220.6	221.2	221.8	0.25	-0.03	-0.02
Meat	23.7	23.7	25.3	7.04	-0.38	0.85
Dairy[5]	13.1	10.7	11.1	3.64	-2.35	0.37
Fish	9	11	12	8.63	0.92	0.87
Sugar	32	33	36	7.55	0.06	0.74
Vegetable oil	12	14	15	9.21	1.47	1.03
Trade (bln USD)						
Net trade[3]	- 56	- 79	- 107	34.34	..	..
Net value of exports[3]	21.2	31	37	20.02	5.41	1.44
Net value of imports[3]	77.1	110.1	144	30.35	2.95	2.25
Self-sufficiency ratio[10]						
Cereals	41.6	37.4	35	-5.2	-1.34	-0.67
Meat	69.3	70.4	70	-0.3	0.30	-0.21
Sugar	26.6	26.7	29	9.4	0.28	0.85
Vegetable oil	23.5	26.7	26	-2.1	2.2	-0.1

Notes: 1. Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports) * 100.

Source: OECD/FAO (2021), "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

Europe and Central Asia[9] is a diverse region that includes the European Union, United Kingdom, the Russian Federation (hereafter "Russia"), Ukraine, Turkey and Kazakhstan as the main agricultural producers. There is considerable variation across its countries in terms of stage of development, demographics, agricultural resources and public policies. Population dynamics also diverge – as a whole the region's population is expected to expand gradually, but it remains static in Western and Eastern Europe and grows at around 1% p.a. in Central Asia. The region is highly urbanised and by 2030 75% of its population will live in urban environments.

Average income in the region is over USD 26 000 per capita per year, but there are substantial differences across countries. While the economies of Western Europe are diverse, those in more eastern regions are focused on commodities, particularly in Russia where oil and gas are critical sectors. The continued spread of COVID-19 around the world presented challenges to economies across the region. However the extent of impact from the pandemic differs in line with the region's diversity, both in terms of economic structure and the actions taken to contain the virus. On average across Europe and Central Asia, per capita GDP declined by 7.4% in 2020 and is projected to recover by 4% in 2021, followed by average annual growth of 1.7% over the ten year period. The contraction in 2020 was most severe in Western Europe, at 7.8%. In Central Asia, where economic restrictions were less severe, the contraction was 3.3%. Across the region, the agricultural sector faced many challenges as a result of the pandemic, including logistical issues, workforce shortages and changes to demand, both in terms of quantity and product mix.

The share of primary agriculture, forestry and fish production in total GDP is low, ranging from just 1.6% in the European Union, to 9% in Ukraine. It is estimated that the share of food in household expenditures averaged about 11% in the region in 2018-2020 base period, ranging from around 5% for United Kingdom to around 19% in Central Asian countries such as Kazakhstan.[10]

The region produces 16% of the global value of agricultural and fish production, a share which continues to decline by 2030, largely due to slow growth in Western Europe. Crop production averages about 55% of the net value of total production, fish about 8% and livestock the remainder of about 37%. Whereas the region accounted for 12% of the total growth in the global net value of agriculture and fish in the last decade, it constituted 35% of growth in global exports. This growing export orientation is largely driven by Eastern Europe where productivity levels in both the crop and livestock sectors have improved, but a fairly static population and relatively mature consumption levels mean demand growth has been weak. Trade within the region is affected by various factors, notably the future trading arrangements between the United Kingdom and the European Union, and the Russian embargoes on imports from the European Union that have been continuously renewed since 2014. Further uncertainty has been added by the short term restrictions imposed on exports from countries in the Black Sea region in order to safeguard domestic availability during COVID-19 related lockdown periods.

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

Within the European Union in particular, environmental sustainability is increasingly prioritised, both from a consumer and policy perspective. For instance, the Farm to Fork Strategy is a growth strategy seeking to promote fair, healthy and environmentally friendly food systems, accelerating the transition to environmental sustainability. In future, this may influence the demand structure, as well as the rate of productivity and production gains in the region. Technological progress, including digital technology, will be critical to achieve this.

2.5.2. Production

The net value of agriculture and fish production (net of feed and seed inputs) is projected to grow 8% by 2030 compared to the base period average of 2018-20, with Western Europe growing by less than 1% compared to growth in Eastern Europe of 15% and Central Asia of almost 30%. Eastern Europe's strong growth will be led by Russia and Ukraine at 12% and 22% respectively. While both crop and livestock sector growth is strong, the crop sectors are expected to grow faster than livestock in both countries. In Russia, the impact that import embargoes have had on domestic markets have stimulated local production of livestock products.

The long term decline in agricultural land use is expected to continue in future, albeit slowly, suggesting that further growth in the sector will be underpinned by productivity gains. By 2030, crop and pasture land use are expected to decline by 1.3 Mha and 2.6 Mha respectively. In relation to changes in land use, direct GHG emissions from agriculture are projected to decline 1.2% over the next decade.

The value of crop production in the region is expected to expand by 11% over the next ten years, accounting for almost 75% of the region's growth in agricultural and fish production. This expansion will be largely due to rising cereals and oilseeds output in the Black Sea region. Russia and Ukraine are projected to sustain robust growth in maize, wheat, soybean and other oilseeds to increase their share in regional production to 40% for maize, 38% for wheat and 54% for all oilseeds. Maize production grows the fastest of all crops in Russia, whereas wheat production growth outpaces others in Ukraine. Yield improvements will drive the bulk of production growth in all these commodities, though total area harvested is still projected to expand in both countries by 2030.

Livestock production growth is slower at 0.34% p.a. over the next decade. Western Europe accounts for the bulk of livestock value in the region, but as the transition to environmental sustainability continues, a minor contraction over the coming decade will see its share diminish from 64% in the base period, to 61% by 2030. Stronger growth in the rest of the region still sees the total value of livestock production expand by 4% over the ten year period. Growth will be based predominantly on intensified production resulting in higher carcass weights. Growth in the total volume of poultry production is expected to be robust across the region, increasing by 10% by 2030 relative to the 2018-20 base period. Most poultry will be produced to supply the domestic market and per capita consumption will rise by 1.5 kg/capita to an average consumption of 24 kg/capita per year. Fish production is expected to grow by 7% over the coming decade. Despite a 14% growth of aquaculture compared to 6% for capture fisheries, aquaculture will still represent only 20% of the total fish production in the region by 2030.

Production of dairy products is expected to remain strong. Positive growth is anticipated across the region, and while the rate of expansion slows slightly relative to the past decade in Western Europe and Central Asia, growth of 0.7% p.a. in Eastern Europe represents an acceleration from the past decade. Across the region, domestic food demand for dairy products will remain strong, contributing 12% of daily calorie intake by 2030 and 19% towards daily protein availability. However, the dairy output expansion will increasingly feed international demand, as an increasing share of the region's butter, cheese and milk powders is expected to be exported over the next decade. The region as a whole will account for 44% of global dairy product exports by 2030. The bulk of the region's dairy product exports accrue from the European Union, which will grow its share in total regional exports of dairy products to 72% by 2030. Shaped by the transition towards environmental sustainability, the European Union's share of global milk production will however decline to 16% by 2030, compared to 18% in the base period.

2.5.3. Consumption

Although most of the region constitutes a fairly mature market, consumers were not spared from the impact of the COVID-19 pandemic (De Vet et al., 2021[5]) (FAO, 2020[6]) (OECD, 2020[7]). This impact entails shorter term affordability implications, particularly in countries where consumers spend a larger share of total income on food products and where income support measures were less comprehensive, as well as changes in product mix and procurement channels. Retail sales increased and more food was consumed at home, while consumers tended towards local products with shorter supply chains, as well as products with a longer shelf life. The pandemic further accentuated consumer trends that had been evident before, such as rising awareness of healthy eating habits.

Average daily calorie availability per capita in the region is well above the global average and is projected to increase by a further 83 kcal/day to exceed 3460 kcal/day. This increase is mainly attributed to increased consumption of cereals, pulses and dairy products. Food demand for sugar is projected to continue to contract as consumers in Europe seek to curb high consumption levels amid increasing health consciousness. Western Europe's sugar consumption per capita is projected to fall by 1.5 kg per year by 2030, but will remain almost 50% higher than the world average.

Protein availability per capita in the region is projected to increase by 3 g/day to 105 g/day by 2030, which is roughly 7% higher than the world average of 98 g/day. Pulse consumption, which has been rising rapidly from a low base in the last decade given its positive health image, is projected to rise 27% to 5.5 kg per capita by 2030. Per capita meat consumption may rise slightly to 59 kg/capita per year, largely due to higher poultry meat consumption, which is anticipated to be the fastest growing meat item, reaching 24 kg per capita. Bovine and pig meat consumption per capita is anticipated to decline over the period, by 2.2% and 2.5% respectively. By contrast, fish consumption is expected to rise slowly to reach 16 kg per capita per year by 2030 – almost 3kg below the global average. Significant differences occur across the region, with central Asia reflecting very low fish consumption, whereas consumption levels in Western Europe are well above the global average. Dairy product consumption is expected to rise faster than meats, adding 8% to current levels by 2030.

Owing largely to the importance of animal products, the region consumes almost a quarter of global protein feed. With slower growth projected for the livestock sector, which includes a positive contribution for poultry and sheep meat, but declining pig meat and bovine sectors, feed use is anticipated to increase only 4% by 2030 over the base period. Maize feed use is expected to expand faster than wheat, reflecting stronger meat production growth in Eastern Europe relative to a minor decline in Western Europe.

Non-food demand for vegetable oil is expected to contract as its role in biofuel production in the European Union will diminish. The region is decreasing its demand for diesel, with an ongoing shift towards electric vehicles. The region's production of biodiesel is therefore projected to contract 7% by 2030, reducing its share of global biodiesel production from 34% to 30%.

2.5.4. Trade

The European and Central Asian region has seen a substantial shift in trade patterns over the past decade. Traditionally the region was one of the largest net importers. Over the past decade, rapid growth in exports has seen Eastern Europe move to a net export position (Figure 2.18). The bulk of export growth originated from Russia and the Ukraine, where the combination of rising productivity and slow domestic demand growth resulted in an ever increasing exportable surplus. With a large land base, both Eastern Europe and Central Asia have a comparative advantage in cereal and oilseed production. Across the total Europe and Central Asian region, growth in total exports outpace growth in imports over the projection period, resulting in a substantial improvement in its net trade balance by 2030. In light of already high consumption levels and a stagnant population, the trend of rising exports is set to persist.

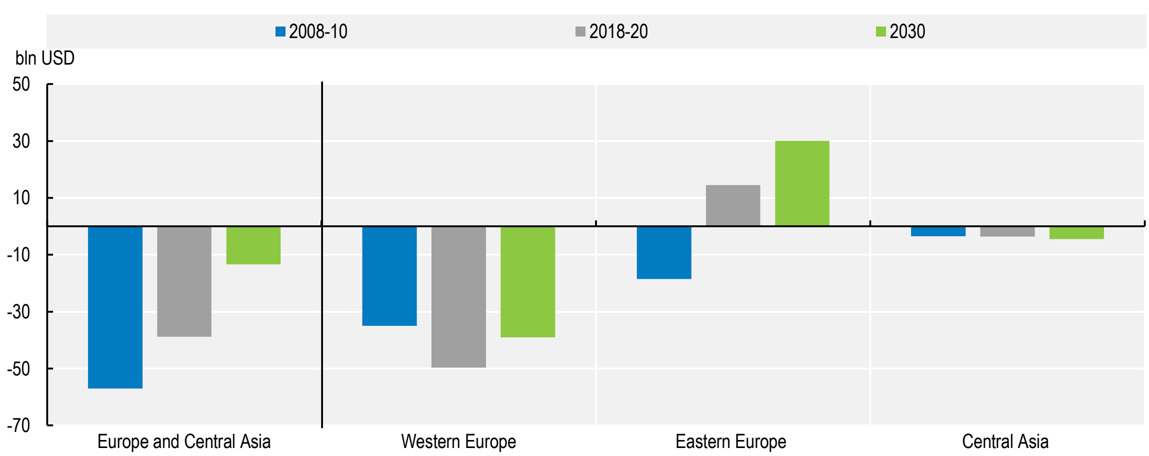
The total value of exports from the region are set to expand 21% by 2030 relative to the base period, underpinned by a 25% expansion in crop exports and a more subdued 14% expansion in animal product exports. The region's cereal exports will grow from 161 Mt in the base period to 209 Mt in 2030, an increase of 30%, with the Near East and North Africa region as a major importer. This will see its global market share increase from 36% in the base period to 39% by 2030, its highest share ever. Similarly, the region will add almost 28 Mt to its wheat exports by 2030, to grow its share in the global market to 57% by 2030, from 54% in the 2018-20 base period. From an import perspective, the requirement for soybean and protein meal imports is anticipated to decline by 5% and 7% respectively by 2030, which still leaves it as one of the major importers of these products globally. The region also remains a net importer of sugar, but this requirement is set to contract 29% by 2030.

In terms of livestock, the region is a major exporter of meat and dairy products. The region accounts for 42% of global pig meat exports and 29% of global poultry exports. This is mostly attributed to the European Union, which accounts for 90% of the region's pig meat exports and 55% of the region's poultry meat exports. The Central Asian region is a net importer of meat products and extensive trade occurs within the broader region. In this respect, the movement controls imposed through the pandemic induced lockdown period in 2020 posed unprecedented challenges to logistical systems, but the sector showed resilience to keep products available. In light of the importance of intra-regional trade, the future status of Russia's import embargo will affect trade within and outside the region, while any recurrence of the short term export controls imposed through the COVID-19 lockdown could have a substantial influence on markets.

The region is the most important dairy product exporter in the world, with a current share of 41% in the global trade of dairy products. Much of this is attributed to the European Union, which accounts for 29% of global dairy product trade. For cheese, the region as a whole constitutes 60% of the global market, with the European Union contributing 41%. For all dairy products, the European Unions and the region as a whole's share in global trade is set to rise. By 2030, the European Union will contribute 46%, 33%, 35% and 14% respectively of global exports for cheese, butter, SMP and WMP.

Led by Russia and Norway, the region is also one of the most important exporters of fish. Russian exports are set to expand by 33% over the ten year projection period, supporting growth of 13% for the Europe and Central Asian region.

Figure 2.15. 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 (2021). FAOSTAT Trade Indices Database, http://www.fao.org/faostat/en/#data/TI; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

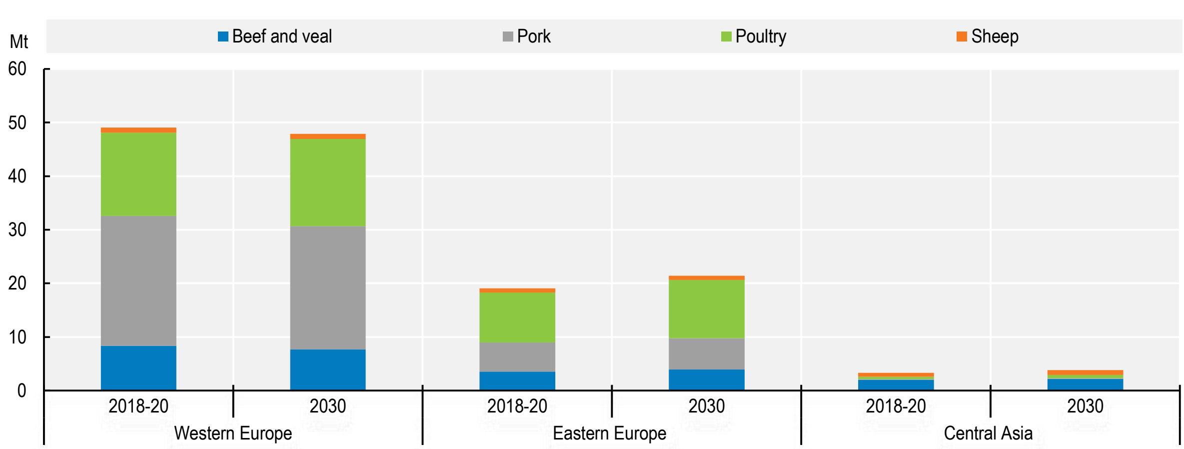
StatLink https://stat.link/d9yfa2

Figure 2.16. Change in area harvested and land use in Europe and Central Asia

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/uwk0i8

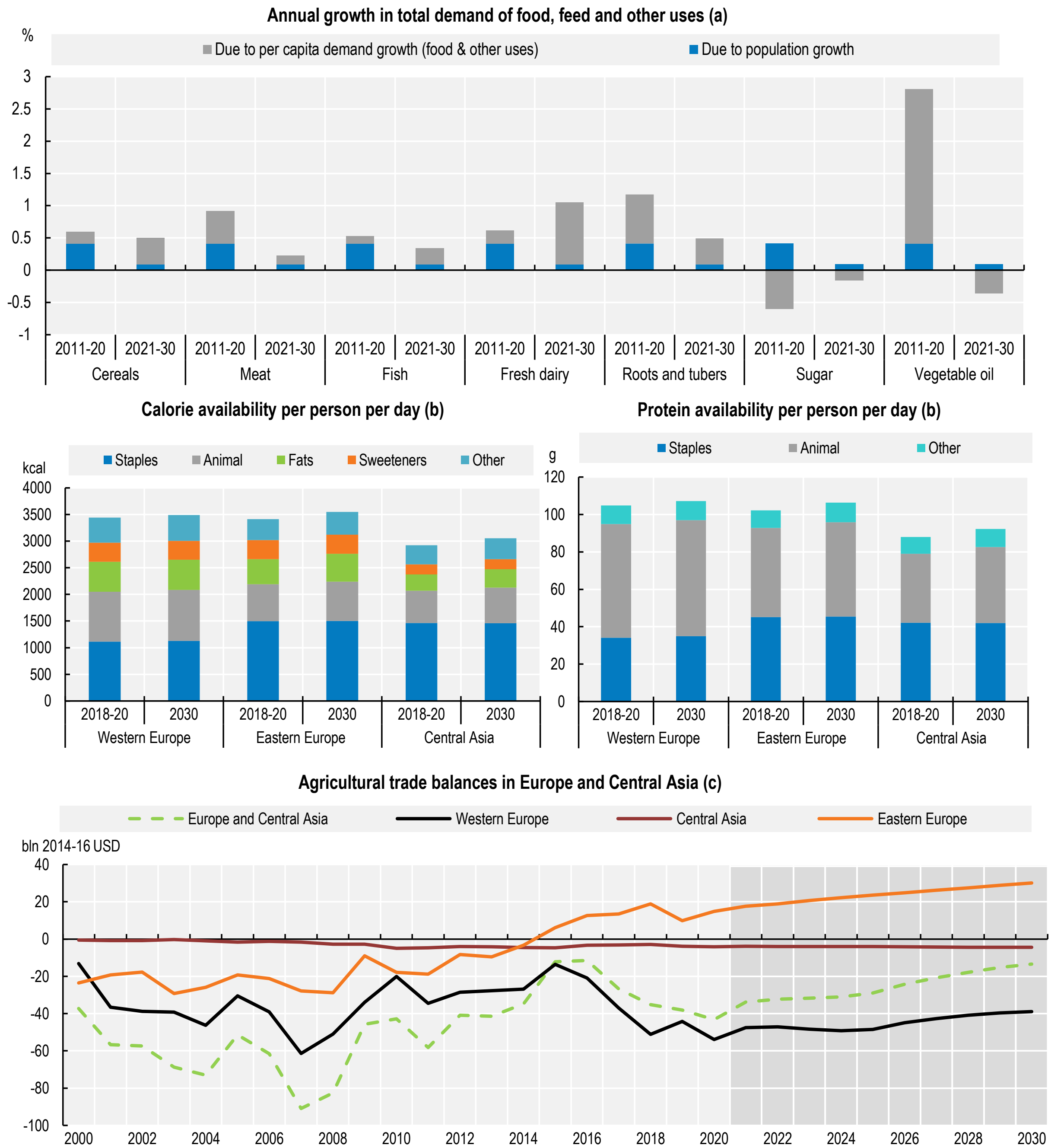
Figure 2.17. Livestock production in Europe and Central Asia



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/zdyuqb

Figure 2.18. 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 (2021). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/2nebas

Table 2.4. Regional indicators: Europe and Central Asia

	Average			%	Growth [2]	
	2008-10	2018-20 (base)	2030	Base to 2030	2011-20	2021-30
Macro assumptions						
Population ('000)	891 851	929 872	942 601	1.37	0.41	0.09
Per capita GDP[1] (kUSD)	23.82	26.10	30.27	15.99	0.94	1.71
Production (bln USD)						
Net value of agricultural and fisheries[3]	592.7	679.7	736.0	8.28	1.35	0.73
Net value of crop production[3]	324.9	374.4	416.6	11.27	1.44	1.00
Net value of livestock production[3]	220.6	252.4	262.6	4.05	1.22	0.34
Net value of fish production[3]	47.2	53.0	56.8	7.33	1.40	0.63
Quantity produced (kt)						
Cereals	516 835	582 818	648 737	11.31	1.55	0.88
Pulses	7 728	10 304	13 349	29.54	3.51	2.50
Roots and tubers	26 770	30 284	32 089	5.96	1.07	0.57
Oilseeds[4]	47 283	68 581	80 453	17.31	3.37	1.67
Meat	59 203	71 442	73 103	2.32	1.90	0.18
Dairy[5]	24 632	29 077	32 449	11.60	1.68	1.10
Fish	16 940	18 931	20 303	7.25	1.39	0.62
Sugar	24 776	28 680	30 049	4.77	0.18	0.66
Vegetable oil	22 994	34 515	38 774	12.34	3.89	1.31
Biofuel production (mln L)						
Biodiesel	9687.52	15965.57	14921.01	-6.54	4.33	-1.08
Ethanol	6 006	7 694	8 104	5.33	0.69	0.22
Land use (kha)						
Total agricultural land use	802 064	798 983	795 092	-0.49	-0.05	-0.04
Total land use for crop production[6]	337 322	333 826	332 512	-0.39	-0.05	-0.04
Total pasture land use[7]	464 743	465 157	462 580	-0.55	-0.05	-0.04
GHG Emissions (Mt CO2-eq)						
Total	665	691	682	-1.22	0.54	-0.11
Crop	190	205	205	0.31	0.92	-0.06
Animal	458	466	458	-1.73	0.35	-0.13
Demand and food security						
Daily per capita caloric availability[8] (kcal)	3 331	3 380	3 463	2.46	0.20	0.23
Daily per capita protein availability[8](g)	100	102	105	2.9	0.2	0.3
Per capita food availability (kg)						
Staples[9]	167.5	168.1	170.6	1.48	0.09	0.14
Meat	54.7	57.8	58.9	1.90	0.49	0.16
Dairy[5]	26.7	29.3	31.6	8.07	0.95	0.90
Fish	16	16	16	2.26	-0.48	0.20
Sugar	36	35	34	-1.69	-0.48	-0.11
Vegetable oil	20	25	25	1.14	2.77	0.43
Trade (bln USD)						
Net trade[3]	-48.9	-38.8	-13.4	-65.5	..	..
Net value of exports[3]	411.5	530.4	644.1	21.43	2.5	1.73
Net value of imports[3]	460.4	569.3	657.5	15.49	2.4	1.24
Self-sufficiency ratio[10]						
Cereals	110.2	121.6	128	5.5	0.84	0.42
Meat	98.0	106.8	106	-0.8	0.92	-0.03
Sugar	81.5	87.4	93	6.0	0.65	0.78
Vegetable oil	79.6	91.5	104	13.8	1.05	1.64

Notes: 1. Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports) * 100.
Source: OECD/FAO (2021), "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

North America comprises two highly developed countries, the United States and Canada, implying that it is more homogeneous than others covered in this chapter. Both economies are mature and diverse, with agriculture's (including forestry and fisheries) share to total GDP less than 1%. The region is a notably important contributor to global agriculture. Its 366 million people comprise just 5% of the global population, yet it produces 10% of global agricultural and fish output. It has the most agricultural land per person and provides the highest value of agricultural and fish production per capita. Over the 2018-20 base period, the region had the second largest trade surplus for agricultural commodities. Nevertheless, in proportionate terms, the role of North America in global agriculture is slowly diminishing over time, as the output from other regions are growing more quickly. By 2030, North America is expected to constitute 9% of the global value of agriculture and fish production. While it is still expected to have the second largest trade surplus by 2030, this surplus will be less than half of the base period value by 2030.

Agriculture in North America is characterised by high input intensity in general, but particularly for capital, as agricultural production occurs to a significant degree on large commercial units. Consequently, the region exhibits very high partial factor productivities for land and livestock, as measured by crop yields, milk yields and livestock/meat off-take ratios. The long term decline in agricultural land use has slowed in recent years, but land utilised for crop production continues to trend downwards and contracted by 2.4% over the past decade. Yields have improved to the extent that the value of crop production increased by 17% over the same period. This trend is expected to continue. Animal production is very important in the region, contributing 35% of its net value of agricultural production. This compares to the global average share of livestock of 28%. However, livestock inventory is proportionately lower given its high productivity. For example, bovine meat production per animal in inventory is three times the global average level. The region is a small producer of fish compared to other regions, with a current 4% share in agricultural value within the region and a dwindling share of global fish production, which is set to reach 3% by 2030.

Food consumption per capita in the region is the highest of all. This is enabled by the highest per capita income (USD 54 280) and the highest urbanisation rate (83%), which affects both the level and composition of food intake. The COVID-19 pandemic and the measures imposed to curb its spread reduced per capita GDP in the region by 4.5% in 2020. Despite the largest year-on-year increase in 2020 in the prevalence of food insecurity since 2014, the mature consumer base, combined with income support measures implies that the shock from the pandemic had a greater influence on the composition and distribution of food sales than absolute quantities consumed. Retail sales increased, while food away from home declined, forcing changes in the food supply chain.

Following a recovery in per capita GDP of almost 3% per annum in 2021 and 2022, real per capita income is projected to grow at an average of 1.4% p.a. over the coming decade. With income levels already high and population growth at 0.6% p.a., possible changes in dietary preferences could be important in influencing food demand over the outlook period. Further to its influence on spending power, the pandemic may also have lasting impacts on such preferences, having provided a renewed focus on the benefits of healthy eating.

While estimates include considerable food waste, calorie and protein availabilities in the region already averaged almost 3 760 kcal/capita per day and 113 g/capita per day over the base period, some 29% and 22% higher than the global average. Food consumption is proportionately high in animal products, with caloric and protein shares of 27% and 64% respectively, compared to global averages of 18% and 35%. North Americans consume substantial amounts of vegetable oil and sweeteners, with caloric shares of 19% and 15% compared to the global averages of 10% and 8% respectively. The North American diet has led to problems of obesity and incidence of food related non-communicable diseases such as diabetes. However, despite this level of aggregate consumption, food insecurity was estimated to be experienced by 10-13% of the region's population prior to accounting for pandemic related impacts (USDA, 2020[8]) (Tarasuk and Mitchell, 2020[9]).

North America (specifically the United States) is the largest bio-fuel producing region, with a production share of global output approaching 50%. It comprises primarily ethanol derived from maize feedstocks, and to a much lesser extent, biodiesel derived from soybean oil. Production has been mainly policy driven, with mandates largely filled at blending rates near the blend wall for transportation fuels. Trade within the region is important, with Canada relying strongly on ethanol imports from the United States in order to fulfil its own blending mandate.

2.6.2. Production

Agricultural and fish production in North America is projected to continue expanding, albeit at a slower rate of 9% over the coming decade, relative to the past expansion of 15%. The general cause of slowing growth is stable and in some instances declining real prices for the main crop and livestock commodities and strength in the US dollar relative to competing countries. Growth is expected to be stronger in crop sectors, which grow 10% by 2030 relative to the base period, whereas the value of livestock production only expands by 8%.

Growth in crop output comes despite a continuation of the historic decline in crop land use, which contracts by a further 3% by 2030. Land use in cereal production is projected to remain almost unchanged, thereby increasing its share in total cropland to 41% by 2030. Oilseed area is expected rise by 3% over the next ten years, supported by high prices in the beginning of the outlook period, and feed demand from livestock production growth. This implies that the share of oilseeds in total crop area will rise to 28% by 2030. From a much smaller base, the land used for pulse production will also expand by 11% over the next ten years, while declines are evident in roots and tubers. Total area harvested in the region is expected to remain fairly stagnant, rising by only 1.4% over the next ten years due to intensification. This entails an increase in the United States of 1.1%, together with a 2.4% increase in Canada. In the United States, total crop output volume is set to rise by 8% relative to the base period, whereas in Canada this growth will be faster at 13%, building on a strong season in 2020, where field crop production in Canada reached record levels. In both countries, production gains will emanate mostly from yield gains in the range of 9% for cereals and 10% for oilseeds.

The impact of the pandemic related recession resulted in downward pressure on meat prices in 2020, due both to consumer spending power and the influence of the disease and measures to contain its spread on processing facility capacity. After a short term recovery, real prices trend downwards over time. Nevertheless, feed prices remain competitive and total meat production in North America is expected to rise to 56 Mt by 2030, a 9% increase relative to the base period. Of the 4.5 Mt gain, 4 Mt, or 88%, is attributed to the United States. Poultry meat production is expected to grow faster than any other meat type at 1.1% p.a. and accounts for more than 60% of additional meat produced by 2030. Bovine meat and pig meat production are expected to increase by modest annual average rates of 0.6% and 0.3% respectively. Consequently, poultry will increase its share in total meat output to 47% by 2030.

An increase in milk production of 13.5% will be achieved by growth in dairy cow milk yields of 11%, as dairy herds expand by only 2% over the same period. Led by consumer preferences, an increasing share of milk will be allocated to processed dairy products and a decreasing share to fluid milk products.

Fish production in North America, which is dominated by captured fisheries (89%), is expected to rise by 8% by 2030 relative to the base period, with aquaculture increasing its share of total production to 12.5% by 2030. The latter sector continues to develop from a low base, encouraged by favourable relative prices emanating from firm demand for fish.

The increase total GHG emissions from agriculture is expected to slow relative to the past decade. Emissions will be 1.3% higher in 2030 than in the base period. Emissions from livestock activities are the major contributor, growing by 3.2% in light of minor ruminant inventory expansion. Emissions from the crop sector, however, are projected to decline by 2.7%.

2.6.3. Consumption

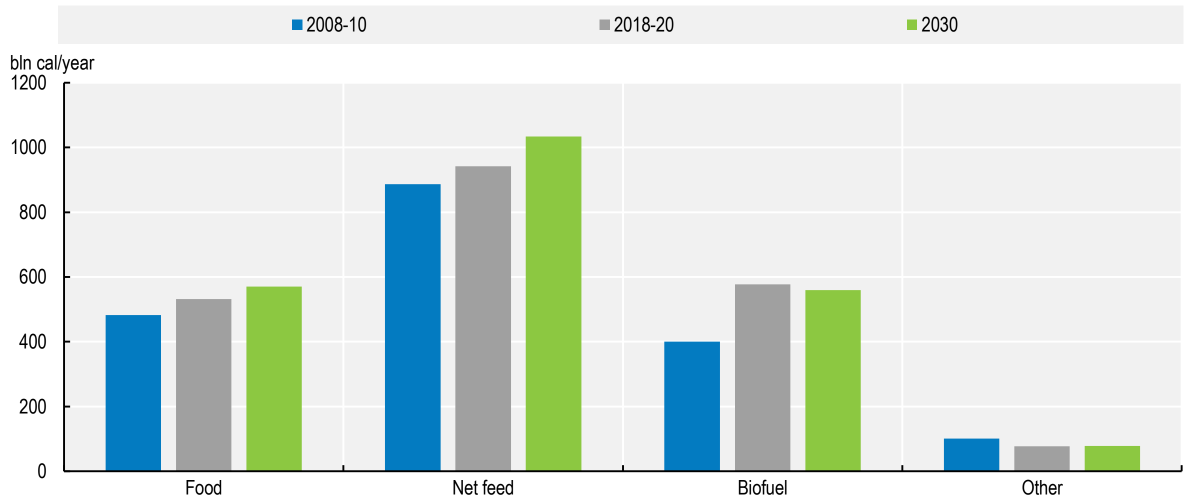
Movements in food consumption on a per capita basis will largely be determined by adjustments in preferences, which are projected to be minor. Though the effects of the pandemic may induce a greater focus on healthy eating, this would have a greater influence on fresh produce, which is not directly covered in this *Outlook*. As measured by caloric availability, food consumption in North America is set to remain at high levels increasing by a further 48 kcal/capita/day by 2030. This implies that average caloric availability in the region will exceed 3800 kcal/capita/day. Regionally, the greatest increase is expected to come from vegetable oils (+25kcal) followed by dairy products (+19 kcal), meat products (+17 kcal) and pulses (+11 kcal). Such gains are partly offset by a decline in calories from sweeteners (-43 kcal) and cereals (-7kcal). The increase in caloric availability will be greater in Canada than in the United States, but the absolute levels of caloric availability will still be higher in the United States than in Canada by 2030.

Protein intake in the region will increase only marginally from 113 g/day in the base period, to 117g/day by 2030. The split between animal and vegetal sources is expected to remain constant, with 64% of total protein availability obtained from animal sources. Consumption of both meat and dairy products are expected to rise further, with a comparatively larger (2.2 kg/capita) increase in meat products. The bulk of consumption growth in this sector is attributed to poultry, where consumption is set to increase by 2.4 kg per capita per year, compared to a minor increase of 0.7kg per capita for pork and a decline of 0.5 kg per capita for bovine meat. Protein availability from dairy products is also expected to rise, as growth in cheese, butter and WMP consumption more than offsets the continued decline in fresh dairy products. Fish consumption is projected to increase 4% by 2030 relative to the base period. Despite the trend decline in cereal consumption, growth in pulse intake will result in modest gains in protein availability from vegetal sources.

Feed use in the region is a significant offtake of agricultural output, consuming more energy/calories than final food use (Figure 2.19). Following livestock production, total feed use is projected to rise by 10% to 290 Mt by 2030, with shares from sources of maize (including distiller dried grains) rising slowly over time to 67%, while protein meal remains stable at 17%.

Biofuel production is another important market uptake for feed grains in the region. Ethanol production is projected to decline to just under 60 billion litres by 2030, down by 3% from the base period, on the back of reduced gasoline usage in the United States and Canada over the coming decade. Decarbonisation programs will sustain ethanol use to some extent, limiting the decline in production. Biodiesel production is also expected to decline by 2% over the coming decade. The outlook for biofuel is heavily contingent on developments in the energy sector, and biofuel policies in the region.

Figure 2.19. 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 by the *Outlook* are extended by trends.
Source: FAO (2021). FAOSTAT Food Balances Database, http://www.fao.org/faostat/en/#data/FBS; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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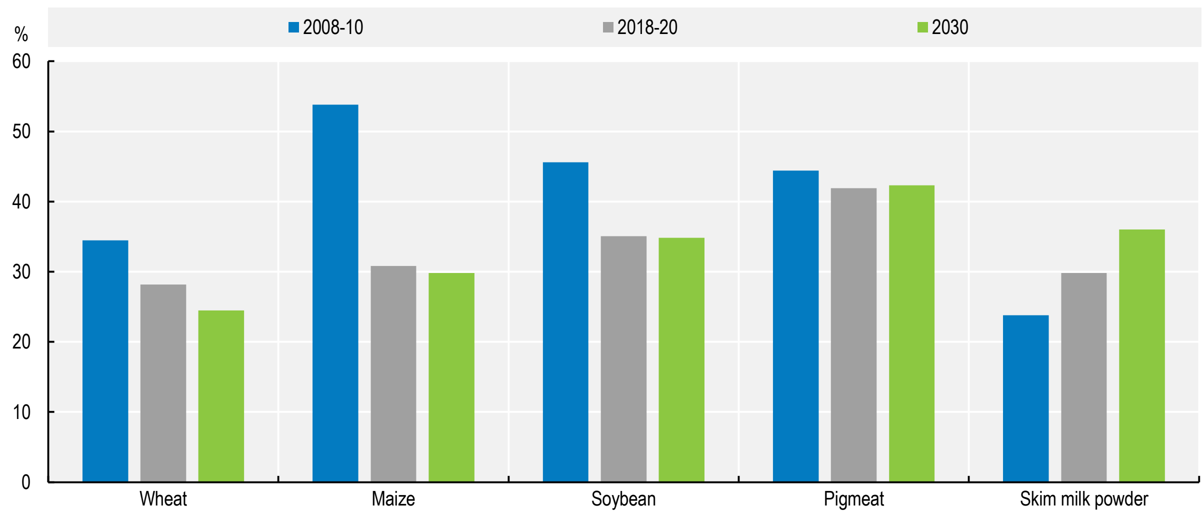
2.6.4. Trade

North America's agricultural trade surplus remains second only to Latin America and the Caribbean, but has declined by more than 25% over the past decade. This trend is expected to prevail over the outlook period, as the net value of imports into the region grows faster than that of exports from the region. Growth in both exports and imports will decelerate. The slower growth reflects weakening domestic and foreign demand, and the subsequent slowdown in production growth. Trade relations, particularly between the United States and China, will substantially affect the region, as bilateral trade has been significant. These relations have improved and in 2021, China is expected to once again become the top market for exports from the United States. While this points to resumed and potentially expanded trade opportunities, it is also a factor of China's expansion in poultry production, rapid rebuilding of its pig herd and resulting increased demand for feed products. The United States-Mexico-Canada (USMCA) Agreement, which was implemented on 1 July 2020 to replace the North American Free Trade Agreement (NAFTA), will improve intra-regional trade, especially for certain dairy products.

The net value of exports, measured at international commodity prices in 2014-16, is, projected to rise 14% by 2030 relative to the 2018-20 base period. This compares to an increase in the last decade of 21%. Reasons for slower growth relate largely to soybean exports, where growth slows substantially relative to the past decade, despite improvements in trade relations with China. Ethanol exports are also projected to decline in the coming decade, along with pig meat, where the rebuilding of China's herd as it recovers from the devastating African Swine Fever outbreak will reduce its demand for imports. The region has lost considerable trade share in recent times for cereals and oilseeds. In the case of cereals, this trend is expected to continue, but at a slower rate, due to growing competition from Latin America and the Black Sea region. North America's share in global oilseed exports is set to stabilise at 35% by 2030 (Figure 2.20). While North America's share in global pig meat trade is expected to stabilise, it will continue to rise for Skim Milk Powder.

Despite its trade surplus, the region is also the third largest importer of agricultural produce in the world. The net value of imports, measured in constant 2014-16 value, is expected to rise 25% by 2030. The region used to be a large net importer of bovine meat, and while it still has a large share of world imports (18%), the region became a net exporter in the last decade. This trend is expected to persist. The region remains a relatively large importer of fish, with a 15% share of global markets and imports are set to grow by 6% by 2030. The region is also a major importer of fresh fruit and vegetables.

Figure 2.20. Trends in export market shares of selected commodities of North America



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/qauo0l

Figure 2.21. Change in area harvested and land use in North America

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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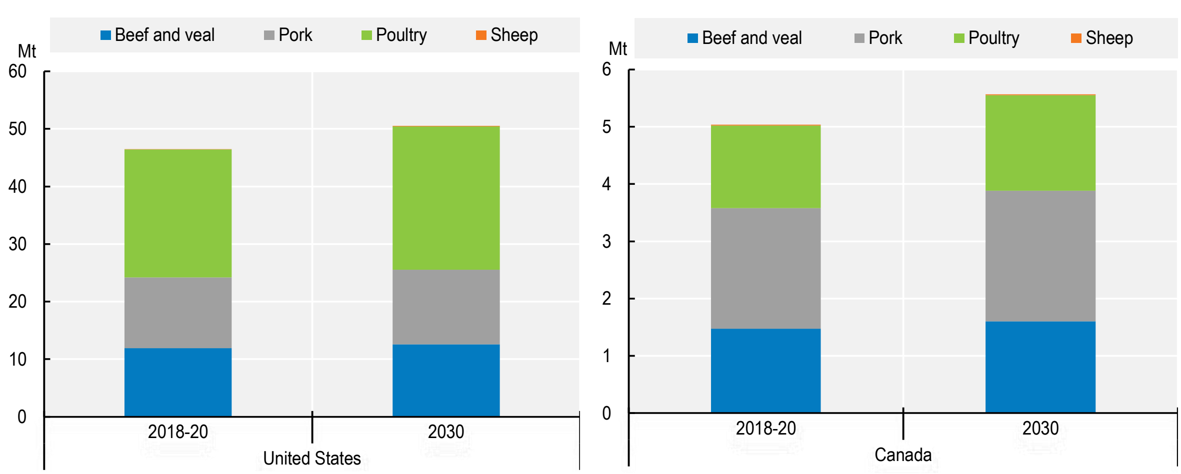
Figure 2.22. Livestock production in North America



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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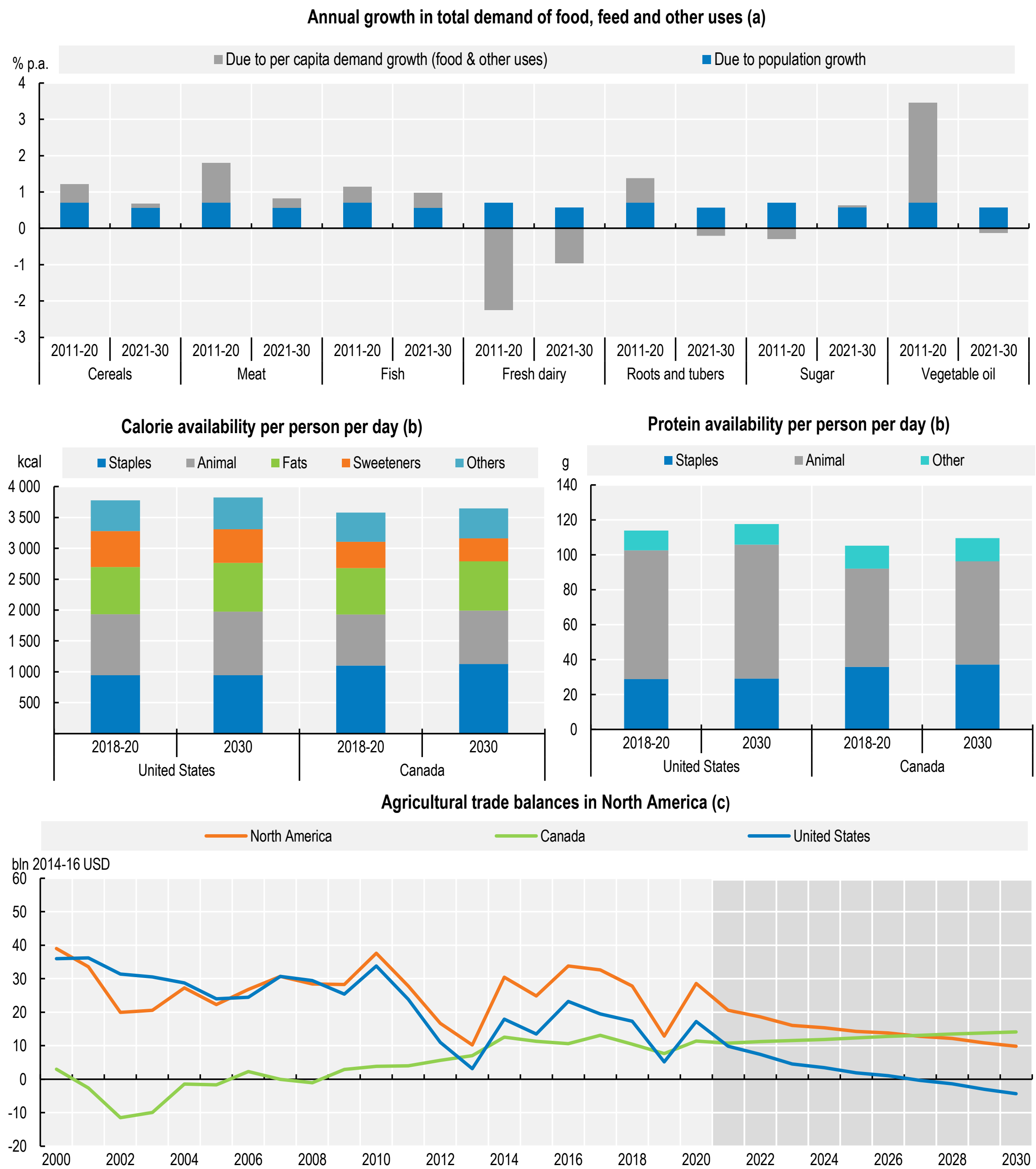
Figure 2.23. Demand for key commodities, food availability and agricultural trade balances in North America



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

Source: FAO (2021). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/k7go6q

Table 2.5. Regional indicators: North America

	Average			%	Growth [2]	
	2008-10	2018-20 (base)	2030	Base to 2030	2011-20	2021-30
Macro assumptions						
Population ('000)	340 012	366 464	390 476	6.55	0.70	0.57
Per capita GDP[1] (kUSD)	48.44	54.28	61.87	13.98	1.28	1.38
Production (bln USD)						
Net value of agricultural and fisheries[3]	343.6	395.3	431.1	9.06	1.73	0.77
Net value of crop production[3]	204.4	239.3	262.9	9.85	2.14	0.76
Net value of livestock production[3]	122.6	138.6	149.4	7.82	1.36	0.79
Net value of fish production[3]	16.5	17.4	18.8	8.13	-0.68	0.61
Quantity produced (kt)						
Cereals	455 153	489 594	529 621	8.18	1.53	0.58
Pulses	7 422	10 582	12 798	20.94	4.68	1.69
Roots and tubers	4 955	5 566	5 816	4.50	0.94	0.28
Oilseeds[4]	16 451	24 206	27 703	14.44	3.73	1.12
Meat	45 756	51 543	56 085	8.81	1.73	0.73
Dairy[5]	11 415	13 516	15 364	13.67	1.73	1.09
Fish	5 898	6 213	6 713	8.05	-0.69	0.60
Sugar	6 592	7 440	8 134	9.33	0.50	0.39
Vegetable oil	12 897	18 241	19 668	7.82	3.61	0.91
Biofuel production (mln L)						
Biodiesel	2092.57	8833.02	8677.32	-1.76	9.75	-0.31
Ethanol	44 085	61 336	59 620	-2.80	1.48	-0.32
Land use (kha)						
Total agricultural land use	467 803	463 418	460 804	-0.56	0.05	-0.05
Total land use for crop production[6]	176 523	172 303	166 462	-3.39	0.11	-0.31
Total pasture land use[7]	291 280	291 115	294 342	1.11	0.01	0.10
GHG Emissions (Mt CO2-eq)						
Total	397	414	419	1.33	0.49	0.07
Crop	131	140	136	-2.74	0.08	-0.21
Animal	245	246	254	3.16	0.54	0.21
Demand and food security						
Daily per capita caloric availability[8] (kcal)	3 680	3 756	3 804	1.28	0.42	0.04
Daily per capita protein availability[8](g)	111.9	113.0	116.8	3.3	0.6	0.2
Per capita food availability (kg)						
Staples[9]	136.0	133.6	133.6	-0.02	0.09	-0.03
Meat	94.0	97.9	100.1	2.25	1.24	0.24
Dairy[5]	31.2	33.4	34.9	4.33	0.90	0.33
Fish	19	21	21	4.31	1.11	0.33
Sugar	31	30	31	1.22	0.09	0.02
Vegetable oil	34	40	40	0.91	1.57	0.06
Trade (bln USD)						
Net trade[3]	31	23.09	10	-57.39	..	..
Net value of exports[3]	146.3	177	202	14.10	2.78	1.26
Net value of imports[3]	114.9	154.1	192	24.81	2.80	1.92
Self-sufficiency ratio[10]						
Cereals	127.5	129.6	129	-0.8	0.60	-0.06
Meat	114.8	116.4	115	-0.8	0.09	-0.03
Sugar	60.0	64.9	65	0.7	0.18	-0.31
Vegetable oil	102.8	99.6	101.3	1.7	0.09	0.42

Notes: 1. Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. Projections for not included crops have been made on the basis of longer term trends 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports) * 100.

Source: OECD/FAO (2021), "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

The Latin America and Caribbean[11] region comprises about 8.5% of the global population and will add another 58 million people by 2030. The region has urbanised rapidly and by 2030, 84% of the population is expected to reside in urban settings. This makes it the most urbanised amongst developing regions. This rapid urbanisation implies the most of the region's poor dwell in urban locations, but the incidence of poverty in rural areas remains persistently high. The region's farm structures are highly diverse: large, commercial export-oriented farms dominate agriculture in the Southern Cone, particularly in Argentina and Brazil, but there are also some 15 million smallholder and family farms responsible for much of the region's food production.

Even prior to COVID-19, the region was affected by considerable economic uncertainty, which has only been heightened by the pandemic. On a per capita basis, incomes grew by only 0.2% over the past decade. Exchange rates, particularly in Argentina, were exceptionally volatile, in many cases around a rapidly depreciating trend in nominal terms. The region has been particularly hard hit by the pandemic and in 2020, per capita GDP declined by 8.4%. As in many other developing regions, exchange rates depreciated sharply. In countries such as Argentina, whose economy already faced structural challenges prior to the pandemic, the income contraction was even sharper. After initially making good progress in decreasing the prevalence of undernourishment in the region, it had started to increase again post 2015. The combined impact of economic recession, deteriorating financial conditions and value chain disruptions could have accelerated this trend, pushing a further 16 million people into extreme poverty in 2020 and thereby exacerbating food insecurity. The year-on-year increase in the prevalence of moderate to severe food insecurity in the Latin America and Caribbean region was larger than any other region in 2020. From a substantially reduced base, per capita GDP in the region is expected to recover by an annual average of 1.5% over the coming decade. This will enable average income levels to rise to USD 10 100 per capita by 2030, 22% below the global average. The average share of food in household expenditures is estimated to be around 13% in the period 2018-2020, implying that macro instability and food prices may have considerable impact on access to food in the region.[12]

Abundant in land and water, the region accounts for 13% of the global production value of agricultural and fish commodities and 17% of the net export value of such products. This share is set to increase further over the coming decade, underscoring the importance to the region of trade openness at a global level. Export demand will be the critical source of growth for the sector over the medium term.

Despite the importance of exports, the primary agriculture and fish sectors account for about 5% of Gross Domestic Product. This share could increase in the short term, given agricultures greater resilience to the imposition of economic restrictions resulting from the pandemic and the expanded role of its agricultural exports at a time when several countries outside the region constrained exports to ensure domestic supply. As for other regions, this share is anticipated to decline marginally in Latin America and Caribbean over the medium term.

2.7.2. Production

Agricultural and fish production in the Latin America and Caribbean region is projected to expand by 14% over the next ten years. Just under 60% of this growth is attributed to crop production, while about 37% is due to expansion of the livestock sector. Merely 3% originates from the development of fish output.

Despite the region's land abundance, intensification will be important to crop production expansion. Crop land use is projected to grow by 3%, while crop area harvested will grow by 5%, due to rising prevalence of double cropping. Of this 7.7 Mha growth in harvested area by 2030, nearly 53% and 23% are attributable to additional cultivation of soybeans and maize respectively. The region will remain the largest producer of soybeans, with its global production share exceeding 54% by 2030, a minor increase from the base period. Average yields are expected to rise over the next ten years by around 10% for most major commodities and will account for a substantial share of production growth.

Livestock production growth will benefit from productivity gains and further intensification, with increased use of feed grains in production. Poultry production will account for almost 70% of growth in meat production by 2030, with bovine and pork production constituting 17% and 14% respectively. Despite short term increases in the early years of the outlook, feed grain prices will be favourable over the medium term, supporting expansion of poultry and pork production, both of which rely on intensive use of feed in production systems. Bovine meat expansion will essentially result from productivity gains and increased carcass weights, with herd numbers remaining almost unchanged by 2030.

Fish production will recover from a contraction over the past ten years to register growth of 5% by 2030. Output growth is almost exclusively attributable to the development of aquaculture in several countries across the region. Captured fisheries are expected to be volatile over the projection period, influenced by El Niño effects, which tend to affect fish (mainly anchoveta) used for the production fishmeal and fish oil.

GHG emissions are projected to grow marginally by 0.1% p.a. over the next decade. The bulk of this increase accrues from crop production, where emissions will increase by 4.4% over the ten-year period. Emissions from animal sources will remain fairly stable.

2.7.3. Consumption

Following a decline in 2020 & 2021 owing to the impact of the pandemic on purchasing power, per capita calorie intake is projected to rise in the medium term to reach 3074 kcal/day by 2030, a gain of 50 kcal/day from the base period 2018-20. Almost 57% of this increase is attributed to vegetal products, mainly cereals and vegetable oil. Sugar consumption will decline, in line with a longer term trend of reducing sugar intake in the region. Despite the decline, Latin America and the Caribbean will remain the largest sugar-consuming region in the world on a per capita basis. Initiatives such as improved labelling legislation have been imposed across the region in an effort to address the rising prevalence of overweight and obesity.

Per capita protein intake is expected to rise to 89 g/day by 2030, an increase over the period of 2.6 g/day. Animal products will contribute the bulk of the increase at almost 56%, with rising consumption of dairy products contributing the most to this increase. For its middle-income profile, the region's meat consumption is already high at almost 61 kg/year, almost double the average world level. However, per capita meat consumption is projected to rise by only 3.8% over the next decade, as consumers increase their intake of protein from other sources. Consumption of fish will rise by only 0.2 kg/capita, merely half of the growth observed over the past decade.

Increasing intensification of the livestock sector is expected to lead to an 18% increase in feed use over the period. Most of that increase will come from maize, whose feed use will expand by 21%, but protein meal is also projected to expand by 18%. This implies that maize and protein meal will constitute more than 85% of additional feed use between them.

The share of sugarcane output directed to ethanol production is set to decline marginally by 2030, a reversal of the trend observed over the past decade on the back of slowing demand growth globally. Nevertheless, ethanol production from the region is still expected to increase 4% by 2030 relative to the base period, to contribute 26% of global growth in ethanol production. Brazil, with its Renovabio program, is the biggest ethanol producer in the region and will remain an important contributor to the global market. The evolution of global energy and transportation sectors will remain a major uncertainty facing the region's biofuel sector.

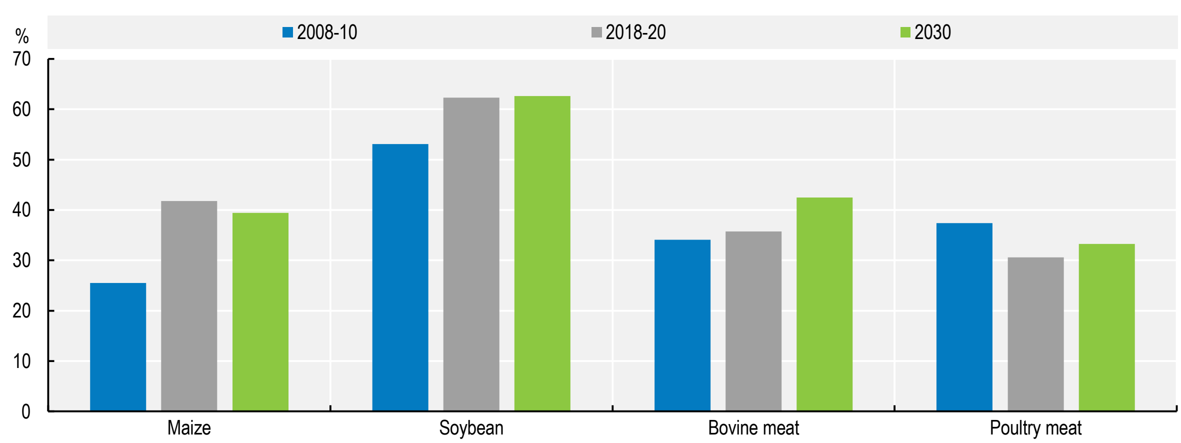
2.7.4. Trade

Trade is key to the success of the region's agriculture and fish sectors, making it less vulnerable to exogenous shocks and economic risks within the region. The share of output traded in the global market has also increased consistently in the past. Over the coming decade, the net value of exports from the region is projected to expand by 31%, which is only just more than half of the rate achieved over the past ten years. This reflects a significant slowdown in export growth from both Brazil and Argentina, which are the biggest exporters in the region. With exports of fruit and vegetables from countries such as Costa Rica and Ecuador remaining strong, the share of net export value in the Latin America and Caribbean region's agriculture and fish production value is set to reach 50% by 2030.

The region's expansion in supplies will allow it to remain an important global exporter of maize, soybean, beef, poultry, fish meal, fish oil, sugar and ethanol. With the exception of maize which declines and soybeans which stabilises, the region will grow its share in the global market for all of the aforementioned commodities. By 2030, it will account for 63% of global soybean exports, 56% of global sugar exports, 44% of global fish meal exports, 42% of global beef exports and 33% of global poultry and fish oil exports.

The extent of global openness to trade will have important consequences for the sector. Trade agreements and in particular trade relations between China and the United States will play an important role in affecting the region's trade profile. The finalisation of the EU-Mercosur Free Trade Agreement could expand trade opportunities and thereby support further growth in the agriculture and fish sectors of the region. While the benefits to the region of a trade orientated global market is clear, improved integration and expanded trade within the region will diversify market opportunities and therefore further bolster the sectors resilience.

Figure 2.24. Trends in export market shares of the Latin America and the Caribbean



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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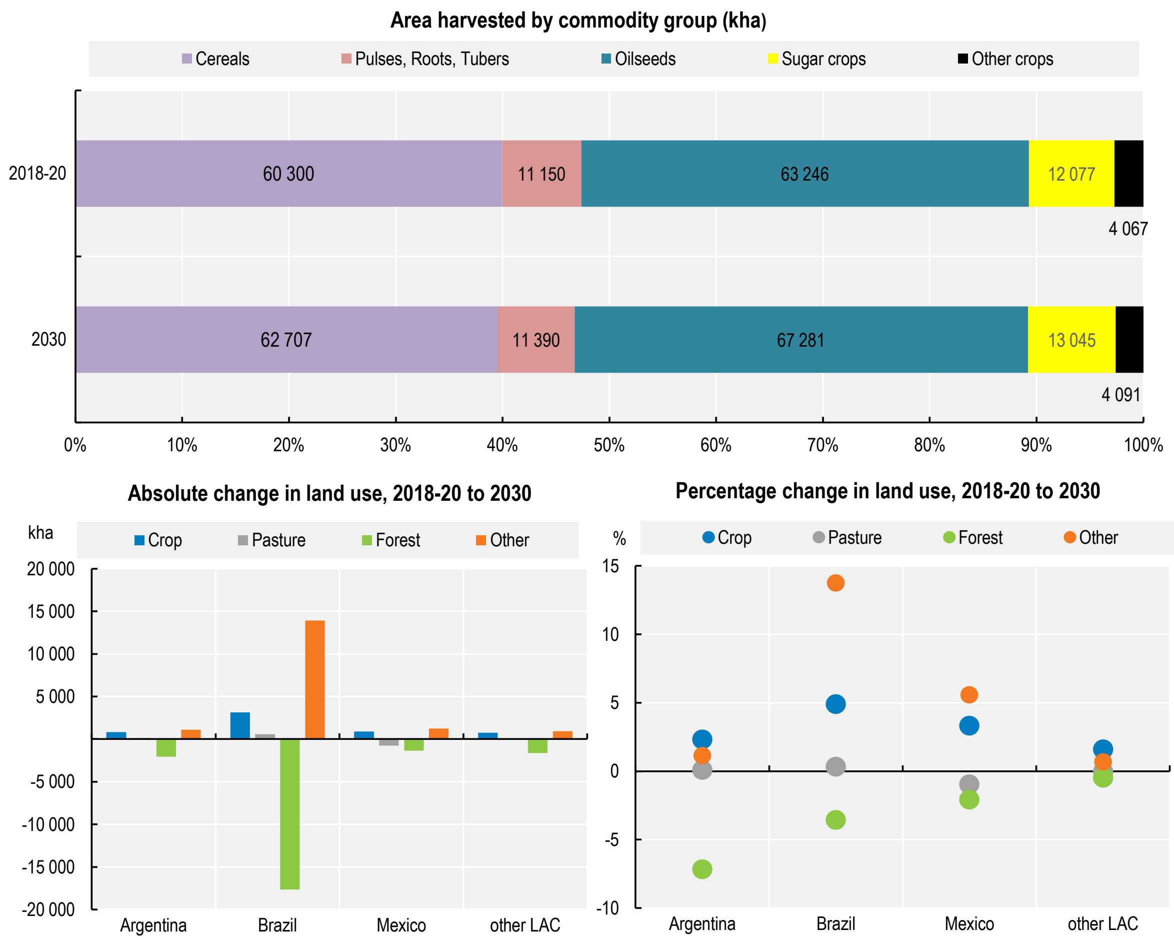
Figure 2.25. Change in area harvested and land use in Latin America and the Caribbean



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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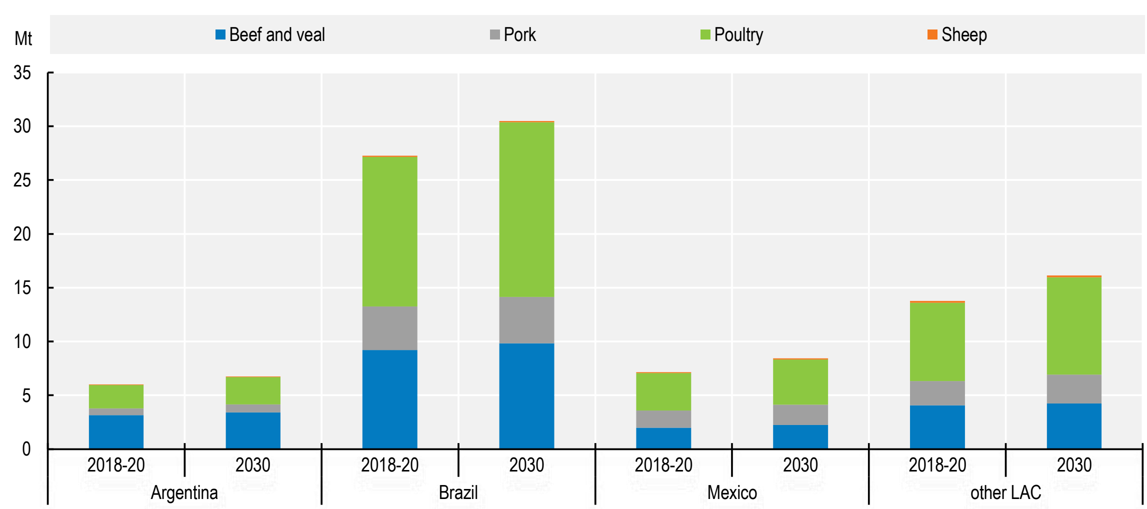
Figure 2.26. Livestock production in Latin America and the Caribbean



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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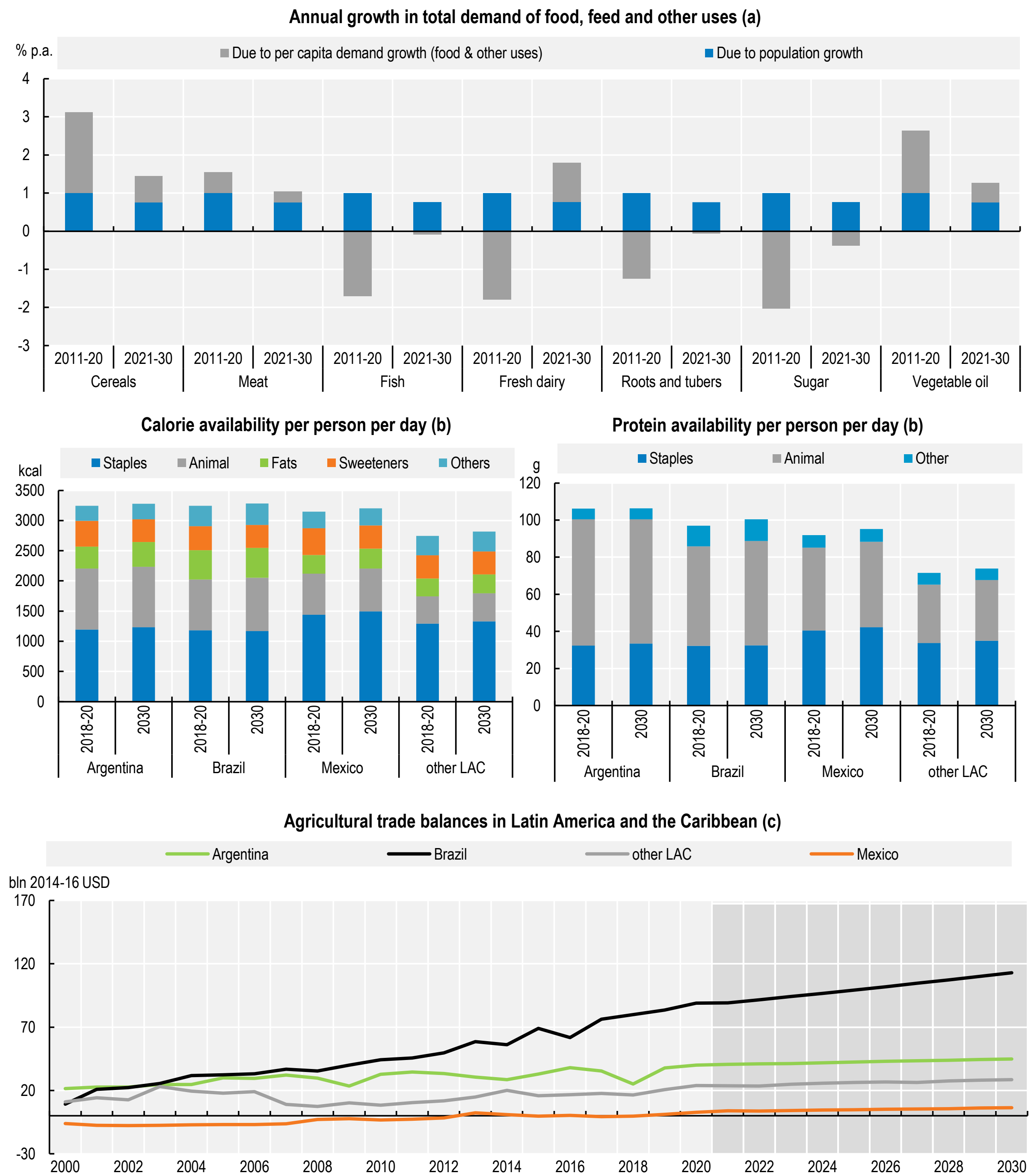
Figure 2.27. Demand for key commodities and food availability in Latin America and the Caribbean



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 (2021). FAOSTAT Value of Agricultural Production Database, http://www.fao.org/faostat/en/#data/QV; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/zvydtr

Table 2.6. Regional Indicators: Latin America and Caribbean Region

	Average			%	Growth [2]	
	2008-10	2018-20 (base)	2030	Base to 2030	2011-20	2021-30
Macro assumptions						
Population ('000)	583 047	646 387	704 425	8.98	1.00	0.76
Per capita GDP[1] (kUSD)	9.16	9.18	10.10	10.01	-0.97	1.48
Production (bln USD)						
Net value of agricultural and fisheries[3]	437.5	530.1	603.4	13.82	1.74	1.26
Net value of crop production[3]	233.1	297.0	340.6	14.68	2.13	1.34
Net value of livestock production[3]	157.9	187.3	214.5	14.53	1.61	1.24
Net value of fish production[3]	46.6	45.9	48.4	5.41	-0.06	0.77
Quantity produced (kt)						
Cereals	174 515	276 504	316 084	14.31	3.88	1.47
Pulses	6 851	8 293	9 470	14.19	2.87	1.39
Roots and tubers	14 572	14 026	15 143	7.96	-0.35	0.81
Oilseeds[4]	5 179	6 091	6 714	10.23	2.15	1.20
Meat	45 072	54 202	61 837	14.09	1.69	1.21
Dairy[5]	8 893	9 812	11 688	19.12	0.38	1.65
Fish	16 589	16 376	17 270	5.46	-0.04	0.76
Sugar	55 170	55 457	63 685	14.84	-0.35	1.40
Vegetable oil	19 774	28 103	32 225	14.67	3.24	1.39
Biofuel production (mln L)						
Biodiesel	3352.36	8798.36	9415.10	7.01	5.28	1.05
Ethanol	29 634	38 512	40 075	4.06	4.57	1.26
Land use (kha)						
Total agricultural land use	693 627	712 729	718 220	0.77	0.27	0.07
Total land use for crop production[6]	159 841	174 147	179 781	3.24	1.00	0.28
Total pasture land use[7]	533 786	538 582	538 439	-0.03	0.05	0.00
GHG Emissions (Mt CO2-eq)						
Total	878	935	941	0.66	0.67	0.06
Crop	97	116	121	4.35	1.67	0.27
Animal	756	788	789	0.05	0.47	0.03
Demand and food security						
Daily per capita caloric availability[8] (kcal)	2 919	3 024	3 074	1.66	0.29	0.25
Daily per capita protein availability[8](g)	80.7	86.3	88.8	3.0	0.60	0.33
Per capita food availability (kg)						
Staples[9]	159.7	161.6	165.7	2.50	0.03	0.22
Meat	56.5	61.1	63.2	3.40	0.62	0.32
Dairy[5]	15.5	15.8	17.1	8.18	-0.36	0.80
Fish	8	9	9	3.40	0.73	0.44
Sugar	45	38	37	-3.50	-2.01	-0.37
Vegetable oil	18	19	21	7.19	0.40	0.73
Trade (bln USD)						
Net trade[3]	80.7	140.0	192.9	37.81	..	..
Net value of exports[3]	150.9	232.9	304.1	30.56	4.72	2.11
Net value of imports[3]	70.2	92.9	111.2	19.64	3.15	1.79
Self-sufficiency ratio[10]						
Cereals	98.3	108.9	108	-0.6	0.88	0.05
Meat	110.8	111.6	112.7	1.05	0.15	0.17
Sugar	210.4	230.9	244	5.9	0.77	0.81
Vegetable oil	129.1	131.3	132.8	1.1	0.5	0.13

Notes: 1. Per capita GDP in constant 2010 US dollars. 2. Least square growth rates (see glossary). 3. Net value of agricultural and fisheries data follows FAOSTAT methodology, based on the set of commodities represented in the Aglink-Cosimo model valued at average international reference prices for 2014-16. Projections for not included crops have been made on the basis of longer term trends. 4. Oilseeds represents soybeans and other oilseeds. 5. Dairy includes butter, cheese, milk powders and fresh dairy products, expressed in milk solid equivalent units. 6. Crop Land use area accounts for multiple harvests of arable crops. 7. Pasture land use represents land available for grazing by ruminant animals. 8. Daily per capita calories represent availability, not intake. 9. Staples represents cereals, oilseeds, pulses, roots and tubers. 10. Self-sufficiency ratio calculated as Production / (Production + Imports - Exports) * 100.

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

References

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

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

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

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|. [1]

Njiwa, D. and K. Marwusi (2020), *Improving the Functioning of Regional Food Supply Chains and Trade amidst the COVID-19 pandemicin East and Southern Africa*, https://agra.org/wp-content/uploads/2020/08/Improving-Functioning-of-Regional-Food-Supply-Chains.pdf. [4]

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

Reardon, T. et al. (2014), *Urbanization, Diet Change, and Transformation of Food Supply Chains in Asia*, Michigan State University, http://www.fao.org/fileadmin/templates/ags/docs/MUFN/DOCUMENTS/MUS_Reardon_2014.pdf. [3]

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. [9]

USDA (2020), "Interactive Charts and Highlights", *Food security in the U.S.*, https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/interactive-charts-and-highlights/. [8]

Notes

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

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

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

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

[6] 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*.

[7] 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.

[8] 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*.

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

[10] 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*.

[11] 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.

[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*.

3 Cereals

This chapter describes recent market developments and highlights medium-term projections for world cereal markets for the period 2021-30. Price, production, consumption and trade developments for maize, rice, wheat and other coarse grains are discussed. The chapter concludes with a discussion of important risks and uncertainties that might affect world cereal markets over the next ten marketing years.

3.1. Projection highlights

Cereal markets in the 2020/2021 marketing year were more dynamic than in previous years. While global stocks were high at the beginning of the season, lower harvests in some major producing countries combined with logistical bottlenecks, temporary export restrictions, and a substantial increase in feed grain demand by the People's Republic of China (hereafter "China") as its pork sector recovers from the outbreak of African Swine Fever (ASF), pushed cereal prices to levels not witnessed since 2013. *The OECD-FAO Agricultural* Outlook assumes this boost, largely driven by maize, will be a short-term phenomenon and that global supply and trade will return to past trends as of 2022.

Over the next ten years, a higher share of global cereal production will originate from yield growth as area expansion is expected to become more limited. Yield improvements are assumed to result from several factors: improved and more widely accessible seed varieties; efficiency gains in the use of inputs; and better agricultural practices. However, certain factors such as increased environmental concerns, limited access to new technologies, and a lack of investment could constrain output growth. Globally, average cereal yield growth is projected to be about 1% p.a.

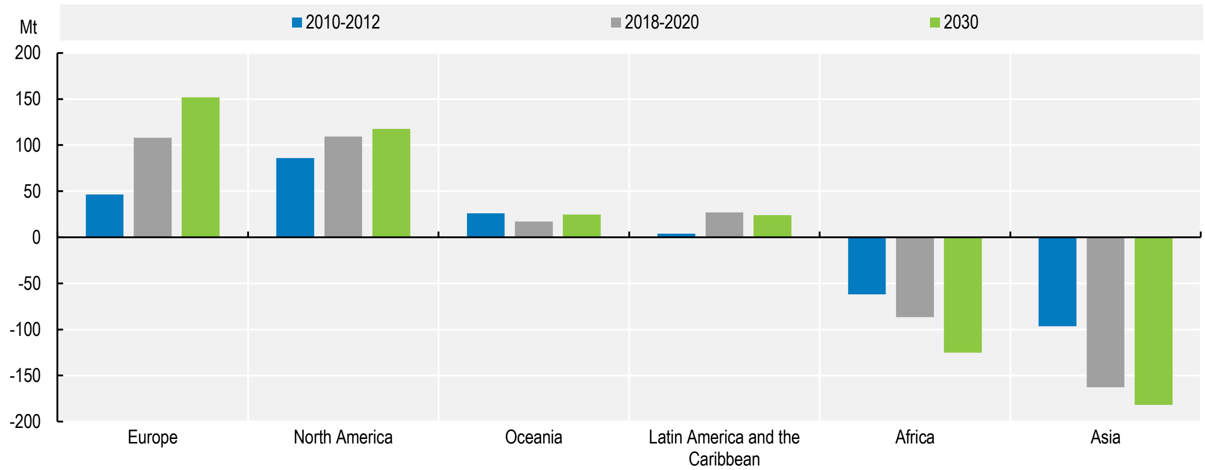
Over the next decade, cereal production is expected to increase by 336 Mt, reflecting gains made primarily in major grain-producing countries. More than 50% of the global production increase in wheat will come from India, the Russian Federation (hereafter "Russia"), and Ukraine. For maize, the United States, China, and Brazil will account for more than half of the expected production increase. For other coarse grains (barley, oats, rye, sorghum, millets, and other cereals), Russia, Ukraine, Ethiopia, and India are the key producers expected to increase production, while India, China, and Thailand are expected to be the main contributors to the global production increase in rice.

Over the medium term, cereal demand growth should be moderate compared to the previous decade for three reasons. First, growth in feed demand is projected to slow down; second, the increase in cereal demand for biofuels and other industrial uses is projected to level off over the coming decade; and third, direct human per capita consumption of most cereals has reached saturation levels in many countries. Nevertheless, population growth will increase global cereal food consumption in some regions; wheat and rice in particular are expected to remain important components of diets in Asia, while millet, sorghum and white maize will remain staple food commodities in Africa. Rice will play an increasingly important role in African diets.

Globally, about 17% of cereal production is traded internationally, with shares for single commodities ranging from 9% for rice to 25% for wheat. The share for total cereals is projected to increase to 18% by 2030, largely due to increased trade in rice. Rice will nevertheless remain a thinly traded commodity. In volume terms, net cereal surplus and deficits show a clear regional pattern (Figure 3.1). However, these patterns differ for single commodities. For example, Asian countries have a larger surplus in rice, and Latin America exports larger shares of maize but imports more wheat.

World cereal trade is projected to increase by 21% to reach 542 Mt by 2030. Russia surpassed the European Union in 2016 to become the largest wheat exporter and is expected to increase its lead throughout the outlook period, accounting for 22% of global exports by 2030. Concerning maize, the United States will remain the leading exporter, followed by Brazil, Ukraine, Argentina, and Russia. The European Union, Australia, and the Black Sea region are expected to continue to be the main exporters of other coarse grains. India, Viet Nam and Thailand will continue to lead global rice trade, but Cambodia and Myanmar are expected to play an increasingly important role in global rice exports, whilst exports by China will remain above the levels observed between 2010 and 2016.

Figure 3.1. Cereal net trade by continent



Note: Europe includes the Russia, Ukraine and Kazakhstan
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/nul9kw

Under the current *Outlook* assumptions, all cereal prices are expected to decrease from current levels for the next two marketing years. Thereafter, they will resume their long-term trend, a decrease in real terms, over the outlook period. The responsiveness of cereal prices to recent trade disruptions, animal diseases, production variability, and economic crises has shown their potential for volatility and countries are preparing various strategies to prepare for future disruptions. For example, some are building stocks or regulating exports, which could alter the trajectory of prices over the next two years. China's feed demand will remain an important element for future cereal markets. While this *Outlook* assumes maize imports to return to levels defined by the tariff rate quota (TRQ) over the outlook period, any change in this assumption would shift grain markets. Grain prices could also become more volatile given the increasing participation in global grain markets of the Black Sea region, where production tends to be more volatile.

3.2. Recent market developments

Over the past seven years cereal prices have been relatively stable, but they increased significantly in 2020/2021. The impact of the COVID-19 pandemic, however, on cereal markets was relatively modest, as the few cases of restrictions placed on labour or the slowdown in transportation were outweighed by a generally resilient supply chain and an upswing of direct human consumption of staples.

Grain prices increased sharply towards the end of the 2020 calendar year and continued to rise during the marketing season. The main driver of this increase was the large maize import volumes by China which could reach record levels in 2020/2021 for several reasons: the gradual rebuilding of pig herds following the outbreak of ASF, improved trade relations with the United States, and stagnant domestic maize production.

This price increase was further accentuated as global production did not increase as much as in previous years. Wheat production in the European Union was, for example, the lowest in ten years and decreased in Argentina for the first time in five years.

The surge in grain prices contributed to higher food price inflation in many countries, especially those where the negative economic impacts of the pandemic were already more pronounced.

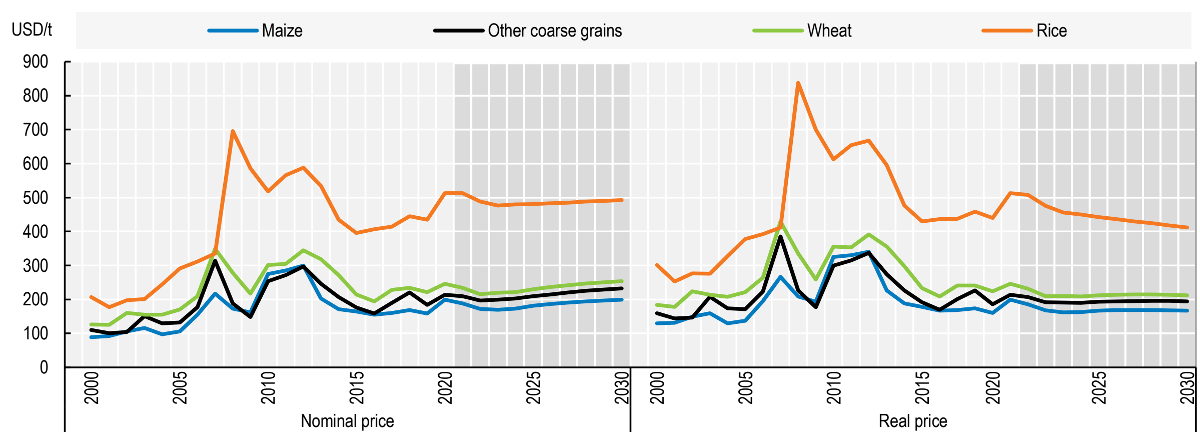
3.3. Prices

The world wheat price, as measured by the benchmark US wheat No. 2 Hard Red Winter (fob), was USD 245/t in 2020, the highest since 2014. Over the outlook period, wheat prices are projected to increase to USD 253/t by 2030 due to average harvest expectations and moderate growth in exports and food use.

The world maize price, as measured by the benchmark US maize No. 2 Yellow (fob), averaged USD 199/t in 2020, the highest level in six years; however prices are expected to revert back to trend over the next three years to USD 169/t by 2023. Over the medium term, declining stocks combined with strong global feed demand will support maize prices, reaching nearly USD 200/t by 2030 in nominal terms.

The average world market price for other coarse grains, as measured by the price for feed barley (fob. Rouen) was USD 214/t in 2020, slightly below the historical peak of 2018. By 2022, the world market price for other coarse grains should decrease to USD 197/t, thereafter recovering to reach USD 232/t by 2030. The medium term recovery is expected to be sustained by growing import demand, mainly from China.

Figure 3.2. World cereal prices



Note: Wheat: US wheat, No.2 Hard Red Winter, fob Gulf; maize: US Maize, No.2 Yellow, fob Gulf; other coarse grains: France, feed barley, fob Rouen; rice: Thailand, 2nd grade milled 100%, fob Bangkok. Real prices are nominal world prices deflated by the US GDP deflator (2020=1).
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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The reference export price used for rice (milled, 100% B, fob Bangkok) in the 2020 calendar year was USD 512/t, the highest level since 2013. However, this upward trajectory could reverse and by 2023 the price could be USD 476/t. Over the medium term, growing demand from countries in Asia, Africa, and the Middle East will support an increase in nominal terms, although large supplies are expected to limit gains with prices at USD 492/t by 2030.

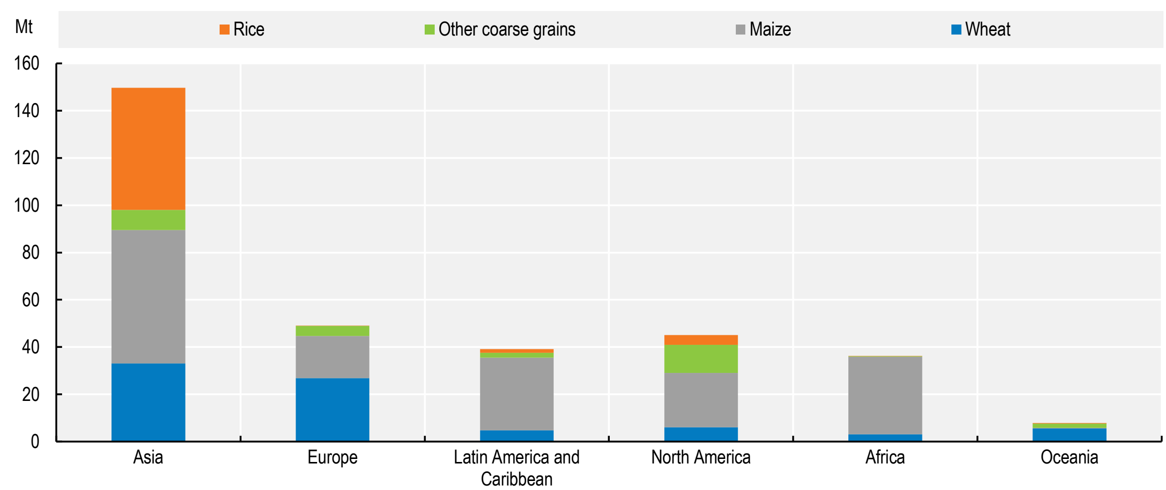
In real terms, prices for wheat, maize, other coarse grains and rice are expected to decline over the ten-year horizon.

3.4. Production

The global area harvested to cereals is expected to grow by 14 Mha between the base period (2018-20) and 2030. Harvested area in developed countries is expected to increase by 4 Mha owing to gains in Russia, Ukraine, and Australia, and in developing countries by about 10 Mha, due mainly to gains in Asia and Latin America. Global wheat and maize areas are projected to increase by 3% and 4%, while other coarse grains and rice areas are expected to remain stagnant. Decreasing harvested areas of rice in China, Viet Nam and Brazil will be offset by gains in African and Asian countries. With land expansion limited by restricted land availability as compared to the previous decade, the result of constraints placed on converting forest or pasture into arable land, as well as ongoing urbanisation, increased global production is expected to be largely driven by intensification. Growth in yields, due to improving technology and cultivation practices in developing countries in particular, is expected to sustain future cereals production. Global yields are expected to grow between the base period and 2030 by about 9% for wheat and other coarse grains, 10% for maize, and 12% for rice.

Global wheat production is expected to increase by 87 Mt to 840 Mt by 2030, a moderate pace in relative terms compared to the last decade. Developed countries are set to increase their production by 47 Mt by 2030, and developing countries are expected to add 40 Mt to global output, thus increasing their share of global production (Figure 3.3). India, the world's third largest wheat producer, is expected to provide the largest share of the additional wheat supply, increasing its wheat production by 18 Mt by 2030, driven by yield improvements and area expansion in response to national policies to improve self-sufficiency in wheat. There will be significant production increases in Russia (14.5 Mt), Ukraine (9.8 Mt), Australia (5.9 Mt), and Pakistan (5.1 Mt). In the Black Sea region, Russia, Ukraine, and Kazakhstan, additional areas planted with wheat will account for more than 60% of the global net area gains; although traditionally considered as a winter wheat production region, spring wheat is expected to also contribute to area expansion. As currently, China is projected to be the largest producer of wheat by 2030 (Figure 3.4)

Figure 3.3. Regional contribution of growth in cereal production, 2018-20 to 2030



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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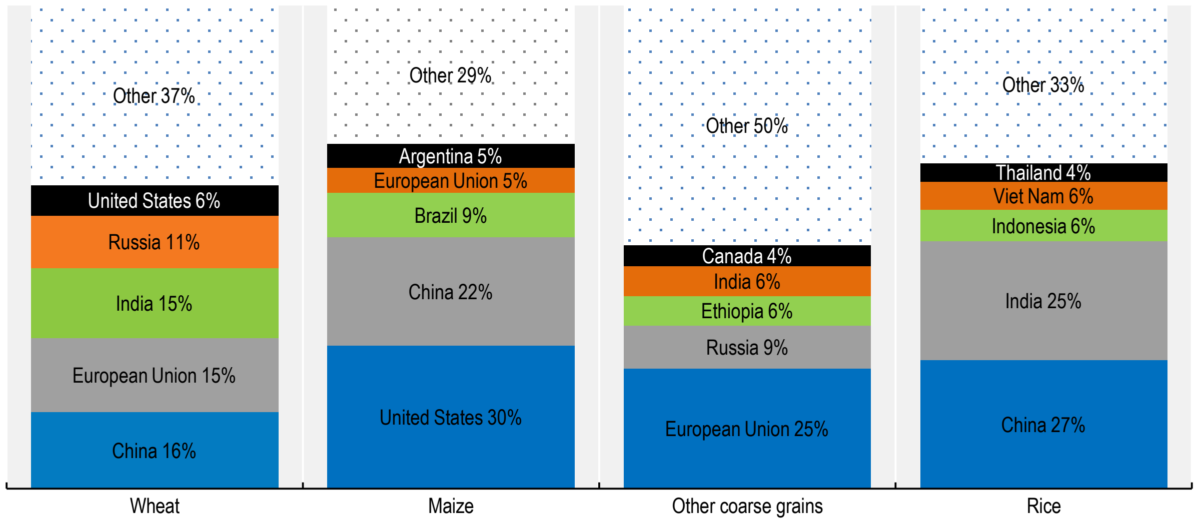
Figure 3.4. Global cereal production concentration in 2030



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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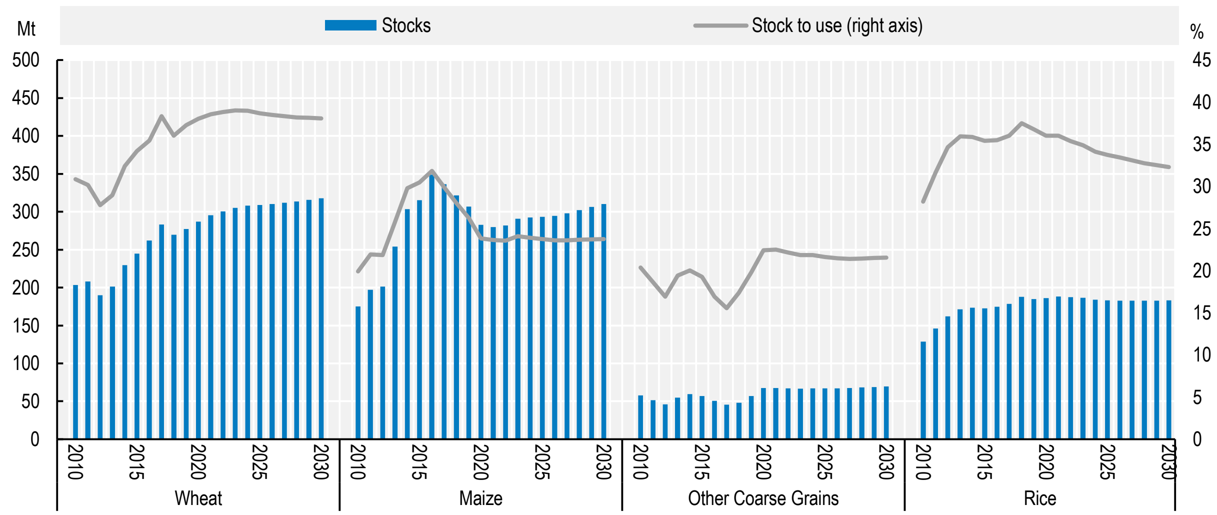
Global maize production is expected to grow by 160 Mt to 1.3 bln t over the next decade, with the largest increases in China (35 Mt), followed by the United States (32 Mt), Brazil (18 Mt), Ukraine (10 Mt), and Argentina (7 Mt). Increased production in Brazil will be driven by higher second-crop maize following the soybean harvest. Production growth in the United States is expected to slow to 0.6% p.a. over the next ten years, compared to 2% p.a. the previous decade, due to slower growth in domestic demand, particularly for ethanol. Slow production growth in the United States will be supported by higher yields as planted area is expected to decline because of area competition with soybeans. Production in Ukraine will continue to increase due to exceptional soil fertility conditions and increasing integration of maize into the crop rotation.

In Sub-Saharan Africa, total maize output is projected to increase by 22.5 Mt, of which white maize – a major staple crop in the region – will account for the largest share. Increases in maize production are expected to stem primarily from yield improvements.

Maize production in China decreased between 2015 and 2018 due to policy changes in 2016 which reduced price supports in order to end stock piling; these were replaced with market-oriented purchasing combined with direct subsidies to farmers. Production also fell because of the release of accumulated stocks. In 2015, the stock-to-use ratio of maize was estimated at almost 80%, falling to about 47% in 2020, which is very close to the ratio estimated for the period 2007 to 2009 before stocks started to pile up. This *Outlook* assumes no significant further decrease in stock levels in the coming years, to reach a stock-to-use ratio of 44%. It is assumed that Chinese farmers will have adapted to the new policy in place and as such feed demand is projected to strengthen at 3% p.a. over the next ten years; maize production should therefore gain in competitiveness in the years to come. Indeed, China is projected to contribute the most (33%) to increases in global maize output, mainly by expected increases in yields and from increased cultivation of maize.

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



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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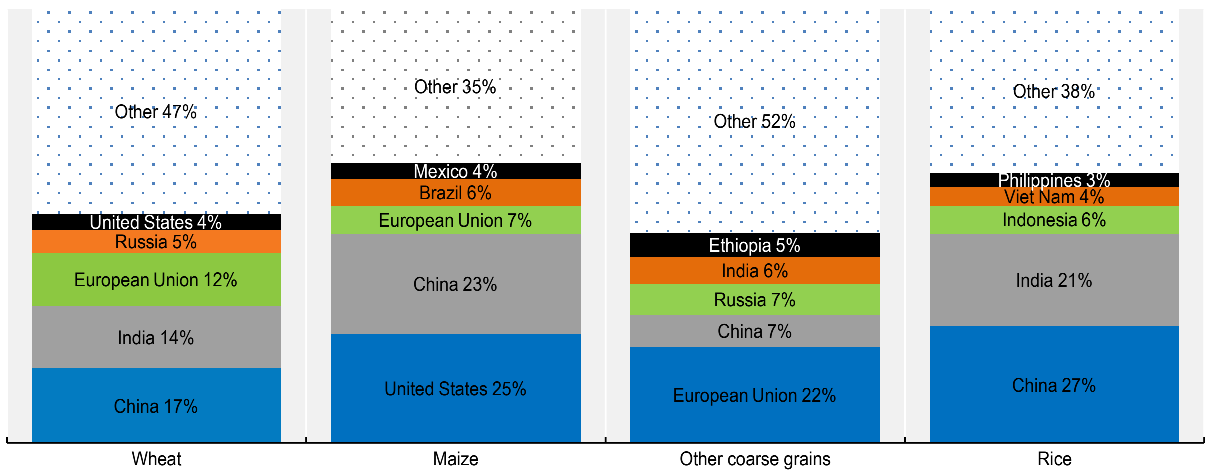
Global production of other coarse grains – sorghum, barley, millets, rye, and oats – is projected to reach 330 Mt by 2030, up 29 Mt from the base period. Developing countries will contribute the most, with 21 Mt from African countries. Africa has the fastest growing population and also relies on other coarse grains, such as millet and sorghum, mainly for food. Nearly half of the global production increase of other coarse grains is expected to come from African countries. Ethiopia will contribute the most, adding 6 Mt to reach 20 Mt by 2030. Output in most developed countries, however, will stagnate due to slower growth in feed demand and changes in feed composition in favour of maize as opposed to barley. In the United States, for example, production will remain stagnant over the outlook period. After historical harvests in 2020, other coarse grain production in the European Union is projected at 80 Mt in 2021 under normal weather expectations, and at 82 Mt by 2030 over the medium term. The Black Sea region will contribute one-fifth to the increase in global production, mainly via barley and oats, with higher production in Russia (+3.4 Mt) and Ukraine (+2 Mt).

Global rice production is expected to grow by 58 Mt to reach 567 Mt by 2030. While production in developed countries is projected to stagnate, production in developing countries, which account for the bulk of global rice output, is expected to be robust, increasing by nearly 59 Mt to 550 Mt by 2030. Asia contributes the majority of the additional global production, accounting for 52 Mt of the increase during the outlook period. The highest growth is expected in India (+20 Mt), followed by LDC Asian region (+13 Mt), China (+6 Mt), Viet Nam (+4.5 Mt), and Thailand (+2.5Mt). India will remain a major producer of Indica and basmati rice. Viet Nam is expected to increase production mainly through yield improvements, while harvested area is expected to decline, assuming government efforts to shift to alternative crops are effective. China, the world's largest rice producer, is expected to increase production at a slower pace than during the last ten years. Area planted to rice in China is expected to decline despite government policies to maintain production through its minimum purchase price. Production in developed markets, such as Korea, Japan, and the European Union, is projected to fall slightly below the base period's production level. Production in the United States and Australia will expand by about 0.8% and 2% p.a. respectively.

3.5. Consumption

Global consumption of cereals is less concentrated than production. Nonetheless, between 48% and 65% of global consumption occurs in the top 5 consumer countries of each commodity (Figure 3.6). Global use of cereals is projected to increase from 2.7 bln t in the base period to 3 bln t by 2030, driven mainly by higher feed use (+163 Mt), followed by food use (+146 Mt). Developing countries will account for almost 90% of the projected demand increase. Absolute growth in food use (+140 Mt) in developing countries will also exceed growth in feed use (+124 Mt).

Figure 3.6. Global cereal demand concentration in 2030



Note: Presented numbers refer to shares in world totals of the respective variable.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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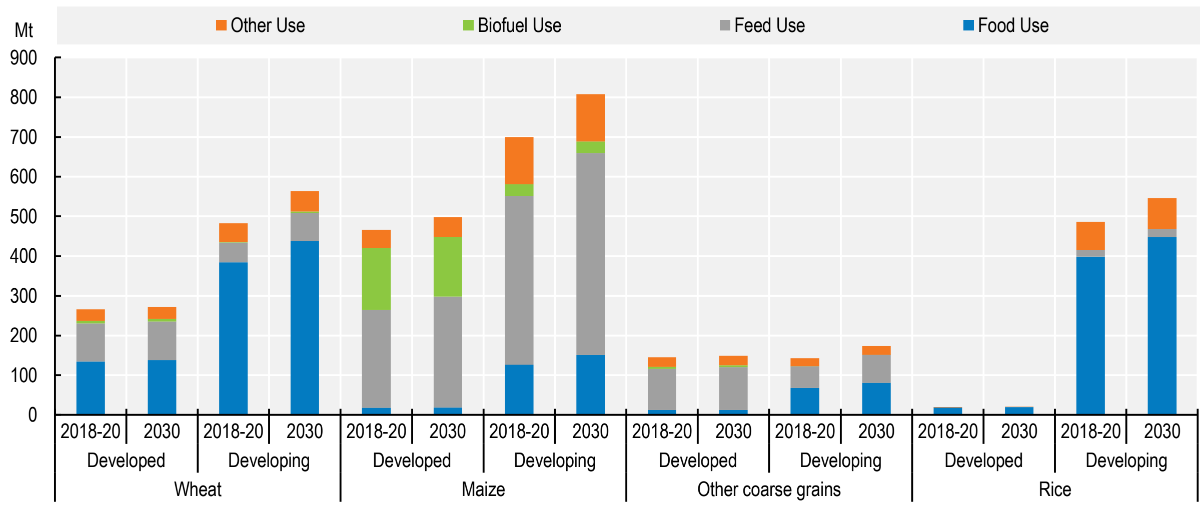
Global feed consumption of cereals is expected to increase the most for maize (1.4% p.a.), and more modestly for wheat (1.1% p.a.) and other coarse grains (0.8% p.a.) over the next ten years. Per capita consumption of cereals for food is expected to increase at a slower rate compared to the previous decade.

Wheat consumption is expected to increase by 12% by 2030 compared to the base period. Four countries account for nearly half of this increase: India (+18 Mt), China (+15 Mt), Pakistan (+6 Mt), and Egypt (+4 Mt). Global use of wheat for food is projected to increase by 58 Mt but to remain stable at about 70% of total consumption; growth will be slower compared to the previous decade as the world population increases at a more moderate pace. Feed use is expected to increase by 22 Mt compared to the base period (Figure 3.7).

Globally, the projected increase in wheat for food use is more than three times larger than the increase in feed use. Food use is expected to expand especially in Asia where there is increasing demand for processed cereal-food products, such as pastries and noodles. These products call for higher quality and higher protein wheat, which is produced in the United States, Canada, Australia, to a lesser extent in the European Union, and potentially in Russia and Ukraine. Countries in the Middle East, such as Egypt, Algeria, and the Islamic Republic of Iran, will remain major consumers of wheat with high levels of per capita consumption. Global production of wheat-based ethanol is not expected to increase significantly as changing biofuel policies in the European Union – the major user of wheat in ethanol processing – have led to reduced support to first generation biofuels.

Figure 3.7. Cereal use in developed and developing countries



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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Global maize consumption is projected to increase by 1.1% p.a. over the projection period, a slower pace compared to 3.2% p.a. in the previous decade. This increase is principally driven by higher incomes that translate into higher feed demand, which holds the largest share of total utilisation, rising from 58% in the base period to around 60% by 2030. Developing countries account for over three-quarters of the increase in feed consumption due to fast expanding livestock and poultry sectors. Feed demand is expected to rise by 116 Mt to 787 Mt, with the major countries accounting for the increase being the United States (+26 Mt), China (+24 Mt), Argentina (+6 Mt), Viet Nam (+5 Mt), India (+5 Mt), and Indonesia (+4 Mt). Production in South-East Asia in particular will increase due to its fast-expanding poultry industry.

The use of maize as food is expected to increase primarily in Sub-Saharan Africa where population growth is strong. Maize, white maize in particular, will remain an important staple, accounting for about a quarter of total caloric intake. Overall, growth in maize consumption as food is strongest in African countries amongst all developing countries at about 2.5% p.a.

Maize use for biofuel production more than doubled between 2007 and 2020. During the outlook period, however, biofuel consumption is expected to decrease by 0.5% annually as the international ethanol market is restrained by biofuel policies (Figure 3.7). Although maize-based ethanol use will increase in Brazil, bioethanol consumption will decrease given the decline in gasoline use in the United States.

World utilisation of other coarse grains is projected to increase by 35 Mt, or 0.8% p.a., over the next ten years, a faster pace than the 0.6% p.a. of the previous decade. This acceleration is driven by developing countries (+31 Mt) as consumption is expected to remain stable in developed countries. The food share of total consumption is projected to increase from about 28% in the base period to 29% by 2030 as a result of increased food demand in Africa (+10 Mt) and Asia (+2 Mt). Sub-Saharan African countries, Ethiopia in particular, rely heavily on millet as a source of calories.

Rice is primarily a foodstuff and continues to be a major food staple in Asia, Latin America and the Caribbean, and increasingly in Africa. World rice consumption is expected to increase by 0.9% p.a. over the next ten years, compared with 1.1% p.a. in the last decade. Asian countries account for 65% of the projected increase in global rice consumption, largely due to population increases rather than per capita gains (Table 3.1). On a per capita basis, food intake of rice is projected to make notable increases in Africa, with all other regions seeing smaller gains or losses. At the global level, the average per capita food use of rice is projected to maintain a similar level as in the base period at around 55 kg per year.

Table 3.1. Rice per capita consumption

kg/person/year

	2018-20	2030	Growth rate (% p.a.)
Africa	27.4	31.5	1.2
Oceania	13.5	14.2	0.44
North America	6.3	6.6	0.42
Europe	20.7	25.6	-0.08
Latin America and Caribbean	28.0	28.1	-0.14
Asia	77.2	77.5	-0.15

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

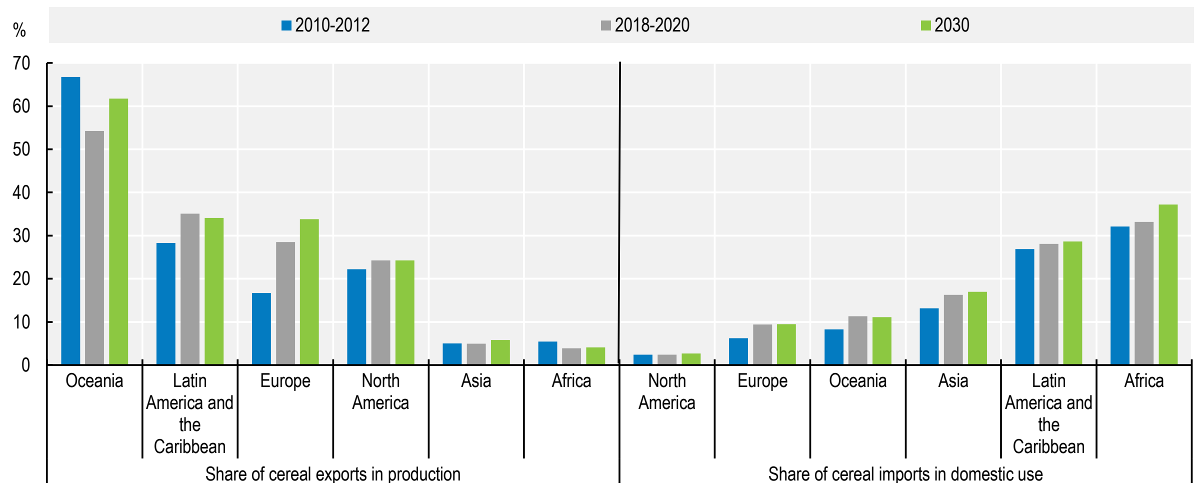
3.6. Trade

Trade in cereals presently accounts for about 17% of global consumption and is projected to reach 18% by 2030. It is an important source of food and feed for importing countries. Traditionally, the Americas and Europe supply cereal to Asia and Africa (Figure 3.1), where growing food demand from rising populations and higher feed demand from expanding livestock sectors means that demand will expand faster than domestic production. This situation is expected to continue over the next decade and exports of cereals should increase by 21% by 2030. Figure 3.8 illustrates how important cereal trade is relative to production and consumption. The absolute net trade of cereals shown in Figure 3.1 might be low for Latin America and the Caribbean and Oceania, but the share of cereal exports in domestic production is the highest among the regions. In Latin America and the Caribbean, cereal imports are as important as exports and will represent almost 30% of domestic consumption by 2030. Amongst all the continents, it is Africa where imports of cereals are the most important for domestic consumption and by 2030 almost 40% of domestic cereal use in Africa will originate from non-African countries.

Wheat exports are expected to grow by 36 Mt to 220 Mt by 2030. Russia surpassed the European Union as the top exporter in 2016 and it is expected to maintain this position, accounting for 22% of global wheat exports by 2030. Production in the major wheat-producing countries of the Black Sea region – Russia, Kazakhstan and Ukraine – has been volatile over the past decade (Table 3.2) due mainly to yield fluctuations. Nonetheless, recent production growth has on average outpaced consumption growth, so further increases of wheat exports are expected.

By 2030, the European Union, the second largest wheat exporter, will account for 14% of global trade, although wheat exports are projected to stay below the record volumes of 2019. The third largest exporter is expected to be Canada, followed by Ukraine; both are projected to surpass US exports, traditionally the third largest exporter (Figure 3.9). Although the traditional wheat exporters – the United States, Canada, and European Union – may lose their overall export share, they are expected to retain the higher quality and higher protein wheat markets, particularly in Asia. Russia and Ukraine may play a role in these higher quality markets, but will be more competitive in other soft wheat markets, such as the Middle East and Central Asia, for reasons of proximity. Wheat imports by the North African and the Middle East regions will maintain a stable share of 28% of total trade over the next ten-year horizon.

Figure 3.8. Trade as a percentage of production and consumption



Note: These estimates include intra-regional trade except for the European Union.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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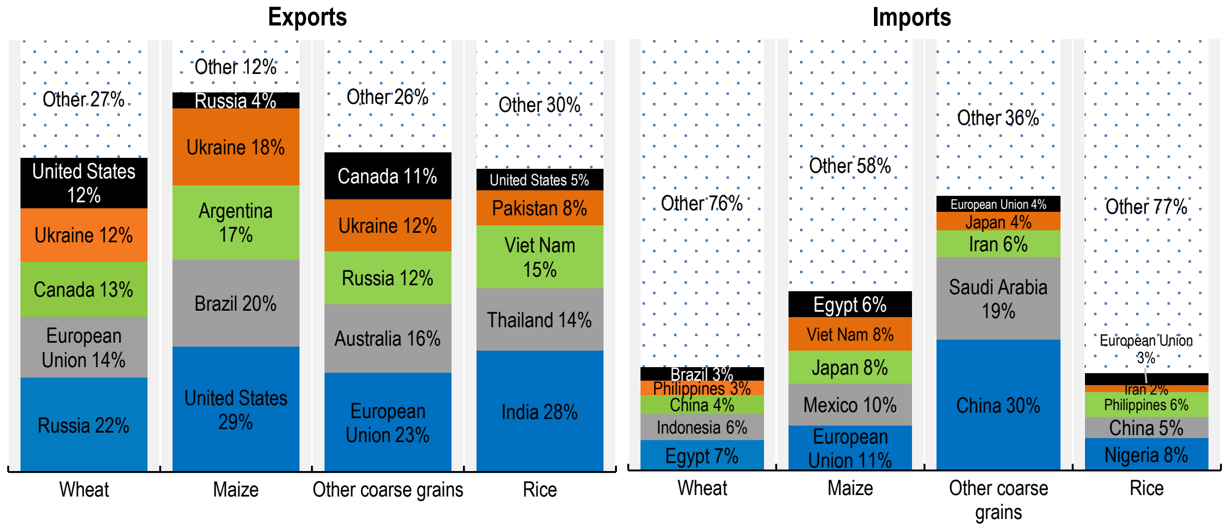
Maize exports are expected to grow by 29 Mt to 207 Mt by 2030. The export share of the top five exporters – the United States, Brazil, Ukraine, Argentina, and Russia – accounts for almost 90% of total trade over the projection period. The United States is projected to remain the top maize exporter, although exports should remain below the base year peak and the corresponding export share will drop one percentage point to 29%. Stable export shares are expected for Brazil (20%) as production of second-crop maize following soybeans increases. Ukraine and Russia will increase their export market shares from 16% and 2% in the base period, to 18% and 4% in 2030 respectively. Shipments from Argentina, which used to be the third largest exporter, will grow slower than in other countries; Ukraine will take third position by 2030. The LDC Sub-Saharan African region will continue to play a major role supplying white maize for food consumption in the region. South Africa will remain a regional supplier, but expansion will be limited as they produce GMO varieties that face restrictions in neighbouring countries.

The top five maize importers during the base period – the European Union, Japan, Mexico, Viet Nam, and Korea – account for 41% of world imports during the outlook period and this share is expected to remain stable in the coming decade. However, Egypt is expected to surpass Korea and become the fifth largest importer of maize by 2030 (Figure 3.9).

The international trade volume of other coarse grains, dominated by barley and sorghum, is much smaller than for maize or wheat. Other coarse grain exports are expected to increase by 10 Mt to 53 Mt by 2030. The top five exporters – the European Union, Australia, Russia, Ukraine, and Canada – had an export share of 73% of global trade during the base period, and this share is expected to increase to 74% by 2030 as lower export growth in Canada will be offset by stronger growth in Australia, Russia, and Ukraine. In contrast to maize and wheat markets, imports of other coarse grains are much less widespread among countries. The five major importers – China, Saudi Arabia, Japan, the Islamic Republic of Iran, and the European Union – absorb almost 65% of global trade, with China accounting for 30% by 2030.

Figure 3.9. Global cereal trade concentration in 2030



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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As mentioned above, it is assumed that maize production in China will increase more dynamically than in the past decade so that the net-feed deficit of 2020/2021 will decrease over the medium term. Maize imports are assumed to return to the TRQ level (7.25 Mt), while imports of sorghum and barley are projected to increase to 14 Mt.

During the past ten years, rice trade grew at 1.5% p.a. This expansion is expected to speed up to about 2.6% p.a., with overall export volumes rising by 16 Mt to reach 62 Mt by 2030. The export share of the top five major rice exporters – India, Thailand, Viet Nam, Pakistan, and the United States – is expected to fall from 74% to 70%. Ongoing changes in the varietal make up of production and the increased focus in cultivating higher quality strains will certainly help Viet Nam to reduce its dependence on China. Thailand is projected to continue playing an important export role, but is expected to face more competition.

The group of the five largest exporters will lose market shares to countries in the less developed countries (LDC) in Asia, particularly Cambodia and Myanmar, as these countries becomes more competitive internationally. Shipments from the LDC Asia region will more than double from 4 Mt in the base period to 10 Mt by 2030, 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 ten years.

Imports by China, the largest importer of rice during the base period, are expected to grow by 1% p.a. Larger import growth will occur in African countries where demand growth is expected to outpace production growth. Nigeria is projected to become the largest importer of rice, increasing imports by 3 Mt, with imports accounting for 50% of domestic consumption by 2030. Overall, imports by African countries are expected to increase from 16 Mt in the base period to 33 Mt by 2030, increasing Africa's share of world imports from 36% to 50%. In addition to China and Nigeria, the group of five major importers in 2030 will include the Philippines, the Islamic Republic of Iran, and the European Union. This group is expected to account for 22% of global rice imports by 2030, compared to 23% in the base period.

3.7. Main issues and uncertainties

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. Wheat and maize yields are particularly volatile in some large exporting countries such as Russia, Ukraine, Brazil, and Argentina, compared to Canada, the United States, and the European Union (Table 3.2).

Table 3.2. Historical yield volatility of wheat and maize for the top 5 exporters

	Wheat	Maize
Ukraine	13%	9%
Russia	9%	13%
Argentina		7%
Brazil		6%
Canada	6%	
European Union	4%	
United States	4%	4%

Note: Volatility is calculated based on the time period 2000-2020.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

The increasing participation in global markets of regions – such as the Black Sea region – with larger yield fluctuations increases the probability of crop shortages due to harvest failures or of surpluses due to bumper crops. These factors could contribute to greater volatility in grain prices.

The macroeconomic environment is another source of uncertainty. Cereal prices could be affected by a potential slowdown in economic growth due to a decrease in investment, in particular in fast-growing economies. Global cereals markets remain uncertain due to inflationary pressure and real exchange rate movements, especially in exporting countries, which could stimulate or discourage production. Moreover, energy prices could directly affect input prices, e.g. fertilizers and agrochemicals.

The policy environment will be important. The reinforcement of food security and the focus on increased sustainability in coming reforms (e.g. in the European Union) as well as the design of biofuel policies (in the European Union, Brazil, and the United States) will impact the demand for cereals. China's domestic policies, which influence their import demand for feed, are also crucial for future developments in the cereal markets. Trade restrictions could provoke market reactions and changes in trade flows that are not reflected in the current projections. Russia, for example, has applied export taxes to grains in the past and planned to implement a new floating permanent tax in 2021 in order to avoid strong domestic food price inflation. However, when the *Outlook* was prepared, this policy was not yet official but its implementation would impact international grain – notably wheat – trade.

Crop pests, crop diseases, and animal diseases remain factors that could disrupt cereal supply and demand. On the supply side, this is relevant 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 the affected regions. Animal diseases could affect feed demand negatively, as seen recently with the effects of the ASF outbreak on South East Asia.

Box 3.1. Contribution of agricultural investments to international Indica and Japonica rice price stability under climate change

Indica and Japonica are the two major types of rice traded on the global market. Despite their different market structures in terms of production zones, consumer preferences and policies, most agricultural models do not distinguish between the two varieties. This study projects future global Indica and Japonica rice markets over the medium and long term. To incorporate the impact of climate change, a new partial equilibrium model, the Rice Economy Climate Change (RECC), was developed. This model covers Indica and Japonica rice markets in 24 countries and regions (Thailand, Viet Nam, Indonesia, Malaysia, the Philippines, Cambodia, Lao PDR, Myanmar, China, Japan, Korea, India, United States, European Union including United Kingdom, Bangladesh, Sri Lanka, Nepal, Pakistan, Brazil, Côte d'Ivoire, Egypt, Madagascar, Nigeria, and the rest of the world), as well as the global rice market.

The results of the baseline projections and scenario simulations of the RECC model show that climate change is expected to impact Indica and Japonica production.[1] More specifically, the international Japonica rice price is projected to be more volatile than for Indica rice. The model also examined how future agricultural investments would impact world Indica and Japonica rice markets, including the stability of their prices on the international market, based on scenarios of future climate change over the mid- to long-term. The baseline is compared with six scenarios, which assume zero growth in a specific type of agricultural investments (agricultural knowledge and innovation system, or development and maintenance of infrastructure) in individual countries (Viet Nam, the Philippines, and China). Investment in agricultural knowledge and innovation system in Viet Nam (Scenario 1) and China (Scenario 5) will play a significant role in stabilising international Indica and Japonica rice prices, respectively, in the mid- to long-term, as rice production is increasingly affected by climate change (Table 3.3).

Table 3.3. Contribution of agricultural investments to international Indica and Japonica rice price stability under climate change

	Countries/ regions	Growth rate of agricultural investment during the projection period (2015/17 to 2040)		The coefficient of variation (CV) of international Indica rice price	The coefficient of variation (CV) of international Japonica rice price
		Agricultural knowledge and innovation system	Development and maintenance of infrastructure		
Baseline	24 countries and regions	Same as 2000-2017 annual growth rate	Same as 2000-2017 annual growth rate	0.1083	0.1776
Scenario 1	Viet Nam	0% p.a. (no growth)	Same as 2000-2017 annual growth rate	0.1339	0.1794
Scenario 2	Viet Nam	Same as 2000-2017 annual growth rate	0% p.a. (no growth)	0.1164	0.1783
Scenario 3	Philippines	0% p.a. (no growth)	Same as 2000-2017 annual growth rate	0.1091	0.1777
Scenario 4	Philippines	Same as 2000-2017 annual growth rate	0% p.a. (no growth)	0.1121	0.1780
Scenario 5	China	0% p.a. (no growth)	Same as 2000-2017 annual growth rate	0.1174	0.2215
Scenario 6	China	Same as 2000-2017 annual growth rate	0% p.a. (no growth)	0.1175	0.2079

1. The climate variables are based on the Model for Interdisciplinary Research on Climate (MIROC), a global climate model under the RCP 4.5 scenario.

Source: Koizumi, T., Gay. S.H, and Furuhashi. G. (2021) "Reviewing Indica and Japonica Rice Market Developments", *OECD Food, Agriculture and Fisheries Papers*, April 2021, No.154, https://www.oecd-ilibrary.org/agriculture-and-food/reviewing-indica-and-japonica-rice-market-developments_0c500e05-en.

4 Oilseeds and oilseed products

This chapter describes recent market developments and highlights the medium-term projections for world oilseed markets for the period 2021-30. Price, production, consumption and trade developments for soybean, other oilseeds, protein meal, and vegetable oil are discussed. The chapter concludes with a discussion of important risks and uncertainties that might affect world oilseed markets over the next ten marketing years.

4.1. Projection highlights

Global market conditions of oilseeds and oilseed products resulted in rapid price increases in the second half of 2020, following short-term market disruptions due to the COVID-19 pandemic. Strong demand, especially for imported soybeans by the People's Republic of China (hereafter "China") and limited supply growth, especially of palm oil, lead to this price increase.

Soybean production is projected to increase by 1.1% p.a. during the outlook period. The expansion of harvested area, including increased double-cropping in Latin America, accounts for about a quarter of global output growth. Soybean production is expected to reach 411 Mt by 2030, more than double the combined output of other oilseeds (rapeseed, sunflower seed and groundnuts) at 179 Mt. Oilseeds are generally processed (90% of soybeans and 87% of other oilseeds) into protein meal, almost entirely used for feed, and into vegetable oil for food, oleochemical, and biodiesel uses.

Soybean production and exports are dominated by two countries: Brazil and the United States. Brazil is expected to be the world's largest producer, with domestic output projected to reach 149 Mt by 2030 based on improved yields and increased cropping intensity by double cropping soybeans with maize. The United States is projected to produce 123 Mt. These two countries 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 by 1.3% p.a. over the next decade, implying slower growth relative to the last ten years. Production growth incentives will be curbed by stagnating demand for rapeseed oil as a feedstock in European biodiesel production and the increasing competition by cereals for limited arable land in China and the European Union. In general, cultivation of other oilseeds is much less concentrated than that of soybeans. China, the European Union, Canada, and Ukraine each produce between 20 to 32 Mt.

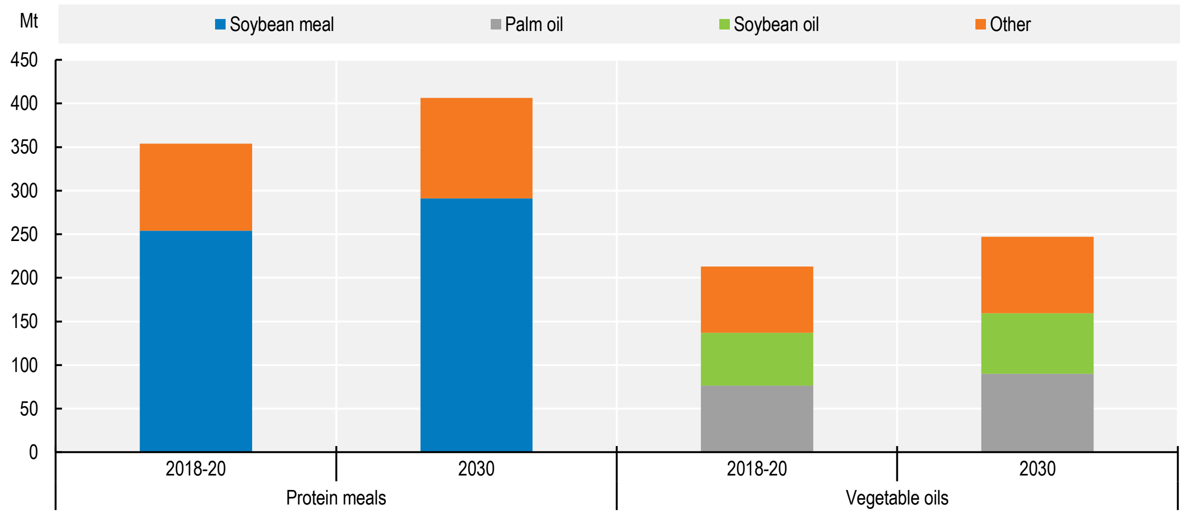
The vegetable oil aggregate in this *OECD-FAO Agricultural Outlook* includes oil obtained from the crushing of oilseeds (about 55% of world vegetable oil production) and palm oil (36%), as well as palm kernel, coconut and cottonseed oils (Figure 4.1). In view of a slowdown in the expansion of the mature oil palm area, further production growth in Indonesia (1.4% p.a.) and Malaysia (0.9% p.a.) is projected to be limited. Nevertheless, by 2030 Indonesia and Malaysia are projected to account for 83% of global palm oil production and 34% of global vegetable oil production. In addition, the expected increase in Indonesia's domestic biodiesel production will lower its export growth of crude palm oil in the medium-term. Global demand for vegetable oil is projected to expand by 33 Mt by 2030, with food use accounting for 68% of total demand.

Soybean meal dominates the protein meal sector. Compared to the past decade, the expansion of protein meal utilisation (1.2% p.a. vs. 3.8% p.a.) is expected to be constrained by slower growth in global pork and poultry production. Demand growth in China is expected to slow down considerably (1.2% p.a. vs. 5.7% p.a.), driven by improved feed efficiency and by efforts to adopt a lower protein meal share in livestock feed rations. China is nevertheless projected to account for about a quarter of global protein meal demand growth. 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 mixtures.

Growth in world exports of soybeans, dominated by the Americas, is expected to slow considerably over the next decade due to projected slower growth in soybean imports by China.

Of all agricultural commodities, vegetable oil has one of the highest trade shares (41%) of production. Indonesia and Malaysia, the world's leading suppliers of palm oil, will continue to dominate the vegetable oil trade, exporting over 70% of their combined production and jointly accounting for nearly 60% of global exports. India, the world's biggest importer of vegetable oil, is projected to maintain its high import growth of 3.4% p.a. due to growing domestic demand and limited production growth opportunities.

Figure 4.1. Protein meal and vegetable oil production by type



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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While in the 2020 marketing year prices in the oilseed complex recovered from past multi-year lows, a downward adjustment is expected during the first years of the outlook period. Thereafter, prices are expected to increase slightly in nominal terms, while declining in real terms following the long-term trend of agricultural commodity prices. This price trend will be subject to multiple uncertainties, e.g. weather variations in major producing countries and shifts in demand preferences.

China's imports of soybeans expanded substantially in the 2020 marketing year due partly to the rebuilding of pork production following the African Swine Fever (ASF) outbreak, but also to improved trade relations with the United States. The future demand for protein meal in China depends on the balance between feed intensity and efficiency especially of the pigmeat sector. The vegetable oil market will remain dominated by palm oil. The scope to increase output in Indonesia and Malaysia will increasingly depend on oil palm replanting activities and accompanying yield improvements (as opposed to area expansion). Sustainability concerns also influence the expansion of palm oil output as demand in developed countries favours oils that are not associated with deforestation and as consumers seek sustainability certifications for vegetable oil. The use of vegetable oil as biodiesel feedstock is mostly determined by biofuel policies, which determine countries' mandated blending ratios.

4.2. Recent market developments

The conditions in global markets of oilseeds and oilseed products resulted in rapid price increases in the second half of 2020, following short-term market disruptions due to the COVID-19 pandemic. Strong demand, especially for imported soybeans by China, and limited supply growth, especially of palm oil, led to these price increases. The surge in prices contributed to food price inflation in numerous countries, aggravating food access problems stemming from pandemic-driven income losses.

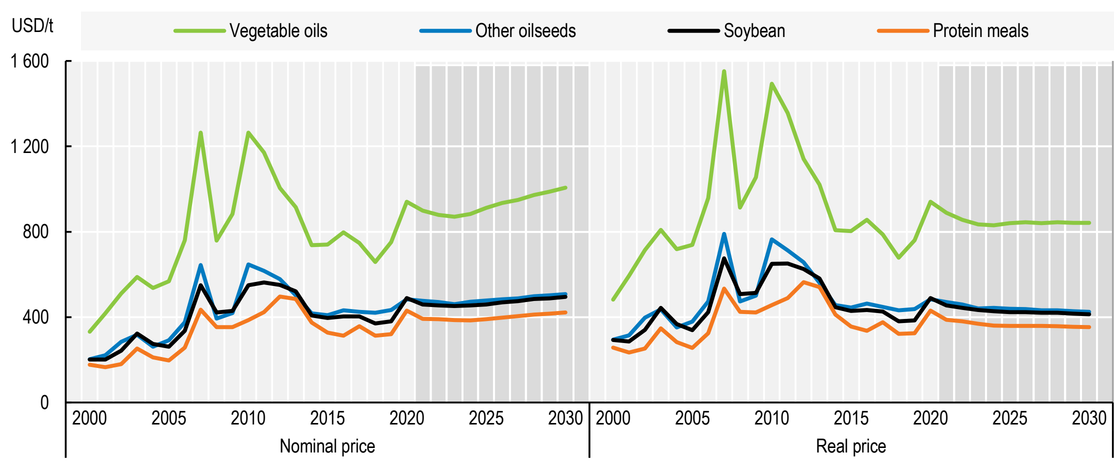
During the first half of 2020, the COVID-19 pandemic led to temporary slowdowns in demand and short-term disruption of supply chains, resulting in price declines. Overall, oilseeds and oilseed products markets adjusted to the new conditions and recovery in demand dominated development as of the second half of 2020. In Malaysia, labour shortages, exacerbated by measures to restrict the movement of people so as to contain the spread of COVID-19, impacted the palm oil harvest in 2020, curbing overall output.

Production of oilseeds and palm oil increased in the 2020/2021 marketing year due to a rebound in harvested area and higher yields in major producing countries. But demand increased faster than production, mainly driven by a strong increase in soybean imports by China in its efforts to rebuild the pig herd following the outbreak of ASF and to its improved trade relations with the United States.

4.3. Prices

The price of oilseeds and oilseed products increased rapidly in the second half of 2020 as global demand increased faster than supply. A downward adjustment is expected during the first years of the outlook period, reflecting expectations of better production prospects and the gradual elimination of COVID-19-related logistics constraints on trade. 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 4.2). The assumed increase in the real price of crude oil and sustained economic growth following the recovery from COVID-19 should support the price of oilseed and oilseed products over the outlook period, whereas continued productivity improvements will put downward pressure on real prices.

Figure 4.2. Evolution of world oilseed prices



Note: Soybeans, US, c.i.f. Rotterdam; Other oilseeds, Rapeseed, Europe, c.i.f. Hamburg; Protein meal, production weighted average price for soybean meal, sunflower meal and rapeseed meal, European port; Vegetable oil, production weighted average price for palm oil, soybean oil, sunflower oil and rapeseed oil, European port. Real prices are nominal world prices deflated by the US GDP deflator (2020=1).
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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4.4. Oilseed production

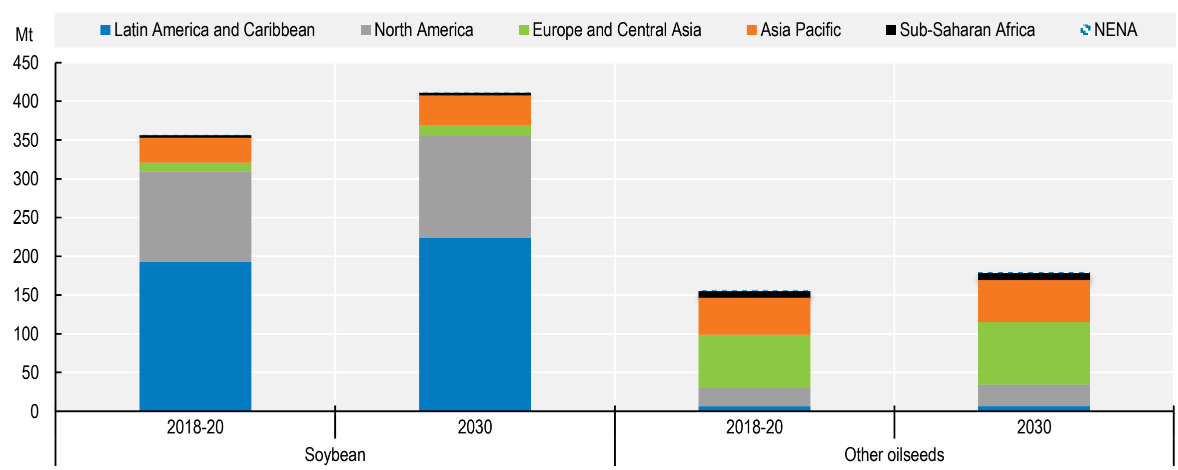
The production of soybeans is projected to grow by 1.1% p.a., compared to 4.0% p.a. over the last decade. The production of other oilseeds (rapeseed, sunflower seed, and groundnuts) will grow at a slower pace, at 1.3% p.a. compared to 2.5% p.a. over the previous ten years (2011-2020). Growth will be dominated by yield increases, accounting for three-quarter of production growth. Soybeans benefit from their fast growing period, which allows for double-cropping production, especially in Latin America. Consequently, a considerable share of additional harvested area increase will result from double-cropping soybean with maize in Brazil and with wheat in Argentina.

Brazil has in recent years been the largest producer of soybeans and is expected to grow at 1.2% p.a. over the next decade – faster than the United States, the second largest producer, at 0.7% p.a. This is also due to the possibility of increased cropping intensity by double cropping soybean with maize. The production of soybeans is projected to grow strongly elsewhere in Latin America, with Argentina and Paraguay producing 55 Mt and 12 Mt respectively by 2030 (Figure 4.3). In China, soybean production is expected to continue to increase in response to reduced policy support for the cultivation of cereals. Soybean production is also expected to increase in India, the Russian Federation (hereafter "Russia), Ukraine, and Canada.

China (a major producer of rapeseed and groundnuts) and the European Union (which mainly produces rapeseed and sunflower seeds) are the most important producers of other oilseeds, with a projected annual output of 31 Mt and 30 Mt respectively by 2030. However, limited growth in output is projected for both regions (0.9% p.a. for China and 1.1% 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 23 Mt by 2030. Strong growth in other oilseed production is projected for Ukraine and Russia, supported by ongoing expansion of arable land in the Black Sea region.

Soybean stocks are projected to remain stable, resulting in a lower stock-to-use ratio of 10.5% by 2030. Overall, the stock-to-use ratio remains low compared to the past two decades, which implies that harvest failures could quickly lead to market shortages.

Figure 4.3. Oilseed production by region



Note: NENA stands for Near East and North Africa, and is defined as in Chapter 2.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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

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

In absolute terms, soybean crush is projected to expand by 47 Mt over the outlook period, well below the 92 Mt of the previous decade. Due to the gradual recovery of the crush sector in China, reflecting expectations of a steady increase in the pig herd, Chinese soybean crush is projected to increase by 20 Mt, accounting for about 43% of the world's additional soybean crush, the bulk of which will utilise imported soybeans. The growth in China although large is projected to be considerably lower than in the previous decade as the country's demand for compound feed is expected to slow down due to lower animal production growth rates. In addition, the protein meal content in China's compound feed has reached a relatively high level, leaving little scope to further increase the incorporation rate. Global crush of other oilseeds as compared to soybeans is expected to grow in line with production by 21 Mt over the outlook period and to occur more often in the producing country.

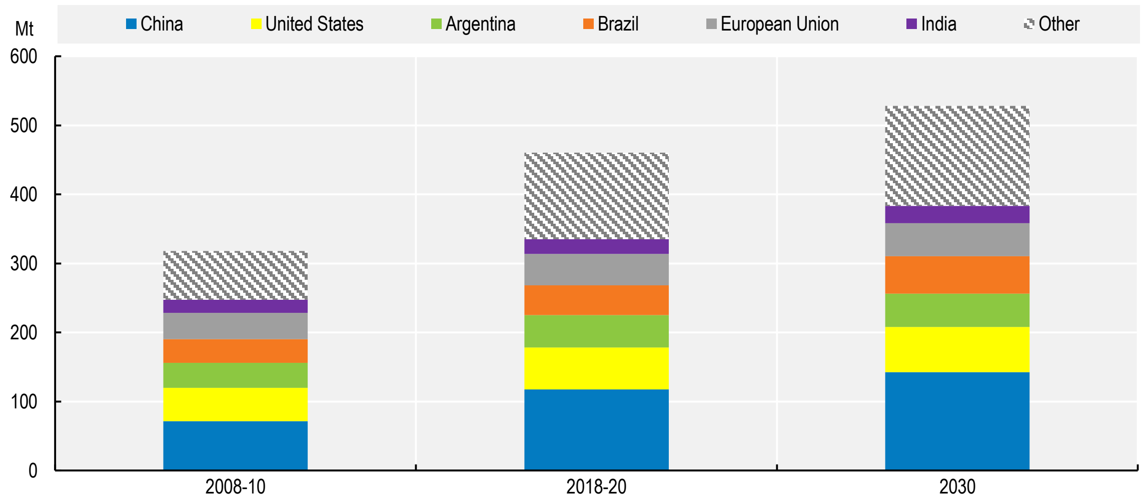
Global vegetable oil production depends on both the crush of oilseeds and the production of perennial tropical oil plants, especially palm oil. Global palm oil output has outpaced the production of other vegetable oils over the past decade. However, growth in the production of palm oil is expected to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

At the global level, palm oil supplies are projected to expand at an annual rate of 1.3%. Increasingly stringent environmental policies from the major importers of palm oil and sustainable agricultural norms (e.g. in the context of the 2030 Agenda for Sustainable Development) are expected to slow the expansion of the oil palm area in Indonesia and Malaysia. This implies that growth in production comes increasingly from productivity improvements, including an acceleration of replanting activities. Palm oil production in other countries is expected to expand more rapidly from a low base, mainly for domestic and regional markets. For example, Thailand is projected to produce 3.8 Mt by 2030, Colombia 2.0 Mt, and Nigeria 1.6 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 aggregate includes palm kernel, coconut and cottonseed oil, as well as palm oil and oil extracted from the crush of oilseeds as analysed above. Palm kernel oil is produced alongside palm oil and follows the production trend of the latter. Coconut oil is mainly produced in the Philippines, Indonesia, and Oceanic islands. Palm kernel oil and coconut oil have important industrial uses, and dominance has shifted towards palm kernel oil along the growing production of palm oil. Cottonseed oil is a by-product of cotton ginning, with global production concentrated largely in India, the United States, Pakistan, and China. Overall, vegetable oil production is projected to increase globally by 1.3% p.a., a higher rate than most agricultural commodities covered in this *Outlook*, driven mainly by food demand in developing countries resulting from population and income growth.

Global protein meal output is projected to increase by 1.2% p.a., reaching 406 Mt by 2030. 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 4.4). 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 are the dominant raw material.

Figure 4.4. Oilseed crush by country or region



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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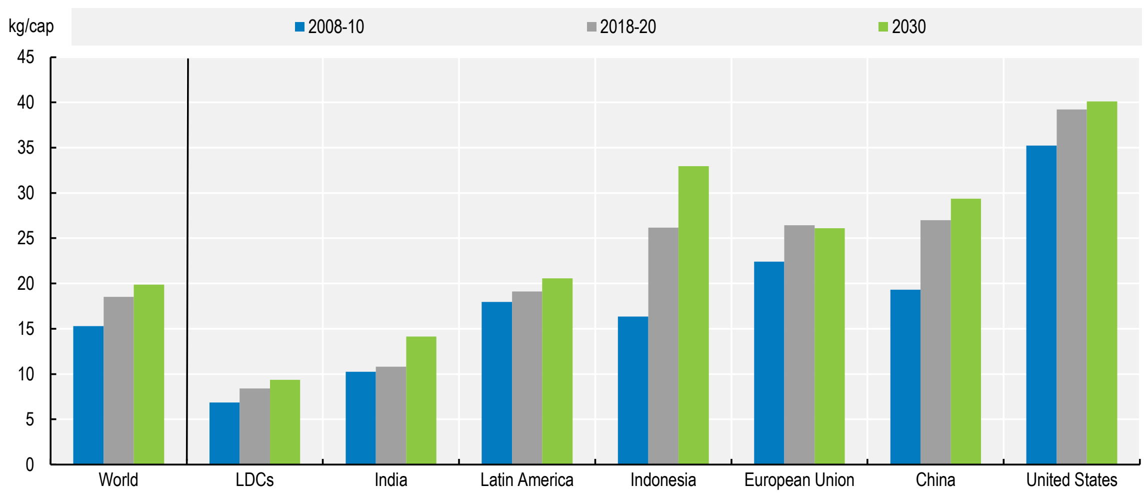
4.6. Vegetable oil consumption

Per capita consumption of vegetable oil for food is projected to grow by 0.8% p.a., considerably less than the 2.3% p.a. increase observed during 2011-20 due to increasingly saturated food demand in developed countries and emerging markets. In China (29 kg/capita) and Brazil (26 kg/capita), the per capita level of vegetable oil food availability is set to reach levels comparable to those of developed countries, where growth in vegetable oil food consumption is projected to level off at 28 kg/capita, growing at 0.3% p.a. (Figure 4.5).

India, the world's second largest consumer and number one importer of vegetable oil, is projected to maintain a high per capita consumption growth of 2.6% p.a., reaching 14 kg/capita by 2030. This substantial increase will be the result of both increases in its domestic production, crushing of increased domestic oilseed production, and in imports of mainly palm oil from Indonesia and Malaysia. As urbanisation increases in developing countries, dietary habits and traditional meal patterns are expected to shift towards processed foods that have a high content of vegetable oil. For least developed countries (LDCs), the per capita availability of vegetable oil is projected to increase by 1.3% p.a., to reach 9 kg per capita by 2030 due to low per capita income.

The uptake of vegetable oil as feedstock for biodiesel (about 10-15% of global vegetable oil use) is projected to remain stable over the next ten years, compared to the 6.5% p.a. increase recorded over the previous decade when biofuel support policies took effect (Figure 4.6). Projected increases in Asia and Latin America will be offset by reductions in Europe and North America, where fixed blending targets and declining transport fuel consumption affect demand for biodiesel. In general, national targets for mandatory biodiesel consumption are expected to increase less than in previous years. In addition, used oils, tallow, and other feedstocks are increasing their share in the production of biodiesel, especially in the European Union and the United States, largely due to specific policies (see Chapter 9 for more details on biofuels). Vegetable oil uptake by Argentina's export-oriented biodiesel industry is projected to be 2.1 Mt by 2030, equivalent to 66% of domestic vegetable oil consumption. In Indonesia, the growth in the use of vegetable oil to produce biodiesel is projected to remain strong and reach 7.9 Mt by 2030 due to supportive domestic policies. Indonesia is the main driver for the increasing use of vegetable oil as feedstock for biodiesel in the world. The use of vegetable oil as feedstock for biodiesel depends on the policy setting (Chapter 9) and the relative price development of vegetable oil and crude oil (see below).

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



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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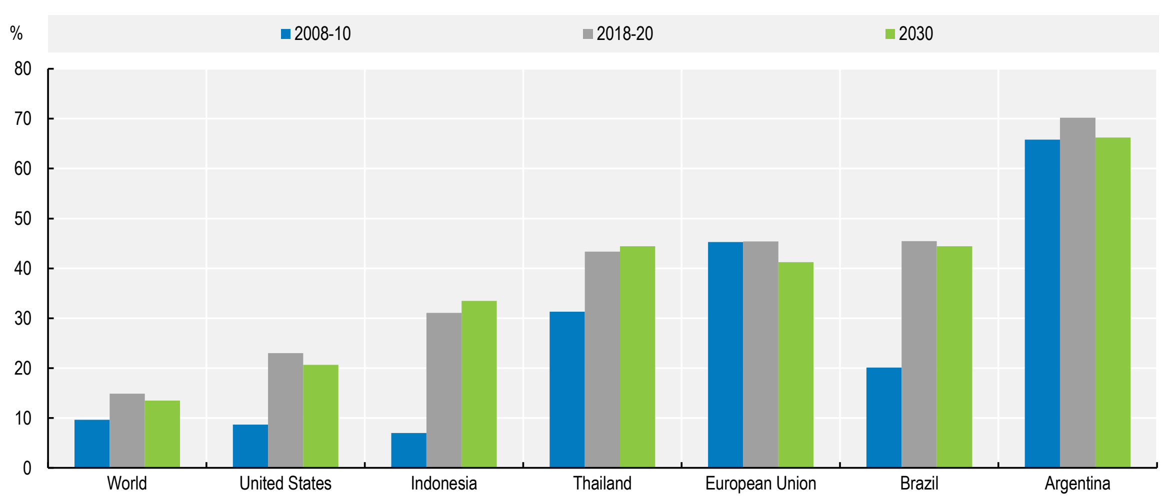
Figure 4.6. Share of vegetable oil used for biodiesel production



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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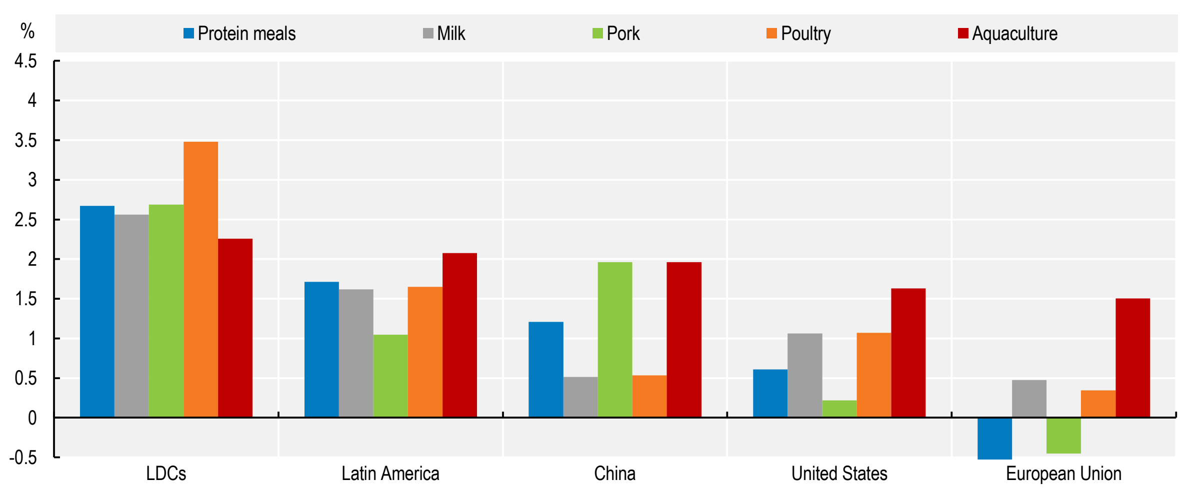
4.7. Protein meal consumption

Protein meal is exclusively used as feed and its consumption is projected to continue to grow at 1.2% p.a., considerably below the last decade's growth rate of 3.8% p.a. Several factors influence the link between feed use of protein meal and animal production: intensification of animal production increases demand for protein meal, whereas feeding efficiencies lead to a reduction of protein feed per animal production output. Composition of animal husbandry and herd sizes are additional determining factors.

The link between animal production and protein meal consumption is associated with a country's level of economic development (Figure 4.7). Lower income countries, which rely on backyard production, consume less protein meal, whereas higher income economies which employ intensive production systems use higher amounts of protein meal. Because of a shift to more feed-intensive production systems in developing countries in response to rapid urbanisation and increasing demand for animal products, growth in protein meal consumption tends to exceed growth in animal production. In LDCs, where the use of protein meals is very low, intensification in livestock production with growing use of compound feed is expected to continue. With intensification, the use of protein meal per unit of livestock production increases considerably, leading to fast growth in total demand.

China accounts for more than a quarter of global protein meal demand and is therefore shaping global demand development. Growth in China's demand for compound feed is expected to be slower than in the previous decade due to declining growth rates for animal production and the existing large share of compound feed-based production. The protein meal content in China's compound feed is expected to remain stable as it surged in the last decade and considerably exceeds at present the levels of the United States and the European Union. As pig herds are being rebuilt in China following the outbreak of ASF, larger scale feed-based production systems have been installed. This could lead to an additional shift in demand for protein meal due to further intensification of the Chinese pigmeat production.

Figure 4.7. Average annual growth in protein meal consumption and animal production (2021-30)



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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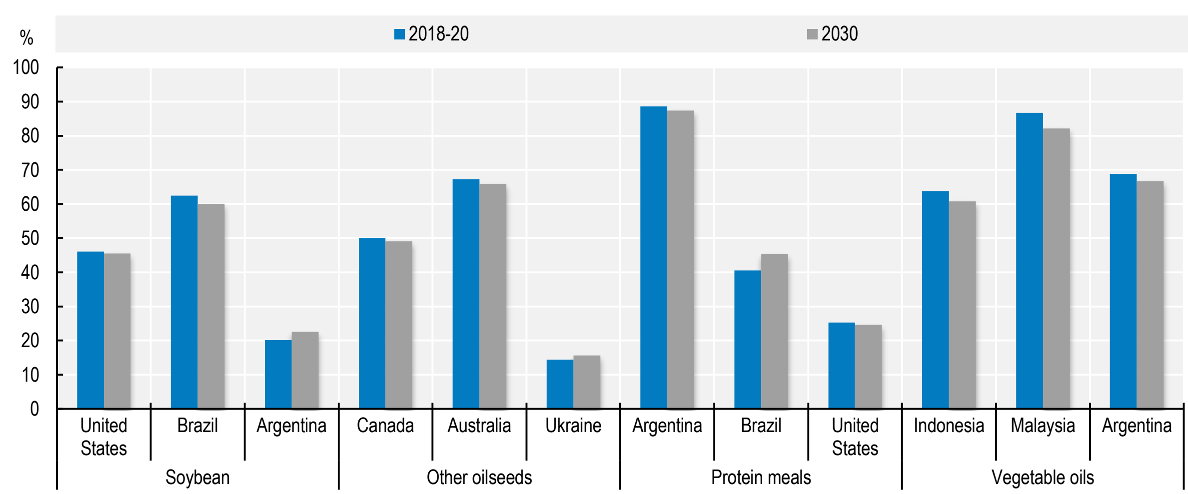
In the United States and the European Union, where compound feed satisfies most protein requirements of animal production, protein meal consumption is expected to grow slower than animal production due to improving feeding efficiencies. In addition, animal products, primarily poultry and dairy, are increasingly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

4.8. Trade

Over 42% of world soybean production is traded internationally, a high share compared to other agricultural commodities. The expansion in world soybean trade is directly linked to projected slower growth of the soybean crush in China and subsequent imports. Chinese soybean imports are projected to grow by 1.2% p.a. to about 108 Mt by 2030 (down from 7.1% p.a. in 2011-2020), accounting for about two-thirds of world soybean imports. Exports of soybeans originate predominately from Brazil and the United States. Whereas the United States was historically the largest global exporter of soybeans, Brazil has taken over that role with steady growth in its export capacity and is projected to account for 50% of total global exports of soybean over the projection period.

For other oilseeds, the internationally traded share of global production traded remains much lower at about 13% of world production as the two largest producers, China and the European Union, are net-importers. The main exporters are Canada, Australia, and Ukraine, which are projected to account for more than 69% of world exports by 2030. In Canada and Australia, more than half of the other oilseed production (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 (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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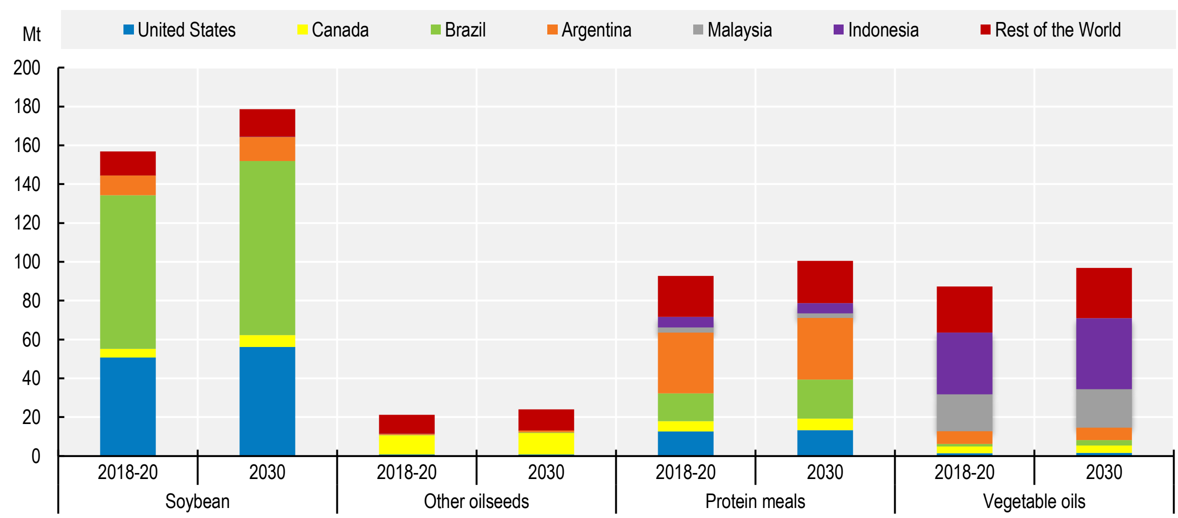
Vegetable oil exports, which amount to 40% of global vegetable oil production, continue to be dominated by a few players. Indonesia and Malaysia are expected to continue to account for 60% of total vegetable oil exports during the outlook period (Figure 4.9). However, the share of exports in production 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 3.4% p.a., reaching 21 Mt by 2030, or about a quarter of world vegetable oil imports, in order to respond to an increasing demand driven by population growth, urbanisation, and increases in disposable income.

The projected growth in world trade of protein meal is 0.8% p.a. over the outlook period, down from 1.8% p.a. over the last decade. Argentina is expected to remain the largest meal exporter because it is the only major protein meal producer with a clear export orientation. The largest importer is the European Union, with imports expected to decline due to reduced domestic demand for protein meal. Almost all of the 8 Mt global import growth in protein meal is projected to occur in Asia. Viet Nam in particular, where additional growth will come with the recovery from the ASF outbreak. The domestic crushing capacity in Asian countries is not expected to keep pace with protein meal demand, and expansion of the livestock sector is expected to require imported feed to meet production requirements.

Figure 4.9. Exports of oilseeds and oilseed products by region



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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4.9. Main issues and uncertainties

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

Consumer concerns regarding soybeans stem from the high share of 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 15% of world protein demand in 2018-20. Environmental concerns are also on the rise, especially with respect to a potential link between deforestation and increasing soybean production in Brazil and Argentina. These concerns have motivated the private sector to incentivise the use of land already cleared for further area expansion so as to avoid further deforestation. If successful, these voluntary initiatives should discourage clearing of land by soybean producers.

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

Biofuel policies in the United States, the European Union, and Indonesia remain a major source of uncertainty in the vegetable oil sector given that about 14% of global vegetable oil supplies go to biodiesel production. In Indonesia, the attainability of the recently proposed 30% biodiesel mandate is questionable as – in addition to requiring government subsidisation –may impose medium-term supply constraints. In the European Union, policy reforms and the emergence of second-generation biofuel technologies will likely prompt a shift away from crop-based feedstocks. The development of crude oil prices, which affects the profitability of biodiesel production, remains a major source of uncertainty. The fastest growth in biodiesel production is expected in Indonesia, but the relationship between palm oil and crude oil prices, as well as economic development, could considerably alter the projected growth path.

The pace of recovery of the Chinese pigmeat industry from ASF and COVID-19 will have a large influence on feed demand as a faster recovery of livestock production requires more protein meal for feeding. Protein meals compete in part with other feed components in the production of compound feed and are thus reactive to any change in cereal prices. This might result in adjustment of feed mixture and influence protein meal use.

5 Sugar

This chapter describes recent market developments and highlights the medium-term projections for world sugar markets for the period 2021-30. Price, production, consumption and trade developments for sugar beet, sugar cane, sugar, molasses, and high-fructose corn syrup are discussed. The chapter concludes with a discussion of important risks and uncertainties that might affect world sugar markets over the next ten marketing years.

5.1. Projections highlights

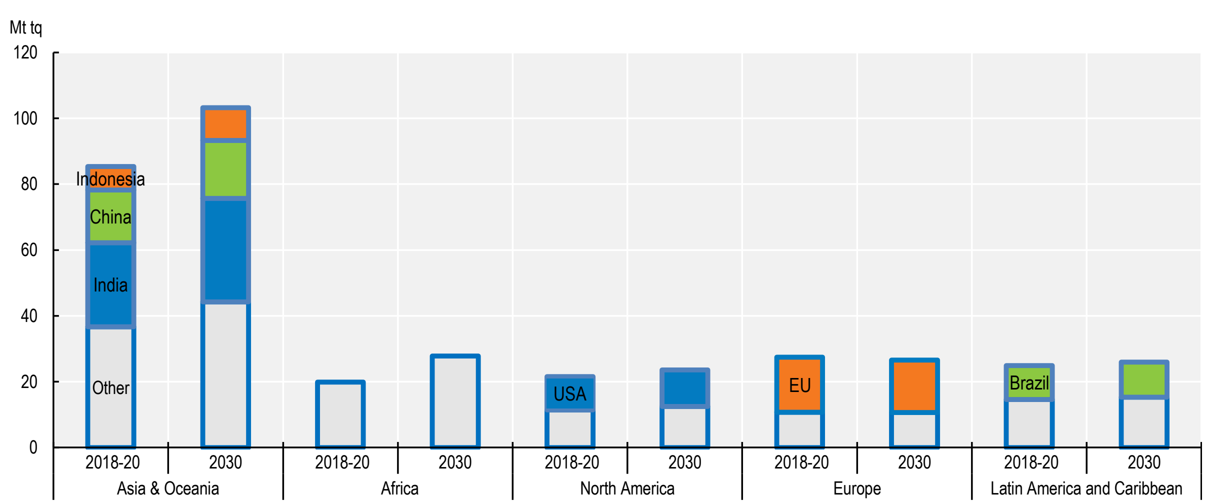
Global production of sugar in the current season (October 2020-September 2021) is foreseen to decrease for the third consecutive year after unfavourable weather conditions negatively affected prospects in some of the key producing countries. World production is expected to fall below global consumption, which is projected to rebound from the lower level of the 2019 season following the onset of the COVID-19 pandemic.

Assuming normal weather conditions, production of sugarcane and sugar beet crops is expected to increase over the next decade, mainly on account of some remunerative returns. Both sugar crops are expected to grow at a higher rate than in the past decade, although well below those observed in the 1990s and 2000s, when production of sugar crops was also used for the development of first generation biofuels. Over the next decade, the diversion of sugar crop crushing to ethanol production – the other main sub-product – will continue to challenge sugar production.

Most of the projected growth in sugar production is expected to come from developing countries. Brazil[1] is expected to maintain its position as the world's largest sugar producer, closely followed by India; these two countries will respectively account for about 21% and 18% of the world's total sugar output by 2030. In absolute terms and compared to the base period (2018-2020), Brazil (+5.8 Mt), India (+5.1 Mt), and Thailand (+3.2 Mt) show the largest increases in production. In Thailand, higher prices are expected to support a production recovery after two consecutive seasons of reduced output (2019 and 2020) due to a combination of bad weather and low prices that curtailed plantings.

Overall, global average per-capita consumption is expected to increase over the next decade as a result of income gains and urbanisation in developing countries. Sugar consumption in Asia is foreseen to grow the most (in absolute terms) and to represent more than half of global consumption by 2030, reflecting higher demand in sugar-rich confectionery products and soft drinks. In Africa, the increase in consumption is expected to be driven by population growth but consumption is projected to remain at levels well below those in Asia, in absolute terms.

Figure 5.1. Evolution of sugar consumption, by regions



Note: Data are expressed on a tel quel basis (tq).
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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In developed countries, total sugar consumption is not expected to grow in the next decade, a reflection of concerns about its negative effects on health when consumed excessively. Per capita consumption is anticipated to decline, although at a slower pace than in the past ten years, as several countries have implemented measures to discourage sugar consumption. These measure are assumed to remain in effect over the outlook period. Global consumption of the main alternative caloric sweetener, high fructose corn syrup (HFCS), is projected to increase by 0.6 Mt to reach 14 Mt by 2030, mainly driven by population growth.

Sugar is traded internationally in the form of raw or white (refined) sugar from sugarcane and white sugar from sugar beet. Driven by remunerative returns and a marginal increase in the nominal premium, the share of white sugar exports from some producing countries is expected to increase slightly over the projection period. Brazil is expected to remain the leading sugar exporter, followed by Thailand and India. Countries that have invested in sugar refineries will mainly import raw sugar (Indonesia, China – hereafter “China”–, United Arab Emirates, Algeria), while countries without refining capacity will continue to import refined sugar.

In real terms, raw and white sugar prices are expected to remain fairly flat over the projection period, with additional supplies foreseen to keep up with the growth in consumption in developing countries, a result of higher population and per capita income. The white sugar premium (the difference between white and raw sugar prices), which averaged USD 79/t during the base period, is projected to increase slightly in nominal terms to USD 88/t by 2030.

These projections are based on assumptions about productivity, consumption behaviour, macro-economic conditions, and policies. Deviations between actual trends and assumptions could alter the market projections presented in this edition of the *OECD-FAO Agricultural Outlook.* Other sources of uncertainty include oil prices, investments in bioethanol, and demand for sweeteners. A greater increase in oil prices would increase competition between sugar and sugarcane-based ethanol, which would have a significant impact on Brazil, the main sugar exporter, and affect the international sugar market. Investments in the bioethanol sector in India could decrease the availability of cane for sugar production, which could affect the international market as well. A lower than expected demand for caloric sweeteners due to health concerns in countries that consume high amounts of these sweeteners would also lead to outcomes that diverge from the findings of this *Outlook*. Finally, the policy environment regulating the sector constitutes a source of uncertainty for the projections.

5.2. Recent market developments

The international sugar market is characterised by production shortfalls in some major producing countries for a third consecutive year, resulting in a tight global sugar balance and an upward pressure on prices. The global deficit is nevertheless contained by two main producers: Brazil, where the weakness of its currency favours a good level of sugar exports combined with the fact that sugarcane-based ethanol is not very profitable due to low crude oil prices, and India, where good rainfalls have allowed for a good production level. Prospects for sugar crop yields are improving in the 2021 season, given rains in Thailand and some winter frost coupled with a temporary reauthorisation of neonicotinoids for beet seeds in several EU countries. These should allow sugar market to return to positive levels.

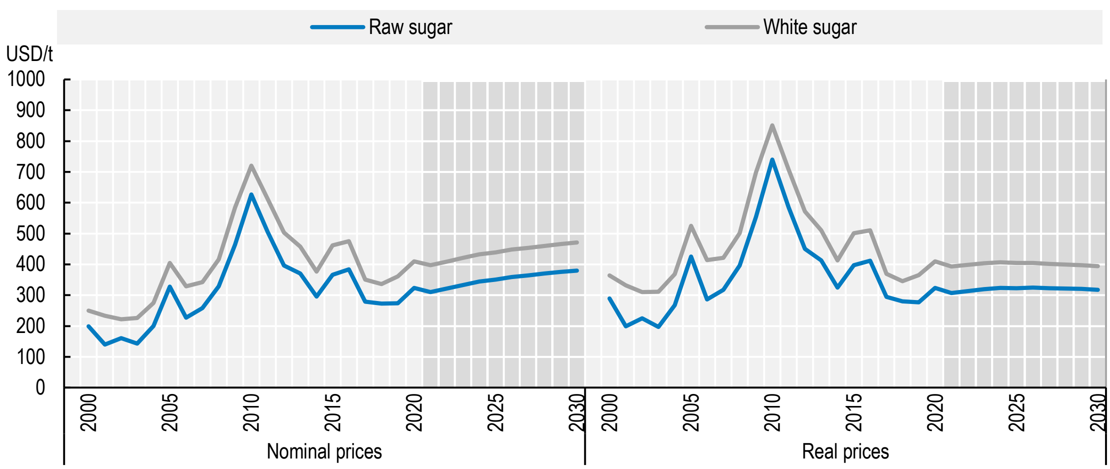
Overall, global sugar consumption declined in 2019 (-0.4%) due to the COVID-19 pandemic, which led to national lockdowns and/or closure of restaurants for several months. Demand, however, is assumed to pick up in 2020 in nearly all countries, with the highest per capita sugar consumption growth taking place in low income countries.

5.3. Prices

As demand returns to the trends prevailing before the COVID-19 pandemic, prices in nominal terms are projected to follow a moderate upward trend, with supply easily meeting demand, assuming normal weather conditions and little change in ethanol price parity with sugar. Some domestic policies and the dominance of few exporters may result in some price variability of international sugar prices over the next ten years. Global stocks are expected to increase slowly, which will bring some confidence back to the market with a stock-to-use ratio stabilising at around 49%, close to that of the last decade.

After recovering from a fall at the onset of the outlook period, real prices are projected to resume their long-term decline due to productivity gains from better yields (Figure 5.2). Overall, real prices should fall below the average level of the last 20 years, when prices were under upward pressure due to competition from biofuels (ethanol). White sugar premium is projected to decrease slightly in absolute real terms, with a slight increase of the share of white sugar exports in total trade.

Figure 5.2. Evolution of world sugar prices



Note: Raw sugar world price, Intercontinental Exchange contract No.11 nearby futures price; Refined sugar price, Euronext Liffe, Futures Contract No. 407, London. Real sugar prices are nominal world prices deflated by the US GDP deflator (2020=1).
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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5.4. Production

Sugar markets, benefiting from a small rebound in prices, are expected to undergo a slow recovery over the outlook period. Sugarcane, the main sugar crop, grows mainly in tropical and sub-tropical regions and is water-intensive. It is a perennial crop; the same plants can be harvested after 12 to 18 months for about five years, although yields decline over time. Apart from sugar, sugarcane also makes it possible to produce ethanol (with a certain flexibility in Brazil). In addition to sugar and ethanol, sugarcane can produce molasses or thick juice and the residue from milling cane (bagasse) is used to supply energy (cogeneration feedstock for electricity). Conversely, sugar beet is an annual crop, cultivated mostly in temperate zones, whose thick juice is used for sugar or ethanol production. Beet pulp and molasses are the two by-products derived from sugar beet. This crop is then used to produce a wide range of products, including food (sugar), feed, bio-based products for industry (pharmaceuticals, plastics, textiles and chemicals) and ethanol. Over the next ten years, the profitability of the two main sub-products of the sugar crops, sugar and ethanol, are projected to expand slightly, which will result in an increase in sugar crop production. Sugarcane will continue to account for around 86% of sugar crops and sugar beet will make up the remainder.

Over the outlook period, the increase in the production of sugarcane is projected to come from higher yields combined with improving irrigation techniques (Brazil, Thailand, Central America) and area expansion. In the case of sugar beet, increases are expected mainly from yields. Sugarcane production is projected to grow by 1% p.a. and reach 1 960 Mt by 2030, with Brazil and India anticipated to contribute 65% of the change in global output volume (38% and 27% respectively). Prospects are less robust for sugar beet, which is projected to reach 302 Mt by 2030, with annual production growth anticipated to be 0.6% p.a., under the 1% p.a. achieved during the past decade (Figure 5.3). Compared to the base period, expansion is expected in Egypt and the United States (+4.4 Mt each), the Russian Federation (hereafter "Russia") (+3.9 Mt), China (+3.4 Mt), Turkey (+3 Mt), and Ukraine (+2.6 Mt), and contractions in the European Union (-1.9 Mt), in contrast to it contributing to more than 11% of the global increase in sugar beet over the last decade.

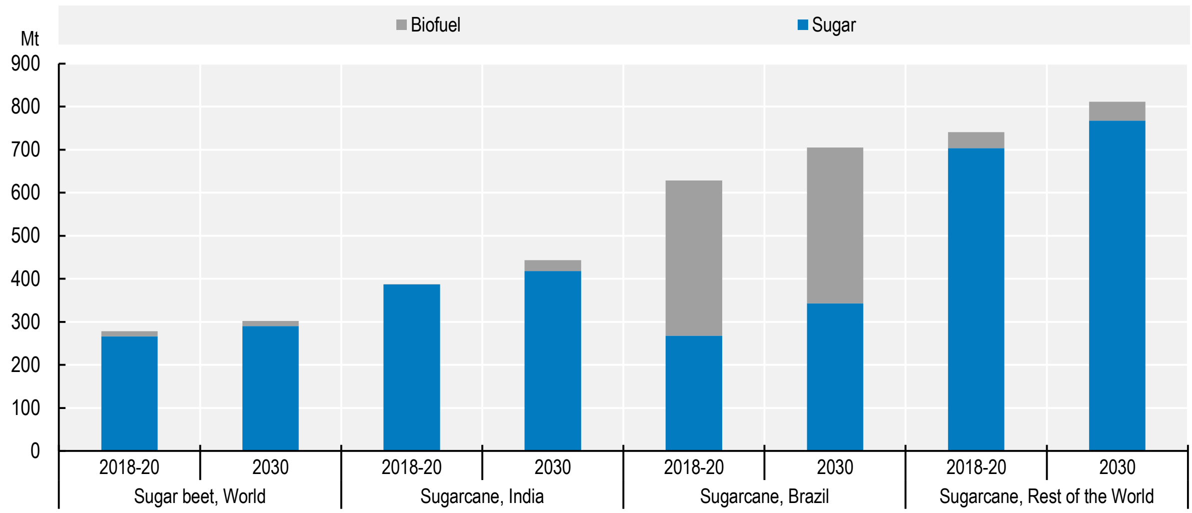
In the European Union, the use of neonicotinoids was banned in 2018 given their suspected harmful effects on bees, for a sustainable agricultural sector. This ban resulted in the development of some diseases (yellow virus) harmful to beet plants in 2020,[2] with losses of more than 12% in the sugar output of the season (which began in October 2019). Production growth is projected to be weak, due notably to a lack of alternatives to neonicotinoids and prices that are not sufficiently attractive to encourage massive investments in the sector. In Russia, production costs should remain high as climatic conditions are harsh; after a drought leading to a low output, production should recover in 2021, although not much growth is expected. In the United States, where both sugar crops are cultivated, higher yields are projected and sugar will continue to be produced almost equally from the two crops. However, in the case of sugar beet, increasing input costs (i.e. from improved harvesting technologies) and decreasing cultivated areas will dampen production growth after a few years. Nevertheless, some growth in sugarcane production is expected as this crop is more stable given its perennial nature.

Over the outlook period, the shares of sugar crops used for sugar and ethanol are projected to be about 81% for the production of sugar (78% in the case of sugarcane and 96% in the case of sugar beet) and 19% for ethanol. Brazil will continue to be the main producer of sugar and sugarcane-based ethanol, producing 36% of the world's sugarcane by 2030. Its sugarcane will be used for 20% of global sugar production and 84% of global sugarcane-based ethanol production (compared to 20% and 91% during the base period).

As of 2020, world sugar production is projected to increase at a stronger average growth rate than in the previous decade (1.4% vs 0.3% p.a.), responding to attractive sugar prices due to steady growth in global demand. Most production increases are expected to occur in developing countries, which are projected to represent 79% of global sugar production by 2030 (compared to 76% in the base period). The leading regions are Asia and Latin America. Asia is projected to expand its share in global production from 39.6% during the base period to 40.9% by 2030; Latin America from 32.1% to 31.8%.

Brazil, the world's biggest supplier, has been persistently in debt over the last ten years but some restructuring has recently started. Over the next decade, the assumed depreciation of the Real combined with some incentive interest rates are foreseen to help increase the profitability of the sector and to attract new investments despite rising input costs. Its sugar sector will continue to be challenged by biofuels, with more than half of its sugarcane being used to produce ethanol. Overall, the country's dominance as the world's top producer and exporter of sugar will be maintained over the outlook period, with production projected to reach 41 Mt (+5.8 Mt compared to the base period) by 2030.

Figure 5.3. World sugar crops production



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/yxqueg

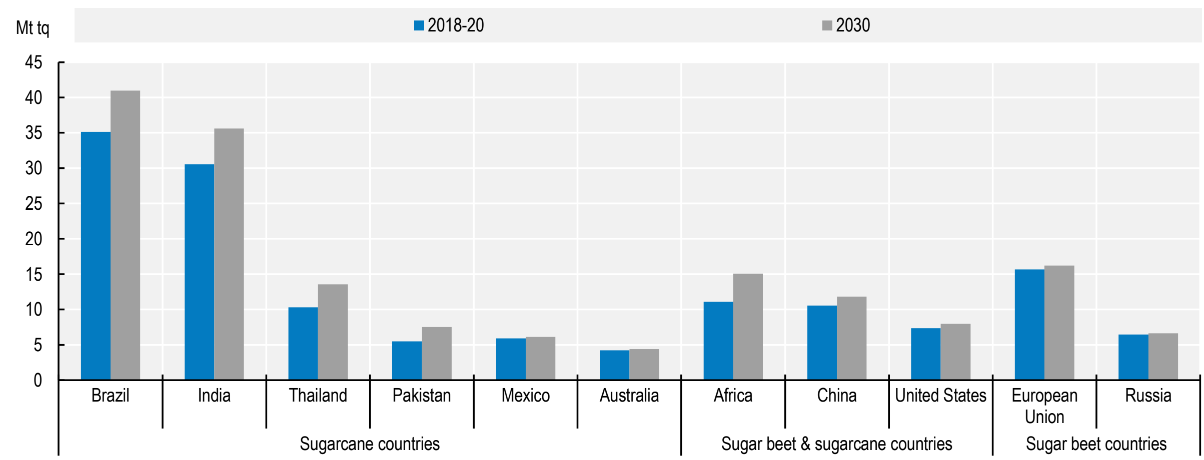
India is the world's second largest sugar producer. A significant output recovery is projected for 2020, after a drop in 2019, as a result of good weather conditions and larger plantings. On the basis of remunerative returns, production is projected to increase by 5.1 Mt over the next decade, reaching 35.6 Mt by 2030. In Thailand, where a second consecutive year of low output is anticipated for 2020, production is projected to recover in 2021 and reach as high as 13.6 Mt by 2030. At this level, Thailand would become the world's fourth largest producer, the European Union being in the third place. Chinese production, in the first years of the projection period, is expected to benefit from the 2020-2022 action plan of the main sugarcane-producing province, Guangxi, that aims to modernize the sector. Production costs are expected, however, to remain high when compared to neighbouring countries. By 2030, Chinese sugar production is projected to reach 11.8 Mt. In Pakistan, where government strongly supports the sugar sector through guaranteed prices to farmers, production is projected to increase by 2.3% per annum, compared to 1.8% during the last decade, to reach 7.6 Mt by 2030.

In Africa, sugar output is projected to increase by 36% to reach 15.1 Mt by the end of 2030 compared to the base period; this is due to production expansion in Sub-Saharan countries, boosted by national and international investments in the sector, and to suitable conditions for growing sugar crops, including a favourable climate and available land. Egypt is expected to be a key contributor to overall growth, with production projected to reach 3.8 Mt by 2030, due mostly to expansion of the sugar beet area. However, despite this production growth, Africa will continue to represent only a small share of world output (7.5% in 2030).

In the last decade, developed countries accounted for 22% of the increase of global sugar output, with significant growth in Russia. This share, however, is projected to decrease to 8% over the forecast period (Figure 5.4), with a projected growth of only 0.7% p.a. (1.6% p.a. in developing countries). In this group of countries and relative to the base period, the United States, is foreseen to increase its production the most (+0.7 Mt) as it benefits from government policies supporting domestic production. US policies include: 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 needs only (through tariff rate quotas, regional agreements, and the Suspension Agreements on Sugar with Mexico). In the European Union and Russia, sugar production levels should not change much over the next ten years. The European Union will maintain its position as the world's third largest producer. As for Russia, efforts in recent years towards self-sufficiency have been successful, but the country remains a high-cost producer and its exports are not competitive for production to continue to increase much over the next decade.

As a result, global sugar stocks will increase moderately over the next decade but the global stock-to-use ratio is projected to stay constant, close to the average level of the last ten years (49%).

Figure 5.4. Sugar production classified by traditional crops



Note: data are expressed on a tel quel basis (tq)
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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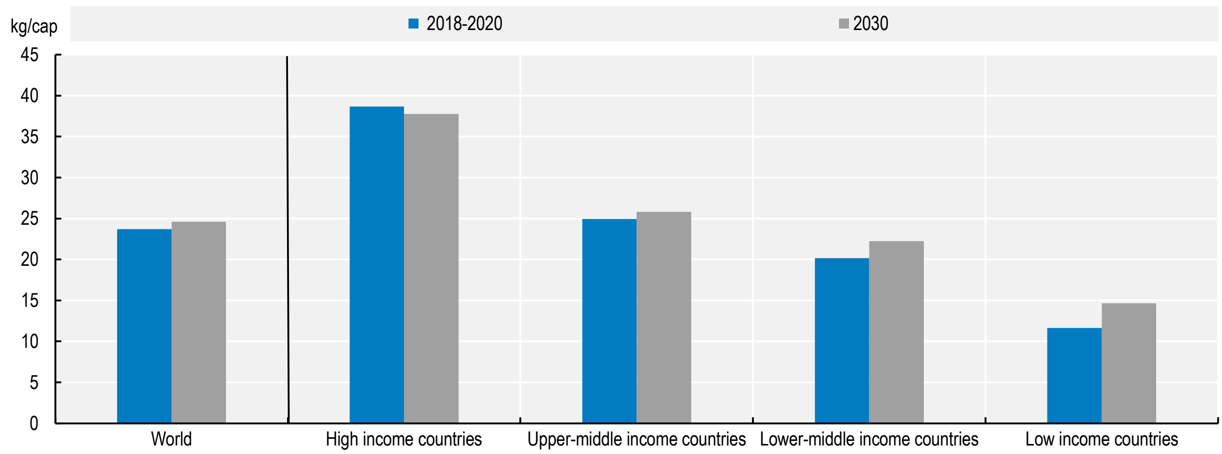
5.5. Consumption

Global sugar consumption is projected to continue growing at around 1.4% p.a., reaching 196 Mt by 2030, underpinned by population and income growth. Over the outlook period, the average world level of per capita consumption is expected to increase from 22 kg/cap to 23 kg/cap, although considerable variations between regions and countries will occur (Figure 5.5). In general, a decline is projected in high income economies that are more mature markets, while other economies should see an increase, proportionately higher when the group's income is lower.

The largest contributions to additional demand will occur in Asia (66%) and Africa (30%). In these two sugar deficit regions, per capita consumption levels are generally low compared to other regions, and the prospects for growth are high. The higher growth rate in Asia will stem from a higher demand in sugar-rich confectionery products and soft drinks, generally in urban areas, while that of Africa will come from a higher access to direct consumption. In Latin America, which already has high per capita consumption levels, growth in consumption by 2030 is projected to be relatively small, only 4%.

Figure 5.5. Per capita consumption of sweeteners



Note: Data are expressed on a tel quel basis (tq).The 38 individual countries and 11 regional aggregates in the baseline are classified into the four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower-middle: < USD 3 895, upper-middle: < USD 13 000, high: > USD 13 000.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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In Asia, it is expected that India will experience the largest increase in the level of sugar consumption based on population growth and the expansion of the food and beverage industry. In Africa, the highest changes in total consumption are projected for Egypt and several Sub-Saharan countries. Per capita consumption in Asia and Africa is expected to grow by 1.1% p.a. and 0.8% p.a. respectively over the next decade. Despite this overall increase, average per capita consumption is projected to remain below global average levels.

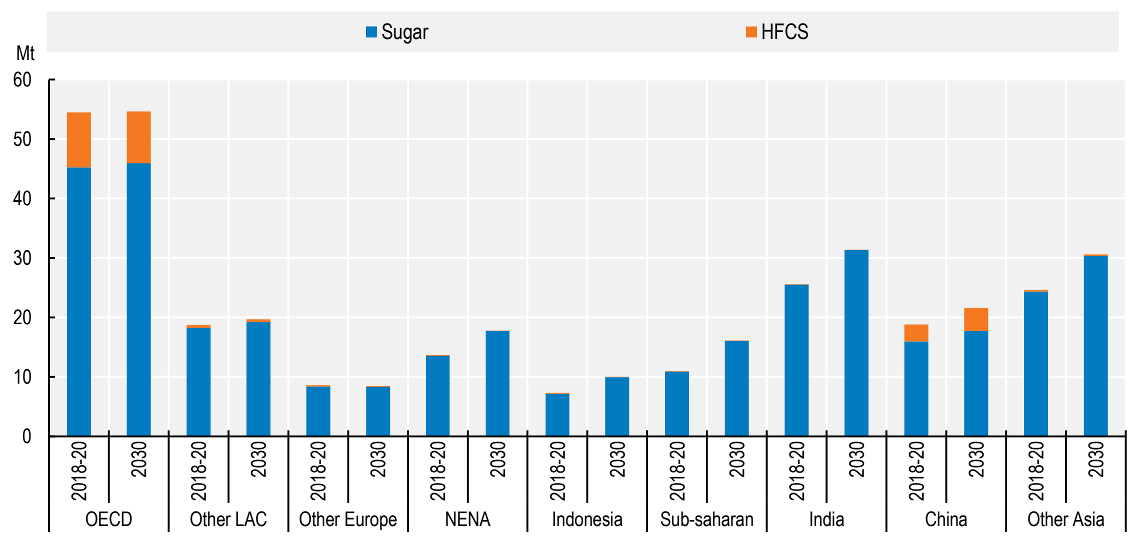
In contrast, the level of per capita sugar consumption in many developed countries is expected to continue to decline due to increased concerns about the negative health effects of sugar overconsumption; unhealthy weight gains that increase the risks of diabetes (type 2), heart disease, and tooth decay. Several countries have implemented taxes on caloric sugary products in an attempt to reduce sugar consumption. (Mexico was the first country to do so at the national level in 2014). In some countries or regions, bans were designed to limit the sale and/or the promotion of sugary drinks or sweet products to children under 18 years. In reaction to this trend, some multinationals have adapted by reducing portion sizes and the amount of caloric sweeteners per product, or by replacing the amount of sugar with an equivalent amount of artificial sweetener, the latter having a sweeter taste but fewer calories.

The decline in per capita caloric sweetener consumption in developed countries is projected to be strongest in Mexico, Australia and New Zealand, followed by Canada and countries in Western Europe. In the United States, even if per capita consumption of caloric sweeteners is one of the highest in the world, it is not expected to diminish much; a scientific committee's proposal to reduce the amount of added sugar consumed in the daily calorie diet from 10% (WHO recommendation) to 6% was not retained in the 2020 dietary guidelines. However, the share of sugar in per capita caloric sweetener consumption (HFCS is the other caloric sweetener in this *Outlook*) is projected to increase from 63% during the last decade to 68% by 2030. In Russia, sugar demand is not projected to grow much as the level per capita is already high. The debate on a possible taxation of sugar is still in progress, but sugar is expected to remain a cheap source of calories and consumer habits are not expected to change.

Owing to its competitiveness in caloric sugary soft drinks, HFCS consumption (dry weight) is projected to grow by 0.5% or 0.6 Mt by 2030. Global consumption will remain limited to a few countries (Figure 5.6).

The biggest increase will occur in China, one of the few countries with low per capita sweetener consumption although temporary safeguard measures[3] were put in place to protect its sugar sector. As the world's largest starch producer, China is projected to increase its supply of HFCS to meet growing domestic demand, although a lack of profitability is likely to dampen this growth. In the European Union, unlike expectations related to the abolition of the quota system, HFCS will only become slightly more competitive with sugar over the next decade and its share in the consumption of caloric sweeteners is projected to increase from an average of 3.5% over the past decade to 4.5% by 2030. In other consuming countries which have generally a high level of per capita sweetener consumption, HFCS consumption per habitant is assumed to decline. In Mexico, government efforts to reduce caloric sweetener consumption should reduce demand along with sugar consumption. A decline is also foreseen in the United States, the leading HFCS producer and the share of HFCS in national caloric sweetener consumption is projected to continue to decrease from 37% during the base period to 32% by 2030 as the potential greater health hazard of HFCS over sugar continues to be debated in the country. Thus, despite its leading position, production of HFCS in the United States is projected to decline by 10%, to reach 6.2 Mt by 2030.

Figure 5.6. Evolution of caloric sweetener consumption in major regions and countries



Note: NENA stands for Near East and North Africa, and is defined as in Chapter 2.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

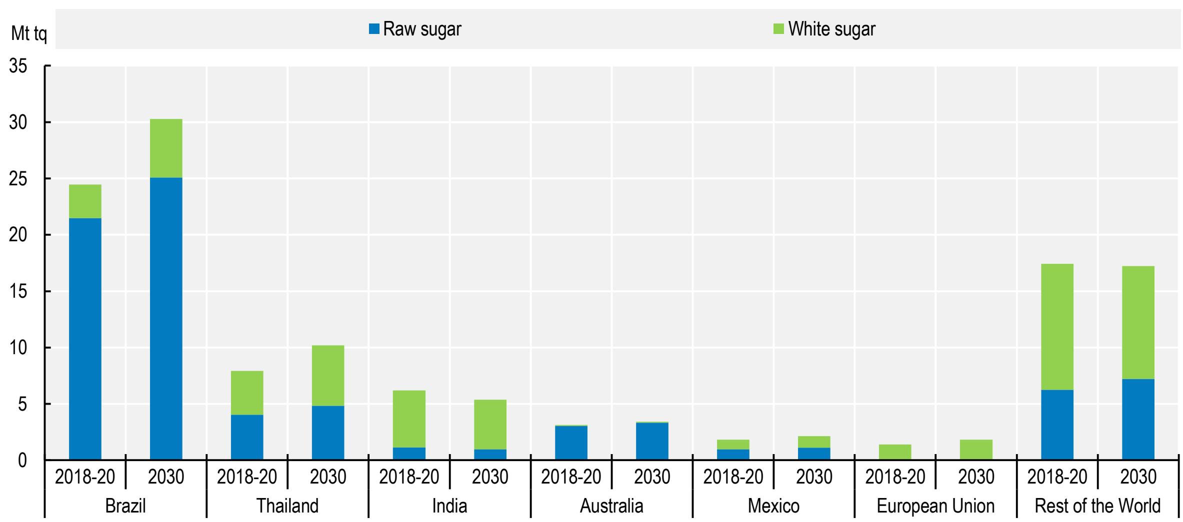
StatLink https://stat.link/z2cxrf

5.6. Trade

Over the coming decade, sugar exports are projected to remain highly concentrated, with Brazil consolidating its position as the leading exporter (from 39% of world trade in the base period to 43% by 2030) (Figure 5.7). Brazil's weak currency *vis-à-vis* the US dollar over the outlook period will improve its sugar sector's competitiveness. Despite rising input costs, millers will benefit from good incentives to produce sugar for exports, although favourable returns for sugarcane-based ethanol production could pose challenges. Brazilian sugar exports are traditionally traded under the form of very high polarization raw sugar, and relatively little sugar is refined for exports. Its exports are projected to represent 72% of the increase in global trade, +5.8 Mt when compared to the base period, mainly under the form of raw sugar.

In Thailand, the world's second largest sugar exporter, very little ethanol is produced directly from sugarcane (less than 2%); molasses or cassava are used instead. Production is expected to progressively recuperate from the current dip and regain international market shares towards the end of the projection period, accounting for 14% of world sugar exports by 2030 (versus 13% during the base period) and reaching 10 Mt of sugar exports by 2030. India is projected to have enough supplies to maintain a high level of exports, mainly in the form of white sugar, and to be the third largest sugar exporter throughout the next decade. However, the government's continued efforts to promote ethanol inclusion is projected to contribute to a weaker growth in sugar exports during the projection period, with more sugarcane diverted to the production of ethanol. In Australia, sugarcane will be limited by the availability of irrigated land; in view of this constraint, production levels are projected to remain close to the relatively low levels of the current season, but higher than the domestic demand. Thus, the country will continue to export around 77% of its production.

Figure 5.7. Raw and white sugar exports for major countries and regions



Note: data are expressed on a tel quel basis (tq)
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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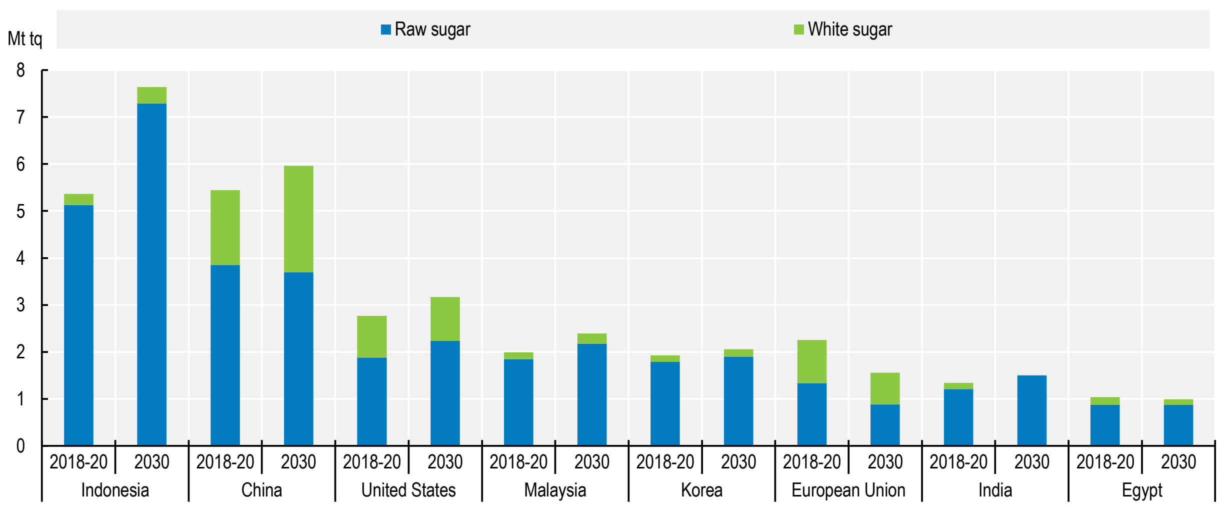
In 1968, the European Union introduced sugar and isoglucose production quotas to guarantee production and prices. These quotas were abolished in 2017, which led to a decrease in domestic prices and freed exports from their WTO subsidised export limit[4]. Production is not projected to increase much. That of HFCS is expected to generally satisfy internal demand without significant change in EU exports. But the European Union will become a net exporter of high quality white sugar towards the end of the next decade. Its exports traditionally reach sugar-deficit countries in the NENA and Far East regions, but will face competition from the supply of sugar refinery industries which have developed during the last decade, notably in the NENA region, to meet domestic demand while allowing for exports. The NENA region critically depends on Brazil as a supplier of raw sugar, which makes it vulnerable to supply constraints for processing and to movements in exchange rates and freight costs. In addition, it faces strong competition from India in the export of white sugar to East Africa and the Near East.

World sugar imports are less concentrated than are exports (Figure 5.8). Based on the outlook projections, Asia and Africa will see the strongest growth in sugar demand, which in turn will influence the ranking of main importers. During the base period, Indonesia and China were the leading importers (at 5.4 Mt each), followed by the United States (2.8 Mt), the European Union (2.2 Mt), Malaysia (2.0 Mt), Korea (1.9 Mt), and India (1.3 Mt). Over the next decade, Indonesia, with a strong growth in consumption, is projected to consolidate its position as the leading sugar importer by 2030 (7.6 Mt), followed by China (6 Mt), the United States (3.2 Mt), Malaysia (2.4 Mt), Korea (2.1 Mt), and India (1.5 Mt).

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

Sugar imports are expected to decline mainly in the European Union, Iran and South Africa. The preferential agreements the European Union signed with partner countries have become less attractive since 2017, when the abolition of sugar quotas resulted in lower prices. The EU sugar imports are projected to meet lower demand and decrease to 1.6 Mt by 2030.

Figure 5.8. Raw and white sugar imports for major countries and regions



Note: Data are expressed on a tel quel basis (tq)
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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5.7. Main issues and uncertainties

The Covid-19 pandemic was continuing when the economic assumptions for this report where decided and delays in vaccines have generated uncertainty as to economic recovery in 2021. This *Outlook* assumes that at the end of the 2020 sugar season, confinement and restriction measures will be lifted, restaurants will be reopened, and out-of-home consumption will resume. After a temporary increase, consumption should be back to its long-term growth; recovery may change, however, depending on the availability of vaccines and virus mutations.

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

To stay competitive, and in view of declining trends in the sugar demand, producers will look to diversify. New products derived from sugar crops have been developed over the last decade: oligosaccharides obtained from fermentation processes can replace some of the added nutritive elements in feed rations (lysine), bioplastics, and some chemical products. The development on a large scale of these alternative products could create tensions on the markets of the two traditional main sub-products.

The prospects for the sugar demand are uncertain in view of the growing evidence of the negative impact of excessive sugar consumption on human health. Among other things, some governments have imposed taxes on caloric sweeteners to encourage lower consumption, which could be reinforced over the next decade. As a result, some pro-active reactions have been taken by the food industry – such as product reformulation, the use of alternative non-caloric sweeteners including stevia, and decreasing portion sizes – which could also be amplified.

The projections for Brazil carry several uncertainties, particularly with respect to the ongoing financial consolidation. The outlook for the Brazilian Real exchange rate, with respect to the US dollar, and the oil price are two crucial dynamics for Brazil’s sugar sector, which has the flexibility to easily switch between the use of its sugarcane for either sugar or ethanol, depending on the relative profitability of the main two sub-products. When the Brazilian Real depreciates, this gives incentives when the product is denominated in US dollars to sell on sugar the international world market (and vice versa). As for the price of crude oil, it must be high enough for millers to produce ethanol as the price of ethanol is fixed at 70% of the crude oil price. An appreciation or depreciation of the Real directly affects the competitiveness of the sector and has a significant impact on international and domestic markets. The implementation of the biofuel programme (Renovabio) can also have a significant impact on sugar markets as could the potential for alternative feedstocks to replace some of the sugarcane-based ethanol which could influence the sector as well.

The outlook for India is subject to high uncertainties. Small changes in consumption or production trends or in related policies could have large impacts on world markets. For example, changes on the assumed fulfilment of the country’s ambitious ethanol blending targets could have substantial impact on sugar supply to the domestic and international markets. Similarly, changes to export-related policies could have a large impact on global markets. In addition, production and exports have historically had large swings, which can easily affect the market predictions of this *Outlook*.

Trade distortions on international sugar markets will persist. Changes in international sugar prices are not fully transferred to domestic sugar producers and consumers, even if some world sugar markets have undertaken structural reforms (e.g. elimination of sugar quotas in the European Union and Thailand). However, to protect their domestic markets, many countries continue to use trade policy instruments. These include: (i) high out-of-quota tariffs in China; (ii) the South African dollar-based reference price mechanism that ensures a minimum import price; (iii) adjustments to WTO TRQ and export limits for Mexico (United States); (iv) transportation subsidies to stimulate exports of sugar and support domestic sugar prices (Pakistan, India); (v) high import tariffs (European Union, Russia, United States); and (vi) regional trade agreements (NAFTA, European Economic Partnership Agreements, and Everything but Arms).

Notes

[1] The economic assumptions underlining the projections for increased production include the depreciation of the Brazilian Real against the US dollar reflecting Brazil's position as the top sugar exporter.

[2] Some emergency authorisations for the use of a neonicotinoid seed treatment can be granted until 2023 (Article 53 of Regulation (EC) No. 1107/2009).

[3] The 50% import tariff was increased to 95% from 22 May 2017 to 21 May 2018, 90% from 22 May 2018 to 21 May 2019, and 85% from 22 May 2019 to 21 May 2020.

[4] A complaint filed by Australia, Brazil, and Thailand at the WTO succeeded in capping EU subsidised exports to 1 279 kt/year, as of 2006.

6 Meat

This chapter describes recent market developments and highlights the medium-term projections for world meat markets for the period 2021-30. Price, production, consumption and trade developments for beef and veal, pigmeat, poultry, and sheepmeat are discussed. The chapter concludes with a discussion of important risks and uncertainties that might affect world meat markets over the next ten marketing years.

6.1. Projection highlights

International meat prices declined in 2020 due to the impact of COVID-19. Logistical hurdles and reduced food service and household spending temporarily curtailed import demand by some leading importing countries. COVID-19 related market disturbances reduced incomes in net meat-importing, low-income countries, significantly eroding household purchasing power and compelling consumers to substitute the intake of meat products with cheaper alternatives. The fall in international meat prices would have been greater if the People's Republic of China (hereafter "China") had not sharply increased its import demand due to the African Swine Fever (ASF) outbreak, which continues to limit local production. Significantly higher feed costs further hampered the profitability of the meat sector at the start of the outlook period.

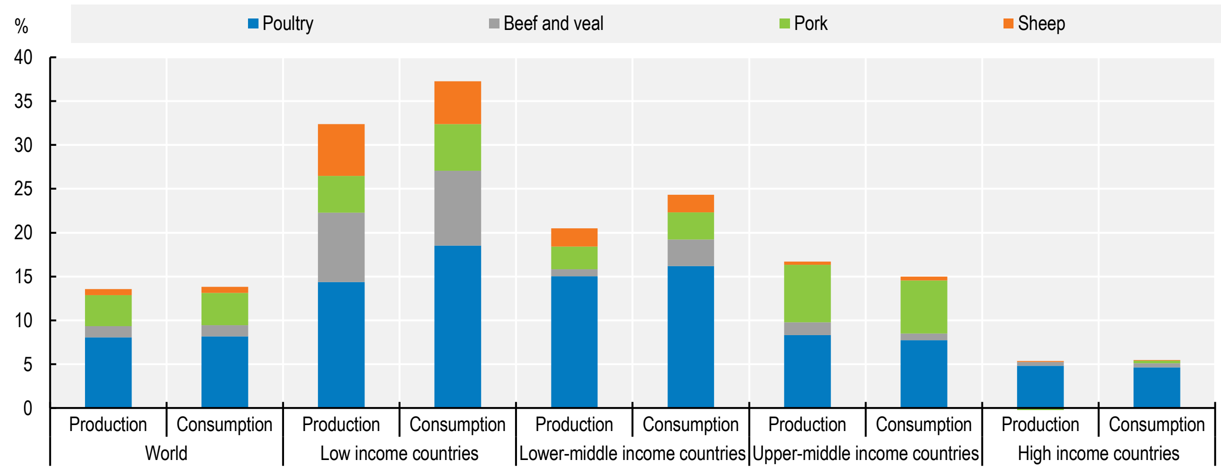
This year's edition of the *OECD-FAO Agricultural Outlook* projects the global meat supply to expand over the projection period, reaching 374 Mt by 2030. Herd and flock expansion, especially in the Americas and China, combined with increased per animal productivity (average slaughter weight, improved breeding, and better feed formulations) will support the meat market. China is projected to account for most of the total increase in meat production, followed by Brazil and the United States. Increase in global meat production is led mainly by growth in poultry production. The increase in pigmeat production will remain limited in the first three years of the Outlook due to the slow recovery from the outbreaks of ASF in China, the Philippines and Viet Nam. The recovery process is assumed to be completed by 2023, especially in China, supported by the rapid development of large scale production facilities that can ensure biosecurity.

Growth in global consumption of meat proteins over the next decade is projected to increase by 14% by 2030 compared to the base period average of 2018-2020, driven largely by income and population growth. Protein availability from beef, pork, poultry, and sheep meat is projected to grow 5.9%, 13.1%, 17.8% and 15.7% respectively by 2030 (Figure 6.1). In high income countries, however, changes in consumer preferences, ageing, and slower growing populations will lead to a levelling off in per capita meat consumption and a move towards the consumption of higher valued meat cuts.

Meat consumption has been shifting towards poultry. In lower income developing countries this reflects the lower price of poultry as compared to other meats, while in high-income countries this indicates an increased preference for white meats which are more convenient to prepare and perceived as a healthier food choice. Globally, poultry meat is expected to represent 41% of all the protein from meat sources in 2030, an increase of 2 percentage points when compared to the base period. The global shares of other meat products are lower: beef (20%), pigmeat (34%), and sheep meat (5%). Per capita meat consumption in China is projected to return to its longer term trend by 2023, as the ASF impact on domestic pigmeat prices abates. As a result, one-third of the overall increase in meat consumption over the projection period is attributed to pigmeat. China will account for 70% of the increase in pigmeat consumption from the reference period to 2030. In light of these factors, global meat consumption per capita is projected to increase 0.3% p.a. to 35.4 kg in retail weight equivalent (r.w.e.) by 2030. Over one-half of this increase is due to higher per capita consumption of poultry meat.

International meat trade will expand in response to growing demand from countries in Asia and the Near East, where production will remain largely insufficient to meet demand. Import demand in several middle and high income Asian countries has been steadily increasing in recent years due to a shift toward diets that include higher quantities of animal products. International trade agreements have included specific provisions for meat products that improve market access and create trade opportunities.

Figure 6.1. Growth in meat production and consumption on a protein basis, 2021 to 2030



Note: The 38 individual countries and 11 regional aggregates in the baseline are classified into the four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower-middle: < USD 3 895, upper-middle: < USD 13 000, high > USD 13 000.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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This *Outlook* projects that nominal meat prices for beef, pork, and poultry will recover in 2021, as demand in high income countries recovers from the COVID-19 pandemic. Further nominal price increases are foreseen, albeit modestly, up to 2025 as income and consumer spending are assumed to recover in other countries, especially in middle-income countries where meat demand is responsive to income. Over the first years of the projection period, supply constraints in several Asian countries, particularly China, will induce higher import demand and lead to higher prices. This is especially relevant for the pigmeat sector, where ASF-related losses have decreased production in Asia.

Greenhouse gas emissions (GHG) from meat production comprised about 54% of total emissions from agriculture during the 2018-20 base period (in CO2 eq. basis). The increase of emissions by the meat sector of 5% by 2030 is considerably less than the increase in meat production, due primarily to the increased contribution of poultry production and to projected higher meat output from a given stock of animals. The adoption of new technologies to reduce methane emissions, for example feed supplements that are not widely available today, could further reduce future per unit emissions.

Animal disease outbreaks, sanitary restrictions, and trade policies will affect the evolution and dynamics in world meat markets. The effectiveness of global efforts to prevent and control the spread of ASF will significantly influence the growth in the amount of meat traded internationally. It remains uncertain by how much global import demand will increase to satisfy the ASF-induced meat deficits in affected countries. This is expected to add volatility to meat prices in the early part of the projection period. The modalities of existing or future trade agreements (for example, the African Continental Free Trade Area or the Regional Comprehensive Economic Partnership) will influence the size of trade flows and meat trade patterns over the outlook period, both globally and bilaterally.

The projections assume that the economic impact of the COVID-19 pandemic will be short-lived and mainly affect the meat sector through income effects that reduce demand for higher valued meat products. Some uncertainties remain on the food services sector's recovery path, which represents a significant part of meat consumption and, in particular, sales of expensive cuts which are not fully replaced by retail sales. These uncertainties may also affect the supply of meat and meat processing, given that health protocols and restrictions in the movement of people have led to several meat processing facilities and slaughterers to lower their operational capacities.

The projections assume that consumer preferences will evolve following historical patterns and that income and prices will shape diets. However, other factors that could influence the meat outlook over the medium term include changing consumer preferences and attitudes towards lower meat protein consumption at a quicker pace than has been observed in the past years. The emergence, albeit from a low base, of alternative protein sources, such as cultured and plant-based substitutes for meat, and automation of the labour intensive processing, packaging (including labelling) and distribution sectors will also influence projections.

6.2. Recent market developments

International meat prices declined in 2020 due to the impact of COVID-19, which temporarily curtailed meat demand by some leading consuming and importing countries. Logistical hurdles, reduced food service, reduced household spending due to lower incomes all contributed to this reduced demand. The fall in international meat prices would have been larger had there not been a sharp rise in meat imports by China, where ASF continues to limit local production.

World meat production remained stable in 2020 at an estimated 328 Mt, as output increases in poultry and ovine meats offset contractions in pig and bovine meat production. Total poultry meat production in 2020 is estimated at 134 Mt, up 1.2 % from 2019, underpinned by a sharp rise in demand in China.

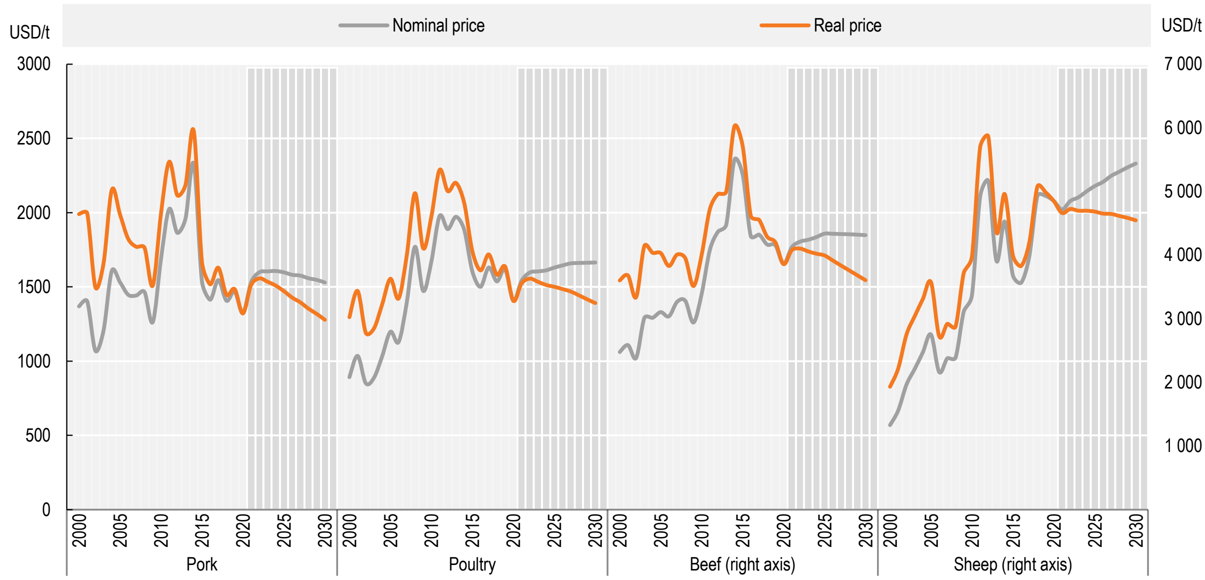
The on-going outbreak of ASF was the main factor causing reduced pigmeat production in East Asia, especially in China. Bovine meat output also fell in some major producing countries, caused by the limited availability of animals for slaughter (in Australia, New Zealand, and the European Union) and regulations associated with animal welfare, and the purchasing and transport of animals by the processing sector (India).

World meat imports in 2020 are expected to have reached 36.3 MT, growing by 6.3% year-on-year, led mainly by AFS-induced imports by China; excluding China, global meat imports fell by 1.4 Mt, or 4.3%. Leading exporters – including Brazil, Canada, the European Union, the Russian Federation (hereafter “Russia”), and the United States – supplied much of the expanded import demand for meat.

6.3. Prices

Meat prices are anticipated to rebound from COVID-19 induced lows in 2020, and to rise moderately over the medium term as demand recovers and higher feed costs are passed through; yet, they are expected to remain well below their peaks of ten years ago (Figure 6.2). The projected rise in nominal meat prices is expected for all meats, although each sub-sector has different dynamics given their respective biological supply responses to recent shocks. However, the ratio of nominal meat prices over feed prices is projected to decline, albeit at a slower pace compared to recent years (Figure 6.3). The downward trend in this ratio reflects ongoing feed productivity gains within the sector, whereby less feed is required to produce a unit of meat output. Nevertheless, higher feed costs are further hampering the profitability of meat production at the start of the projection period.

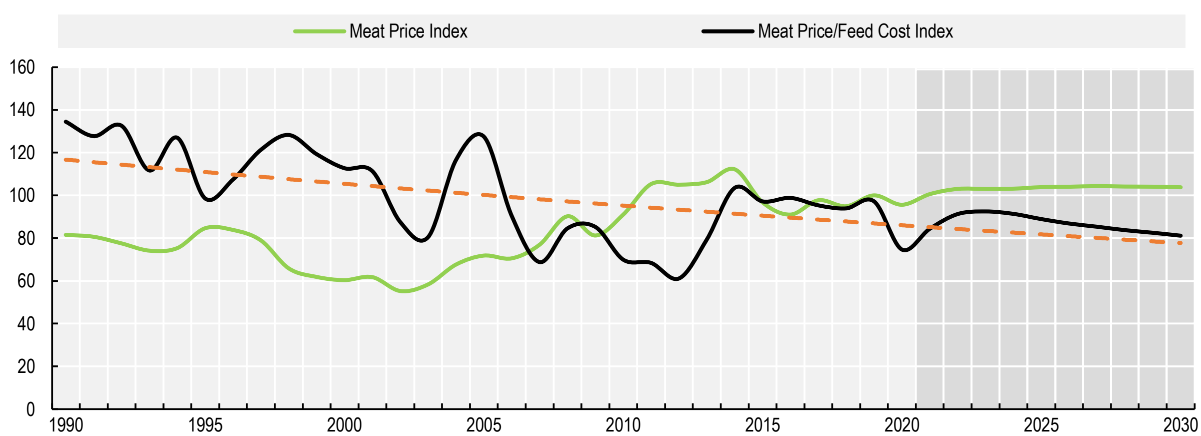
Figure 6.2. World reference prices for meat -rising in nominal, but falling in real terms



Note: Real prices are nominal world prices deflated by the US GDP deflator (2020=1). US Barrows and gilts, National base 51-52% lean c.w.e. Brazil: Export unit value for chicken (f.o.b.) product weight. US Choice steers, 5-area Direct c.w.e., Total all grades. New Zealand lamb price c.w.e., all grade average.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/0akovw

Figure 6.3. FAO Food Price Index for meat and its ratio to feed prices



Note: Index: average 2014-2016=100. Meat price Index: computed from average prices of four types of meat.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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All meat prices are projected to fall from the base period levels of 2018-20, and back to longer term real trends as costs of meat production decline in real terms. The exception is sheep meat, the prices of which have displayed an increasing trend as exports from New Zealand have been constrained in view of the rising opportunity costs of pasture land induced by rising long-term real prices of dairy products. The reference price for pigmeat in heavily traded Pacific markets (represented by the US national base price) will increase early in the projection period to meet robust demand, particularly from China, but will be contained by rising export supplies from Brazil, the European Union, and the United States. Poultry prices (represented by Brazil's fresh, chilled or frozen export prices) are expected to closely follow grain prices given the high share of feed costs in their production and the swift response of production to global rising demand. Beef prices (represented by US choice steer prices) are projected to increase from cyclically lower base period levels, but to remain constrained as supplies and cattle inventory levels increase in key exporting countries such as Argentina, Australia, and the United States.

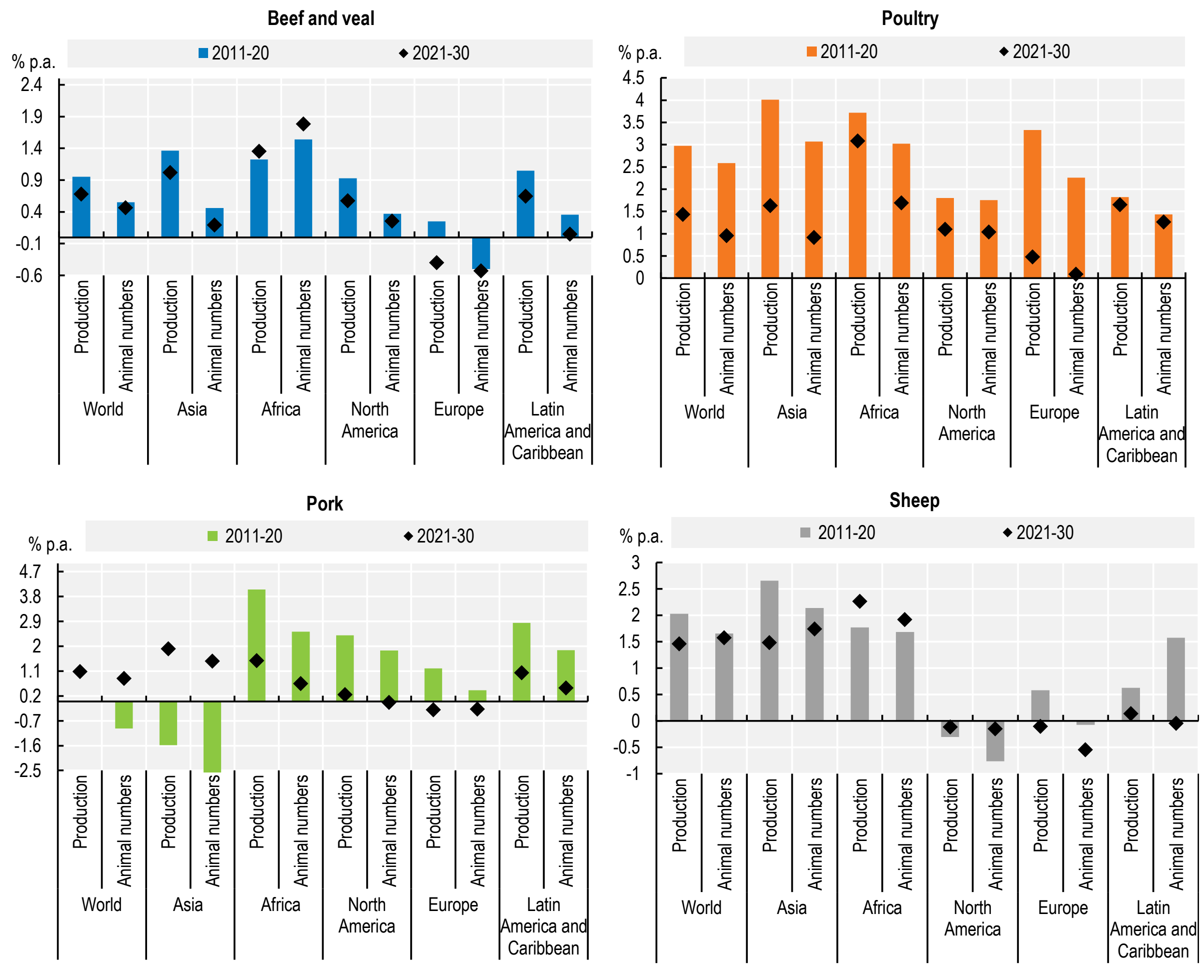
6.4. Production

Global meat production is projected to expand by nearly 44 Mt by 2030, reaching 373 Mt on the basis of higher profitability, especially in the first years of the outlook period as meat prices rebound post-COVID-19 (Figure 6.3). Overall, most meat production growth will occur in developing regions, which will account for 84% of the additional output. The market share of the Asia and Pacific regions will return to 41%, after dipping during the ASF crisis, mainly due to developments in China which is the world's largest meat producer. The production share of the world's top 5 meat producers – China, the United States, the European Union, Brazil, and Russia – will gradually trend downwards from its current level, illustrating an emerging broader base for global production. Globally, low real interest rates will facilitate livestock expansion, and the increasing size and consolidation of production units towards a more integrated production system, especially in emerging developing countries (Figure 6.4).

Poultry meat will continue to be the primary driver of meat production growth, albeit rising at a slower rate in the projection period relative to the past decade. Favourable meat-to-feed ratios compared to other ruminants, together with its short production cycle, enables producers to respond quickly to market signals while allowing for rapid improvements in genetics, animal health, and feeding practices. Production will expand rapidly from sustained productivity gains in China, Brazil, and the United States, and investments made in the European Union (due to lower production costs in Hungary, Poland and Romania). Rapid expansion is foreseen in Asia as the shift away from pigmeat in the short term will benefit poultry in the medium term.

Pigmeat output is projected to rise to 127 Mt by 2030, up 13% from an ASF-reduced base level in 2018-2020[1] and benefiting from more favourable meat-to-feed ratios compared to beef meat production. The ASF outbreak across Asia, starting in late 2018, will continue to affect many countries in the early years of the outlook period, with China, the Philippines and Viet Nam suffering the greatest impact. It is projected that ASF outbreaks will continue to keep global pigmeat output below previous peak levels until 2023, after which it is expected to steadily increase over the remainder of the outlook period. This *Outlook* assumes that pigmeat production in China and Viet Nam will start to increase in 2021 and attain 2017 levels by 2023. Most of the pigmeat production increase in ASF-affected regions will be the result of a shift away from backyard production facilities to commercial production facilities. Pigmeat production in the European Union is projected to decrease slightly as environmental and public concerns are expected to limit its expansion. Russia, the fourth largest pigmeat producer, has almost doubled output in the last decade in response to import bans and domestic policies to restructure and stimulate production. It is projected to expand production by a further 10% by 2030.

Figure 6.4. Production of meat and animal inventories by type



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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Beef production will grow to 75 Mt by 2030, just 5.8% higher than in the base period. Slow growth is attributable to weak beef demand as consumers shift preferences to poultry meat. Sub-Saharan Africa is projected to have the strongest growth rate at 15%, due to high population growth. In the major producing and exporting regions, growth will be more modest. In North America, the largest producing region, beef production is projected to grow 6% by 2030. Production in Europe is projected to fall 5% as inventories of dairy cows, responsible for approximately two-thirds of the beef supply, will decrease following productivity gains in the milk sector. Other factors limiting the growth potential of this sector in the European Union are a reduction in suckler cowherds due to their low profitability, escalating competition in export markets, and declining domestic demand. In Australia, beef supply will remain tight as above average pasture production encouraged farmers to increase their livestock inventories, a significant change from the drought conditions that have prevailed over the past few years. A gradual recovery in production is expected to follow, but herd rebuilding is expected to take several years. In India, beef production is projected to fall by 33% by 2030 due to reforms in animal transportation and collection regulations that affect the welfare of animals; these are assumed to remain in place for the duration of the outlook period. Overall, beef producers have less ability to increase slaughter in the short term but have more flexibility to increase carcass weights, meaning that in the early years of this *Outlook* beef production will be due to higher efficiency rather than more slaughtered animals, barring any severe droughts.

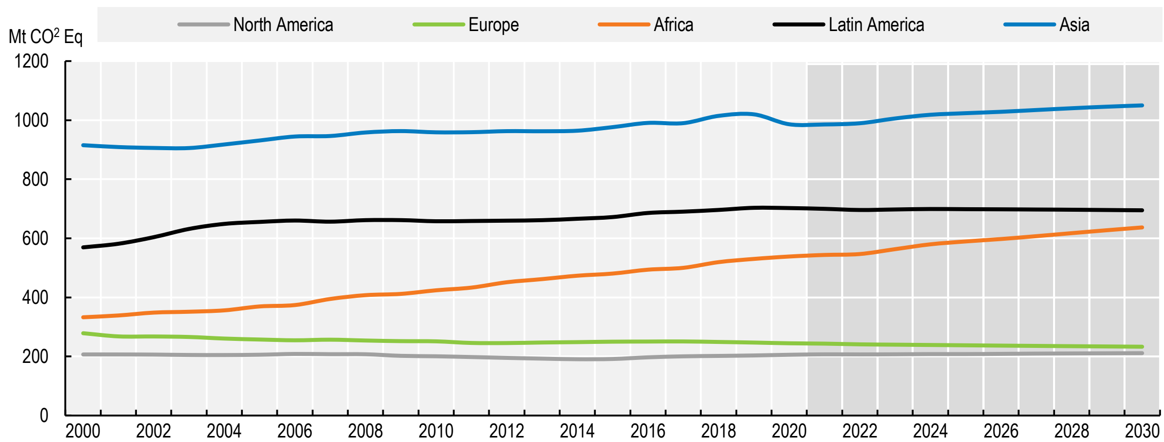
Growth in sheep meat production will mostly originate in Asia, led by China, Pakistan, and India but significant increases in production are projected to occur in Africa, particularly in the least developed countries of Sub-Saharan Africa. Despite limitations linked to urbanisation, desertification, and the availability of feed in some countries, sheep and goats are well adapted to the region and the extensive production systems it utilises. In Oceania, production growth is expected to increase moderately because of ongoing competition for pastureland from beef and dairy in New Zealand, which is the major exporter, as well as the extreme and prolonged drought in Australia where total sheep numbers fell from 72 to 63 million from 2017 to 2020. Sheep meat production in the European Union is expected to remain stable as it will be sustained by the voluntary coupled support in the main sheep-producing Member States.

The projections assume that situations due to COVID-19 and animal diseases (ASF and Highly Pathogenic Avian Influenza – HPAI) will normalise in the short term, and that no further critical shocks will hit feed grain markets. As a result, meat supply will rise in response to increasing demand over the medium term with further intensification of production and efficiency gains. If the situation evolves differently, these projections will need to be revised accordingly.

6.4.1. Greenhouse gas emissions will increase slowly

It is estimated that humans and the animals raised for food constitute 96% of all mammals on earth, and that poultry represents 70% of all live birds.[2] It is projected that stocks of farmed animals for meat will increase during the next decade, rising 11%, 9%, 2% and 18% for poultry, pigs, beef cattle and sheep respectively. These projections imply higher output-to-animal inventory ratios, which while slowing compared to the previous decade, represent continued increases in the productivity of animal stocks over the period, by 6%, 3%, 4% and a 2% respectively. These changes in herd inventories and productivity increases are reflected in the meat sector emissions, which are projected to rise by 5% by 2030. This growth is considerably less than the rise in meat production due primarily to shifts towards poultry production, national low carbon emission initiatives, and increased productivity which yields higher meat output from a given stock of animals. New technologies that reduce methane emissions which are not widely available at present, such as feed supplements and seaweed, could further reduce future per unit emissions. The strongest growth in meat-related greenhouse gas emissions will be in Africa (Figure 6.5). A renewed effort to reduce GHG emissions could include policies such as carbon taxes and specific regulations combined with incentives to adopt technologies and production systems that reduce the sector's GHG footprint.

Figure 6.5. Strongest growth in GHG emissions from meat in Africa



Note: Estimates are based on historical time series from the FAOSTAT Emissions Agriculture databases which are extended with the Outlook database. Emission types that are not related to any Outlook variable (organic soil cultivation and burning Savannahs) are kept constant at their latest available value.
Source: FAO (2021). FAOSTAT Emissions-Agriculture Database, http://www.fao.org/faostat/en/#data/GT; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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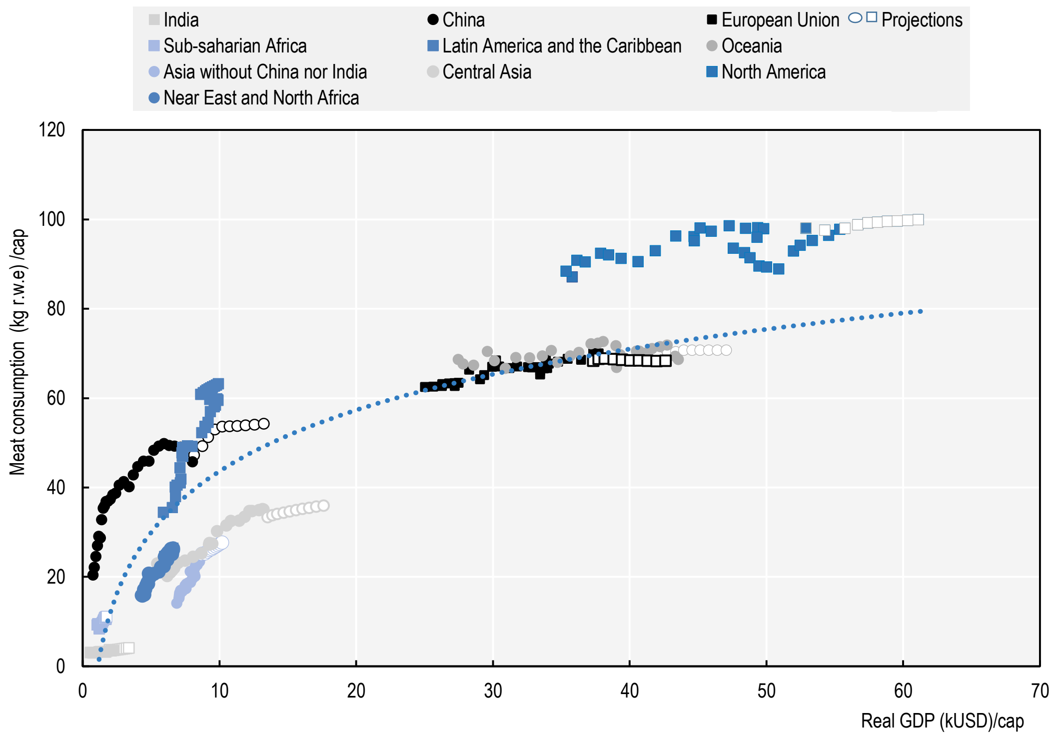
6.5. Consumption

Determinants of meat consumption are complex. Demographics, urbanisation, incomes, prices, tradition, religious beliefs, cultural norms, and environmental, ethical/animal welfare and health concerns are key factors that affect not only the level but also the type of meat consumption. The past several decades have witnessed considerable changes in the impact of each of these factors across a broad array of countries and regions. Population growth is clearly the main driver of increased consumption, and the projected global increase of 11% will underpin a projected increase of 14% in global meat consumption by 2030, compared to the base period of this *Outlook* (Figure 6.6). It is the main reason why meat consumption is projected to grow by 30% in Africa, 18% in the Asia and Pacific region, and 12% in the Latin American region; the projected increase in meat consumption is 0.4% in Europe and 9% in North America.

Economic growth is another important driver of meat consumption. Income growth enables the purchase of meat, which is typically a more expensive source of calories and proteins. It is also accompanied by other structural changes such as greater urbanisation, higher labour participation, and food service expenditures that encourage higher meat purchases. The response of per capita meat consumption to income increases is demonstrably higher at lower incomes, and less so at higher incomes where consumption is largely saturated and limited by other factors such as environmental, and ethical/animal welfare and health concerns.

Figure 6.6. Income impact on per capita meat consumption per region, 1990 to 2030



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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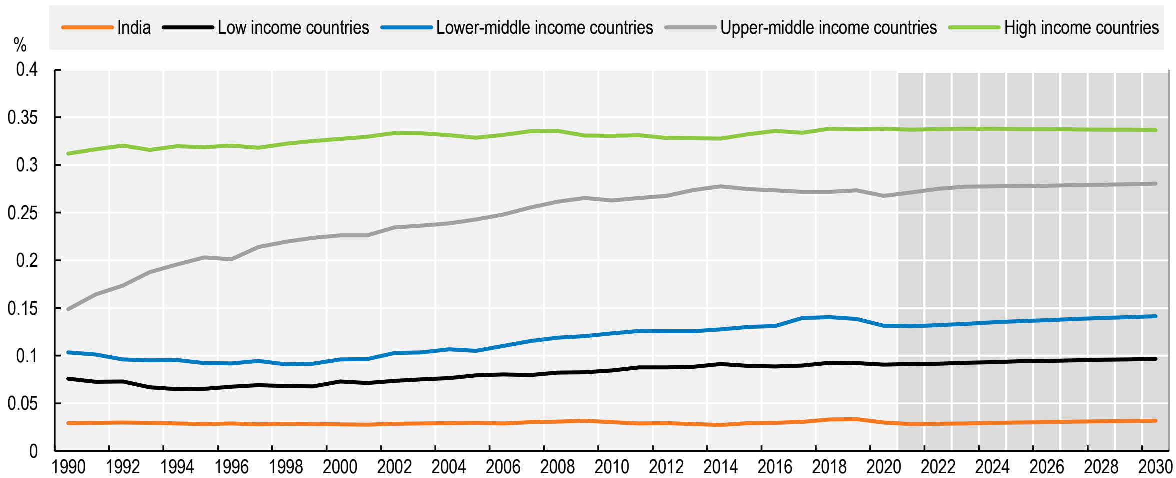
Empirical evidence on consumer behaviour suggests that increases in income stimulate a higher consumption of high value foods such as animal protein compared to other foods such as carbohydrates. In general, the evidence since 1990 suggests that such a shift has been marginal (Figure 6.7). The shares of meat proteins in total protein availability has increased somewhat for upper middle-income countries, but recently less so or not at all for lower middle-income and low-income countries when income increases have not been high enough to stimulate a dietary shift, or in high-income countries where diets remained unchanged. These trends are not anticipated to change much over the next decade. Indeed, it is possible that higher incomes in lower middle-income and low-income countries in particular may induce higher per capita food consumption, but not necessarily a higher share of meats in diets.

A clear trend is the rise of poultry meat consumption in virtually all countries and regions (Figure 6.7). Consumers are attracted to poultry due to lower prices, product consistency and adaptability, and higher protein/lower fat content. Consumption of poultry meat is projected to increase globally to 152 Mt over the projection period, accounting for 52% of the additional meat consumed. On a per capita basis, the expected robust growth rates in poultry consumption reflect the significant role it plays in the national diets of several populous developing countries, including China and India.

Figure 6.7. Marginal shift in composition of food consumption toward meat

Share of meat protein in total protein consumption



Note: The 38 individual countries and 11 regional aggregates in the baseline are classified into the four income groups according to their respective per-capita income in 2018. The applied thresholds are: low: < USD 1 550, lower-middle: < USD 3 895, upper-middle: < USD 13 000, high: > USD 13 000.The lower middle income category excludes India.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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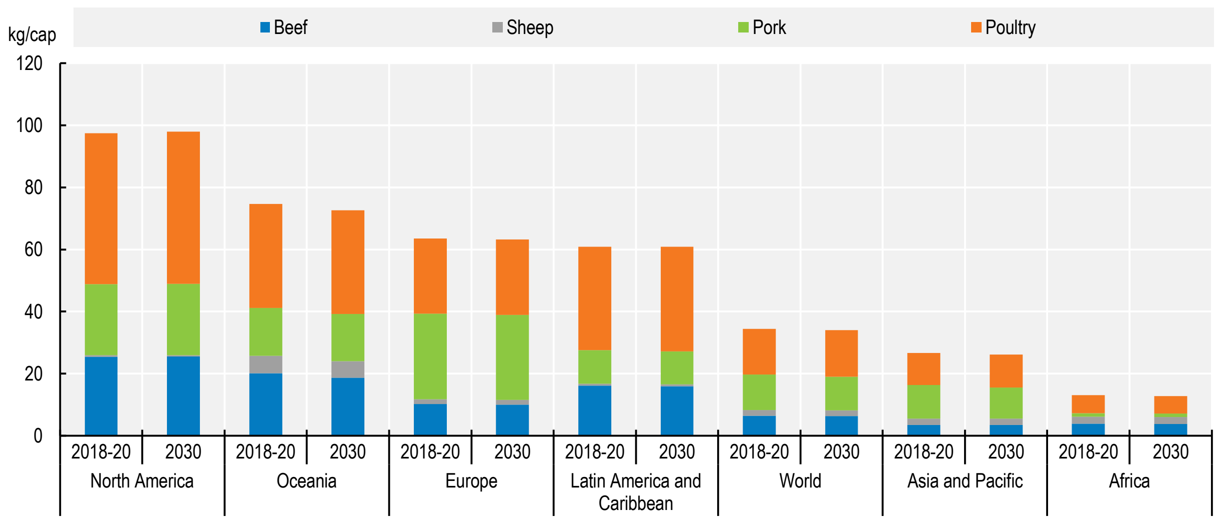
Global pigmeat consumption is projected to increase to 127 Mt over the next ten years and to account for 33% of the total increase in meat consumption. On a per capita basis, pigmeat consumption is expected to marginally increase over the outlook period while its consumption declines in most developed countries. In the European Union, for example, it is projected to decline as changes in the composition of the population influence diets that will favour poultry to pigmeat; the former is not only cheaper, but perceived as a healthier food choice. In developing countries, per capita consumption of pigmeat, which is half that in developed countries, is expected to marginally increase over the projection period. Growth rates are sustained in most of Latin America, where per capita pigmeat consumption has grown rapidly, backed by favourable relative prices that have positioned pork as one of the favoured meats, along with poultry to meet rising demand from the middle class. Several Asian countries, which traditionally consume pork, are projected to increase consumption on a per capita basis once the impact of ASF wanes.

Global per capita beef consumption, which has declined since 2007, is projected to fall by a further 5% by 2030. Asia and the Pacific is the only region where per capita beef consumption is projected to increase over the outlook period, albeit from a low base. In China, the world's second largest consumer of beef in absolute terms, per capita consumption is projected to rise a further 8% by 2030, after having risen 35% in the last decade. But most countries that have high beef per capita consumption will see their level of beef consumption decline in favour of poultry meat. For example, in the Americas, which is where preferences for beef are among the highest in the world, per capita consumption will fall in Argentina (-7%), Brazil (-6%), the United States (-1%), and Canada (-7%). It is also expected to fall significantly in Australia and New Zealand.

Global sheep meat consumption, a niche market in some countries and considered a premium component of diets in many others, is projected to increase to 18 Mt over the outlook period and to account for 6% of the additional meat consumed. Sheep meat consumption worldwide, on a per capita basis, is comparable in both developing and developed countries. In many Near Eastern and North African (NENA) countries, where sheep meat is traditionally consumed, per capita consumption is projected to continue its long-term decline as that for poultry increases. Demand growth in this region is linked to the oil market, which substantially influences the disposable income of the middle class and government spending patterns.

Figure 6.8. Meat consumption per capita: Continued rise of poultry and fall of beef



Note: Per capita consumption is expressed in retail weight.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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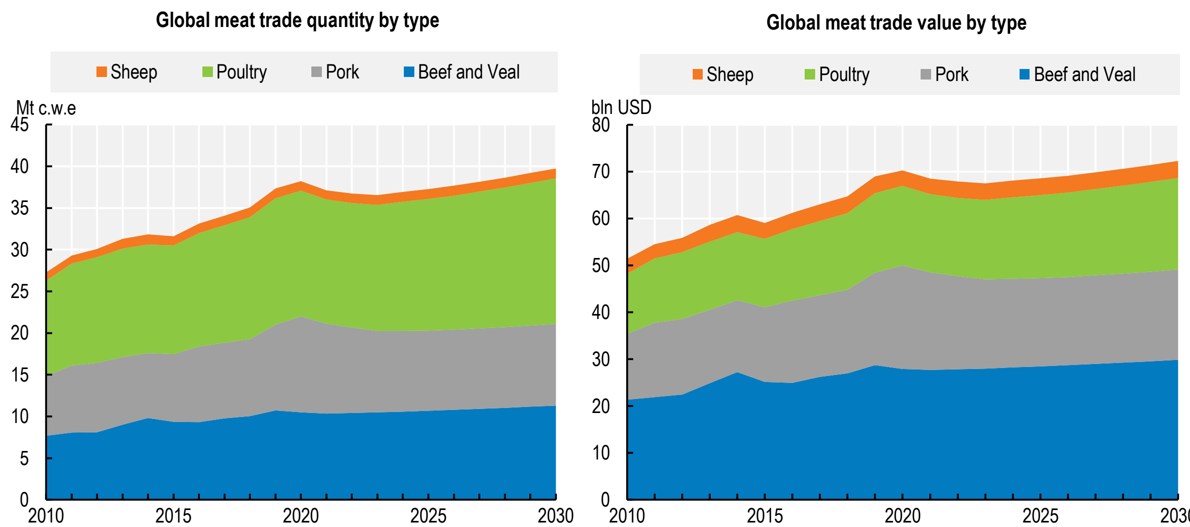
6.6. Trade

Global meat exports are projected to be 8% higher by 2030 than in the base period, reaching 40 Mt. This may appear to be a considerable slow-down in the growth of meat trade compared to the previous decade, but is largely the result of high pigmeat trade during the ASF crisis in Asia, particularly in China. By 2030, the proportion of meat output traded will be stable at around 11%.

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

Meat exports are concentrated, and the combined share of the three largest meat exporting countries – Brazil, the European Union, and the United States – is projected to remain stable and account for around 60% of global world meat exports over the outlook period. In Latin America, traditional exporting countries are expected to retain a high share of the global meat trade, benefiting from the depreciation of their currencies and surplus feed grain production. Brazil, which is the largest exporter of poultry meat, will become the largest beef exporter with a 22% market share. India's exports of beef will plummet by 53% to 0.6 Mt by 2030, given the government reforms concerning animal welfare that are assumed to remain in place over the outlook period; exports fell by 14% in 2020, and are expected to fall a further 26% in 2021 (Figure 6.9). Meat trade in value is dominated by beef and veal, but increasingly dominated by poultry in quantity

Figure 6.9. Meat trade in value is dominated by beef and veal, but increasingly dominated by poultry in quantity



Note: c.w.e. is carcass weight equivalent. Exports measured in constant 2014-16 USD.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/8u4ot6

Import demand is expected to increase the fastest in terms of volume in Africa, 1.4 Mt or 48% from the base period. The Asian region will account for 52% of global trade by 2030. The greatest increases in imports will occur in the Philippines and Viet Nam, the latter for poultry meat. While Chinese meat imports remain high in the early part of the projection period, a gradual decline is projected in the second half of the projection period as pigmeat production recovers from the ASF outbreak. The increased import demand for pigmeat in China is expected to yield high benefits for Brazil, Canada, the European Union, and the United States. In Russia, the long-term effects of the routinely extended 2014 import ban on meat, which this *Outlook* assumes will be prolonged until the end of 2021, has stimulated domestic production, and meat import levels are expected to continue to decline over the projection period.

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

6.7. Main issues and uncertainties

Several assumptions drive the results of the analysis of the medium to longer term outlook for meat markets. The first concerns the impact of diseases – human and animal – on meat markets. COVID-19 clearly affected meat markets in 2020 and will have implications for the medium term as the decrease in consumer demand is expected to put downward pressure on agricultural prices and production.[3] This *Outlook* assumes that the impacts of COVID-19 on economic growth and on restrictions in the movement of people and goods will be short-lived and that recovery will start in 2021. However, any prolongation of the pandemic and slower economic recovery may affect supply in terms of logistical issues in processing, transport, and trade. At the same time, the impact of the pandemic on meat demand as countries recover will be important in so far as the extent to which it has affected the restaurant/hotel and tourism sectors.

Animal diseases such as ASF, highly pathogenic avian influenza (HPAI), foot and mouth disease (FMD) always pose significant risks for meat markets. Outbreaks can occur quickly and shock markets, which may take years to recover. This *Outlook* assumes that recovery from ASF in East Asia will be completed by the end of the projection period, but there is risk that this is not the case or that ASF emerges elsewhere.[4] Investments to restructure and modernise production and processing facilities in the pigmeat sector, the successful development of a vaccine, as well as the implementation of recently developed compartmentalisation guidelines from the World Organisation for Animal Health (OIE),[5] may have implications for future production and trade. It should be noted that Russia's investments in its pigmeat sector enabled it to nearly double its output over the last decade.

This *Outlook* has long held that existing markets for beef and pigmeat are segmented, i.e. into "Pacific" and "Atlantic" markets. Recent evidence suggests this segmentation is less evident as markets have become increasingly integrated over time. For example, price correlations between the two markets have increased in the last decade. The segmentation of markets was originally caused by the division of countries between those free of FMD and those which were not; as such, trade was partitioned accordingly and countries affected by FMD could not trade with countries free of FMD. However, once the World Organisation for Animal Health (OIE) was able to facilitate the zoning of FMD-free areas within countries without resorting to vaccinations, the trade risk of an FMD outbreak was minimised. This allowed other zones of an FMD-affected country to increase trade in response to market signals (international prices) with countries free of FMD[6]. In time, countries such as Brazil, which was initially pivotal in the "Atlantic" market, were able to develop markets in the "Pacific" zone.

Assumptions regarding productivity improvements and climate change policies will affect Outlook analysis of the meat sectors contribution to climate change. As meat is a significant user of resources – of land, feed and water – lower demand along with productivity improvements imply lower demand for these resources. For example, lower demand and higher productivity for beef implies lower animal inventories and hence fewer feed inputs (meat production in 2018-20 uses around 37% of the calories produced by the crops covered in this *Outlook*). [7] Lower production would also imply lower GHG emissions from meat production compared to past decades. The role of the meat sector is critical in discussions on climate change, and future policies may have important consequences for production and trade.

Finally, this *Outlook* assumes that consumer preferences will evolve according to historical patterns. As a result, dietary preferences for lower meat consumption (e.g. vegetarian or vegan diets) or for alternative protein sources (e.g. cultured and plan-based protein substitute for meat) are assumed to expand slowly and to be adopted by a small part of population concentrated mainly in high income countries, and therefore hardly affect meat consumption over the next decade. Nevertheless, while the competition from substitutes will increase, consumer choice will continue to be influenced by the nutritional content in meat as compared to protein substitutes.

Consumers are also expressing concerns about meat production systems, including traceability and the use of antimicrobials in feeds. While the technical benefits of antimicrobial use in animal production are well documented, there is a growing preference for antimicrobial-free meat due to the global risks associated with antimicrobial resistance.[8] If antimicrobial-free meat production systems are adopted by an increasing share of producers, this may affect global meat markets, albeit in the longer term. The extent to which consumers are willing to pay a premium for such meat remains unclear.

Nevertheless, as consumer preferences for such diets increase more quickly than in past years, meat demand may contract, reducing in turn meat production and import demand.

Notes

[1] Unless otherwise specified, % changes refer to the change from the average base period 2018/20 and 2030.

[2] Dasgupta, P. (2021), *The Economics of Biodiversity: The Dasgupta Review*, Abridged Version, HM Treasury, London, p.1.

[3] OECD (2020), "The impact of COVID-19 on agricultural markets and GHG emissions", *OECD Policy Responses to Coronavirus (COVID-19)*, OECD Publishing, Paris, https://doi.org/10.1787/57e5eb53-en.

[4] Frezal, C., S. 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.

[5] OIE (2020), *Compartmentalization Guidelines: African Swine Fever*, Paris.

[6] Holst, Carsten and von Cramon-Taubadel (2012), "International Synchronisation of the Pork Cycle," *Acta Oeconomica et Informatica*, Faculty of Economics and Management, Slovak Agricultural University in Nitra (FEM SPU), Vol. 15(1), pp. 1-6, March.

[7] For more analysis see OECD/FAO (2020), *OECD-FAO Agricultural Outlook 2020-2029*, OECD Publishing, Paris/FAO, Paris, https://doi.org/10.1787/1112c23b-en.

[8] Ryan, M. (2019), "Evaluating the economic benefits and costs of antimicrobial use in food-producing animals", *OECD Food, Agriculture and Fisheries Papers*, No. 132, OECD Publishing, Paris, https://doi.org/10.1787/f859f644-en.

7 Dairy and dairy products

This chapter describes recent market developments and highlights the medium-term projections for world dairy markets for the period 2021-30. Price, production, consumption and trade developments for milk, fresh dairy products, butter, cheese, skim milk powder and whole milk powder are discussed. The chapter concludes with a discussion of important risks and uncertainties that might affect world dairy markets over the next ten marketing years.

7.1. Projection highlights

The dairy sector has proved notably resilient during the COVID-19 pandemic. The perishable nature of fresh liquid milk and fresh dairy products made them particularly vulnerable to supply chain disruptions; however, the dairy sector was not as significantly impacted as other sectors from a global perspective. The effects of the pandemic varied regionally, with negative effects ranging from shipping container shortages to disposing of surplus products. At the same time, other countries adjusted quickly and successfully to production and labour issues, and experienced minimal disruptions to their regular trade environment. Many countries adopted confinement measures that affected away-from-home consumption, which often includes a large share of dairy products; at-home consumption (retail sales) offset some of these losses. Overall, quick production and packaging adjustments resulted in no major shortages or surpluses globally.

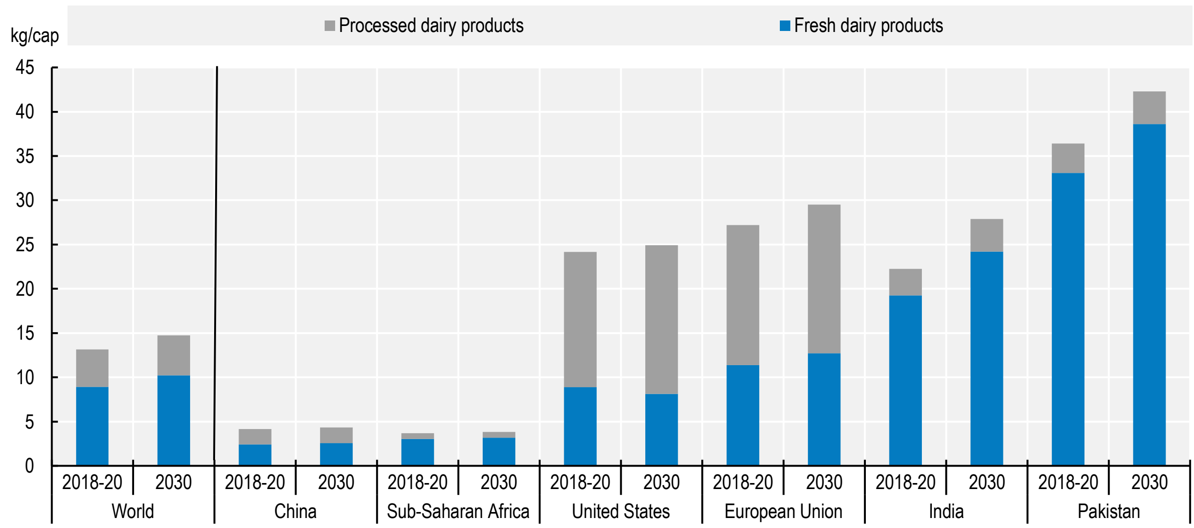
The pandemic had the largest effect on butter prices compared to other dairy prices due to the loss in demand for milk fat from the hospitality sector. The world price of butter is projected to remain at post-pandemic levels, but will be considerably higher than the SMP (skim milk powder) price, as it has been since 2015 due to stronger demand for milk fat compared to other milk solids, and the European Union's SMP intervention (from first purchases in 2015 to final disposal in 2019). Although the gap between the price of butter and SMP is assumed to remain a defining feature over the coming decade, it is expected to narrow over the projection period. Demand for SMP, particularly in developing countries, will outpace demand for milk fat on the international market, narrowing the price gap between the two commodities.

World milk production (roughly 81% cow milk, 15% buffalo milk, and 4% for goat, sheep and camel milk combined) is projected to grow at 1.7% p.a. over the projection period (to 1 020 Mt by 2030, faster than most other main agricultural commodities). The projected growth in the number of milk-producing animals (1.1% p.a.) is higher than the projected average yield growth (0.7%) as herds are expected to grow faster in countries with lower yields, and with herds comprised of lower yielding animals (i.e. goats and sheep). It is expected that India and Pakistan, important milk producers, will contribute more than half of the growth in world milk production over the next ten years, and will account for more than 30% of world production in 2030. Production in the second largest global milk producer, the European Union, is expected to grow more slowly than the world average due to policies on sustainable production and slower domestic demand growth.

Most dairy production is consumed in the form of fresh dairy products[1], which are unprocessed or only slightly processed (i.e. pasteurised or fermented). The share of fresh dairy products in world consumption is expected to increase over the coming decade due to strong demand growth in India, Pakistan and Africa, driven by increases in income and population. In developed countries, per capita consumption is projected to grow modestly from 23.6 kg in 2018-20 to 25.2 kg (milk solids) in 2030, compared to an increase from 10.7 kg to 12.6 kg in developing countries. The consumption preferences of developed countries tend towards processed products, while in developing countries fresh dairy products comprise over 75% of average per capita dairy consumption in milk solids (Figure 7.1). Regional disparities are significant in developing nations, where the fresh dairy product share of per capita consumption can range from 99% in Ethiopia to 5.8% in the Philippines.

Consumption of processed dairy products ranges substantially by region. The second most important dairy product consumed in terms of milk solids (after fresh dairy products) is cheese. Consumption of cheese primarily occurs in Europe and North America, and is growing in both regions. In Asia, butter is the most consumed processed dairy product, accounting for almost half of all processed dairy consumption in terms of milk solids. Butter also has the strongest projected growth in consumption, although starting from a low base relative to Europe and North America. In Africa, cheese and WMP (whole milk powder) account for the majority of processed dairy consumption in milk solids. Over the coming ten years, however, SMP is expected to have the highest growth, although again from a lower consumption base.

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



Note: Milk solids are calculated by adding the amount of fat and non-fat solids for each product; Processed dairy products include butter, cheese, skim milk powder and whole milk powder.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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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 slight increase in domestic milk production relative to the past decade. Japan, South East Asia, the Russian Federation (hereafter "Russia"), Mexico, the Near East, and North Africa will continue to be other important net importers of dairy products. Compared with rest of the world, per capita consumption of dairy products is low in Asia, especially in South-East Asia. However, economic and population growth, and a shift towards higher-value foods and livestock products are expected to continue to drive the projected increase in import demand for dairy products in many Asian countries. International trade agreements (e.g. CPTPP, CETA, and the preferential trade agreement between Japan and the European Union) have specific arrangements for dairy products (e.g. tariff rate quotas) which create opportunities for further trade growth.

Dairy trade flows could be substantially altered by changes in the trade policy environment. For example, large amounts of cheese and other dairy products are traded between the European Union and the United Kingdom. Trade between the two regions could be affected by the new relationship, with transportation delays and changing regulations already increasing trade frictions. The United States-Mexico-Canada Agreement (USMCA) is expected to influence dairy trade flows in North America, with the United States gaining increased access to Canadian and Mexican dairy markets. Though they currently account for a relatively small share of trade, some South American countries like Argentina and Chile could have the potential to become competitors in the global dairy market for WMP and SMP respectively. To date, the big milk consuming countries, India and Pakistan, are largely self-sufficient and have not integrated into the international market. Greater engagement in trade by these two countries could have a significant effect on world markets.

Sustainable production policies or manifested consumer concerns would alter the projections for the dairy sector. In some countries, dairy production accounts for a substantial share of overall greenhouse gas (GHG) emissions, resulting in discussions on how adjustments to dairy production could contribute to reducing such emissions. Many technical adjustments are being considered, with different implications for commodity balances. In regions with high stocking densities, nitrogen and phosphate run-off can create environmental problems if not managed properly. The planned or implemented regulations to address pollution could have a significant effect on dairy farming, notably in the Netherlands, Denmark, and Germany. On the other hand, these pressures could lead to innovative solutions improving long-term competitiveness.

Consumer interest in vegan diets and concerns about the environmental effects of dairy production are expected to continue to bolster the consumption of plant-based replacements for dairy in the liquid market. Plant-based offerings continue to diversify year after year, expanding beyond the traditional substitutes of soy, almond, and coconut- based beverages. New offerings are proving popular with consumers, and include oat, rice, and hemp-based drinks. A range of nut drinks (cashew, hazelnut, macadamia) has also become popular, although they have not proven to be more environmentally sustainable, specifically with respect to water usage. Strong growth is expected in East Asia, Europe and North America, albeit from low volumes. Offerings are likely to continue to expand as consumers in these regions look for lactose-free, vegan or sustainable alternatives to dairy products.

7.2. Recent market developments

The effect of the COVID-19 pandemic on the dairy sector was relatively modest, contrasting with initial concerns that the sector was particularly vulnerable. The pandemic had the largest effect on world butter prices compared to other dairy prices due to the loss of demand for milk fat from the hospitality sector. Butter prices fell the most sharply in 2020, compared to the WMP price which decreased by a smaller margin, and SMP and cheese prices which increased. World exports and imports had been steadily growing in previous years, but in 2020 growth remained flat. Transportation slowdowns, disruptions in the value chain, and decreased demand all contributed to the change in export and import growth. Overall, however, the sector adapted quickly and mitigated many of the initially drastic effects seen in the earlier months of the pandemic.

World milk production grew by 1.4% in 2020 to about 861 Mt. In India, the world’s largest milk producer, production increased by 2.1% to 195 Mt. India, however, has little impact on the world dairy market as they trade only marginal quantities of milk and dairy products. Indian production was relatively unaffected by the pandemic, with any excess milk being processed into milk powder.

The three major dairy exporters are New Zealand, the European Union, and the United States. In 2020, milk production increased in the European Union and the United States respectively, while it decreased slightly in New Zealand due to a drought near the end of the season. As domestic consumption of dairy products in these three countries is stable, the availability of fresh dairy products and processed products for export was not significantly affected. In China, the world’s largest importer of dairy products, milk production increased by 6.6%, and dairy imports remained strong in 2020.

7.3. Prices

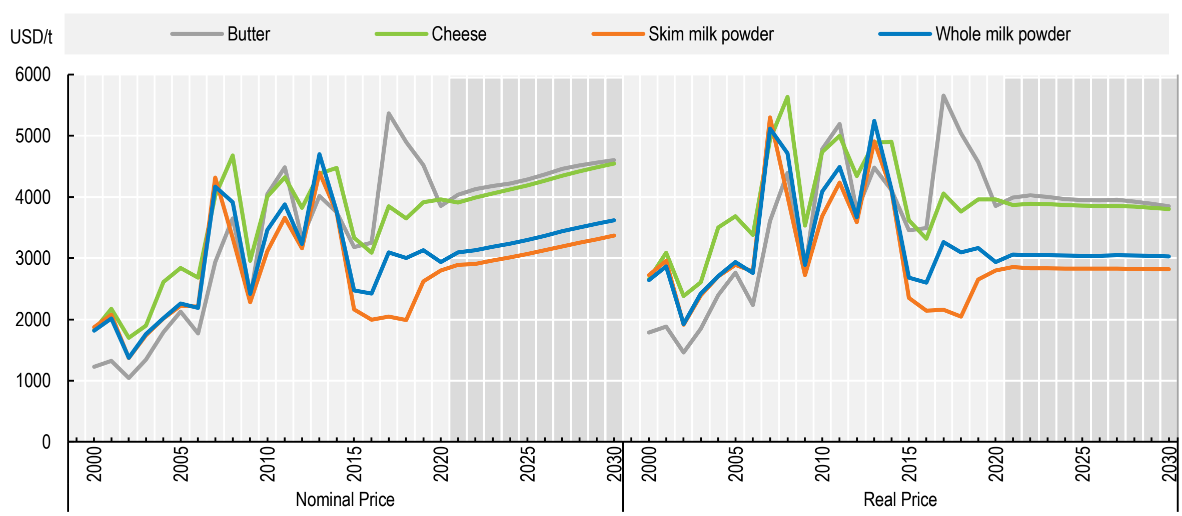
International dairy prices refer to the prices of processed products of the main exporters in Oceania and Europe. It does not include unprocessed milk as this is not generally traded. The two main reference prices for dairy are butter and SMP, where butter is the reference for milk fat and SMP for other milk solids. Milk fat and other milk solids together account for about 13% of the weight of milk, with the remainder being water.

The strong volatility of international dairy prices stems from its small trade share (approximately 7% of world milk production), the dominance of a few exporters and importers, and a restrictive trade policy environment. Most domestic markets are only loosely connected to those prices as fresh dairy products dominate consumption, and only a small share of milk is processed as compared to that which is fermented or pasteurised.

Since 2015, the price of butter has increased considerably more than SMP. Increased demand for milk fat, coupled with the European Union's SMP intervention (from first purchases in 2015 to final disposal in 2019), resulted in a price gap emerging between the two products. While the butter price will continue to be supported by stronger demand for milk fat compared to other milk solids on the international market, world demand for SMP will outpace demand for milk fat, narrowing the price gap between the two commodities over the projection period (Figure 7.2).

Following the complete disposal of intervention stocks in the European Union, SMP prices recovered in 2019 and were not significantly affected by the pandemic in 2020. SMP prices will remain stable in real terms throughout the projection period. Annual butter prices peaked historically in 2017 due to changing dietary preferences which resulted in increased demand, but have been declining since. Butter prices are expected to continue to decline moderately in real terms after recovering slightly from a sharp decline in 2020. World prices for WMP and cheese are expected to be affected by butter and SMP price developments, in line with the respective content of fat and non-fat solids.

Figure 7.2. Dairy product prices, 2000-2030



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 (2020=1).
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/gq74ba

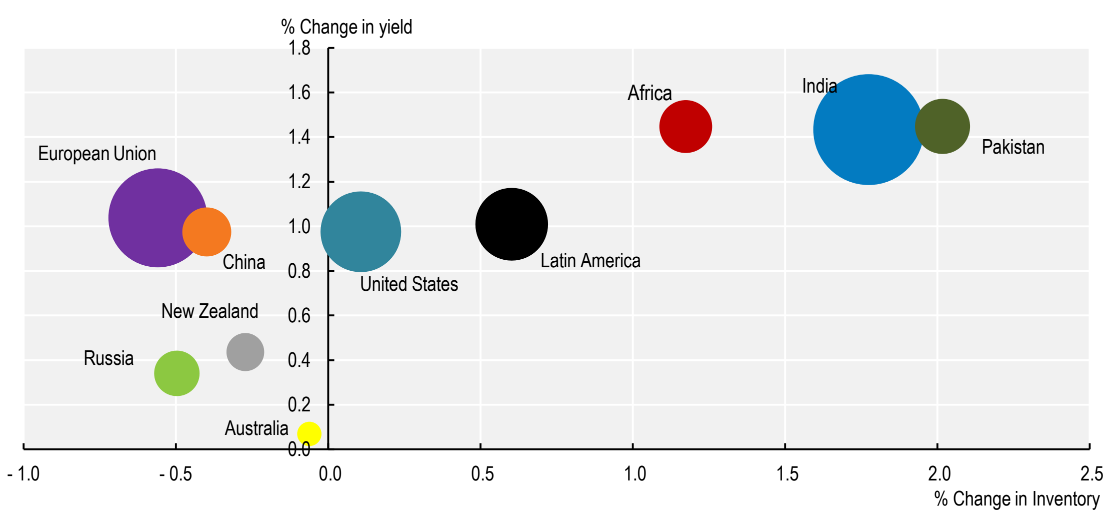
7.4. Production

World milk production is projected to grow at 1.7% p.a. (to 1020 Mt by 2030) over the next decade, faster than most other main agricultural commodities. While the world average growth of herds (1.1% p.a.) is greater than the world average yield growth (0.7% p.a.), the changing averages are the result of herds growing faster in countries that have relatively low yields and that have herds composed of lower yielding animals. In almost all regions of the world, yield growth is expected to contribute more to production increases than herd growth (Figure 7.3). The drivers of yield growth include the optimisation of milk production systems, improved animal health, improved efficiencies in feeding, and better genetics.

India and Pakistan are expected to contribute to more than half of the growth in world milk production over the next ten years. They are also expected to account for more than 30% of world production in 2030. Production will occur mostly in small herds of a few cows or buffaloes. It is expected that yields will continue to grow fast and will contribute more to production growth. Nevertheless, the growing herd sizes and limited growth in pasture area require an intensification of pasture use. In both countries, the vast majority of production will be consumed domestically as few fresh products and processed dairy products are traded internationally.

Production in the European Union is projected to grow more slowly than the world average. Dairy herds are projected to decline (-0.5% p.a.), but milk yields are projected to grow at 1.0% p.a. over the next decade. The European Union production originates from a mix of grass- and feed-based production systems. In addition, a growing share of milk produced is expected to be organic or in other non-conventional production systems. At present, more than 10% of dairy cows are within, but not limited to, organic systems located in Austria, Sweden, Latvia, Greece, and Denmark. Countries like Germany and France have also seen an increase in organic dairy production. These organic farms have about a quarter lower yields than conventional production and high production costs, but they constitute more than 3% of European Union milk production, suggesting a considerable price premium on European milk. In general, domestic demand (cheese, butter, cream, and other products) is expected to grow only slightly, with most additional production destined for export.

Figure 7.3. Annual changes in inventories of dairy herd and yields between 2020 and 2030

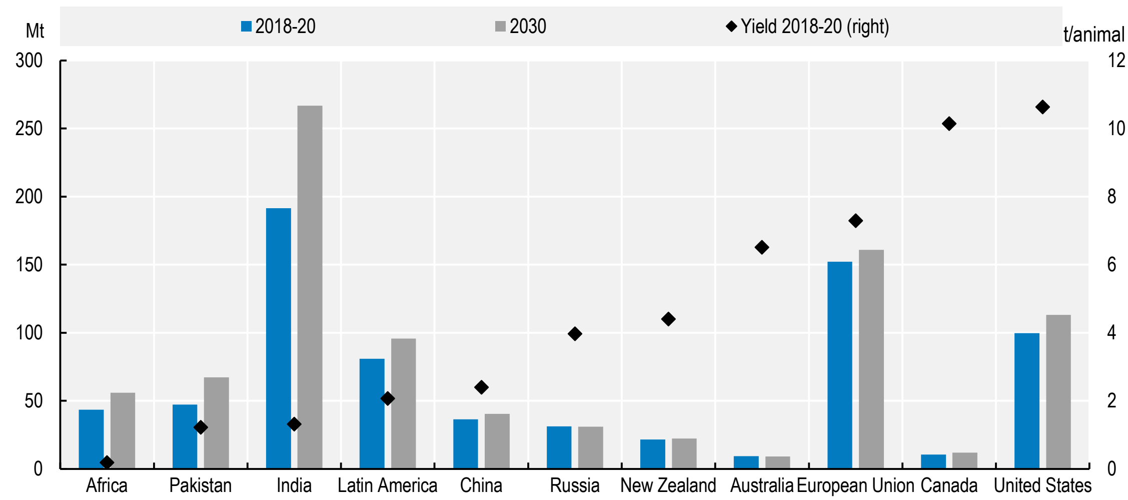


Note: The size of the bubbles refer to the total milk production in the base period 2018-20.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/ug218d

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 cowherds in the United States and Canada are expected to remain largely unchanged and production growth is expected to originate from further yield increases. As domestic demand is projected to remain stronger for milk fats, the United States will mostly export SMP, while Canadian exports of SMP are capped under the USMCA. The United States will also export a sizable amount of cheese, whey, and lactose.

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 (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/7zem9c

New Zealand is the most export-orientated producer, but growth in milk production has been very modest in recent years. Milk production is mainly grass-based and yields are considerably lower than in North America and Europe. The efficiency of grass management, however, allows New Zealand to be competitive. The main constraining factors for growth are land availability and increasing environmental restrictions. A change to a more feed-based production is not expected.

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

It is projected that less than 40% of milk will be further processed into products such as butter, cheese, SMP, WMP, or whey powder. There is considerable direct food demand for butter and cheese, especially the latter, and they presently account for a large share of consumption of milk solids in Europe and North America. SMP and WMP are highly traded and largely produced for trade only. Both are used in the food processing sector, notably in confectionary, infant formula, and bakery products.

Butter production is projected to grow at a similar rate relative to overall milk production, at 1.9% p.a., reflecting strong demand for butter in developed countries and China. All other dairy products are projected to grow at slower rates, with SMP and cheese at 1.2% p.a., WMP at 1.4% p.a. The slower growth rate of WMP reflects the decreased growth in demand in China, Thailand, and the Philippines. The slower growth rate for cheese is due to the importance of slow-growing food markets in Europe and North America.

7.5. Consumption

Most dairy production is consumed in the form of fresh dairy products, including pasteurised and fermented products. The share of fresh dairy products in world global consumption is expected to increase over the coming decade due to stronger demand growth in India and Pakistan, which in turn is driven by income and population growth. World per capita consumption of fresh dairy products is projected to increase by 1.2% p.a. over the coming decade, slightly faster than over the past ten years, and driven by higher per-capita income growth.

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

In Europe and North America, overall per capita demand for fresh dairy products is stable to declining, but the composition of demand has been shifting over the last several years towards dairy fat, e.g. full-fat drinking milk and cream. Consumers may be influenced by recent studies that have shed a more positive light on the health benefits of dairy fat consumption, contrary to the messaging of the 1990s and 2000s. In addition, this shift may reflect increasing consumer preference for foods that are less processed or healthier, and potentially increased interest in at-home baking.

The largest percentage of total cheese consumption occurs in Europe and North America, where per capita consumption is expected to continue to increase. Consumption of cheese will also increase where it was not traditionally part of the national diet. In South East Asian countries, urbanisation and income increases have resulted in more away-from-home eating, including fast food such as burgers and pizzas. It is worth noting that the pandemic has not only increased usage of e-groceries and take-away foods in these regions, but also consumer focus on foods they consider to be healthier or more wholesome. The aforementioned changes in consumer consumption behaviour have benefitted the dairy sector.

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

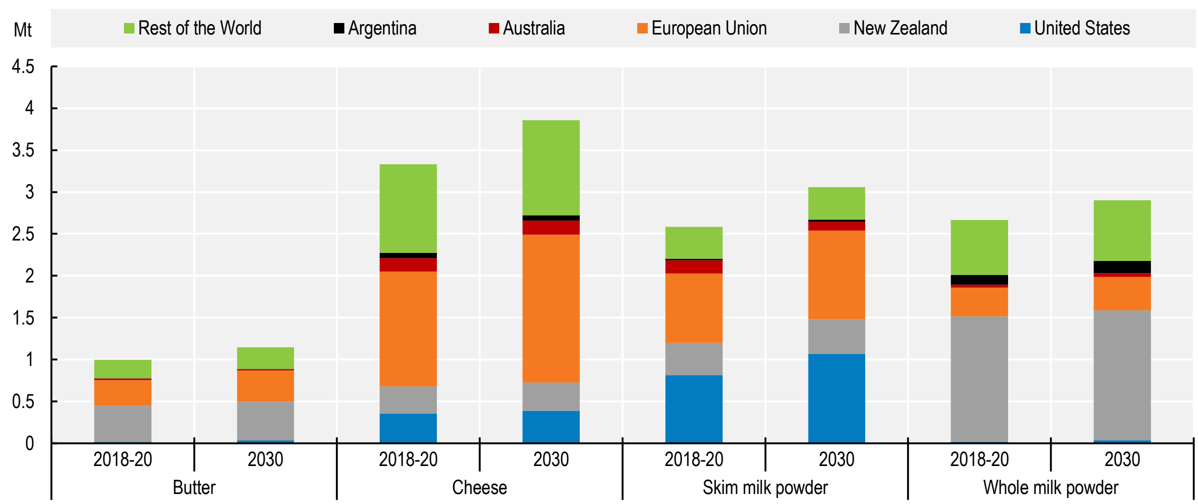
The dominant use of SMP and WMP will continue to be in the manufacturing sector, notably in confectionary, infant formula, and bakery products. A small share of dairy products, especially SMP and whey powder, are used in animal feed. China imports both products for feeding, but the African Swine Fever (ASF) outbreak reduced its demand. With the expected recovery (see Chapter 6 on meat), the feed demand for SMP and whey powder is expected to grow over the coming decade.

7.6. Trade

Approximately 7% of world milk production is traded internationally. This is primarily due to the perishability of milk and its high water content (more than 85%). The notable exceptions are the small amounts of fermented milk products traded between neighbouring dairy producing nations (i.e. Canada and the United States, the European Union and Switzerland) and imports of liquid milk by China. Chinese imports of liquid milk are primarily supplied by the European Union and New Zealand, and have increased considerably in recent years. Trade of liquid milk is made possible primarily by the ability of Ultra-High Temperature milk and cream products to be shipped long distances, but also favourable Chinese freight rates in some cases. China's net imports of fresh dairy products over the base period were about 0.9 Mt, and this is projected to increase over the projection period by 1.5% p.a. The trade share of WMP and SMP is high at over 50% of world production, since these products are often produced only as a means to store and trade milk over a longer period or distance.

The three major exporters of dairy products in the base period are the European Union, New Zealand, and the United States. These three countries are projected to jointly account for around 62% of cheese, 70% of WMP, 76% of butter, and 83% of SMP exports in 2030 (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 2030. In recent years, Belarus has become an important exporter, orienting its exports primarily to the Russian market due to the Russian embargo on several major dairy exporters.

Figure 7.5. Exports of dairy products by region



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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The European Union will continue to be the main world cheese exporter, followed by the United States and New Zealand. It is projected that the European Union's share in world cheese exports will be around 46% by 2030, sustained by increased cheese exports to Canada via the CETA agreement and to Japan following the ratification of the bilateral trade agreement in 2019. The United Kingdom, Russia, Japan, the European Union, and Saudi Arabia are projected to be the top five cheese importers in 2030. These countries are often also exporters of cheese and international trade is expected to increase the choice of cheeses for consumers.

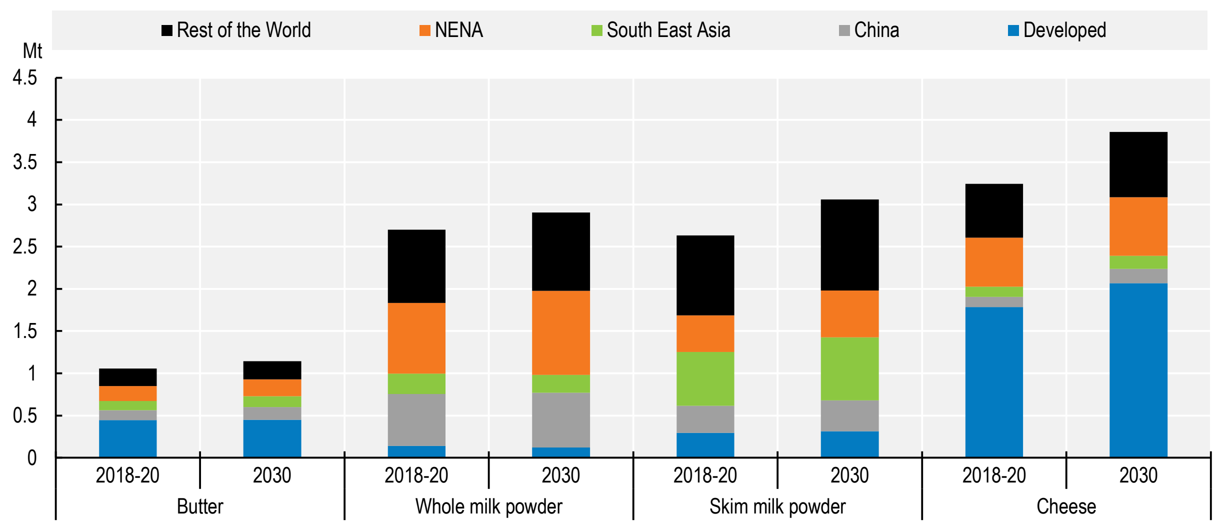
New Zealand remains the primary source for butter and WMP on the international market, and its market shares are projected to be around 40% and 53%, respectively, by 2030. China is the principle importer of WMP from New Zealand, but trade between the two countries is projected to be considerably less dynamic over the projection period. The expected growth in domestic milk production in China will limit the growth in WMP imports. It is expected that New Zealand will diversify and slightly increase its production of cheese over the outlook period.

Imports are spread more widely across countries, with the dominant destinations for all dairy products being the Near East and North Africa (NENA), developed countries, South East Asia, and China (Figure 7.6). China is expected to continue to be the world's major dairy importer, particularly for WMP. Per capita consumption of dairy products in China is relatively low, but there has been significant increases in demand over the past decade, with growth in demand projected to continue. Most of its dairy imports come from Oceania, although in recent years the European Union has increased its exports of butter and SMP to China. Imports by the Near East and North Africa are expected to originate primarily from the

European Union, while United States and Oceania are expected to be the main suppliers of milk powders to South East Asia. Developed countries import a high level of cheese and butter, around 55% and 42% respectively of world imports in 2018-20. These percentages are expected to decline slightly by 2030.

While the effects of the pandemic will subside, it will have a lasting effect on GDP in many non-OECD nations, with per capita income growth being lower than pre-pandemic projected growth. It is likely that the income shock will disproportionately affect poorer households and lower their consumption, especially in Central Asia, Indonesia, and the least developed African countries. Since dairy product demand, specifically processed dairy products like butter and cheese, is closely tied to rising incomes, it is projected there will be less import demand for butter from these nations.

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. South East Asia contains Indonesia, Malaysia, Philippines, Thailand and Viet Nam.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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7.7. Main issues and uncertainties

The COVID-19 pandemic has affected daily life worldwide. While the dairy sector was relatively stable in the wake of the pandemic, there may be structural changes that will have long-term effects. Vaccination rates, which are tied to the reduction of restrictions and economic recovery, vary substantially across regions. This will have an effect on dairy products like cheese, which are often consumed away from home (e.g. in burgers and pizzas). At the same time, there may be a shift to more at-home cooking and baking, and an increased focus on foods that consumers view as wholesome or healthy. The pandemic has also lowered the projected overall GDP level in many countries. This has implications for the dairy sector, as increased dairy consumption is tied to per capita income growth in many regions. The effects of a staggered global recovery are also unclear, as there may be longer lasting implications for supply chains that span diverse regions.

Changes to or the creation of trade agreements would affect dairy demand and trade flows. USMCA is expected to influence dairy trade flows in North America, with members gaining increased access to domestic dairy markets. The new trade relationship between the United Kingdom and the European Union is also in its infant stages. Historically, large amounts of cheese and other dairy products have been traded between the two regions, but there have been increased trade frictions as importers and exporters navigate the new and changing trade environment. Russia embargo on several dairy products from major exporting countries was partially lifted in 2020 to shore up domestic dairy supplies during the pandemic. The embargo was temporarily lifted specifically for whey powder used in infant formula and specialized dairy products.

Dairy trade flows could be substantially altered by changes in the trade environment. To date, India and Pakistan, the big dairy consuming countries, have not integrated the international dairy market as domestic production is projected to expand fast to respond to growing internal demand. Future investment in cold chain infrastructure in these regions will increase their self-sufficiency in this sector. Countries such as Poland, Ukraine and notably Belarus could also emerge as players on the global market, as they have favourable agricultural inputs (flat land, ideal climate, competitive labour and feed costs) and are close to traditional dairy markets.

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, under certain circumstances, intervention buying of SMP and butter at fixed prices remains possible and this has had a considerable market impact in recent years.

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, e.g. North America, Europe and East Asia. Available replacements have continued to expand past the more traditional options, branching into various nuts, legumes and other crops. Causes include lactose intolerance, health concerns, and consumer concerns regarding the environmental impact of dairy production. The growth rates of plant-based replacements for dairy products are strong, albeit from a low base, although conflicting views exist regarding their environmental impact and relative health benefits. Popular substitutes such as almond and soya beverage have been questioned on the environmental sustainability front as more consumers consider other environmental issues in addition to GHG emissions, such as water usage and deforestation. Flexitarian, vegetarian, and vegan diets are on the rise, but given the range of preferences of these consumers, the effect on dairy consumption is not clear. Similarly, lactose intolerance is a concern for some consumers, but a range of lactose-free dairy products are becoming widely available for those who do not prefer plant-based replacements. Overall, there is uncertainty on the long-term impact of plant-based replacements on dairy demand.

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, Ireland) and any changes in related policies could affect dairy production. The increasing trend towards sustainable practices such as water access and manure management are additional areas where policy changes could have an impact. Nevertheless, stricter environmental legislation could lead to innovative solutions that improve the long-term competitiveness of the sector.

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

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

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 2021-30. Price, production, consumption and trade developments for fish from catch and aquaculture are discussed. The chapter concludes with a discussion of important risks and uncertainties that might affect world fish markets over the next ten marketing years.

8.1. Market situation

Fish[1] production, trade, and consumption all contracted in 2020. However, trends differed across species and products. The slight decline in production was driven by lower aquaculture output while capture fisheries remained largely unchanged. Disruption in some key producing countries was especially important for trade in 2020. In particular, the contraction was strong over the first half of 2020 when the strict lockdown in the People's Republic of China (hereafter "China"), the top fish producer and exporter, negatively affected its fish production. COVID-19 also disrupted Chinese processing of imported fish for re-export, which impacted global fish trade and markets.

According to the FAO Fish Price Index[2], international fish prices were 7% lower on average in 2020 compared to 2019. The impact of COVID-19 in 2020 on the hotel, restaurant and catering (HORECA) sector was significant as fish are often consumed outside the home. Lower demand from out-of-home food services contributed to lower prices, particularly for high-value species. Overall, per capita fish intake declined by about 0.5 kg in 2020 to 20.2 kg.

8.2. Projection highlights

Nominal fish prices will increase at a rate between 0.8% and 1.6% p.a. over the 2021-2030 period, with a stronger increase in 2022 when the negative effects of COVID-19 on markets are expected to end. In real terms, all fish prices are projected to decline over the 2021-2030 period; aquaculture by 0.3% p.a., capture by 1.1% p.a., traded fish by 0.9% p.a., fishmeal by 0.6% p.a., and fish oil by 0.4%.

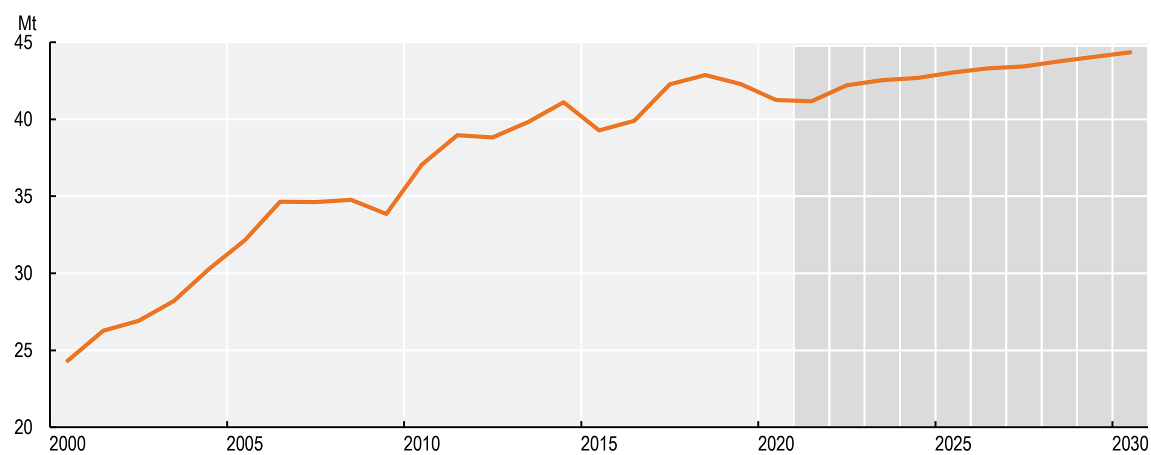
World fish production is projected to grow at 1.2% p.a. during the outlook period, a relative slowdown compared to the 2.1% p.a. growth of the previous decade. Production is expected to reach 201 Mt, an overall increase of 23 Mt (+12.8%) from the base period (2018-2020 average) to 2030. Most of the growth will be in developing countries and in particular in Asia. Aquaculture production is expected to continue increasing over the outlook period (+23% by 2030 at + 2.0% p.a.), but at a slower rate than observed over the previous decade (+4.0% p.a.). Lower growth rates are the consequence of a higher initial value and the impact of policy changes in China affecting production. These changes are focused on environmental protection and diversification of production, including efforts to target species preferred by Chinese consumers. By 2030, global aquaculture production is projected to reach 103 Mt, 6 Mt more than the capture sector.

Despite the increasing prominence of aquaculture in total fish supply (52% in 2030 vs 47% in the base period), the capture fisheries sector is expected to remain dominant for a number of species, and vital for domestic and international food security. Capture fisheries production should experience modest growth (+3.6% by 2030), with some fluctuations in *El Niño* years (2022 and 2027), which will also negatively affect production of fishmeal and fish oil. In 2030, world production of fishmeal is projected to reach 5.8 Mt, increasing 0.9% p.a. relative to the average 2018-2020 level, while fish oil production should grow by 0.8% p.a. and reach 1.2 Mt during the same period. A higher proportion of fishmeal and fish oil obtained from fish waste is expected to drive most of the growth in production. By 2030, approximately 29% of fishmeal and 42% of fish oil will be obtained from fish waste compared with 27% and 38% respectively in the base period.

The majority of fish production is projected to be consumed as food (181 Mt in 2030), with only 10% going to non-food uses (mainly fishmeal and fish oil). About 72% of the food fish will be consumed in Asian countries. In 2030, aquaculture is expected to provide 57% of the fish destined to human consumption, compared with 53% in the base period. Global food fish consumption is projected to increase by 1.3% p.a., a substantial decline relative to the 2.3% p.a. growth rate witnessed over the previous decade. This decline reflects the slowdown in demand caused by lower incomes at the beginning of the decade, reduced population growth, and lower world meat prices, in particular poultry. World apparent[3] food fish consumption is projected to reach 21.2 kg per capita in 2030, up from 20.5 kg per capita in the base period. Per capita fish consumption will increase in Asia, Europe, and the Americas, while it will remain stable in Oceania and decrease in Africa, the continent with the fastest growing population which will outpace growth in its food fish supply.

Food fish and non-food fish products will continue to be highly traded, with about 35% of total fish production (31% excluding intra-EU trade) expected to be exported in 2030, a slight decline relative to the 37% of the base period (32% excluding intra-EU trade). After contracting in 2019 (-1.4%) and 2020 (-2.5%), world trade of food fish is projected to increase once again, at a rate of 0.7% p.a. over the coming decade (Figure 8.1). This rate is lower than was observed in the past decade (+1.0% p.a.), reflecting the slowdown in production growth, the diversification of aquaculture production in China (mentioned above), and of an expected small decline in 2021 due to the effects of COVID-19. Asian countries will continue to be the main exporters of food fish, but their share of all exports will decline to 47% in 2030, from 48% in the base period. Asia and Europe will remain the main importers, accounting for 38% and 27% of all imports by 2030.

Figure 8.1. Exports of food fish



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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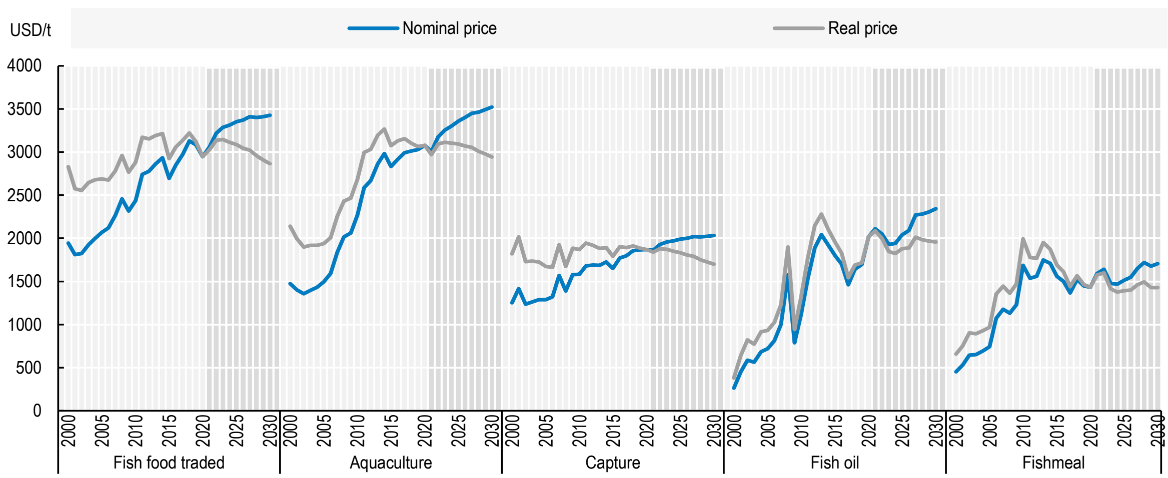
Many factors influence the evolution and dynamics of world fish markets and, as a consequence, a range of uncertainties exist when projecting into the future. The major uncertainty during this forecasting exercise is the COVID-19 pandemic, in particular for the first years of the decade. The pandemic has impacted both supply, with restrictions keeping many vessels in port and complicating access to production inputs (e.g. seeds and feeds) for aquaculture, and demand with higher unemployment and many restaurants and hotels closed or empty for long periods. The duration of the outbreak remains uncertain, contributing to risk aversion that may suppress investment in the sector. The availability of investment capital for future production may be limited due to reduced demand and lower prices, which could lead to long-term transformations of the sector. On a positive note, the pandemic has created opportunities for new distribution channels, product innovation, and shorter value chains which are likely to benefit the industry going forward.

8.3. Prices

Fish prices are expected to remain high relative to historic levels and continue to grow in nominal terms. However, in real terms the prices of all categories are expected to fall in the projection period (Figure 8.2). Looking in more detail, real prices are expected to fall initially, reflecting reduced demand due to the COVID-19 pandemic at the start of the period, followed by a brief recovery before falling again from 2023/24 onward. The decline in the second half of the projection period is largely driven by policy changes in China, the largest capture fisheries and aquaculture producer, which are expected to result in reduced production growth up to 2023 and faster growth over the remainder of the projection period. Further, competition from other protein sources, most notably pig meat, is expected to increase through the projection period as production in Asia recovers from the devastating ASF outbreak.

Figure 8.2. World Fish Prices



Note: Fish food traded: world unit value of trade (sum of exports and imports) of fish for human consumption. Aquaculture: FAO world unit value of aquaculture fisheries production (live weight basis). Capture: FAO estimated value of world ex-vessel value of capture fisheries production excluding for reduction. Fishmeal: 64-65% protein, Hamburg, Germany. Fish oil: N.W. Europe. Real prices are nominal world prices deflated by the US GDP deflator (2020=1)
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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Prices of wild caught fish follow a similar trajectory. In nominal terms they are expected to increase by 8.2% (+0.8% p.a.) over the projection period, while in real terms this represents a decline of 10.7% (-1.1% p.a.). The expected trend in real prices of wild caught fish shows a return to the pre-COVID-19 period in 2022-2023, followed by a similar decline than the price of traded products from 2023 onwards. Again, this decline reflects increasing competition from other protein sources and the continued growth in aquaculture production, particularly in the second half of the projection period. In the same period, aquaculture prices are projected to increase by 15.0% (+1.6% p.a.) in nominal terms, while in real terms this translates into a modest decline of 5.1% (-0.3% p.a.). This decline is driven by continued production increases and stable feed prices leading to increased supply. Despite the expected decline, aquaculture prices will remain higher in real terms than seen in the latter half of the 1990s and the 2000s, but below the peaks experienced in the 2010s. One factor contributing to the smaller decline in the aquaculture prices in real terms is the change in the species composition, with the share of lower value species, like carp, expected to further decline. The prices of food fish traded are expected to decline by 8.8% (-0.9% p.a.) over the projection period (in real terms) and reach levels similar to those seen in 2010.

Fishmeal will experience a decline in real prices of 8.7% (-0.6% p.a.). The price of oilseed meals, a direct competitor in the feed market, will decline more than fishmeal resulting in a small increase in the relative price of fishmeal when compared to 2021 but will remain significantly lower than in the previous decade except during the assumed *El Niño* years. The price of fish oil is projected to decrease by 6.2% (-0.4% p.a.) in real terms – it grew by 45.1% over the previous decade – reflecting a slowdown in the growth of aquaculture production, more efficient use of fish oil based feeds in the production cycle and a stabilisation of the Omega-3 demand (of which fish oil has a high content) as a dietary supplement from the food sector. In the case of aquaculture, the relatively high price of fish oil based feeds has resulted in their use being restricted to specific stages of production cycle where high nutrient feeds are required (e.g. hatching and finishing). The price of fish oil relative to vegetable oil is expected to remain close to the new plateau recorded since 2012. Overall, the real price of fish oil and fishmeal will remain high compared to pre-2005 levels.

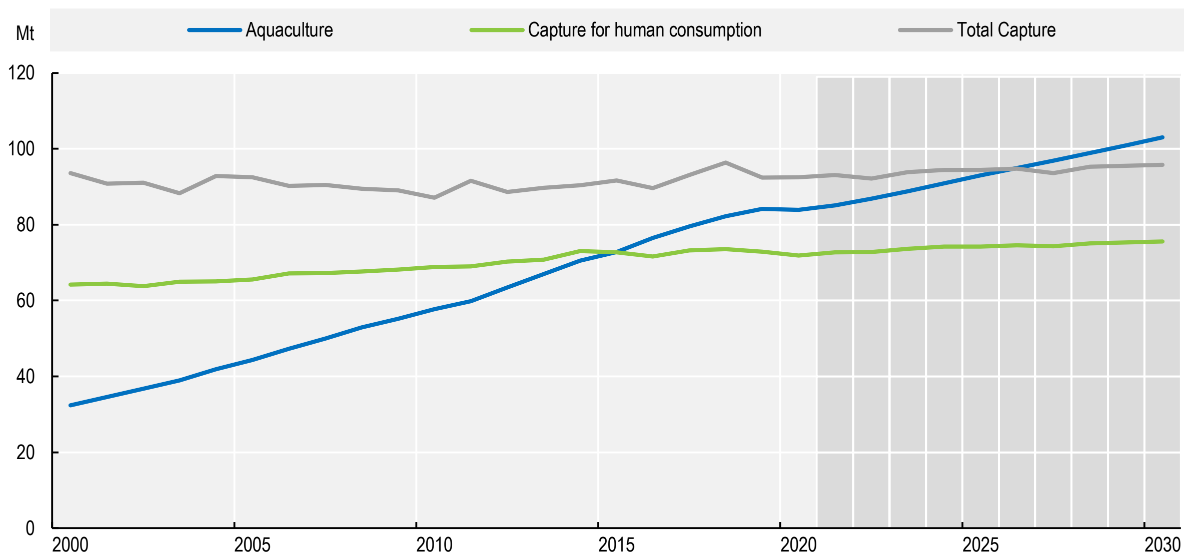
8.4. Production

Global fish production (capture and aquaculture) is expected to grow from 178 Mt (2018-20 average) to 201 Mt by 2030, an increase of 12.8% (+1.2% p.a.). While this represents an increase of 23 Mt in the projection period, this is a relative slower increase in global fish production representing approximately 69% of the previous decade growth (+33 Mt). The increase in fish production is driven, primarily by the continued progression in aquaculture production, which is expected to reach 103 Mt by 2030. However, aquaculture production growth over the projection period, 19 Mt (+23.0%) at 2.0% p.a., is slower than in the previous decade when production grew by 29 Mt (+52.7%) at 4.0% p.a. Aquaculture production is expected to overtake capture production in 2027 and account for 52% of all fish production by 2030 (Figure 8.3).

The slower aquaculture production growth compared to the previous decade is due to many factors. Firstly, in the previous decade the price of aquaculture species relative to the feed cost was more favourable as it trended strongly upward between 2012 and 2019 (except in 2018). With the on-going COVID-19 pandemic and an assumed *El Niño* year in 2022, the aquaculture to feed price ratio will remain below 2019 levels until 2023 and is expected to remain near that level until 2026. From 2027 onwards, the feed price ratio is expected to fall due to low meat prices. Other factors contributing to the slower aquaculture production growth include reduced productivity gains, more stringent environmental regulations in the world’s largest producers, most notably China, and the challenges siting new production facilities due to competition for land.

New regulations aimed at increasing the sustainability of the sector and targeting growth in species demanded by domestic consumers are expected to limit production growth in China in the first half of the production period. Despite an acceleration of the growth in Chinese production over the second half of the outlook period, China’s share of global aquaculture production is expected to decrease slightly from 57% in 2018-20 to 56% in 2030. Regionally, Asia is expected to maintain its position as the largest producer, with the share of global production from the region accounting for 88% in 2030, with strong production growth expected in other major Asian producers: India (+24.7%), Indonesia (+30.5%), Viet Nam (+20.4%) and Thailand (+30.0%).

Figure 8.3. World aquaculture and capture fisheries production



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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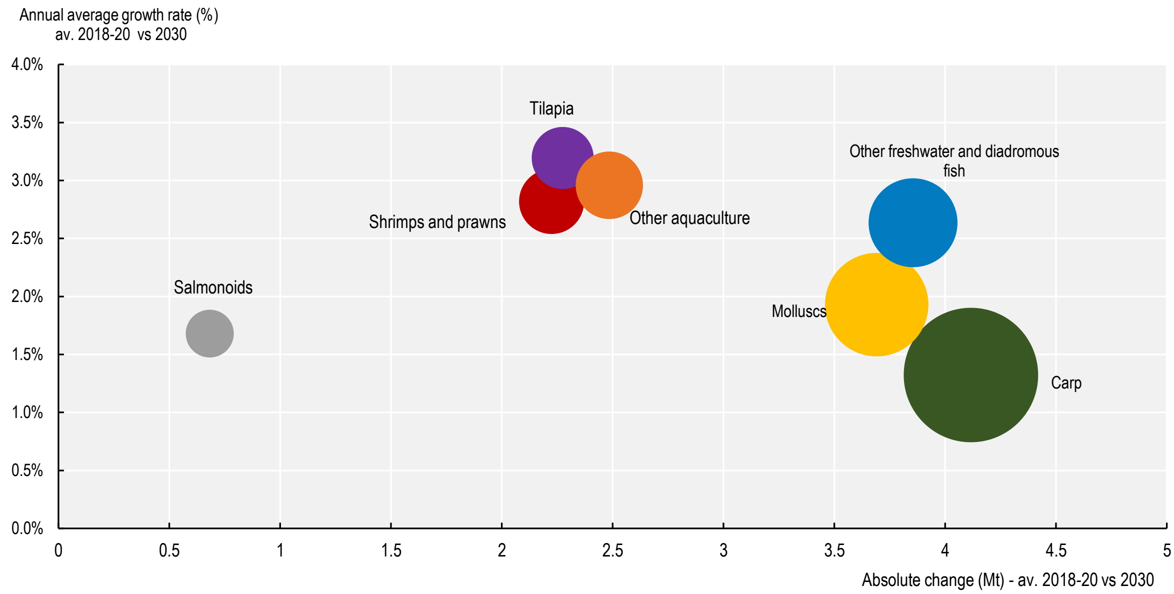
From a species perspective strong production growth is expected for tilapia (+36.9%), and shrimps and prawns (+32.0%) (Figure 8.4). However, in most cases production growth is significantly slower than experienced during the previous decade. The projection of +14.0% for carp production is predominantly determined by China and it is unclear how this production will change under the 14th five-year plan commencing in 2021.

By comparison, capture fisheries are projected to experience relatively modest growth of 3 Mt or 3.6% (+0.4% p.a.) in the projection period, reaching 97 Mt in 2030. This growth in production is expected to come largely from improved fisheries management and technological improvements reducing discards and waste. The growth in capture fisheries production is expected to be slightly less than the previous decade (+4.1% at +0.5% p.a.), with reduced growth rates in most regions. More specifically, while Africa is still expected to experience the strongest growth rate, +10.3% at 0.8% p.a. (+1.1 Mt), this is significantly slower growth than experienced in the previous decade (+38.6% at +3.1% p.a.). Capture fisheries production in Asia is expected to increase by 1.2 Mt, however the relative growth (+2.4%) will be slower than in Africa (+10.3) and Europe (+5.7%). Consequently, the share of Asia in global capture production is projected to decline slightly to 51.6% in 2030 compared to 52.2% in the base period. After declining in the previous decade (-9.9%) capture fisheries production in America is projected to return to growth with an increase of 1.7% (+0.4% p.a.) over the outlook period. From a country perspective, the largest increases in capture production over the outlook period are projected in the Russian Federation (hereafter “Russia”) (+0.6 Mt), Viet Nam (+0.5 Mt), Indonesia (+0.3 Mt), and India (+0.3 Mt), while in China, the world’s largest producer, capture production is projected to decline by 0.4 Mt (-2.7%).

Figure 8.4. Growth in world aquaculture production by species



Note: The size of the bubble represents the average world total production (tonnes) in 2018-2020.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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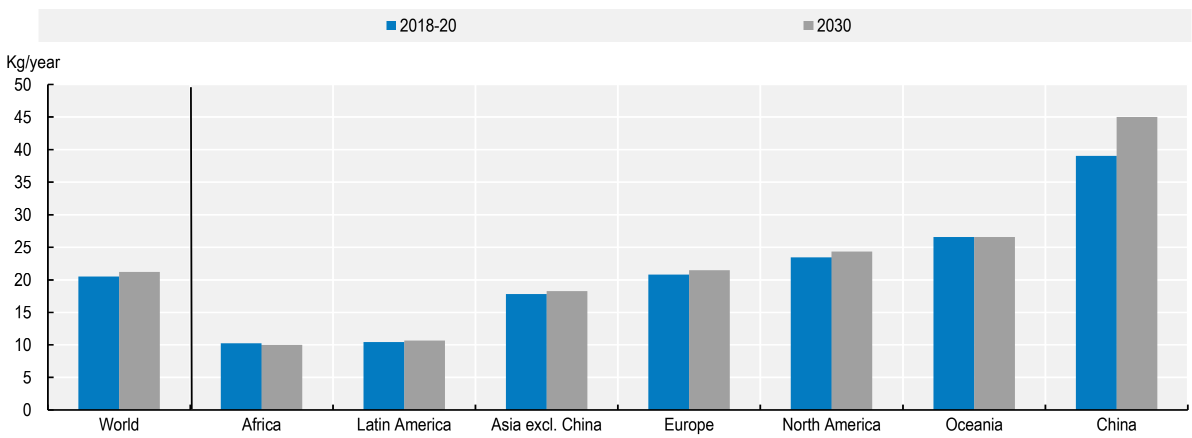
The popularity of fishmeal and fish oil for use in animal feed and their relatively high price when compared to alternatives is expected to drive production increases. Production of fish oil and fishmeal is expected to increase during the outlook period reaching 1.2 Mt and 5.8 Mt respectively by 2030, compared to 1.1 Mt and 5.5 Mt in the base period. However, production growth will be relatively slower than the previous decade for fishmeal (0.9% p.a. vs 1.0% p.a.), and it will remain below pre-2005 levels. Both fishmeal and fish oil can be produced from whole fish or as a by-product of fish processing, so called fish residue. About 64% of the increase in fishmeal and 79% in fish oil output will originate from production obtained from fish residue. The share of fishmeal and fish oil being produced from fish residue is expected to grow over the production period, increasing from 27% in the base period to 29% by 2030 for fishmeal and from 38% to 43% for fish oil.

8.5. Consumption

By 2030, it is projected that 90% of fish production will be consumed as food, 8% reduced into fishmeal and fish oil, and the remaining 2% as other non-food uses. As a source of protein, fatty acids and micronutrients fish will remain key to global diets and playing a key role in food security in particular for coastal and inland communities highly dependent on fish for their diets. Other non-food uses of fish include, ornamental fish, culturing, fingerlings and fry, bait, pharmaceutical inputs, and as direct feed for aquaculture, livestock and other animals. The share of fish originating from aquaculture in total food fish consumption will continue to increase over the outlook period. By 2030, 57% of the food fish is projected to originate from aquaculture, up from 53% in the base period (2018-2020).

At the global level, food fish consumption is projected to increase by 14.8%, or an additional 23 Mt, to reach 181 Mt by 2030. The amount of fish for human consumption will expand on all continents, but significant differences exist among and within countries in terms of the quantity and products consumed at per capita level. These are related to a diversity of conditions in terms of price, access, incomes, and consumers' tastes. As the most populous continent and major producer, Asia is projected to consume the largest share (72%) of the total food fish in 2030, while the lowest quantities will be consumed in Oceania (1%). Africa, America and Europe will each account for 9% of total food fish consumption by 2030 – despite significant differences in their population size. Asia will continue to dominate growth in consumption, accounting for 76% of the additional fish consumed by 2030. The driving force behind the growth in food fish consumption will be a combination of rising incomes and urbanisation, expansion of fish production, improved distribution channels, product innovation, lower meat prices, together with a growing recognition of fish as healthy and nutritious food by many consumers, expected to further grow up in next decade. Being the largest fish producer, China will remain by far the world's largest fish consuming country, projected to account for 37% of the global total in 2030.

Figure 8.5. Per capita fish consumption – 2018-20 vs 2030



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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World per capita apparent fish consumption is projected to reach 21.2 kg in 2030, up from an average of 20.5 kg in 2018-20 (Figure 8.5). However, the rate of growth will slow compared with the previous decade (0.4% p.a. vs 1.1% p.a.). Overall, per capita apparent fish consumption will increase by 3.6% between 2018-20 and 2030, compared to 10.8% over the previous decade. Fish consumption per capita will rise in Asia, Europe and America, while it will remain stable in Oceania and decline in Africa (-2.2%). A greater decline is projected in sub-Saharan Africa (-5.6%), where the rapid population growth will outpace the growth in supply. The decline in Africa raises concerns in terms of food security due to high prevalence of undernourishment[4] in the region and the key role played by fish in terms of share of fish in total animal proteins across many countries. Overall, the decline in fish consumption may also weaken the ability of more dependent countries to meet nutrition targets (2.1 and 2.2) of SDG 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture).

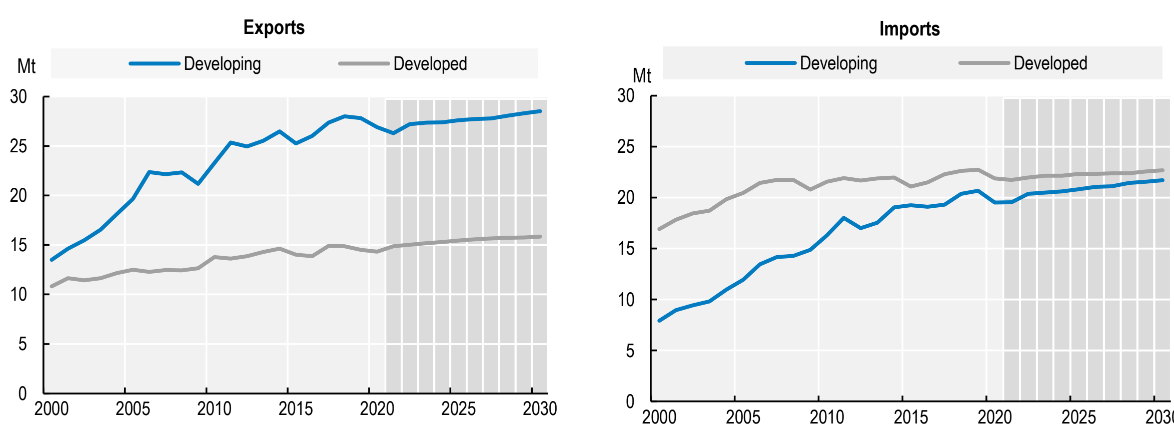
Fishmeal is primarily used in diets for farmed animals, particularly farmed fish. By 2030, 85% of fishmeal should be consumed by the aquaculture sector as feed. China, being the largest aquaculture producer, is the largest consumer of fishmeal, projected to account for 38% of world fishmeal consumption by 2030. Consumption of fish oil is characterised by a competition between aquaculture and dietary supplements for human consumption. By 2030, 66% of fish oil is projected to be fed to farmed fish, in particular salmon. The European Union and Norway will remain the main consumers of fish oil, with 16% and 14%, respectively of the world total in 2030.

8.6. Trade

Trade in food fish is characterized by a wide range of players and products. The mismatch between areas of fisheries and aquaculture production and areas of demand contributes to the very high levels of trade in fish and fish products. The role of fish trade varies between countries but it is important for many economies, as a significant source of foreign currency earnings, employment, and food security (Figure 8.6).

Global trade in fish and fish products contracted in 2019 due to lower production. In 2020, fish trade declined for the second consecutive year, driven primarily by the impacts of COVID-19, as fish production was only slightly down. Over the outlook period, global trade is expected to recover but remain below previous projections. While fish and fish products will remain among the most traded food commodities worldwide, it is projected that the share of fish production being traded will be 35% in 2030 (31% if excluding intra-EU trade). Aquaculture will contribute to a growing share of the international food fish trade with high-value species, such as salmon, seabass, seabream, shrimp and prawns, but also with lower value species, such as tilapia, catfish and carps.

Figure 8.6. Trade of fish for human consumption



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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World exports of food fish are projected to reach 44 Mt live weight equivalent (excluding intra-EU trade) by 2030. This represents a rise of 5.3% in the next decade, significantly lower than the 17.3% increase in the previous decade. Due to their primary role in fishery production, 47% of world food fish exports will originate from Asian countries by 2030. However, additional growth is no longer expected to originate predominantly from Asia (+0.8 Mt) but from Europe (+1.4 Mt), due to slower growth in Chinese food fish exports (2.8% vs 5.3% in the previous decade). Nevertheless, China will maintain its position as the leading global exporter of food fish products and will account for 18% of world trade of food fish in quantity terms by 2030, a slight decline relative to 19% in the base period. Viet Nam is projected to experience the largest growth over the outlook period, accounting for 47% of the additional exports volume. This strong growth is expected to be partly offset by lower exports from India, and Indonesia. Among the non-Asian countries, Russia, and Chile are projected to substantially increase their exports with growth rates of 33% and 40%, respectively.

International trade plays an important role in ensuring access to food fish to consumers. However, striking differences exist between developed and developing countries regarding their reliance on food fish imports. Developed economies will continue to be strongly dependent on imports of food fish to meet their consumption levels, with fish imports accounting for 71% of total food fish consumption by 2030. This compares with a share of 15% for developing countries by 2030. This relatively low figure is strongly influenced by Asia, due to its predominant role in terms of production and exports. By 2030, the leading importers of food fish will remain the European Union, the United States, China, and Japan. In the European Union and the United States, fish food imports are expected to grow but at a slower pace than over the previous decade as consumption levels are already rather high. In China, imports are projected to decrease 2.1% by 2030 as domestic production is increasingly targeted at consumer preferences. In Japan, imports are projected to continue declining (-15.0%), reflecting lower fish consumption per capita and a decline in population.

Exports of fishmeal are projected to increase by 8.6% relative to 2018-20 and reach 3.4 Mt product weight by 2030. Developing countries will remain the main exporters and importers of fishmeal, accounting for 71% of global exports and 79% of global imports by 2030. Peru will continue to be the leading exporter of fishmeal, followed by the European Union, the United States, and Thailand. China will remain the largest fishmeal importer with a 51% share of world fishmeal imports by 2030, to satisfy the needs of its aquaculture and pig industries. Fish oil exports are projected to increase by 5.2% between 2018-20 and 2030. By 2030, Peru and the European Union will be the main exporters of fish oil while Norway and the European Union will be the main importers. Fish oil is mainly used as supplementary feed in the salmon industry and as a food supplement for human consumption.

8.7. Main issues and uncertainties

The projections analysed in this chapter represent an anticipated scenario for the fisheries and aquaculture sectors over the coming decade. Developing these projections depends on assumptions being made with respect to a range of economic, policy, and environmental conditions. These include the macroeconomic environment, the continuation of agricultural policies and announced policy reforms, international trade rules and tariffs, ongoing negotiations at the World Trade Organization (WTO) on binding disciplines for environmentally harmful subsidies to fisheries, frequency and effects of El Niño phenomenon, absence of extraordinary fish-related disease events, fishery quotas, and longer term productivity trends. Should any of these assumptions change, this would lead to a different set of projections for the fish market. In this year's edition of the OECD-FAO Agricultural Outlook, the uncertainty related to the on-going COVID-19 pandemic is by far the main risk factor to the projections presented, at least for the first years of the decade.

The development of the COVID-19 pandemic has the potential to aggravate poverty, hunger, and malnutrition, including an unprecedented impact on the fisheries and aquaculture sector. A lower global GDP scenario or important differences among countries could lead to longer-term decreases in food fish consumption, trade, and production. The COVID-19 pandemic led to significant changes in consumer behaviour for fish products. The place of consumption changed from the usual HORECA sector to the home, and the demand for prepared and preserved fish products rose strongly while the demand for higher value fresh products fell (as they were predominantly eaten outside of home). These changes may lead to structural changes in the patterns of fish consumption and in trade flows in the future, in particular taking into consideration that fish is a globalised product with species that can be harvested in one country, processed in a second country, and consumed in a third country. Sanitary and food safety concerns boosted by the COVID-19 pandemic could also lead to a change in trade flow patterns.

Significant policy changes in China create additional uncertainty for production trends in both capture fisheries and aquaculture. For example, it is unclear how the Chinese aquaculture sector will respond to changes in the 14th five-year plan targeting the production of domestic species and reducing the environmental impacts of the sector. In capture fisheries, reductions in the levels of direct support, in particular for inputs such as fuel, could have significant impacts on the profitability and structure of the Chinese fleet over the projection period.

Overall, the fisheries and aquaculture sectors are expected to continue to face many challenges including environmental change, resource availability, and ineffective governance. Despite the progress made by several countries and regions, with fish stocks consistently above target levels of rebuilding when fisheries are properly managed, there are still many areas where fisheries management is not in place, or is ineffective and the status of fish stocks is poor and deteriorating. This unequal progress is expected to persist unless successful and adequate policies and measures are implemented. Therefore, there is the urgent need for new mechanisms to support the effective implementation of policy and management regulations for sustainable fisheries and ecosystems to ensure fisheries around the world are sustainable. This will require concerted effort in waters within and beyond national jurisdiction, encompassing not only conservation measures but also capacity building and support, particularly for small island developing states and least developed countries. Further, it will be essential for management policies to pay close attention to the impact of climate change and the potential for migration of wild stocks due to rising ocean temperatures and the acidification of ocean waters.

Aquaculture is expected to be the main driver for the increase of fish production globally, and while showing a slower increase than previous decades, it will be higher than the growth in the production of fishmeal and fish-oil, important components in the diets for fed aquaculture (currently representing about 70% of aquaculture production globally). Fishmeal and fish oil are still considered the most nutritious and most digestible ingredients for farmed fish and it is expected these will be used even more selectively and efficiently at specific stages of production. Maintaining aquaculture growth will require increased use of other feed sources, and potentially the development of new nutrient rich feeds, all which represent additional sources of uncertainty in the predictions. Further, the regional development of aquaculture is uneven and hampered by constraints such as equitable distribution, competition for land, rights to water, diversity of species produced, and access to credit, seeds and expertise. Such constraints need to be adequately addressed through responsive and effective governance, increased investment, improvements in technology, innovations and research, and more efficient production and profitability. Ensuring long term biosecurity will be crucial as well as the targeted support to environmentally-friendly production systems, such as integrated multi-trophic aquaculture in coastal areas and integrated-agriculture aquaculture in inland regions. A special focus on Africa, which is projected to experience a decline in apparent consumption per capita in the next decade, may be required.

The ability of the capture fisheries and aquaculture sectors to meet demand will depend, in part, on their ability to increase or maintain production with minimal impact on marine and freshwater ecosystems, while also improving the utilisation of the harvest by reducing food loss and waste. Yet aquatic food production systems are nested in the larger development framework. Many “blue economy” policies favour large projects such as oil/gas and shipping/ports or even tourism, which bring economic benefits but also environmental degradation, with impacts on food from the ocean and ocean biodiversity. Trade-offs in the blue economy require further investigation for risk-informed, sound policy-making and investments for resilient and sustainable development. On these aspects, one of the new priority areas of the Strategic Framework of FAO for 2021-2030 is expected to be the Blue Transformation, with more efficient, inclusive, resilient and sustainable blue food systems promoted through improved policies and programmes for integrated science-based management, technological innovation, and private-sector engagement.

Notes

[1] In the *OECD-FAO Agricultural Outlook 2021-2030*, the term "fish" and "seafood" are used to indicate fish, crustaceans, molluscs and other aquatic animals, but exclude aquatic mammals, crocodiles, caimans, alligators and aquatic plants. All quantities are expressed in live weight equivalent, except those of fishmeal and fish oil.

[2] Calculated in nominal terms, and covering fish and fish products.

[3] The term "apparent" refers to the amount of food available for consumption, which is not equal to the edible average food intake. The amount is calculated as production + imports – exports – non-food uses, +/- stocks variations, all expressed in live-weight equivalent.

[4] FAO, IFAD, UNICEF, WFP and WHO. 2020. The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets. Rome, FAO. https://doi.org/10.4060/ca9692en.

9 Biofuels

This chapter describes recent market developments and highlights the medium-term projections for world biofuel markets for the period 2021-30. Price, production, consumption and trade developments for ethanol and biodiesel are discussed. The chapter concludes with a discussion of important risks and uncertainties that might affect world biofuel markets over the next ten marketing years.

9.1. Projection highlights

The COVID19 pandemic caused a drop of 8.5% in global transport fuel use in 2020 with respect to the previous year due to restrictions on people's movements and disruption in trade logistics around the globe. Consequently, biofuel use fell by 8.7% in 2020 with respect to 2019. This year's edition of the *OECD-FAO Agricultural Outlook* projects that biofuel markets will continue to be largely influenced by national support policies and fossil fuel demand. Global biofuel demand is expected to recover in 2021 and 2022, in line with the expected total fuel demand recovery. Over the medium term, global biofuel consumption is expected to further increase, mainly driven by higher blending targets in developing countries. In developed countries, biofuel expansion will be limited due to decreasing fossil fuel demand and reduced policy incentives. International biofuel prices are projected to increase over the outlook period in nominal terms, while remaining almost constant in real terms. Biofuel prices generally relate to market fundamentals such as feedstock prices, crude oil price, and distribution costs; however, policies have a strong impact on shaping the path of prices over time by covering part of production costs and binding biofuel use to fossil fuels use via mandates.

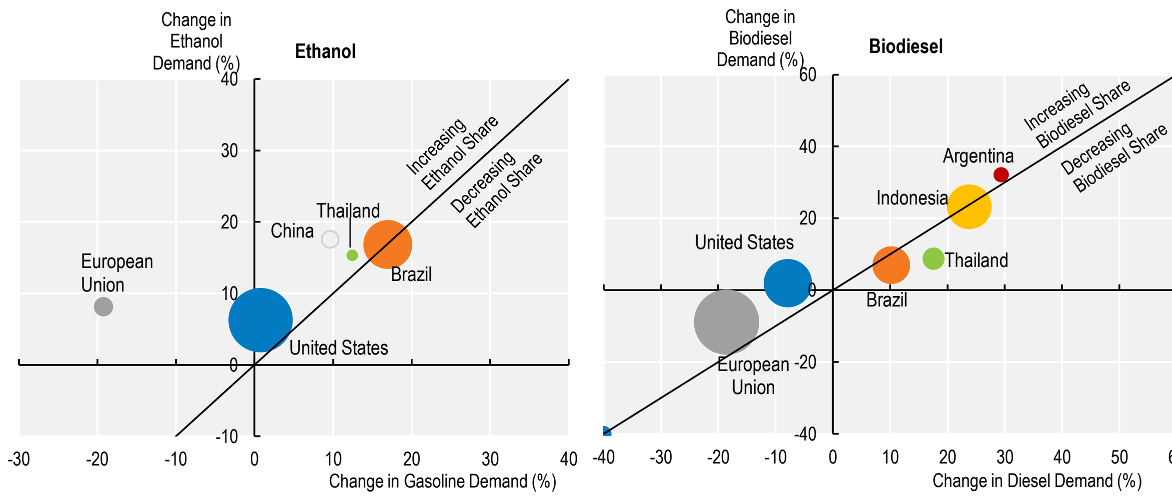
Global biofuel use is expected to grow over the projection period (Figure 9.1). The *IEA World Energy Outlook* (on which this *Outlook* bases its own fossil fuel demand projections) foresees decreasing total fuel use in the European Union and the United States, suggesting limited growth in biofuel consumption. In the European Union, the Renewable Energy Directive (RED) II classifies palm oil-based biodiesel under a high Indirect Land Use Change (ILUC) risk category and the consumption of palm oil-based biodiesel is expected to decline under RED II requirements, resulting in decreased biodiesel consumption. In the United States, biofuel demand is expected to be sustained by the Renewable Fuel Standard (RFS). However, the 10 % ethanol blend wall[1] is assumed to constrain increases of domestic ethanol consumption during the projection period.

Fuel consumption trends and policy developments in emerging economies play a significant role. In Brazil, total fuel consumption is expected to further increase over the projection period, and ethanol and biodiesel consumption are projected to grow proportionately. The People's Republic of China (hereafter "China") is not expected to implement a nationwide E10 mandate, as proposed in 2017, because this programme depends on maize stock levels which have been decreasing since 2017. This *Outlook* therefore assumes that China will maintain the lower blending rate of 2% to 2030.

Blending mandates are expected to evolve over the projection period for some emerging economies. In Indonesia, both total diesel use and biodiesel consumption are expected to increase over the outlook period. Indonesia introduced the B30 (Biodiesel 30% blend) programme in 2020, which together with increasing fossil fuel demand stimulates biodiesel use. This *Outlook* assumes that the biodiesel blending rate will remain around 30% over the projection period. In Argentina, the current 10% biodiesel blend rate is assumed to be maintained. By 2030, India's ethanol blending rate is projected to be about 8%, with sugarcane-based ethanol contributing significantly to meet this target. However, the projection is expected to remain below the E20 goal the government seeks to achieve by 2030 owing to the limited supply of feedstuffs, mainly molasses, which would remain as the main feedstuff.

Global biofuel production will continue to be supplied predominantly by traditional feedstock; sugarcane and maize for ethanol and various vegetable oils for biodiesel production. Biodiesel produced from used cooking oil will continue to play an important role in the European Union, Canada, the United States, and Singapore. In most countries, biofuel policies aim to reduce GHG emissions and dependency on fossil fuels. Therefore, markets are mainly supplied domestically, leaving the international trade share relatively low and projected to decrease even further over the coming decade. World biodiesel trade is projected to decrease by 25% from current levels, largely reflecting declining demand for palm oil-based biodiesel in the European Union; ethanol trade will decrease moderately. On the export side, shipments from Indonesia are expected to decrease, reflecting high domestic demand.

Figure 9.1. Biofuel demand developments 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 2020.

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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This *Outlook* expects that most biofuels will be produced from primary agricultural commodities. No substantial increase in advanced biofuels such as cellulose-based ethanol and recycled oil-base biodiesel are expected before the end of the outlook period. Uncertainty in the projections arises from the assumptions about future developments in the transportation sector. Unforeseen advances in technology and potential changes in the regulatory framework may result in substantial deviations from current market projections for biofuels.

9.2. Recent market development

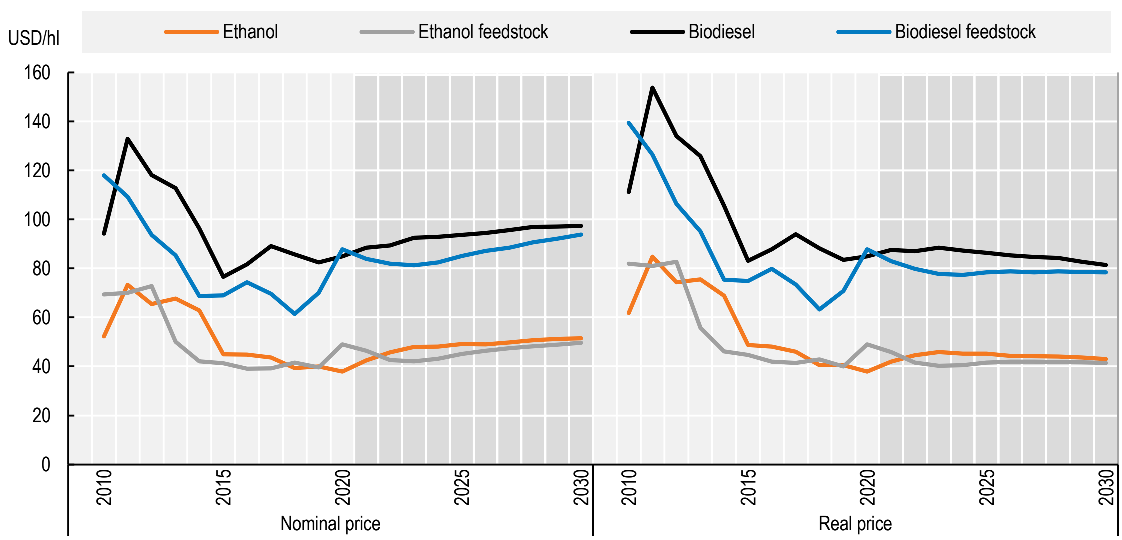
The lockdown measures and economic decline resulting from the COVID-19 pandemic decreased global fuel demand in 2020. COVID-19 curtailed the global transportation oil use; however, industrial use of fossil fuels was less affected. The United States and Brazil recorded the highest reductions in ethanol consumption and drove down global demand. Indonesia and Thailand increased biodiesel use owing to higher blend rates, while decreasing diesel use. Production margins for biofuels were affected by the higher maize and vegetal oil prices, which, combined with declining fossil fuel prices, created an unstable scenario; government support relieved some of the pressure on markets. Increasing use of ethanol in industry, driven by its use as a sanitizer in response to the COVID-19 pandemic, also helped sustain biofuels production. Biodiesel also played a more significant role in the production of electricity. The use of biofuels in sectors other than transportation was less affected. Despite government support, and in line with decreasing demand, the overall level of global ethanol and biodiesel production decreased for the first time in the last decade by 13.2 bln L and 1.9 bln L respectively in 2020 compared to 2019.

These negative effects on the biofuels sector in 2020 were partially offset by current and new policies, in particular those that regulate domestic prices of biofuels by providing specific subsidies and preferential taxes, in addition to the obligatory mandates that bind the demand of biofuels to that of fossil fuels. Global biofuel demand is assumed to recover from 2021 as part of the expected economic recovery and the higher blend mandates and decarbonisation initiatives. Overall demand will be lower than in 2019, however.

9.3. Prices

Influenced by developments on the vegetable oil markets, nominal biodiesel prices are projected to increase at a slower pace (1.1% p.a.) than ethanol prices (1.8% p.a.). Expressed in real terms, biodiesel prices are projected to decrease after 2024 and ethanol prices to resume a decreasing trend after 2026. Nominal ethanol prices will perform more strongly than biodiesel primarily because ethanol prices are currently at historical lows and the recovery expected in the first years of the projection period will start from this low base. It should be borne in mind that due to policies that include fiscal benefits or support prices, international and domestic biofuel prices often diverge.

Figure 9.2. 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 (2020=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 (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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9.4. Production and consumption

Globally, this *Outlook* expects biofuel production and consumption to increase at a much slower pace during the projection period than in previous decades primarily as result of US and EU policies that are reducing support to this sector. Demand for biofuels is expected to grow in major developing countries due to expected developments in transportation fleets, domestic policies that favour higher blends, and greater demand from consumers.

Box 9.1. Biofuels at a glance

Biofuels (bioethanol and biodiesel[1]) are fuels produced from biomass. At present, about 60% of ethanol is produced from maize, 25% from sugarcane, 2% from molasses, 3% from wheat, and the remainder from other grains, cassava or sugar beets. About 75% of biodiesel is based on vegetable oils (20% rapeseed oil, 25% soybean oil, and 30% palm oil) or used cooking oils (20%). More advanced technologies based on cellulosic feedstock (e.g. crop residues, dedicated energy crops, or wood) do not account for large shares of total biofuel production. The international biofuel sectors are strongly influenced by national policies that have three major goals: farmer support, reduced GHG emissions, and/or increased energy independence.

Table 9.1. Biofuel production ranking and major feedstock

	Production ranking (base period)		Major feedstock	
	Ethanol	Biodiesel	Ethanol	Biodiesel
United States	1 (48.2%)	2 (18.1%)	Maize	Soybean oil, used cooking oils
European Union	5 (4.8%)	1 (32.3%)	Sugar beet /wheat /maize	Rapeseed oil /Palm oil/ used cooking oils
Brazil	2 (26.7%)	4 (12.2%)	Sugarcane / maize	Soybean oil/
China	3 (8.3%)	9 (2.3%)	Maize / cassava	Used cooking oils
India	5 (2.3%)	15 (0.5%)	Molasses	Used cooking oils
Canada	6 (1.6%)	13 (0.7%)	Maize / wheat	Canola oil / used cooking oil/soybean oil
Indonesia	20 (0.1%)	3 (15%)	Molasses	Palm oil
Argentina	8 (1.0%)	5 (5%)	Molasses / sugarcane/ maize	Soybean oil
Thailand	7 (1.4%)	7 (3.8%)	Molasses / cassava/ sugarcane	Palm oil
Colombia	13 (0.44%)	11 (1.3%)	Sugarcane	Palm oil
Paraguay	14 (0.42%)	19 (0.03%)	Maize/ sugarcane	Jatropha

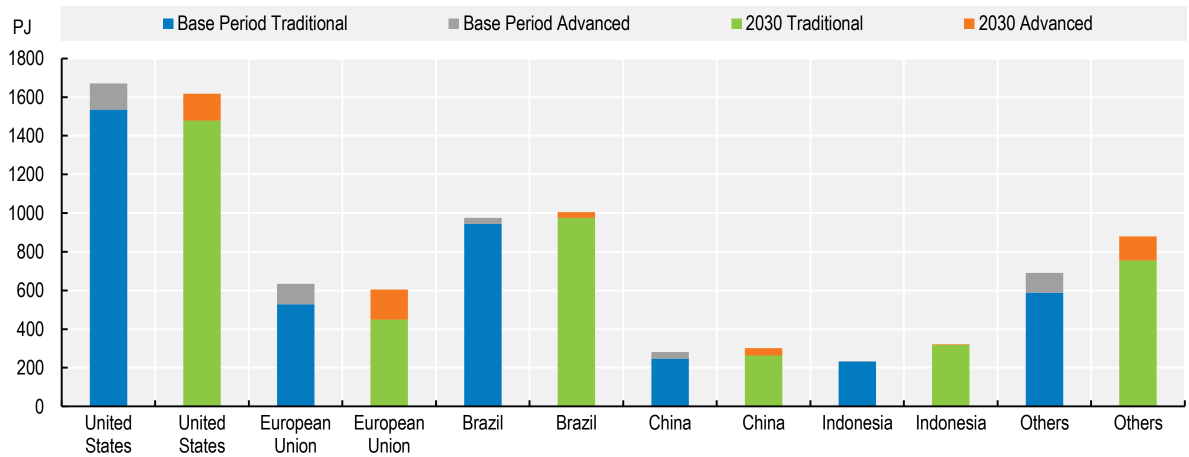
Notes

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 2021-2030*, biodiesel includes renewable diesel (also known as Hydrotreated Vegetable Oil or HVO), although these are different products.

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

Global ethanol production is projected to increase to 132 bln L by 2030, while global biodiesel production is projected to increase to 50 bln L, driven principally by Indonesia's mandate increase over the initial projection years. Feedstock for biofuel products vary from country to country. Global biofuel production will continue to be dominated by traditional feedstock despite the increasing sensitivity to the sustainability dimension of biofuel production observed in many countries (Figure 9.3).

Figure 9.3. World biofuel production from traditional and advanced feedstock



Note: Traditional feedstocks are here defined as food and feed crop based biofuels. Values in Petajoules = 1015 Joules.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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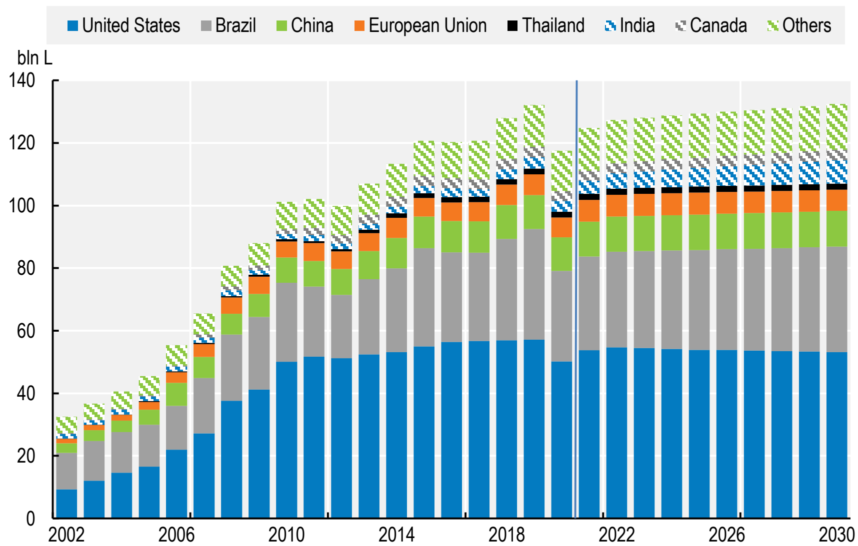
The share of energy that enters the transport sector through biofuels exceeds 10% only in Brazil. Yet a goal of many biofuel policies, especially in developing countries, is to reduce energy dependency from fossil fuel sources.

9.4.1. United States

This *Outlook* assumes that the US government will keep all mandates set by EPA at recently announced levels in volume terms despite the projected decrease in the use of transportation fuel. The consumption of ethanol is projected to decrease by 0.2% p.a. (Figure 9.4). The 10% ethanol blend wall is assumed to constrain domestic ethanol use over the next decade, which is projected to be constant at 10% by 2030 as current discussions about developing E15 infrastructures have not been promoted nationwide.

Growth in ethanol production is projected to decrease by 0.4% p.a. Corn is assumed to be the main feedstock for ethanol production, accounting for 99% of production in 2030. The production capacity for cellulosic ethanol is assumed to remain constant over the projection period. Although it is projected to maintain its position as the world's largest ethanol producer, US global production shares are projected to decrease from 47% to 44%, and US production of biodiesel is projected to decrease by 0.3% p.a. (Figure 9.5). US global production shares are projected to decrease from 18% to 17%.

Figure 9.4. Development of the world ethanol consumption



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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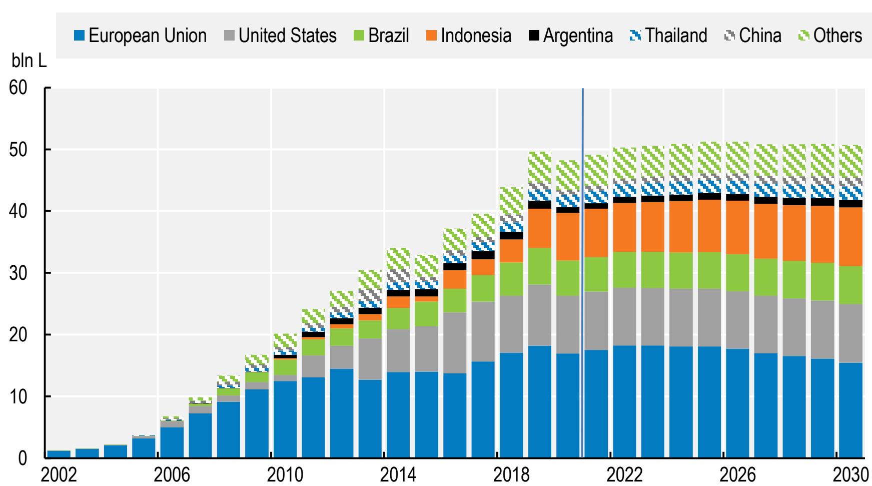
Figure 9.5. Development of the world biodiesel consumption



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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9.4.2. The European Union

Since 2010, EU legislation related to biofuel support has been based on the 2009 Renewable Energy Directive (RED), which required that at least 10% of transport energy use in EU Member States be based on renewables by 2020. In June 2018, agreement was reached to increase the biofuel 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) in 2018 and will be implemented by 2030.[2] RED II classifies palm oil-based biodiesel under a high ILUC risk category and thus consumption of this biodiesel is expected to decline.

According to the International Energy Agency's (IEA) baseline used for this *Outlook*, total energy use in the transport sector is projected to decrease for diesel and gasoline. The decrease for diesel-type fuels is strong; ethanol consumption is projected to increase (+0.2 bln L), while biodiesel consumption is projected to decrease in absolute terms (-2.0 bln L). Palm oil-based biodiesel constitutes a large share of this decrease in view of EU sustainability concerns associated with palm oil production. Biodiesel produced from other vegetable oils is also expected to decrease, but less significantly, while production from used cooking oils is projected to increase. Given the demand projections for the biodiesel sector, the European Union is expected to remain the world's largest biodiesel-producing region in 2030, although global production shares are expected to decrease from 32% to 28%.

Total EU biofuel consumption is projected to decrease by 1.1% p.a., but the share of advanced biofuel sources is projected to increase from 17% at present to 26% by 2030 (Figure 9.3).

9.4.3. Brazil

Brazil has a large fleet of flex-fuel vehicles that can run on either gasohol (a mix of gasoline and anhydrous ethanol) or on E100 (hydrous ethanol). For gasohol, the government can vary the ethanol blend rate between 18% and 27%, depending on the price relationship between domestic sugar and ethanol. The current percentage requirement for ethanol is legislated at 27%. The current differentiated taxation system favours hydrous ethanol over blended gasohol in key Brazilian states. For biodiesel, the government is assumed to maintain biodiesel blend ratio at 11% during the projection period.

The largest ethanol consumption and production increases projected in this *Outlook* are expected to be in Brazil (Figure 9.4), due mainly to its RenovaBio programme.[3] This programme was officially signed in January 2018 and is intended to reduce the emissions intensity of the Brazilian transport sector in line with the country's commitments under COP21. To create the necessary incentive structure, RenovaBio will introduce a system of tradeable carbon savings. Brazilian production is projected to increase by 1.3% p.a. By 2030, more than half of the total Brazilian ethanol production is projected to be consumed by high blend flex-fuel vehicles, implying an increase in this fleet.

In contrast to the United States and the European Union, total fuel consumption of gasoline and diesel in Brazil is projected to increase over the coming decade, underpinning the potential growth of blending biofuels to gasoline and diesel. As a consequence, this *Outlook* projects that ethanol market volumes and biodiesel consumption will increase in Brazil.

9.4.4. China

In 2017, China announced a new nationwide E10 mandate aimed at eliminating excessive maize stocks. In 2018, the government announced it would expand this programme from 11 to 26 provinces[4] by 2020. As maize stocks have declined since 2017, the main incentive to step up ethanol use is disappearing. This *Outlook* nevertheless assumes that the blending rate of 2% will be maintained to 2030. Chinese ethanol consumption will increase with higher overall fuel use, although the growth rate will decrease compared with the last decade. This is projected to correspond to a production increase of 0.1% p.a. during the projection period. This *Outlook* assumes most of the ethanol demand will be produced from domestic feedstock. Biodiesel in China will continue to be produced mostly from cooking oil, which has limited growth potential.

9.4.5. Indonesia

The implementation of B30 (Biodiesel 30% blend) aims at reducing the country's dependency on imported fossil fuels and reducing GHG emissions. In recent years, biodiesel production has increased due to a national biodiesel programme, which provides support to biodiesel producers and it is financed by the crude palm oil (CPO) fund. The projected international reference prices for vegetable oil and exports, together with the levy collection of USD 55/t on exports will be sufficient to maintain B30 over the projection period. The support to biodiesel producers covers the gap between biodiesel and diesel prices. The biodiesel price is calculated as the CPO price plus production costs, set at USD 80/t, plus freight and transports costs. In 2020, the average subsidy to biodiesel production increased to about USD 0.22/L owing to high CPO and low diesel prices. However, this subsidy should decrease over the outlook period as oil prices are expected to recover, driving fossil fuel prices up. On the basis of these assumptions, biodiesel production in Indonesia is projected to increase to 9.7 bln L by 2030. In view of the EU environmental regulation and declining use of diesel in developed countries, export are projected to remain low over the outlook period.

9.4.6. Argentina

Argentine ethanol use ratio to gasoline and biodiesel use ratio are assumed to remain at current levels. Tax exemptions should continue to boost the development of the country's biodiesel industry, which exports almost half of its production. However, trade barriers set by the United States and the Argentinian export tax will constrain biodiesel exports, which are projected to decrease by 0.6% p.a.

9.4.7. Thailand

The domestic feedstock – molasses, cassava and palm oil – supply constrains biofuels production. Without increased production of these commodities or including a broader range of commodities in the feedstuff basket, the projected production lags the targets set for 2036. In addition, the government will gradually reduce the current subsidy on ethanol by 2022, although higher blend (E85) are expected to be less affected than lower blend (E10); on average, blending is expected to remain around 14% over the outlook period and production is projected to increase marginally to 2.0 bln L in 2030. Biodiesel demand is expected to be supported by the obligatory blending rates, with subsidies favouring B20 and B10 against B7. However, limited domestic palm oil supply will constrain the domestic supply and by 2030 demand will marginally increase to 2.1 bln L.

9.4.8. India

The National Policy on Biofuels came into effect in May 2018, with the aim to achieve 20% ethanol and 5% biodiesel blending; these targets are substantially above the current 4% and 0.1% blending levels. The main limitation to the increase in biofuel production over the outlook period is the availability of current feedstock, mainly molasses, the production of which will not be sufficient to meet increasing demand from the biofuels industry. Recent developments indicate that sugarcane will become a relevant feedstock in ethanol production. Aided by soft loans, sugar mills are investing and developing the capacity to produce ethanol from sugarcane juice; in 2021, reports indicate that ethanol from sugarcane juice could account for as much as 15% of the total ethanol production. In spite of such developments, sugar exports subsidies are expected to slow down the transition towards sugarcane juice ethanol. This in combination with accelerating gasoline demand will constrain the expansion of blending and, by 2030, the average is expected to be only around E8. Ethanol production is expected to be nearly 7 bln L in 2030, but this would not meet the growing demand; as such, increased imports would fill the gap.

9.4.9. Canada

The Canadian Clean Fuels Standard (CFS) and provincial blend mandates maintain biofuels use in Canada. The CFS policy, currently under negotiation, aims to reduce GHG emissions by introducing Carbon Savings Credits. The ethanol use ratio to gasoline and biodiesel use ratio are assumed to remain at current levels.

9.4.10. Colombia

Ethanol demand is projected to increase over the outlook period in line with the recovery of gasoline demand. In 2020, the blending increased marginally above E10 because the use of gasoline decreased; ethanol demand did not react to the same extent. Over the medium term, the blending rate is projected to return to E10. This *Outlook* assumes sugarcane to continue as the main feedstock; moreover, in 2030 biofuels use will account for about 22% of the sugarcane production against 17% in the base period, thus consolidating ethanol as an important element in sustaining the Colombian sugarcane industry. Biodiesel demand has been subdued over the last three years due to a decline in diesel demand, although the blending rate remained stable at around B10. This *Outlook* assumes this level will continue over the medium term. Production is projected to reach 0.6 bln L by 2030, nearly identical to the high historical rate of 2018.

9.4.11. 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 2030; the blending rate in these three countries is assumed to remain stable at around 10%.

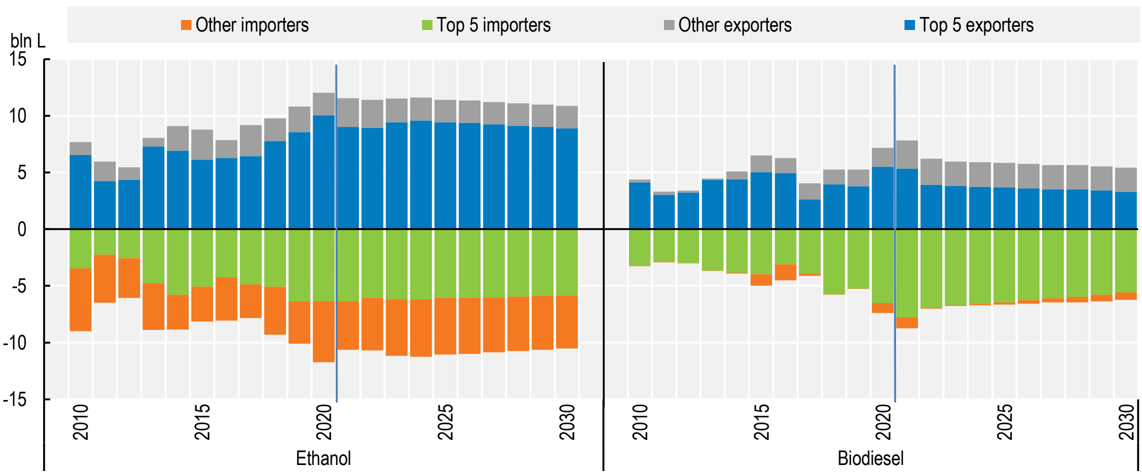
Other major biodiesel producers are Malaysia, the Philippines and Peru, where production could reach 1.6 bln L, 0.3 bln L and 0.2 bln L respectively by 2030. In Malaysia blending is projected to remain around 10%, whereas in Peru and Philippines around 6% and 3% respectively. Other Asian countries, in particular Singapore, would continue to produce around 0.9 bln L of biodiesel from cooking oil over the outlook period. Unlike the vast majority of countries where biofuels are domestically used in order to reduce GHG emissions and to reduce national dependency on imported oil, production of biodiesel in Singapore is largely exported.

9.5. Trade

Global ethanol trade is projected to remain as a low share of global production, decreasing from 9% over the base period to 8% by 2030. The United States is expected to remain a net exporter of maize-based ethanol. However, US ethanol exports should decrease over the outlook period due to the weak production. Brazilian ethanol exports are projected to increase by 0.1% p.a. over the outlook period given that the Brazil's ethanol industry will mostly fill sustained domestic demand.

Global biodiesel trade is projected to decrease from 7.1 bln L to 5.3 bln L by 2030. Indonesian biodiesel exports are projected to decrease dramatically, reflecting high domestic demand. Although Argentina is assumed to remain the leading biodiesel exporter, followed by the European Union and the United States, Argentinian exports are projected to decrease by 0.6% over the projection period due to weak international demand.

Figure 9.6. Biofuel trade dominated by a few global players



Note: Top five ethanol exporters in 2030: United States, Brazil, European Union, Pakistan, United Kingdom. Top five ethanol importers in 2030: Brazil, United States, Japan, Canada, United Kingdom. Top five biodiesel exporters in 2030: Argentina, European Union, United States, Indonesia, Canada. Top five biodiesel importers in 2030: European Union, United States, United Kingdom, Canada, Peru. Classification of biofuels by domestic policies can result in simultaneous exports and imports of biofuels in several countries.

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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9.6. Main issues and uncertainties

The major risks and uncertainties for the future development of the biofuels sector are related to the policy environment and oil prices. Policy uncertainty includes changes in mandate levels, enforcement mechanisms, investment in non-traditional biofuel feedstock, tax exemptions and subsidies for biofuels and fossil fuels, and electric vehicles (EVs) technology and policies for its promotion.

The policy environment will remain uncertain because it depends on agricultural and oil prices developments. Oil market developments affect policies since fossil fuel prices affect biofuel competitiveness and the subsidies allocated to the biofuel sector. Another uncertainty arises from the feedstuff supply; traditionally, countries sought to use commodities for which they have a surplus so as not to reduce food availability. As biofuels compete with food use and may have undesired land use effects, countries are cautious on expanding biofuel production at a faster pace. Despite this, blending mandates are expected to evolve positively over the projection period for some emerging economies.

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 so as to cut greenhouse emissions; this includes via blending mandates, subsidies, and tax reductions. All these measures helped transfer uncertainty in energy to the agricultural markets. Therefore, a driving factor of future biofuel demand is related to the response of the private sector to these measures. The automotive and other industries are currently investing in EVs which, depending on the uptake of this technology and the policies supporting its adoption, could add to a potential decrease in the use of biofuels over the next decade and beyond.

Notes

[1] The blend wall in this context is the maximum achievable national average blend rate, given that most pumps in the United States offer only E10.

[2] https://ec.europa.eu/jrc/en/jec/renewable-energy-recast-2030-red-ii.

[3] http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2017/lei/L13576.htm.

[4] Eleven provinces accounted for 46.1% of China's total population in 2017.

10 Cotton

This chapter describes recent market developments and highlights the medium-term projections for world cotton markets for the period 2021-30. Price, production, consumption and trade developments for cotton are discussed. The chapter concludes with a discussion of important risks and uncertainties that might affect world cotton markets over the next ten marketing years.

10.1. Projection highlights

Cotton consumption and trade recovered in 2020 from the 2019 low. However production fell to levels not seen since 2016 as production in the Americas was below expectations. As a consequence, cotton prices increased and gained on the price of polyester. Driven by the assumption that the price ratio between cotton and other fibres will be more stable over the outlook period compared to recent years, global mill consumption is expected to grow slightly faster than world population. The distribution of consumption across the globe depends on the location of cotton mills, often located in proximity to clothing and apparel industries. Over the past decades, there has been a marked shift in cotton mill activity from the developed world and the former Soviet Union towards Asia, especially the People's Republic of China (hereafter "China"). Chinese consumption peaked in 2007 and has been declining since as stricter regulations and rising labour costs have stimulated a move of the industry to other Asian countries, notably Viet Nam and Bangladesh. Since 2016, the decline in Chinese mill consumption seems to have ceased and this year's edition of the *OECD-FAO Agricultural Outlook* assumes a slight upward trend for the coming decade. In India, another major cotton consumer, support to the sector is expected to result in continuous growth in cotton mill use.

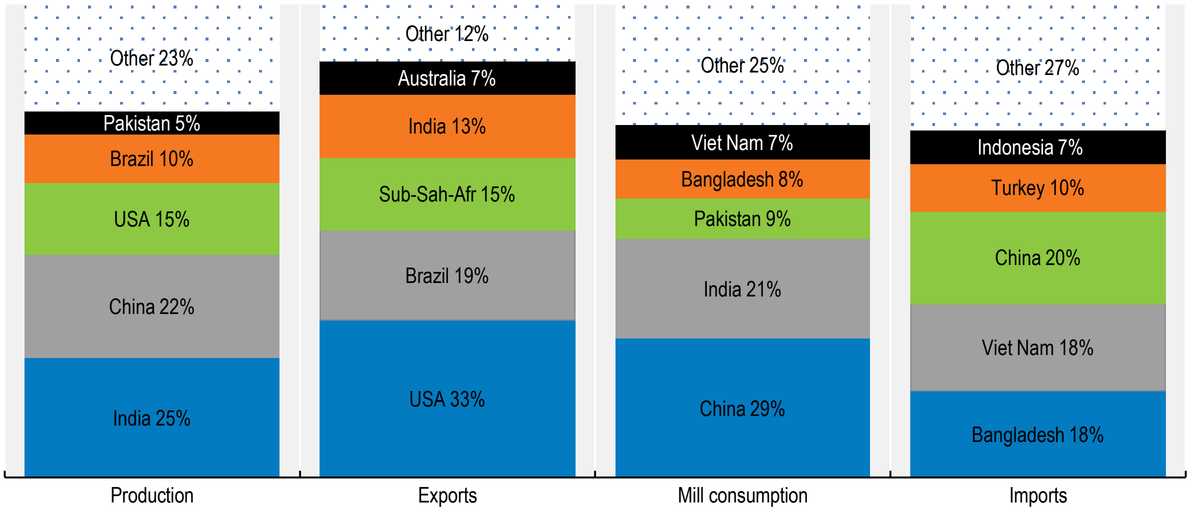
World cotton production is projected to grow 1.5% p.a. to reach 28 Mt in 2030. This growth will come from an expansion of the cotton area (0.5% p.a.) and growth in average global yields (1% p.a.). Yields have been flat since 2004 as several countries have struggled with pest problems and water scarcity, and because production shares of low yielding countries have been increasing. Better genetics and the adoption of better agronomic practices for sustainable cotton production could bring improvement over the coming decade, but yield growth could remain a challenge in several countries. India will continue to be the world's largest cotton producer, with the increase in production resting mostly on higher yields, while area expansion is expected to be limited in line with recent trends. In general, the global players in cotton markets in 2030 will be the same as in the base period, which means that Sub-Saharan Africa as a region is projected to remain the third largest exporter of raw cotton by 2030 (Figure 10.1).

Cotton is mainly traded in bales of raw cotton fibres. The global trade in raw cotton is projected to surpass 11 Mt by 2030, 25% higher than during the base period. Global trade is therefore expected to grow slightly faster than overall consumption given the demand growth in countries without much domestic cotton production, such as Bangladesh and Viet Nam, and stagnating domestic mill use in Brazil.

After trending downwards since 2017, global cotton prices are expected to increase over the projection period in nominal terms, while decreasing slightly in real terms. Assuming China resumes its efforts towards a greener economy, polyester production should be dampened. This decrease in the rate of growth of polyester production should lead to increasing nominal cotton prices in the coming years.

Several uncertainties affect the outlook period under study. It is unclear how per capita consumption of cotton textiles in developing and emerging economies will evolve as incomes grow and urbanisation continues, especially given competition from polyester and the uncertainty related to how the global economy will emerge from the COVID-19 economic recession. On the production side, projections are sensitive to pests and weather conditions. Climate change, with its impact on the occurrence and magnitude of events such as droughts and storms, constitutes an additional factor of uncertainty. Sustainability considerations regarding cotton and man-made fibres will continue to influence the future demand and supply of cotton. Trade tensions are another source of uncertainty for cotton markets.

Figure 10.1. Global players in cotton markets in 2030



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/mqhou3

10.2. Recent market developments

During the first wave of lockdowns since the start of the COVID-19 pandemic, prices for raw cotton dropped strongly in the spring of 2020. The onset of the pandemic drove consumers from stores, with apparel retailers particularly affected, and it hindered yarn spinning in many countries. However, this price drop did not affect planting decisions as much as it would have had it happened a few months earlier. Nonetheless, the decrease in cotton production in the 2020/2021 marketing year was the highest since 2016 for several reasons: one cause was that corn and soybean prices had gained on cotton prices to some degree before the COVID shock, putting downward pressure on cotton area in several countries. Another reason was that in the United States, the harvested area was reduced by disappointing weather.

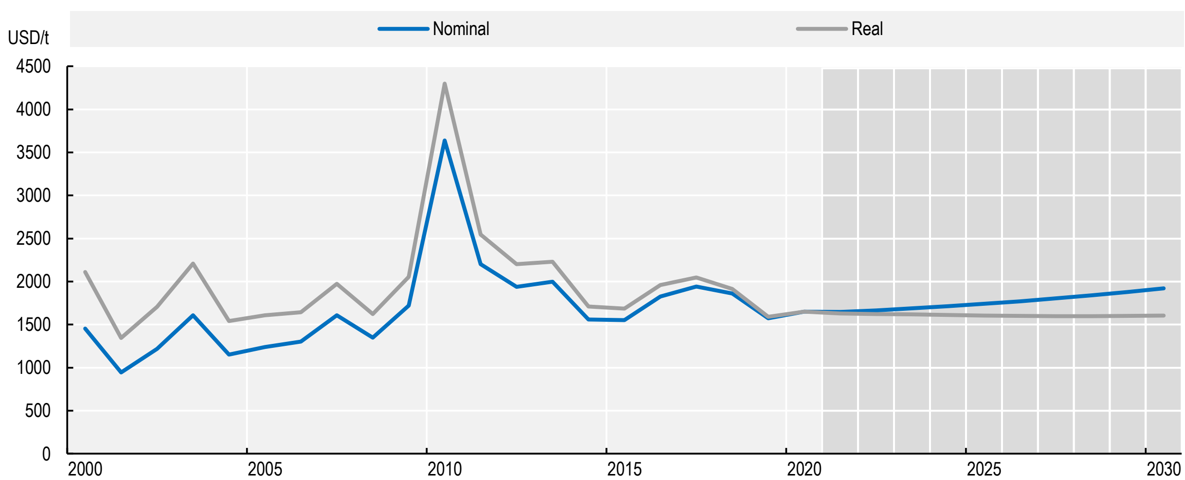
After the first demand shock, demand for goods was stronger than initially expected as government policies to sustain incomes for segments of the work force and the increased savings that were boosted by the large decrease in spending on services sustained demand for cotton. Consequently, global demand of raw cotton increased in 2020/2021.

World trade of raw cotton fell less than consumption in 2019/2020, and the rebound in world trade in 2020/2021 resulted in the highest trade volumes since the record-high of 2012. While international trade conflicts and the impact of the pandemic on consumption halted China’s rebound in imports in 2019, in 2020 these reached their highest volumes in seven years. Pakistan, mainly in response to a shortfall in the 2020 output, increased its imports. In Bangladesh and Indonesia, imports have not fully recovered from their sharp drop in 2019 mainly due to the lingering effects of the pandemic on domestic textile industries. Cotton exports from India, a key exporter, grew more than 70% from the 2019 level, sustained by the depreciation of the country’s currency and the rally in global cotton prices in the second half of 2020 and early 2021.

10.3. Prices

International cotton prices are expected to decrease in real terms throughout the outlook period, as world cotton demand remains under pressure from synthetic fibres, notably polyester. The decrease in real prices is equivalent to a slight increase in nominal terms. From the early 1970s, when polyester became price-competitive with cotton, cotton prices tended to follow on average 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. Polyester prices are not part of this *Outlook*'s projections; it is implicitly assumed that the relative competiveness between these two types of fibre does not change drastically, but that there are slight improvements in favour of cotton.

Figure 10.2. World cotton prices



Note: Real prices are nominal world prices deflated by the US GDP deflator (2020=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 (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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The cotton market has historically been sensitive to external shocks that have led to large price swings. In 2010/11, cotton prices more than doubled due to a mix of high oil and polyester prices, and unexpected high demand. The subsequent correction was only partial as both the additional demand from China and polyester prices progressively decreased (Chinese stockpiling progressively decreased up to 2014 and polyester prices decreased up to 2015/16).

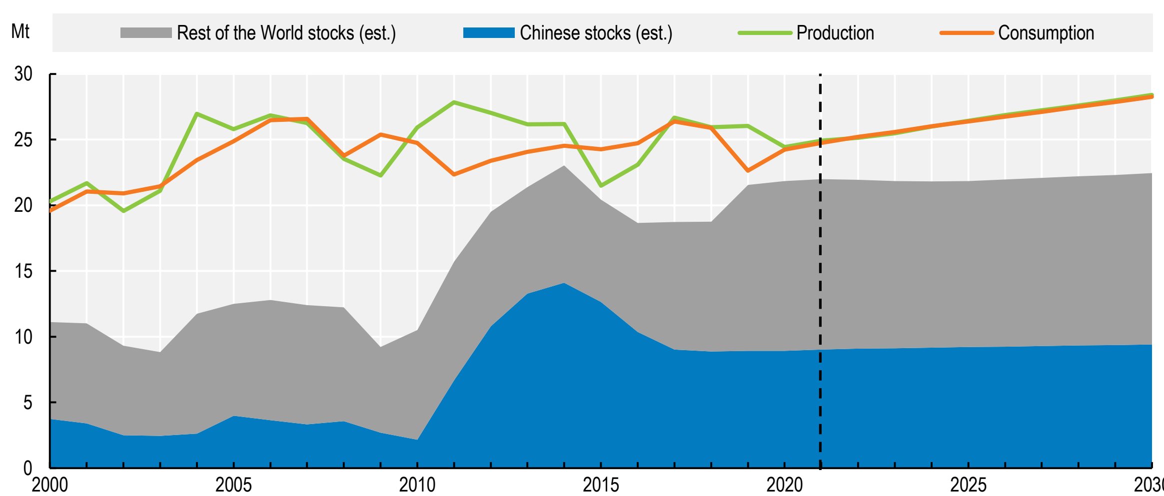
The potential for external shocks to create volatility exists, but a repetition of the 2010/11 price peak seems unlikely given higher global stocks. However, decisions on destocking in China can affect projections. In the past three years, Chinese public stock levels seem to have stabilised after they decreased when the minimum support price system was removed in 2014. This *Outlook* assumes stocks to remain at currents levels, in line with recent trends. The future path of cotton prices is clearly sensitive to this assumption.

10.4. Production

Cotton is grown in subtropical and seasonally dry tropical areas in both the northern and southern hemispheres, although most of the world's production takes place north of the equator. The main producing countries are India, China, the United States, Brazil, and Pakistan. Together, these countries account for more than three-quarters of global production (Figure 10.1).

Most of the production growth in the coming decade is expected to come from these countries, with India accounting for more than 40% of the global increase. At the global level, the cotton area is projected to expand by 1% while yields are projected to increase by 10% compared to the base period. In the last decade, global yields were stagnant, reflecting stagnant or decreasing yields for some major producers (United States, Pakistan, India), declining cotton area in China (where yields are well above average), and expanding cotton area in India (where yields are well below average). These factors are expected to continue to affect global yield trends in the coming decade, despite growth in both yields and cotton area in Brazil.

Figure 10.3. World cotton production, consumption, and stocks



Note: est. stands for estimate.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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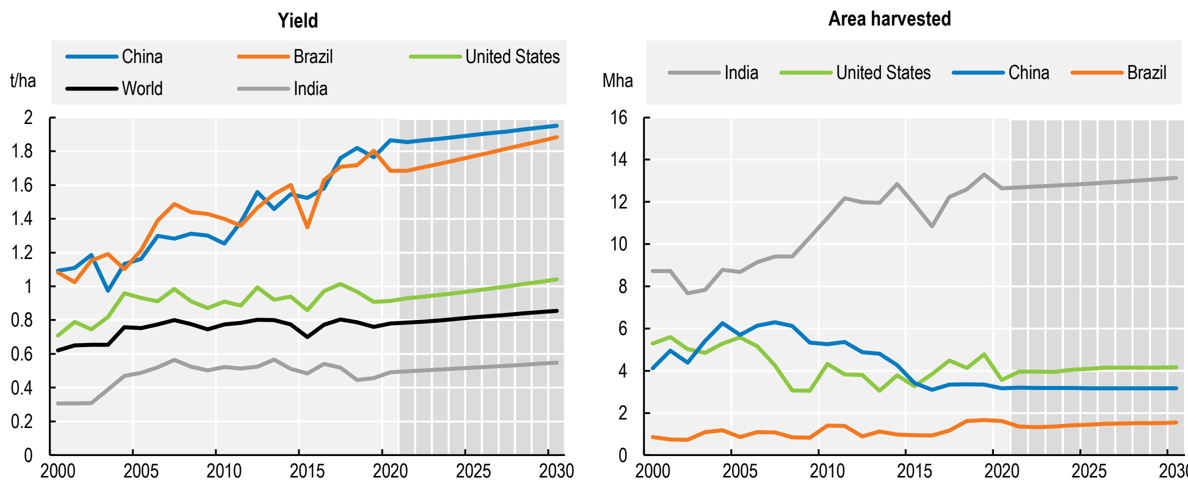
Production in India is projected to grow by around 1.5% p.a. over the outlook period, mainly on account of higher yields rather than area expansion, since cotton already competes for acreage with other crops. Raw cotton productivity has remained stagnant in recent years and is among the lowest globally, as producers struggle with adverse weather, insect pests, and diseases. However, growing demand from the domestic apparel industry continues to spur investments in the sector and this *Outlook* assumes a growth in yields that reflects increased use of smart mechanisation, varietal development, and pest management practices. Nonetheless, climate change, with most cotton grown under rain-fed conditions, may undermine the yield growth potential.

Chinese cotton producers currently achieve yields that are more than double the world average, even though yields continue to be below the country's potential levels. Since further improvement may become more difficult, yield growth is projected to slow down to 0.6% p.a. Although in general the cotton area in China has been declining over the past decade, mostly due to changing government policies, this trend seems to have been halted since 2016. This *Outlook* expects a stagnating cotton area in China.

In Brazil, cotton is grown in part as a second crop in rotation with soybeans or maize, and output has recently grown strongly in the main growing areas, e.g. Mato Grosso. Favourable growing conditions and a high rate of adoption of modern technologies have driven rising cotton yields and areas over the past years. This *Outlook* assumes that these factors support further production growth.

Figure 10.4. Cotton yields and area harvested in major producing countries



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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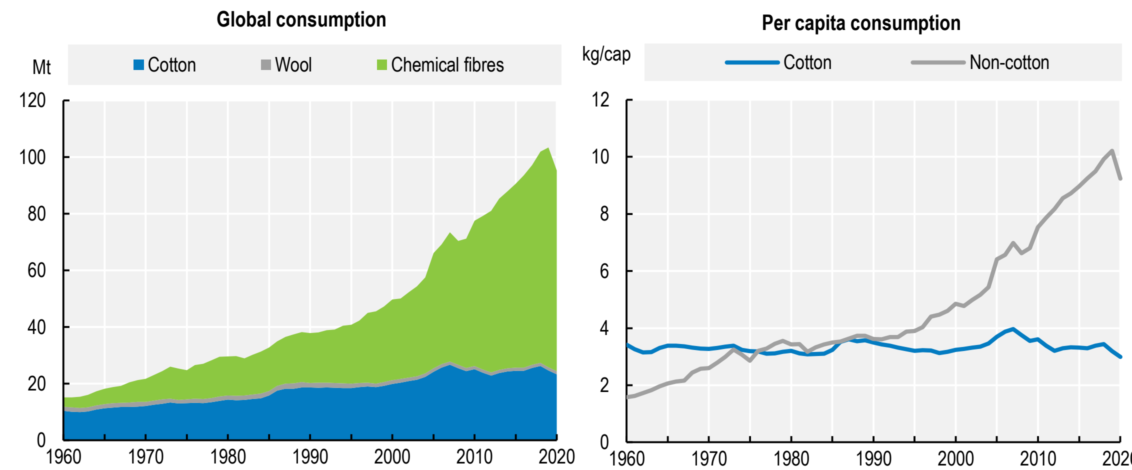
10.5. Consumption

Cotton consumption statistics in this *Outlook* refer to the use of cotton fibres by mills for the production of yarn. This mill use depends on the global demand for textiles and on competition from substitutes such as polyester and other synthetic fibres. Over the past decades, global demand for textile fibres has grown strongly, but most of this demand has been met by synthetic fibres (Figure 10.5). Per capita consumption of non-cotton fibres overtook that of cotton in the early 1990s and has continued to grow strongly. By contrast, global per capita consumption of cotton fibres has increased little over time, and has even decreased in recent years. As a result, global cotton consumption peaked in 2007 at 27 Mt, but decreased to around 24 Mt in 2018-20.

The prospects for global cotton use depend on developments in developing and emerging economies. Data collected by the International Cotton Advisory Committee (ICAC) suggests that global per capita demand for cotton products decreased between 2007 and 2012, but that it has since stabilised (Figure°10.5). The effects of income growth should lead to a higher demand for cotton products. However, strong population growth in regions where per capita demand for cotton products is below average dampens this effect. Demand from developing regions with lower absolute levels of consumption but higher income responsiveness will put an upward trend on global demand as the incomes and population of these countries are projected to increase. As a result, this *Outlook* expects that global consumption of cotton products will grow at a slightly higher pace than global population in the coming decade. Correspondingly, global mill use is projected to grow by around 1.5% p.a. over the outlook period.

Figure 10.5. Historical trends in consumption of textile fibres



Source: ICAC World Textile Demand estimates, 2021.

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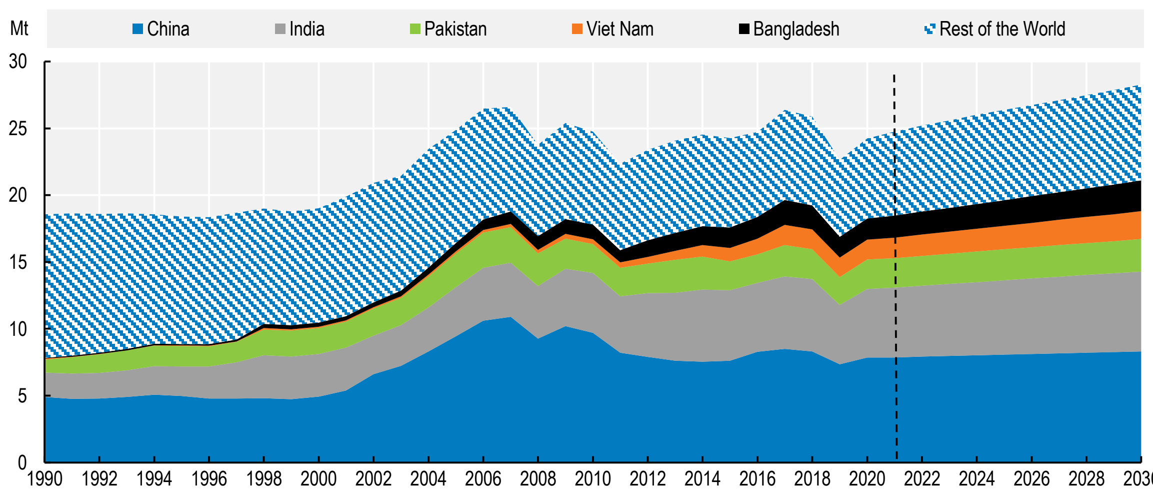
The distribution of demand for cotton fibres depends on the location of spinning mills, where cotton and synthetic fibres are spun into yarn. The greatest amount of yarn spinning occurs in countries where downstream industries are located, mostly in Asian countries with lower labour costs. China has been the world's largest consumer of cotton since the 1960s. Major shifts are taking place, however, with yarn production gradually moving from China to other Asian countries.

China's cotton mill consumption has been decreasing since the support price system was abolished in 2014. The artificially higher prices had caused a shift from cotton to synthetic fibres on the demand side. The decline in cotton demand also reflects structural change as higher labour costs and more stringent labour and environmental regulations provoked a move of the industry to other Asian countries, notably Viet Nam and Bangladesh. In recent years, mill consumption has regained some lost ground in China, in part because 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 is therefore assumed to maintain a slight upwards trend over the next decade under the assumption that cotton-based fabrics produced in the Xinjiang region will regain consumer trust. Human rights concerns with respect to the treatment of workers has raised concerns, especially in the United States, which has banned imports from that region.

Support to the sector in India is expected to result in continuous growth in cotton mill use. Cotton plays an important role in the Indian economy as the country's textile industry is predominantly cotton based. The textile industry represents an important component of the country's industrial production and is one of the largest source of employment. The industry, however, faces several challenges, including technological obsolescence, high input costs, and poor access to credit. To address these issues, the government has implemented several subsidy schemes and is currently developing a new textile policy for the overall development of the sector.

Figure 10.6. Cotton mill consumption by region



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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The phase-out in 2005 of the Multi Fibre Arrangement (which had fixed bilateral quotas for developing country imports into Europe and the United States) was expected to favour Chinese textile producers at the cost of smaller Asian countries. In practice, countries such as Bangladesh, Viet Nam, and Indonesia experienced strong growth of their textile industry based on an abundant labour force, low production costs, and government support measures. In addition, the escalation of the United States-China trade dispute has spurred additional mill use in Bangladesh and Viet Nam. In the case of Viet Nam, this was partly driven by its accession to the World Trade Organization in 2007 and by foreign direct investment (FDI) by Chinese entrepreneurs. The rapid growth in these countries is expected to continue over the outlook period, with Bangladesh and Viet Nam expanding their mill use by 40% and Indonesia by 28% relative to the base period (the spinning industry in Indonesia faces challenges that are impeding further production growth, including increased production costs and lower labour productivity). Further growth is also expected in Turkey and Central Asia, where the textile industry is expanding in part thanks to growing exports to the European Union and the Russian Federation (hereafter "Russia").

Sustainability considerations will continue to influence future demand and supply of cotton. As shown in Table 10.1, the share of cotton lint produced under special sustainability or organic standards has increased steadily since 2010. In 2018, it reached a share of 25%. Among the existing standards, the Better Cotton Initiative dominates globally, accounting for more than 45% of sustainable cotton supply in 2018, followed by the Responsible Brazilian Cotton initiative with 35%. Brazil, where about 80% of cotton production is certified under these two initiatives, takes a leading role in global sustainable cotton production. It is most likely that the sustainable and organic segment will continue to grow in the future with the implication that this will lead to an increased need for transparency and traceability along the supply chain.

Table 10.1. Sustainable and organic cotton production

	Total production (1000t)	Sustainable and organic cotton production (1000t)	% share / total world production
2010	25 869	185	1%
2011	27 856	578	2%
2012	27 079	1 289	5%
2013	26 225	1 490	6%
2014	26 233	2 465	9%
2015	21 640	3 211	15%
2016	23 196	3 609	16%
2017	26 798	5 375	20%
2018	25 972	6 400	25%

Source: ICAC.

10.6. Trade

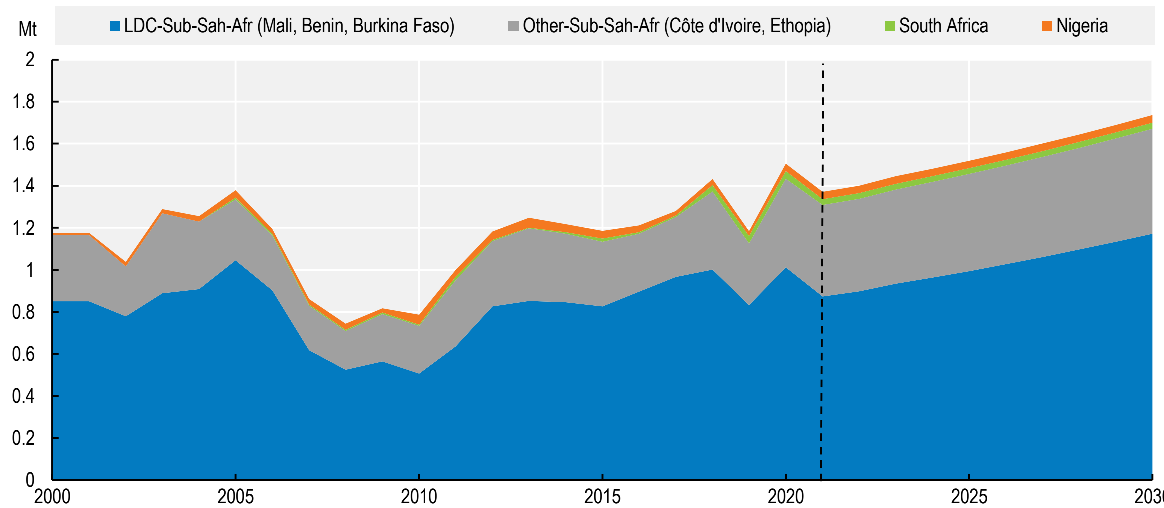
China is expected to remain the leading raw cotton importer over the next decade, followed by Viet Nam and Bangladesh. By 2030, imports in China are projected to increase by 17%, and in Bangladesh and Viet Nam by 41%, in line with mill consumption growth. These three countries will account for more than half of global cotton imports (Figure 10.1).

The United States will remain the world's largest exporter throughout the outlook period. Exports of the country have stabilised in recent years, recovering from the lows in 2016, and the US share of world trade is projected at 33% in 2030, compared to a 36% share in the base period. Recent trade tensions between the United States and China has placed some pressure in cotton shipments between the countries. Under the assumption of better trade relations in the future, the United States should regain some shares in Chinese raw cotton imports.

Brazilian exports are expected to grow strongly over the next decade as Brazil establishes its position as the second largest exporter by 2030, continuing to increase its share in global markets. India will follow as the third largest exporter with shipments projected at 1.5 Mt by 2030, 70% higher than in the base period.

Cotton is an important export crop for Sub-Saharan Africa, which currently accounts for 15% of global exports. Overall, cotton production in the region has increased in the past several years, mainly as a result of an area expansion, although in 2020 the decline in cotton prices led to a drop in acreage and production, particularly in Mali, a key producing country. Spinning mill consumption remains limited throughout Sub-Saharan Africa and many countries export virtually all that they produce. However, the textile and apparel industry is growing in some countries, especially Ethiopia, as the region presents some attractive conditions for FDI, which has been significant in recent years. In the long run, this might change the net export condition of Sub-Saharan Africa. Sub-Saharan African exports are projected to continue growing at around 2.7% p.a. in the coming decade, with the region's market share remaining at around 15% as in the base period; South and Southeast Asia are the major export destinations.

Figure 10.7. Cotton exports in Sub-Saharan Africa



Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook OECD Agriculture statistics (database)", http://dx.doi.org/10.1787/agr-outl-data-en.

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10.1. Main issues and uncertainties

Economic growth and urbanisation will affect the per capita demand for cotton textiles in developing and emerging economies. Since the consumption of textiles and apparel is more income responsive than the consumption of food commodities, deviations from the economic conditions assumed for the developing world could lead to important changes in global consumption, production, and trade projections. Consequently, the general uncertainty of this *Outlook* on how economies will emerge from the pandemic is potentially more important for raw cotton than for other agricultural commodities.

Other demand trends could affect the projections. For example, recycling by the textile industry is creating a competitive secondary market that provides raw material to producers of lower-quality textiles and non-textile products. This trend could further reduce the demand for cotton and other fibres. However, in high-income countries there appears to be an increasing consumer preference for natural fibres that could favour cotton over polyester.

Policy measures can affect consumption trends. For example, several East African countries are increasingly discouraging second-hand clothing imports, which could give a push to cotton consumption and encourage value addition in Africa.

Like other crops, cotton production is sensitive to pests and weather conditions and projections are therefore sensitive to climate change, which could lead to increasing frequency of droughts and other adverse weather conditions. As noted above, yield growth has been slow in several countries over the past decade. Faster than expected improvements in genetics (e.g. facilitated in part by a better understanding of the cotton genome) and better pest management have the potential to lead to higher yield growth than what is projected in this *Outlook*. However, such innovations take time to develop and deploy, and in the case of genetically modified cotton are sometimes controversial. In India, pink bollworm appears to have become resistant to Bt cotton, resulting in significant crop losses. In Burkina Faso, the introduction of Bt cotton in 2008 was effective in combatting bollworms, but resulted in a shorter staple length (and hence lower quality premiums). This prompted the government to phase out Bt cotton in 2015.

Policies also play an important role in global cotton markets. This is notably the case for Chinese stockholding policies. Other policy initiatives (e.g. support for domestic textile industries, input subsidies) may affect projections. In Mexico, Bt cotton is widely planted (95% of the area), but farmers are facing seed shortages. In recent months, the Mexican Ministry of Agriculture has denied new releases of GM cotton, limiting the Bt varieties that farmers can use for planting but without giving farmers access to local conventional seeds to replace these varieties. The ministry also published a decree in December 2020 banning the use of the herbicide glyphosate in all federal government programs. Such policies add more uncertainty to the forecast of cotton production in the coming years.

Trade tensions may also play a role in affecting the development of the raw cotton markets. In recent years, the cotton market has been affected by the US-China trade dispute. In early 2021, the United States banned all products made in part or entirely from cotton produced in the Xinjiang region due to the treatment of ethnic minorities in that region. This issue is increasingly an important concern for consumers, industry, and policy makers in many countries and, depending on whether these concerns will increase or decrease in the future, could considerably alter China’s export prospects of cotton-based fabrics and consequently their cotton mill demand.

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 (2021-30) 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 in a little 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 (98 Mt) and Africa (92 Mt). In Sub Saharan Africa, roots play a significant role as a staple crop. Globally, about 125 Mt are used as food, 54 Mt as feed, and 61 Mt for other uses, mostly biofuel and starch. As the perishable nature of these crops prohibits significant international trade in fresh produce, countries tend to be self-sufficient. About 14 Mt are currently traded internationally, mostly in processed or dried form. Thailand and Viet Nam are the leading exporters and the People’s Republic of China (hereafter “China”) is the main destination.

Global production of roots and tubers reached 237 Mt (dry matter) in the base period (2018-20); 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) decreased in 2020 as yields in many major-producing regions were favourable. 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.

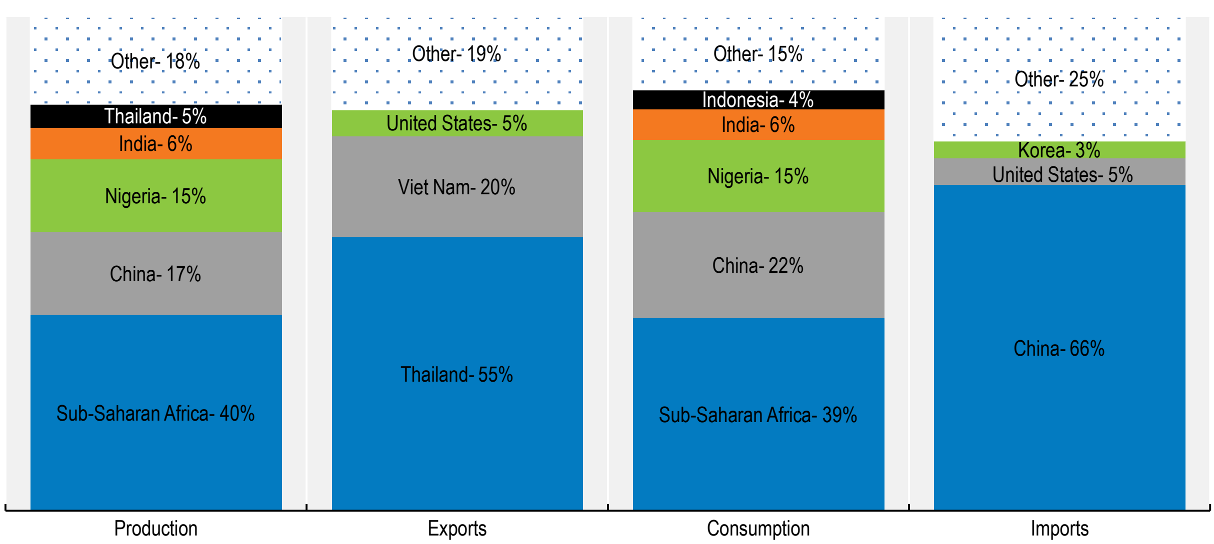
Global sweet potato cultivation has declined in recent years, mostly due to a sharp decline in acreage (which shows no sign of abating) in China, the world's foremost producer. Food demand largely defines the growth potential of sweet potato and other less prominent roots and tuber crops given the limited 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 2.3% p.a. while supply in high-income countries should grow at only 0.3% annually. Global land use is projected to increase by 2 Mha to 65 Mha, but there will be some regional shifts. African countries are expected to increase their cultivation area, while reductions are projected for Europe and America. Production growth is mainly attributed to investments in yield improvements in Africa and Asia, as well as an intensification of land use in these regions.

By 2030, an additional 1 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 40 kg per year. Biofuel use, albeit from a low basis (3% of use), is expected to grow by more than one-third 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 12% and 18% respectively, over the outlook period.

Figure 11.1. Global players in roots and tubers markets in 2030



Note: Presented numbers refer to shares in world totals of the respective variable
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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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 13 Mt, mainly to supply the growing biofuel and starch industries in China.

Given the substitutability between roots and tubers and cereals on food and feed markets, prices of roots and tubers are projected to follow a similar path to cereal prices in the medium term; namely, an increase in nominal prices but a decline in real terms.

11.2. Pulses

11.2.1. Market overview

Pulses are the edible seeds of plants in the legume family. Commonly, eleven types are recognised.[1] They provide protein, dietary fibre, vitamins, minerals, phytochemicals, and complex carbohydrates. Apart from the nutritional benefits, pulses help to improve digestion, reduce blood glucose, minimise inflammation, lower blood cholesterol, and prevent chronic health issues such as diabetes, heart disease, and obesity. However, their consumption levels differ from region to region depending on the dietary patterns, availability and prevailing conditions.

Cultivation of pulses has a long tradition in almost all regions of the world. For centuries, legumes have played a fundamental role in the functioning of traditional agricultural systems. Prior to 2000, global production of pulses stagnated due to the widespread disappearance of small farms in developing countries which led to a decline of traditional farming systems that included pulses in their crop rotation. Production was further hampered because of their weak resilience to diseases due to a lack of genetic diversity, limited access to high-yield varieties, and the lack of policy support to pulses growers. The sector began to recover in the early 2000s and has since seen an annual increase of about 3% globally, led by Asia and Africa. These two regions combined accounted for about 63% of the 18 Mt production increase in the past decade.

Global per capita consumption of pulses started to decline in the 1960s (Figure 11.2) due to slow growth in yields and resulting increases in price. Income growth and urbanisation shifted preferences away from pulses as human diets became richer in animal proteins, sugar, and fats. Nonetheless, pulses have remained an important source of protein in developing countries, and average global per capita consumption has increased to about 8 kg/year to date. This growth has been driven mainly by income gains in countries were pulses are an important source of protein; this particularly true of India where vegetarians account for about 30% of the population.

Pulses can be processed into different forms such as whole pulses, split pulses, pulse flours, and pulse fractions like protein, starch and fibre. The flour and fractions have diverse applications in industries related to meat and snack food, bakery and beverages, and batter and breading.

11.2.2. Current market conditions

India is by far the largest producer of pulses, accounting for about 24% of global production in the past decade. Canada (8%) and the European Union (5%) are the next largest producing countries. The Asian market accounts for more than half of all consumption, but only about 45% of production, making it the most significant import destination. About 12% of global production is traded internationally with Canada (38% of global trade) by far the largest exporter and India the largest importer (29% of global trade). Africa has further expanded its production and consumption in the past decade, and has remained largely self-sufficient.

In 2020, the global pulses market reached a volume of 92 Mt, after an average annual growth of 3% p.a. during the previous decade; this growth was led by Asia and Africa. Growth between 2019 and 2020 was high in the European Union (+10%). World trade volumes were registered at 18 Mt, 0.5 Mt higher than in 2019. Due to an ample supply situation, international prices for pulses, approximated by the Canadian field pea price, have dropped to USD 186/Mt, its lowest value since 2009.

11.2.3. Main drivers for projections

As pulses are associated with various health benefits, health-conscious consumers are increasingly integrating these in their daily diets, which in turn is propelling the growth of the global pulses market. Rapid urbanisation, changing lifestyles, and hectic work schedules are also making 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 9 kg by 2030. Per capita consumption is projected to level off in Latin America and Africa at around 12 kg/year, but is expected to increase in many other regions over the coming decade. (Figure 11.2)

Global supply is projected to increase by 22 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 6.6 Mt by 2030. 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 70% of production growth can be attributed to yield improvements during the projection period, and the remaining 30% to land use intensification, mainly in Asia, Africa and Europe. Particularly in Africa, a combination of area expansion and yield growth is estimated to add about 0.5 Mt annually to the regional production.

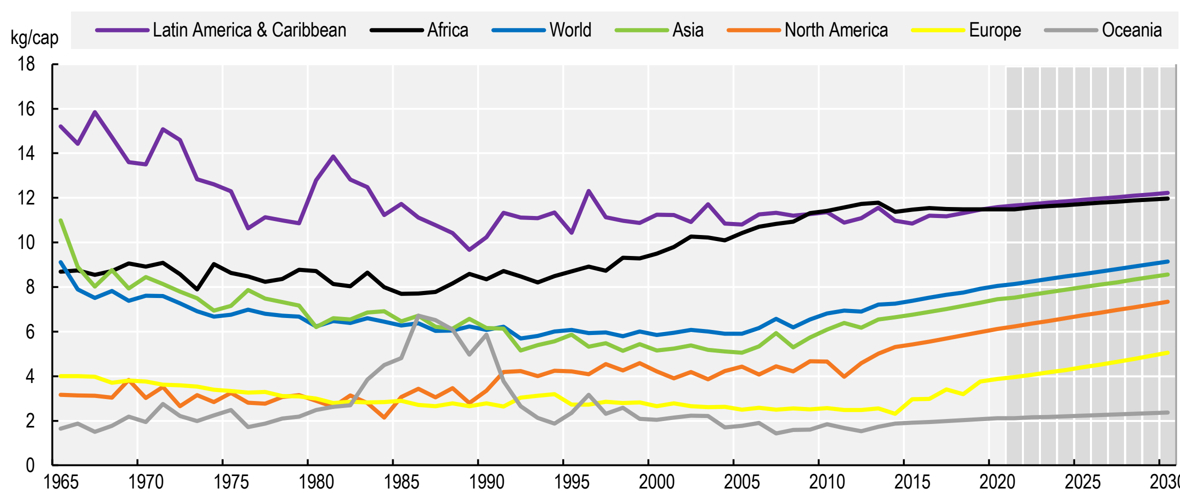
This *Outlook* assumes that growth will be sustained by increased intercropping of pulses with cereals, in particular in Asia and Africa where smallholder farmers represent a large share of producers. The projected yield improvements of pulses will continue to lag cereals and oilseeds because in most countries pulses are not included in the development of high-yielding varieties, improved irrigation systems, and agricultural support policies.

World trade of pulses grew from 13 Mt to 17 Mt over the past decade and is projected to reach 19 Mt by 2030. India’s recent efforts to become self-sufficient in pulses are the major factor driving the anticipated slowdown in global pulses trade. After a continued increase in the near term, imports by India are expected to level off by 2030 when they are projected to reach 5 Mt.

Canada remains the main exporter of pulses, with volumes expected to grow from 6.7 Mt at present to 8 Mt by 2030, followed by Australia with 2.4 Mt of exports by 2030. However, given that Canada’s major trading partner is India, which is expected to slow its import growth, they will need to diversify their export markets.

International prices are expected to increase in nominal terms over the coming decade, while real prices will decline slightly.

Figure 11.2. Per capita food consumption of Pulses per continent



Source: OECD/FAO (2021), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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11.3. Bananas and major tropical fruits

11.3.1. Market overview

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, income growth 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. Against this backdrop, export quantities of the four major fresh tropical fruits have experienced some of the fastest average annual growth among internationally traded food commodities, while export quantities of bananas have increased to unprecedented heights.

Based on 2019 figures, the global banana and major tropical fruit export industries respectively generate around USD 9.1 billion and USD 10 billion per year. Although only approximately 15% of global banana production and 5% of global major tropical fruit production are traded in international markets, in exporting countries, which are mostly low-income economies, revenue from production and trade can weigh substantially in agricultural GDP. For instance, banana represented about 42% of agricultural export revenue in Ecuador in 2018, and 17% in Guatemala. 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.

11.3.2. Constraints under COVID-19

Since the onset of the COVID-19 pandemic, a smooth continuation of global supplies of bananas and major tropical fruits has been jeopardized by the impact of the disease itself as well as by the disease mitigation measures that have been implemented. Both of these factors discernibly affected the production, transport, distribution, marketing and consumption of fresh bananas and major tropical fruits in 2020, with disruptions and contractions widely reported. At the same time, surges in consumer demand for vitamin-rich fruits have facilitated fast growth in trade for some commodities in some markets.

On the supply side, the adverse effects of not only the disease spread but also of the physical distancing measures have tended to be more immediate and pronounced for the relatively labour-intensive production and trade of fruits and vegetables than for most other food commodities, particularly staple foods. Given their typically high perishability, fresh fruits and vegetables require timely and well-coordinated harvesting and post-harvest handling, as well as uninterrupted cold chains. Some major tropical fruits, such as fresh mangoes, furthermore, partly rely on airfreight for export. In many producing countries, quarantine-related delays at ports and borders, border closures, as well as extreme shortages of reefer containers and airfreight belly-capacity, have slowed trade, while market closures have interrupted producers' access to local and national distribution outlets. Reports of produce remaining unsold and going to waste have been widespread, particularly for more perishable varieties such as papayas and pineapples. With input factories and import routes disrupted, reduced availability and higher costs of key inputs for production and distribution have further jeopardized a smooth continuation of supply. Under these circumstances, the profitability of many farms and plantations has been severely affected, with industry sources reporting difficulties arising from cancelled orders, particularly for small- to medium-sized producers.

On the demand side, the rapid decline in global economic activity has resulted in negative impacts on the global incidence of unemployment, poverty, inequality and undernourishment. Reduced consumer incomes have resulted in reports of reduced demand in the major tropical fruits sector globally, given the high income elasticities of demand for the majority of these high-value commodities. In addition to income effects, the closure of schools, canteens, restaurants, bars and hotels around the world has severely affected food consumption patterns. While precise figures are not currently available, away-from-home consumption of tropical fruits, especially avocados and pineapples, can account for a substantial share of total consumption in key import markets.[2] This has most notably been observed in the United States and the European Union, where distributors reported difficulties in selling produce, most notably pineapples, throughout the duration of lockdowns.

Up to this point, in the presence of significant delays and discrepancies in data reporting, the short-term impact of COVID-19 continues to be difficult to gauge. The medium-term impact is similarly uncertain as it depends on the recovery path following the current pandemic, and since projections of trade in tropical products would be sensitive to different economic growth assumptions. Adverse weather and climate-related factors, given their mostly unpredictable nature, bring additional uncertainty to the outlook, as further discussed below. However, despite these uncertainties, global production and trade of bananas and major tropical fruits are projected to expand solidly over the medium term. Demand growth in high-income countries, where nutritional awareness is becoming stronger, and increasing demand also in emerging countries such as China and India, are expected to drive investments and expansion in banana and major tropical fruit production zones. The outlook accordingly indicates that bananas and major tropical fruits would continue to be among the fastest growing and most valuable agricultural industries in terms of their international trade prospects.

11.3.3. Bananas

Market situation

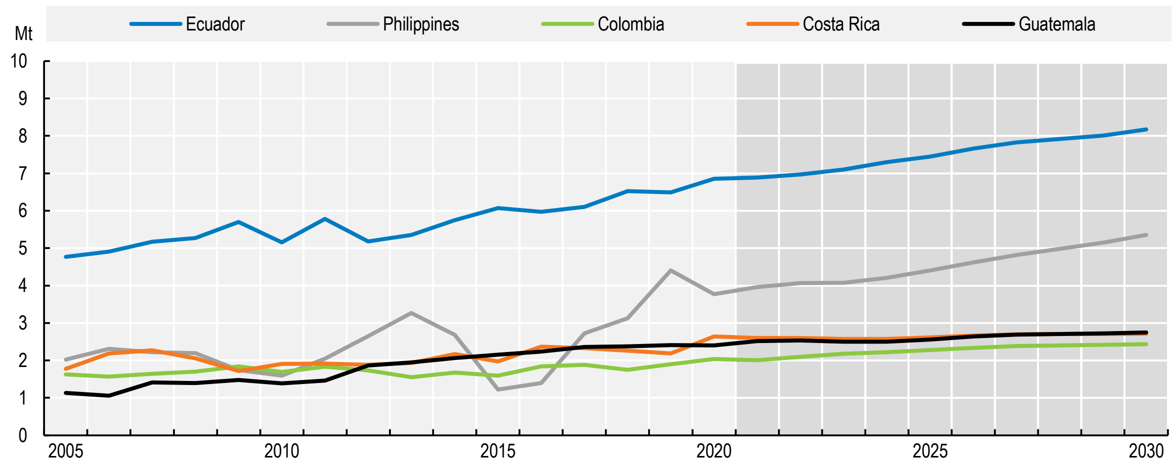
Preliminary estimates indicate that global exports of bananas, excluding plantain, reached a new record high of 22.2 Mt in 2020, an increase of 1.7% compared to 2019. Strong supply growth in Ecuador, Costa Rica, and Colombia, three of the five leading exporters, was chiefly accountable for this rise. All three countries reportedly implemented disease mitigation strategies in their plantations at early stages of the pandemic and were thereby able to minimize disruptions to their ability to supply bananas to world markets. Meanwhile, exports from the Philippines, the second leading global exporter, were affected by severe difficulties arising from the impact of the pandemic on the country's banana production, which reportedly had a particularly detrimental effect on small-scale producers. Preliminary data and information accordingly indicate a contraction of 14% in Philippine banana exports in 2020.

On a provisional basis, global net import quantities of bananas stood at approximately 18.9 MT in 2020, a mere 0.2% increase from 2019, reflecting pandemic-induced strains on global supply chains as well as strains on demand in several key import markets. While demand in the European Union reportedly remained strong, preliminary data indicate a contraction in imports of 0.1% in the United States, the second largest importer behind the European Union, due to reduced demand. More drastically, imports by China, the third largest importer of bananas globally, contracted by an estimated 10% on account of the supply disruptions experienced in the Philippines. However, it needs to be noted that reported trade data for bananas currently display a large discrepancy between exports and imports for 2020, which may also be caused by data reporting lags or errors. FAO is continuously monitoring global trade flows of bananas and will correct these estimates in the event that more precise data become available.

Projection highlights

Assuming normal weather conditions and no further spread of banana plant diseases, the current baseline projections expect world production of bananas to grow at 1.4% p.a., to reach 138 Mt in 2030. As in previous projections, demand for bananas is forecast to become increasingly saturated in most regions and primarily driven by population growth. However, 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 is expected to remain the leading global producing region at a quantity share of 53%, with India projected to reach 36 Mt and a per capita consumption of 24 kg in 2030. Production from the leading exporting region of Latin America and the Caribbean is expected to reach 36 Mt, encouraged by rising demand from key importing markets, most importantly the European Union, the United States, China, and the Russian Federation. The largest exporters from the region – critically Ecuador, Guatemala, Colombia, and Costa Rica – all continue to be well positioned to benefit from this rise, assuming that production growth can be shielded from the adverse effects of erratic weather events and disease outbreaks. Rising import demand is similarly 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% p.a. over the outlook period – led by Ivory Coast –, to reach a total quantity of approximately 750 000 t in 2030.

Figure 11.3. World banana outlook: Exports by the five major exporters



Source: FAO (2021). FAOSTAT Trade Indices Database, http://www.fao.org/faostat/en/#data/TI; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

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11.3.4. Mango, mangosteen and guava

Market situation

Global exports of fresh mangoes, mangosteens, and guavas[3] grew to an estimated 2.3 Mt in 2020, an increase of 5.1% from the previous year, according to preliminary data. This places the commodity cluster as the second fastest growing group among the major tropical fruits in 2020, behind papaya. The main driver is an approximate 12% expansion in exports from South American suppliers, which reached an estimated 530 000 t in 2020. Favourable production conditions in Brazil and Peru resulted in strong supplies, which in turn facilitated growth in exports of 12.8% and 11.4% for these countries, respectively. Exports from Mexico, the leading supplier of mangoes globally, meanwhile registered growth of 3% in 2020. All three of these suppliers benefited from ample import demand from the United States of America, which accordingly reported an estimated increase in imports by 10.7% in 2020. Exports from Thailand, meanwhile, contracted by 18% on account of COVID-19-related supply chain disruptions affecting shipments to China, the main recipient of Thai mangosteens. With an average export unit value of USD 1 700 per tonne for shipments from Thailand to China in 2020 – approximately 30% higher than in 2019 – mangosteens are among the most valuable tropical fruits traded at the global level. Imports by the European Union were similarly constrained by COVID-19-related supply disruptions and experienced an estimated decline of 10.6% compared to 2019. As such, preliminary data indicate a total global import quantity of fresh mangoes, mangosteens, and guavas of 2.1 Mt in 2020. This preliminary estimate may be revised as more data become available.

Projection highlights

Global production of mangoes, mangosteens and guavas is projected to reach 84 Mt by 2030, increasing at 3.3% p.a. over this period. Asia, the native region of mangoes and mangosteens, is expected to account for 75% of global production in 2030 compared to 73% in the base period. 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 growth. Mango production in India is accordingly projected to account for 43 Mt in 2030, or 51% of global production, destined largely for local informal markets. As such, India is expected to experience increases in per capita consumption of 3% p.a. over the outlook period, reaching 28.4 kg in 2030, while average per capita consumption in Asia overall is expected to reach 14.6 kg in 2030, compared to 10.4 kg in the base period. Global exports of mangoes, mangosteens and guavas are projected to reach almost 3 Mt in 2030, compared to 2.1 Mt in the base period, on account of rising import demand in established and emerging import markets. China, whose domestic mango production is comparatively low at a projected 2.2 Mt in 2030, is expected to experience a growth in imports of 4.9% p.a. This will be mainly due to a strong income-driven increase in Chinese demand for mangosteen, which is expected to be predominantly met by an increase in imports from Thailand, the largest global exporter of mangosteen. Mexico, the leading supplier of mangoes globally, is expected to benefit from further growth in import demand from its major market, the United States, and register 4% p.a. growth in exports over the outlook period, to reach a 22% share of world exports in 2030. Thailand and Brazil, the second and third largest exporters, are projected to have market shares of around 12% by 2030, but will be matched by rising exports from Peru.

11.3.5. Pineapple

Market situation

Global exports of pineapples were strongly impacted by the adverse effects of the COVID-19 pandemic in 2020. Preliminary data suggest a total export quantity of 2.9 Mt in 2020, corresponding to a 13.4% decline compared to 2019. The two main global exporters of pineapples, Costa Rica and the Philippines, both experienced sharp declines in shipments, at -17% and -8%, respectively. Costa Rican exports were primarily affected by lower demand from the European Union and the United Kingdom, where imports declined by 25% and 15% compared with 2019, respectively. Widely implemented closures of the hospitality sector significantly impeded the typical distribution structure for pineapples. The Philippines, meanwhile, experienced substantially lower demand from China and Korea, two major importers of Filipino pineapples. Both of these importing countries had introduced strict lockdowns early in the year, hampering import routes, as ports and warehouses operated at drastically reduced capacity. Amidst these difficulties, global imports of pineapples decreased to an estimated 2.8 Mt in 2020, an approximate decline of 9% compared to 2019.

Projection highlights

Global production of pineapple is projected to grow at 2% p.a., to reach 37 Mt in 2030, on account of a 1.8% expansion in harvested area. Asia is expected to remain the largest producing region and account for 40% of global production; pineapple production being sizeable in the Philippines, Thailand, India, Indonesia, and China. Pineapple cultivation in Asia will continue to cater predominantly to domestic demand and is expected to grow in response to changing demographics and income growth. Only the Philippines, the second leading exporter after Costa Rica, is anticipated to export approximately 20% of its production. Similarly, pineapple production in Latin America and the Caribbean, the second largest producing region at a projected 38% of world production in 2030, will be primarily driven by the evolving consumption needs of the region’s growing and increasingly affluent population. Global exports of pineapple are expected to grow at 1.4% p.a., to 3.5 Mt in 2030, predominantly driven by import demand from the United States. With projected imports of 1.3 Mt in 2030 – equivalent to a 37% global share – the country is expected to remain the largest importer, ahead of the European Union, which is expected to account for 22% of global imports. In both key import markets, demand for pineapples is expected to benefit from low unit prices and to some degree also from the introduction of more premium novelty varieties.

11.3.6. Avocado

Market situation

Preliminary data suggest that global exports of avocado declined slightly in 2020, by 0.8% compared to 2019, at a total quantity of approximately 2.3 Mt. The main factors hampering the overall potential of this previously buoyant market, which had seen fast and uninterrupted expansion for more than a decade, were the impact of COVID-19 on global supply chains as well as a poor harvest in Mexico, the largest supplier of avocados globally. Accordingly, Mexico experienced an estimated 8.1% fall in exports in 2020, to 1.3 Mt. Meanwhile, favourable weather and successful investments in production expansion stimulated significantly higher supplies from Peru, Colombia, and Kenya, three emerging avocado exporters. All three suppliers were thus able to achieve double-digit growth in exports in 2020, and together accounted for about 25% of total global exports. Imports by the United States, the largest importer of avocados globally, declined by an estimated 14.3% in 2020, due to the combination of lower demand from the hospitality sector and lower supplies from Mexico. Imports into the European Union, where out-of-home consumption similarly accounts for a substantial share of total avocado consumption, declined by an estimated 2.5% in 2020 due to the impact of COVID-19. Provisional data accordingly indicate a contraction of 0.6% in global imports in 2020, to 2.1 Mt. However, this preliminary estimate may be revised as more data become available.

Projection highlights

Avocado has the lowest production level among the major tropical fruits but has experienced the fastest growth in output in recent years and is expected to remain the fastest growing commodity of the major tropical fruits over the outlook period. Production is accordingly projected to reach 12 Mt by 2030 – more than three times its level in 2010. Ample global demand and lucrative export unit prices continue to be the main drivers of this growth, stimulating substantial investments in area expansion in both major and emerging production zones. Avocado production has been so far concentrated in a small number of regions and countries, with the top ten producing countries currently accounting for almost 80% of global output, but new growing areas are emerging rapidly. Nevertheless, about 74% 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, avocado is expected to become the most traded major tropical fruit by 2030, reaching 3.9 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 8.3 billion in constant 2014-16 value terms, thereby placing avocado as one of the most valuable fruit commodities. Output in Mexico, the world's largest producer and exporter, is expected to grow by 5.2% p.a. over the next ten years due to continued growth in demand in the United States of America, the key importer of avocados from Mexico. As such, and despite increasing competition from emerging exporters, Mexico is expected to further increase its share of global exports, to 63% in 2030. The United States and the European Union, where consumer interest in avocados is fuelled by the fruit's assumed health benefits, are expected to remain the main importers, with 40% and 31% of global imports in 2030, respectively. However, imports are also rapidly rising in many other countries such as in China and some countries in the Middle East, and, as measured by the Herfindahl-Hirschman Index of all importers, the concentration of imports is gradually decreasing.

11.3.7. Papaya

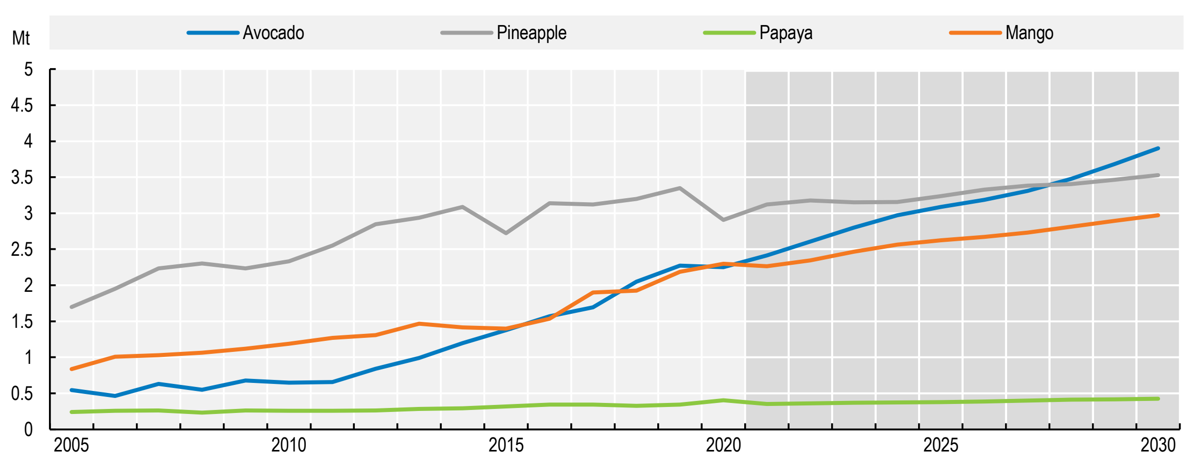
Market situation

Preliminary data indicate an increase in global exports of papayas of 17.5% in 2020, to approximately 400 000 t. The key reasons behind this significant expansion are substantially higher supplies from Brazil and a continued recovery from the weather-related production declines experienced in Mexico in 2017 and 2018. Brazil, an expanding exporter, thus reached second place in global supplies of papayas in 2020, at a total quantity of 96 000 t, following growth in exports of more than 115% from 2019. Mexico, the largest global exporter of papayas, meanwhile expanded shipments by an estimated 4.6% in 2020, to approximately 170 000 t. Virtually 99% of Mexican papaya supplies are exported to the United States, which accordingly ranks as the largest importer of papaya globally, at an estimated import quantity of 180 000 t in 2020, an increase of 1.1% from 2019. Imports by the European Union, meanwhile, declined by an estimated 4% in 2020, to approximately 35 000 t, in light of the COVID-19-induced disruptions to international air transport, which proved particularly detrimental to the long-distance shipment of highly perishable papayas.

Projection highlights

Global papaya production is projected to rise by 2.5% p.a., to 18 Mt in 2030. The strongest growth is expected to be experienced in Asia, the leading producing region globally. Asia's share of world production is set to rise to 60% by 2030. The world's largest producer, India, is projected to increase its papaya production at a rate of 3.0% p.a., thereby expanding its share of global output to 49% by 2030. Income and population growth will be the main factors behind this rise, with Indian per capita consumption of papayas expected to reach 5.9 kg in 2030, up from 4.5 kg in the base period. Global exports will predominantly be shaped by production expansion in Mexico, the largest global exporter of papayas, and higher demand from the key importers, the United States and the European Union. However, a major obstacle to a significant expansion in international trade remains the fruit's high perishability and sensitivity in transport, which makes produce problematic to supply to far afield destinations. Innovations in cold chain, packaging and transport technologies promise to facilitate a broader distribution of papaya, particularly in view of rising consumer demand for tropical fruits in import markets.

Figure 11.4. World major tropical fruit outlook: Global exports



Source: FAO (2021). FAOSTAT Trade Indices Database, http://www.fao.org/faostat/en/#data/TI; OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

StatLink https://stat.link/54jsrd

11.3.8. Uncertainties

Beyond the impact of COVID-19, several significant threats to global production, trade and consumption of bananas and major tropical fruits are present. 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 plant 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 23 countries, predominantly in South and Southeast Asia, but also in the Middle East and Latin America, with Colombia reporting the first infection in August 2019 and Peru in April 2021. A recently conducted assessment of the potential economic impact of the TR4 disease on global banana production and trade showed that a further spread of TR4 would, *inter alia*, entail considerable loss of income and employment in the banana sector in the affected countries, as well as significantly higher consumer costs in importing countries, at varying degrees contingent on the actual spread of the disease.[4] Appropriate re-specifications of the model could similarly be employed to investigate the effects of climate-driven changes on global tropical fruit area, changes in actual and attainable yields, as well as the impact of increased frequencies of extreme weather events on production and trade.

Notes

[1] Pulses types: dry beans, dry broad beans, dry peas, chickpeas, cow peas, pigeon peas, lentils, Bambara beans, vetches, lupines and minor pulses (not elsewhere specified).

[2] For example, in France, the largest avocado consuming country in the European Union, one-third of total avocado supply is reported to be consumed out of the home (www.fruitrop.com/en/Articles-by-subject/Direct-from-themarkets/2020/The-impact-of-covid-19-measures-on-fruit-and-vegetablesdistribution-in-France).

[3] International commodity classification schemes for production and trade do not require countries to report the fruits within this cluster separately, thus official data remain sparse. It is estimated that, on average, mango accounts for approximately 75% of total production quantity, guava for 15%, and mangosteen for the remaining 10%.

[4] An alternative simulation was run in 2019 to assess the potential economic impact of the Banana Fusarium Wilt Tropical Race 4 disease on global banana production and trade. The results of this scenario were published in the November 2019 issue of FAO’s biannual publication, *Food Outlook* (http://www.fao.org/3/CA6911EN/CA6911EN.pdf).

Annex A. Glossary

Aquaculture	The farming of aquatic organisms including fish, molluscs, crustaceans, aquatic plants, etc. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding and protection from predators. Farming also implies individual or corporate ownership of the stock being cultivated. For statistical purposes, aquatic organisms that are harvested by an individual or corporate body that has owned them throughout their rearing period contribute to aquaculture, while aquatic organisms that are exploitable by the public as a common property resource, with or without appropriate licenses, are the harvest of capture fisheries. In this *Outlook*, data relating to aquatic plants are not included.
African Swine Fever (ASF)	ASF is a highly contagious hemorrhagic disease of pigs, warthogs, European wild boar and American wild pigs. It is not a human health threat. The organism that causes ASF is a DNA virus of the Asfarviridae family. (For more information on this topic: http://www.oie.int/doc/ged/d13953.pdf)
Atlantic beef / pigmeat market	The Atlantic market for production and trade of beef and pigmeat consists of countries that are Foot and Mouth Disease (FMD) free with vaccination or contain FMD free zones. Most countries in this market are located around the Atlantic Ocean and typically trade grass-fed beef and grain-fed pigmeat. See also Pacific beef/pigmeat market.
Avian Influenza (AI)	AI is a highly contagious viral infection which can affect all species of birds and can manifest itself in different ways depending mainly on the ability of the virus to cause disease (pathogenicity) on the species affected (for more information on this topic, see http://www.oie.int/doc/ged/D13947.PDF)
Baseline	The set of market projections used for the *Outlook* analysis, also used as benchmark to analyse the impact of different economic and policy scenarios. A detailed description on how this baseline was generated is provided in the methodology section
Biofuels	In the wider sense, biofuels can be defined as all solid, fluid or gaseous fuels produced from biomass. More narrowly, the term comprises fuels that replace petroleum-based road-transport fuels. Ethanol is produced from sugar crops, cereals and other starchy crops, and can be used as an additive to, in a blend with, or as a replacement of gasoline. Biodiesel is produced mostly from vegetable oils, but also from waste oils and animal fats.
Biomass	Biomass is defined as any plant matter used directly as fuel or converted into other forms before combustion. Included are wood, vegetal waste (including wood waste and crops used for energy production), animal materials/wastes and industrial and urban wastes, used as feedstock for producing bio-based products. In the context of the *Outlook*, it does not include agricultural commodities used in the production of biofuels (e.g. vegetable oils, sugar or grains).
Blend wall	The term blend wall refers to short run technical constraints that act as an impediment to increased biofuel use in transportation fuels.
BRICS	Refers to the emerging economies of Brazil, the Russian Federation, India, the People's Republic of China, and South Africa.
Bt cotton	A transgenic cotton variety that contains one or more foreign genes derived from the bacterium *Bacillus thuringiensis*. Bt cotton is resistant against some insect pests, but the fiber of BT cotton plants is shorter than that of traditional varieties.

Capture fisheries	Capture fisheries refer to the hunting, collecting and gathering activities directed at removing or collecting live wild aquatic organisms (predominantly fish, molluscs and crustaceans) including plants from the oceanic, coastal or inland waters for human consumption and other purposes by hand or more usually by various types of fishing gear such as nets, lines and stationary traps. The production of capture fisheries is measured by nominal catches (in live weight basis) of fish, crustaceans, molluscs and other aquatic animals and plants, killed, caught, trapped or collected for all commercial, industrial, recreational and subsistence purposes. It should be noted that in this *Outlook* data relating to aquatic plants are not included.
Cereals	Defined as wheat, maize, other coarse grains and rice.
Common Agricultural Policy (CAP)	The European Union’s agricultural policy, first defined in Article 39 of the Treaty of Rome signed in 1957
Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)	CPTPP is a trade agreement between Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, and Viet Nam. It was signed in March 2018 and came into force for the first six countries in December 2018.
Comprehensive Economic and Trade Agreement (CETA)	CETA is a trade agreement between the European Union and Canada. CETA was signed in October 2016 and is in provisional application as of April 2017. Full ratification and implementation is still pending
COVID-19	COVID-19 is the infectious disease caused by the most recently discovered coronavirus. This new virus and disease were unknown before the outbreak began in Wuhan, China, in December 2019. COVID-19 is now a pandemic affecting many countries globally.
Decoupled payments	Direct payments which are not linked to current production of specific commodities or livestock numbers or the use of specific factors of production.
Developed and developing countries	See summary table at the end of the Glossary.
Direct payments	Payments made directly by governments to producers
Domestic support	Refers to the annual level of support, expressed in monetary terms, provided to agricultural production. It is one of the three pillars of the Uruguay Round Agreement on Agriculture targeted for reduction.
El Niño- Southern Oscillation	*El Niño*-Southern Oscillation (ENSO) refers to periodic but irregular variations in wind and sea surface temperatures in the tropical eastern Pacific Ocean. ENSO consists of a warming phase known as *El Niño* and a cooling phase known as *La Niña*, and occurs typically at intervals of two to seven years. The abnormal warm ocean climate conditions of *El Niño* are accompanied by higher local rainfall and flooding, and massive deaths of fish and their predators (including birds).
Energy Independence and Security Act (EISA) 2007	US legislation passed in December 2007 that is designed to increase US energy security by lessening dependence on imported oil, to improve energy conservation and efficiency, expand the production of renewable fuels, and to make America’s air cleaner for future generations.
Ethanol	A biofuel that can be used as a fuel substitute (hydrous ethanol) or a fuel extender (anhydrous ethanol) in mixes with petroleum, and which is produced from agricultural feedstocks such as sugar cane and maize. Anhydrous alcohol is free of water and at least 99% pure. Hydrous alcohol contains water and usually has a purity of 96%. In Brazil, this ethanol is being used as a gasohol substitute in flex-fuel vehicles.
Everything-But-Arms (EBA)	The EBA Initiative eliminates EU import tariffs for numerous goods, including agricultural products, from the least developed countries as of 2009-10.
Export subsidies	Subsidies given to traders to cover the difference between internal market prices and world market prices, such as the EU export restitutions. The elimination of agricultural export subsidies is part of the Nairobi Package adopted at the WTO’s Tenth Ministerial Conference in December 2015.
Farm Bill	In the United States, the Farm Bill is the primary agricultural and food policy tool of the federal government.
Flexible-fuel vehicles (FFVs)	Vehicles that can run on either gasohol or on hydrous ethanol.

Fresh dairy products	Fresh Dairy Products contain all dairy products and milk which are not included in the processed products (butter, cheese skim milk powder, whole milk powder and for some cases casein and whey). The quantities are in cow milk equivalent.
G20	The G20 is an international forum made up of 19 countries and the European Union, representing the world's major developed and emerging economies. Together, the G20 members represent 85% of global GDP, 75% of international trade, and two-thirds of the world's population. Originally bringing together finance ministers and central bank governors, the G20 has evolved into a forum to address broader global challenges.
Gasohol	Fuel that is a mixture of gasoline and anhydrous ethanol.
High Fructose Corn Syrup (HFCS)	Isoglucose sweetener extracted from maize.
Intervention stocks	Stocks held by national intervention agencies in the European Union as a result of intervention buying of commodities subject to market price support. Intervention stocks may be released onto the internal markets if internal prices exceed intervention prices.
Isoglucose	Isoglucose is a starch-based fructose sweetener, produced by the action of the glucose isomerase enzyme on dextrose. This isomerisation process can be used to produce glucose/fructose blends containing up to 42% fructose. Application of a further process can raise the fructose content to 55%. Where the fructose content is 42%, isoglucose is equivalent in sweetness to sugar.
Least squares growth rate	The least-squares growth rate, r, is estimated by fitting a linear regression trend line to the logarithmic annual values of the variable in the relevant period, as follows: Ln(xt) = a + r * t and is calculated as [exp (r) – 1].
Live weight	The weight of meat, finfish and shellfish at the time of their capture or harvest. In the case of fish products it is calculated on the basis of conversion factors from landed to nominal weight and on rates prevailing among national industries for each type of processing.
Market access	Governed by provisions of the Uruguay Round Agreement on Agriculture which refer to concessions contained in the country schedules with respect to bindings and reductions of tariffs and to other minimum import commitments.
Marketing year	It is common to compare crop production across "marketing years," which are defined so that one season's harvest is not artificially split up across different calendar years. In this *Outlook*, international marketing years are mostly defined starting with their harvest in major supply regions, as follows: • Wheat: 1 June • Cotton: 1 August • Maize and other coarse grains: 1 September • Sugar, soybeans, other oilseeds, protein meal, vegetable oils: 1 October. • New Zealand meat: year ended September • Australia meat: year ended June Whenever the text refers to, for example, the marketing year 2020, this is short for 2020/21 for the above commodities. For all other commodities, the marketing year is equal to the calendar year.
North American Free Trade Agreement (NAFTA)	A trilateral agreement on trade, including agricultural trade, between Canada, Mexico, and the United States, phasing out tariffs and revising other trade rules between the three countries over a 15-year period. The agreement was signed in December 1992 and came into effect on 1 January 1994. In 2018, a new agreement between the United States, Mexico and Canada (USMCA) was signed. It is scheduled to come into effect on 1 July 2020 and replace NAFTA.
Other coarse grains	Defined as barley, oats, sorghum and other coarse grains in all countries except Australia where it includes triticale, and in the European Union where it includes rye and other mixed grains.
Other oilseeds	Defined as rapeseed (canola), sunflower seed, and groundnuts (peanuts).
Pacific beef/pigmeat market	The Pacific meat market consists of countries (or zones within countries) that produce and trade livestock free from Foot and Mouth Disease (FMD) without vaccination. FMD status is determined by the OIE according to strict guidelines (www.oie.int/en/animal-health-in-the-world/official-

	disease-status/fmd/) and includes, *inter alia*, Australia, New Zealand, Japan, Korea, North America and the vast majority of Western Europe. The name "Pacific" refers to the fact that most of them are located around the Pacific Rim. See also Atlantic beef/pigmeat market.
Producer Support Estimate (PSE)	Indicator developed and compiled by the OECD showing the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at farm gate level, and arising from policy measures (regardless of their nature, objectives or impacts on farm production or income). The PSE measures support arising from policies targeted to agriculture relative to a situation without such policies, i.e. when producers are subject only to general policies (including economic, social, environmental and tax policies) of the country. The percentage PSE is the ratio of the PSE to the value of total gross farm receipts, measured by the value of total production (at farm gate prices) plus budgetary support (see http://www.oecd.org/agriculture/topics/agricultural-policy-monitoring-and-evaluation/).
Protein meals	Defined as soybean meal, groundnut meal, rapeseed meal, sunflower meal, coconut meal, cottonseed meal and palm kernel meal.
Purchasing Power Parity (PPP)	Purchasing power parities (PPPs) are the rates of currency conversion that eliminate the differences in price levels between countries. The PPPs are given in national currency units per US dollar.
Renewable Energy Directive (RED)	EU directive legislating binding mandates of 20% for the share of renewable energy in all Member States' energy mix by the year 2020, with a specific target of 10% for the renewable energy share in transport fuels.
Renewable Fuel Standard (RFS and RFS2)	A standard in the United States for renewable fuel use in the transport sector in the Energy Act (EISA). RFS2 is a revision of the RFS program for 2010 and beyond.
Roots and Tubers	Plants that yield starch, either derived from their roots (e.g. cassava, sweet potato and yams) or stems (e.g. potatoes and taro). They are destined mainly for human food (as such or in processed form) but can also be used for animal feed or for manufacturing starch, ethanol and fermented beverages. Unless they are processed, they become highly perishable once harvested, which limits opportunities for trade and storage. Roots and tubers contain large amounts of water: all quantities in this publication refer to dry weight to increase comparability.
Scenario	A model-generated set of market projections based on alternative assumptions than those used in the baseline. Used to provide quantitative information on the impact of changes in assumptions on the outlook.
Stock-to-use ratio	The stock-to-use ratio for cereals is defined as the ratio of cereal stocks to its domestic utilisation.
Stock-to-disappearance ratio	The stock-to-disappearance ratio is defined as the ratio of stocks held by the main exporters to their disappearance (i.e. domestic utilisation plus exports). For wheat, the eight major exporters are considered, namely the United States, Argentina, the European Union, Canada, Australia, Russian Federation, Ukraine, and Kazakhstan. In the case of coarse grains, United States, Argentina, the European Union, Canada, Australia, Russian Federation, Ukraine, and Brazil are considered. For rice Viet Nam, Thailand, India, Pakistan and the United States enter this ratio calculation.
Support price	Prices fixed by government policy makers in order to determine, directly or indirectly, domestic market or producer prices. All administered price schemes set a minimum guaranteed support price or a target price for the commodity, which is maintained by associated policy measures, such as quantitative restrictions on production and imports; taxes, levies and tariffs on imports; export subsidies; and/or public stockholding
Tariff-Rate Quota (TRQ)	A two-tier tariff regime where imports within the quota enter at a lower ("in-quota") tariff rate while a higher ("out-of-quota") tariff rate is used for imports above this level, As part of the Uruguay Round Agreement on Agriculture, certain countries agreed to provide minimum import opportunities for products they had previously protected by tariffs.
Tel quel basis	Weight of sugar, regardless of its sucrose content (measured by polarisation).
Trade balances	Calculated as net trade : exports - imports

Uruguay Round Agreement on Agriculture (URAA)	An international agreement negotiated as part of the Uruguay Round of the General Agreement on Tariffs and Trade. The URAA entered into force simultaneously with the establishment of the World Trade Organization in 1995. The URAA contains commitments to improve market access, reduce distorting domestic support, and reduce export subsidies. A separate agreement covers sanitary and phyto sanitary measures known as the SPS Agreement.
Vegetable oils	Defined as rapeseed oil (canola), soybean oil, sunflower seed oil, coconut oil, cottonseed oil, palm kernel oil, groundnut oil and palm oil.
World Trade Organization (WTO)	Intergovernmental organisation regulating international trade, providing a framework for negotiating trade agreements, and acting as dispute resolution process. The WTO was created by the Uruguay Round agreement and officially commenced in 1995.

Annex B. Methodology

This section provides information on how the projections in the *Agricultural Outlook* are generated. First, a general description of the agricultural baseline projections and the *Outlook* report is given. Second, the compilation of a consistent set of the assumptions on macroeconomic projections is discussed in more detail. Section 3 provides reference to the underlying Aglink-Cosimo model, while the last section explains how a partial stochastic analysis is performed with the Aglink-Cosimo model.

The process of generating the OECD-FAO Agricultural Outlook

The projections presented are the result of a process that brings together information from a large number of sources. The projections rely on input from country and commodity experts, and from the OECD-FAO Aglink-Cosimo model of global agricultural markets. This economic model is also used to ensure the consistency of baseline projections. A large amount of expert judgement, however, is applied at various stages of the *Outlook* process. The *Agricultural Outlook* presents a unified assessment judged by the OECD and FAO Secretariats to be plausible given the underlying assumptions and the information available at the time of writing.

The starting point: Creation of an initial baseline

The data series for the historic values are drawn from OECD and FAO databases. For the most part, information in these databases has been taken from national statistical sources. Starting values for the likely future development of agricultural markets are developed separately by OECD for its member states and some non-member countries and by FAO for all remaining countries.

- On the OECD side, an annual questionnaire is circulated in November to national administrations. Through these questionnaires, the OECD Secretariat obtains information on how countries expect their agricultural sector to develop for the various commodities covered in the *Outlook*, as well as on the evolution of agricultural policies.
- On the FAO side, the starting projections for the country modules are developed through model-based projections and consultations with FAO commodity specialists.

External sources, such as the International Monetary Fund (IMF), the World Bank and the United Nations (UN), are also used to complete the view of the main economic forces determining market developments.

This part of the process is aimed at creating a first insight into possible market developments and at establishing the key assumptions which condition the *Outlook*. The main economic and policy assumptions are summarised in the overview chapter and in specific commodity tables. The sources for the assumptions are discussed in more detail further below.

As a next step, the OECD-FAO Aglink-Cosimo modelling framework is used to facilitate a consistent integration of the initial data and to derive an initial baseline of global market projections. The modelling framework ensures that at a global level, projected levels of consumption match with projected levels of production for the different commodities. The model is discussed in section three below.

In addition to quantities produced, consumed and traded, the baseline also includes projections for nominal prices (in local currency units) for the commodities concerned.[1]

The initial baseline results are then reviewed:

- For the countries under the OECD Secretariat's responsibility, the initial baseline results are compared with the questionnaire replies. Any issues are discussed in bilateral exchanges with country experts.
- For country and regional modules developed by the FAO Secretariat, initial baseline results are reviewed by a wider circle of in-house and international experts.

Final baseline

At this stage, the global projection picture starts to emerge, and refinements are made according to a consensus view of both Secretariats and external advisors. On the basis of these discussions and updated information, a second baseline is produced. The information generated is used to prepare market assessments for cereals, oilseeds, sugar, meats, dairy products, fish, biofuels and cotton over the course of the *Outlook* period.

These results are then discussed at the annual meetings of the Group on Commodity Markets of the OECD Committee for Agriculture, which brings together experts from national administrations of OECD countries as well as experts from commodity organisations. Following comments by this group, and data revisions, the baseline projections are finalised.

The *Outlook* process implies that the baseline projections presented in this report are a combination of projections and expert knowledge. The use of a formal modelling framework reconciles inconsistencies between individual country projections and forms a global equilibrium for all commodity markets. The review process ensures that judgement of country experts is brought to bear on the projections and related analyses. However, the final responsibility for the projections and their interpretation rests with the OECD and FAO Secretariats.

The revised projections form the basis for the writing of the *Agricultural Outlook*, which is discussed by the Senior Management Committee of FAO's Department of Economic and Social Development and the OECD's Working Party on Agricultural Policies and Markets of the Committee for Agriculture in May, prior to publication. In addition, the *Outlook* will be used as a basis for analyses presented to the FAO's Committee on Commodity Problems and its various Intergovernmental Commodity Groups.

Sources and assumptions for the macroeconomic projections

Population estimates from the 2019 Revision of the United Nations Population Prospects database provide the population data used for all countries and regional aggregates in the *Outlook*. For the projection period, the medium variant set of estimates was selected for use from the four alternative projection variants (low, medium, high and constant fertility). The UN Population Prospects database was chosen because it represents a comprehensive source of reliable estimates which includes data for non-OECD developing countries. For consistency reasons, the same source is used for both the historical population estimates and the projection data.

The other macroeconomic series used in the Aglink-Cosimo model are real GDP, the GDP deflator, the private consumption expenditure (PCE) deflator, the Brent crude oil price (in US dollars per barrel) and exchange rates expressed as the local currency value of USD 1. Historical data for these series in OECD countries as well as Brazil, Argentina, the People's Republic of China and the Russian Federation are consistent with those published in the *OECD Economic Outlook* No. 108 (December 2020). For other economies, historical macroeconomic data were obtained from the IMF, *World Economic Outlook* (October 2020). Assumptions for 2021 to 2030 are based on the recent medium term macroeconomic projections of the OECD Economics Department, projections of the *OECD Economic Outlook* No. 108, and projections of the IMF.

The model uses indices for real GDP, consumer prices (PCE deflator) and producer prices (GDP deflator) which are constructed with the base year 2010 value being equal to 1. The assumption of constant real exchange rates implies that a country with higher (lower) inflation relative to the United States (as measured by the US GDP deflator) will have a depreciating (appreciating) currency and therefore an increasing (decreasing) exchange rate over the projection period, since the exchange rate is measured as the local currency value of USD 1. The calculation of the nominal exchange rate uses the percentage growth of the ratio "country-GDP deflator/US GDP deflator".

The oil price used to generate the *Outlook* until 2019 is taken from the short-term update of the *OECD Economic Outlook* No. 108 (December 2020). For 2020, the annual average daily spot price is used, while the reference oil price used in the projections is assumed to follow the growth rate of the World Bank average oil price.

The underlying Aglink-Cosimo model

Aglink-Cosimo is an economic model that analyses supply and demand of world agriculture. It is managed by the Secretariats of the OECD and the Food and Agriculture Organization of the United Nations (FAO), and used to generate the *OECD-FAO Agricultural Outlook* and policy scenario analysis.

Aglink-Cosimo is a recursive-dynamic, partial equilibrium model used to simulate developments of annual market balances and prices for the main agricultural commodities produced, consumed and traded worldwide. The Aglink-Cosimo country and regional modules covering the whole world, and projections are developed and maintained by the OECD and FAO Secretariats in conjunction with country experts and national administrations. Several key characteristics are as follows:

- Aglink-Cosimo is a "partial equilibrium" model for the main agricultural commodities, as well as biodiesel and bioethanol. Other non-agricultural markets are not modelled and are treated exogenously to the model. As non-agricultural markets are exogenous, hypotheses concerning the paths of key macroeconomic variables are predetermined with no accounting of feedback from developments in agricultural markets to the economy as a whole.
- World markets for agricultural commodities are assumed to be competitive, with buyers and sellers acting as price takers. Market prices are determined through a global or regional equilibrium in supply and demand.
- Domestically produced and traded commodities are viewed to be homogeneous and thus perfect substitutes by buyers and sellers. In particular, importers do not distinguish commodities by country of origin as Aglink-Cosimo is not a spatial model. Imports and exports are nevertheless determined separately. This assumption will affect the results of analysis in which trade is a major driver.
- Aglink-Cosimo is recursive-dynamic, and outcomes for one year influence those for the next years (e.g. through herd sizes). Aglink-Cosimo models ten years into the future.

A detailed documentation of Aglink-Cosimo was produced in 2015 and is available on www.agri-outlook.org.

The model used to generate the fish projections is operated as a satellite model to Aglink Cosimo. Exogenous assumptions are shared and interacting variables (e.g. prices for cross-price reactions) are exchanged. The fish model went through substantial revision in 2016. The aggregated aquaculture supply functions of 32 components of the model were replaced by 117 species-specific supply functions with specific elasticity, feed ration and time lag. The main species covered are salmon and trout, shrimp, tilapia, carp, catfish (including Pangasius), seabream and seabass, and molluscs. A few other minor productions such as milkfish were also included. The model was constructed to ensure consistency between the feed rations and the fishmeal and fish oil markets. Depending on the species, the feed rations can contain a maximum of five types of feed; fishmeal, fish oil, oilseed meals (or substitutes), vegetable oil and low protein feeds like cereals and brans.

The methodology of stochastic simulations with Aglink-Cosimo

The partial stochastic analysis highlights how alternative scenarios diverge from the baseline by treating a number of variables stochastically. The selection of those variables aims at identifying the major sources of uncertainty for agricultural markets. In particular, country specific macroeconomic variables, the crude oil price, and country- and product-specific yields are treated as uncertain within this partial stochastic framework. Apart from the international oil price, four macroeconomic variables are considered in all countries: the consumer price index (CPI), the gross domestic product index (GDPI), the gross domestic product deflator (GDPD) and the US-Dollar exchange rate (XR). The yield variables considered contain crop and milk yields in all model regions.

The approach applied to determine the stochastic draws of these variables is based on a simple process which captures the historical variance of each single variable. The three main steps of the partial stochastic process are briefly explained below.

(i) The quantification of the past variability around the trend for each macroeconomic and yield variable separately

The first step is to define the historical trend of stochastic variables. Often a linear trend does not represent adequately observed dynamics. Consequently, a non-linear trend is estimated by applying a Hodrick-Prescott filter, which seeks to separate short-term fluctuations from long-term movements.[2] The filter is applied to the yield time series directly and to year-on-year changes for macro variables.

(ii) The generation of 1 000 sets of possible values for the stochastic variables

The second step involves generating 1 000 sets of possible values for the stochastic variables. For each year of the 2021-2030 projection period, one year of the historical period 1995-2020 is drawn. The relative deviation between the actual variable value of that year and the respective trend value estimated in step 1 is then applied to the value of the variable in the actual projection year. All variables thereby receive the value of the same historical year. The process, however, handles macro variables separated from yields, as both are not strongly correlated.

(iii) The execution of the Aglink-Cosimo model for each of these 1 000 possible alternative sets of values (uncertainty scenarios)

The third step involves running the Agink-Cosimo model for each of the 1 000 alternative “uncertainty” scenarios generated in step 2. When both macroeconomic and yield uncertainty were included, this procedure yielded 98% successful simulations. The model does usually not solve all stochastic simulations as the complex system of equations and policies may lead to infeasibilities when exposed to extreme shocks in one or several stochastic variables.

Notes

[1] Trade data for regions, e.g. the European Union or regional aggregates of developing countries, refer only to extra-regional trade. This approach results in a smaller overall trade figure than cumulated national statistics. For further details on particular series, enquiries should be directed to the OECD and FAO Secretariats.

[2] The filter was popularised in the field of economics in the 1990s in Robert Hodrick and Edward C. Prescott (1997), "Postwar U.S. Business Cycles: An Empirical Investigation", *Journal of Money, Credit, and Banking*, Vol. 29 (1), pp. 1–16. JSTOR 2953682.

Annex C. Statistical Annex

ANNEX C

Table C.1. World cereal projections

Marketing year

		Average 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
WHEAT												
World												
Production	Mt	752.7	776.2	780.4	788.9	795.8	802.2	809.3	817.3	824.4	832.6	839.7
Area	Mha	218.1	223.2	222.5	223.1	223.3	223.5	223.6	224.0	224.1	224.4	224.4
Yield	t/ha	3.45	3.48	3.51	3.54	3.56	3.59	3.62	3.65	3.68	3.71	3.74
Consumption	Mt	748.7	765.4	773.1	781.7	790.5	798.8	805.8	813.2	820.5	827.9	835.1
Feed use	Mt	146.0	152.3	153.4	155.2	157.4	159.1	160.3	162.0	163.6	165.7	167.7
Food use	Mt	518.9	531.6	537.0	542.4	547.7	552.8	557.6	562.5	567.3	572.1	576.8
Biofuel use	Mt	8.7	8.6	8.6	8.7	8.7	8.9	9.2	9.4	9.5	9.7	9.8
Other use	Mt	75.1	73.0	74.1	75.4	76.6	78.0	78.7	79.4	80.0	80.5	80.8
Exports	Mt	181.2	193.2	196.2	199.0	201.6	204.4	208.2	211.3	214.0	217.0	219.8
Closing stocks	Mt	277.9	295.4	300.3	305.1	308.1	309.1	310.2	311.9	313.5	315.8	318.0
Price[1]	USD/t	233.6	234.4	215.4	219.5	221.8	230.3	236.6	241.8	247.1	250.6	253.6
Developed countries												
Production	Mt	384.9	399.5	402.2	406.2	410.4	412.9	416.7	420.6	424.3	428.5	432.3
Consumption	Mt	265.7	261.4	261.5	262.6	264.6	265.9	266.9	268.0	268.9	270.1	271.4
Net trade	Mt	126.3	137.5	140.4	142.6	144.3	146.4	150.0	152.6	155.0	157.4	159.8
Closing stocks	Mt	70.9	68.2	68.5	69.5	70.9	71.5	71.4	71.4	71.8	72.9	74.0
Developing countries												
Production	Mt	367.8	376.7	378.1	382.7	385.4	389.3	392.6	396.7	400.1	404.0	407.4
Consumption	Mt	482.9	504.0	511.6	519.2	525.8	533.0	538.9	545.3	551.6	557.9	563.7
Net trade	Mt	-123.5	-135.1	-138.1	-140.3	-142.0	-144.1	-147.6	-150.2	-152.6	-155.1	-157.4
Closing stocks	Mt	207.0	227.2	231.8	235.6	237.2	237.6	238.8	240.5	241.7	242.9	244.0
OECD[2]												
Production	Mt	274.0	279.2	280.7	282.6	284.5	285.2	287.0	288.8	290.4	292.5	294.3
Consumption	Mt	219.1	218.9	218.8	219.5	220.8	221.5	221.9	222.6	223.2	224.1	225.0
Net trade	Mt	58.8	60.1	62.0	62.6	63.0	63.8	65.2	66.1	66.8	67.6	68.3
Closing stocks	Mt	62.3	60.5	60.5	61.0	61.7	61.7	61.6	61.7	62.1	62.9	63.9
MAIZE												
World												
Production	Mt	1 151.4	1 183.4	1 201.4	1 218.9	1 227.2	1 239.0	1 253.3	1 268.8	1 284.2	1 298.1	1 312.2
Area	Mha	190.5	194.0	194.6	195.4	195.5	195.8	196.3	197.0	197.6	198.1	198.6
Yield	t/ha	6.04	6.10	6.17	6.24	6.28	6.33	6.38	6.44	6.50	6.55	6.61
Consumption	Mt	1 166.3	1 183.3	1 196.3	1 207.0	1 222.5	1 234.9	1 248.9	1 262.6	1 276.9	1 291.0	1 305.1
Feed use	Mt	671.0	696.1	705.7	719.2	726.3	735.9	745.6	755.7	766.5	776.8	787.2
Food use	Mt	145.4	148.6	151.3	153.8	156.2	158.5	160.8	163.2	165.6	167.9	170.3
Biofuel use	Mt	184.3	185.7	188.1	186.7	186.0	184.6	183.8	182.6	181.5	180.5	179.5
Other use	Mt	121.7	110.4	108.5	104.4	110.9	112.5	115.2	117.5	119.6	121.8	123.9
Exports	Mt	178.8	187.6	188.7	188.8	190.1	192.7	195.7	198.7	201.8	204.6	207.3
Closing stocks	Mt	303.7	279.8	281.9	290.7	292.4	293.5	294.8	297.9	302.2	306.3	310.3
Price[3]	USD/t	175.4	188.1	172.1	169.3	173.3	181.3	186.6	190.7	193.8	196.8	199.6
Developed countries												
Production	Mt	515.0	533.2	538.2	544.0	545.1	548.0	552.2	557.6	562.9	567.2	571.4
Consumption	Mt	466.4	464.8	470.1	474.1	477.9	481.5	484.8	487.6	490.9	494.1	497.5
Net trade	Mt	52.8	65.9	65.2	65.3	66.0	66.8	67.8	69.2	70.6	71.8	73.0
Closing stocks	Mt	89.8	81.3	84.2	88.9	90.0	89.7	89.3	90.1	91.5	92.7	93.7
Developing countries												
Production	Mt	636.4	650.1	663.2	674.9	682.2	691.0	701.1	711.2	721.4	731.0	740.8
Consumption	Mt	699.8	718.5	726.2	733.0	744.6	753.4	764.1	775.0	786.0	796.8	807.7
Net trade	Mt	-49.8	-62.8	-62.1	-62.2	-62.9	-63.7	-64.7	-66.1	-67.5	-68.8	-69.9
Closing stocks	Mt	213.9	198.6	197.7	201.9	202.4	203.7	205.4	207.8	210.6	213.5	216.6
OECD[2]												
Production	Mt	474.0	484.5	488.9	493.8	493.8	495.4	498.2	502.3	506.3	509.2	512.0
Consumption	Mt	500.6	499.0	504.2	508.5	512.8	516.8	520.5	523.8	527.5	531.3	535.1
Net trade	Mt	-20.9	-15.8	-17.2	-19.1	-20.7	-21.6	-21.9	-22.2	-22.6	-23.2	-24.0
Closing stocks	Mt	84.3	73.7	75.5	79.9	81.6	81.7	81.4	82.2	83.5	84.6	85.4

Table C.1. World cereal projections *(cont.)*

Marketing year

		Average 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
OTHER COARSE GRAINS												
World												
Production	Mt	301.0	305.4	308.7	311.1	313.9	316.0	318.9	321.6	324.5	327.1	329.9
Area	Mha	155.2	155.4	155.4	155.2	155.3	155.1	155.0	154.9	154.8	154.7	154.7
Yield	t/ha	1.94	1.96	1.99	2.00	2.02	2.04	2.06	2.08	2.10	2.11	2.13
Consumption	Mt	287.8	299.4	302.9	305.5	307.4	310.2	312.8	315.2	317.8	320.4	323.1
Feed use	Mt	157.4	165.5	167.7	169.2	170.9	172.4	173.6	174.8	176.0	177.1	178.5
Food use	Mt	80.9	82.8	84.7	85.8	87.1	88.2	89.3	90.4	91.5	92.6	93.6
Biofuel use	Mt	5.2	4.9	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Other use	Mt	44.2	46.2	45.6	45.6	44.7	44.7	45.0	45.2	45.6	45.9	46.3
Exports	Mt	42.9	46.3	47.4	47.8	48.4	49.1	50.1	50.9	51.7	52.3	53.0
Closing stocks	Mt	57.4	67.4	67.1	66.7	67.2	67.1	67.2	67.5	68.1	68.9	69.7
Price[4]	USD/t	206.2	209.3	196.8	199.7	202.7	209.7	215.1	220.4	225.3	229.4	232.8
Developed countries												
Production	Mt	181.0	180.0	181.4	182.1	183.0	183.6	184.7	185.7	186.8	187.7	188.8
Consumption	Mt	145.0	147.3	147.6	147.9	147.2	147.6	148.0	148.3	148.7	149.0	149.4
Net trade	Mt	31.0	34.1	35.0	35.4	35.7	36.2	36.9	37.6	38.2	38.7	39.2
Closing stocks	Mt	32.3	38.9	37.8	36.7	36.8	36.6	36.3	36.2	36.2	36.3	36.4
Developing countries												
Production	Mt	120.0	125.4	127.2	129.0	130.9	132.4	134.2	135.9	137.7	139.4	141.1
Consumption	Mt	142.8	152.1	155.3	157.6	160.2	162.6	164.7	167.0	169.2	171.4	173.6
Net trade	Mt	-25.0	-28.0	-29.0	-29.3	-29.7	-30.2	-30.9	-31.5	-32.1	-32.7	-33.2
Closing stocks	Mt	25.1	28.4	29.4	30.1	30.4	30.5	30.8	31.3	32.0	32.6	33.3
OECD[2]												
Production	Mt	148.8	146.8	147.5	147.9	148.3	148.5	149.1	149.6	150.1	150.5	151.0
Consumption	Mt	123.9	126.3	126.4	126.6	125.8	126.1	126.5	126.7	127.0	127.3	127.7
Net trade	Mt	19.3	22.0	22.5	22.6	22.4	22.5	22.8	23.0	23.2	23.2	23.2
Closing stocks	Mt	25.6	31.9	30.5	29.3	29.4	29.2	29.0	28.9	28.8	28.8	28.9
RICE												
World												
Production	Mt	509.3	525.1	529.2	532.7	537.1	542.0	546.7	551.8	556.9	562.0	567.3
Area	Mha	163.1	164.6	164.3	163.9	163.7	163.6	163.4	163.3	163.3	163.2	163.1
Yield	t/ha	3.12	3.19	3.22	3.25	3.28	3.31	3.35	3.38	3.41	3.44	3.48
Consumption	Mt	506.3	522.7	529.9	533.9	539.4	542.8	547.0	551.9	557.1	561.8	567.0
Feed use	Mt	17.6	18.4	18.8	19.1	19.4	19.8	20.2	20.6	20.9	21.3	21.7
Food use	Mt	417.4	432.0	438.1	441.3	445.9	448.4	451.6	455.6	459.7	463.5	467.6
Exports	Mt	45.9	49.3	50.7	52.1	52.8	53.9	55.6	57.4	58.9	60.6	62.3
Closing stocks	Mt	186.2	188.2	187.5	186.4	184.1	183.2	182.9	182.7	182.6	182.8	183.1
Price[5]	USD/t	464.1	513.4	488.0	476.3	479.4	480.4	483.5	485.1	488.3	490.0	492.4
Developed countries												
Production	Mt	17.7	17.6	17.8	17.7	17.6	17.6	17.6	17.6	17.6	17.5	17.5
Consumption	Mt	19.6	19.9	20.0	20.1	20.1	20.2	20.3	20.4	20.5	20.6	20.7
Net trade	Mt	-2.4	-2.7	-2.8	-2.9	-2.9	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Closing stocks	Mt	8.2	9.3	9.9	10.4	10.8	11.1	11.4	11.5	11.6	11.6	11.5
Developing countries												
Production	Mt	491.6	507.4	511.5	515.1	519.4	524.4	529.1	534.2	539.3	544.5	549.8
Consumption	Mt	486.7	502.9	510.0	513.8	519.2	522.6	526.7	531.5	536.6	541.3	546.3
Net trade	Mt	3.0	2.7	2.8	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0
Closing stocks	Mt	178.0	178.9	177.6	176.0	173.3	172.1	171.5	171.2	171.0	171.2	171.6
OECD[2]												
Production	Mt	22.6	22.7	22.9	22.7	22.6	22.5	22.4	22.4	22.3	22.2	22.1
Consumption	Mt	24.9	25.4	25.5	25.5	25.5	25.6	25.6	25.7	25.8	25.8	25.9
Net trade	Mt	-2.8	-3.2	-3.2	-3.3	-3.3	-3.4	-3.4	-3.5	-3.6	-3.6	-3.7
Closing stocks	Mt	9.7	11.0	11.6	12.1	12.5	12.8	13.1	13.2	13.3	13.2	13.1

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 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. Milled 100%, grade b, nominal price quote, FOB Bangkok (January/December).

Source: OECD/FAO (2021), “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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
SOYBEAN												
World												
Production	Mt	356.1	372.9	377.3	382.6	386.7	391.0	394.8	399.1	402.9	407.5	411.1
Area	Mha	125.8	129.2	129.7	130.4	130.8	131.3	131.6	132.0	132.2	132.6	132.8
Yield	t/ha	2.83	2.89	2.91	2.93	2.96	2.98	3.00	3.02	3.05	3.07	3.09
Consumption	Mt	358.6	370.8	376.2	381.0	386.2	391.1	395.4	398.8	402.7	406.7	410.6
Crush	Mt	324.3	334.1	339.1	343.6	348.5	353.1	357.2	360.3	363.9	367.8	371.5
Closing stocks	Mt	42.4	38.7	39.9	41.5	42.0	41.9	41.3	41.7	42.0	42.7	43.1
Price[1]	USD/t	413.1	459.1	454.6	452.0	455.0	458.8	468.7	474.7	484.2	487.1	494.2
Developed countries												
Production	Mt	129.6	135.3	136.6	138.0	139.3	140.8	141.9	143.2	144.4	145.9	147.2
Consumption	Mt	98.3	98.0	98.0	99.4	99.9	100.7	101.1	101.6	101.9	102.5	103.0
Crush	Mt	89.4	89.1	89.0	90.3	90.8	91.5	91.9	92.3	92.7	93.2	93.6
Closing stocks	Mt	18.1	8.4	9.7	11.2	11.9	12.1	12.1	12.2	12.3	12.6	12.7
Developing countries												
Production	Mt	226.5	237.6	240.7	244.6	247.3	250.2	252.9	255.9	258.5	261.5	263.9
Consumption	Mt	260.3	272.7	278.2	281.6	286.2	290.4	294.3	297.2	300.7	304.2	307.7
Crush	Mt	234.9	245.0	250.2	253.3	257.7	261.7	265.3	268.0	271.3	274.6	277.9
Closing stocks	Mt	24.3	30.3	30.1	30.3	30.1	29.8	29.2	29.5	29.6	30.1	30.4
OECD[2]												
Production	Mt	120.2	126.5	127.6	128.9	130.0	131.3	132.3	133.5	134.5	135.8	136.9
Consumption	Mt	99.1	99.5	99.4	100.9	101.5	102.3	102.8	103.4	103.8	104.5	105.0
Crush	Mt	90.7	90.8	90.7	92.1	92.6	93.5	93.9	94.5	94.9	95.5	96.0
Closing stocks	Mt	18.1	8.6	10.0	11.6	12.2	12.4	12.4	12.6	12.6	12.9	13.0
OTHER OILSEEDS												
World												
Production	Mt	156.0	159.4	162.7	165.6	167.0	169.2	171.1	173.3	175.2	177.4	179.5
Area	Mha	88.9	90.6	91.3	91.9	92.0	92.4	92.6	92.9	93.1	93.4	93.7
Yield	t/ha	1.75	1.76	1.78	1.80	1.81	1.83	1.85	1.87	1.88	1.90	1.92
Consumption	Mt	157.5	159.6	162.2	165.2	166.8	169.0	171.1	173.3	175.2	177.4	179.5
Crush	Mt	136.3	138.4	140.8	143.6	145.1	147.2	149.1	151.1	152.9	154.9	156.8
Closing stocks	Mt	10.0	7.8	8.3	8.7	8.8	9.0	9.0	9.1	9.1	9.2	9.2
Price[3]	USD/t	445.2	476.0	470.8	460.2	471.3	477.1	483.8	488.0	497.3	501.9	507.0
Developed countries												
Production	Mt	94.7	96.1	98.7	100.9	101.7	103.3	104.6	106.2	107.5	109.0	110.5
Consumption	Mt	88.8	88.9	90.5	92.4	93.2	94.5	95.7	97.0	98.1	99.3	100.5
Crush	Mt	81.5	81.7	83.3	85.1	85.8	87.1	88.3	89.4	90.5	91.7	92.8
Closing stocks	Mt	7.7	5.5	6.0	6.3	6.5	6.7	6.6	6.7	6.7	6.7	6.7
Developing countries												
Production	Mt	61.3	63.3	64.0	64.8	65.3	65.9	66.5	67.1	67.7	68.4	69.0
Consumption	Mt	68.7	70.7	71.7	72.8	73.6	74.5	75.4	76.3	77.1	78.1	79.0
Crush	Mt	54.7	56.7	57.5	58.5	59.3	60.1	60.9	61.7	62.4	63.2	64.0
Closing stocks	Mt	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5
OECD[2]												
Production	Mt	57.7	59.9	61.5	62.4	62.6	63.3	63.9	64.6	65.0	65.7	66.3
Consumption	Mt	58.2	58.8	59.5	60.5	60.8	61.4	62.0	62.6	63.0	63.6	64.1
Crush	Mt	52.7	53.2	53.9	54.9	55.1	55.7	56.3	56.9	57.3	57.8	58.3
Closing stocks	Mt	6.4	4.3	4.7	5.0	5.1	5.3	5.3	5.3	5.3	5.3	5.3
PROTEIN MEALS												
World												
Production	Mt	353.7	363.4	368.8	374.3	379.4	384.6	389.3	393.2	397.4	401.9	406.3
Consumption	Mt	353.8	363.1	368.6	374.0	379.3	384.5	389.2	393.1	397.3	401.8	406.2
Closing stocks	Mt	14.1	13.7	14.0	14.3	14.3	14.4	14.4	14.5	14.6	14.7	14.9
Price[4]	USD/t	354.4	391.0	390.2	385.4	384.1	389.9	397.4	404.3	411.7	416.4	422.2
Developed countries												
Production	Mt	114.8	115.0	115.8	117.8	118.6	119.8	120.7	121.7	122.5	123.6	124.5
Consumption	Mt	126.7	126.7	127.6	128.2	128.2	128.6	129.1	129.4	129.5	129.9	130.1
Closing stocks	Mt	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Developing countries												
Production	Mt	238.9	248.3	253.1	256.5	260.8	264.8	268.5	271.5	274.9	278.4	281.8
Consumption	Mt	227.0	236.3	240.9	245.8	251.1	255.9	260.1	263.7	267.8	271.9	276.1
Closing stocks	Mt	11.8	11.4	11.7	12.0	12.1	12.1	12.2	12.2	12.3	12.5	12.6
OECD[2]												
Production	Mt	104.7	105.2	105.7	107.4	108.1	109.2	110.0	110.8	111.5	112.3	113.1
Consumption	Mt	132.4	133.2	134.0	134.6	134.9	135.5	136.1	136.6	136.9	137.4	137.8
Closing stocks	Mt	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9

Table C.2. World oilseed projections *(cont.)*

Marketing year

		Average 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
VEGETABLE OILS												
World												
Production	Mt	212.9	219.7	222.9	226.6	229.3	232.4	235.4	238.2	241.1	244.0	246.9
of which palm oil	Mt	76.3	80.1	81.2	82.4	83.4	84.5	85.6	86.7	87.7	88.9	90.0
Consumption	Mt	213.6	218.7	222.0	225.8	229.3	232.4	235.3	237.9	240.8	243.7	246.6
Food	Mt	142.0	145.6	147.2	150.3	153.2	155.7	158.2	160.8	163.4	166.0	168.8
Biofuel	Mt	31.9	32.5	33.3	33.5	33.8	34.0	33.9	33.6	33.5	33.6	33.4
Exports	Mt	87.2	88.1	89.1	90.5	91.5	92.4	93.2	94.0	95.0	95.9	96.9
Closing stocks	Mt	19.0	19.4	20.3	21.1	21.1	21.1	21.3	21.6	21.9	22.3	22.6
Price[5]	USD/t	783.6	899.2	878.5	871.0	883.6	912.1	935.0	948.8	971.7	987.9	1 005.7
Developed countries												
Production	Mt	53.4	53.3	53.9	55.0	55.4	56.1	56.7	57.4	57.9	58.5	59.1
Consumption	Mt	57.6	58.1	58.3	58.5	58.7	58.8	58.6	58.2	58.2	58.2	58.2
Closing stocks	Mt	3.8	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Developing countries												
Production	Mt	159.5	166.4	169.0	171.5	173.9	176.3	178.7	180.9	183.2	185.5	187.8
Consumption	Mt	156.0	160.6	163.7	167.3	170.6	173.6	176.6	179.7	182.5	185.5	188.4
Closing stocks	Mt	15.2	15.6	16.5	17.2	17.2	17.2	17.4	17.8	18.1	18.4	18.7
OECD[2]												
Production	Mt	43.5	43.6	44.0	44.8	45.1	45.6	46.0	46.3	46.7	47.1	47.4
Consumption	Mt	58.6	59.4	59.6	59.8	60.1	60.3	60.1	59.7	59.7	59.7	59.7
Closing stocks	Mt	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7

Note: Average 2018-20est: Data for 2020 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 (2021), “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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
WORLD												
SUGARBEET												
Production	Mt	278.4	285.1	285.8	288.6	289.5	292.1	293.9	295.6	297.5	299.6	301.8
Area	Mha	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.8	4.8	4.8	4.8
Yield	t/ha	58.75	60.34	60.61	60.93	61.27	61.55	61.87	62.18	62.50	62.83	63.16
Biofuel use	Mt	11.8	11.8	11.7	11.8	11.7	11.7	11.7	11.7	11.7	11.7	11.7
SUGARCANE												
Production	Mt	1 755.7	1 774.3	1 802.2	1 818.0	1 840.8	1 861.7	1 882.6	1 899.2	1 917.1	1 936.4	1 959.8
Area	Mha	24.4	24.4	24.7	24.8	25.0	25.2	25.4	25.5	25.6	25.8	26.0
Yield	t/ha	71.93	72.64	72.93	73.29	73.64	73.93	74.22	74.51	74.82	75.15	75.47
Biofuel use	Mt	397.4	364.7	375.3	384.7	392.3	399.3	405.4	412.1	418.7	425.1	431.5
SUGAR												
Production	Mt tq	172.9	176.4	179.4	181.6	184.3	187.1	189.8	192.0	194.5	197.2	200.3
Consumption	Mt tq	169.0	173.5	175.9	177.9	180.3	182.8	185.4	188.0	190.6	193.2	195.9
Closing stocks	Mt tq	88.3	86.9	87.5	88.3	89.3	90.7	92.1	93.1	94.1	95.2	96.6
Price, raw sugar[1]	USD/t	290.0	310.4	321.2	333.3	344.4	350.3	359.0	364.4	370.1	375.8	380.2
Price, white sugar[2]	USD/t	368.9	397.4	408.5	421.1	433.1	439.1	447.8	453.1	459.5	466.0	471.2
Price, HFCS[3]	USD/t	889.1	586.0	609.2	615.8	632.0	643.8	663.3	675.3	684.9	693.9	702.3
DEVELOPED COUNTRIES												
SUGARBEET												
Production	Mt	223.5	227.6	227.3	228.7	228.5	230.0	230.7	231.3	232.1	233.0	233.9
SUGARCANE												
Production	Mt	80.3	81.8	82.3	83.0	83.8	84.6	85.2	85.7	86.2	86.9	87.8
SUGAR												
Production	Mt tq	40.8	40.7	40.7	41.0	41.1	41.5	41.7	42.0	42.3	42.7	43.0
Consumption	Mt tq	46.0	46.3	46.3	46.2	46.2	46.3	46.3	46.4	46.5	46.5	46.6
Closing stocks	Mt tq	15.3	14.6	14.4	14.4	14.4	14.5	14.5	14.4	14.3	14.2	14.2
HFCS												
Production	Mt dw	8.7	8.6	8.6	8.5	8.5	8.4	8.4	8.3	8.3	8.2	8.2
Consumption	Mt dw	7.7	7.7	7.6	7.6	7.5	7.5	7.4	7.3	7.3	7.2	7.2
DEVELOPING COUNTRIES												
SUGARBEET												
Production	Mt	54.9	57.5	58.5	59.8	60.9	62.1	63.1	64.3	65.4	66.6	67.8
SUGARCANE												
Production	Mt	1 675.4	1 692.5	1 719.9	1 735.0	1 757.1	1 777.1	1 797.4	1 813.5	1 830.9	1 849.5	1 872.0
SUGAR												
Production	Mt tq	132.1	135.7	138.7	140.6	143.2	145.6	148.0	150.0	152.2	154.5	157.2
Consumption	Mt tq	122.9	127.2	129.6	131.7	134.1	136.6	139.1	141.6	144.1	146.7	149.3
Closing stocks	Mt tq	73.0	72.3	73.1	73.9	74.9	76.2	77.6	78.8	79.8	81.0	82.4
HFCS												
Production	Mt dw	4.9	4.9	5.0	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9
Consumption	Mt dw	5.7	5.7	5.8	5.9	6.0	6.1	6.3	6.4	6.5	6.6	6.8
OECD[4]												
SUGARBEET												
Production	Mt	174.2	177.0	176.6	177.1	177.1	177.8	178.2	178.4	178.8	179.3	179.9
SUGARCANE												
Production	Mt	151.3	154.7	154.7	155.4	157.1	158.0	158.3	158.2	158.4	159.0	159.8
SUGAR												
Production	Mt tq	40.3	41.2	41.1	41.2	41.4	41.7	41.9	42.0	42.2	42.4	42.7
Consumption	Mt tq	45.2	45.6	45.6	45.5	45.6	45.6	45.6	45.7	45.8	45.9	45.9
Closing stocks	Mt tq	14.4	14.6	14.4	14.5	14.5	14.7	14.6	14.6	14.5	14.4	14.5
HFCS												
Production	Mt dw	9.5	9.4	9.3	9.3	9.2	9.2	9.1	9.0	9.0	8.9	8.9
Consumption	Mt dw	9.3	9.2	9.1	9.1	9.0	9.0	8.9	8.9	8.8	8.8	8.7

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.HFCS: High fructose corn syrup. Prices are in nominal terms.

1. Raw sugar world price, ICE contract No11 nearby (October/September).
2. Refined sugar price, White Sugar Futures Contract No. 407, Euronext market, Liffe, London, Europe (October/September).
3. United States wholesale list price HFCS-55, dry weight (October/September).
4. Excludes Iceland and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
WORLD												
BEEF AND VEAL												
Production	kt cwe	70 607	70 368	70 707	71 234	71 893	72 417	72 838	73 243	73 761	74 254	74 713
Consumption	kt cwe	70 281	70 117	70 430	70 948	71 615	72 134	72 556	72 959	73 475	73 968	74 421
PIGMEAT												
Production	kt cwe	112 928	112 861	117 799	122 346	122 986	123 627	124 421	125 106	125 833	126 543	127 278
Consumption	kt cwe	112 293	112 597	117 546	122 105	122 730	123 373	124 167	124 852	125 579	126 288	127 027
POULTRY MEAT												
Production	kt rtc	130 629	135 071	137 280	138 413	140 621	142 773	144 858	146 980	149 124	151 307	153 479
Consumption	kt rtc	128 912	133 346	135 624	136 765	138 964	141 117	143 219	145 339	147 473	149 665	151 831
SHEEP MEAT												
Production	kt cwe	15 862	16 166	16 312	16 623	16 874	17 129	17 379	17 630	17 878	18 121	18 359
Consumption	kt cwe	15 901	16 196	16 357	16 659	16 910	17 165	17 416	17 666	17 915	18 157	18 395
TOTAL MEAT												
Per capita consumption[1]	kg rwt	42.7	42.4	43.0	43.4	43.4	43.5	43.5	43.5	43.6	43.6	43.7
DEVELOPED COUNTRIES												
BEEF AND VEAL												
Production	kt cwe	30 951	30 613	30 811	30 987	31 162	31 224	31 333	31 415	31 545	31 661	31 770
Consumption	kt cwe	29 992	29 567	29 662	29 799	29 917	29 965	30 043	30 094	30 203	30 297	30 376
PIGMEAT												
Production	kt cwe	46 305	46 865	46 664	46 352	46 281	46 202	46 288	46 266	46 288	46 302	46 322
Consumption	kt cwe	41 100	41 293	41 494	41 711	41 728	41 747	41 884	41 866	41 894	41 902	41 912
POULTRY MEAT												
Production	kt rtc	51 622	52 888	53 368	53 784	54 361	54 897	55 363	55 850	56 356	56 890	57 423
Consumption	kt rtc	48 558	49 546	50 085	50 575	51 039	51 481	51 882	52 301	52 723	53 185	53 624
SHEEP MEAT												
Production	kt cwe	3 479	3 420	3 463	3 521	3 546	3 568	3 589	3 610	3 636	3 662	3 688
Consumption	kt cwe	2 720	2 676	2 699	2 740	2 761	2 783	2 804	2 825	2 849	2 872	2 894
TOTAL MEAT												
Per capita consumption[1]	kg rwt	85.7	85.6	86.0	86.4	86.6	86.8	87.1	87.2	87.5	87.7	88.0
DEVELOPING COUNTRIES												
BEEF AND VEAL												
Production	kt cwe	39 656	39 755	39 896	40 246	40 731	41 193	41 505	41 828	42 216	42 592	42 943
Consumption	kt cwe	40 289	40 550	40 768	41 149	41 698	42 169	42 514	42 865	43 271	43 670	44 045
PIGMEAT												
Production	kt cwe	66 624	65 996	71 135	75 994	76 705	77 425	78 133	78 840	79 545	80 241	80 956
Consumption	kt cwe	71 193	71 303	76 052	80 394	81 002	81 626	82 284	82 986	83 685	84 386	85 116
POULTRY MEAT												
Production	kt rtc	79 006	82 183	83 912	84 629	86 260	87 875	89 495	91 130	92 769	94 417	96 056
Consumption	kt rtc	80 354	83 799	85 539	86 190	87 925	89 635	91 337	93 038	94 750	96 479	98 207
SHEEP MEAT												
Production	kt cwe	12 383	12 747	12 850	13 102	13 328	13 561	13 790	14 020	14 242	14 459	14 671
Consumption	kt cwe	13 181	13 520	13 658	13 918	14 149	14 382	14 612	14 841	15 066	15 285	15 501
TOTAL MEAT												
Per capita consumption[1]	kg rwt	32.8	32.7	33.4	33.9	34.0	34.1	34.1	34.2	34.3	34.4	34.5
OECD[2]												
BEEF AND VEAL												
Production	kt cwe	29 768	29 599	29 770	29 937	30 114	30 165	30 272	30 347	30 473	30 581	30 684
Consumption	kt cwe	29 015	28 776	28 894	29 038	29 171	29 220	29 309	29 364	29 476	29 571	29 657
PIGMEAT												
Production	kt cwe	44 351	44 808	44 623	44 318	44 287	44 238	44 343	44 347	44 398	44 444	44 494
Consumption	kt cwe	40 307	40 369	40 609	40 878	40 949	40 989	41 145	41 152	41 205	41 242	41 278
POULTRY MEAT												
Production	kt rtc	52 065	53 175	53 623	54 053	54 654	55 216	55 716	56 248	56 802	57 387	57 970
Consumption	kt rtc	48 800	49 773	50 376	50 915	51 403	51 875	52 309	52 765	53 224	53 723	54 199
SHEEP MEAT												
Production	kt cwe	2 827	2 772	2 810	2 844	2 853	2 858	2 863	2 867	2 877	2 888	2 898
Consumption	kt cwe	2 121	2 081	2 097	2 115	2 119	2 123	2 128	2 132	2 139	2 146	2 153
TOTAL MEAT												
Per capita consumption[1]	kg rwt	86.5	86.4	86.8	87.2	87.5	87.6	87.9	88.0	88.2	88.4	88.6

Note: Calendar Year; except year ending 30 September for New Zealand in aggregates. Average 2018-20est: Data for 2020 are estimated. Prices are in nominal terms.

1. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.
2. Excludes Iceland and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
MILK												
World												
Production	kt pw	851 046	872 229	888 144	906 627	924 959	940 352	955 734	971 611	987 915	1 003 691	1 019 691
Inventory	000 hd	714 635	727 482	731 877	746 869	758 219	765 167	771 951	779 489	786 738	793 767	800 198
Yield	t/head	1.19	1.20	1.21	1.21	1.22	1.23	1.24	1.25	1.26	1.26	1.27
Developed countries												
Production	kt pw	403 931	409 765	411 596	414 396	418 194	420 854	423 675	426 532	429 902	432 737	435 996
Inventory	000 hd	75 573	75 507	75 487	75 539	75 556	75 488	75 435	75 409	75 377	75 338	75 285
Yield	t/head	5.35	5.43	5.45	5.49	5.53	5.58	5.62	5.66	5.70	5.74	5.79
Developing countries												
Production	kt pw	447 115	462 464	476 548	492 231	506 765	519 498	532 059	545 080	558 013	570 955	583 695
Inventory	000 hd	639 062	651 975	656 390	671 330	682 663	689 679	696 516	704 080	711 361	718 429	724 913
Yield	t/head	0.70	0.71	0.73	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.81
OECD[1]												
Production	kt pw	366 940	372 781	375 007	378 212	381 809	384 271	386 935	389 668	392 924	395 640	398 795
Inventory	000 hd	82 130	83 033	83 255	83 633	83 889	84 020	84 218	84 523	84 829	85 090	85 333
Yield	t/head	4.47	4.49	4.50	4.52	4.55	4.57	4.59	4.61	4.63	4.65	4.67
FRESH DAIRY PRODUCTS												
World												
Consumption	kt pw	428 250	436 411	448 322	461 316	472 635	482 439	492 206	502 107	511 704	521 501	530 926
Developed countries												
Consumption	kt pw	133 311	132 897	133 826	134 918	135 869	136 656	137 323	138 172	138 960	139 804	140 557
Developing countries												
Consumption	kt pw	294 939	303 513	314 496	326 397	336 766	345 783	354 883	363 935	372 745	381 697	390 368
OECD[1]												
Consumption	kt pw	105 550	104 931	105 597	106 400	107 161	107 804	108 357	109 119	109 850	110 639	111 352
BUTTER												
World												
Production	kt pw	11 611	12 052	12 317	12 587	12 850	13 090	13 333	13 570	13 813	14 049	14 290
Consumption	kt pw	11 632	12 053	12 314	12 581	12 844	13 086	13 330	13 566	13 808	14 043	14 283
Stock changes	kt pw	-8	-1	3	6	6	4	3	4	5	6	6
Price[2]	USD/t	4 424	4 037	4 130	4 180	4 222	4 287	4 366	4 462	4 517	4 564	4 600
Developed countries												
Production	kt pw	4 829	4 903	4 936	4 967	5 003	5 042	5 078	5 109	5 137	5 165	5 194
Consumption	kt pw	4 339	4 391	4 413	4 435	4 459	4 484	4 507	4 526	4 544	4 561	4 579
Developing countries												
Production	kt pw	6 782	7 149	7 381	7 620	7 847	8 048	8 255	8 461	8 676	8 884	9 096
Consumption	kt pw	7 292	7 662	7 901	8 147	8 385	8 602	8 823	9 040	9 264	9 481	9 704
OECD[1]												
Production	kt pw	4 721	4 802	4 842	4 882	4 919	4 958	4 992	5 023	5 050	5 077	5 104
Consumption	kt pw	4 236	4 285	4 309	4 337	4 361	4 388	4 412	4 433	4 453	4 472	4 492
Stock changes	kt pw	-4	-1	3	6	6	4	3	4	5	6	6
CHEESE												
World												
Production	kt pw	24 067	24 667	25 047	25 384	25 676	25 954	26 254	26 568	26 924	27 264	27 613
Consumption	kt pw	24 044	24 658	25 022	25 342	25 632	25 921	26 238	26 552	26 898	27 241	27 613
Stock changes	kt pw	5	9	25	42	44	33	16	16	25	22	0
Price[3]	USD/t	3 842	3 910	3 990	4 057	4 122	4 190	4 267	4 349	4 419	4 485	4 545
Developed countries												
Production	kt pw	19 866	20 371	20 637	20 867	21 081	21 280	21 496	21 727	21 996	22 255	22 522
Consumption	kt pw	18 881	19 327	19 547	19 738	19 921	20 098	20 306	20 511	20 748	20 982	21 245
Developing countries												
Production	kt pw	4 202	4 296	4 410	4 517	4 595	4 674	4 758	4 841	4 927	5 009	5 091
Consumption	kt pw	5 163	5 331	5 475	5 604	5 711	5 823	5 932	6 041	6 151	6 259	6 368
OECD[1]												
Production	kt pw	19 310	19 764	20 004	20 214	20 419	20 606	20 815	21 039	21 300	21 548	21 805
Consumption	kt pw	18 501	18 904	19 097	19 262	19 434	19 600	19 798	19 996	20 224	20 450	20 703
Stock changes	kt pw	5	9	25	42	44	33	16	16	25	22	0

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand in aggregates. Average 2018-20est: Data for 2020 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 (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
SKIM MILK POWDER												
World												
Production	kt pw	4 434	4 620	4 698	4 766	4 832	4 901	4 969	5 036	5 101	5 163	5 228
Consumption	kt pw	4 545	4 618	4 698	4 766	4 832	4 901	4 969	5 036	5 101	5 163	5 228
Stock changes	kt pw	-128	3	0	0	0	0	0	0	0	0	0
Price[1]	USD/t	2 470	2 890	2 909	2 964	3 016	3 072	3 130	3 192	3 252	3 311	3 371
Developed countries												
Production	kt pw	3 820	3 968	4 026	4 079	4 129	4 181	4 234	4 286	4 337	4 387	4 439
Consumption	kt pw	1 787	1 774	1 783	1 791	1 792	1 793	1 795	1 797	1 798	1 798	1 803
Developing countries												
Production	kt pw	614	652	672	687	703	719	735	749	763	777	790
Consumption	kt pw	2 758	2 844	2 916	2 975	3 040	3 107	3 174	3 238	3 302	3 365	3 426
OECD[2]												
Production	kt pw	3 549	3 699	3 756	3 808	3 858	3 909	3 960	4 011	4 060	4 108	4 159
Consumption	kt pw	1 874	1 922	1 934	1 946	1 951	1 957	1 963	1 969	1 975	1 979	1 988
Stock changes	kt pw	-128	3	0	0	0	0	0	0	0	0	0
WHOLE MILK POWDER												
World												
Production	kt pw	5 059	5 379	5 363	5 373	5 458	5 543	5 622	5 704	5 785	5 865	5 945
Consumption	kt pw	5 102	5 381	5 360	5 373	5 460	5 545	5 624	5 704	5 785	5 865	5 945
Stock changes	kt pw	11	-2	3	1	-2	-2	-2	0	0	0	0
Price[3]	USD/t	3 025	3 093	3 130	3 188	3 240	3 299	3 366	3 442	3 503	3 564	3 622
Developed countries												
Production	kt pw	2 510	2 597	2 635	2 649	2 670	2 692	2 705	2 720	2 736	2 753	2 769
Consumption	kt pw	713	743	740	745	752	753	754	755	756	759	761
Developing countries												
Production	kt pw	2 549	2 782	2 728	2 724	2 789	2 851	2 917	2 984	3 048	3 112	3 176
Consumption	kt pw	4 389	4 638	4 620	4 627	4 709	4 792	4 870	4 949	5 028	5 106	5 184
OECD[2]												
Production	kt pw	2 692	2 784	2 826	2 846	2 870	2 895	2 911	2 929	2 948	2 967	2 986
Consumption	kt pw	952	1 003	1 003	1 013	1 023	1 027	1 031	1 036	1 041	1 047	1 052
Stock changes	kt pw	11	-2	3	1	-2	-2	-2	0	0	0	0
WHEY POWDER												
Price[4]	USD/t	909	916	926	929	940	958	983	1 007	1 027	1 046	1 066
CASEIN												
Price[5]	USD/t	6 529	7 659	7 694	7 834	7 973	8 111	8 256	8 402	8 549	8 697	8 846

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand in aggregates. Average 2018-20est: Data for 2020 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 (2021), “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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
FISH[1]												
World												
Production	kt	177 801	180 024	181 281	185 424	188 117	190 121	192 118	192 676	196 214	198 317	200 529
of which aquaculture	kt	84 014	86 282	87 850	90 364	92 454	94 350	95 995	97 759	99 555	101 400	103 339
Consumption	kt	178 260	180 075	181 392	185 525	188 208	190 202	192 189	192 737	196 265	198 358	200 560
of which for food	kt	157 267	159 682	161 935	165 248	167 973	169 990	172 016	173 510	176 126	178 281	180 504
of which for reduction	kt	16 795	16 351	15 483	16 371	16 398	16 444	16 474	15 595	16 576	16 583	16 615
Price												
Aquaculture[2]	USD/t	3 014.9	2 966.9	3 118.5	3 152.6	3 192.5	3 253.8	3 303.9	3 365.4	3 391.1	3 431.6	3 468.4
Capture[3]	USD/t	1 858.6	1 850.6	1 907.6	1 920.9	1 930.0	1 949.3	1 961.0	1 986.5	1 987.3	1 998.5	2 011.0
Product traded[4]	USD/t	3 053.4	3 033.3	3 167.4	3 196.7	3 213.1	3 253.0	3 277.4	3 326.9	3 331.0	3 352.9	3 377.5
Developed countries												
Production	kt	29 470	29 711	30 161	30 271	30 565	30 549	30 757	30 751	31 015	30 958	31 028
of which aquaculture	kt	4 798	4 866	4 942	5 031	5 129	5 234	5 321	5 389	5 421	5 453	5 500
Consumption	kt	37 302	36 587	37 112	37 269	37 426	37 430	37 490	37 486	37 670	37 757	37 875
of which for food	kt	31 477	30 888	31 361	31 519	31 678	31 667	31 726	31 710	31 886	31 983	32 102
of which for reduction	kt	4 740	4 709	4 760	4 759	4 756	4 770	4 770	4 783	4 790	4 780	4 779
Developing countries												
Production	kt	148 331	150 314	151 120	155 152	157 552	159 572	161 362	161 925	165 199	167 359	169 501
of which aquaculture	kt	79 216	81 415	82 908	85 333	87 325	89 116	90 673	92 370	94 134	95 947	97 839
Consumption	kt	140 958	143 488	144 280	148 256	150 782	152 773	154 700	155 251	158 595	160 601	162 684
of which for food	kt	125 791	128 794	130 574	133 729	136 295	138 322	140 289	141 800	144 240	146 298	148 402
of which for reduction	kt	12 056	11 642	10 723	11 612	11 642	11 674	11 703	10 813	11 786	11 804	11 837
OECD[5]												
Production	kt	29 156	29 390	29 418	29 717	30 169	30 133	30 323	29 897	30 412	30 440	30 525
of which aquaculture	kt	6 980	7 093	7 270	7 339	7 526	7 679	7 806	7 899	7 963	8 041	8 156
Consumption	kt	39 027	38 512	38 817	39 196	39 430	39 438	39 501	39 270	39 652	39 771	39 900
of which for food	kt	32 776	32 327	32 838	33 042	33 269	33 277	33 357	33 336	33 543	33 675	33 822
of which for reduction	kt	5 060	5 081	4 881	5 059	5 071	5 076	5 063	4 857	5 037	5 029	5 016
FISHMEAL[6]												
World												
Production	kt	5 474.2	5 416.6	5 249.0	5 504.1	5 545.7	5 596.7	5 640.0	5 454.5	5 728.7	5 764.6	5 805.8
from whole fish	kt	4 016.5	3 964.3	3 767.1	3 992.8	4 011.2	4 034.6	4 053.5	3 849.1	4 102.1	4 115.5	4 135.1
Consumption	kt	5 443.9	5 688.2	5 509.1	5 443.8	5 607.6	5 667.5	5 718.2	5 689.3	5 643.3	5 799.8	5 853.4
Variation in stocks	kt	154.0	-180.6	-174.1	141.3	14.2	0.2	-12.2	-173.8	141.4	15.8	-1.6
Price[7]	USD/t	1 466.6	1 501.2	1 550.0	1 393.5	1 384.0	1 431.9	1 467.1	1 563.3	1 630.4	1 592.1	1 623.0
Developed countries												
Production	kt	1 701.3	1 692.1	1 717.0	1 729.2	1 741.1	1 757.2	1 769.9	1 785.0	1 799.5	1 809.3	1 821.6
from whole fish	kt	1 112.6	1 137.3	1 153.2	1 156.4	1 159.3	1 166.3	1 169.9	1 176.4	1 181.8	1 182.5	1 185.7
Consumption	kt	1 708.4	1 674.4	1 609.3	1 604.3	1 630.2	1 629.9	1 625.5	1 594.4	1 556.0	1 577.4	1 567.2
Variation in stocks	kt	62.7	-71.6	-64.1	42.3	0.2	-7.8	-11.2	-43.8	32.4	8.8	-1.6
Developing countries												
Production	kt	3 772.9	3 724.5	3 532.1	3 774.8	3 804.7	3 839.5	3 870.1	3 669.6	3 929.2	3 955.3	3 984.2
from whole fish	kt	2 903.9	2 827.0	2 613.9	2 836.4	2 852.0	2 868.2	2 883.6	2 672.7	2 920.3	2 933.0	2 949.3
Consumption	kt	3 735.5	4 013.7	3 899.8	3 839.5	3 977.3	4 037.6	4 092.7	4 095.0	4 087.4	4 222.4	4 286.2
Variation in stocks	kt	91.3	-109.0	-110.0	99.0	14.0	8.0	-1.0	-130.0	109.0	7.0	0.0
OECD[5]												
Production	kt	1 636.1	1 651.6	1 619.0	1 668.8	1 683.0	1 695.9	1 704.3	1 669.7	1 720.6	1 729.9	1 738.1
from whole fish	kt	1 146.8	1 173.8	1 133.2	1 174.9	1 181.2	1 186.1	1 186.3	1 144.0	1 186.8	1 188.0	1 188.1
Consumption	kt	1 794.3	1 862.0	1 791.5	1 761.5	1 796.0	1 797.4	1 794.7	1 758.8	1 725.2	1 751.7	1 747.2
Variation in stocks	kt	44.3	-80.6	-66.1	50.3	15.2	-6.8	-8.2	-50.8	40.4	16.8	1.4

Table C.7. World fish and seafood projections *(cont.)*

Calendar year

		Average 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
FISH OIL[6]												
World												
Production	kt	1 104.3	1 156.5	1 133.9	1 175.5	1 192.6	1 195.7	1 207.0	1 170.8	1 227.8	1 230.0	1 235.1
from whole fish	kt	683.8	681.1	646.5	687.4	692.4	696.5	699.5	661.9	707.1	709.4	710.4
Consumption	kt	1 048.1	1 133.8	1 134.5	1 127.7	1 170.9	1 181.2	1 206.0	1 201.2	1 201.7	1 225.3	1 234.5
Variation in stocks	kt	7.8	-8.9	-27.2	26.3	5.1	2.9	-5.6	-31.0	25.5	4.1	0.0
Price[8]	USD/t	1 783.9	1 852.1	1 865.6	1 728.3	1 723.0	1 798.0	1 827.1	1 988.3	1 977.4	1 997.7	2 027.1
Developed countries												
Production	kt	463.3	489.3	501.1	499.5	509.7	507.5	513.7	513.5	523.6	520.9	522.9
from whole fish	kt	207.5	206.5	208.0	207.5	207.4	208.0	207.8	208.0	208.1	207.3	207.1
Consumption	kt	597.6	639.3	647.2	635.6	651.2	658.0	667.2	674.9	664.5	672.8	671.4
Variation in stocks	kt	-1.4	-6.4	-16.2	12.3	2.1	-1.1	-0.6	-15.0	11.5	3.1	0.0
Developing countries												
Production	kt	641.0	667.2	632.8	676.0	682.9	688.2	693.4	657.3	704.2	709.1	712.2
from whole fish	kt	476.3	474.7	438.5	479.9	485.0	488.5	491.8	453.9	499.0	502.1	503.4
Consumption	kt	450.5	494.5	487.3	492.0	519.7	523.2	538.8	526.3	537.2	552.5	563.1
Variation in stocks	kt	9.2	-2.5	-11.0	14.0	3.0	4.0	-5.0	-16.0	14.0	1.0	0.0
OECD[5]												
Production	kt	538.7	575.8	575.7	583.3	593.8	591.0	596.5	585.5	604.3	601.6	602.9
from whole fish	kt	244.8	248.5	238.3	247.1	247.6	247.8	247.1	236.7	245.7	245.2	244.4
Consumption	kt	729.4	770.6	772.2	758.2	788.5	793.3	809.9	804.9	800.8	816.7	821.0
Variation in stocks	kt	-1.6	8.1	-19.7	14.3	7.1	-0.1	-2.6	-21.0	13.5	3.1	0.0

Note: The term "fish" indicates fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, crocodiles, caimans, alligators and aquatic plants. Average 2018-20est: Data for 2020 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 (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ETHANOL												
World												
Production	mrd L	126.1	124.4	126.9	127.5	128.3	128.9	129.6	130.2	130.7	131.4	132.0
Consumption	mrd L	125.9	124.8	127.3	128.1	128.8	129.3	130.0	130.5	131.1	131.8	132.4
Exports	mrd L	11.0	11.2	11.2	11.0	11.0	10.8	10.7	10.6	10.5	10.5	10.3
Price[1]	USD/hl	39.1	42.4	45.7	48.0	48.1	49.1	49.0	49.8	50.7	51.3	51.5
Developed countries												
Production	bln L	69.6	69.3	70.3	69.9	69.8	69.5	69.4	69.1	68.7	68.5	68.3
Consumption	bln L	68.7	68.2	69.2	68.9	68.7	68.4	68.2	67.9	67.7	67.5	67.3
Net trade	bln L	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.0	1.0	1.0
Developing countries												
Production	bln L	56.4	55.1	56.6	57.6	58.6	59.4	60.2	61.1	62.0	62.9	63.7
Consumption	bln L	57.2	56.6	58.2	59.1	60.1	61.0	61.7	62.6	63.4	64.2	65.1
Net trade	bln L	-2.0	-1.6	-1.6	-1.5	-1.6	-1.6	-1.5	-1.5	-1.4	-1.4	-1.3
OECD[2]												
Production	bln L	69.5	69.3	70.3	69.9	69.8	69.5	69.4	69.1	68.8	68.6	68.4
Consumption	bln L	69.9	69.6	70.6	70.4	70.1	69.8	69.7	69.4	69.2	69.0	68.8
Net trade	bln L	0.0	-0.3	-0.2	-0.3	-0.2	-0.2	-0.2	-0.3	-0.4	-0.4	-0.4
BIODIESEL												
World												
Production	bln L	46.8	48.3	49.4	49.7	50.0	50.4	50.4	50.0	49.9	50.0	49.9
Consumption	bln L	47.2	49.1	50.3	50.6	50.9	51.2	51.2	50.8	50.8	50.9	50.7
Exports	bln L	7.1	6.0	5.9	5.8	5.8	5.6	5.6	5.5	5.4	5.3	5.3
Price[3]	USD/hl	84.4	88.5	89.4	92.5	92.9	93.7	94.5	95.6	97.0	97.1	97.3
Developed countries												
Production	bln L	24.8	25.0	25.7	25.6	25.5	25.6	25.3	24.6	24.2	24.1	23.7
Consumption	bln L	28.8	29.0	29.6	29.5	29.4	29.4	29.0	28.2	27.7	27.4	26.8
Net trade	bln L	-4.2	-4.0	-3.9	-3.9	-3.8	-3.8	-3.7	-3.6	-3.5	-3.3	-3.1
Developing countries												
Production	bln L	22.0	23.3	23.8	24.1	24.5	24.8	25.1	25.4	25.7	26.0	26.2
Consumption	bln L	18.4	20.1	20.7	21.1	21.5	21.9	22.2	22.6	23.1	23.5	23.9
Net trade	bln L	3.6	3.2	3.1	3.1	3.0	3.0	2.8	2.8	2.7	2.5	2.3
OECD[2]												
Production	bln L	26.1	26.3	27.0	26.9	26.9	26.9	26.6	26.0	25.6	25.4	25.0
Consumption	bln L	30.1	30.3	30.9	30.8	30.7	30.7	30.3	29.5	29.1	28.7	28.2
Net trade	bln L	-4.2	-4.0	-3.9	-3.9	-3.8	-3.8	-3.6	-3.5	-3.5	-3.3	-3.1

Note: Average 2018-20est: Data for 2020 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 (2021), “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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
WORLD												
Production	Mt	25.5	24.9	25.1	25.5	26.0	26.4	26.9	27.2	27.6	28.0	28.4
Area	Mha	32.8	31.7	31.8	31.9	32.2	32.4	32.6	32.7	32.9	33.0	33.2
Yield	t/ha	0.78	0.79	0.79	0.80	0.81	0.82	0.82	0.83	0.84	0.85	0.86
Consumption[1]	Mt	24.3	24.8	25.2	25.6	26.0	26.4	26.7	27.1	27.5	27.9	28.3
Exports	Mt	9.1	9.5	9.7	9.9	10.1	10.3	10.5	10.7	10.9	11.1	11.3
Closing stocks	Mt	20.7	22.0	21.9	21.8	21.8	21.8	22.0	22.1	22.2	22.3	22.4
Price[2]	USD/t	1 694.1	1 647.2	1 665.9	1 690.2	1 715.3	1 742.6	1 771.2	1 803.5	1 840.3	1 879.9	1 920.3
DEVELOPED COUNTRIES												
Production	Mt	5.8	5.9	5.9	6.0	6.1	6.3	6.4	6.5	6.5	6.6	6.7
Consumption	Mt	1.6	1.7	1.7	1.7	1.8	1.7	1.7	1.7	1.8	1.8	1.8
Exports	Mt	4.6	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.1	5.2	5.3
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	2.0	1.9	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.8
DEVELOPING COUNTRIES												
Production	Mt	19.7	19.1	19.2	19.5	19.9	20.2	20.5	20.8	21.1	21.4	21.7
Consumption	Mt	22.7	23.1	23.5	23.9	24.3	24.6	25.0	25.4	25.7	26.1	26.5
Exports	Mt	4.5	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.8	5.9	6.0
Imports	Mt	8.6	9.2	9.4	9.6	9.8	10.0	10.2	10.4	10.5	10.7	10.9
Closing stocks	Mt	18.7	20.1	20.1	20.1	20.1	20.2	20.3	20.4	20.5	20.6	20.7
OECD[3]												
Production	Mt	5.7	5.6	5.7	5.8	6.0	6.1	6.2	6.3	6.4	6.5	6.6
Consumption	Mt	2.8	3.0	3.1	3.1	3.1	3.1	3.1	3.2	3.2	3.2	3.3
Exports	Mt	4.4	4.3	4.4	4.5	4.6	4.8	4.9	5.0	5.0	5.1	5.2
Imports	Mt	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9
Closing stocks	Mt	2.9	2.9	2.8	2.7	2.6	2.6	2.6	2.7	2.7	2.7	2.7

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 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 (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
REAL GDP[3]												
Australia	%	0.3	3.2	3.1	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5
Canada	%	-0.6	3.5	2.0	2.4	1.8	1.7	1.7	1.7	1.7	1.7	1.7
Chile	%	-0.3	4.5	3.2	2.9	2.7	2.5	2.4	2.4	2.3	2.3	2.2
European Union	%	-1.5	4.2	2.9	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2
Japan	%	-1.4	2.3	1.5	1.2	1.0	0.6	0.6	0.6	0.6	0.6	0.6
Korea	%	1.3	2.8	3.4	2.9	2.6	2.4	2.4	2.4	2.4	2.4	2.4
Mexico	%	-2.4	3.6	3.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1
New Zealand	%	0.2	2.7	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Norway	%	0.3	3.2	1.5	2.3	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Switzerland	%	-0.2	2.2	3.4	1.4	1.9	1.3	1.3	1.3	1.3	1.3	1.3
Turkey	%	-0.4	5.0	4.0	3.5	3.5	3.5	3.4	3.3	3.2	3.1	3.0
United Kingdom	%	-2.9	4.2	4.1	1.9	1.7	1.6	1.6	1.6	1.6	1.6	1.6
United States	%	0.5	3.2	3.5	2.3	1.9	1.8	1.8	1.8	1.8	1.8	1.8
Brazil	%	-1.2	2.6	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
China	%	4.9	8.0	4.9	5.7	5.6	5.5	5.5	5.5	5.5	5.5	5.5
Egypt	%	4.8	2.8	5.0	5.3	5.3	5.6	5.3	5.0	4.8	4.6	4.4
India	%	0.0	8.8	8.0	7.6	7.4	7.2	6.7	6.3	5.9	5.6	5.3
Indonesia	%	2.9	6.1	5.3	5.2	5.1	5.1	4.8	4.6	4.4	4.2	4.0
Iran	%	-5.6	3.2	1.5	1.5	1.1	1.2	1.7	1.7	1.7	1.7	1.7
Malaysia	%	1.0	7.8	6.0	5.7	5.3	5.0	4.8	4.5	4.3	4.2	4.0
Pakistan	%	2.4	1.0	4.0	4.5	5.0	5.0	4.8	4.6	4.4	4.2	4.0
Russia	%	-0.2	2.8	2.2	2.1	2.0	1.8	1.8	1.7	1.7	1.7	1.6
Saudi Arabia	%	-0.9	3.1	3.4	2.5	2.6	2.6	2.6	2.5	2.4	2.4	2.3
South Africa	%	-2.4	3.0	1.5	1.5	2.1	2.3	2.3	2.2	2.2	2.1	2.1
Ukraine	%	-0.2	3.0	3.2	3.4	3.8	4.0	3.8	3.7	3.6	3.4	3.3
OECD[4,5]	%	-0.6	3.6	3.1	2.1	1.9	1.8	1.8	1.8	1.7	1.7	1.7
PCE DEFLATOR[3]												
Australia	%	1.5	1.2	1.4	1.9	2.2	2.4	2.4	2.4	2.4	2.4	2.4
Canada	%	1.4	0.4	0.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Chile	%	2.5	2.7	3.0	3.0	3.0	3.0	2.9	2.8	2.8	2.7	2.6
European Union	%	1.1	1.1	1.3	1.4	1.7	1.7	1.8	1.8	1.8	1.8	1.8
Japan	%	0.4	0.2	0.4	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0
Korea	%	0.8	0.7	1.1	1.3	1.5	2.0	2.0	2.0	2.0	2.0	2.0
Mexico	%	3.7	3.4	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
New Zealand	%	1.6	1.2	1.6	1.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Norway	%	2.1	1.6	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Switzerland	%	0.3	0.3	0.6	0.7	0.9	1.0	1.0	1.0	1.0	1.0	1.0
Turkey	%	14.5	11.9	11.4	11.0	11.0	11.0	9.9	9.0	8.3	7.6	7.1
United Kingdom	%	1.6	0.7	1.5	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
United States	%	1.6	1.2	1.4	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Brazil	%	2.6	1.9	2.9	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
China	%	2.6	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Egypt	%	13.5	6.2	7.9	7.7	7.7	7.4	6.9	6.4	6.0	5.7	5.4
India	%	4.4	3.7	3.8	3.9	3.9	4.0	3.9	3.7	3.6	3.5	3.4
Indonesia	%	2.7	1.6	2.5	3.0	3.0	3.0	2.9	2.8	2.7	2.7	2.6
Iran	%	1.9	2.2	1.8	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Malaysia	%	0.2	2.4	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.8
Pakistan	%	7.1	8.8	7.3	6.5	6.5	6.5	6.1	5.7	5.4	5.2	4.9
Russia	%	3.5	3.2	3.2	3.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Saudi Arabia	%	1.3	3.7	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8
South Africa	%	4.0	3.9	4.3	4.5	4.5	4.5	4.3	4.1	4.0	3.8	3.7
Ukraine	%	7.3	6.0	5.7	5.2	5.0	5.0	4.8	4.5	4.3	4.2	4.0
OECD[4,5]	%	2.3	2.1	2.3	2.7	2.9	3.1	3.0	3.0	2.9	2.9	2.8

Table C.10. Economic assumptions *(cont.)*

Calendar year

		Average 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
GDP DEFLATOR[3]												
Australia	%	1.9	1.3	1.3	1.9	2.0	2.2	2.2	2.2	2.2	2.2	2.2
Canada	%	1.2	0.4	1.0	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Chile	%	3.5	3.9	2.6	2.7	2.7	2.7	2.7	2.6	2.5	2.5	2.4
European Union	%	1.6	1.2	1.3	1.4	1.5	1.6	1.5	1.5	1.5	1.5	1.5
Japan	%	0.5	0.4	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Korea	%	0.3	1.1	0.6	1.4	1.7	2.2	2.2	2.2	2.2	2.2	2.2
Mexico	%	3.6	3.1	3.0	3.2	3.1	3.0	3.0	3.0	3.0	3.0	3.0
New Zealand	%	2.0	1.1	1.7	1.7	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Norway	%	0.9	1.8	1.9	2.3	2.3	2.6	2.6	2.6	2.6	2.6	2.6
Switzerland	%	0.1	0.3	0.6	0.4	0.6	0.7	0.7	0.7	0.7	0.7	0.7
Turkey	%	13.3	5.9	11.4	13.0	10.4	10.6	9.6	8.7	8.0	7.4	6.9
United Kingdom	%	3.4	-2.9	1.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0
United States	%	1.8	1.1	1.5	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Brazil	%	3.9	2.0	2.9	4.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9
China	%	2.0	1.6	2.0	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2
Egypt	%	13.6	6.2	8.1	7.8	7.8	7.8	7.2	6.7	6.3	5.9	5.6
India	%	4.0	3.0	3.7	3.8	3.8	3.8	3.6	3.5	3.4	3.3	3.2
Indonesia	%	2.5	1.6	2.5	3.0	3.0	3.0	2.9	2.8	2.7	2.7	2.6
Iran	%	1.9	2.2	1.8	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Malaysia	%	0.0	2.5	1.9	2.0	2.2	2.3	2.3	2.2	2.2	2.1	2.1
Pakistan	%	6.9	9.4	8.5	7.2	6.2	6.2	5.9	5.6	5.3	5.0	4.8
Russia	%	3.8	3.4	3.5	3.8	4.0	4.4	4.4	4.4	4.4	4.4	4.4
Saudi Arabia	%	0.9	4.8	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.0	2.0
South Africa	%	3.8	3.9	4.3	4.5	4.5	4.5	4.3	4.1	4.0	3.8	3.7
Ukraine	%	9.5	5.5	5.3	5.2	5.0	5.0	4.8	4.5	4.3	4.2	4.0
OECD[5]	%	2.5	1.4	2.2	2.7	2.6	2.8	2.7	2.7	2.6	2.6	2.6
WORLD INPUT PRICES												
Brent crude oil[1]	USD/barrel	59.5	46.5	52.9	55.1	57.5	59.9	62.8	65.6	68.4	71.2	74.0
Fertiliser[2]	USD/t	252.0	228.3	246.5	253.9	260.2	265.3	269.1	274.1	280.8	287.9	294.7
EXCHANGE RATES												
Australia	AUD/USD	1.41	1.42	1.42	1.42	1.42	1.43	1.43	1.44	1.45	1.45	1.46
Canada	CAD/USD	1.32	1.31	1.31	1.30	1.28	1.26	1.25	1.23	1.22	1.20	1.18
Chile	CLP/USD	715.32	762.24	743.03	731.97	725.72	722.14	718.57	714.99	711.42	707.84	704.27
European Union	EUR/USD	0.87	0.85	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84
Japan	JPY/USD	108.79	104.84	104.84	101.09	98.59	96.84	95.11	93.42	91.75	90.12	88.51
Korea	KRW/USD	1 150.17	1 134.60	1 134.60	1 127.70	1 123.02	1 123.94	1 124.86	1 125.79	1 126.71	1 127.63	1 128.56
Mexico	MXN/USD	19.99	21.09	21.09	21.27	21.44	21.60	21.77	21.93	22.10	22.27	22.44
New Zealand	NZD/USD	1.50	1.49	1.49	1.47	1.46	1.44	1.43	1.42	1.40	1.39	1.38
Brazil	BRL/USD	4.27	5.69	5.69	5.67	5.62	5.64	5.66	5.68	5.70	5.72	5.74
China	CNY/USD	6.82	6.68	6.68	6.67	6.65	6.64	6.63	6.62	6.61	6.59	6.58
Egypt	EGP/USD	17.14	16.95	18.29	19.48	20.76	22.01	23.26	24.51	25.76	27.01	28.26
India	INR/USD	71.44	75.32	77.24	79.25	81.37	83.62	85.87	88.13	90.38	92.63	94.89
Indonesia	'000 IDR/USD	14.33	14.71	14.80	14.97	15.15	15.33	15.51	15.69	15.88	16.06	16.24
Malaysia	MYR/USD	4.12	4.09	4.07	4.04	4.04	4.04	4.04	4.05	4.05	4.05	4.06
Pakistan	PKR/USD	111.93	128.88	137.35	144.68	150.77	157.11	163.15	168.90	174.37	179.56	184.50
Russia	RUB/USD	66.82	79.23	79.23	80.38	81.75	83.17	84.60	86.07	87.56	89.07	90.61
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	14.93	16.30	15.80	16.00	16.11	16.30	16.49	16.68	16.87	17.06	17.25
Ukraine	UAH/USD	26.70	28.12	27.96	28.10	28.10	28.10	28.10	28.10	28.10	28.10	28.10
United Kingdom	GBP/USD	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77

Table C.10. Economic assumptions *(cont.)*

Calendar year

		2020est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
POPULATION[3]												
Australia	%	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9	0.9
Canada	%	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7
Chile	%	0.9	0.5	0.2	0.0	-0.1	0.0	0.1	0.2	0.2	0.3	0.3
European Union	%	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Japan	%	-0.3	-0.3	-0.4	-0.4	-0.4	-0.5	-0.5	-0.5	-0.5	-0.5	-0.6
Korea	%	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
Mexico	%	1.1	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.8
New Zealand	%	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.6
Norway	%	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Switzerland	%	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5
Turkey	%	1.1	0.8	0.6	0.5	0.4	0.5	0.5	0.5	0.6	0.6	0.6
United Kingdom	%	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3
United States	%	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5
Argentina	%	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7
Brazil	%	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4
China	%	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0
Egypt	%	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.6	1.5
India	%	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7
Indonesia	%	1.1	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8
Iran	%	1.3	1.2	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8
Malaysia	%	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	0.9
Pakistan	%	2.0	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.6	1.6
Russia	%	0.0	0.0	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3
Saudi Arabia	%	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.0	1.0
South Africa	%	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.9
Ukraine	%	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
OECD[5]	%	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
World	%	1.1	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8

		Average 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
PER CAPITA GDP in constant 2010 US dollars[3]												
Australia	%	-1.0	2.1	1.9	1.5	1.6	1.5	1.5	1.6	1.6	1.6	1.6
Canada	%	-1.5	2.6	1.2	1.6	1.0	0.9	0.9	0.9	0.9	1.0	1.0
Chile	%	-1.5	4.0	3.0	2.9	2.7	2.5	2.3	2.2	2.1	2.0	1.9
European Union	%	-1.7	4.1	2.9	1.3	1.3	1.4	1.3	1.3	1.3	1.3	1.3
Japan	%	-1.2	2.7	1.9	1.6	1.4	1.0	1.0	1.1	1.1	1.1	1.1
Korea	%	1.2	2.8	3.3	2.9	2.6	2.5	2.5	2.5	2.5	2.5	2.6
Mexico	%	-3.5	2.5	2.4	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3
New Zealand	%	-0.6	1.9	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.9
Norway	%	-0.5	2.4	0.7	1.5	1.0	1.0	1.0	1.0	1.0	1.1	1.1
Switzerland	%	-1.0	1.4	2.7	0.8	1.3	0.7	0.7	0.7	0.7	0.8	0.8
Turkey	%	-1.7	4.1	3.4	3.0	3.1	3.0	2.9	2.7	2.6	2.5	2.4
United Kingdom	%	-3.5	3.7	3.7	1.5	1.4	1.3	1.3	1.3	1.3	1.3	1.3
United States	%	-0.1	2.6	2.9	1.7	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Brazil	%	-2.0	1.9	1.5	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.8
China	%	4.4	7.7	4.6	5.5	5.4	5.3	5.3	5.4	5.4	5.4	5.5
Egypt	%	2.8	0.9	3.1	3.5	3.5	3.8	3.6	3.4	3.2	3.0	2.8
India	%	-1.0	7.8	7.0	6.6	6.5	6.3	5.8	5.4	5.1	4.8	4.5
Indonesia	%	1.8	5.0	4.2	4.2	4.1	4.1	3.9	3.7	3.5	3.4	3.2
Iran	%	-6.9	1.9	0.4	0.4	0.1	0.1	0.7	0.8	0.8	0.9	0.9
Malaysia	%	-0.3	6.5	4.7	4.4	4.1	3.8	3.6	3.5	3.3	3.2	3.1
Pakistan	%	0.3	-0.9	2.1	2.6	3.1	3.2	3.0	2.8	2.7	2.5	2.4
Russia	%	-0.3	2.9	2.3	2.3	2.2	2.0	2.0	2.0	2.0	1.9	1.9
Saudi Arabia	%	-2.5	1.6	2.0	1.2	1.3	1.4	1.4	1.4	1.3	1.3	1.3
South Africa	%	-3.6	1.7	0.3	0.4	1.0	1.3	1.2	1.2	1.2	1.2	1.2
Ukraine	%	0.4	3.6	3.9	4.1	4.5	4.7	4.6	4.4	4.3	4.2	4.1
OECD[5]	%	-1.0	3.1	2.7	1.6	1.4	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. 108, December 2020. For other economies, historical macroeconomic data were obtained from the IMF, World Economic Outlook, October 2020. Assumptions for the projection period draw on the recent medium term update of the OECD Economics Department, projections of the IMF, and for population, projections from the United Nations World Population Prospects Database, 2019 Revision (medium variant). Data for the European Union are euro area aggregates except for population. The price index used is the private consumption expenditure deflator. Average 2018-20est and 2020est: Data for 2020 are estimated.

1. Short-term update for crude oil price from the OECD Economic Outlook N°108 (December 2020). For 2020, the annual average daily spot price is used and oil prices follow the growth rate from the World bank crude oil average price during the projection period.
2. World Bank. Data for 2020 are estimated, projections by OECD and FAO Secretariats.
3. Annual per cent change.
4. Annual weighted average real GDP and CPI growth rates in OECD countries are based on weights using purchasing power parities (PPPs).
5. Excludes Iceland and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
CEREALS												
Wheat[1]	USD/t	233.6	234.4	215.4	219.5	221.8	230.3	236.6	241.8	247.1	250.6	253.6
Maize[2]	USD/t	175.4	188.1	172.1	169.3	173.3	181.3	186.6	190.7	193.8	196.8	199.6
Other coarse grains[3]	USD/t	206.2	209.3	196.8	199.7	202.7	209.7	215.1	220.4	225.3	229.4	232.8
Rice[4]	USD/t	464.1	513.4	488.0	476.3	479.4	480.4	483.5	485.1	488.3	490.0	492.4
Distiller's dry grains[5]	USD/t	162.0	163.2	148.8	148.6	152.0	158.6	162.8	166.5	169.8	172.7	175.4
OILSEEDS												
Soybean[6]	USD/t	413.1	459.1	454.6	452.0	455.0	458.8	468.7	474.7	484.2	487.1	494.2
Other oilseeds[7]	USD/t	445.2	476.0	470.8	460.2	471.3	477.1	483.8	488.0	497.3	501.9	507.0
Protein meals[8]	USD/t	354.4	391.0	390.2	385.4	384.1	389.9	397.4	404.3	411.7	416.4	422.2
Vegetable oils[9]	USD/t	783.6	899.2	878.5	871.0	883.6	912.1	935.0	948.8	971.7	987.9	1 005.7
SWEETENERS												
Raw sugar[10]	USD/t	290.0	310.4	321.2	333.3	344.4	350.3	359.0	364.4	370.1	375.8	380.2
Refined sugar[11]	USD/t	368.9	397.4	408.5	421.1	433.1	439.1	447.8	453.1	459.5	466.0	471.2
HFCS[12]	USD/t dw	889.1	586.0	609.2	615.8	632.0	643.8	663.3	675.3	684.9	693.9	702.3
Molasses[13]	USD/t	168.7	161.7	155.9	160.1	163.0	166.4	167.1	169.6	173.7	178.1	183.9
MEAT												
Beef and veal												
Price, EU[14]	USD/t dwt	4 163.6	3 947.6	4 016.4	3 984.0	3 961.4	3 974.4	3 976.2	3 974.0	3 964.7	3 954.5	3 938.7
Price, United States[15]	USD/t dwt	4 058.5	4 121.6	4 209.3	4 239.5	4 281.5	4 335.9	4 333.9	4 329.6	4 326.1	4 319.8	4 312.2
Price, Brazil[16]	USD/t dwt	4 170.8	4 287.9	4 383.7	4 350.2	4 310.0	4 315.1	4 320.9	4 323.2	4 312.4	4 302.6	4 293.6
Pigmeat												
Price, EU[17]	USD/t dwt	1 801.3	1 879.6	1 895.6	1 887.9	1 876.7	1 881.7	1 870.7	1 861.6	1 842.3	1 832.7	1 812.9
Price, United States[18]	USD/t dwt	1 398.9	1 530.4	1 598.3	1 604.1	1 606.9	1 597.8	1 581.3	1 576.0	1 558.0	1 547.2	1 529.5
Price, Brazil[19]	USD/t dwt	2 191.6	2 428.3	2 423.3	2 389.9	2 369.0	2 380.3	2 375.0	2 372.8	2 353.7	2 348.5	2 325.7
Poultry meat												
Price, EU[20]	USD/t rtc	2 179.7	2 337.6	2 418.4	2 431.9	2 445.7	2 474.1	2 494.8	2 512.3	2 513.5	2 511.6	2 510.7
Price, United States[21]	USD/t rtc	1 069.9	968.5	1 004.9	1 010.2	1 010.8	1 019.4	1 026.9	1 034.0	1 034.4	1 033.3	1 032.5
Price, Brazil[22]	USD/t rtc	1 520.6	1 540.1	1 596.6	1 603.9	1 611.3	1 629.7	1 644.6	1 658.1	1 661.2	1 662.3	1 664.3
Sheep meat												
Price, New Zealand[23]	USD/t dwt	4 902.8	4 714.1	4 847.3	4 906.3	4 999.9	5 083.4	5 148.4	5 243.2	5 309.3	5 377.1	5 437.1
FISH AND SEAFOOD												
Product traded[24]	USD/t	3 053.4	3 033.3	3 167.4	3 196.7	3 213.1	3 253.0	3 277.4	3 326.9	3 331.0	3 352.9	3 377.5
Aquaculture[25]	USD/t	3 014.9	2 966.9	3 118.5	3 152.6	3 192.5	3 253.8	3 303.9	3 365.4	3 391.1	3 431.6	3 468.4
Capture[26]	USD/t	1 858.6	1 850.6	1 907.6	1 920.9	1 930.0	1 949.3	1 961.0	1 986.5	1 987.3	1 998.5	2 011.0
Meal[27]	USD/t	1 466.6	1 501.2	1 550.0	1 393.5	1 384.0	1 431.9	1 467.1	1 563.3	1 630.4	1 592.1	1 623.0
Oil[28]	USD/t	1 783.9	1 852.1	1 865.6	1 728.3	1 723.0	1 798.0	1 827.1	1 988.3	1 977.4	1 997.7	2 027.1
DAIRY PRODUCTS												
Butter[29]	USD/t	4 424.0	4 036.6	4 129.7	4 180.4	4 221.6	4 287.2	4 365.7	4 461.5	4 517.1	4 563.5	4 599.7
Cheese[30]	USD/t	3 841.8	3 910.0	3 989.8	4 057.2	4 121.5	4 190.2	4 266.8	4 348.9	4 418.9	4 484.5	4 545.4
Skim milk powder[31]	USD/t	2 469.9	2 890.1	2 909.0	2 964.3	3 015.9	3 071.6	3 130.3	3 191.5	3 252.2	3 310.7	3 371.0
Whole milk powder[32]	USD/t	3 025.2	3 093.4	3 129.7	3 188.0	3 239.5	3 299.1	3 365.9	3 441.5	3 503.3	3 564.4	3 621.7
Whey powder[33]	USD/t	909.0	915.6	926.5	928.8	939.6	958.0	983.2	1 007.1	1 027.2	1 046.2	1 066.3
Casein[34]	USD/t	6 528.9	7 659.0	7 694.5	7 834.2	7 972.6	8 110.5	8 256.0	8 402.2	8 549.3	8 697.1	8 846.1
BIOFUEL												
Ethanol[35]	USD/hl	39.1	42.4	45.7	48.0	48.1	49.1	49.0	49.8	50.7	51.3	51.5
Biodiesel[36]	USD/hl	84.4	88.5	89.4	92.5	92.9	93.7	94.5	95.6	97.0	97.1	97.3
COTTON												
Cotton[37]	USD/t	1 694.1	1 647.2	1 665.9	1 690.2	1 715.3	1 742.6	1 771.2	1 803.5	1 840.3	1 879.9	1 920.3
ROOTS AND TUBERS												
Roots and tubers[38]	USD/t	463.1	467.0	454.9	472.0	490.6	512.5	519.6	531.5	539.8	552.1	559.6
USA GDP Deflator (2020=1)	**Index**	**0.987**	**1.011**	**1.026**	**1.045**	**1.065**	**1.086**	**1.107**	**1.128**	**1.151**	**1.173**	**1.196**

Table C.11. World prices *(cont.)*

Real price

		Average 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
CEREALS												
Wheat[1]	USD/t	236.7	231.8	209.9	210.1	208.4	212.1	213.8	214.3	214.8	213.6	212.0
Maize[2]	USD/t	177.6	186.0	167.8	162.1	162.8	167.0	168.6	169.0	168.5	167.8	166.9
Other coarse grains[3]	USD/t	209.1	206.9	191.8	191.1	190.4	193.2	194.3	195.3	195.8	195.6	194.6
Rice[4]	USD/t	470.1	507.7	475.6	455.9	450.3	442.6	436.8	429.9	424.5	417.8	411.7
Distiller's dry grains[5]	USD/t	164.0	161.4	145.1	142.2	142.7	146.1	147.1	147.6	147.6	147.2	146.7
OILSEEDS												
Soybean[6]	USD/t	418.2	454.0	443.1	432.7	427.4	422.7	423.5	420.7	420.9	415.3	413.2
Other oilseeds[7]	USD/t	451.0	470.7	458.8	440.5	442.7	439.5	437.2	432.5	432.2	427.9	423.9
Protein meals[8]	USD/t	358.7	386.7	380.3	368.9	360.8	359.2	359.0	358.3	357.8	355.0	353.0
Vegetable oils[9]	USD/t	793.0	889.3	856.2	833.8	830.0	840.3	844.8	840.9	844.6	842.2	841.0
SWEETENERS												
Raw sugar[10]	USD/t	293.8	306.9	313.1	319.0	323.5	322.7	324.4	322.9	321.7	320.4	317.9
Refined sugar[11]	USD/t	373.6	393.0	398.2	403.1	406.8	404.6	404.6	401.6	399.4	397.3	394.0
HFCS[12]	USD/t dw	901.5	579.5	593.7	589.4	593.7	593.1	599.4	598.4	595.4	591.5	587.2
Molasses[13]	USD/t	170.9	159.9	151.9	153.2	153.1	153.3	151.0	150.3	151.0	151.8	153.8
MEAT												
Beef and veal												
Price, EU[14]	USD/t dwt	4 223.0	3 903.7	3 914.4	3 813.7	3 720.9	3 661.4	3 592.8	3 521.9	3 446.2	3 371.4	3 293.5
Price, United States[15]	USD/t dwt	4 115.4	4 075.8	4 102.4	4 058.2	4 021.6	3 994.5	3 916.0	3 837.0	3 760.4	3 682.8	3 605.8
Price, Brazil[16]	USD/t dwt	4 226.5	4 240.3	4 272.3	4 164.2	4 048.3	3 975.4	3 904.3	3 831.3	3 748.5	3 668.1	3 590.2
Pigmeat												
Price, EU[17]	USD/t dwt	1 825.0	1 858.7	1 847.5	1 807.2	1 762.8	1 733.5	1 690.4	1 649.8	1 601.4	1 562.4	1 515.9
Price, United States[18]	USD/t dwt	1 418.4	1 513.4	1 557.7	1 535.5	1 509.3	1 472.0	1 428.9	1 396.7	1 354.2	1 319.0	1 279.0
Price, Brazil[19]	USD/t dwt	2 219.5	2 401.3	2 361.8	2 287.7	2 225.2	2 192.9	2 146.0	2 102.9	2 045.9	2 002.2	1 944.7
Poultry meat												
Price, EU[20]	USD/t rtc	2 210.2	2 311.6	2 357.0	2 327.9	2 297.2	2 279.3	2 254.3	2 226.5	2 184.8	2 141.2	2 099.4
Price, United States[21]	USD/t rtc	1 086.2	957.7	979.4	967.0	949.4	939.1	927.8	916.4	899.1	880.9	863.3
Price, Brazil[22]	USD/t rtc	1 541.9	1 523.0	1 556.1	1 535.4	1 513.5	1 501.4	1 486.1	1 469.5	1 443.9	1 417.2	1 391.6
Sheep meat												
Price, New Zealand[23]	USD/t dwt	4 970.3	4 661.7	4 724.1	4 696.5	4 696.4	4 683.2	4 652.0	4 646.7	4 614.9	4 584.1	4 546.4
FISH AND SEAFOOD												
Product traded[24]	USD/t	3 096.1	2 999.6	3 087.0	3 060.0	3 018.1	2 996.8	2 961.4	2 948.4	2 895.4	2 858.4	2 824.2
Aquaculture[25]	USD/t	3 056.3	2 934.0	3 039.3	3 017.8	2 998.7	2 997.6	2 985.3	2 982.5	2 947.6	2 925.6	2 900.2
Capture[26]	USD/t	1 884.0	1 830.1	1 859.1	1 838.8	1 812.8	1 795.8	1 771.9	1 760.5	1 727.4	1 703.8	1 681.6
Meal[27]	USD/t	1 487.1	1 484.5	1 510.6	1 334.0	1 300.0	1 319.2	1 325.6	1 385.4	1 417.2	1 357.4	1 357.1
Oil[28]	USD/t	1 806.6	1 831.5	1 818.2	1 654.4	1 618.4	1 656.4	1 650.9	1 762.1	1 718.8	1 703.1	1 695.0
DAIRY PRODUCTS												
Butter[29]	USD/t	4 489.6	3 991.8	4 024.9	4 001.7	3 965.3	3 949.7	3 944.8	3 954.0	3 926.4	3 890.6	3 846.1
Cheese[30]	USD/t	3 892.8	3 866.5	3 888.5	3 883.7	3 871.3	3 860.2	3 855.4	3 854.2	3 841.0	3 823.2	3 800.7
Skim milk powder[31]	USD/t	2 499.5	2 858.0	2 835.1	2 837.5	2 832.8	2 829.8	2 828.4	2 828.5	2 826.9	2 822.5	2 818.8
Whole milk powder[32]	USD/t	3 066.8	3 059.0	3 050.2	3 051.8	3 042.9	3 039.3	3 041.4	3 050.0	3 045.1	3 038.8	3 028.3
Whey powder[33]	USD/t	921.7	905.4	903.0	889.1	882.5	882.5	888.4	892.6	892.9	891.9	891.6
Casein[34]	USD/t	6 609.8	7 573.9	7 499.0	7 499.2	7 488.6	7 471.9	7 459.9	7 446.3	7 431.2	7 414.6	7 396.9
BIOFUEL												
Ethanol[35]	USD/hl	39.7	42.0	44.5	45.9	45.2	45.2	44.3	44.2	44.0	43.7	43.0
Biodiesel[36]	USD/hl	85.6	87.5	87.1	88.5	87.3	86.4	85.4	84.8	84.3	82.8	81.4
COTTON												
Cotton[37]	USD/t	1 718.5	1 628.9	1 623.6	1 618.0	1 611.2	1 605.4	1 600.4	1 598.3	1 599.7	1 602.7	1 605.7
ROOTS AND TUBERS												
Roots and tubers[38]	USD/t	469.8	461.8	443.4	451.9	460.8	472.1	469.5	471.0	469.2	470.7	467.9

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 2018-20est: Data for 2020 are estimated. Real prices are deflated using USA GDP base year 2020=1.

1. No.2 hard red winter wheat, ordinary protein, United States FOB Gulf Ports (June/May).
2. No.2 yellow corn, United States FOB Gulf Ports (September/August).
3. Feed barley, Europe, FOB Rouen (July/June).
4. Milled 100%, grade b, nominal price quote, FOB Bangkok (January/December).
5. Wholesale price, Central Illinois (September/August).
6. Soybean, U.S., CIF Rotterdam (October/September).
7. Rapeseed, Europe, CIF Hamburg (October/September).
8. Weighted average meal price, European port (October/September).
9. Weighted average price of oilseed oils and palm oil, European port (October/September).
10. Raw sugar world price, ICE contract No11 nearby (October/September).
11. Refined sugar price,Euronext,Liffe,Contract No. 407 London, Europe (October/September).
12. United States wholesale spot price for HFCS-55, dry weight (October/September).
13. Unit import price, Europe (October/September).
14. EU average beef producer price.
15. Choice steers, 1100-1300 lb lw, Nebraska - lw to dwt conversion factor 0.63.
16. Brazil: frozen beef, export unit value, product weight.
17. EU average pigmeat producer price.
18. Barrows and gilts, No. 1-3, 230-250 lb lw, Iowa/South Minnesota - lw to dwt conversion factor 0.74.
19. Brazil: frozen pigmeat, export unit value, product weight.
20. EU average producer price.
21. National composite wholesale, broiler.
22. Brazil: export unit value for chicken (FOB), product weight.
23. New Zealand lamb price carcass weight, all grade average.
24. World unit value of trade (sum of exports and imports).
25. World unit value of aquaculture fisheries production (live weight basis).
26. FAO estimated value of world ex-vessel value of capture fisheries production excluding for reduction.
27. Fishmeal, 64-65% protein, Hamburg, Germany.
28. Fish oil any origin, N.W. Europe.
29. FOB export price, butter, 82% butterfat, Oceania.
30. FOB export price, cheddar cheese, 39% moisture, Oceania.
31. FOB export price, non-fat dry milk, 1.25% butterfat, Oceania.
32. FOB export price, WMP 26% butterfat, Oceania.
33. FOB export price, sweet whey non-hygroscopic, Western Europe.
34. Export price, New Zealand.
35. Wholesale price, United States, Omaha.
36. Producer price Germany net of biodiesel tariff and energy tax.
37. Cotlook A index, Middling 1 1/8", c.f.r. far Eastern ports (August/July).
38. Thailand, Bangkok, Cassava (flour), wholesale.

Source: OECD/FAO (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Wheat												
World Trade	**kt**	**178 477**	**190 875**	**193 888**	**196 659**	**199 202**	**201 993**	**205 803**	**208 894**	**211 685**	**214 632**	**217 459**
OECD[1]	kt	41 086	41 669	42 062	41 795	41 859	42 012	42 228	42 490	42 666	42 921	43 146
Developing countries	kt	147 633	160 363	162 982	165 810	168 248	170 816	174 492	177 380	180 057	182 827	185 485
Least Developed Countries	kt	17 973	19 729	20 657	21 076	21 715	22 350	23 091	23 759	24 423	25 121	25 828
Maize												
World Trade	**kt**	**175 725**	**184 510**	**185 649**	**185 736**	**187 071**	**189 590**	**192 680**	**195 615**	**198 780**	**201 507**	**204 238**
OECD[1]	kt	82 246	82 685	84 561	85 289	85 550	86 307	87 374	88 390	89 608	90 697	91 759
Developing countries	kt	131 543	141 604	141 188	141 379	143 097	145 397	147 971	150 566	153 215	155 554	157 938
Least Developed Countries	kt	3 332	3 552	3 843	3 928	3 876	3 901	3 989	4 084	4 179	4 247	4 274
Other coarse grains												
World Trade	**kt**	**36 893**	**40 272**	**41 325**	**41 799**	**42 362**	**43 110**	**44 035**	**44 857**	**45 635**	**46 315**	**47 009**
OECD[1]	kt	7 943	7 548	7 769	7 759	7 850	7 983	8 188	8 390	8 603	8 779	8 963
Developing countries	kt	29 760	33 138	34 062	34 576	35 142	35 861	36 686	37 424	38 110	38 721	39 348
Least Developed Countries	kt	677	508	635	709	797	969	1 156	1 314	1 440	1 525	1 616
Rice												
World Trade	**kt**	**45 333**	**49 264**	**50 681**	**52 134**	**52 810**	**53 921**	**55 607**	**57 400**	**58 863**	**60 584**	**62 261**
OECD[1]	kt	6 625	6 983	7 105	7 182	7 233	7 330	7 430	7 540	7 648	7 785	7 889
Developing countries	kt	38 874	42 497	43 791	45 162	45 769	46 792	48 395	50 102	51 480	53 088	54 678
Least Developed Countries	kt	9 830	10 896	11 651	12 372	13 059	13 847	14 715	15 592	16 379	17 218	18 068
Soybean												
World Trade	**kt**	**158 168**	**161 711**	**164 870**	**167 216**	**169 980**	**171 568**	**172 989**	**174 401**	**175 690**	**177 303**	**178 605**
OECD[1]	kt	31 013	30 242	29 722	30 661	30 833	30 923	30 845	30 836	30 777	30 824	30 784
Developing countries	kt	134 405	138 911	142 735	144 297	147 032	148 747	150 400	152 015	153 540	155 330	156 866
Least Developed Countries	kt	1 605	1 815	1 873	1 921	1 974	2 036	2 090	2 144	2 196	2 253	2 307
Other oilseeds												
World Trade	**kt**	**21 625**	**21 305**	**21 530**	**21 947**	**22 155**	**22 506**	**22 868**	**23 175**	**23 453**	**23 730**	**24 047**
OECD[1]	kt	13 264	12 607	12 606	12 753	12 754	12 816	12 881	12 928	12 962	12 992	13 026
Developing countries	kt	10 059	10 165	10 404	10 718	10 969	11 285	11 613	11 905	12 159	12 417	12 712
Least Developed Countries	kt	287	313	316	316	319	323	329	333	337	340	345
Protein meals												
World Trade	**kt**	**91 660**	**93 459**	**93 819**	**94 823**	**95 077**	**96 115**	**96 920**	**97 856**	**98 727**	**99 619**	**100 527**
OECD[1]	kt	48 550	48 317	48 797	48 303	47 820	47 666	47 646	47 581	47 466	47 333	47 237
Developing countries	kt	51 202	53 345	53 367	54 987	55 865	57 178	58 142	59 278	60 401	61 553	62 703
Least Developed Countries	kt	1 127	1 398	1 439	1 542	1 624	1 716	1 787	1 857	1 925	1 986	2 049
Vegetable oils												
World Trade	**kt**	**85 894**	**88 052**	**89 120**	**90 460**	**91 459**	**92 436**	**93 247**	**94 008**	**94 958**	**95 934**	**96 919**
OECD[1]	kt	24 329	24 823	24 806	24 637	24 519	24 287	23 803	23 148	22 881	22 572	22 286
Developing countries	kt	63 268	65 171	66 261	67 782	68 900	70 114	71 423	72 849	74 070	75 357	76 630
Least Developed Countries	kt	7 392	7 821	8 099	8 401	8 678	8 935	9 208	9 495	9 756	10 029	10 301
Sugar												
World Trade	**kt**	**59 205**	**58 704**	**59 076**	**59 789**	**60 830**	**61 905**	**63 139**	**64 043**	**65 086**	**66 207**	**67 480**
OECD[1]	kt	12 568	12 617	12 331	12 384	12 446	12 443	12 427	12 402	12 404	12 376	12 358
Developing countries	kt	46 475	46 072	46 751	47 438	48 477	49 582	50 806	51 709	52 750	53 885	55 167
Least Developed Countries	kt	9 422	9 280	9 580	9 878	10 199	10 591	10 982	11 414	11 899	12 419	12 972
Beef[2]												
World Trade	**kt**	**10 260**	**10 293**	**10 342**	**10 431**	**10 548**	**10 623**	**10 728**	**10 846**	**10 959**	**11 073**	**11 191**
OECD[1]	kt	4 475	4 418	4 465	4 531	4 590	4 625	4 651	4 690	4 732	4 775	4 823
Developing countries	kt	6 168	6 301	6 347	6 387	6 468	6 530	6 624	6 717	6 801	6 891	6 981
Least Developed Countries	kt	109	150	146	149	158	168	176	185	194	205	217
Pigmeat[2]												
World Trade	**kt**	**9 855**	**10 715**	**10 238**	**9 763**	**9 690**	**9 635**	**9 620**	**9 659**	**9 712**	**9 782**	**9 866**
OECD[1]	kt	5 194	5 149	5 226	5 336	5 369	5 404	5 438	5 469	5 499	5 527	5 557
Developing countries	kt	6 193	7 117	6 577	6 025	5 912	5 822	5 778	5 788	5 811	5 854	5 908
Least Developed Countries	kt	158	160	168	196	223	249	278	310	343	377	413
Poultry meat												
World Trade	**kt**	**13 203**	**13 202**	**13 243**	**13 459**	**13 819**	**14 144**	**14 437**	**14 746**	**15 077**	**15 440**	**15 807**
OECD[1]	kt	4 098	4 111	4 176	4 267	4 327	4 377	4 416	4 453	4 490	4 529	4 570
Developing countries	kt	8 801	8 883	8 943	9 098	9 407	9 700	9 970	10 256	10 559	10 890	11 223
Least Developed Countries	kt	946	814	881	954	1 034	1 113	1 191	1 271	1 357	1 449	1 543
Sheep meat[2]												
World Trade	**kt**	**1 131**	**1 072**	**1 099**	**1 123**	**1 133**	**1 137**	**1 139**	**1 141**	**1 144**	**1 148**	**1 152**
OECD[1]	kt	438	416	418	424	426	426	425	424	423	422	420
Developing countries	kt	710	674	699	717	726	730	732	735	740	745	751
Least Developed Countries	kt	3	3	3	3	3	3	3	3	3	3	3

Table C.12.1. World trade projections, imports *(cont.)*

		Average 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Butter												
World Trade	**kt**	**1 057**	**1 039**	**1 048**	**1 056**	**1 066**	**1 079**	**1 091**	**1 103**	**1 117**	**1 130**	**1 145**
OECD[1]	kt	349	340	338	334	332	332	332	333	335	338	340
Developing countries	kt	610	603	610	617	626	638	650	660	671	682	693
Least Developed Countries	kt	12	12	13	12	12	14	16	18	19	21	23
Cheese												
World Trade	**kt**	**3 243**	**3 376**	**3 433**	**3 483**	**3 535**	**3 592**	**3 645**	**3 698**	**3 751**	**3 804**	**3 857**
OECD[1]	kt	1 716	1 758	1 783	1 801	1 819	1 842	1 864	1 887	1 910	1 931	1 952
Developing countries	kt	1 457	1 527	1 557	1 581	1 611	1 644	1 673	1 701	1 729	1 759	1 788
Least Developed Countries	kt	23	25	26	27	28	28	29	29	30	31	31
Whole milk powder												
World Trade	**kt**	**2 699**	**2 704**	**2 736**	**2 752**	**2 775**	**2 801**	**2 822**	**2 841**	**2 862**	**2 882**	**2 903**
OECD[1]	kt	168	180	171	168	167	166	164	163	162	161	160
Developing countries	kt	2 560	2 569	2 608	2 625	2 649	2 675	2 697	2 716	2 738	2 759	2 780
Least Developed Countries	kt	228	219	229	237	245	254	262	270	278	287	295
Skim milk powder												
World Trade	**kt**	**2 632**	**2 610**	**2 667**	**2 712**	**2 760**	**2 811**	**2 861**	**2 911**	**2 961**	**3 011**	**3 059**
OECD[1]	kt	572	581	591	594	598	602	607	611	616	621	625
Developing countries	kt	2 338	2 305	2 356	2 400	2 448	2 499	2 550	2 600	2 649	2 698	2 746
Least Developed Countries	kt	141	129	137	142	148	153	159	165	170	176	181
Fish												
World Trade	**kt**	**42 592**	**41 280**	**42 320**	**42 639**	**42 770**	**43 123**	**43 381**	**43 499**	**43 820**	**44 109**	**44 388**
OECD[1]	kt	22 921	22 220	22 539	22 778	22 746	22 949	22 971	23 107	23 111	23 259	23 386
Developing countries	kt	20 185	19 538	20 360	20 478	20 618	20 803	21 063	21 107	21 449	21 545	21 703
Least Developed Countries	kt	1 301	1 238	1 232	1 262	1 295	1 317	1 342	1 359	1 383	1 403	1 421
Fishmeal[3]												
World Trade	**kt**	**3 240**	**3 359**	**3 159**	**3 232**	**3 311**	**3 348**	**3 354**	**3 242**	**3 338**	**3 402**	**3 429**
OECD[1]	kt	1 126	1 044	993	1 031	1 038	1 038	1 025	968	991	983	971
Developing countries	kt	2 347	2 582	2 428	2 444	2 518	2 556	2 574	2 513	2 592	2 662	2 700
Least Developed Countries	kt	58	69	67	71	76	77	79	76	73	79	80
Fish oil[3]												
World Trade	**kt**	**877**	**901**	**892**	**910**	**933**	**939**	**956**	**939**	**961**	**971**	**974**
OECD[1]	kt	722	728	723	735	750	753	766	751	770	774	774
Developing countries	kt	296	310	301	305	321	322	331	321	328	337	343
Least Developed Countries	kt	5	5	5	5	5	5	5	5	5	5	5
Ethanol												
World Trade	**kt**	**11 662**	**11 515**	**11 595**	**11 395**	**11 350**	**11 194**	**11 090**	**10 990**	**10 873**	**10 801**	**10 692**
OECD[1]	kt	6 941	7 199	7 256	7 107	7 045	6 900	6 805	6 740	6 659	6 591	6 494
Developing countries	kt	5 702	5 423	5 421	5 358	5 369	5 353	5 338	5 299	5 257	5 248	5 231
Least Developed Countries	kt	3	4	4	4	4	4	4	4	4	4	4
Biodiesel												
World Trade	**kt**	**7 717**	**6 774**	**6 715**	**6 653**	**6 570**	**6 460**	**6 468**	**6 364**	**6 232**	**6 163**	**6 080**
OECD[1]	kt	6 890	6 514	6 403	6 282	6 092	5 919	5 806	5 602	5 425	5 217	5 033
Developing countries	kt	827	260	311	371	478	541	662	762	807	946	1 047
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Cotton												
World Trade	**kt**	**8 962**	**9 521**	**9 748**	**9 916**	**10 115**	**10 317**	**10 524**	**10 717**	**10 905**	**11 095**	**11 296**
OECD[1]	kt	1 569	1 667	1 721	1 738	1 765	1 789	1 816	1 839	1 864	1 887	1 911
Developing countries	kt	8 639	9 171	9 380	9 554	9 751	9 953	10 159	10 353	10 538	10 728	10 928
Least Developed Countries	kt	1 478	1 474	1 536	1 593	1 656	1 722	1 789	1 858	1 928	2 001	2 076
Roots and tubers												
World Trade	**kt**	**17 939**	**18 399**	**18 724**	**19 076**	**19 420**	**19 782**	**20 104**	**20 430**	**20 779**	**21 158**	**21 549**
OECD[1]	kt	3 600	3 670	3 682	3 729	3 730	3 741	3 754	3 771	3 785	3 797	3 804
Developing countries	kt	14 956	15 376	15 670	15 980	16 335	16 695	16 998	17 312	17 647	18 025	18 410
Least Developed Countries	kt	228	254	269	262	271	267	279	288	301	311	323

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 2018-20est: Data for 2020 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 (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Wheat												
OECD[1]	kt	99 895	101 786	104 026	104 414	104 896	105 837	107 396	108 576	109 447	110 477	111 466
Developing countries	kt	24 129	25 272	24 918	25 538	26 264	26 762	26 875	27 153	27 423	27 760	28 049
Least Developed Countries	kt	108	100	98	97	95	93	92	90	89	87	86
Maize												
OECD[1]	kt	61 301	66 868	67 355	66 203	64 830	64 717	65 432	66 191	67 022	67 499	67 724
Developing countries	kt	81 769	78 803	79 083	79 153	80 182	81 697	83 227	84 433	85 703	86 779	88 025
Least Developed Countries	kt	3 495	3 668	3 396	3 335	3 409	3 389	3 292	3 205	3 128	3 078	3 021
Other coarse grains												
OECD[1]	kt	27 198	29 595	30 244	30 319	30 231	30 481	31 003	31 425	31 768	32 002	32 211
Developing countries	kt	4 802	5 110	5 080	5 242	5 476	5 678	5 797	5 897	5 979	6 068	6 177
Least Developed Countries	kt	666	784	647	615	563	468	391	342	313	298	286
Rice												
OECD[1]	kt	3 870	3 818	3 864	3 896	3 914	3 939	3 991	4 058	4 094	4 154	4 205
Developing countries	kt	41 881	45 202	46 604	48 045	48 689	49 757	51 369	53 074	54 480	56 121	57 727
Least Developed Countries	kt	4 287	5 064	5 324	5 871	6 248	6 979	7 684	8 180	8 706	9 248	9 832
Soybean												
OECD[1]	kt	55 446	55 810	56 482	57 099	58 735	59 700	60 330	60 848	61 370	61 931	62 557
Developing countries	kt	98 213	103 081	105 507	107 160	108 242	108 834	109 591	110 443	111 168	112 180	112 817
Least Developed Countries	kt	21	18	18	17	17	16	16	16	16	15	15
Other oilseeds												
OECD[1]	kt	13 644	14 135	14 188	14 422	14 400	14 570	14 789	14 902	14 968	15 077	15 226
Developing countries	kt	2 879	2 691	2 664	2 623	2 657	2 671	2 688	2 708	2 745	2 734	2 730
Least Developed Countries	kt	191	190	169	160	145	136	120	109	100	94	86
Protein meals												
OECD[1]	kt	20 719	20 348	20 462	21 085	21 063	21 390	21 521	21 771	22 011	22 254	22 477
Developing countries	kt	64 294	65 081	65 231	65 421	65 500	66 002	66 484	66 976	67 411	67 856	68 327
Least Developed Countries	kt	352	360	355	340	322	311	305	299	293	288	284
Vegetable oils												
OECD[1]	kt	9 318	9 076	9 267	9 523	9 489	9 577	9 680	9 751	9 809	9 877	9 942
Developing countries	kt	68 755	70 009	70 555	71 328	72 175	72 815	73 288	73 731	74 379	75 042	75 721
Least Developed Countries	kt	545	549	528	506	487	471	455	439	426	412	400
Sugar												
OECD[1]	kt	7 929	8 037	7 979	8 070	8 224	8 425	8 662	8 700	8 879	8 985	9 063
Developing countries	kt	54 600	54 829	55 093	55 607	56 535	57 369	58 248	58 972	59 726	60 628	61 707
Least Developed Countries	kt	2 638	1 443	1 352	1 221	1 089	989	900	846	825	820	817
Beef[2]												
OECD[1]	kt	4 780	4 821	4 904	4 964	5 061	5 095	5 147	5 212	5 270	5 330	5 393
Developing countries	kt	5 531	5 431	5 400	5 404	5 419	5 474	5 540	5 608	5 674	5 739	5 804
Least Developed Countries	kt	15	14	12	10	9	9	8	7	7	7	7
Pigmeat[2]												
OECD[1]	kt	9 195	9 549	9 213	8 760	8 676	8 625	8 607	8 636	8 663	8 700	8 747
Developing countries	kt	1 448	1 638	1 461	1 404	1 366	1 363	1 363	1 369	1 390	1 418	1 448
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Poultry meat												
OECD[1]	kt	7 379	7 447	7 429	7 421	7 584	7 726	7 849	7 958	8 081	8 214	8 357
Developing countries	kt	7 469	7 271	7 316	7 537	7 742	7 940	8 128	8 347	8 578	8 828	9 071
Least Developed Countries	kt	63	36	34	32	29	28	26	25	23	22	21
Sheep meat[2]												
OECD[1]	kt	1 072	1 035	1 075	1 090	1 096	1 097	1 099	1 101	1 104	1 107	1 111
Developing countries	kt	78	76	70	74	75	74	72	69	67	64	61
Least Developed Countries	kt	4	3	3	3	3	3	2	2	2	2	2
Butter												
OECD[1]	kt	828	858	867	873	884	898	909	918	927	936	945
Developing countries	kt	102	87	86	87	84	80	78	77	77	78	79
Least Developed Countries	kt	2	2	2	2	2	2	2	2	2	2	2
Cheese												
OECD[1]	kt	2 521	2 609	2 666	2 712	2 761	2 816	2 865	2 914	2 960	3 007	3 053
Developing countries	kt	495	491	492	494	495	495	499	502	506	508	512
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Whole milk powder												
OECD[1]	kt	1 897	1 963	1 992	2 001	2 016	2 035	2 046	2 056	2 069	2 081	2 094
Developing countries	kt	720	713	716	722	728	734	744	751	758	765	772
Least Developed Countries	kt	6	6	6	5	5	5	5	5	5	5	5
Skim milk powder												
OECD[1]	kt	2 385	2 356	2 412	2 457	2 504	2 554	2 604	2 652	2 701	2 749	2 796
Developing countries	kt	195	114	112	112	111	111	111	110	110	110	110
Least Developed Countries	kt	4	3	3	3	3	3	3	3	3	3	3

Table C.12.2. World trade projections, exports *(cont.)*

		Average 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Fish[3]												
OECD[1]	kt	13 046	13 099	13 140	13 300	13 485	13 644	13 793	13 734	13 871	13 928	14 011
Developing countries	kt	27 568	26 293	27 200	27 375	27 388	27 603	27 725	27 782	28 053	28 303	28 520
Least Developed Countries	kt	1 983	1 818	1 867	1 853	1 835	1 836	1 834	1 846	1 846	1 855	1 866
Fishmeal[4]												
OECD[1]	kt	923	914	887	888	909	943	943	930	946	944	960
Developing countries	kt	2 293	2 402	2 170	2 280	2 332	2 350	2 353	2 218	2 325	2 388	2 398
Least Developed Countries	kt	140	130	131	131	132	132	132	132	132	133	133
Fish oil[4]												
OECD[1]	kt	533	525	546	545	548	551	555	553	560	556	556
Developing countries	kt	477	485	458	475	481	483	491	468	481	492	492
Least Developed Countries	kt	36	33	33	33	33	33	33	33	33	33	33
Ethanol												
OECD[1]	kt	6 953	6 944	7 039	6 842	6 834	6 685	6 576	6 450	6 301	6 221	6 095
Developing countries	kt	3 701	3 868	3 852	3 846	3 809	3 801	3 804	3 830	3 862	3 871	3 887
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Biodiesel												
OECD[1]	kt	2 709	2 544	2 540	2 417	2 302	2 168	2 159	2 053	1 960	1 955	1 942
Developing countries	kt	4 378	3 436	3 379	3 440	3 471	3 495	3 511	3 513	3 475	3 411	3 340
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Cotton												
OECD[1]	kt	4 375	4 294	4 448	4 530	4 645	4 764	4 877	4 971	5 050	5 129	5 214
Developing countries	kt	4 522	5 030	5 119	5 221	5 319	5 419	5 528	5 639	5 761	5 882	6 008
Least Developed Countries	kt	1 048	997	1 022	1 060	1 090	1 122	1 156	1 192	1 229	1 268	1 307
Roots and tubers												
OECD[1]	kt	1 741	1 750	1 806	1 784	1 820	1 838	1 857	1 876	1 895	1 925	1 957
Developing countries	kt	11 861	12 224	12 496	12 865	13 171	13 512	13 816	14 122	14 452	14 799	15 157
Least Developed Countries	kt	133	122	117	122	120	125	122	121	120	120	120

Note: Average 2018-20est: Data for 2020 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 (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**752 703**	**839 661**	**1.28**	**0.89**	**178 477**	**217 459**	**2.65**	**1.47**	**181 239**	**219 820**	**2.81**	**1.46**
NORTH AMERICA	84 597	91 429	-0.30	0.68	3 440	3 699	-0.52	0.79	50 990	53 836	0.72	0.79
Canada	33 403	37 844	2.29	1.06	174	136	11.11	1.08	24 721	28 036	2.90	0.78
United States	51 193	53 584	-1.71	0.43	3 266	3 563	-0.94	0.79	26 269	25 800	-0.93	0.80
LATIN AMERICA	31 412	36 658	3.58	1.38	24 443	27 532	1.33	0.75	15 239	18 743	6.25	1.81
Argentina	18 803	22 426	8.01	1.43	3	3	0.00	0.00	12 973	15 839	15.29	1.93
Brazil	5 646	6 903	1.09	1.95	6 873	7 152	-1.10	0.02	449	563	-16.59	0.00
Chile	1 310	1 329	-0.46	0.19	1 168	991	5.35	-1.50	1	0	..	..
Colombia	4	6	-18.28	2.76	1 895	2 317	3.83	1.34	15	18	22.92	-1.32
Mexico	3 051	3 232	-1.59	0.63	5 163	6 279	3.02	1.53	970	1 200	2.32	3.15
Paraguay	1 304	1 236	-1.04	0.47	0	1	-52.82	0.48	397	566	-7.68	1.03
Peru	186	248	-2.60	2.70	2 061	2 460	2.64	1.45	3	3	-6.22	-0.38
EUROPE	251 637	280 811	2.29	0.81	10 332	9 155	-0.64	-0.41	85 149	109 517	8.08	1.70
European Union[1]	128 199	128 286	0.27	0.07	5 444	5 978	-2.00	0.57	29 598	31 112	2.90	0.58
United Kingdom	13 323	16 878	-1.25	1.27	2 259	869	4.66	-4.44	598	1 188	-12.56	4.22
Russia	76 530	91 103	6.98	1.19	243	358	28.13	3.31	35 927	48 161	14.09	1.43
Ukraine	26 011	35 858	3.63	2.43	15	15	-12.88	0.36	17 679	27 247	13.95	3.38
AFRICA	27 141	30 445	0.42	0.79	49 182	63 617	2.22	2.26	1 578	1 274	1.83	-1.39
Egypt	8 783	10 470	-0.10	1.84	12 967	15 523	3.36	1.23	598	523	34.12	-1.20
Ethiopia	5 068	5 654	5.80	1.01	1 350	2 578	5.66	6.91	0	0	..	..
Nigeria	65	71	-7.50	1.02	4 733	6 060	1.89	2.20	600	475	3.73	-2.15
South Africa	1 850	1 511	-0.60	-3.36	1 610	2 507	0.06	5.10	89	65	-15.49	6.10
ASIA	336 190	372 583	1.11	0.92	90 177	112 456	3.92	1.42	15 409	18 223	-2.73	1.62
China[2]	133 096	133 534	1.31	0.26	4 951	9 636	6.02	1.80	306	210	-2.91	-0.69
India	103 687	121 843	1.84	1.26	2	1	-4.22	0.05	657	1 032	-19.62	0.05
Indonesia	0	0	..	..	10 889	13 317	6.95	1.84	78	71	3.51	-1.81
Iran	14 333	14 737	6.95	0.50	1 189	3 083	-16.26	2.67	67	49	8.80	-0.29
Japan	946	885	2.42	0.25	5 434	5 447	-2.01	-0.28	0	0	..	..
Kazakhstan	13 218	16 735	-1.60	1.81	633	78	188.17	-2.51	7 460	9 633	-1.21	2.57
Korea	23	29	-3.88	0.57	3 838	5 599	-2.85	2.52	50	55	0.00	0.80
Malaysia	0	0	..	..	1 685	2 031	2.39	1.07	148	133	8.10	-1.06
Pakistan	24 895	29 996	0.33	1.70	945	2 283	-14.75	1.96	365	49	-20.19	-0.88
Philippines	0	0	..	..	6 506	7 271	7.50	1.94	43	34	499.80	-1.90
Saudi Arabia	429	283	-17.30	-2.15	3 150	3 963	2.51	1.31	0	0	..	..
Thailand	1	0	-0.82	..	3 145	3 816	4.01	1.28	15	13	5.21	-1.26
Turkey	19 833	23 409	-0.70	1.40	8 964	7 865	12.46	-1.40	4 683	5 714	6.78	1.42
Viet Nam	0	0	..	..	3 263	4 160	7.17	2.19	48	40	-13.97	-2.14
OCEANIA	21 726	27 735	-2.56	1.65	902	1 001	2.47	1.11	12 874	18 226	-6.17	1.77
Australia	21 309	27 185	-2.59	1.66	28	28	7.96	-0.04	12 874	18 226	-6.17	1.77
New Zealand	417	550	-1.22	1.31	534	545	2.93	0.68	0	0	..	..
DEVELOPED COUNTRIES	**384 878**	**432 294**	**1.10**	**0.89**	**30 844**	**31 975**	**-0.09**	**0.49**	**157 110**	**191 771**	**3.04**	**1.48**
DEVELOPING COUNTRIES	**367 825**	**407 367**	**1.47**	**0.90**	**147 633**	**185 485**	**3.31**	**1.65**	**24 129**	**28 049**	**1.66**	**1.31**
LEAST DEVELOPED COUNTRIES (LDC)	8 793	10 324	0.81	1.04	17 973	25 828	6.15	2.97	108	86	-5.68	-1.60
OECD[3]	**274 023**	**294 306**	**-0.27**	**0.58**	**41 086**	**43 146**	**1.68**	**0.37**	**99 895**	**111 466**	**0.19**	**0.97**
BRICS	**320 809**	**354 893**	**2.62**	**0.84**	**13 679**	**19 654**	**1.72**	**1.44**	**37 429**	**50 030**	**7.86**	**1.37**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**748 656**	**835 099**	**1.17**	**0.97**	**518 905**	**576 819**	**1.28**	**0.91**	**67.6**	**67.8**	**0.14**	**-0.01**
NORTH AMERICA	39 497	41 022	-1.21	0.42	29 176	30 482	0.34	0.38	79.6	78.1	-0.36	-0.19
Canada	8 834	9 886	-0.01	1.38	3 030	3 288	1.40	0.69	81.0	80.5	0.41	-0.10
United States	30 663	31 136	-1.53	0.13	26 146	27 194	0.22	0.34	79.5	77.8	-0.45	-0.20
LATIN AMERICA	40 638	45 348	1.69	0.98	36 037	40 414	1.35	0.99	55.8	57.4	0.35	0.23
Argentina	5 917	6 580	1.36	0.93	5 316	5 972	1.12	1.01	118.7	121.7	0.12	0.20
Brazil	12 070	13 459	1.33	0.96	11 417	12 796	1.18	1.00	54.1	57.2	0.35	0.50
Chile	2 662	2 318	2.49	-0.34	2 001	1 874	1.01	-0.75	105.7	96.3	-0.20	-0.87
Colombia	1 938	2 302	3.81	1.44	1 773	2 137	3.19	1.38	35.2	40.0	1.91	0.92
Mexico	7 311	8 323	1.09	1.06	6 486	7 402	1.85	1.17	50.8	52.5	0.63	0.29
Paraguay	515	632	1.04	1.80	364	437	1.51	1.61	51.7	55.0	0.17	0.53
Peru	2 276	2 700	2.40	1.60	2 136	2 522	2.59	1.56	65.7	70.0	1.20	0.70
EUROPE	181 380	179 891	0.21	0.28	79 820	79 643	0.13	-0.06	106.7	107.3	-0.03	0.04
European Union[1]	106 696	102 988	-0.15	-0.06	49 426	49 844	0.23	0.05	111.1	112.8	0.10	0.14
United Kingdom	14 815	16 215	0.63	0.36	6 281	6 823	0.04	0.55	93.0	96.8	-0.61	0.19
Russia	42 624	43 270	2.48	1.16	14 682	14 004	0.31	-0.47	100.7	97.7	0.13	-0.27
Ukraine	8 795	8 623	-5.04	-0.08	4 692	4 273	-1.14	-0.88	106.7	104.5	-0.67	-0.20
AFRICA	76 115	92 371	2.21	1.86	65 423	80 996	2.52	1.92	50.5	48.4	-0.07	-0.39
Egypt	21 270	25 393	1.54	1.53	18 937	22 761	2.24	1.55	188.6	188.4	0.08	-0.09
Ethiopia	6 451	8 199	5.38	2.54	5 384	7 109	5.31	2.58	48.0	49.0	2.50	0.25
Nigeria	4 205	5 648	1.43	2.67	4 012	5 421	2.71	2.74	20.0	20.6	0.05	0.27
South Africa	3 428	3 948	0.85	1.09	3 286	3 715	1.00	1.10	56.1	56.3	-0.47	0.05
ASIA	401 470	466 028	1.61	1.14	305 603	341 989	1.43	0.95	66.8	69.1	0.46	0.27
China[2]	128 314	143 730	0.50	0.59	93 233	96 474	0.65	0.20	65.0	65.9	0.15	0.04
India	101 698	120 126	2.59	1.26	82 428	93 498	1.48	1.10	60.3	62.2	0.38	0.25
Indonesia	10 877	13 217	7.16	1.92	6 877	8 569	2.35	1.97	25.4	28.6	1.11	1.07
Iran	15 750	17 653	1.95	1.08	13 983	15 952	1.37	1.14	168.7	172.1	0.04	0.18
Japan	6 398	6 336	-1.02	-0.18	5 241	5 076	0.03	-0.30	41.3	42.0	0.21	0.18
Kazakhstan	6 269	7 099	-1.66	1.26	2 645	2 929	1.19	0.87	142.6	141.9	-0.27	-0.05
Korea	3 777	5 565	-3.30	2.41	2 443	2 526	0.62	0.30	47.7	49.4	0.30	0.33
Malaysia	1 554	1 891	3.19	1.32	1 114	1 370	3.11	1.23	34.9	38.0	1.73	0.15
Pakistan	26 309	32 185	1.52	1.75	25 498	31 038	2.04	1.73	117.7	118.0	-0.05	-0.01
Philippines	6 496	7 214	7.58	1.95	2 613	3 250	2.38	2.05	24.2	26.3	0.84	0.84
Saudi Arabia	3 647	4 194	0.54	1.24	3 360	3 860	2.27	1.21	98.1	98.2	-0.06	0.02
Thailand	3 197	3 776	4.50	1.37	1 149	1 297	1.67	1.03	16.5	18.4	1.29	0.97
Turkey	23 006	25 405	0.97	0.82	17 611	19 154	1.69	0.57	211.2	214.8	0.10	0.06
Viet Nam	3 387	4 101	6.74	2.28	1 634	2 055	3.51	2.18	16.9	19.7	2.46	1.50
OCEANIA	9 556	10 438	3.00	0.83	2 847	3 295	1.50	1.33	69.0	70.1	0.04	0.16
Australia	8 268	8 926	3.42	0.76	2 107	2 399	1.51	1.17	83.6	85.2	0.13	0.18
New Zealand	952	1 093	0.27	0.98	420	495	1.28	1.50	87.9	95.6	0.30	0.80
DEVELOPED COUNTRIES	**265 748**	**271 416**	**0.01**	**0.44**	**134 564**	**138 150**	**0.35**	**0.20**	**94.2**	**94.4**	**-0.08**	**0.00**
DEVELOPING COUNTRIES	**482 909**	**563 682**	**1.86**	**1.24**	**384 341**	**438 669**	**1.63**	**1.14**	**61.6**	**62.3**	**0.31**	**0.07**
LEAST DEVELOPED COUNTRIES (LDC)	27 492	35 882	4.30	2.43	23 444	30 952	4.09	2.59	27.0	28.0	1.70	0.40
OECD[3]	**219 146**	**224 983**	**-0.05**	**0.32**	**125 212**	**130 849**	**0.61**	**0.34**	**90.1**	**91.1**	**0.05**	**0.07**
BRICS	**288 133**	**324 533**	**1.54**	**0.93**	**205 045**	**220 487**	**0.99**	**0.59**	**63.8**	**64.8**	**0.21**	**0.11**

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.14.1. Maize projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**1 151 427**	**1 312 195**	**2.58**	**1.12**	**175 725**	**204 238**	**7.08**	**1.21**	**178 789**	**207 303**	**6.89**	**1.19**
NORTH AMERICA	370 448	403 226	1.97	0.59	3 054	3 503	3.52	1.33	55 329	61 794	7.33	0.01
Canada	13 617	14 379	1.38	1.37	2 116	2 460	14.56	1.85	1 198	1 372	3.61	3.53
United States	356 830	388 847	2.00	0.56	938	1 042	-4.37	0.20	54 132	60 422	7.62	-0.06
LATIN AMERICA	206 702	237 392	5.14	1.62	39 239	48 882	7.17	2.01	74 708	81 671	8.85	1.65
Argentina	58 585	65 577	11.06	1.57	4	4	1.62	0.00	35 557	35 653	14.81	0.71
Brazil	102 483	120 452	3.85	1.90	1 065	851	3.21	0.02	35 920	41 845	5.70	2.25
Chile	720	676	-9.76	1.33	2 678	3 071	13.42	1.35	22	19	-14.72	-0.84
Colombia	1 493	1 745	-2.61	1.37	5 834	7 906	8.48	2.63	1	1	-5.45	-0.20
Mexico	27 332	29 905	4.38	0.64	16 271	19 974	8.91	1.86	935	1 318	31.08	3.16
Paraguay	5 807	7 701	7.18	2.44	12	10	-1.56	-0.45	2 199	2 763	-2.80	5.77
Peru	1 510	2 037	-1.27	2.84	4 024	5 955	9.95	3.49	10	10	4.66	-0.44
EUROPE	126 512	144 228	1.95	1.05	22 727	23 978	10.52	0.90	39 444	53 433	7.19	2.12
European Union[1]	67 377	67 963	-0.08	0.44	20 009	21 795	11.68	1.03	4 361	4 011	0.50	1.98
United Kingdom	0	0	..	..	1 736	1 433	6.16	-0.44	0	0	..	..
Russia	13 234	18 811	10.07	2.63	37	102	1.16	4.82	3 693	7 746	8.75	4.36
Ukraine	33 988	44 009	4.20	1.54	38	39	-2.23	0.32	27 997	36 903	8.03	1.82
AFRICA	88 084	111 093	3.05	1.96	24 250	33 220	5.84	2.70	4 378	5 927	-0.99	2.48
Egypt	7 417	7 907	-0.03	0.80	10 137	12 629	6.71	1.94	0	0	..	..
Ethiopia	9 443	12 276	5.75	2.79	0	0	-82.04	..	783	827	0.93	0.42
Nigeria	12 587	13 553	4.14	0.75	400	1 902	10.80	23.61	150	64	0.88	-9.88
South Africa	14 739	19 841	2.59	1.90	170	0	-70.64	..	2 138	3 832	2.79	6.05
ASIA	359 236	415 652	2.08	1.20	86 317	94 594	6.91	0.43	4 889	4 411	-2.77	-1.69
China[2]	259 539	294 690	1.87	1.01	10 702	7 202	12.37	-5.38	22	19	-10.92	10.74
India	28 284	35 035	3.40	1.77	192	33	44.89	0.47	1 134	1 168	-18.58	-2.83
Indonesia	22 739	27 459	2.53	1.70	996	1 155	-13.65	2.93	13	15	-6.55	-0.26
Iran	1 238	1 254	-5.67	0.42	9 328	9 761	12.69	0.67	0	0	..	..
Japan	0	0	..	..	15 797	15 853	0.81	0.08	0	0	..	..
Kazakhstan	905	1 145	7.94	1.67	5	4	137.21	1.20	67	151	23.68	5.38
Korea	74	65	-0.92	-1.15	10 706	11 520	3.20	0.37	0	0	..	..
Malaysia	85	107	2.32	2.14	3 860	4 993	3.36	2.14	9	8	6.94	-2.09
Pakistan	6 670	8 621	5.89	2.17	25	57	14.87	9.46	40	8	66.87	-11.30
Philippines	7 956	9 574	1.32	1.58	655	631	19.51	2.60	0	0	..	..
Saudi Arabia	87	66	-0.69	-2.54	4 076	5 357	9.89	2.26	0	0	..	..
Thailand	4 781	4 905	-0.44	0.95	1 117	2 239	27.79	2.46	124	73	-10.18	-1.21
Turkey	5 910	7 538	3.03	1.49	3 748	3 730	16.98	1.00	567	469	43.58	-0.98
Viet Nam	4 746	5 375	-0.68	1.25	10 895	16 004	27.84	2.84	450	431	54.93	-2.76
OCEANIA	445	605	-5.93	1.03	139	63	53.54	0.22	42	67	-11.14	-0.95
Australia	245	372	-8.73	0.78	0	0	..	..	39	63	-11.19	-1.00
New Zealand	190	220	-1.67	1.43	137	62	70.39	0.31	3	4	-9.81	0.00
DEVELOPED COUNTRIES	**514 991**	**571 385**	**1.99**	**0.75**	**44 182**	**46 301**	**5.15**	**0.69**	**97 020**	**119 278**	**7.13**	**1.07**
DEVELOPING COUNTRIES	**636 435**	**740 811**	**3.11**	**1.42**	**131 543**	**157 938**	**7.79**	**1.36**	**81 769**	**88 025**	**7.11**	**1.35**
LEAST DEVELOPED COUNTRIES (LDC)	43 891	56 695	3.66	2.15	3 332	4 274	11.45	1.74	3 495	3 021	4.29	-1.78
OECD[3]	**474 016**	**511 970**	**1.73**	**0.59**	**82 246**	**91 759**	**6.37**	**1.09**	**61 301**	**67 724**	**7.02**	**0.16**
BRICS	**418 279**	**488 829**	**2.63**	**1.37**	**12 166**	**8 189**	**10.94**	**-4.87**	**42 906**	**54 610**	**4.08**	**2.60**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**1 166 255**	**1 305 125**	**3.23**	**1.10**	**671 024**	**787 208**	**3.78**	**1.36**	**18.9**	**20.0**	**0.82**	**0.59**
NORTH AMERICA	323 190	344 380	1.53	0.75	136 930	163 326	1.46	1.28	17.6	17.3	-0.59	-0.20
Canada	14 575	15 430	2.65	1.15	9 082	9 440	4.24	1.42	31.2	28.1	-3.77	-0.78
United States	308 615	328 950	1.48	0.73	127 848	153 886	1.28	1.27	16.1	16.0	-0.02	-0.10
LATIN AMERICA	171 102	203 901	4.56	1.70	113 790	137 222	5.18	1.82	50.5	51.9	0.16	0.34
Argentina	22 751	29 812	8.11	2.69	16 850	23 101	10.57	3.13	36.3	37.3	1.60	0.20
Brazil	67 145	79 101	3.31	1.62	46 506	53 884	2.37	1.50	24.6	25.0	0.32	0.13
Chile	3 431	3 720	4.34	1.47	2 961	3 228	5.17	1.64	20.6	20.8	-0.09	0.15
Colombia	7 360	9 639	5.26	2.43	6 372	8 538	5.76	2.68	18.2	18.5	0.97	0.15
Mexico	42 868	48 483	5.53	1.07	23 999	27 095	9.80	1.00	136.0	141.1	0.10	0.36
Paraguay	3 755	4 859	16.66	1.82	907	1 243	10.56	2.93	54.2	55.0	-0.51	0.15
Peru	5 566	7 973	5.99	3.35	4 843	7 191	6.57	3.65	16.2	16.5	1.87	0.15
EUROPE	109 649	114 518	1.79	0.63	87 283	91 169	2.06	0.54	8.4	8.6	0.11	0.27
European Union[1]	83 394	85 527	1.71	0.52	66 491	68 433	1.95	0.41	10.6	10.9	0.09	0.31
United Kingdom	1 821	1 495	8.70	-0.04	1 249	948	12.86	0.21	4.8	4.6	1.55	-0.36
Russia	9 377	11 152	12.40	1.55	7 645	9 216	16.61	1.56	1.4	1.5	3.17	0.94
Ukraine	6 709	7 134	-2.86	0.44	4 982	5 185	-3.06	0.24	10.7	11.2	-0.35	0.40
AFRICA	107 270	137 649	3.87	2.22	36 108	46 572	4.27	2.23	43.9	44.1	0.71	0.18
Egypt	17 503	20 500	3.43	1.51	12 703	15 184	4.04	1.72	41.8	38.8	-0.51	-0.63
Ethiopia	8 410	11 380	6.19	3.11	1 617	2 225	10.81	3.69	48.1	52.3	1.85	0.99
Nigeria	12 604	15 323	4.54	2.18	2 000	2 016	6.79	-0.10	40.1	41.2	1.92	0.40
South Africa	12 620	15 934	2.33	1.42	5 357	6 788	0.55	2.46	89.0	84.5	-0.14	-0.48
ASIA	454 502	504 077	4.31	0.93	296 531	348 493	4.99	1.33	9.4	9.5	0.51	0.06
China[2]	284 445	300 490	4.31	0.51	179 000	203 402	4.43	0.96	10.0	9.9	0.81	0.01
India	27 400	33 841	5.92	2.01	13 430	18 037	7.88	3.01	6.2	6.4	-0.02	0.01
Indonesia	23 803	28 551	1.22	1.80	12 291	16 104	8.76	2.46	29.4	29.9	0.17	0.15
Iran	10 257	10 990	8.16	0.79	10 032	10 746	8.38	0.80	0.9	0.9	-1.32	0.03
Japan	15 671	15 866	0.79	-0.02	12 042	11 935	1.24	-0.01	0.8	0.9	0.31	0.48
Kazakhstan	803	992	6.88	1.68	693	860	6.77	1.73	0.5	0.6	-1.44	0.98
Korea	10 970	11 582	3.29	0.33	8 767	9 383	4.07	0.41	2.0	2.0	1.13	0.02
Malaysia	3 940	5 086	3.06	2.19	3 676	4 798	2.82	2.28	2.0	1.9	3.07	-0.27
Pakistan	6 638	8 637	6.81	2.27	3 849	5 282	11.42	2.79	7.9	8.1	1.44	0.48
Philippines	8 600	10 181	2.13	1.70	5 666	6 689	1.42	1.97	18.8	18.6	1.00	-0.04
Saudi Arabia	4 130	5 413	9.56	2.25	3 924	5 173	9.26	2.30	0.2	0.2	-2.28	-0.99
Thailand	5 708	7 058	2.82	1.51	5 353	6 696	3.19	1.56	1.2	1.3	-0.37	0.60
Turkey	8 925	10 753	6.00	1.66	7 004	8 701	7.87	1.93	15.8	16.3	-0.12	0.40
Viet Nam	15 450	20 931	12.00	2.58	11 821	16 830	11.02	2.98	8.1	7.5	3.56	-0.29
OCEANIA	543	601	-1.81	1.18	383	425	0.06	1.73	2.3	2.0	-0.93	-1.20
Australia	206	309	-8.14	1.18	70	159	-14.40	2.59	3.1	2.7	-0.92	-1.23
New Zealand	324	278	4.68	1.19	310	263	4.83	1.24	1.5	1.5	-0.97	0.07
DEVELOPED COUNTRIES	**466 424**	**497 451**	**1.61**	**0.73**	**246 218**	**279 201**	**1.69**	**1.02**	**12.8**	**13.0**	**0.09**	**0.16**
DEVELOPING COUNTRIES	**699 831**	**807 674**	**4.43**	**1.33**	**424 807**	**508 006**	**5.17**	**1.55**	**20.3**	**21.5**	**0.87**	**0.59**
LEAST DEVELOPED COUNTRIES (LDC)	44 077	57 662	4.14	2.47	10 749	14 855	7.40	2.68	29.1	30.0	0.50	0.62
OECD[3]	**500 582**	**535 147**	**2.03**	**0.76**	**268 465**	**304 956**	**2.54**	**1.03**	**22.9**	**24.4**	**0.36**	**0.58**
BRICS	**400 987**	**440 519**	**4.26**	**0.87**	**251 938**	**291 327**	**4.23**	**1.23**	**10.4**	**10.4**	**0.46**	**0.01**

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**301 018**	**329 918**	**1.06**	**0.85**	**36 893**	**47 009**	**1.89**	**1.73**	**42 920**	**53 036**	**2.22**	**1.51**
NORTH AMERICA	28 001	28 256	2.14	0.12	1 534	1 798	-3.23	0.72	9 528	9 804	3.16	0.42
Canada	14 476	14 446	2.83	0.34	68	75	8.24	0.16	5 983	5 775	3.95	0.74
United States	13 525	13 810	1.57	-0.11	1 466	1 723	-3.52	0.74	3 545	4 029	3.36	-0.01
LATIN AMERICA	19 772	21 955	-1.87	0.87	1 728	1 973	-10.40	1.42	3 192	3 317	-7.26	0.87
Argentina	6 911	7 493	-3.85	1.02	1	1	0.00	0.00	3 052	3 148	-7.46	1.01
Brazil	3 661	4 208	3.77	1.46	604	751	5.35	2.25	3	3	-13.88	-0.25
Chile	804	853	1.55	0.10	73	103	-24.63	10.35	29	18	-16.24	-7.02
Colombia	22	26	-12.70	1.85	342	360	-10.49	0.66	0	0	..	..
Mexico	5 689	6 249	-3.90	0.44	407	442	-16.30	0.09	2	2	32.31	-0.79
Paraguay	108	122	-1.89	1.27	0	0	..	..	5	0	-3.30	..
Peru	259	318	-0.05	1.89	169	180	5.42	0.41	0	0	..	..
EUROPE	132 742	137 090	0.65	0.53	2 627	2 797	1.91	1.72	21 220	26 869	5.71	1.99
European Union[1]	83 551	82 140	0.72	0.29	1 778	1 788	6.04	3.86	10 073	12 279	3.56	1.67
United Kingdom	8 314	7 902	2.79	-0.22	168	298	-4.84	2.44	1 514	1 616	9.29	-1.22
Russia	25 922	29 448	1.27	0.83	48	58	-23.31	0.31	5 062	6 484	8.45	2.18
Ukraine	9 599	11 662	-0.61	1.87	17	17	-7.57	0.18	4 429	6 408	6.95	3.47
AFRICA	57 821	69 622	3.30	1.79	4 290	6 913	5.95	4.91	1 288	2 431	-1.86	4.74
Egypt	1 038	1 187	0.44	1.82	95	126	-2.05	-1.15	0	0	..	..
Ethiopia	13 896	19 970	4.42	3.31	0	0	-79.27	..	495	2 025	5.06	12.58
Nigeria	8 646	9 612	2.55	1.01	20	21	0.00	1.95	100	92	0.00	-4.19
South Africa	625	648	2.43	-0.75	144	378	1.46	3.14	7	9	-15.74	-0.57
ASIA	49 981	58 438	0.56	0.88	26 605	33 388	3.33	1.24	1 728	2 213	5.11	0.87
China[2]	9 054	9 586	0.17	0.42	9 831	14 247	13.86	0.83	85	93	-3.82	2.45
India	17 470	20 566	-1.56	1.11	189	158	98.98	-5.66	151	248	-15.61	4.92
Indonesia	0	0	..	..	73	87	-5.91	1.67	0	0	..	..
Iran	2 948	3 431	1.43	1.66	3 116	2 955	14.82	-0.25	0	0	..	..
Japan	237	229	1.49	-0.36	2 183	1 970	-4.61	-1.17	0	0	..	..
Kazakhstan	4 229	5 015	7.69	0.92	39	31	16.20	2.03	1 399	1 776	17.50	0.49
Korea	117	118	4.92	0.15	112	123	-0.17	0.85	0	0	..	..
Malaysia	0	0	..	..	13	16	234.31	2.06	0	0	..	..
Pakistan	520	593	0.60	1.20	134	192	28.36	5.20	0	0	..	..
Philippines	1	1	0.19	1.66	41	47	1.40	1.92	0	0	..	..
Saudi Arabia	182	131	3.93	-2.57	6 699	8 985	-3.52	2.24	0	0	..	..
Thailand	183	121	0.48	-1.21	569	1 114	54.63	1.50	2	2	0.07	-0.26
Turkey	8 364	9 679	0.54	0.61	621	1 212	23.26	10.76	85	87	19.00	-1.81
Viet Nam	3	4	9.89	1.93	100	115	5.67	1.25	0	0	..	..
OCEANIA	12 703	14 558	0.96	0.85	109	141	2.18	2.82	5 965	8 402	-0.78	1.01
Australia	12 286	14 102	1.05	0.85	0	0	..	..	5 964	8 401	-0.78	1.01
New Zealand	413	455	-1.63	1.06	24	31	1.03	2.98	0	0	..	..
DEVELOPED COUNTRIES	**180 999**	**188 794**	**1.09**	**0.51**	**7 133**	**7 661**	**-1.70**	**0.77**	**38 118**	**46 859**	**3.96**	**1.41**
DEVELOPING COUNTRIES	**120 020**	**141 124**	**1.00**	**1.31**	**29 760**	**39 348**	**2.92**	**1.92**	**4 802**	**6 177**	**-6.39**	**2.36**
LEAST DEVELOPED COUNTRIES (LDC)	28 101	32 072	3.91	1.32	677	1 616	0.95	14.11	666	286	-5.20	-11.16
OECD[3]	**148 839**	**151 009**	**0.87**	**0.30**	**7 943**	**8 963**	**-3.93**	**1.92**	**27 198**	**32 211**	**2.49**	**0.93**
BRICS	**56 732**	**64 456**	**0.31**	**0.88**	**10 816**	**15 592**	**11.52**	**0.84**	**5 307**	**6 836**	**6.00**	**2.27**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**287 761**	**323 088**	**0.61**	**0.83**	**157 435**	**178 462**	**0.35**	**0.81**	**10.5**	**11.0**	**-0.01**	**0.40**
NORTH AMERICA	20 098	20 230	1.18	0.10	13 685	13 923	2.37	0.16	4.4	4.4	0.70	-0.20
Canada	8 649	8 734	2.08	0.20	7 786	8 107	1.84	0.22	8.1	7.6	-0.23	-0.85
United States	11 449	11 495	0.50	0.02	5 899	5 816	3.12	0.08	4.0	4.1	0.91	-0.07
LATIN AMERICA	18 204	20 583	-1.93	0.89	12 158	13 685	-3.76	0.76	3.5	3.6	-1.45	0.22
Argentina	3 839	4 334	0.87	0.96	2 273	2 610	0.30	0.96	14.5	13.7	-4.11	-0.45
Brazil	4 263	4 952	4.21	1.57	2 733	3 009	3.99	1.10	1.8	2.1	1.66	2.02
Chile	853	938	-3.84	1.08	517	574	-7.31	1.33	3.9	4.3	1.87	0.99
Colombia	365	385	-10.67	0.75	35	29	-35.19	2.76	0.5	0.4	-11.83	-1.05
Mexico	5 993	6 681	-6.33	0.36	5 264	5 885	-7.11	0.30	5.7	5.6	0.97	-0.13
Paraguay	102	122	-1.87	1.36	88	100	-3.04	1.22	0.0	0.0	-2.27	-1.24
Peru	429	497	1.75	1.34	25	35	-0.51	3.50	6.6	7.4	0.73	0.74
EUROPE	110 647	112 998	-0.45	0.07	80 080	82 575	-0.31	0.33	13.7	13.4	-1.03	-0.14
European Union[1]	71 099	71 719	-0.27	-0.11	53 362	54 480	-0.27	0.25	10.3	10.5	-0.36	0.16
United Kingdom	6 970	6 590	1.83	0.11	3 428	2 932	2.83	-0.55	35.4	35.0	-0.17	-0.06
Russia	21 218	22 952	-0.13	0.45	15 091	16 656	0.50	0.66	12.4	10.7	-3.44	-1.30
Ukraine	5 117	5 258	-4.82	0.31	3 396	3 459	-5.26	0.29	16.9	15.9	-2.64	-0.56
AFRICA	59 627	73 619	2.82	2.02	8 854	11 213	2.90	2.46	32.8	31.7	0.20	-0.18
Egypt	1 133	1 311	0.77	1.47	778	921	1.06	1.68	2.9	2.7	-1.93	-0.63
Ethiopia	13 191	17 750	4.33	2.74	593	861	2.15	4.13	93.4	98.7	1.25	0.50
Nigeria	8 549	9 535	0.82	1.11	273	283	-5.80	0.09	38.9	33.1	-1.18	-1.30
South Africa	777	1 014	3.56	0.72	106	134	-2.70	2.12	2.6	2.3	-1.35	-0.98
ASIA	73 625	89 396	1.31	1.07	38 988	52 643	2.57	1.46	5.2	5.3	-1.37	-0.16
China[2]	18 838	23 761	5.41	0.65	7 728	13 423	19.46	1.08	3.2	3.0	-0.03	-0.62
India	17 544	20 475	-1.13	1.00	913	1 649	2.11	3.82	11.8	12.1	-1.87	-0.11
Indonesia	73	87	-5.91	1.67	0	0	0.00	0.00	0.3	0.3	-7.07	0.78
Iran	5 798	6 366	6.20	0.78	5 621	6 180	6.45	0.79	0.3	0.3	-1.32	-0.92
Japan	2 406	2 211	-4.67	-1.17	1 449	1 414	-8.72	-0.51	4.0	4.2	1.70	0.40
Kazakhstan	2 747	3 259	4.68	1.33	1 715	1 987	3.44	1.52	2.5	2.2	-1.44	-1.02
Korea	230	241	2.12	0.50	59	59	0.14	0.20	3.3	3.6	2.58	0.63
Malaysia	13	16	217.37	2.16	12	15	256.56	2.20	0.0	0.0	170.73	1.00
Pakistan	654	786	3.12	2.05	198	264	0.18	3.50	1.9	1.8	3.03	-0.28
Philippines	42	48	1.36	1.91	30	33	-0.33	1.90	0.0	0.1	1.60	1.20
Saudi Arabia	7 248	9 071	-1.54	2.18	7 052	8 865	-1.58	2.23	2.6	2.3	-2.28	-0.99
Thailand	741	1 233	19.76	1.21	292	641	22.35	1.58	1.4	1.6	-0.38	0.99
Turkey	8 630	10 749	0.71	1.55	7 577	9 607	0.91	1.67	3.5	3.2	-1.56	-0.91
Viet Nam	103	119	5.77	1.27	0	0	0.00	0.00	0.0	0.0	4.34	1.20
OCEANIA	5 560	6 262	-0.34	0.53	3 670	4 423	-1.76	0.95	6.3	6.7	-1.92	0.20
Australia	5 035	5 668	-0.29	0.44	3 272	3 977	-1.79	0.90	7.3	7.7	-2.73	-0.14
New Zealand	437	485	-1.51	1.18	379	427	-1.74	1.35	1.7	1.5	-0.97	-0.68
DEVELOPED COUNTRIES	**144 983**	**149 448**	**-0.14**	**0.15**	**103 133**	**107 584**	**-0.06**	**0.40**	**9.0**	**8.7**	**-0.92**	**-0.33**
DEVELOPING COUNTRIES	**142 778**	**173 640**	**1.43**	**1.45**	**54 303**	**70 878**	**1.20**	**1.47**	**10.9**	**11.5**	**0.16**	**0.50**
LEAST DEVELOPED COUNTRIES (LDC)	27 216	33 171	3.02	1.95	1 617	1 819	5.71	1.78	24.3	23.9	0.66	0.05
OECD[3]	**123 865**	**127 730**	**-0.44**	**0.12**	**90 504**	**94 911**	**-0.65**	**0.38**	**7.7**	**7.7**	**-0.15**	**-0.04**
BRICS	**62 639**	**73 156**	**1.21**	**0.74**	**26 572**	**34 871**	**3.81**	**0.99**	**7.2**	**7.3**	**-1.49**	**-0.09**

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**509 290**	**567 270**	**0.69**	**0.87**	**45 333**	**62 261**	**2.37**	**2.61**	**45 906**	**62 261**	**1.51**	**2.61**
NORTH AMERICA	6 549	6 711	0.65	0.85	1 468	1 955	5.00	2.08	2 965	3 122	-1.03	0.68
Canada	0	0	..	..	390	469	0.89	1.76	0	0	..	..
United States	6 549	6 711	0.65	0.85	1 079	1 486	6.89	2.19	2 965	3 122	-1.03	0.68
LATIN AMERICA	18 618	20 080	-0.02	0.63	4 537	5 037	3.13	0.29	3 834	3 913	1.07	0.17
Argentina	852	889	-3.93	0.26	7	7	1.25	0.00	398	241	-5.79	-3.17
Brazil	7 646	7 307	-1.50	-0.37	713	920	2.49	0.65	1 086	995	-0.76	-1.46
Chile	122	134	3.44	0.72	172	191	6.11	0.38	2	1	54.01	-0.12
Colombia	1 857	2 081	5.08	0.37	178	249	-2.27	1.88	3	5	105.84	-0.15
Mexico	308	226	7.87	-2.93	740	947	2.15	2.20	83	63	85.30	0.00
Paraguay	737	1 069	11.97	2.46	1	1	0.31	0.01	712	991	15.06	2.64
Peru	2 279	2 558	2.04	1.29	293	371	5.75	-0.33	84	89	57.42	0.25
EUROPE	2 830	2 935	-0.41	0.42	2 678	3 056	3.16	1.23	707	1 052	1.07	3.33
European Union[1]	1 684	1 645	-0.65	-0.26	1 444	1 764	5.33	1.97	445	655	2.55	3.57
United Kingdom	0	0	..	..	675	684	0.38	0.12	42	23	1.39	-5.00
Russia	1 093	1 230	0.80	1.36	224	238	1.24	0.41	209	370	-0.93	3.84
Ukraine	40	45	-11.50	1.20	94	108	6.94	0.82	4	2	-17.73	-0.81
AFRICA	24 269	28 444	3.70	1.01	16 491	31 226	2.55	5.77	455	228	-3.91	-4.29
Egypt	3 965	4 701	-1.13	0.84	427	882	18.90	8.15	10	0	-77.68	..
Ethiopia	113	157	7.72	2.82	633	1 168	25.15	4.89	0	0	..	..
Nigeria	5 002	6 430	6.62	2.20	2 210	4 701	-5.10	6.21	0	0	..	..
South Africa	2	2	0.00	-2.97	924	1 171	-0.61	1.98	0	0	..	..
ASIA	456 845	508 621	0.61	0.87	19 432	20 135	1.62	-0.21	37 806	53 849	2.06	2.96
China[2]	145 731	151 599	0.53	0.22	2 855	3 066	11.36	0.53	2 379	2 850	27.83	2.08
India	119 450	139 249	1.80	1.25	5	1	15.47	0.22	12 702	17 566	2.87	1.21
Indonesia	36 057	36 733	-0.47	0.21	1 051	51	-12.75	-33.50	1	0	-0.12	..
Iran	2 457	2 908	8.36	1.69	1 145	976	-4.29	-0.41	2	1	2.24	0.03
Japan	7 407	6 463	-0.77	-1.60	763	776	-0.68	0.06	113	161	-1.24	1.27
Kazakhstan	356	433	6.30	1.59	12	9	-9.63	-0.88	101	102	9.85	0.89
Korea	3 915	3 653	-0.84	-1.00	402	429	-0.68	-0.14	52	50	61.24	0.40
Malaysia	1 565	1 699	-1.20	0.74	1 145	1 526	1.57	1.51	34	53	40.53	-0.61
Pakistan	7 598	9 442	3.13	0.79	6	4	-31.43	0.16	4 275	5 068	2.42	0.03
Philippines	12 481	14 738	1.04	1.56	2 732	3 549	10.68	1.08	0	0	-15.92	..
Saudi Arabia	0	0	..	..	1 313	1 521	0.97	1.32	0	0	..	..
Thailand	19 858	22 372	-2.86	1.20	310	357	-5.52	7.66	7 274	8 946	-0.90	2.68
Turkey	584	703	1.29	0.82	235	297	1.42	2.64	23	28	-7.60	-2.01
Viet Nam	28 221	32 824	-0.10	1.69	532	737	0.26	4.03	6 854	9 121	-2.42	4.44
OCEANIA	178	480	-21.14	2.03	725	853	6.55	0.69	139	97	-19.72	2.53
Australia	167	465	-22.14	2.03	221	216	6.12	-2.04	138	97	-19.76	2.54
New Zealand	0	0	..	..	55	63	4.02	1.50	0	0	..	..
DEVELOPED COUNTRIES	**17 687**	**17 485**	**-0.54**	**-0.14**	**6 458**	**7 583**	**2.44**	**1.23**	**4 025**	**4 534**	**-1.79**	**1.30**
DEVELOPING COUNTRIES	**491 603**	**549 785**	**0.74**	**0.90**	**38 874**	**54 678**	**2.35**	**2.81**	**41 881**	**57 727**	**1.88**	**2.72**
LEAST DEVELOPED COUNTRIES (LDC)	77 690	92 843	1.13	1.46	9 830	18 068	4.79	5.79	4 287	9 832	7.29	8.01
OECD[3]	**22 593**	**22 080**	**-0.23**	**-0.38**	**6 625**	**7 889**	**2.53**	**1.34**	**3 870**	**4 205**	**-1.59**	**1.06**
BRICS	**273 921**	**299 387**	**1.00**	**0.68**	**4 721**	**5 395**	**5.63**	**0.84**	**16 376**	**21 780**	**4.17**	**1.22**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**506 290**	**566 985**	**1.12**	**0.87**	**54.4**	**55.0**	**0.00**	**-0.07**
NORTH AMERICA	4 957	5 529	2.75	1.01	13.5	14.2	2.03	0.44
Canada	390	469	0.89	1.76	10.4	11.5	-0.10	0.97
United States	4 567	5 059	2.93	0.94	13.9	14.5	2.24	0.40
LATIN AMERICA	19 367	21 179	0.33	0.65	28.0	28.1	-0.74	-0.14
Argentina	512	653	1.20	1.90	10.0	11.1	1.25	0.99
Brazil	7 300	7 233	-1.60	-0.08	34.6	32.3	-2.40	-0.57
Chile	280	323	4.49	0.77	12.3	13.6	3.26	0.55
Colombia	1 995	2 316	3.60	0.85	36.3	39.0	1.69	0.32
Mexico	854	1 110	0.53	0.05	6.7	7.9	-0.68	-0.82
Paraguay	81	80	3.31	0.69	6.1	5.5	0.46	-0.84
Peru	2 503	2 835	2.20	1.16	68.2	71.0	0.65	0.31
EUROPE	4 792	4 938	1.25	0.34	6.3	6.6	1.15	0.42
European Union[1]	2 694	2 757	1.72	0.28	6.1	6.2	1.59	0.37
United Kingdom	633	661	0.35	0.35	9.4	9.4	-0.30	-0.01
Russia	1 091	1 095	1.04	0.39	7.5	7.6	0.86	0.60
Ukraine	132	151	-0.96	0.96	2.9	3.6	-0.21	1.64
AFRICA	40 778	59 186	3.80	3.33	27.4	31.5	1.31	1.24
Egypt	4 549	5 570	1.84	1.63	41.4	42.3	-0.10	0.04
Ethiopia	776	1 317	21.79	4.64	6.4	8.6	18.35	2.44
Nigeria	7 372	11 100	2.82	3.77	31.7	37.6	0.11	1.49
South Africa	930	1 169	0.29	2.14	15.5	17.4	-0.72	1.10
ASIA	435 508	474 919	0.91	0.61	77.2	77.5	-0.06	-0.15
China[2]	147 174	152 475	1.29	0.21	76.5	76.5	0.09	-0.01
India	102 886	121 354	1.25	1.02	69.9	74.4	0.24	0.11
Indonesia	37 674	36 708	-0.27	-0.14	126.1	111.1	-0.62	-1.31
Iran	3 593	3 875	3.43	1.14	37.4	36.0	1.34	0.25
Japan	7 523	7 217	-1.65	-0.27	53.0	53.8	-0.92	0.28
Kazakhstan	264	338	3.33	1.92	12.6	14.7	1.41	1.04
Korea	4 513	4 031	0.25	-0.79	61.1	53.2	-1.82	-1.29
Malaysia	2 699	3 168	0.15	1.21	78.6	82.9	-0.60	0.12
Pakistan	3 310	4 360	3.56	1.85	12.5	13.3	0.82	0.19
Philippines	15 232	18 249	2.05	1.52	120.3	129.0	0.49	0.29
Saudi Arabia	1 280	1 516	-0.06	1.50	36.9	38.1	-2.25	0.32
Thailand	12 321	13 736	-1.02	0.73	100.0	101.4	0.12	0.00
Turkey	807	970	1.42	1.55	9.1	10.2	-0.01	1.03
Viet Nam	21 973	24 379	0.80	0.96	152.6	152.0	-0.63	-0.07
OCEANIA	888	1 233	1.69	1.08	20.7	25.6	-0.10	-0.08
Australia	357	583	-4.32	0.26	14.1	20.7	-5.62	-0.72
New Zealand	55	63	4.02	1.50	11.5	12.2	3.02	0.80
DEVELOPED COUNTRIES	**19 622**	**20 651**	**0.37**	**0.43**	**13.1**	**13.5**	**0.30**	**0.27**
DEVELOPING COUNTRIES	**486 668**	**546 333**	**1.15**	**0.89**	**63.9**	**63.6**	**-0.15**	**-0.21**
LEAST DEVELOPED COUNTRIES (LDC)	83 451	100 746	1.41	1.63	75.8	73.6	-0.30	-0.38
OECD[3]	**24 947**	**25 880**	**0.52**	**0.20**	**16.1**	**16.3**	**-0.07**	**-0.07**
BRICS	**259 380**	**283 325**	**1.18**	**0.55**	**66.7**	**68.6**	**0.07**	**0.05**

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ARGENTINA												
Crops export tax	%	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Rice export tax	%	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
CANADA												
Tariff-quotas[1]												
Wheat	kt	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
In-quota tariff	%	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Out-of-quota tariff	%	61.7	61.7	61.7	61.7	61.7	61.7	61.7	61.7	61.7	61.7	61.7
Barley	kt	399.0	399.0	399.0	399.0	399.0	399.0	399.0	399.0	399.0	399.0	399.0
In-quota tariff	%	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Out-of-quota tariff	%	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0
EUROPEAN UNION[2,3]												
Voluntary coupled support												
Wheat[4]	mln EUR	89.7	89.7	89.7	89.7	89.7	89.7	89.7	89.7	89.7	89.7	89.7
Rice[5]	mln EUR	55.7	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6	55.6
Cereal reference price[6]	EUR/t	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3
Direct payments ceilings[7]	bln EUR	41.8	42.3	42.3	42.3	42.3	42.3	42.3	42.3	42.3	42.3	42.3
Rice reference price[8]	EUR/t	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
Wheat tariff-quota[1]	kt	4 519.8	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2	4 523.2
Coarse grain tariff-quota[1]	kt	4 450.5	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8	4 470.8
JAPAN												
Wheat tariff-quota	kt	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0	5 740.0
In-quota tariff	'000 JPY/t	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	'000 JPY/t	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0
Barley tariff-quota	kt	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0	1 369.0
In-quota tariff	'000 JPY/t	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	'000 JPY/t	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Rice tariff-quota	kt	682.2	682.2	682.2	682.2	682.2	682.2	682.2	682.2	682.2	682.2	682.2
In-quota tariff	'000 JPY/t	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	'000 JPY/t	341.0	341.0	341.0	341.0	341.0	341.0	341.0	341.0	341.0	341.0	341.0
KOREA												
Wheat tariff	%	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Maize tariff-quota	kt	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0	6 102.0
In-quota tariff	%	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Out-of-quota tariff	%	304.7	304.7	304.7	304.7	304.7	304.7	304.7	304.7	304.7	304.7	304.7
Barley tariff-quota	kt	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
In-quota tariff	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Out-of-quota tariff	%	271.4	271.4	271.4	271.4	271.4	271.4	271.4	271.4	271.4	271.4	271.4
Rice quota[9]	kt	408.7	408.7	408.7	408.7	408.7	408.7	408.7	408.7	408.7	408.7	408.7
In-quota tariff	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
MERCOSUR												
Wheat tariff	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Coarse grain tariff[10]	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Rice tariff	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
MEXICO												
Barley import tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNITED STATES												
ARC participation rate												
Wheat	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Coarse grains	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Wheat loan rate	USD/t	118.8	124.2	124.2	124.2	124.2	124.2	124.2	124.2	124.2	124.2	124.2
Maize loan rate	USD/t	83.3	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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
INDIA												
Minimum support price												
Rice	INR/t	20 361	18 076	18 578	19 092	19 626	20 176	20 717	21 245	21 761	22 267	22 760
Wheat	INR/t	17 595	19 138	19 539	20 679	21 076	22 124	22 645	23 640	24 218	25 129	25 733
Wheat tariff	%	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0
Rice tariff	%	70.5	70.5	70.5	70.5	70.5	70.5	70.5	70.5	70.5	70.5	70.5
RUSSIA												
Wheat ad valorem import tax	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Rice tariff equivalent of import barriers	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Coarse grains tariff equivalent of import barriers	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coarse grain specific tariff	RUB/t	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coarse grain ad valorem import tax	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.The sources for tariffs and Tariff Rate Quotas are the national questionnaire reply, UNCTAD and WTO.

1. Year beginning 1 July.
2. Since 2015 the Basic payment scheme (BPS) holds, which shall account for 68% maximum of the national direct payment envelopes. On top of this, compulsory policy instruments have been introduced: the Green Payment (30%) and young farmer scheme (2%).
3. Refers to all current European Union member States (excludes the United Kingdom)
4. Mainly for durum wheat. Implemented in 6 Member States.
5. Implemented in 6 Member States.
6. Buying-in at the fixed reference price is operable automatically only for common wheat up to a maximum quantity of 3 million tons per marketing year. Above that ceiling and for durum wheat, maize and barley intervention can take place only via tender.
7. Estimated net amounts for all direct payments based on Annex II of EU Regulation No 1307/2013, accounting for the transfers between direct aids and rural development envelopes.
8. Intervention is set at zero tonnes per marketing year. However, the Commission may initiate intervention if market requires.
9. Milled rice basis.
10. Applied by Brazil only.

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**356 133**	**411 052**	**3.97**	**1.08**	**158 168**	**178 605**	**7.33**	**1.06**	**156 859**	**178 605**	**6.66**	**1.06**
NORTH AMERICA	116 547	132 125	3.45	0.84	1 172	909	-0.51	0.00	55 189	62 265	4.36	1.31
Canada	6 640	9 038	4.26	2.58	591	500	7.72	0.00	4 539	6 207	5.02	2.73
United States	109 907	123 088	3.40	0.72	581	409	-5.29	0.00	50 651	56 057	4.29	1.16
LATIN AMERICA	192 893	223 309	4.46	1.15	11 922	11 351	10.98	0.70	97 556	111 886	8.17	0.91
Argentina	50 767	55 213	-0.96	0.95	4 210	3 001	935.63	0.00	10 202	12 474	-7.50	2.89
Brazil	126 672	149 335	7.50	1.15	410	410	6.04	0.00	79 073	89 609	12.07	0.59
Chile	0	0	..	..	220	214	3.09	0.70	2	2	145.49	-0.70
Colombia	73	86	-0.08	1.32	623	674	2.41	0.80	0	0	-62.85	..
Mexico	279	582	2.81	5.66	4 987	5 672	4.97	1.42	0	0	..	..
Paraguay	9 750	12 104	6.41	1.87	0	0	-79.34	..	5 817	7 327	5.27	1.85
Peru	5	6	0.00	2.00	393	435	18.81	1.04	0	0	..	..
EUROPE	11 225	12 763	9.14	1.82	18 486	16 774	4.08	-0.48	3 422	3 509	10.86	1.47
European Union[1]	2 771	3 519	12.84	1.81	14 630	13 265	2.95	-0.31	228	275	10.67	1.75
United Kingdom	0	0	..	..	745	758	-0.43	0.00	0	0	..	..
Russia	4 324	5 042	13.12	1.83	2 247	1 945	15.59	-2.25	930	936	37.54	0.00
Ukraine	3 674	3 710	4.85	1.95	14	10	35.69	-0.10	2 256	2 292	6.68	2.11
AFRICA	2 938	3 422	4.51	1.51	5 478	7 565	12.80	2.56	191	205	3.16	-0.31
Egypt	30	32	-0.11	0.56	4 140	5 770	13.36	2.61	37	39	5.30	-2.54
Ethiopia	120	148	12.88	1.90	3	0	-58.77	..	78	104	116.19	2.22
Nigeria	690	756	1.28	0.76	87	181	194.35	9.47	10	7	63.75	-2.71
South Africa	1 324	1 627	8.38	2.16	55	145	22.73	-0.13	14	3	-26.06	-0.15
ASIA	32 487	39 389	1.84	1.27	121 109	142 005	7.48	1.22	493	729	-2.53	0.37
China[2]	17 889	22 671	4.01	1.40	92 293	108 219	7.06	1.21	183	300	-11.48	0.00
India	12 361	14 097	-0.27	1.07	174	8	65.25	-0.89	193	365	12.66	0.95
Indonesia	565	659	-6.14	0.74	2 728	3 287	5.54	1.93	3	5	17.92	-0.22
Iran	213	254	3.03	1.51	2 350	2 777	26.40	1.48	27	9	31.13	-1.46
Japan	224	253	0.52	0.25	3 325	3 127	2.46	-0.71	0	0	..	..
Kazakhstan	274	336	6.76	1.58	27	21	-4.77	-0.84	13	0	58.79	..
Korea	94	143	-5.23	3.82	1 338	1 549	1.18	1.33	0	0	..	..
Malaysia	0	0	..	..	933	1 082	9.25	1.37	10	8	-10.36	-1.35
Pakistan	2	2	-15.29	1.74	2 347	3 304	34.22	2.06	0	0	..	..
Philippines	1	1	0.00	1.60	233	264	21.20	1.59	0	0	..	..
Saudi Arabia	0	0	..	..	784	903	67.08	1.13	0	0	..	..
Thailand	43	45	-7.04	0.20	3 537	4 414	8.90	1.45	5	3	-12.35	-1.43
Turkey	140	161	0.46	1.35	2 812	3 367	11.20	1.02	18	4	69.36	-1.01
Viet Nam	78	99	-12.51	1.98	1 830	2 014	6.99	1.08	3	3	125.51	-0.82
OCEANIA	42	44	-1.85	0.84	2	2	-1.52	-0.05	8	11	17.15	0.00
Australia	42	44	-1.85	0.84	1	1	-2.85	-0.09	8	11	17.15	0.00
New Zealand	0	0	..	..	1	1	0.00	-0.02	0	0	..	..
DEVELOPED COUNTRIES	**129 639**	**147 152**	**3.89**	**0.93**	**23 763**	**21 739**	**3.54**	**-0.44**	**58 646**	**65 788**	**4.64**	**1.32**
DEVELOPING COUNTRIES	**226 494**	**263 900**	**4.00**	**1.17**	**134 405**	**156 866**	**8.12**	**1.29**	**98 213**	**112 817**	**8.08**	**0.91**
LEAST DEVELOPED COUNTRIES (LDC)	888	983	2.28	1.00	1 605	2 307	34.99	2.70	21	15	2.82	-1.76
OECD[3]	**120 176**	**136 920**	**3.58**	**0.88**	**31 013**	**30 784**	**3.44**	**0.26**	**55 446**	**62 557**	**4.37**	**1.31**
BRICS	**162 570**	**192 772**	**6.39**	**1.20**	**95 180**	**110 727**	**7.22**	**1.13**	**80 394**	**91 212**	**12.01**	**0.59**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**358 602**	**410 638**	**4.26**	**1.13**	**324 278**	**371 490**	**4.47**	**1.17**
NORTH AMERICA	65 341	70 630	3.26	0.68	60 024	64 796	3.12	0.70
Canada	2 710	3 317	3.68	1.89	1 900	2 615	3.25	1.88
United States	62 631	67 313	3.24	0.62	58 124	62 181	3.11	0.65
LATIN AMERICA	107 498	122 675	2.44	1.39	100 339	114 374	2.46	1.39
Argentina	44 275	45 746	1.83	0.41	43 260	44 673	1.87	0.41
Brazil	48 509	60 044	2.28	2.14	43 118	53 690	2.25	2.22
Chile	218	213	2.91	0.72	217	210	2.88	0.72
Colombia	690	760	3.19	0.89	683	754	3.14	0.90
Mexico	5 349	6 254	5.30	1.89	5 110	6 002	5.58	1.95
Paraguay	4 057	4 766	7.08	1.99	3 899	4 601	7.22	2.00
Peru	395	441	17.08	1.08	395	441	17.25	1.08
EUROPE	26 848	26 030	5.34	0.32	24 358	23 655	5.43	0.33
European Union[1]	17 586	16 514	4.21	0.07	15 591	14 662	4.06	0.08
United Kingdom	745	758	-0.43	0.00	705	688	0.32	-0.17
Russia	5 785	6 052	11.60	0.60	5 701	5 973	11.50	0.61
Ukraine	1 427	1 425	3.55	1.86	1 286	1 312	3.58	1.96
AFRICA	8 251	10 764	9.46	2.31	7 598	9 949	11.05	2.29
Egypt	4 083	5 750	12.71	2.67	4 083	5 750	12.77	2.67
Ethiopia	45	44	4.95	1.17	24	19	4.81	0.83
Nigeria	767	930	2.66	2.03	636	750	10.36	1.60
South Africa	1 435	1 765	11.74	2.10	1 297	1 604	11.80	2.08
ASIA	150 625	180 504	5.77	1.19	131 920	158 683	6.44	1.28
China[2]	107 699	130 471	6.10	1.16	92 678	112 793	6.63	1.29
India	12 161	13 729	-0.03	1.11	10 405	11 633	0.55	0.96
Indonesia	3 239	3 937	2.52	1.77	2 728	3 501	5.54	2.01
Iran	2 563	3 020	22.25	1.52	2 542	3 001	22.59	1.53
Japan	3 617	3 381	2.24	-0.61	2 835	2 571	3.34	-0.93
Kazakhstan	281	356	4.28	1.62	154	191	3.15	1.21
Korea	1 425	1 692	0.61	1.61	1 403	1 664	0.88	1.61
Malaysia	910	1 073	10.08	1.42	909	1 070	10.06	1.43
Pakistan	2 365	3 300	33.80	2.11	2 358	3 300	33.82	2.11
Philippines	224	265	20.80	1.73	223	265	20.82	1.73
Saudi Arabia	783	903	70.62	1.14	781	900	70.57	1.14
Thailand	3 515	4 453	8.21	1.47	3 508	4 433	8.52	1.48
Turkey	2 968	3 519	10.20	1.15	2 888	3 401	10.65	1.19
Viet Nam	1 899	2 106	5.30	1.22	1 858	2 060	6.28	1.25
OCEANIA	40	35	-2.94	1.07	38	34	-2.92	1.12
Australia	39	34	-3.00	1.11	38	34	-2.92	1.12
New Zealand	1	1	0.00	-0.02	0	0	0.00	0.00
DEVELOPED COUNTRIES	**98 261**	**102 962**	**3.84**	**0.57**	**89 400**	**93 608**	**3.80**	**0.58**
DEVELOPING COUNTRIES	**260 341**	**307 676**	**4.43**	**1.32**	**234 878**	**277 882**	**4.74**	**1.38**
LEAST DEVELOPED COUNTRIES (LDC)	2 466	3 273	13.88	2.20	2 030	2 710	18.72	2.19
OECD[3]	**99 143**	**105 008**	**3.58**	**0.63**	**90 653**	**96 028**	**3.54**	**0.66**
BRICS	**175 589**	**212 060**	**4.59**	**1.42**	**153 200**	**185 693**	**4.92**	**1.51**

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.19.1. Other oilseed projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**156 040**	**179 493**	**2.46**	**1.27**	**21 625**	**24 047**	**2.91**	**1.38**	**21 204**	**24 047**	**2.49**	**1.38**
NORTH AMERICA	24 206	27 703	3.73	1.12	1 057	1 140	1.33	1.97	10 571	11 863	2.62	1.23
Canada	19 741	22 504	3.73	1.24	268	243	1.50	0.25	9 889	11 039	2.64	1.23
United States	4 466	5 199	4.04	0.65	788	898	1.49	2.49	682	824	2.75	1.20
LATIN AMERICA	6 091	6 714	2.15	1.20	1 657	1 998	0.01	1.69	1 040	1 490	7.11	5.66
Argentina	4 214	4 391	1.61	0.89	1	1	56.51	0.00	668	999	5.11	8.06
Brazil	624	885	6.29	2.93	6	5	-9.43	0.00	176	243	17.87	2.19
Chile	200	227	5.24	0.97	38	23	11.24	-1.15	9	12	13.08	0.99
Colombia	2	3	0.00	2.03	7	7	0.00	0.19	0	0	..	..
Mexico	102	119	-0.11	1.24	1 578	1 938	-0.12	1.79	3	3	8.45	0.00
Paraguay	218	247	-1.60	1.39	0	0	..	..	27	37	-2.22	2.85
Peru	6	8	0.00	1.86	1	0	0.00	..	0	0	..	..
EUROPE	65 411	76 574	3.24	1.68	7 567	7 256	5.76	0.03	5 283	6 593	3.65	2.85
European Union[1]	26 338	30 222	0.32	1.08	6 585	6 393	4.93	0.06	914	901	0.99	-0.32
United Kingdom	1 918	2 055	-3.93	0.40	373	319	9.80	-0.07	115	129	-22.54	-0.26
Russia	16 425	19 027	6.35	2.53	245	254	10.62	0.25	868	1 240	16.23	3.59
Ukraine	18 366	22 580	6.94	2.00	30	31	3.31	-0.20	2 651	3 535	6.55	4.30
AFRICA	9 147	10 112	0.90	0.93	427	457	2.05	1.95	262	124	6.56	-6.99
Egypt	118	126	-0.27	0.64	85	69	1.79	-0.02	22	18	6.14	0.02
Ethiopia	99	115	0.35	1.54	0	0	..	..	0	0	..	..
Nigeria	2 154	2 433	0.07	1.14	0	55	..	289.83	23	0	-10.98	-67.30
South Africa	898	1 087	2.43	1.09	25	0	-5.81	-33.27	4	4	-12.19	9.06
ASIA	48 327	54 903	1.65	0.95	10 885	13 174	1.97	2.07	2 133	1 686	7.05	-1.95
China[2]	28 274	31 059	0.94	0.85	3 782	6 057	2.57	4.52	699	704	4.69	-0.08
India	12 553	15 081	2.85	0.94	167	164	-3.41	-0.54	569	236	5.62	-10.37
Indonesia	637	696	-1.93	1.21	234	237	5.96	-1.34	2	1	1.22	0.12
Iran	399	427	6.38	1.21	189	225	22.34	1.42	1	1	0.00	-0.12
Japan	24	25	1.73	0.67	2 477	2 491	0.14	-0.09	0	0	..	..
Kazakhstan	1 194	1 461	10.07	1.69	7	7	-1.31	0.05	524	540	22.32	1.64
Korea	12	10	2.66	-1.30	30	33	-4.05	0.43	0	0	..	..
Malaysia	5	6	0.00	1.65	44	47	2.06	0.83	3	3	0.00	-0.82
Pakistan	900	1 120	-1.14	1.33	867	806	-0.36	0.77	0	0	-79.81	..
Philippines	20	24	0.35	1.58	83	90	5.35	0.97	0	0	..	..
Saudi Arabia	3	2	0.00	-2.56	4	5	0.00	1.91	0	0	..	..
Thailand	90	94	0.24	0.50	51	55	-1.60	-0.40	3	4	-0.33	0.25
Turkey	1 846	2 269	5.15	1.46	930	498	-1.20	-1.01	102	13	2.26	0.98
Viet Nam	329	388	3.67	1.51	189	178	110.14	-0.41	35	37	12.14	0.41
OCEANIA	2 859	3 488	-2.98	0.03	32	21	2.16	-0.24	1 915	2 290	-4.84	-0.43
Australia	2 846	3 474	-2.99	0.03	28	17	4.00	-0.20	1 914	2 289	-4.84	-0.44
New Zealand	10	10	0.00	-0.05	4	5	-4.99	-0.04	0	1	..	0.00
DEVELOPED COUNTRIES	**94 718**	**110 484**	**3.16**	**1.48**	**11 565**	**11 336**	**3.99**	**0.20**	**18 325**	**21 317**	**2.07**	**1.51**
DEVELOPING COUNTRIES	**61 322**	**69 010**	**1.46**	**0.95**	**10 059**	**12 712**	**1.80**	**2.55**	**2 879**	**2 730**	**5.64**	**0.37**
LEAST DEVELOPED COUNTRIES (LDC)	6 332	6 826	0.77	0.83	287	345	0.71	1.12	191	86	16.57	-8.43
OECD[3]	**57 652**	**66 284**	**1.39**	**1.03**	**13 264**	**13 026**	**2.59**	**0.38**	**13 644**	**15 226**	**0.45**	**0.85**
BRICS	**58 774**	**67 141**	**2.71**	**1.35**	**4 224**	**6 480**	**2.45**	**4.12**	**2 315**	**2 427**	**8.75**	**-0.04**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**157 518**	**179 455**	**2.59**	**1.28**	**136 285**	**156 817**	**2.90**	**1.37**
NORTH AMERICA	15 180	16 966	4.74	1.14	12 750	14 462	4.88	1.23
Canada	10 599	11 693	5.32	1.27	9 980	11 129	5.20	1.31
United States	4 581	5 273	3.54	0.86	2 770	3 333	3.91	0.97
LATIN AMERICA	6 819	7 222	1.18	0.58	6 291	6 618	1.17	0.52
Argentina	3 652	3 393	1.44	-0.60	3 523	3 269	1.80	-0.61
Brazil	461	647	3.36	3.19	383	530	2.53	3.05
Chile	229	238	5.69	0.74	209	216	5.75	0.70
Colombia	9	10	0.00	0.65	8	9	0.00	0.84
Mexico	1 678	2 054	-0.12	1.76	1 509	1 872	-0.61	1.86
Paraguay	191	210	-2.33	1.17	158	169	-2.56	0.90
Peru	7	8	0.00	1.59	3	3	0.00	1.20
EUROPE	67 835	77 246	3.51	1.43	63 527	72 722	3.74	1.48
European Union[1]	32 307	35 739	1.08	0.92	29 948	33 307	1.12	0.99
United Kingdom	2 176	2 244	1.15	0.37	2 101	2 169	1.24	0.38
Russia	15 686	18 030	6.33	2.45	14 979	17 147	6.80	2.48
Ukraine	15 707	19 072	7.12	1.63	14 792	18 205	7.62	1.66
AFRICA	9 363	10 437	0.90	1.12	5 652	5 948	1.17	0.58
Egypt	185	177	0.64	0.44	134	120	2.15	0.31
Ethiopia	99	115	0.35	1.54	62	72	1.56	1.51
Nigeria	2 130	2 489	0.33	1.44	746	770	0.32	0.19
South Africa	945	1 077	2.71	0.93	849	950	2.70	0.74
ASIA	57 228	66 366	1.55	1.26	47 083	55 961	1.85	1.45
China[2]	31 381	36 412	1.13	1.40	24 659	29 892	1.45	1.73
India	12 152	14 989	2.25	1.30	10 689	13 298	2.47	1.38
Indonesia	862	931	-0.27	0.50	278	337	4.34	1.27
Iran	589	651	9.89	1.29	547	600	10.21	1.25
Japan	2 536	2 516	0.22	-0.08	2 404	2 372	-0.38	-0.09
Kazakhstan	714	926	5.69	1.77	570	730	5.93	1.68
Korea	43	43	-2.71	0.01	38	38	-2.82	0.01
Malaysia	46	50	1.96	1.02	45	48	2.03	0.98
Pakistan	1 759	1 925	-0.46	1.09	1 614	1 754	-0.47	1.11
Philippines	104	113	4.49	1.10	91	100	5.12	1.22
Saudi Arabia	7	7	0.00	0.47	5	5	0.00	0.58
Thailand	140	146	-0.32	0.17	82	95	-0.82	0.79
Turkey	2 704	2 754	3.07	0.97	2 500	2 501	2.92	0.92
Viet Nam	483	529	6.05	0.91	366	390	7.41	0.65
OCEANIA	1 093	1 219	2.87	0.97	983	1 105	2.96	1.08
Australia	1 076	1 202	2.96	0.98	971	1 094	3.00	1.09
New Zealand	14	14	-2.15	-0.05	11	10	0.00	0.00
DEVELOPED COUNTRIES	**88 801**	**100 488**	**3.63**	**1.33**	**81 548**	**92 841**	**3.79**	**1.39**
DEVELOPING COUNTRIES	**68 717**	**78 967**	**1.37**	**1.22**	**54 737**	**63 976**	**1.68**	**1.34**
LEAST DEVELOPED COUNTRIES (LDC)	6 435	7 084	0.46	1.03	4 479	4 744	0.59	0.65
OECD[3]	**58 240**	**64 093**	**2.00**	**0.95**	**52 696**	**58 323**	**1.94**	**1.00**
BRICS	**60 626**	**71 155**	**2.55**	**1.64**	**51 558**	**61 817**	**3.03**	**1.85**

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**353 712**	**406 279**	**3.64**	**1.24**	**91 660**	**100 527**	**2.12**	**0.84**	**92 771**	**100 527**	**1.68**	**0.84**
NORTH AMERICA	57 224	62 594	3.13	0.83	5 046	4 940	2.10	-0.15	17 835	19 222	4.08	1.09
Canada	7 044	8 368	4.46	1.45	1 066	984	1.04	-1.02	5 152	5 896	5.72	1.40
United States	50 179	54 226	2.96	0.74	3 980	3 956	2.44	0.08	12 683	13 326	3.48	0.96
LATIN AMERICA	83 934	95 679	2.32	1.41	9 630	12 050	2.48	2.19	50 049	56 293	1.24	1.30
Argentina	35 437	36 443	1.69	0.38	0	0	..	..	31 387	31 845	1.80	0.27
Brazil	35 485	44 238	2.26	2.29	5	5	-5.63	0.00	14 393	20 042	-0.54	3.38
Chile	290	289	3.93	0.72	1 133	1 307	1.03	1.88	1	1	-11.80	-0.18
Colombia	732	824	3.09	0.98	1 621	2 299	9.68	3.44	97	80	6.08	-3.33
Mexico	5 180	6 151	4.06	1.91	1 884	2 154	2.52	1.45	22	22	1.06	0.00
Paraguay	3 121	3 676	6.50	1.97	2	2	0.35	-0.04	2 363	2 678	7.85	1.81
Peru	334	371	12.67	1.04	1 520	2 422	7.85	4.27	5	5	0.00	-0.99
EUROPE	49 875	53 577	3.95	0.99	28 608	25 138	-0.30	-1.45	10 410	12 701	3.88	1.98
European Union1	29 074	30 147	2.21	0.63	23 643	19 950	-0.18	-1.92	1 922	2 215	-0.53	1.65
United Kingdom	1 654	1 672	0.97	0.21	2 793	2 701	-0.58	0.06	474	562	15.46	1.41
Russia	9 808	10 817	8.23	1.57	326	346	-9.24	0.13	2 382	2 827	2.40	2.09
Ukraine	7 589	9 140	7.09	1.70	30	29	-8.24	0.08	5 245	6 772	6.33	2.22
AFRICA	10 550	12 921	6.18	1.91	4 504	5 852	-0.71	2.35	686	604	2.45	-1.63
Egypt	3 362	4 649	11.50	2.61	376	175	-11.08	-7.35	9	5	24.02	0.70
Ethiopia	110	121	4.72	1.53	20	53	103.11	10.49	0	0	..	..
Nigeria	1 010	1 147	4.55	1.10	567	653	28.71	-0.48	188	203	3.37	0.48
South Africa	1 449	1 738	8.54	1.72	729	1 000	-6.61	3.23	31	29	-6.54	-1.25
ASIA	151 170	180 160	4.38	1.31	40 520	48 677	4.28	1.74	13 689	11 538	-0.67	-2.32
China2	89 475	108 083	5.13	1.34	4 258	4 861	20.96	-1.30	1 021	1 075	-4.46	2.12
India	19 624	23 130	0.60	1.24	492	1 219	20.75	11.81	2 946	1 232	-4.93	-10.56
Indonesia	8 130	10 050	5.45	1.60	4 862	5 254	4.06	0.99	5 440	5 208	5.52	-0.98
Iran	2 362	2 778	19.08	1.49	1 878	1 391	-4.65	-0.15	40	10	-24.38	0.04
Japan	3 635	3 407	1.82	-0.61	1 862	1 558	-2.23	-1.58	1	1	-11.95	0.00
Kazakhstan	458	561	4.37	1.34	5	5	-0.08	-0.02	139	134	-0.67	0.29
Korea	1 200	1 399	0.78	1.48	3 466	3 475	-0.47	-0.05	50	50	-8.42	0.00
Malaysia	3 441	3 865	1.79	1.05	1 500	1 599	3.01	0.68	2 509	2 403	0.11	-0.67
Pakistan	4 043	4 878	3.90	1.77	404	1 110	-8.66	11.52	66	42	-12.42	-4.93
Philippines	1 163	1 394	2.04	1.16	3 064	3 315	5.87	2.03	366	317	-5.40	-1.99
Saudi Arabia	619	713	47.71	1.14	1 715	2 279	14.04	2.74	25	20	86.29	-2.07
Thailand	3 291	4 150	9.12	1.49	3 538	4 266	1.09	2.02	12	12	8.10	-0.20
Turkey	4 315	4 808	5.90	1.24	2 202	2 987	3.12	2.92	166	119	0.16	-2.25
Viet Nam	1 694	1 878	6.07	1.21	6 188	8 868	7.68	3.53	70	30	-4.32	-2.75
OCEANIA	959	1 348	-0.05	2.18	3 353	3 869	5.09	1.85	101	169	-4.31	-0.09
Australia	827	1 199	-0.18	2.32	1 065	1 247	6.63	2.24	47	102	-10.96	-0.01
New Zealand	8	7	0.19	0.00	2 276	2 612	4.47	1.68	0	0	..	..
DEVELOPED COUNTRIES	**114 795**	**124 459**	**3.40**	**0.88**	**40 458**	**37 825**	**0.20**	**-0.73**	**28 477**	**32 200**	**3.91**	**1.42**
DEVELOPING COUNTRIES	**238 917**	**281 821**	**3.75**	**1.39**	**51 202**	**62 703**	**3.90**	**1.91**	**64 294**	**68 327**	**0.81**	**0.57**
LEAST DEVELOPED COUNTRIES (LDC)	4 929	5 869	4.63	1.76	1 127	2 049	10.40	4.49	352	284	3.77	-2.74
OECD3	**104 672**	**113 068**	**2.88**	**0.82**	**48 550**	**47 237**	**0.81**	**-0.31**	**20 719**	**22 477**	**3.52**	**1.10**
BRICS	**155 841**	**188 006**	**3.96**	**1.56**	**5 810**	**7 432**	**9.44**	**0.66**	**20 774**	**25 205**	**-1.44**	**1.80**

.. Not available

Note: Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), “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 2018-20est	2030	2011-20	2021-30
WORLD	**353 761**	**406 167**	**3.76**	**1.24**
NORTH AMERICA	**44 479**	**48 313**	**2.65**	**0.62**
Canada	2 961	3 456	1.14	0.76
United States	41 518	44 856	2.77	0.61
LATIN AMERICA	**43 592**	**51 410**	**3.51**	**1.71**
Argentina	4 049	4 598	1.92	1.14
Brazil	21 097	24 201	3.86	1.46
Chile	1 404	1 593	1.53	1.70
Colombia	2 256	3 038	7.45	3.01
Mexico	7 040	8 282	3.62	1.79
Paraguay	750	985	4.28	2.87
Peru	1 849	2 785	8.44	3.81
EUROPE	**68 091**	**66 013**	**2.03**	**-0.16**
European Union[1]	50 794	47 882	1.14	-0.55
United Kingdom	3 972	3 811	-1.06	-0.06
Russia	7 694	8 336	9.39	1.33
Ukraine	2 434	2 397	9.84	0.43
AFRICA	**14 407**	**18 162**	**3.79**	**2.21**
Egypt	3 739	4 817	5.80	2.00
Ethiopia	130	174	6.83	3.57
Nigeria	1 388	1 597	10.06	0.51
South Africa	2 131	2 707	1.44	2.33
ASIA	**179 009**	**217 221**	**4.84**	**1.65**
China[2]	93 827	111 866	5.70	1.21
India	17 093	23 078	2.24	2.98
Indonesia	7 569	10 091	4.62	2.86
Iran	4 196	4 158	5.15	0.92
Japan	5 436	4 963	-0.01	-0.92
Kazakhstan	321	432	7.91	1.72
Korea	4 605	4 824	0.15	0.37
Malaysia	2 450	3 060	4.54	2.41
Pakistan	4 363	5 940	2.67	3.14
Philippines	3 832	4 388	6.25	2.11
Saudi Arabia	2 354	2 972	16.42	2.37
Thailand	6 841	8 403	4.35	1.77
Turkey	6 370	7 670	5.40	1.97
Viet Nam	7 808	10 714	7.65	3.12
OCEANIA	**4 183**	**5 048**	**4.07**	**2.01**
Australia	1 810	2 345	3.71	2.39
New Zealand	2 290	2 619	4.50	1.68
DEVELOPED COUNTRIES	**126 734**	**130 079**	**2.20**	**0.27**
DEVELOPING COUNTRIES	**227 027**	**276 088**	**4.72**	**1.74**
LEAST DEVELOPED COUNTRIES (LDC)	**5 688**	**7 629**	**5.67**	**2.67**
OECD[3]	**132 446**	**137 815**	**1.99**	**0.37**
BRICS	**141 842**	**170 189**	**5.03**	**1.49**

Note: Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**212 889**	**246 941**	**3.66**	**1.30**	**85 894**	**96 919**	**3.14**	**1.04**	**87 247**	**96 919**	**3.13**	**1.04**
NORTH AMERICA	18 241	19 668	3.61	0.91	4 942	5 159	3.37	0.19	4 922	5 419	3.80	1.93
Canada	4 714	5 161	5.06	1.29	319	358	-0.42	0.09	3 520	3 785	4.48	1.35
United States	13 527	14 507	3.14	0.78	4 623	4 801	3.69	0.20	1 402	1 634	2.28	3.42
LATIN AMERICA	28 103	32 225	3.24	1.39	4 777	5 089	1.61	0.47	11 573	13 042	3.43	1.27
Argentina	9 417	9 515	1.82	0.26	17	17	4.68	0.00	6 485	6 345	3.13	-0.25
Brazil	10 126	12 692	3.56	2.35	482	493	0.64	0.70	1 349	2 756	-3.16	7.90
Chile	120	121	4.75	0.71	468	540	4.36	0.87	1	1	-4.45	-0.13
Colombia	1 872	2 302	6.07	1.42	699	692	5.70	0.30	850	854	17.28	-0.30
Mexico	2 000	2 410	2.81	1.84	1 065	1 173	3.27	0.59	52	51	4.52	0.00
Paraguay	767	900	5.82	1.92	13	11	0.00	-2.03	657	776	10.17	2.07
Peru	292	360	6.14	1.77	645	772	6.77	1.46	1	0	0.00	-0.12
EUROPE	31 411	35 429	4.03	1.33	14 879	11 950	3.31	-2.65	13 258	15 454	7.10	1.68
European Union[1]	15 672	16 967	1.78	0.82	11 199	8 327	3.17	-3.60	2 337	2 447	1.16	-0.28
United Kingdom	1 091	1 115	1.19	0.31	1 104	1 110	1.18	0.11	284	252	-0.34	-0.04
Russia	6 878	7 984	7.25	2.29	1 358	1 388	7.59	0.17	3 792	4 606	10.74	3.13
Ukraine	6 876	8 403	7.47	1.67	281	212	-1.75	-1.64	6 373	7 648	8.33	1.67
AFRICA	8 711	10 136	3.28	1.37	11 468	15 137	3.32	2.59	1 531	1 211	0.41	-2.47
Egypt	832	1 113	9.74	2.49	1 806	2 001	0.44	0.94	138	124	-12.21	-0.93
Ethiopia	60	68	4.06	1.58	517	779	7.24	4.09	0	0	..	..
Nigeria	1 908	2 247	3.48	1.22	1 432	2 138	3.30	3.66	89	70	-7.07	-3.14
South Africa	564	656	5.62	1.37	871	1 053	0.64	1.70	17	17	-20.12	-1.03
ASIA	125 159	147 966	3.73	1.31	49 477	59 225	3.18	1.73	55 085	60 793	2.32	0.85
China[2]	27 215	32 879	4.13	1.43	10 915	10 419	1.16	0.00	266	298	7.63	0.00
India	9 357	11 248	0.82	1.32	14 795	21 029	4.15	3.36	71	51	-9.30	-0.55
Indonesia	49 937	60 415	6.09	1.43	143	109	6.63	0.02	31 833	36 687	4.40	1.03
Iran	698	812	16.02	1.43	1 308	1 231	-3.56	0.34	17	9	-32.67	-0.16
Japan	1 535	1 474	0.69	-0.36	944	992	2.70	0.21	2	2	2.07	0.00
Kazakhstan	309	386	4.53	1.47	170	202	8.55	1.51	86	63	25.32	-1.49
Korea	310	358	0.61	1.41	1 268	1 409	5.72	0.88	3	3	-8.92	0.00
Malaysia	21 897	24 141	0.34	0.94	1 782	1 775	0.11	-0.78	18 992	19 814	-0.31	0.79
Pakistan	1 713	1 928	-0.18	1.59	3 391	4 374	4.60	2.20	77	56	-7.76	-2.08
Philippines	1 938	2 325	0.62	1.09	1 284	1 501	11.71	1.49	1 027	920	1.02	-1.47
Saudi Arabia	143	164	36.39	1.13	885	1 098	8.85	2.03	55	44	44.75	-1.99
Thailand	4 128	5 132	8.15	1.62	305	233	0.83	-2.83	510	804	2.05	3.47
Turkey	1 973	2 096	3.98	1.20	1 569	1 774	1.68	0.16	547	545	-1.11	-0.16
Viet Nam	673	747	5.33	1.15	1 125	1 415	5.72	1.52	159	133	4.00	-1.50
OCEANIA	1 263	1 518	1.32	1.35	350	359	4.14	0.31	878	1 001	1.84	0.88
Australia	469	614	1.03	1.84	225	220	5.65	-0.03	175	219	3.04	0.92
New Zealand	5	4	0.57	0.00	97	113	2.69	1.33	0	0	..	..
DEVELOPED COUNTRIES	**53 357**	**59 095**	**3.68**	**1.14**	**22 626**	**20 289**	**3.28**	**-1.47**	**18 492**	**21 198**	**5.97**	**1.72**
DEVELOPING COUNTRIES	**159 532**	**187 846**	**3.66**	**1.34**	**63 268**	**76 630**	**3.09**	**1.83**	**68 755**	**75 721**	**2.45**	**0.86**
LEAST DEVELOPED COUNTRIES (LDC)	3 904	4 439	1.85	1.37	7 392	10 301	5.64	3.09	545	400	7.25	-3.45
OECD[3]	**43 539**	**47 403**	**2.77**	**0.92**	**24 329**	**22 286**	**3.32**	**-1.32**	**9 318**	**9 942**	**3.39**	**0.92**
BRICS	**54 141**	**65 460**	**3.73**	**1.69**	**28 420**	**34 381**	**2.86**	**2.00**	**5 495**	**7 728**	**4.93**	**4.40**

.. Not available

Note: Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**213 625**	**246 628**	**3.87**	**1.33**	**18.5**	**19.9**	**2.25**	**0.76**
NORTH AMERICA	18 316	19 406	3.45	0.45	39.1	40.0	1.62	0.07
Canada	1 548	1 733	5.87	0.89	37.8	38.7	4.05	0.18
United States	16 769	17 673	3.25	0.41	39.2	40.1	1.39	0.06
LATIN AMERICA	21 312	24 267	2.64	1.27	19.1	20.6	0.40	0.73
Argentina	2 949	3 187	-0.84	1.34	19.3	22.0	0.36	1.18
Brazil	9 237	10 429	4.49	1.18	23.9	25.9	0.03	0.91
Chile	587	660	4.62	0.87	11.0	11.8	2.76	0.75
Colombia	1 733	2 138	2.71	1.84	19.0	23.3	1.32	1.81
Mexico	3 014	3 531	2.84	1.43	23.6	25.1	1.61	0.56
Paraguay	125	135	-4.24	0.73	16.5	15.7	-5.19	-0.36
Peru	933	1 131	6.51	1.58	11.0	12.1	4.52	0.90
EUROPE	33 106	31 920	2.74	-0.48	26.3	26.8	3.38	0.36
European Union[1]	24 586	22 845	2.56	-0.92	26.4	26.1	3.53	0.03
United Kingdom	1 911	1 972	1.34	0.24	28.3	28.0	0.69	-0.12
Russia	4 444	4 766	4.92	0.93	30.5	33.2	4.73	1.13
Ukraine	809	963	-0.48	1.08	13.8	17.4	-0.37	1.67
AFRICA	18 669	24 047	3.64	2.39	9.5	10.0	0.71	0.71
Egypt	2 530	2 988	5.01	1.59	8.2	9.1	1.88	1.35
Ethiopia	578	847	6.90	3.87	4.8	5.5	4.05	1.68
Nigeria	3 232	4 312	3.47	2.48	10.4	11.0	0.73	0.33
South Africa	1 429	1 691	3.21	1.63	13.4	14.9	1.71	1.29
ASIA	121 485	146 111	4.54	1.73	18.1	20.5	2.95	1.28
China[2]	38 699	42 950	3.79	1.05	27.0	29.4	3.27	0.91
India	24 324	32 197	3.08	2.63	10.8	14.1	1.31	2.64
Indonesia	18 503	23 686	9.98	2.27	26.2	33.0	9.39	2.17
Iran	2 005	2 034	2.68	0.77	11.2	10.6	0.48	0.27
Japan	2 440	2 464	1.40	-0.14	19.2	20.4	1.57	0.34
Kazakhstan	398	524	4.27	1.98	20.4	24.2	2.73	1.10
Korea	1 573	1 764	4.73	0.99	18.3	21.2	2.76	1.94
Malaysia	5 233	6 076	3.51	1.24	26.3	27.2	2.49	0.48
Pakistan	5 026	6 239	3.16	2.09	18.0	19.0	1.02	0.65
Philippines	2 240	2 902	5.79	2.32	13.5	15.8	5.21	1.35
Saudi Arabia	963	1 216	9.84	2.14	22.5	25.6	7.38	1.31
Thailand	3 882	4 554	8.87	1.12	13.8	17.5	8.18	2.09
Turkey	2 982	3 322	3.86	0.94	26.2	26.6	1.79	0.26
Viet Nam	1 641	2 028	5.71	1.64	2.6	3.6	3.96	2.83
OCEANIA	737	876	2.12	1.47	17.3	18.1	0.99	0.33
Australia	517	615	2.41	1.45	20.5	21.8	1.02	0.46
New Zealand	101	117	2.58	1.28	21.2	22.6	1.59	0.58
DEVELOPED COUNTRIES	**57 598**	**58 178**	**2.90**	**-0.03**	**27.4**	**28.2**	**2.44**	**0.29**
DEVELOPING COUNTRIES	**156 027**	**188 450**	**4.24**	**1.79**	**16.5**	**18.1**	**2.30**	**1.02**
LEAST DEVELOPED COUNTRIES (LDC)	10 791	14 331	4.17	2.79	8.4	9.4	1.22	1.29
OECD[3]	**58 616**	**59 739**	**2.93**	**0.03**	**28.0**	**28.8**	**2.21**	**0.27**
BRICS	**78 134**	**92 033**	**3.69**	**1.60**	**19.8**	**22.3**	**2.46**	**1.24**

Note: Average 2018-20est: Data for 2020 are estimated.

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2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
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
AUSTRALIA												
Tariffs												
Soybean oil	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Rapeseed oil	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
CANADA												
Tariffs												
Rapeseed oil	%	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
EUROPEAN UNION[1,2]												
Voluntary coupled support												
Soybean	mln EUR	33	34	35	36	36	36	37	37	39	39	40
Tariffs												
Soybean oil	%	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Rapeseed oil	%	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
JAPAN												
New output payments												
Soybean	JPY/kg	156.1	165.5	165.5	165.5	165.5	165.5	165.5	165.5	165.5	165.5	165.5
Tariffs												
Soybean oil	JPY/kg	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
Rapeseed oil	JPY/kg	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
KOREA												
Soybean tariff-quota	kt	1 032	1 032	1 032	1 032	1 032	1 032	1 032	1 032	1 032	1 032	1 032
In-quota tariff	%	5	5	5	5	5	5	5	5	5	5	5
Out-of-quota tariff	%	487	487	487	487	487	487	487	487	487	487	487
Soybean (for food) mark up	'000 KRW/t	131	131	131	131	131	131	131	131	131	131	131
MEXICO												
Tariffs												
Soybean	%	33	33	33	33	33	33	33	33	33	33	33
Soybean meal	%	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
Soybean oil	%	45	45	45	45	45	45	45	45	45	45	45
UNITED STATES												
ARC participation rate												
Soybean	%	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
Soybean loan rate	USD/t	213.1	227.8	227.8	227.8	227.8	227.8	227.8	227.8	227.8	227.8	227.8
Tariffs												
Rapeseed	%	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Soybean meal	%	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Rapeseed meal	%	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Soybean oil	%	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
Rapeseed oil	%	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
CHINA												
Tariffs												
Soybean	%	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Soybean meal	%	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Soybean oil in-quota tariff	%	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Vegetable oil tariff-quota	kt	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1	7 998.1
INDIA												
Soybean tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Rapeseed tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Soybean meal tariff	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Soybean oil tariff	%	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6
INDONESIA												
Protein meal tariff	%	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PAKISTAN												
Protein meal tariff	%	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
VIET NAM												
Protein meal tariff	%	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.The sources for tariffs and Tariff Rate Quotas are the national questionnaire reply, UNCTAD and WTO.

1. Since 2015 the Basic payment scheme (BPS) holds, which shall account for 68% maximum of the national direct payment envelopes. On top of this, compulsory policy instruments have been introduced: the Green Payment (30%) and young farmer scheme (2%).
2. Refers to all current European Union member States (excludes the United Kingdom)

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**172 878**	**200 288**	**0.33**	**1.40**	**59 205**	**67 480**	**1.35**	**1.62**	**62 357**	**70 424**	**1.22**	**1.55**
NORTH AMERICA	7 440	8 134	0.50	0.39	4 069	4 401	-0.92	1.27	103	80	-12.92	0.00
Canada	109	135	0.40	0.19	1 298	1 231	1.16	1.03	69	50	5.31	0.00
United States	7 331	7 999	0.50	0.40	2 771	3 170	-1.79	1.37	35	30	-23.07	0.00
LATIN AMERICA	55 457	63 685	-0.35	1.40	1 924	1 684	-2.30	-1.29	31 926	39 318	0.10	1.84
Argentina	1 666	2 051	-1.53	1.44	0	0	..	..	285	742	4.77	3.79
Brazil	35 129	40 952	-0.43	1.59	1	0	-29.22	..	24 464	30 272	0.16	1.90
Chile	193	219	-4.60	2.05	520	540	1.30	-0.47	0	0	..	..
Colombia	2 244	2 462	0.65	1.47	193	75	-4.21	-4.33	628	535	-2.79	4.52
Mexico	5 921	6 118	-0.01	0.04	14	10	-9.00	-0.22	1 839	2 143	-0.54	0.15
Paraguay	156	191	-0.57	3.53	52	69	97.60	-2.39	81	110	2.67	2.44
Peru	1 187	1 412	0.42	1.46	287	310	4.62	-0.39	130	113	7.12	0.39
EUROPE	25 946	26 701	-0.11	0.56	4 251	3 468	-5.22	-2.25	3 148	3 625	0.58	5.42
European Union[1]	15 660	16 202	-0.75	0.33	2 255	1 561	-5.70	-2.90	1 390	1 812	-4.54	5.80
United Kingdom	1 138	1 028	-1.95	0.04	1 020	1 136	-1.60	-0.12	318	293	0.76	-0.07
Russia	6 441	6 611	4.11	0.57	185	85	-62.06	-1.94	780	844	97.92	7.33
Ukraine	1 383	1 236	-5.61	2.03	34	26	-22.45	-18.27	229	151	10.61	22.36
AFRICA	11 099	15 072	1.36	2.92	14 526	17 334	2.80	2.18	5 452	4 221	2.97	-0.53
Egypt	2 466	3 766	3.13	3.85	1 041	994	-4.32	-0.89	270	433	-2.54	0.90
Ethiopia	440	707	6.44	3.74	262	365	17.18	3.61	37	23	245.51	-6.49
Nigeria	20	0	4.06	..	1 630	1 750	3.33	2.17	0	0	-47.76	..
South Africa	2 202	2 905	0.52	3.23	380	64	-8.28	-5.42	1 139	1 404	9.51	5.73
ASIA	68 491	82 010	0.81	1.58	34 083	40 245	2.45	2.00	18 432	19 579	3.14	1.09
China[2]	10 556	11 809	-1.98	0.89	5 446	5 964	1.64	2.54	109	70	10.22	0.00
India	30 527	35 617	2.31	1.40	1 344	1 506	8.59	1.25	6 194	5 369	13.25	-1.23
Indonesia	2 189	2 368	-2.16	0.79	5 364	7 641	7.51	3.81	1	0	53.72	..
Iran	1 640	2 170	5.14	2.35	1 060	622	-3.86	-2.33	0	0	-75.44	..
Japan	714	703	0.73	0.00	1 374	1 227	-0.35	-0.74	4	5	21.39	0.00
Kazakhstan	52	0	23.82	..	443	531	1.03	0.56	9	0	-20.68	..
Korea	0	0	..	..	1 928	2 057	0.92	0.33	312	367	-0.66	1.45
Malaysia	0	0	-81.53	..	1 996	2 397	0.51	1.28	175	175	-6.88	-1.27
Pakistan	5 486	7 534	1.80	2.32	311	151	33.29	-4.35	483	808	2.12	4.75
Philippines	2 124	2 476	-1.49	1.31	115	43	398.31	-0.46	179	371	-4.12	0.47
Saudi Arabia	0	0	..	..	1 767	1 958	3.66	1.07	494	426	12.71	-1.06
Thailand	10 308	13 551	-0.58	2.40	11	0	63.90	..	7 913	10 187	0.89	3.05
Turkey	2 506	3 142	2.24	1.47	244	244	64.37	-4.06	175	400	21.43	4.23
Viet Nam	1 037	1 142	-4.11	1.88	594	634	18.51	2.05	229	127	7.48	-2.01
OCEANIA	4 446	4 687	0.37	0.42	352	348	-1.67	-0.39	3 296	3 601	0.60	0.32
Australia	4 234	4 400	0.49	0.27	19	20	-23.87	0.00	3 131	3 404	0.73	0.28
New Zealand	0	0	..	..	251	243	1.05	-0.09	25	19	0.83	0.00
DEVELOPED COUNTRIES	**40 764**	**43 048**	**0.17**	**0.66**	**12 730**	**12 313**	**-2.62**	**-0.15**	**7 757**	**8 716**	**0.95**	**2.94**
DEVELOPING COUNTRIES	**132 114**	**157 240**	**0.37**	**1.61**	**46 475**	**55 167**	**2.69**	**2.06**	**54 600**	**61 707**	**1.24**	**1.36**
LEAST DEVELOPED COUNTRIES (LDC)	4 022	5 333	2.35	2.52	9 422	12 972	4.86	3.79	2 638	817	1.70	-6.70
OECD[3]	**40 289**	**42 686**	**-0.10**	**0.43**	**12 568**	**12 358**	**-1.49**	**-0.10**	**7 929**	**9 063**	**-0.88**	**1.58**
BRICS	**84 854**	**97 895**	**0.64**	**1.41**	**7 355**	**7 619**	**0.56**	**2.11**	**32 686**	**37 960**	**2.24**	**1.59**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated. Sugar data are expressed on a tel quel basis.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**168 965**	**195 923**	**0.83**	**1.37**	**22.0**	**23.0**	**-0.29**	**0.45**
NORTH AMERICA	11 417	12 443	0.41	0.63	30.2	30.7	-0.03	0.03
Canada	1 264	1 314	0.96	0.22	24.6	21.3	1.91	-1.15
United States	10 153	11 129	0.35	0.68	30.9	31.8	-0.16	0.13
LATIN AMERICA	24 905	25 927	-1.03	0.38	38.5	36.8	-2.01	-0.37
Argentina	1 282	1 308	-3.59	0.32	28.6	26.7	-4.55	-0.49
Brazil	10 310	10 637	-1.79	0.35	48.9	47.5	-2.59	-0.15
Chile	747	758	-0.26	0.20	39.5	39.0	-1.45	0.08
Colombia	1 833	1 997	1.28	0.51	36.4	37.4	0.03	0.06
Mexico	4 052	3 982	-0.50	-0.13	31.8	28.3	-1.69	-0.99
Paraguay	134	150	0.80	1.01	19.0	18.9	-0.52	-0.06
Peru	1 378	1 590	2.63	1.11	42.4	44.1	1.24	0.25
EUROPE	27 443	26 540	-0.55	-0.29	36.7	35.8	-0.70	-0.19
European Union[1]	16 731	15 950	-0.63	-0.41	37.6	36.1	-0.76	-0.32
United Kingdom	1 887	1 871	-1.08	-0.03	27.9	26.5	-1.72	-0.39
Russia	5 911	5 854	0.87	-0.10	40.5	40.8	0.69	0.10
Ukraine	1 247	1 112	-5.54	-0.49	28.3	27.2	-5.10	0.20
AFRICA	19 835	27 761	2.23	3.09	15.3	16.6	-0.35	0.75
Egypt	3 191	4 249	0.88	2.77	31.8	35.2	-1.25	1.10
Ethiopia	654	1 031	6.54	4.15	5.8	7.1	3.69	1.78
Nigeria	1 295	1 685	-0.13	2.71	6.4	6.4	-2.72	0.25
South Africa	1 470	1 561	-3.56	0.94	25.1	23.7	-4.96	-0.11
ASIA	84 016	101 808	1.68	1.78	18.4	20.6	0.70	1.09
China[2]	15 973	17 684	1.42	1.12	11.1	12.1	0.91	0.97
India	25 559	31 377	1.47	1.87	18.7	20.9	0.36	1.01
Indonesia	7 160	9 936	3.41	3.02	26.5	33.2	2.15	2.11
Iran	2 478	2 787	0.49	1.11	29.9	30.1	-0.84	0.15
Japan	2 040	1 925	-1.04	-0.48	16.1	15.9	-0.86	0.00
Kazakhstan	491	530	0.78	0.65	26.5	25.7	-0.68	-0.27
Korea	1 627	1 693	1.40	0.19	31.8	33.1	1.07	0.23
Malaysia	1 859	2 206	2.65	1.51	58.2	61.1	1.27	0.43
Pakistan	5 394	6 820	2.40	2.01	24.9	25.9	0.30	0.27
Philippines	1 853	2 139	-1.76	1.42	17.1	17.3	-3.24	0.21
Saudi Arabia	1 260	1 523	2.33	1.75	36.8	38.7	0.00	0.56
Thailand	3 058	3 325	1.42	0.62	43.9	47.3	1.05	0.55
Turkey	2 716	2 939	2.25	0.56	32.6	33.0	0.66	0.04
Viet Nam	1 384	1 627	-0.09	2.13	14.4	15.6	-1.10	1.45
OCEANIA	1 349	1 444	0.01	0.40	32.7	30.7	-1.43	-0.76
Australia	984	1 030	-0.77	0.18	39.1	36.6	-2.12	-0.80
New Zealand	225	224	0.53	-0.10	47.0	43.3	-0.44	-0.79
DEVELOPED COUNTRIES	**46 047**	**46 627**	**-0.34**	**0.09**	**32.0**	**31.5**	**-0.71**	**-0.12**
DEVELOPING COUNTRIES	**122 919**	**149 295**	**1.30**	**1.80**	**19.7**	**21.2**	**-0.01**	**0.72**
LEAST DEVELOPED COUNTRIES (LDC)	10 725	17 226	4.59	4.21	12.3	15.6	2.19	1.99
OECD[3]	**45 227**	**45 931**	**-0.08**	**0.09**	**32.3**	**31.7**	**-0.58**	**-0.20**
BRICS	**59 223**	**67 113**	**0.62**	**1.21**	**18.4**	**19.7**	**-0.16**	**0.73**

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.Sugar data are expressed on a tel quel basis.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.24. Main policy assumptions for sugar markets

Marketing year

		Average 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ARGENTINA												
Tariff, sugar	ARS/t	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
BRAZIL												
Tariff, raw sugar	%	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Tariff, white sugar	%	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
CANADA												
Tariff, raw sugar	CAD/t	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7
Tariff, white sugar	CAD/t	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9
CHINA[1]												
TRQ sugar	kt	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0
In-quota tariff, raw sugar	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
In-quota tariff, white sugar	%	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5
Tariff, over-quota	%	85.0	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	176.2	169.3	169.3	169.3	169.3	169.3	169.3	169.3	169.3	169.3	169.3
Tariff, raw sugar	EUR/t	339.0	339.0	339.0	339.0	339.0	339.0	339.0	339.0	339.0	339.0	339.0
Tariff, white sugar	EUR/t	419.0	419.0	419.0	419.0	419.0	419.0	419.0	419.0	419.0	419.0	419.0
INDIA												
Tariff, sugar	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
INDONESIA												
Tariff, sugar	%	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6
JAPAN												
Minimum stabilisation price, raw sugar	JPY/kg	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2
Tariff, raw sugar	JPY/kg	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8
Tariff, white sugar	JPY/kg	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1
KOREA												
Tariff, raw sugar	%	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Tariff, white sugar	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
MEXICO												
Mexico common external tariff, raw sugar	USD/t	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6
Mexico common external tariff, white sugar	USD/t	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4
RUSSIA												
Minimum tariff, raw sugar	USD/t	253.3	240.0	240.0	203.0	203.0	203.0	203.0	171.0	171.0	171.0	171.0
Minimum tariff, white sugar	USD/t	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0
UNITED STATES												
Loan rate, raw sugar	USD/t	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	1 646	1 696	1 699	1 703	1 706	1 710	1 713	1 716	1 720	1 720	1 720
TRQ, refined sugar	kt rse	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0
Raw sugar 2nd tier WTO tariff	USD/t	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6	338.6
White sugar 2nd tier WTO tariff	USD/t	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4	357.4
VIET NAM												
Tariff, sugar	%	83.2	83.2	83.2	83.2	83.2	83.2	83.2	83.2	83.2	83.2	83.2

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated. The sources for tariffs and Tariff Rate Quotas are the national questionnaire reply, UNCTAD and WTO.

1. Refers to mainland only.
2. Refers to all current European Union member States (excludes the United Kingdom)
3. Implemented in 11 Member States.

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**330 027**	**373 830**	**1.42**	**1.16**	**34 450**	**38 015**	**3.20**	**0.95**	**36 876**	**39 751**	**2.91**	**0.88**
NORTH AMERICA	51 543	56 085	1.73	0.73	2 700	2 889	2.89	0.84	10 012	10 738	1.64	0.40
Canada	5 037	5 568	1.45	0.83	652	725	-0.66	0.58	2 098	2 344	2.21	0.62
United States	46 506	50 517	1.76	0.72	2 048	2 165	4.28	0.93	7 914	8 393	1.50	0.34
LATIN AMERICA	54 202	61 837	1.69	1.21	4 711	5 451	4.21	1.48	9 564	11 834	3.70	2.21
Argentina	6 001	6 760	2.73	1.07	50	37	-1.83	1.06	937	1 245	9.54	1.70
Brazil	27 280	30 502	1.20	0.97	52	56	0.69	-0.20	6 597	8 297	2.63	2.77
Chile	1 559	1 866	1.16	1.49	584	598	10.32	0.18	438	562	5.89	0.91
Colombia	2 890	3 273	3.42	1.53	235	448	12.73	7.01	32	3	8.07	-19.02
Mexico	7 163	8 431	2.63	1.44	2 147	2 186	4.56	0.09	475	459	9.98	-1.47
Paraguay	600	767	5.77	2.60	39	43	3.93	1.79	352	490	5.94	3.15
Peru	2 143	2 916	4.78	2.88	97	93	14.34	-0.12	2	0	-22.57	..
EUROPE	63 675	63 776	1.70	-0.03	5 052	5 148	-3.79	0.82	9 311	9 314	4.53	0.22
European Union[1]	44 301	43 179	1.19	-0.20	1 502	1 640	-0.91	1.38	7 028	6 967	3.82	0.41
United Kingdom	3 952	3 831	1.69	-0.61	1 787	2 093	1.05	1.94	870	695	2.04	-2.07
Russia	10 377	11 146	4.63	0.48	748	425	-15.06	-4.16	438	527	32.12	1.00
Ukraine	2 234	2 696	1.05	1.19	414	324	0.54	-0.61	445	550	20.06	0.71
AFRICA	18 194	22 851	2.42	2.20	2 925	4 321	3.13	5.19	326	212	2.32	-3.37
Egypt	2 255	3 021	2.36	2.95	352	411	7.46	4.26	5	4	3.95	-0.67
Ethiopia	691	864	1.64	2.55	1	2	14.60	7.44	16	14	-0.32	1.88
Nigeria	1 231	1 283	1.61	0.67	17	35	13.35	14.97	0	0	..	..
South Africa	3 340	4 291	2.44	2.23	585	569	3.01	1.37	146	120	0.48	-2.18
ASIA	135 879	162 053	0.96	1.66	18 630	19 699	5.76	0.11	4 867	4 522	2.99	0.19
China[2]	79 320	94 975	-0.35	1.42	5 497	4 503	21.08	-4.66	573	570	-3.01	1.42
India	7 656	8 117	2.50	2.26	2	28	0.00	42.63	1 387	644	-0.47	-3.28
Indonesia	4 150	4 670	6.90	2.29	230	238	18.08	0.53	3	1	-6.83	-7.19
Iran	2 963	3 450	1.49	1.71	130	122	-8.09	8.72	59	21	-2.19	-4.16
Japan	3 392	3 322	0.77	-0.31	3 157	3 137	2.72	-0.08	18	21	11.21	0.58
Kazakhstan	953	1 091	3.33	1.05	293	383	0.46	2.15	23	23	32.87	-1.21
Korea	2 562	2 653	3.29	0.19	1 433	1 598	4.58	1.11	54	51	4.44	-1.04
Malaysia	2 099	2 560	2.89	1.94	335	501	3.94	3.95	215	115	6.00	-5.96
Pakistan	4 461	6 152	6.42	3.17	2	2	-10.25	2.61	75	27	4.60	-11.92
Philippines	3 397	3 378	1.25	2.03	608	1 259	8.91	7.11	6	6	-12.50	-0.91
Saudi Arabia	859	1 320	6.79	2.47	801	673	-3.68	0.36	60	56	-1.06	-0.25
Thailand	3 064	3 586	1.22	1.46	27	32	-6.67	-0.05	1 268	1 626	6.59	2.44
Turkey	3 743	4 646	4.68	1.75	93	78	-2.87	0.02	665	962	8.85	2.73
Viet Nam	4 909	6 831	2.28	3.10	868	808	-3.25	7.81	75	104	19.33	-4.08
OCEANIA	6 532	7 228	0.98	1.29	432	507	3.43	2.08	2 796	3 132	0.22	1.36
Australia	4 949	5 641	0.84	1.62	224	253	1.82	1.45	1 711	2 090	-0.92	2.26
New Zealand	1 433	1 408	1.37	0.00	83	100	6.18	1.99	1 082	1 040	2.20	-0.24
DEVELOPED COUNTRIES	**132 357**	**139 204**	**1.70**	**0.45**	**12 578**	**13 152**	**-0.34**	**0.74**	**22 350**	**23 367**	**2.60**	**0.42**
DEVELOPING COUNTRIES	**197 669**	**234 625**	**1.23**	**1.61**	**21 872**	**24 863**	**5.78**	**1.07**	**14 526**	**16 385**	**3.42**	**1.58**
LEAST DEVELOPED COUNTRIES (LDC)	11 876	15 677	3.56	2.69	1 216	2 175	3.03	7.70	82	30	13.25	-6.35
OECD[3]	**129 011**	**136 046**	**1.64**	**0.48**	**14 204**	**15 369**	**2.79**	**0.92**	**22 426**	**23 607**	**2.50**	**0.47**
BRICS	**127 973**	**149 031**	**0.55**	**1.31**	**6 885**	**5 580**	**6.78**	**-4.06**	**9 141**	**10 157**	**2.20**	**2.01**

.. Not available

Note: Calendar year; except year ending 30 September for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Gross indigenous production.
5. Least-squares growth rate (see glossary).
6. Excludes trade of live animals.

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**327 387**	**371 675**	**1.43**	**1.17**	**42.7**	**43.7**	**0.29**	**0.25**
NORTH AMERICA	44 548	48 602	1.80	0.83	121.6	124.5	1.09	0.25
Canada	3 301	3 653	1.41	0.94	88.2	89.4	0.42	0.16
United States	41 247	44 949	1.83	0.82	125.3	128.6	1.15	0.27
LATIN AMERICA	48 808	54 852	1.54	1.04	75.5	77.9	0.54	0.28
Argentina	5 114	5 552	1.72	0.93	114.2	113.2	0.71	0.12
Brazil	20 549	22 117	0.84	0.38	97.4	98.8	0.02	-0.12
Chile	1 688	1 880	2.35	1.24	89.2	96.6	1.12	1.12
Colombia	3 049	3 657	3.89	2.16	60.6	68.5	2.61	1.70
Mexico	8 605	9 850	3.03	1.25	67.5	69.9	1.80	0.37
Paraguay	283	316	5.76	1.74	40.2	39.8	4.37	0.65
Peru	2 238	3 008	5.15	2.78	68.9	83.5	3.72	1.91
EUROPE	59 201	59 437	0.68	0.01	79.2	80.1	0.53	0.11
European Union[1]	38 442	37 630	0.64	-0.21	86.4	85.2	0.51	-0.13
United Kingdom	4 871	5 229	1.40	0.57	72.1	74.2	0.74	0.20
Russia	10 784	11 074	0.91	0.20	73.9	77.3	0.72	0.40
Ukraine	2 198	2 467	-1.07	1.04	50.0	60.3	-0.61	1.73
AFRICA	20 850	27 025	2.55	2.70	16.1	16.2	-0.05	0.37
Egypt	2 640	3 457	2.95	3.08	26.3	28.6	0.78	1.41
Ethiopia	653	847	1.87	2.88	5.8	5.8	-0.85	0.54
Nigeria	1 303	1 440	1.54	1.41	6.5	5.5	-1.09	-1.02
South Africa	3 742	4 659	2.33	2.31	63.9	70.6	0.84	1.25
ASIA	150 147	177 521	1.44	1.50	32.8	35.9	0.46	0.81
China[2]	84 241	98 833	0.45	1.04	58.8	67.5	-0.05	0.88
India	6 259	7 489	3.29	2.97	4.6	5.0	2.16	2.10
Indonesia	4 502	5 051	7.33	2.16	16.6	16.9	6.03	1.26
Iran	3 020	3 545	1.28	1.95	36.4	38.3	-0.05	0.99
Japan	6 531	6 443	1.69	-0.20	51.5	53.4	1.87	0.28
Kazakhstan	1 225	1 455	2.37	1.37	66.0	70.5	0.90	0.44
Korea	3 888	4 200	3.58	0.49	75.9	82.1	3.24	0.52
Malaysia	2 237	2 966	2.67	2.73	70.0	82.2	1.30	1.63
Pakistan	4 380	6 117	6.43	3.33	20.2	23.3	4.25	1.56
Philippines	4 005	4 638	2.27	3.19	37.1	37.5	0.72	1.96
Saudi Arabia	1 746	2 098	0.90	1.66	51.0	53.4	-1.40	0.46
Thailand	1 628	1 614	-1.82	0.21	23.4	22.9	-2.19	0.15
Turkey	3 246	3 777	3.35	1.46	38.9	42.4	1.74	0.94
Viet Nam	5 736	7 551	1.24	3.66	59.5	72.5	0.21	2.98
OCEANIA	3 832	4 238	1.98	1.24	92.9	90.2	0.51	0.08
Australia	3 129	3 448	1.92	1.19	124.2	122.4	0.54	0.20
New Zealand	431	459	1.70	0.66	90.2	88.7	0.71	-0.04
DEVELOPED COUNTRIES	**122 370**	**128 806**	**1.28**	**0.49**	**85.7**	**88.0**	**0.85**	**0.29**
DEVELOPING COUNTRIES	**205 017**	**242 869**	**1.53**	**1.55**	**32.8**	**34.5**	**0.21**	**0.47**
LEAST DEVELOPED COUNTRIES (LDC)	13 006	17 786	3.60	3.18	15.0	16.1	1.22	0.97
OECD[3]	**120 243**	**127 287**	**1.61**	**0.54**	**86.5**	**88.6**	**1.05**	**0.27**
BRICS	**125 574**	**144 171**	**0.73**	**0.99**	**39.1**	**42.4**	**-0.04**	**0.51**

Note: Calendar year; except year ending 30 September New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).
5. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.

Source: OECD/FAO (2021), “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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**70 607**	**74 713**	**0.95**	**0.68**	**10 260**	**11 191**	**4.38**	**0.96**	**10 410**	**11 283**	**2.96**	**0.99**
NORTH AMERICA	13 363	14 172	0.93	0.57	1 633	1 673	3.64	0.52	1 955	2 286	3.33	1.08
Canada	1 472	1 603	1.20	0.63	199	213	-3.71	0.64	532	692	5.56	1.87
United States	11 891	12 569	0.90	0.57	1 434	1 460	5.10	0.50	1 424	1 594	2.59	0.76
LATIN AMERICA	18 407	19 718	1.05	0.65	790	817	1.10	-0.01	3 727	4 832	7.02	1.84
Argentina	3 165	3 415	2.69	0.80	7	7	3.10	0.00	671	862	17.37	1.07
Brazil	9 192	9 819	0.41	0.45	42	50	0.18	0.00	1 806	2 534	6.05	2.31
Chile	228	271	1.61	0.81	319	359	7.99	0.98	21	25	14.11	-0.97
Colombia	807	737	-1.27	-0.26	7	5	13.47	-5.51	30	2	14.21	-21.33
Mexico	1 992	2 230	1.35	1.11	139	123	-1.90	-0.37	223	250	7.71	1.06
Paraguay	488	632	4.98	2.79	9	5	14.20	-3.16	340	479	5.52	3.26
Peru	192	215	0.44	1.14	9	12	6.92	3.75	0	0	..	..
EUROPE	10 784	10 197	0.25	-0.40	1 289	1 258	-3.35	0.67	1 071	1 083	2.58	0.72
European Union[1]	7 208	6 689	0.43	-0.50	368	389	0.99	1.51	585	653	2.40	1.64
United Kingdom	890	736	0.01	-1.88	356	472	2.09	3.28	151	79	0.11	-3.32
Russia	1 624	1 722	0.04	0.50	411	252	-10.31	-3.52	53	65	12.89	0.00
Ukraine	365	325	-1.54	-0.39	5	10	-5.20	2.27	43	15	12.56	-2.94
AFRICA	6 575	7 497	1.23	1.35	565	822	3.93	4.70	94	49	0.46	-5.81
Egypt	715	711	-1.83	0.20	306	364	14.53	4.20	1	1	14.49	-0.34
Ethiopia	416	480	0.73	1.90	0	0	..	..	3	0	23.43	..
Nigeria	281	281	-0.67	-0.70	1	2	-4.46	2.78	0	0	..	..
South Africa	1 043	1 182	2.52	1.59	15	4	-16.11	1.15	55	40	5.55	-4.10
ASIA	18 228	19 566	1.36	1.02	5 949	6 588	7.93	0.86	1 780	983	0.50	-2.85
China[2]	6 594	7 127	1.07	0.58	1 526	1 849	49.23	-0.28	61	59	-4.88	0.34
India	2 410	1 610	-1.08	-1.19	0	0	..	..	1 367	642	-0.43	-3.21
Indonesia	377	392	-2.28	0.84	225	227	18.69	0.25	0	0	-7.01	..
Iran	381	310	0.21	-0.57	108	121	-5.28	8.80	4	3	11.83	-1.39
Japan	473	410	-1.05	-1.39	888	920	2.61	0.36	5	5	25.97	0.00
Kazakhstan	490	528	3.49	0.61	59	73	-0.02	1.19	9	11	44.80	-0.36
Korea	285	309	-1.20	0.54	542	608	6.40	0.68	4	4	-1.01	0.00
Malaysia	31	32	2.68	0.55	197	281	2.18	3.37	9	6	-1.24	-3.26
Pakistan	2 207	2 944	4.76	3.19	1	1	-11.05	..	61	11	8.59	-17.92
Philippines	292	256	-0.56	0.70	164	234	5.22	2.46	3	3	-3.83	-0.41
Saudi Arabia	42	62	-1.06	3.80	157	183	-0.08	1.26	13	10	-9.96	-1.25
Thailand	188	175	-2.62	0.46	21	26	-5.86	-0.30	44	45	-1.72	0.30
Turkey	986	1 285	6.15	1.83	26	11	-11.45	-1.82	23	36	3.33	1.70
Viet Nam	411	532	1.46	1.76	563	348	-1.54	4.54	2	2	37.68	-0.50
OCEANIA	3 249	3 563	0.22	1.35	32	34	-0.08	0.87	1 782	2 051	-0.91	1.60
Australia	2 549	2 894	-0.13	1.76	10	8	-3.78	-0.28	1 157	1 453	-2.67	2.55
New Zealand	689	661	1.51	-0.28	10	10	3.52	0.00	623	596	3.00	-0.37
DEVELOPED COUNTRIES	**30 951**	**31 770**	**0.76**	**0.39**	**4 092**	**4 210**	**0.62**	**0.59**	**4 879**	**5 479**	**1.51**	**1.15**
DEVELOPING COUNTRIES	**39 656**	**42 943**	**1.11**	**0.90**	**6 168**	**6 981**	**7.74**	**1.18**	**5 531**	**5 804**	**4.44**	**0.84**
LEAST DEVELOPED COUNTRIES (LDC)	4 002	4 925	1.94	1.93	109	217	1.40	4.69	15	7	8.87	-7.50
OECD[3]	**29 768**	**30 684**	**0.74**	**0.38**	**4 475**	**4 823**	**3.19**	**0.94**	**4 780**	**5 393**	**1.56**	**1.21**
BRICS	**20 863**	**21 459**	**0.51**	**0.42**	**1 994**	**2 155**	**8.61**	**-0.71**	**3 342**	**3 340**	**2.82**	**0.81**

.. Not available

Note: Calendar year; except year ending 30 September for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Gross indigenous production.
5. Least-squares growth rate (see glossary).
6. Excludes trade of live animals.

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**70 281**	**74 421**	**1.06**	**0.68**	**6.4**	**6.1**	**-0.08**	**-0.23**
NORTH AMERICA	13 312	13 920	0.81	0.51	25.4	25.0	0.11	-0.06
Canada	965	977	-0.36	0.03	18.1	16.7	-1.34	-0.75
United States	12 347	12 943	0.91	0.55	26.3	25.9	0.24	0.00
LATIN AMERICA	14 919	15 090	-0.12	0.25	16.2	15.0	-1.11	-0.51
Argentina	2 501	2 560	0.50	0.71	39.1	36.5	-0.50	-0.10
Brazil	7 243	7 190	-0.52	-0.11	24.0	22.5	-1.33	-0.61
Chile	510	584	4.36	1.03	18.9	21.0	3.12	0.91
Colombia	741	680	-1.76	-0.08	10.3	8.9	-2.98	-0.53
Mexico	1 666	1 784	1.38	0.82	9.1	8.9	0.17	-0.05
Paraguay	153	155	5.30	1.32	15.2	13.6	3.91	0.24
Peru	201	227	0.68	1.24	4.3	4.4	-0.69	0.38
EUROPE	10 867	10 242	-0.72	-0.36	10.2	9.7	-0.87	-0.26
European Union[1]	6 759	6 267	0.14	-0.50	10.6	9.9	0.01	-0.41
United Kingdom	1 097	1 129	0.68	0.11	11.4	11.2	0.03	-0.26
Russia	2 083	1 941	-3.64	-0.30	10.0	9.5	-3.81	-0.10
Ukraine	319	315	-2.93	-0.19	5.1	5.4	-2.48	0.49
AFRICA	7 167	8 477	1.45	1.84	3.9	3.5	-1.11	-0.47
Egypt	1 058	1 103	1.04	1.36	7.4	6.4	-1.09	-0.28
Ethiopia	391	477	0.87	2.44	2.4	2.3	-1.83	0.11
Nigeria	332	398	-0.64	1.55	1.2	1.1	-3.21	-0.89
South Africa	960	1 064	0.80	2.04	11.5	11.3	-0.67	0.98
ASIA	22 833	25 490	2.90	1.12	3.5	3.6	1.91	0.43
China[2]	8 138	8 941	3.93	0.33	4.0	4.3	3.41	0.18
India	1 043	968	-1.47	0.44	0.5	0.5	-2.55	-0.41
Indonesia	743	769	2.94	0.52	1.9	1.8	1.69	-0.36
Iran	488	429	-0.72	1.33	4.1	3.2	-2.02	0.37
Japan	1 343	1 330	1.22	-0.21	7.4	7.7	1.40	0.26
Kazakhstan	543	593	2.87	0.70	20.5	20.1	1.38	-0.22
Korea	821	913	3.36	0.64	11.2	12.5	3.03	0.67
Malaysia	234	323	1.51	3.04	5.1	6.3	0.15	1.95
Pakistan	2 138	2 924	4.65	3.48	6.9	7.8	2.50	1.72
Philippines	461	494	1.63	1.49	3.0	2.8	0.10	0.28
Saudi Arabia	187	236	0.71	1.99	3.8	4.2	-1.58	0.79
Thailand	119	118	-4.07	0.37	1.2	1.2	-4.43	0.31
Turkey	1 065	1 274	4.18	1.74	8.9	10.0	2.55	1.22
Viet Nam	1 005	891	0.66	2.73	7.3	6.0	-0.36	2.05
OCEANIA	1 183	1 202	1.66	0.63	20.1	17.9	0.19	-0.53
Australia	1 085	1 116	2.22	0.76	30.1	27.7	0.83	-0.23
New Zealand	77	64	-4.19	-1.63	11.2	8.6	-5.11	-2.31
DEVELOPED COUNTRIES	**29 992**	**30 376**	**0.44**	**0.29**	**14.7**	**14.5**	**0.01**	**0.09**
DEVELOPING COUNTRIES	**40 289**	**44 045**	**1.54**	**0.95**	**4.5**	**4.4**	**0.23**	**-0.11**
LEAST DEVELOPED COUNTRIES (LDC)	4 154	5 236	2.19	2.06	3.3	3.3	-0.16	-0.12
OECD[3]	**29 015**	**29 657**	**0.90**	**0.32**	**14.6**	**14.5**	**0.33**	**0.05**
BRICS	**19 466**	**20 104**	**0.74**	**0.20**	**4.2**	**4.1**	**-0.04**	**-0.28**

Note: Calendar year; except year ending 30 September New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).
5. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**112 928**	**127 278**	**-0.01**	**1.09**	**9 855**	**9 866**	**4.53**	**-0.66**	**10 346**	**9 813**	**3.66**	**-0.77**
NORTH AMERICA	14 415	15 271	2.40	0.26	694	829	2.12	1.67	4 379	4 261	2.98	-1.08
Canada	2 110	2 281	1.09	0.48	255	291	2.11	0.26	1 429	1 499	2.17	0.04
United States	12 304	12 990	2.64	0.22	438	538	2.10	2.51	2 950	2 762	3.40	-1.65
LATIN AMERICA	8 527	9 620	2.85	1.05	1 629	1 721	8.11	0.54	1 242	1 175	7.32	-0.96
Argentina	619	725	8.74	0.99	33	25	1.34	1.62	31	36	24.80	-0.47
Brazil	4 065	4 312	2.46	0.45	4	1	6.32	-5.96	696	579	6.21	-1.03
Chile	546	658	-0.14	1.67	124	121	24.85	-1.59	236	330	6.00	1.61
Colombia	416	517	8.66	1.81	119	133	17.90	2.61	1	0	..	..
Mexico	1 582	1 908	3.60	1.60	1 003	1 025	7.57	0.26	247	200	13.21	-4.13
Paraguay	59	66	8.65	1.37	4	4	4.62	-0.94	6	7	33.88	1.21
Peru	170	205	4.73	1.94	11	12	10.09	7.18	0	0	..	..
EUROPE	29 713	28 874	1.20	-0.30	1 242	1 339	-7.86	1.50	4 449	4 038	3.88	-0.43
European Union[1]	23 000	21 746	0.58	-0.45	159	172	0.33	1.28	4 005	3 647	3.97	-0.33
United Kingdom	912	917	2.33	-0.40	765	816	0.33	0.99	265	234	4.59	-1.53
Russia	3 955	4 350	6.37	0.40	90	51	-29.27	3.85	106	100	65.82	0.00
Ukraine	708	818	0.20	1.22	35	38	-20.54	0.57	4	5	-19.87	-0.07
AFRICA	1 632	1 890	4.05	1.48	283	567	4.06	8.28	29	20	0.50	-1.41
Egypt	1	1	4.22	-2.00	2	3	30.07	3.33	0	0	..	..
Ethiopia	2	3	1.74	2.72	0	0	..	..	0	0	..	..
Nigeria	289	304	2.18	1.51	3	5	26.90	2.38	0	0	..	..
South Africa	278	322	3.89	1.53	35	33	-2.97	1.50	25	17	0.44	-1.48
ASIA	58 087	71 035	-1.58	1.91	5 713	5 066	9.35	-2.55	209	277	-2.65	-0.16
China[2]	45 898	57 295	-2.26	1.96	2 659	1 505	22.44	-8.66	82	54	-9.57	-0.50
India	364	381	0.26	0.85	1	25	-0.74	57.26	1	0	..	..
Indonesia	232	229	-1.45	0.37	2	8	7.35	11.85	0	0	..	..
Iran	0	0	..	..	0	0	..	..	0	0	..	..
Japan	1 283	1 248	-0.03	-0.31	1 336	1 318	2.74	-0.19	2	4	11.20	3.57
Kazakhstan	87	74	-2.61	-1.89	33	61	-3.40	4.54	1	1	24.00	-0.95
Korea	1 363	1 356	4.17	-0.18	679	773	3.34	1.83	2	3	6.54	0.00
Malaysia	223	228	0.26	0.70	27	30	7.42	1.21	5	4	-2.30	-0.77
Pakistan	0	0	..	..	0	0	..	..	0	0	..	..
Philippines	1 671	1 483	-0.32	2.19	128	293	3.15	7.13	2	2	-3.64	-1.62
Saudi Arabia	0	0	..	..	19	16	13.75	0.00	3	1	32.95	0.00
Thailand	1 110	1 344	0.86	1.13	1	2	-13.35	1.28	39	94	4.89	4.78
Turkey	0	0	..	..	16	19	2.23	-0.01	16	19	2.23	0.01
Viet Nam	3 424	4 665	1.01	3.21	129	238	56.30	17.16	40	75	9.54	-4.18
OCEANIA	555	589	1.65	0.91	295	344	3.39	1.84	39	42	0.77	1.37
Australia	411	428	2.17	0.73	214	245	2.14	1.51	37	41	0.37	1.43
New Zealand	46	45	-1.00	-0.33	69	86	6.97	2.37	1	1	..	0.02
DEVELOPED COUNTRIES	**46 305**	**46 322**	**1.53**	**-0.10**	**3 663**	**3 958**	**-2.21**	**1.00**	**8 898**	**8 365**	**3.41**	**-0.76**
DEVELOPING COUNTRIES	**66 624**	**80 956**	**-1.00**	**1.84**	**6 193**	**5 908**	**11.01**	**-1.65**	**1 448**	**1 448**	**5.26**	**-0.82**
LEAST DEVELOPED COUNTRIES (LDC)	2 357	2 999	6.31	2.69	158	413	6.64	11.56	0	0	-12.01	..
OECD[3]	**44 351**	**44 494**	**1.41**	**-0.05**	**5 194**	**5 557**	**3.48**	**0.78**	**9 195**	**8 747**	**3.71**	**-0.76**
BRICS	**54 559**	**66 659**	**-1.42**	**1.74**	**2 789**	**1 616**	**8.07**	**-8.15**	**909**	**749**	**5.02**	**-0.89**

.. Not available

Note: Calendar year; except year ending 30 September New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Gross indigenous production.
5. Least-squares growth rate (see glossary).
6. Excludes trade of live animals.

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**112 293**	**127 027**	**0.05**	**1.09**	**11.4**	**11.7**	**-1.08**	**0.17**
NORTH AMERICA	10 766	11 834	2.24	0.90	22.9	23.6	1.52	0.33
Canada	822	909	1.12	1.01	17.1	17.4	0.13	0.22
United States	9 945	10 925	2.33	0.89	23.6	24.4	1.65	0.34
LATIN AMERICA	8 919	10 171	3.08	1.21	10.8	11.3	2.06	0.45
Argentina	622	714	7.51	1.09	10.8	11.4	6.44	0.27
Brazil	3 372	3 734	1.77	0.71	12.5	13.0	0.94	0.21
Chile	434	449	0.40	0.72	17.9	18.0	-0.80	0.60
Colombia	534	651	10.08	1.96	8.3	9.5	8.72	1.50
Mexico	2 343	2 737	4.33	1.61	14.3	15.2	3.08	0.73
Paraguay	56	63	7.43	1.22	6.2	6.2	6.02	0.14
Peru	181	217	5.05	2.15	4.3	4.7	3.62	1.28
EUROPE	26 495	26 178	0.18	-0.19	27.6	27.5	0.03	-0.09
European Union[1]	19 115	18 246	-0.03	-0.46	33.5	32.2	-0.16	-0.38
United Kingdom	1 411	1 499	0.85	0.53	16.3	16.6	0.20	0.17
Russia	3 939	4 300	1.64	0.45	21.1	23.4	1.45	0.65
Ukraine	743	854	-2.09	1.19	13.2	16.3	-1.63	1.88
AFRICA	1 887	2 437	4.12	2.74	1.1	1.1	1.49	0.41
Egypt	3	4	20.96	2.34	0.0	0.0	18.41	0.68
Ethiopia	2	3	1.19	3.80	0.0	0.0	-1.52	1.44
Nigeria	293	310	2.34	1.52	1.1	0.9	-0.31	-0.91
South Africa	287	338	3.31	1.71	3.8	4.0	1.81	0.65
ASIA	63 413	75 517	-0.85	1.53	10.8	11.9	-1.80	0.85
China[2]	48 393	58 649	-1.51	1.49	26.3	31.2	-2.00	1.34
India	364	406	0.23	1.56	0.2	0.2	-0.86	0.70
Indonesia	220	230	-1.26	0.93	0.6	0.6	-2.46	0.05
Iran	0	0	..	..	0.0	0.0	-1.32	-0.95
Japan	2 621	2 562	1.33	-0.25	16.1	16.5	1.50	0.23
Kazakhstan	119	134	-2.93	0.56	5.0	5.1	-4.33	-0.36
Korea	1 989	2 125	3.54	0.40	30.3	32.4	3.20	0.43
Malaysia	244	255	0.96	0.78	6.0	5.5	-0.40	-0.29
Pakistan	0	0	..	..	0.0	0.0	25.17	-1.71
Philippines	1 796	1 774	-0.11	2.86	13.0	11.2	-1.61	1.63
Saudi Arabia	17	15	13.90	0.00	0.4	0.3	11.30	-1.18
Thailand	909	911	0.10	0.10	10.2	10.1	-0.27	0.04
Turkey	0	0	..	..	0.0	0.0	-1.56	-0.45
Viet Nam	3 514	4 831	1.47	3.79	28.4	36.2	0.44	3.11
OCEANIA	811	891	2.30	1.24	15.3	14.8	0.82	0.07
Australia	588	631	2.28	0.98	18.2	17.5	0.89	-0.01
New Zealand	114	130	3.10	1.36	18.6	19.5	2.10	0.66
DEVELOPED COUNTRIES	**41 100**	**41 912**	**0.79**	**0.14**	**22.4**	**22.3**	**0.36**	**-0.06**
DEVELOPING COUNTRIES	**71 193**	**85 116**	**-0.38**	**1.59**	**8.9**	**9.4**	**-1.66**	**0.51**
LEAST DEVELOPED COUNTRIES (LDC)	2 527	3 424	6.31	3.43	2.3	2.4	3.87	1.22
OECD[3]	**40 307**	**41 278**	**1.19**	**0.22**	**22.6**	**22.4**	**0.63**	**-0.05**
BRICS	**56 355**	**67 426**	**-1.10**	**1.38**	**13.7**	**15.5**	**-1.86**	**0.90**

.. Not available

Note: Calendar year; except year ending 30 September for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).
5. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.

Source: OECD/FAO (2021), “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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**130 629**	**153 479**	**2.98**	**1.43**	**13 203**	**15 807**	**1.57**	**2.13**	**14 951**	**17 470**	**2.46**	**1.91**
NORTH AMERICA	23 674	26 547	1.80	1.10	247	270	-0.05	0.71	3 675	4 188	-0.51	1.73
Canada	1 438	1 667	2.27	1.55	176	197	-0.70	0.99	137	153	-5.46	1.19
United States	22 235	24 880	1.77	1.07	71	73	1.73	0.00	3 537	4 034	-0.26	1.75
LATIN AMERICA	26 813	32 026	1.82	1.65	2 271	2 894	3.16	2.57	4 573	5 806	0.85	3.34
Argentina	2 164	2 562	1.60	1.47	10	5	-10.55	0.00	232	343	-1.66	3.81
Brazil	13 890	16 235	1.40	1.44	0	0	..	..	4 095	5 184	0.92	3.54
Chile	770	924	2.11	1.61	142	118	8.06	-0.18	176	202	5.26	0.18
Colombia	1 656	2 007	5.23	2.21	108	309	9.22	10.15	2	1	-16.75	-1.15
Mexico	3 485	4 183	3.05	1.57	999	1 033	3.30	-0.03	4	7	-6.33	5.85
Paraguay	51	66	13.60	2.18	26	34	1.83	3.16	6	5	177.71	-3.06
Peru	1 742	2 453	5.54	3.17	77	69	16.21	-1.39	2	0	-22.89	..
EUROPE	21 886	23 445	3.33	0.48	2 259	2 299	-1.15	0.62	3 619	4 042	6.28	0.84
European Union[1]	13 457	14 116	2.84	0.35	811	929	-1.70	1.63	2 383	2 602	3.90	1.21
United Kingdom	1 843	1 888	2.48	-0.20	580	713	2.25	2.46	357	313	2.61	-2.01
Russia	4 582	4 870	5.36	0.56	245	121	-11.29	-7.13	267	350	34.47	1.54
Ukraine	1 146	1 537	2.66	1.55	373	276	7.03	-0.84	398	530	24.83	0.85
AFRICA	6 585	9 132	3.72	3.09	2 059	2 917	3.04	4.84	173	118	4.94	-2.81
Egypt	1 458	2 202	5.96	4.05	43	43	-5.48	4.97	4	3	1.83	-0.79
Ethiopia	77	107	3.82	3.35	1	1	..	2.91	0	0	..	..
Nigeria	244	241	3.41	0.32	13	28	28.13	22.68	0	0	..	..
South Africa	1 855	2 610	2.45	2.78	532	529	4.90	1.36	65	62	-2.58	-0.95
ASIA	50 112	60 486	4.01	1.63	6 289	7 326	1.69	1.57	2 846	3 244	5.61	1.39
China[2]	21 980	25 010	3.16	0.53	954	776	8.92	-5.41	431	458	-0.75	1.83
India	4 051	5 133	5.82	3.85	1	2	..	11.64	5	0	-8.60	-24.89
Indonesia	3 381	3 875	9.59	2.65	0	0	-18.06	..	2	1	-6.56	-9.40
Iran	2 302	2 886	2.76	2.18	4	1	-30.35	0.77	56	18	-2.91	-4.50
Japan	1 637	1 665	2.05	-0.04	910	879	2.96	-0.33	10	12	6.98	0.00
Kazakhstan	205	311	8.73	3.24	200	249	1.41	1.92	11	10	32.70	-1.76
Korea	912	987	3.79	0.61	195	199	3.66	-0.11	48	44	4.77	-1.19
Malaysia	1 844	2 300	3.25	2.09	76	140	6.52	6.65	201	105	6.78	-6.24
Pakistan	1 522	2 280	8.83	3.47	1	1	-10.29	2.10	9	8	10.28	-4.90
Philippines	1 373	1 557	3.87	2.08	315	731	14.99	9.16	1	1	-24.44	-0.68
Saudi Arabia	817	1 258	7.56	2.41	597	447	-4.50	0.00	43	44	3.94	0.00
Thailand	1 764	2 064	2.01	1.78	4	4	-9.17	0.75	1 185	1 487	7.04	2.37
Turkey	2 303	2 882	3.97	1.99	51	48	13.47	0.52	627	907	9.30	2.84
Viet Nam	1 053	1 605	7.49	3.26	176	221	-11.51	6.85	33	28	99.93	-4.00
OCEANIA	1 559	1 843	2.88	1.54	78	101	8.08	3.78	66	72	4.91	1.89
Australia	1 280	1 524	2.43	1.57	0	0	..	..	46	54	2.55	1.87
New Zealand	238	265	5.21	1.21	1	1	136.42	0.00	20	18	13.24	2.00
DEVELOPED COUNTRIES	**51 622**	**57 423**	**2.52**	**0.92**	**4 402**	**4 584**	**0.63**	**0.71**	**7 482**	**8 398**	**2.44**	**1.23**
DEVELOPING COUNTRIES	**79 006**	**96 056**	**3.28**	**1.76**	**8 801**	**11 223**	**2.05**	**2.77**	**7 469**	**9 071**	**2.49**	**2.58**
LEAST DEVELOPED COUNTRIES (LDC)	3 297	4 809	4.81	3.48	946	1 543	2.75	7.34	63	21	18.44	-5.94
OECD[3]	**52 065**	**57 970**	**2.44**	**0.97**	**4 098**	**4 570**	**1.89**	**1.14**	**7 379**	**8 357**	**1.79**	**1.42**
BRICS	**46 358**	**53 857**	**2.97**	**1.19**	**1 731**	**1 428**	**2.66**	**-3.61**	**4 862**	**6 053**	**1.38**	**3.21**

.. Not available

Note: Calendar year; except year ending 30 September for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**128 912**	**151 831**	**2.89**	**1.46**	**14.8**	**15.7**	**1.73**	**0.54**
NORTH AMERICA	20 261	22 645	2.24	0.99	48.7	51.0	1.53	0.42
Canada	1 476	1 726	2.91	1.47	34.7	37.2	1.90	0.69
United States	18 785	20 919	2.19	0.95	50.2	52.7	1.51	0.41
LATIN AMERICA	24 512	29 114	2.13	1.43	33.4	36.4	1.12	0.66
Argentina	1 942	2 224	1.96	1.15	38.2	39.9	0.95	0.33
Brazil	9 795	11 051	1.61	0.60	40.8	43.4	0.78	0.10
Chile	735	840	2.37	1.71	34.2	38.0	1.15	1.59
Colombia	1 762	2 315	5.50	2.99	30.8	38.1	4.19	2.52
Mexico	4 480	5 209	3.12	1.23	30.9	32.5	1.89	0.35
Paraguay	71	95	7.28	2.88	8.9	10.6	5.87	1.78
Peru	1 817	2 522	5.94	3.02	49.2	61.6	4.50	2.15
EUROPE	20 520	21 701	2.31	0.44	24.1	25.7	2.15	0.54
European Union[1]	11 879	12 443	2.27	0.29	23.5	24.8	2.13	0.38
United Kingdom	2 066	2 288	2.39	0.86	26.9	28.6	1.73	0.49
Russia	4 561	4 641	3.00	0.19	27.5	28.5	2.82	0.39
Ukraine	1 122	1 283	0.35	1.28	22.4	27.6	0.82	1.97
AFRICA	8 471	11 931	3.53	3.57	5.8	6.3	0.91	1.22
Egypt	1 496	2 242	5.33	4.08	13.1	16.3	3.11	2.39
Ethiopia	77	107	3.91	3.34	0.6	0.7	1.14	1.00
Nigeria	257	269	3.26	1.35	1.1	0.9	0.59	-1.08
South Africa	2 322	3 077	3.19	2.61	34.9	41.0	1.69	1.54
ASIA	53 577	64 567	3.65	1.63	10.3	11.5	2.65	0.95
China[2]	22 503	25 328	3.48	0.27	13.8	15.2	2.96	0.11
India	4 046	5 135	5.85	3.86	2.6	3.0	4.70	2.99
Indonesia	3 379	3 875	9.60	2.65	11.0	11.4	8.27	1.75
Iran	2 251	2 869	2.58	2.25	23.9	27.2	1.22	1.28
Japan	2 543	2 532	2.38	-0.14	17.6	18.5	2.56	0.34
Kazakhstan	394	550	4.32	2.73	18.7	23.5	2.82	1.79
Korea	1 059	1 143	3.67	0.55	18.2	19.7	3.33	0.59
Malaysia	1 719	2 335	3.02	2.93	47.4	56.9	1.64	1.83
Pakistan	1 515	2 273	8.79	3.52	6.2	7.6	6.55	1.75
Philippines	1 687	2 287	5.49	3.89	13.7	16.3	3.90	2.65
Saudi Arabia	1 371	1 662	1.05	1.77	35.2	37.2	-1.25	0.57
Thailand	597	580	-3.74	0.36	7.6	7.3	-4.10	0.29
Turkey	1 727	2 024	2.52	1.60	18.2	20.0	0.92	1.08
Viet Nam	1 196	1 798	1.05	3.81	10.9	15.2	0.03	3.13
OCEANIA	1 572	1 872	3.01	1.63	33.5	35.1	1.53	0.46
Australia	1 234	1 470	2.43	1.56	43.1	45.9	1.04	0.56
New Zealand	219	248	4.72	1.15	40.4	42.1	3.71	0.45
DEVELOPED COUNTRIES	**48 558**	**53 624**	**2.35**	**0.87**	**29.9**	**32.2**	**1.91**	**0.66**
DEVELOPING COUNTRIES	**80 354**	**98 207**	**3.22**	**1.79**	**11.3**	**12.3**	**1.89**	**0.71**
LEAST DEVELOPED COUNTRIES (LDC)	4 180	6 331	4.21	4.35	4.2	5.0	1.82	2.12
OECD[3]	**48 800**	**54 199**	**2.49**	**0.93**	**30.9**	**33.2**	**1.92**	**0.66**
BRICS	**43 227**	**49 232**	**3.17**	**0.79**	**11.8**	**12.7**	**2.37**	**0.31**

Note: Calendar year; except year ending 30 September for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).
5. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**15 862**	**18 359**	**2.03**	**1.46**	**1 131**	**1 152**	**2.34**	**0.65**	**1 169**	**1 185**	**1.73**	**0.39**
NORTH AMERICA	92	95	-0.30	-0.12	127	117	4.35	0.11	3	3	-9.20	-0.04
Canada	17	17	0.69	0.05	22	24	2.18	0.51	0	0	..	..
United States	76	78	-0.51	-0.15	105	94	4.88	0.02	3	3	-9.29	-0.05
LATIN AMERICA	454	473	0.63	0.14	21	19	-3.79	1.59	23	21	-1.52	-2.14
Argentina	52	57	-1.61	0.71	0	0	..	..	3	4	-3.22	-0.11
Brazil	133	136	2.14	0.09	5	4	-2.33	0.45	0	0	..	..
Chile	14	13	-1.55	-1.18	0	0	..	..	6	5	-0.14	-2.26
Colombia	11	11	2.86	0.08	0	1	..	2.05	0	0	..	..
Mexico	104	110	0.74	0.38	6	4	-7.18	0.26	1	1	..	0.00
Paraguay	2	3	-5.99	0.68	0	0	..	..	0	0	..	..
Peru	39	42	-0.79	0.84	0	0	..	..	0	0	..	..
EUROPE	1 292	1 260	0.58	-0.11	262	252	-2.72	0.04	172	151	1.23	-0.98
European Union[1]	637	628	0.11	0.01	164	151	-1.79	-0.21	56	65	6.12	0.94
United Kingdom	307	290	0.51	-0.45	88	92	-3.33	0.45	97	69	-2.15	-2.54
Russia	215	205	1.73	0.00	2	2	-18.82	0.27	12	11	200.25	0.00
Ukraine	15	15	-3.46	-0.06	0	0	..	..	0	0	..	..
AFRICA	3 402	4 332	1.77	2.26	18	16	-10.41	1.53	30	25	-1.03	-1.94
Egypt	82	107	-5.90	2.40	1	0	-9.19	-1.90	0	0	..	..
Ethiopia	196	274	3.02	3.48	0	0	..	..	13	14	-1.40	3.00
Nigeria	417	457	1.98	1.23	0	0	..	..	0	0	..	..
South Africa	165	178	-0.30	0.21	4	2	-19.13	2.36	1	1	-0.90	-0.87
ASIA	9 452	10 966	2.65	1.48	678	720	6.02	0.91	33	18	-4.68	-2.06
China[2]	4 849	5 543	2.63	1.28	359	373	14.32	0.02	0	0	-33.80	..
India	831	993	1.33	1.92	0	0	..	..	14	2	-0.85	-10.47
Indonesia	159	174	5.03	0.94	2	3	6.14	6.77	0	0	..	..
Iran	281	253	-4.70	-0.24	18	1	-12.54	..	0	0	..	..
Japan	0	0	..	..	23	19	-1.56	-1.89	0	0	..	..
Kazakhstan	171	178	1.62	0.35	0	0	..	..	2	1	108.42	-6.04
Korea	2	2	2.43	0.00	17	18	18.34	0.10	0	0	..	..
Malaysia	2	1	-4.85	-4.00	35	50	7.52	2.66	0	0	..	..
Pakistan	732	927	7.17	2.40	0	0	..	..	5	7	-14.52	0.62
Philippines	61	82	1.49	2.99	1	1	0.22	10.71	0	0	..	..
Saudi Arabia	0	0	-46.19	..	27	27	-9.08	0.93	1	1	-11.74	-0.92
Thailand	2	3	4.67	2.11	1	1	1.98	1.35	0	0	..	..
Turkey	454	479	5.47	0.23	0	0	..	..	0	0	..	..
Viet Nam	20	30	13.61	3.90	1	1	-19.55	0.41	0	0	..	..
OCEANIA	1 169	1 233	0.43	0.98	26	27	-1.36	1.01	909	967	2.42	0.82
Australia	709	796	0.87	1.70	0	0	..	..	471	542	4.20	1.64
New Zealand	460	437	-0.20	-0.21	3	4	-0.27	0.00	438	425	0.81	-0.15
DEVELOPED COUNTRIES	**3 479**	**3 688**	**0.88**	**0.79**	**421**	**401**	**-1.22**	**0.07**	**1 091**	**1 124**	**2.22**	**0.54**
DEVELOPING COUNTRIES	**12 383**	**14 671**	**2.37**	**1.64**	**710**	**751**	**5.27**	**0.98**	**78**	**61**	**-3.56**	**-2.02**
LEAST DEVELOPED COUNTRIES (LDC)	2 221	2 944	2.39	2.78	3	3	4.16	-0.42	4	2	0.99	-7.72
OECD[3]	**2 827**	**2 898**	**0.99**	**0.41**	**438**	**420**	**-0.32**	**0.06**	**1 072**	**1 111**	**2.02**	**0.56**
BRICS	**6 193**	**7 056**	**2.32**	**1.28**	**371**	**381**	**11.24**	**0.04**	**27**	**15**	**2.94**	**-2.19**

.. Not available

Note: Calendar year; except year ending 30 September for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Gross indigenous production.
5. Least-squares growth rate (see glossary).
6. Excludes trade of live animals.

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**15 901**	**18 395**	**2.15**	**1.46**	**1.8**	**1.9**	**1.00**	**0.54**
NORTH AMERICA	209	202	2.55	0.01	0.5	0.5	1.83	-0.56
Canada	38	40	1.21	0.32	0.9	0.9	0.22	-0.46
United States	171	162	2.88	-0.06	0.5	0.4	2.19	-0.61
LATIN AMERICA	458	478	0.57	0.30	0.6	0.6	-0.42	-0.46
Argentina	50	54	-1.40	0.77	1.0	1.0	-2.37	-0.05
Brazil	139	141	1.90	0.09	0.6	0.6	1.07	-0.41
Chile	9	8	-2.37	-0.36	0.4	0.3	-3.53	-0.48
Colombia	11	12	3.55	0.22	0.2	0.2	2.27	-0.23
Mexico	115	119	0.39	0.36	0.8	0.7	-0.81	-0.51
Paraguay	2	3	-5.98	0.68	0.3	0.3	-7.21	-0.39
Peru	39	42	-0.79	0.84	1.0	1.0	-2.14	-0.02
EUROPE	1 319	1 317	-0.60	0.18	1.6	1.6	-0.75	0.28
European Union[1]	688	675	-1.35	0.18	1.4	1.3	-1.48	0.26
United Kingdom	297	314	0.16	0.34	3.9	3.9	-0.49	-0.03
Russia	202	193	0.13	0.00	1.2	1.2	-0.05	0.20
Ukraine	14	15	-4.13	-0.04	0.3	0.3	-3.68	0.64
AFRICA	3 325	4 179	1.82	2.13	2.3	2.2	-0.76	-0.19
Egypt	82	107	-5.93	2.38	0.7	0.8	-7.91	0.72
Ethiopia	183	260	3.51	3.52	1.4	1.6	0.74	1.17
Nigeria	421	463	1.93	1.25	1.8	1.5	-0.71	-1.18
South Africa	173	180	-0.90	0.24	2.6	2.4	-2.35	-0.80
ASIA	10 323	11 948	2.89	1.46	2.0	2.1	1.90	0.77
China[2]	5 207	5 916	3.13	1.20	3.2	3.6	2.62	1.04
India	806	980	1.21	1.99	0.5	0.6	0.11	1.13
Indonesia	161	177	5.12	1.01	0.5	0.5	3.85	0.12
Iran	281	248	-4.01	-0.05	3.0	2.4	-5.28	-1.00
Japan	23	19	-1.56	-1.89	0.2	0.1	-1.39	-1.42
Kazakhstan	169	177	1.44	0.38	8.0	7.6	-0.02	-0.53
Korea	19	19	15.84	0.09	0.3	0.3	15.46	0.13
Malaysia	39	53	6.67	2.38	1.1	1.3	5.23	1.29
Pakistan	727	920	7.58	2.41	3.0	3.1	5.37	0.66
Philippines	62	83	1.48	3.06	0.5	0.6	-0.05	1.83
Saudi Arabia	172	186	-0.77	0.49	4.4	4.2	-3.03	-0.69
Thailand	3	4	1.53	2.15	0.0	0.0	1.15	2.09
Turkey	454	479	4.89	0.23	4.8	4.7	3.26	-0.28
Viet Nam	21	30	7.68	3.83	0.2	0.3	6.59	3.15
OCEANIA	266	272	-2.59	1.36	5.7	5.1	-3.99	0.20
Australia	221	230	-2.50	1.65	7.7	7.2	-3.82	0.66
New Zealand	21	18	-4.49	-1.53	3.8	3.1	-5.41	-2.21
DEVELOPED COUNTRIES	**2 720**	**2 894**	**0.16**	**0.86**	**1.7**	**1.7**	**-0.26**	**0.65**
DEVELOPING COUNTRIES	**13 181**	**15 501**	**2.60**	**1.57**	**1.9**	**1.9**	**1.28**	**0.50**
LEAST DEVELOPED COUNTRIES (LDC)	2 145	2 794	2.55	2.56	2.2	2.2	0.20	0.37
OECD[3]	**2 121**	**2 153**	**0.38**	**0.33**	**1.3**	**1.3**	**-0.18**	**0.06**
BRICS	**6 526**	**7 409**	**2.62**	**1.22**	**1.8**	**1.9**	**1.83**	**0.74**

Note: Calendar year; except year ending 30 September for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).
5. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.

Source: OECD/FAO (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ARGENTINA												
Beef export tax[1]	%	8.0	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	100.2	102.6	106.2	108.6	110.3	112.0	113.7	115.4	117.2	118.9	120.7
In-quota tariff	%	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Out-of-quota tariff	%	196.6	196.6	196.6	196.6	196.6	196.6	196.6	196.6	196.6	196.6	196.6
EUROPEAN UNION[2,3]												
Voluntary coupled support												
Beef and veal[4]	mln EUR	1 693	1 693	1 693	1 693	1 693	1 693	1 693	1 693	1 693	1 693	1 693
Sheep and goat meat[5]	mln EUR	491	496	496	496	496	496	496	496	496	496	496
Beef basic price[6]	EUR/kg dwt	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Beef buy-in price[6,7]	EUR/kg dwt	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Beef tariff-quota	kt cwe	359.8	378.3	387.5	389.0	390.6	392.2	392.7	393.2	393.7	394.2	394.7
Pig tariff-quota	kt cwe	203.5	230.3	245.7	246.6	247.5	248.4	249.3	250.2	251.1	252.0	252.9
Poultry tariff-quota	kt rtc	1 017.9	1 024.3	1 026.3	1 028.4	1 030.5	1 032.5	1 034.6	1 036.7	1 038.7	1 040.8	1 042.9
Sheep meat tariff-quota	kt cwe	296.0	296.5	296.7	296.9	297.1	297.1	297.5	297.7	297.9	298.1	298.3
JAPAN[8]												
Beef stabilisation prices												
Upper price	JPY/kg dwt	418.3	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	308.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beef tariff	%	31.9	26.0	25.2	24.4	23.6	22.7	21.9	21.1	20.2	18.6	16.8
Pigmeat stabilisation prices												
Upper price	JPY/kg dwt	198.3	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	146.7	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	%	3.0	1.8	1.5	1.3	1.0	0.8	0.5	0.3	0.1	0.0	0.0
Standard import price	JPY/kg dwt	373.1	351.7	361.1	311.8	289.1	279.5	268.8	260.0	249.6	243.6	238.0
Poultry meat tariff	%	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
KOREA												
Beef tariff	%	18.6	13.3	10.6	8.0	5.3	2.6	0.0	0.0	0.0	0.0	0.0
Pigmeat tariff	%	18.6	13.3	10.6	8.0	5.3	2.6	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[9]												
Beef and veal tariff-quota	kt pw	146.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-quota tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff[10]	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Poultry meat tariff-quota	kt pw	200.0	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	%	51.7	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Pigmeat tariff-quota[11]	kt pw	286.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-quota tariff	%	0.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Out-of-quota tariff	%	51.7	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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
CHINA												
Beef tariff	%	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5
Pigmeat tariff	%	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Sheep meat tariff	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Poultry meat tariff	%	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1
INDIA												
Beef tariff	%	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5
Pigmeat tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Sheep meat tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Poultry meat tariff	%	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4
SOUTH AFRICA												
Beef tariff	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Pigmeat tariff	%	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
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	%	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5

Note: Average 2018-20est: Data for 2020 are estimated.

1. In Argentina, a temporary export tax is applied on all goods from September 4th 2018 until December 31st 2020.
2. Since 2015 the Basic payment scheme (BPS) holds, which shall account for the maximum of the national direct payment envelopes. On top of this, compulsory policy instruments have been introduced: the Green Payment and young farmer scheme.More details can be found in here: https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/voluntary-coupled-support-note-revised-aug2018_en.pdf
3. Refers to all current European Union member States (excludes the United Kingdom)
4. Implemented in 24 Member States.
5. Implemented in 22 Member States.
6. Price for R3 grade male cattle.
7. Safety-net trigger.
8. Year beginning 1 April.
9. Intended for countries which whom Mexico has no free trade agreements.
10. 25% for frozen beef.
11. Eliminated in 2020 and replaced by import tariff.

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**11 611**	**14 290**	**2.34**	**1.90**	**1 057**	**1 145**	**1.82**	**1.09**	**1 033**	**1 145**	**0.52**	**1.09**
NORTH AMERICA	1 035	1 168	1.55	0.96	56	56	23.35	-0.66	21	34	-14.27	8.65
Canada	116	135	3.57	1.13	18	21	14.90	2.73	0	0	-17.41	..
United States	920	1 033	1.32	0.94	38	35	30.45	-2.25	20	34	-14.19	8.65
LATIN AMERICA	435	508	1.38	1.38	59	76	4.58	2.37	36	45	-5.19	2.69
Argentina	29	34	-8.19	1.01	0	0	..	..	8	6	-9.43	2.08
Brazil	104	109	3.66	0.46	3	8	10.32	8.88	0	1	-16.30	-1.17
Chile	23	32	1.06	3.11	6	2	21.06	-6.04	2	4	-7.01	6.22
Colombia	17	17	-2.27	0.04	0	0	..	..	0	0	..	..
Mexico	200	237	3.37	1.36	27	38	5.95	2.52	9	12	19.09	1.68
Paraguay	1	1	0.38	..	0	0	..	..	0	1	..	..
Peru	4	4	2.50	1.85	8	17	5.35	5.63	0	0	..	..
EUROPE	3 086	3 256	2.33	0.45	291	303	0.51	0.97	431	536	3.34	1.51
European Union[1]	2 327	2 477	2.22	0.39	52	55	-3.95	0.26	277	375	3.58	1.69
United Kingdom	176	153	3.58	0.23	108	99	0.52	0.96	45	41	0.98	-0.96
Russia	292	306	4.21	0.50	114	121	3.14	1.41	3	3	-1.65	0.00
Ukraine	93	82	0.95	-0.65	6	20	-10.30	3.75	20	8	36.50	-3.61
AFRICA	285	353	-1.37	2.37	95	112	-6.52	1.55	6	7	-5.66	-0.61
Egypt	98	115	-2.92	2.16	33	40	-10.86	1.40	2	3	-8.33	-0.41
Ethiopia	14	16	-3.67	2.43	0	1	..	..	0	0	..	..
Nigeria	12	17	-0.89	3.84	13	18	4.49	2.96	0	0	..	..
South Africa	22	27	2.58	2.18	6	7	7.13	1.58	3	2	10.25	-1.55
ASIA	6 213	8 445	3.05	2.79	516	555	3.03	1.17	68	48	5.74	-1.90
China[2]	109	114	0.58	0.53	115	148	13.65	2.64	2	2	-0.78	1.00
India	4 555	6 335	3.42	2.88	0	3	-12.40	20.37	30	0	16.41	-40.39
Indonesia	0	0	..	..	23	26	4.59	2.61	1	1	8.39	-2.54
Iran	144	120	-2.29	-1.28	24	35	-12.88	10.14	1	0	13.64	..
Japan	66	63	0.34	-0.56	20	18	7.16	0.00	0	0	..	..
Kazakhstan	21	32	5.95	4.06	6	10	-1.45	3.50	2	1	67.01	-3.26
Korea	3	3	2.43	0.31	13	19	8.96	3.14	0	0	..	..
Malaysia	0	0	..	..	20	25	4.32	2.30	6	4	5.06	-2.25
Pakistan	851	1 147	3.05	3.15	1	0	13.20	..	0	0	..	..
Philippines	0	0	..	..	34	43	8.53	2.96	0	0	..	..
Saudi Arabia	5	9	-2.34	4.69	48	56	-1.95	1.20	7	7	9.82	-1.18
Thailand	0	0	..	..	13	15	0.65	1.25	1	1	3.91	-1.24
Turkey	256	330	4.05	2.41	22	0	3.58	-44.70	1	1	4.18	5.38
Viet Nam	0	0	..	..	19	21	3.72	0.66	0	0	..	..
OCEANIA	558	560	-0.54	0.38	41	42	7.73	0.19	471	475	-0.48	0.48
Australia	77	73	-6.33	-0.32	37	36	9.18	0.00	19	12	-13.58	-0.05
New Zealand	479	486	0.69	0.50	1	1	1.59	1.00	452	463	0.59	0.50
DEVELOPED COUNTRIES	**4 829**	**5 194**	**1.78**	**0.65**	**447**	**451**	**3.12**	**0.34**	**932**	**1 066**	**0.63**	**1.30**
DEVELOPING COUNTRIES	**6 782**	**9 096**	**2.75**	**2.68**	**610**	**693**	**0.93**	**1.61**	**102**	**79**	**-0.64**	**-1.46**
LEAST DEVELOPED COUNTRIES (LDC)	207	247	0.76	1.68	12	23	-3.93	8.36	2	2	-8.02	0.12
OECD[3]	**4 721**	**5 104**	**1.79**	**0.68**	**349**	**340**	**4.14**	**0.02**	**828**	**945**	**0.20**	**1.12**
BRICS	**5 081**	**6 892**	**3.40**	**2.67**	**239**	**287**	**6.97**	**2.27**	**38**	**8**	**10.14**	**-13.44**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**11 632**	**14 283**	**2.53**	**1.89**	**1.5**	**1.7**	**1.33**	**0.97**
NORTH AMERICA	1 062	1 190	2.79	0.71	2.9	3.0	2.07	0.13
Canada	132	155	4.66	1.36	3.5	3.8	3.63	0.58
United States	930	1 035	2.55	0.62	2.8	3.0	1.86	0.06
LATIN AMERICA	462	539	2.79	1.41	0.7	0.8	1.77	0.65
Argentina	25	27	-3.50	0.78	0.6	0.6	-4.46	-0.03
Brazil	107	117	3.91	0.88	0.5	0.5	3.06	0.38
Chile	27	31	4.33	1.73	1.4	1.6	3.09	1.61
Colombia	17	17	-2.33	0.03	0.3	0.3	-3.54	-0.42
Mexico	218	263	3.35	1.51	1.7	1.9	2.11	0.63
Paraguay	0	0	..	..	0.0	0.0	-40.76	0.76
Peru	12	22	4.44	4.73	0.4	0.6	3.02	3.84
EUROPE	2 934	3 023	2.02	0.33	3.9	4.1	1.71	0.42
European Union[1]	2 102	2 157	2.05	0.18	4.7	4.9	1.92	0.27
United Kingdom	227	211	1.61	0.83	3.4	3.0	0.95	0.46
Russia	403	425	3.52	0.75	2.8	3.0	2.11	0.96
Ukraine	79	94	-2.15	0.43	1.8	2.3	-1.69	1.12
AFRICA	373	458	-2.80	2.21	0.3	0.3	-5.26	-0.11
Egypt	129	153	-5.42	2.00	1.3	1.3	-7.42	0.35
Ethiopia	14	17	-3.58	2.80	0.1	0.1	-6.15	0.46
Nigeria	25	35	1.99	3.37	0.1	0.1	-0.65	0.90
South Africa	26	32	3.18	2.37	0.4	0.5	1.68	1.31
ASIA	6 655	8 946	3.01	2.71	1.5	1.8	2.02	2.01
China[2]	222	259	5.68	1.68	0.2	0.2	5.16	1.53
India	4 525	6 338	3.36	2.93	3.3	4.2	2.23	2.06
Indonesia	22	25	4.51	2.89	0.1	0.1	3.24	1.99
Iran	167	154	-3.75	0.38	2.0	1.7	-5.01	-0.57
Japan	83	81	0.57	-0.44	0.7	0.7	0.75	0.04
Kazakhstan	26	41	3.07	4.19	1.4	2.0	1.59	3.24
Korea	13	16	4.82	1.48	0.3	0.3	4.48	1.52
Malaysia	14	22	3.79	3.31	0.4	0.6	2.40	2.21
Pakistan	852	1 147	3.06	3.15	3.9	4.4	0.94	1.39
Philippines	34	43	8.45	3.00	0.3	0.3	6.82	1.78
Saudi Arabia	46	59	-3.04	1.98	1.4	1.5	-5.25	0.78
Thailand	12	14	0.40	1.36	0.2	0.2	0.02	1.30
Turkey	277	330	4.07	1.67	3.3	3.7	2.45	1.15
Viet Nam	19	21	3.73	0.66	0.2	0.2	2.68	0.00
OCEANIA	145	127	6.44	-0.04	3.5	2.7	4.91	-1.19
Australia	113	97	5.90	-0.24	4.5	3.5	4.46	-1.21
New Zealand	27	25	17.71	0.50	5.7	4.7	16.57	-0.19
DEVELOPED COUNTRIES	**4 339**	**4 579**	**2.32**	**0.47**	**3.0**	**3.1**	**1.77**	**0.27**
DEVELOPING COUNTRIES	**7 292**	**9 704**	**2.65**	**2.64**	**1.2**	**1.4**	**1.33**	**1.55**
LEAST DEVELOPED COUNTRIES (LDC)	217	268	0.58	2.12	0.3	0.2	-1.73	-0.06
OECD[3]	**4 236**	**4 492**	**2.48**	**0.53**	**3.0**	**3.1**	**1.91**	**0.26**
BRICS	**5 282**	**7 171**	**3.46**	**2.70**	**1.6**	**2.1**	**2.56**	**2.21**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**24 067**	**27 613**	**1.64**	**1.23**	**3 243**	**3 857**	**2.87**	**1.49**	**3 262**	**3 857**	**1.67**	**1.49**
NORTH AMERICA	6 443	7 547	2.75	1.43	166	193	-0.77	1.19	363	400	3.76	1.08
Canada	489	537	3.25	1.36	33	67	5.19	2.75	10	10	0.75	0.29
United States	5 955	7 010	2.71	1.43	133	127	-1.91	0.46	352	389	3.86	1.10
LATIN AMERICA	2 131	2 644	-0.67	1.93	371	441	4.34	1.56	161	158	-0.14	-0.22
Argentina	441	523	-3.30	1.66	2	1	-11.96	0.00	63	63	0.03	0.02
Brazil	760	987	1.19	2.33	29	31	-0.52	2.05	3	5	2.89	3.70
Chile	100	130	2.51	2.32	48	49	16.61	-0.14	9	9	-0.13	0.14
Colombia	49	50	-2.27	0.48	5	4	17.58	-2.44	1	1	0.83	0.45
Mexico	324	386	1.44	1.21	125	165	5.20	2.87	2	4	26.67	7.81
Paraguay	0	0	..	..	5	6	14.82	2.34	0	0	..	..
Peru	25	33	2.95	2.71	8	9	10.06	1.58	0	0	..	..
EUROPE	12 221	13 626	1.85	0.90	1 159	1 343	0.96	1.17	1 889	2 412	2.65	2.06
European Union[1]	10 437	11 543	1.78	0.86	209	217	2.32	0.45	1 325	1 764	2.18	2.48
United Kingdom	465	489	2.49	0.33	525	560	2.46	0.47	187	167	5.76	-1.09
Russia	507	667	1.68	1.82	268	343	-4.06	2.32	26	24	4.64	-0.66
Ukraine	194	190	0.88	0.17	30	95	8.38	6.24	7	4	-26.60	-4.62
AFRICA	926	1 069	-1.21	1.51	137	172	-2.59	1.76	98	82	-6.02	-1.61
Egypt	506	575	-2.88	1.34	27	34	-6.40	1.56	73	65	-6.54	-1.54
Ethiopia	6	8	0.00	2.23	0	1	..	..	0	0	..	..
Nigeria	9	10	-1.45	0.21	1	2	2.59	10.04	0	0	..	..
South Africa	100	110	2.16	1.08	10	10	0.78	2.32	11	9	20.32	-2.27
ASIA	1 597	1 952	0.71	2.12	1 299	1 587	5.66	1.83	256	301	-1.98	1.89
China[2]	278	291	0.56	0.50	118	169	17.85	2.60	0	0	..	..
India	4	6	11.40	3.86	3	3	15.04	-1.70	8	9	14.65	1.73
Indonesia	0	0	..	..	30	36	5.99	2.36	1	1	10.07	-2.30
Iran	209	210	-2.46	0.07	0	0	..	..	56	40	11.83	-2.83
Japan	45	45	-0.56	0.06	291	363	3.75	2.63	0	0	..	..
Kazakhstan	25	33	3.56	2.82	20	28	-1.71	1.79	2	2	43.08	-1.73
Korea	26	23	2.00	0.10	133	175	7.58	2.25	0	0	..	..
Malaysia	0	0	..	..	27	38	10.35	2.71	1	1	14.71	-2.64
Pakistan	0	0	..	..	4	5	14.63	4.12	0	0	..	..
Philippines	0	0	..	..	38	48	11.53	2.76	0	0	-18.38	..
Saudi Arabia	173	225	0.91	3.15	175	195	4.14	0.57	81	76	-10.54	-0.57
Thailand	5	4	0.00	-1.20	17	22	10.45	2.69	1	1	..	-2.62
Turkey	245	342	3.70	3.28	11	6	5.26	-7.26	56	116	6.90	7.83
Viet Nam	0	0	..	..	11	11	13.31	0.64	0	0	..	..
OCEANIA	748	775	2.37	0.37	111	120	5.11	0.57	495	504	2.07	0.20
Australia	383	399	1.72	0.38	98	105	4.35	0.56	166	168	0.18	0.02
New Zealand	366	376	3.08	0.36	12	13	13.70	0.50	330	337	3.13	0.29
DEVELOPED COUNTRIES	**19 866**	**22 522**	**2.15**	**1.09**	**1 786**	**2 069**	**1.50**	**1.25**	**2 767**	**3 346**	**2.73**	**1.66**
DEVELOPING COUNTRIES	**4 202**	**5 091**	**-0.54**	**1.85**	**1 457**	**1 788**	**4.76**	**1.78**	**495**	**512**	**-2.82**	**0.47**
LEAST DEVELOPED COUNTRIES (LDC)	377	464	1.13	2.12	23	31	-2.30	2.39	0	0	..	..
OECD[3]	**19 310**	**21 805**	**2.12**	**1.08**	**1 716**	**1 952**	**3.44**	**1.17**	**2 521**	**3 053**	**2.64**	**1.76**
BRICS	**1 650**	**2 063**	**1.31**	**1.82**	**427**	**556**	**-0.25**	**2.36**	**48**	**46**	**7.97**	**-0.15**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**24 044**	**27 613**	**1.79**	**1.24**	**3.1**	**3.2**	**0.64**	**0.32**
NORTH AMERICA	6 243	7 341	2.58	1.47	17.0	18.8	1.86	0.89
Canada	513	593	3.59	1.52	13.7	14.5	2.57	0.74
United States	5 729	6 748	2.49	1.46	17.4	19.3	1.81	0.91
LATIN AMERICA	2 341	2 927	-0.03	2.01	3.6	4.2	-1.02	1.24
Argentina	380	461	-3.81	1.90	8.5	9.4	-4.77	1.08
Brazil	785	1 014	1.10	2.32	3.7	4.5	0.27	1.81
Chile	139	170	6.15	1.67	7.4	8.7	4.88	1.55
Colombia	53	53	-1.42	0.21	1.1	1.0	-2.64	-0.24
Mexico	447	547	2.31	1.65	3.5	3.9	1.09	0.77
Paraguay	5	6	16.40	2.44	0.7	0.8	14.87	1.35
Peru	32	42	4.06	2.49	1.0	1.2	2.64	1.62
EUROPE	11 491	12 556	1.63	0.72	15.4	16.9	1.47	0.82
European Union[1]	9 321	9 995	1.74	0.59	20.9	22.6	1.61	0.68
United Kingdom	802	882	1.81	0.72	11.9	12.5	1.15	0.35
Russia	749	986	-0.82	2.06	5.1	6.9	-1.00	2.26
Ukraine	216	281	7.28	1.95	4.9	6.9	7.78	2.65
AFRICA	966	1 160	-0.74	1.80	0.7	0.7	-3.24	-0.51
Egypt	460	545	-2.26	1.75	4.6	4.5	-4.33	0.10
Ethiopia	6	8	0.12	3.16	0.1	0.1	-2.55	0.82
Nigeria	10	12	-1.14	1.39	0.1	0.0	-3.70	-1.04
South Africa	99	112	1.00	1.50	1.7	1.7	-0.47	0.45
ASIA	2 638	3 238	3.29	2.00	0.6	0.7	2.29	1.31
China[2]	396	460	3.83	1.22	0.3	0.3	3.31	1.07
India	0	0	..	..	0.0	0.0	-61.03	0.18
Indonesia	28	35	5.80	2.54	0.1	0.1	4.52	1.64
Iran	152	170	-5.29	0.89	1.8	1.8	-6.53	-0.07
Japan	334	407	3.03	2.31	2.6	3.4	3.21	2.80
Kazakhstan	43	59	0.28	2.52	2.3	2.9	-1.17	1.58
Korea	159	197	6.49	1.98	3.1	3.9	6.15	2.01
Malaysia	26	37	10.24	2.81	0.8	1.0	8.76	1.72
Pakistan	4	5	14.63	4.12	0.0	0.0	12.28	2.35
Philippines	38	47	12.48	2.78	0.3	0.4	10.78	1.56
Saudi Arabia	267	344	14.47	2.50	7.8	8.8	11.86	1.29
Thailand	21	26	7.09	2.08	0.3	0.4	6.70	2.01
Turkey	199	232	2.99	1.21	2.4	2.6	1.39	0.69
Viet Nam	10	11	12.72	0.66	0.1	0.1	11.58	0.00
OCEANIA	365	390	3.69	0.67	8.9	8.3	2.20	-0.49
Australia	315	335	3.48	0.62	12.5	11.9	2.08	-0.36
New Zealand	48	53	4.99	0.90	10.1	10.2	3.97	0.21
DEVELOPED COUNTRIES	**18 881**	**21 245**	**2.00**	**1.03**	**13.2**	**14.5**	**1.57**	**0.83**
DEVELOPING COUNTRIES	**5 163**	**6 368**	**1.04**	**1.95**	**0.8**	**0.9**	**-0.27**	**0.87**
LEAST DEVELOPED COUNTRIES (LDC)	401	495	0.88	2.14	0.5	0.4	-1.44	-0.04
OECD[3]	**18 501**	**20 703**	**2.16**	**1.00**	**13.3**	**14.4**	**1.59**	**0.72**
BRICS	**2 029**	**2 572**	**0.81**	**1.98**	**0.6**	**0.8**	**0.04**	**1.49**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**4 434**	**5 228**	**2.63**	**1.37**	**2 632**	**3 059**	**4.31**	**1.77**	**2 669**	**3 059**	**4.58**	**1.77**
NORTH AMERICA	1 192	1 555	2.21	2.60	4	4	-1.26	0.00	795	1 102	7.31	3.75
Canada	100	108	3.05	0.97	2	1	-9.20	0.00	53	35	26.18	-0.61
United States	1 092	1 447	2.14	2.73	3	2	12.35	0.00	742	1 067	6.53	3.93
LATIN AMERICA	286	334	0.74	1.19	523	552	6.64	1.01	83	47	1.68	1.14
Argentina	41	42	2.10	0.96	0	0	..	..	21	24	1.77	1.95
Brazil	154	194	1.27	1.60	27	25	-1.28	0.00	0	0	..	..
Chile	3	3	-15.50	0.72	13	17	8.45	4.52	1	0	-11.01	..
Colombia	0	0	..	..	25	40	36.25	2.48	0	0	..	..
Mexico	44	44	1.36	-0.13	336	383	6.16	0.97	41	3	8.47	0.00
Paraguay	0	0	..	..	1	1	10.30	0.06	1	1	..	-0.06
Peru	0	0	..	..	24	27	3.55	2.46	0	0	..	..
EUROPE	1 889	2 205	4.24	0.99	168	168	3.39	-0.06	1 107	1 318	6.66	1.58
European Union[1]	1 482	1 779	4.86	1.12	48	50	11.11	0.55	868	1 060	7.07	1.80
United Kingdom	57	65	-1.95	0.95	29	30	-4.66	0.34	79	82	5.17	0.39
Russia	82	75	3.07	-0.99	81	77	5.43	-0.55	1	1	19.89	0.00
Ukraine	110	100	0.63	-0.39	2	4	-6.17	2.28	19	6	-1.30	-9.45
AFRICA	9	9	0.53	0.49	394	577	3.26	3.32	12	9	-0.31	-1.67
Egypt	0	0	..	..	76	107	-0.08	3.74	0	0	-47.50	..
Ethiopia	0	0	..	..	1	1	12.03	2.26	0	0	..	..
Nigeria	0	0	..	..	40	79	4.18	5.33	0	0	..	..
South Africa	5	5	1.00	-0.71	15	25	13.32	0.88	7	6	5.81	-0.87
ASIA	469	585	3.98	2.09	1 526	1 737	4.01	1.75	113	64	-2.68	-1.29
China[2]	20	20	0.00	0.02	321	367	9.09	1.64	1	1	22.03	0.00
India	294	420	7.17	3.07	1	1	-26.20	-0.63	18	3	-12.34	-1.90
Indonesia	0	0	..	..	181	249	3.89	2.50	1	1	-1.24	-2.44
Iran	0	0	..	..	9	4	-6.93	0.00	9	4	6.98	0.00
Japan	134	123	-0.01	-0.45	46	39	5.06	-1.87	0	0	..	..
Kazakhstan	2	2	0.25	-0.93	19	26	-0.27	2.67	1	1	..	-2.60
Korea	10	11	1.64	1.45	25	26	0.54	-0.02	0	0	..	..
Malaysia	0	0	..	..	126	138	2.68	1.01	4	2	-18.03	-1.00
Pakistan	0	0	..	..	35	37	3.68	4.25	0	0	-14.43	..
Philippines	0	0	..	..	158	163	5.72	1.68	0	0	..	..
Saudi Arabia	0	0	..	..	25	14	-17.34	3.25	7	4	-15.15	-3.15
Thailand	0	0	..	..	67	70	0.65	0.75	9	5	32.76	-0.74
Turkey	0	0	..	..	27	14	39.33	0.00	27	14	39.33	0.00
Viet Nam	0	0	..	..	104	127	3.81	1.19	2	3	32.34	0.00
OCEANIA	590	540	-0.82	-0.72	17	22	8.10	0.80	560	519	0.36	-0.67
Australia	177	120	-3.07	-3.68	12	13	15.22	0.00	154	105	0.56	-3.84
New Zealand	412	420	0.31	0.32	0	2	-28.00	0.00	406	414	0.29	0.32
DEVELOPED COUNTRIES	**3 820**	**4 439**	**2.52**	**1.25**	**294**	**313**	**4.50**	**0.18**	**2 475**	**2 949**	**5.09**	**1.86**
DEVELOPING COUNTRIES	**614**	**790**	**3.36**	**2.13**	**2 338**	**2 746**	**4.30**	**1.97**	**195**	**110**	**-1.55**	**-0.35**
LEAST DEVELOPED COUNTRIES (LDC)	0	0	..	..	141	181	8.04	3.74	4	3	-1.15	-2.88
OECD[3]	**3 549**	**4 159**	**2.35**	**1.30**	**572**	**625**	**6.19**	**0.76**	**2 385**	**2 796**	**5.34**	**1.91**
BRICS	**556**	**714**	**4.29**	**2.04**	**444**	**495**	**6.32**	**1.13**	**28**	**11**	**-5.96**	**-0.93**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**4 545**	**5 228**	**2.65**	**1.38**	**0.6**	**0.6**	**1.50**	**0.51**
NORTH AMERICA	408	457	-3.91	0.26	1.0	1.1	-4.71	-0.55
Canada	56	74	-4.28	2.00	0.6	0.7	-6.90	0.18
United States	352	382	-3.86	-0.05	1.1	1.1	-4.50	-0.59
LATIN AMERICA	726	839	4.21	1.08	1.0	1.1	3.41	0.28
Argentina	19	18	3.05	-0.26	0.4	0.4	2.02	-1.06
Brazil	180	219	0.82	1.41	0.6	0.7	-0.38	0.86
Chile	15	20	-0.69	4.04	0.8	1.0	-1.87	3.91
Colombia	25	40	36.71	2.49	0.5	0.7	35.01	2.03
Mexico	339	424	4.00	0.86	2.7	3.0	2.76	-0.02
Paraguay	0	0	..	..	0.0	0.0	-4.99	-0.61
Peru	24	27	3.55	2.46	0.7	0.7	2.14	1.59
EUROPE	1 088	1 054	2.31	0.13	1.3	1.3	1.99	0.39
European Union[1]	781	769	3.30	0.22	1.5	1.5	3.10	0.56
United Kingdom	17	13	-16.66	3.84	0.3	0.2	-17.20	3.47
Russia	172	151	3.99	-0.77	1.2	1.1	3.81	-0.57
Ukraine	92	98	1.11	0.64	2.1	2.4	1.58	1.33
AFRICA	391	578	3.32	3.37	0.3	0.3	0.71	1.02
Egypt	76	107	0.17	3.74	0.8	0.9	-1.94	2.06
Ethiopia	1	1	12.94	2.32	0.0	0.0	9.92	0.00
Nigeria	40	79	4.14	5.37	0.2	0.3	1.44	2.84
South Africa	14	24	37.68	0.99	0.2	0.4	35.68	-0.06
ASIA	1 874	2 258	4.45	1.94	0.4	0.5	3.44	1.27
China[2]	339	385	8.27	1.55	0.2	0.3	7.73	1.40
India	277	418	10.18	3.10	0.2	0.3	8.98	2.23
Indonesia	180	248	3.94	2.52	0.7	0.8	2.68	1.62
Iran	0	0	-74.33	..	0.0	0.0	-74.67	-0.09
Japan	171	162	-0.22	-0.82	1.1	1.1	-0.98	-0.50
Kazakhstan	21	28	-0.34	2.47	1.1	1.3	-1.78	1.54
Korea	36	37	1.59	0.40	0.7	0.7	1.26	0.43
Malaysia	122	136	4.80	1.04	3.8	3.8	3.39	-0.03
Pakistan	35	37	4.04	4.30	0.2	0.1	1.90	2.52
Philippines	158	163	5.72	1.68	1.5	1.3	4.13	0.47
Saudi Arabia	17	10	-22.79	7.92	0.5	0.3	-24.55	6.65
Thailand	58	65	-1.15	0.88	0.8	0.9	-1.51	0.82
Turkey	0	0	..	..	0.0	0.0	-1.56	-0.05
Viet Nam	102	124	3.72	1.22	1.1	1.2	2.67	0.55
OCEANIA	57	43	-5.09	-0.61	1.4	0.9	-6.45	-1.75
Australia	45	28	-6.47	-1.48	1.8	1.0	-7.74	-2.44
New Zealand	7	8	-4.68	0.24	1.5	1.6	-5.60	-0.45
DEVELOPED COUNTRIES	**1 787**	**1 803**	**0.16**	**0.14**	**1.1**	**1.1**	**-0.54**	**-0.03**
DEVELOPING COUNTRIES	**2 758**	**3 426**	**4.53**	**2.09**	**0.4**	**0.5**	**3.25**	**1.02**
LEAST DEVELOPED COUNTRIES (LDC)	137	179	8.42	3.87	0.2	0.2	5.94	1.65
OECD[3]	**1 874**	**1 988**	**0.52**	**0.35**	**1.2**	**1.3**	**-0.26**	**0.12**
BRICS	**982**	**1 198**	**5.94**	**1.69**	**0.3**	**0.3**	**5.42**	**1.21**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
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3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**5 059**	**5 945**	**0.82**	**1.25**	**2 699**	**2 903**	**1.75**	**0.78**	**2 645**	**2 903**	**1.63**	**0.78**
NORTH AMERICA	68	77	9.60	1.25	10	10	-2.98	0.00	23	40	11.67	7.21
Canada	8	7	-3.37	-1.77	3	3	-4.85	0.00	1	1	4.75	1.16
United States	60	70	13.70	1.61	7	7	-1.57	0.00	22	39	11.95	7.38
LATIN AMERICA	1 332	1 746	0.23	2.24	271	249	-4.39	-1.20	291	375	-1.68	2.33
Argentina	187	204	-6.08	1.04	0	0	-59.53	..	115	145	-7.93	2.45
Brazil	592	872	1.38	2.87	63	55	2.72	-1.04	0	11	-11.44	6.97
Chile	81	89	-2.08	1.15	7	6	5.40	-7.13	3	5	-20.41	7.68
Colombia	35	45	-2.27	2.90	18	30	15.04	1.01	1	0	-15.56	..
Mexico	224	261	1.19	1.23	44	42	9.93	-0.79	6	6	-7.57	0.00
Paraguay	0	0	..	..	6	9	19.43	0.00	6	9	59.80	0.00
Peru	0	0	..	..	22	22	6.80	0.48	0	0	..	..
EUROPE	900	1 037	1.23	1.23	82	75	0.55	-0.64	416	495	-1.15	1.76
European Union[1]	715	821	1.55	1.19	21	15	-6.10	-2.35	336	402	-1.57	1.58
United Kingdom	38	52	-1.95	2.41	22	18	-2.92	-1.38	46	49	3.11	1.84
Russia	61	62	0.40	0.43	36	40	14.66	0.57	1	1	20.03	0.00
Ukraine	10	9	0.91	-0.86	0	0	..	..	6	4	21.06	-1.64
AFRICA	54	68	10.67	2.45	561	723	0.54	2.44	25	22	4.94	-1.11
Egypt	0	0	..	..	25	22	-9.98	1.39	11	9	33.41	-1.37
Ethiopia	0	0	..	..	2	3	18.77	2.32	0	0	..	..
Nigeria	0	0	..	..	49	77	-5.06	3.53	0	0	..	..
South Africa	12	12	2.41	0.36	3	3	6.58	-0.16	6	6	7.16	0.16
ASIA	1 202	1 405	-0.80	1.18	1 736	1 816	3.51	0.58	409	382	4.70	-0.17
China[2]	1 072	1 204	-1.10	0.75	617	648	5.13	0.32	1	1	-21.89	0.07
India	7	9	82.56	3.20	0	0	-25.14	..	3	5	20.28	5.88
Indonesia	83	135	2.73	4.62	53	27	-2.01	-5.91	1	1	-29.17	1.04
Iran	1	1	-4.42	0.65	2	2	-0.36	0.63	1	1	-0.16	0.00
Japan	10	13	-3.28	1.43	0	0	..	..	0	0	..	..
Kazakhstan	16	18	1.71	0.61	2	2	-11.94	-0.61	0	0	..	..
Korea	2	2	-0.31	0.62	5	6	9.43	0.65	0	0	..	..
Malaysia	0	0	..	..	57	49	10.41	0.10	43	38	18.49	-0.10
Pakistan	0	0	..	..	1	1	-12.97	0.87	1	1	-25.86	0.00
Philippines	0	0	..	..	28	30	-4.86	0.65	7	7	-18.95	-0.65
Saudi Arabia	0	0	..	..	128	176	4.22	2.26	13	6	-10.10	-2.21
Thailand	0	0	..	..	58	62	7.37	0.92	2	2	-14.12	-0.91
Turkey	0	0	..	..	1	1	-6.04	0.00	1	1	-6.04	0.00
Viet Nam	0	0	..	..	44	43	2.43	0.46	16	13	6.21	0.00
OCEANIA	1 503	1 610	2.05	0.30	39	30	12.93	-1.51	1 480	1 590	2.34	0.30
Australia	58	57	-12.75	1.17	32	22	18.16	-2.15	40	43	-12.59	1.69
New Zealand	1 445	1 553	3.16	0.27	2	3	19.59	0.00	1 439	1 547	3.16	0.27
DEVELOPED COUNTRIES	**2 510**	**2 769**	**1.86**	**0.67**	**139**	**123**	**2.83**	**-0.80**	**1 925**	**2 131**	**1.57**	**0.72**
DEVELOPING COUNTRIES	**2 549**	**3 176**	**-0.13**	**1.78**	**2 560**	**2 780**	**1.70**	**0.85**	**720**	**772**	**1.74**	**0.93**
LEAST DEVELOPED COUNTRIES (LDC)	34	43	31.21	2.37	228	295	0.73	3.31	6	5	-7.24	-2.10
OECD[3]	**2 692**	**2 986**	**1.62**	**0.74**	**168**	**160**	**4.09**	**-1.07**	**1 897**	**2 094**	**1.44**	**0.68**
BRICS	**1 744**	**2 160**	**-0.19**	**1.54**	**720**	**745**	**5.02**	**0.22**	**12**	**24**	**-5.44**	**3.95**

.. Not available

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1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**5 102**	**5 945**	**0.85**	**1.25**	**0.7**	**0.7**	**-0.28**	**0.33**
NORTH AMERICA	49	48	3.23	-1.19	0.1	0.1	2.50	-1.75
Canada	6	9	-12.61	6.07	0.1	0.2	-13.47	5.25
United States	43	39	8.17	-2.36	0.1	0.1	7.45	-2.89
LATIN AMERICA	1 312	1 620	-0.50	1.61	2.0	2.3	-1.49	0.84
Argentina	72	59	-2.93	-1.82	1.6	1.2	-3.90	-2.62
Brazil	655	916	1.63	2.55	3.1	4.1	0.80	2.04
Chile	85	91	0.49	0.13	4.5	4.7	-0.70	0.01
Colombia	52	75	1.87	2.11	1.0	1.4	0.61	1.65
Mexico	262	298	2.44	0.94	2.1	2.1	1.21	0.07
Paraguay	0	0	..	..	0.0	0.0	-54.48	-0.10
Peru	22	22	6.93	0.48	0.7	0.6	5.48	-0.37
EUROPE	558	618	2.96	0.51	0.7	0.8	2.80	0.60
European Union[1]	391	434	4.08	0.60	0.9	1.0	3.95	0.68
United Kingdom	14	21	-11.86	0.01	0.2	0.3	-12.44	-0.35
Russia	96	101	3.37	0.48	0.7	0.7	3.18	0.69
Ukraine	5	5	-10.53	-0.02	0.1	0.1	-10.11	0.66
AFRICA	590	769	0.99	2.57	0.5	0.5	-1.56	0.24
Egypt	14	13	-17.31	3.81	0.1	0.1	-19.06	2.13
Ethiopia	2	3	20.56	2.32	0.0	0.0	17.34	0.00
Nigeria	49	77	-4.91	3.54	0.2	0.3	-7.37	1.06
South Africa	9	9	2.45	0.33	0.2	0.1	0.96	-0.71
ASIA	2 528	2 839	1.12	0.97	0.6	0.6	0.14	0.29
China[2]	1 688	1 851	0.78	0.59	1.2	1.3	0.28	0.43
India	4	4	21.29	0.85	0.0	0.0	19.97	0.00
Indonesia	136	160	1.55	1.89	0.5	0.5	0.32	1.00
Iran	2	2	-3.03	0.96	0.0	0.0	-4.31	0.00
Japan	10	13	-2.79	1.38	0.1	0.1	-2.62	1.86
Kazakhstan	18	19	-0.76	0.50	1.0	0.9	-2.19	-0.42
Korea	7	7	6.04	0.66	0.1	0.1	5.70	0.69
Malaysia	14	11	-1.56	0.81	0.4	0.3	-2.88	-0.26
Pakistan	1	1	39.93	1.74	0.0	0.0	37.06	0.00
Philippines	21	23	8.15	1.06	0.2	0.2	6.52	-0.14
Saudi Arabia	114	170	6.83	2.48	3.3	4.3	4.39	1.28
Thailand	57	60	9.28	0.97	0.8	0.9	8.88	0.91
Turkey	0	0	..	..	0.0	0.0	-1.56	-0.05
Viet Nam	28	30	0.97	0.66	0.3	0.3	-0.06	0.00
OCEANIA	66	50	-0.78	-1.14	1.6	1.1	-2.21	-2.27
Australia	54	36	-1.66	-1.75	2.1	1.3	-2.99	-2.71
New Zealand	7	9	5.02	0.45	1.6	1.7	4.00	-0.24
DEVELOPED COUNTRIES	**713**	**761**	**2.60**	**0.29**	**0.5**	**0.5**	**2.16**	**0.09**
DEVELOPING COUNTRIES	**4 389**	**5 184**	**0.59**	**1.39**	**0.7**	**0.7**	**-0.71**	**0.32**
LEAST DEVELOPED COUNTRIES (LDC)	256	333	2.43	3.28	0.3	0.3	0.08	1.08
OECD[3]	**952**	**1 052**	**2.22**	**0.55**	**0.7**	**0.7**	**1.65**	**0.28**
BRICS	**2 452**	**2 882**	**1.10**	**1.17**	**0.8**	**0.8**	**0.33**	**0.68**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), “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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**3 280**	**3 780**	**2.09**	**1.09**	**1 620.4**	**2 059.8**	**4.39**	**2.20**	**1 939.2**	**2 378.6**	**3.34**	**1.87**
NORTH AMERICA	484	512	-0.80	0.68	6.2	6.1	6.01	-0.45	226.7	248.0	-0.10	1.02
Canada	40	44	5.85	1.36	6.2	6.1	6.01	-0.45	42.3	43.0	7.70	0.00
United States	443	468	-1.25	0.62	0.0	0.0	..	..	184.5	205.0	-1.35	1.25
LATIN AMERICA	163	196	1.07	1.60	129.4	143.8	0.26	0.81	177.9	206.0	-0.20	1.24
Argentina	73	86	1.11	1.66	0.6	0.5	-31.98	0.00	49.7	58.9	-4.16	1.67
Brazil	0	0	..	..	14.4	14.5	-5.11	-0.01	0.4	0.5	..	0.00
Chile	7	9	83.59	2.32	8.1	16.6	5.60	6.57	15.1	25.5	7.04	4.91
Colombia	0	0	..	..	12.5	16.0	9.22	2.29	0.0	0.0	-47.81	..
Mexico	56	67	0.37	1.21	64.2	66.0	1.46	0.00	64.2	66.0	1.46	0.00
Paraguay	0	0	..	..	1.2	1.5	42.65	2.48	0.0	0.0	..	..
Peru	0	0	..	..	10.0	13.8	4.54	2.88	10.0	13.8	4.54	2.88
EUROPE	2 352	2 765	2.79	1.16	173.5	150.3	1.92	-0.69	930.3	1 070.5	3.79	1.10
European Union[2]	2 071	2 443	2.28	1.18	60.9	51.2	0.53	0.09	652.8	767.9	3.78	1.23
United Kingdom	76	78	2.84	-0.17	48.8	39.1	9.31	-1.98	51.4	46.0	-1.05	-1.02
Russia	1	1	0.81	0.00	45.3	48.2	-0.32	0.70	45.3	43.9	-0.32	0.00
Ukraine	42	43	8.82	0.02	2.0	2.8	3.30	3.13	31.6	33.4	4.91	0.27
AFRICA	2	2	-8.37	1.09	56.1	87.6	4.96	4.41	30.4	54.9	6.39	5.80
Egypt	0	0	..	..	9.8	0.0	-4.77	-60.24	9.8	0.0	-4.77	-62.67
Ethiopia	0	0	..	..	0.4	0.6	..	3.75	0.0	0.0	..	..
Nigeria	0	0	..	..	4.1	11.0	6.54	9.47	4.1	11.0	278.79	9.47
South Africa	2	2	-8.38	1.08	11.1	13.7	3.60	2.37	0.3	0.0	-16.55	..
ASIA	129	147	2.41	1.30	1 214.4	1 631.5	5.12	2.59	520.0	756.2	5.90	3.56
China[3]	75	75	-0.88	0.00	583.0	774.8	6.60	2.24	0.7	0.8	11.56	0.00
India	1	1	5.99	3.86	8.7	13.0	6.35	3.89	0.8	2.2	..	9.30
Indonesia	0	0	..	..	128.8	187.2	4.64	3.43	128.8	187.2	4.64	3.43
Iran	9	9	3.66	0.07	3.5	4.9	1.28	3.07	9.0	10.5	7.72	1.13
Japan	0	0	..	..	54.3	54.5	1.08	0.00	0.0	0.0	..	..
Kazakhstan	0	0	..	..	8.0	22.1	14.69	9.47	8.0	22.1	371.09	9.47
Korea	0	0	..	..	35.9	34.6	0.39	0.00	0.3	0.3	..	..
Malaysia	0	0	..	..	85.1	107.7	4.82	2.36	85.1	107.7	4.82	2.36
Pakistan	0	0	..	..	26.8	73.6	3.27	9.47	26.8	73.6	95.91	9.47
Philippines	0	0	..	..	66.6	125.9	-5.76	6.27	66.6	125.9	-15.05	6.27
Saudi Arabia	0	0	..	..	6.1	16.8	10.41	9.47	6.1	16.8	275.27	9.47
Thailand	0	0	..	..	59.9	63.3	1.09	0.39	59.9	63.3	1.09	0.39
Turkey	44	62	11.41	3.28	0.1	0.0	..	..	44.5	62.0	11.47	3.28
Viet Nam	0	0	..	..	52.1	53.6	2.73	0.00	0.0	0.0	-30.81	..
OCEANIA	150	156	3.04	0.38	40.8	40.6	12.69	0.78	53.8	43.0	2.93	-1.03
Australia	120	125	2.76	0.38	15.6	22.1	4.36	1.47	39.4	29.7	2.34	-1.63
New Zealand	30	31	4.20	0.36	24.9	18.2	25.20	0.02	14.4	13.2	5.36	0.48
DEVELOPED COUNTRIES	**2 988**	**3 436**	**2.14**	**1.05**	**301.6**	**296.9**	**3.29**	**0.36**	**1 221.7**	**1 386.4**	**3.01**	**1.10**
DEVELOPING COUNTRIES	**292**	**344**	**1.64**	**1.47**	**1 318.8**	**1 763.0**	**4.66**	**2.54**	**717.4**	**992.2**	**3.94**	**3.05**
LEAST DEVELOPED COUNTRIES (LDC)	0	0	..	..	24.2	37.6	9.16	4.31	14.9	25.8	130.95	5.22
OECD[4]	**2 915**	**3 354**	**1.91**	**1.06**	**341.4**	**333.4**	**3.24**	**0.18**	**1 126.3**	**1 276.5**	**2.70**	**1.08**
BRICS	**79**	**79**	**-1.09**	**0.09**	**662.6**	**864.2**	**5.41**	**2.13**	**47.6**	**47.4**	**-0.18**	**0.28**

.. Not available

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Least-squares growth rate (see glossary).
2. Refers to all current European Union member States (excludes the United Kingdom)
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
4. Excludes Iceland and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2021), “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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**428 841**	**531 924**	**1.90**	**2.18**	**55.8**	**62.4**	**0.79**	**1.24**
NORTH AMERICA	25 484	24 175	-1.51	-0.39	69.2	61.6	-2.23	-0.95
Canada	2 851	2 784	-0.65	0.00	75.6	67.5	-1.91	-0.78
United States	22 633	21 390	-1.62	-0.43	68.5	60.9	-2.27	-0.98
LATIN AMERICA	34 312	40 997	-0.83	1.76	52.7	57.9	-1.78	1.02
Argentina	1 570	1 680	-1.50	0.40	28.3	27.7	-1.59	-0.36
Brazil	15 217	19 556	0.08	2.36	72.4	87.7	-0.75	1.87
Chile	361	321	-10.84	-0.52	19.1	16.5	-11.90	-0.64
Colombia	4 868	6 421	-1.45	3.09	96.8	120.2	-2.67	2.63
Mexico	3 474	3 291	-1.16	-0.46	27.3	23.5	-2.38	-1.32
Paraguay	458	549	-1.18	1.55	65.0	69.0	-2.48	0.47
Peru	1 862	2 501	2.08	2.97	57.3	69.4	0.69	2.10
EUROPE	76 282	78 413	-0.61	0.41	101.4	104.3	-0.69	0.44
European Union[1]	39 045	42 177	0.58	0.97	85.8	91.8	0.37	0.91
United Kingdom	7 439	7 210	-0.56	-0.24	111.9	105.9	-0.23	-0.45
Russia	15 233	15 624	-2.25	0.10	106.6	111.2	-2.27	0.30
Ukraine	6 577	5 938	-3.22	-0.39	149.5	145.2	-2.77	0.29
AFRICA	33 467	43 849	-0.69	2.89	25.8	26.2	-3.20	0.56
Egypt	1 152	1 398	-3.25	2.18	11.5	11.6	-5.29	0.53
Ethiopia	2 453	3 936	-4.41	5.26	21.9	27.2	-6.97	2.87
Nigeria	227	237	-0.76	0.69	1.1	0.9	-3.33	-1.72
South Africa	2 596	2 751	2.35	0.62	44.3	41.7	0.86	-0.43
ASIA	255 822	340 585	4.10	2.83	56.1	69.1	3.14	2.13
China[2]	26 483	29 463	0.73	0.48	19.1	20.9	0.64	0.35
India	132 020	183 970	6.10	3.35	96.6	122.3	4.95	2.48
Indonesia	994	1 141	-0.69	1.64	3.7	3.8	-1.89	0.75
Iran	3 490	4 340	1.77	2.09	42.1	46.8	0.43	1.13
Japan	4 347	4 260	0.14	-0.21	34.3	35.3	0.32	0.27
Kazakhstan	5 004	5 990	1.47	1.73	269.8	290.2	0.00	0.80
Korea	1 355	1 335	-0.08	-0.48	26.7	26.3	-0.33	-0.45
Malaysia	52	55	-6.65	0.58	1.6	1.5	-7.91	-0.49
Pakistan	37 078	53 464	3.21	3.72	171.2	203.3	1.09	1.95
Philippines	15	17	-1.92	0.78	0.1	0.1	-3.40	-0.42
Saudi Arabia	1 334	1 504	5.97	1.13	39.0	38.2	3.56	-0.06
Thailand	625	689	-6.52	1.03	9.0	9.8	-6.86	0.97
Turkey	15 289	18 600	3.75	1.99	183.4	208.6	2.13	1.47
Viet Nam	977	1 393	12.59	4.02	10.1	13.4	11.45	3.34
OCEANIA	3 474	3 905	1.95	0.63	67.5	65.9	-1.37	-0.64
Australia	2 923	3 333	1.81	0.68	102.1	102.0	-0.67	-0.45
New Zealand	541	563	3.51	0.34	42.5	40.6	-5.89	-0.48
DEVELOPED COUNTRIES	**134 553**	**142 515**	**-0.11**	**0.66**	**93.3**	**96.0**	**-0.54**	**0.41**
DEVELOPING COUNTRIES	**294 288**	**389 409**	**2.94**	**2.79**	**47.2**	**55.5**	**1.66**	**1.70**
LEAST DEVELOPED COUNTRIES (LDC)	20 858	26 744	0.05	2.77	24.0	24.2	-2.24	0.58
OECD[3]	**107 077**	**113 599**	**0.13**	**0.71**	**76.0**	**77.5**	**-0.46**	**0.39**
BRICS	**191 548**	**251 365**	**3.79**	**2.64**	**60.0**	**74.4**	**3.05**	**2.14**

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**851 046**	**1 019 691**	**1.91**	**1.75**	**714 635**	**800 198**	**1.12**	**1.08**	**1.19**	**1.27**	**0.79**	**0.66**
NORTH AMERICA	110 189	125 096	1.57	1.07	10 417	10 647	0.38	0.09	10.58	11.75	1.18	0.98
Canada	10 565	12 015	2.81	1.17	1 050	1 182	1.32	-0.09	10.14	10.17	1.47	1.26
United States	99 624	113 081	1.44	1.06	9 367	9 465	0.27	0.11	10.64	11.95	1.17	0.95
LATIN AMERICA	80 926	95 762	0.46	1.62	39 167	41 635	-2.70	0.60	2.07	2.30	3.25	1.01
Argentina	10 545	11 877	-1.01	1.01	1 718	1 697	-0.20	-0.10	6.14	7.00	-0.81	1.11
Brazil	35 757	43 988	1.79	1.92	16 297	17 832	-4.89	0.91	2.19	2.47	7.03	1.00
Chile	2 037	2 418	-2.77	1.79	1 050	1 089	0.31	0.41	1.94	2.22	-3.07	1.38
Colombia	5 774	7 391	-1.59	2.80	5 644	6 414	-0.69	1.24	1.02	1.15	-0.90	1.54
Mexico	12 366	13 225	1.43	0.68	2 555	2 655	0.92	0.38	4.84	4.98	0.51	0.30
Paraguay	473	576	-1.14	2.03	213	238	-0.58	0.90	2.22	2.42	-0.56	1.12
Peru	2 102	2 806	2.16	2.91	1 171	1 373	0.39	1.48	1.80	2.04	1.76	1.42
EUROPE	225 955	233 935	0.89	0.35	40 796	37 754	-0.80	-0.67	5.54	6.20	1.71	1.03
European Union[2]	152 216	160 972	1.28	0.48	20 552	19 201	-0.50	-0.54	7.29	8.23	1.89	1.01
United Kingdom	15 129	14 366	0.93	-0.05	1 878	1 770	0.57	-0.62	8.06	8.12	0.36	0.58
Russia	31 262	30 892	0.21	0.02	7 870	7 424	-1.32	-0.50	3.97	4.16	1.55	0.52
Ukraine	9 816	8 926	-2.01	-0.37	2 665	2 135	-4.01	-2.05	3.68	4.18	2.08	1.71
AFRICA	43 525	55 969	-0.72	2.69	232 533	262 447	1.38	1.24	0.19	0.21	-2.07	1.43
Egypt	4 499	5 252	-3.12	1.79	6 545	6 547	-0.25	0.40	0.69	0.80	-2.88	1.38
Ethiopia	2 758	4 304	-4.31	4.98	12 986	17 611	-1.08	3.12	0.21	0.24	-3.27	1.80
Nigeria	535	647	-0.90	2.22	2 327	2 476	-0.08	0.64	0.23	0.26	-0.82	1.57
South Africa	3 764	4 101	2.34	0.89	842	797	-1.54	-0.62	4.47	5.14	3.94	1.52
ASIA	359 546	477 617	3.59	2.74	385 355	441 581	1.70	1.25	0.93	1.08	1.86	1.48
China[3]	36 469	40 467	0.26	0.51	13 500	13 439	-1.32	-0.39	2.40	2.71	1.91	0.97
India	191 476	266 674	5.30	3.20	145 473	175 483	2.47	1.78	1.32	1.52	2.76	1.40
Indonesia	1 514	1 980	0.38	2.80	14 600	17 220	2.74	1.49	0.10	0.12	-2.30	1.29
Iran	7 618	8 003	-0.69	0.65	20 380	17 803	-0.45	-1.06	0.37	0.45	-0.24	1.73
Japan	7 360	7 293	-0.25	-0.10	842	810	-1.24	-0.33	8.74	9.00	1.00	0.23
Kazakhstan	5 711	6 985	1.81	1.94	3 030	3 175	1.69	0.30	1.88	2.20	0.12	1.64
Korea	2 047	2 001	0.09	-0.35	258	254	0.24	-0.12	7.95	7.89	-0.14	-0.22
Malaysia	52	55	-6.65	0.58	105	95	-5.77	-1.22	0.49	0.58	-0.94	1.83
Pakistan	47 214	67 118	3.20	3.60	38 560	47 634	2.99	2.11	1.22	1.41	0.20	1.46
Philippines	15	17	-1.92	0.78	5	5	-0.05	-1.07	2.79	3.53	-1.87	1.88
Saudi Arabia	2 505	3 076	2.78	2.19	4 838	5 127	0.67	0.56	0.52	0.60	2.10	1.62
Thailand	655	716	-6.28	0.94	136	121	-5.49	-0.98	4.82	5.94	-0.84	1.94
Turkey	21 861	27 253	3.80	2.19	31 404	35 210	5.42	0.87	0.70	0.77	-1.54	1.31
Viet Nam	977	1 393	12.59	4.02	331	411	9.58	2.29	2.95	3.39	2.75	1.69
OCEANIA	30 905	31 311	0.95	0.06	6 367	6 135	-0.36	-0.27	4.86	5.10	1.32	0.33
Australia	9 246	9 056	-0.70	-0.02	1 422	1 392	-2.08	-0.27	6.51	6.51	1.41	0.26
New Zealand	21 636	22 234	1.77	0.09	4 913	4 717	0.25	-0.26	4.41	4.71	1.51	0.35
DEVELOPED COUNTRIES	**403 931**	**435 996**	**1.20**	**0.70**	**75 573**	**75 285**	**-0.10**	**-0.03**	**5.35**	**5.79**	**1.29**	**0.74**
DEVELOPING COUNTRIES	**447 115**	**583 695**	**2.60**	**2.60**	**639 062**	**724 913**	**1.27**	**1.21**	**0.70**	**0.81**	**1.31**	**1.37**
LEAST DEVELOPED COUNTRIES (LDC)	27 158	34 326	0.29	2.56	218 082	241 317	0.98	1.01	0.12	0.14	-0.68	1.54
OECD[4]	**366 940**	**398 795**	**1.32**	**0.75**	**82 130**	**85 333**	**1.64**	**0.30**	**4.47**	**4.67**	**-0.31**	**0.45**
BRICS	**298 728**	**386 122**	**3.48**	**2.43**	**183 982**	**214 976**	**1.12**	**1.46**	**1.62**	**1.80**	**2.34**	**0.96**

Note: Calendar year; except year ending 30 June for Australia and 31 May for New Zealand. Average 2018-20est: Data for 2020 are estimated.

1. Least-squares growth rate (see glossary).
2. Refers to all current European Union member States (excludes the United Kingdom)
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
4. Excludes Iceland and Costa Rica but includes all EU member countries.

Source: OECD/FAO (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
CANADA												
Milk target price[2]	CADc/litre	81.4	82.6	83.6	85.0	86.6	88.5	90.4	92.5	94.4	96.4	98.6
Butter support price	CAD/t	8 301.9	7 844.8	7 985.2	8 128.3	8 282.8	8 457.4	8 634.0	8 826.9	9 002.8	9 178.4	9 365.0
Cheese tariff-quota	kt pw	33.6	49.0	56.4	60.9	63.2	65.4	65.7	65.9	66.2	66.5	66.8
In-quota tariff	%	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Out-of-quota tariff	%	245.6	245.6	245.6	245.6	245.6	245.6	245.6	245.6	245.6	245.6	245.6
EUROPEAN UNION[3]												
Voluntary coupled support												
Milk and milk products[4]	mln EUR	853	846	846	846	846	846	846	846	846	846	846
Butter reference price[5]	EUR/t	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5	2 217.5
SMP reference price	EUR/t	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0	1 400.0
Butter tariff-quotas	kt pw	90.1	90.3	90.4	90.4	90.5	90.5	90.6	90.6	90.7	90.7	90.8
Cheese tariff-quotas	kt pw	119.2	119.9	120.2	120.5	120.8	121.2	121.5	121.8	122.1	122.5	122.8
JAPAN												
Direct payments[6]	JPY/kg	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
Cheese tariff[7]	%	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2
Tariff-quotas												
Butter	kt pw	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	%	278.6	308.9	302.7	309.2	313.5	314.2	314.1	313.1	314.6	316.8	319.7
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
WMP	kt pw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-quota tariff	%	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Out-of-quota tariff	%	316.2	316.2	316.2	316.2	316.2	316.2	316.2	316.2	316.2	316.2	316.2
KOREA												
Tariff-quotas												
Butter	kt pw	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
In-quota tariff	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Out-of-quota tariff	%	89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0
SMP	kt pw	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
In-quota tariff	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Out-of-quota tariff	%	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0
WMP	kt pw	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
In-quota tariff	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Out-of-quota tariff	%	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0
MEXICO												
Butter tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tariff-quotas												
Cheese	kt pw	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
In-quota tariff	%	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Out-of-quota tariff	%	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
SMP	kt pw	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
In-quota tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	%	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Liconsa social program	mln MXN	1 313.9	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8	1 240.8
RUSSIA												
Butter tariff	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Cheese tariff	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
UNITED STATES[8]												
Butter tariff-quota	kt pw	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
In-quota tariff	%	2.8	3.1	3.0	2.9	2.9	2.9	2.8	2.8	2.7	2.7	2.7
Out-of-quota tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cheese tariff-quota	kt pw	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0
In-quota tariff	%	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
Out-of-quota tariff	%	39.1	38.5	37.8	37.1	36.3	35.8	35.2	34.6	34.1	33.6	33.1
INDIA												
Butter tariff	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Cheese tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Skim milk powder tariff	%	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Whole milk powder tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOUTH AFRICA												
Butter tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cheese tariff	%	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9
Skim milk powder tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whole milk powder tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note: Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. For manufacturing milk.
3. Since 2015 the Basic payment scheme (BPS) holds, which shall account for 68% maximum of the national direct payment envelopes. On top of this, compulsory policy instruments have been introduced: the Green Payment (30%) and young farmer scheme (2%).
4. Implemented in 19 Member States. The maximum quantity limit is 11.695 million dairy cow heads.
5. Buying-in when market prices go below the reference price for SMP and 90% of the reference price for butter is operable automatically for a maximum quantity of 109 000 tonnes for SMP and 50 000 tonnes for butter (before 2014, this ceiling was set at 30 000 tonnes). Above that ceiling intervention can take place only via tender. For 2018 due to a temporary measure the SMP buying in quantity at fixed prices of is set to 0. Buying in via a tendering procedure may still be possible.
6. In April 2017, in addition to skim milk powder, butter and cheese, milk used for fresh cream, concentrated skim mik and concentrated whole milk production became covered by the direct payments.
7. Excludes processed cheese.
8. A milk margin (all-milk price minus the average feed margin) protection program applies, which has been updated February 2018, and provides a dairy safety net to farmers. Farmers have to decide on enrolment and coverage levels.

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**177 801**	**200 529**	**2.06**	**1.20**	**42 592**	**44 388**	**0.98**	**0.69**	**42 139**	**44 357**	**0.96**	**0.72**
NORTH AMERICA	6 213	6 713	-0.69	0.60	6 264	6 652	1.79	0.88	2 619	2 451	-1.69	-0.27
Canada	966	1 145	-1.12	1.67	652	618	-0.01	-0.32	797	854	-0.19	0.68
United States	5 247	5 568	-0.61	0.40	5 612	6 034	2.02	1.01	1 821	1 596	-2.29	-0.75
LATIN AMERICA	16 376	17 270	-0.04	0.76	2 340	2 367	0.10	0.88	4 881	5 540	2.25	1.10
Argentina	830	896	0.49	0.86	66	65	0.91	0.00	594	672	-0.30	1.03
Brazil	1 301	1 489	0.52	1.28	586	513	-4.09	-0.88	56	61	3.40	0.96
Chile	3 334	3 856	-1.13	1.39	136	152	3.69	1.41	1 629	2 278	2.85	3.17
Colombia	248	320	5.78	1.02	243	296	2.08	3.10	51	51	-5.10	-2.00
Mexico	1 863	1 921	1.17	0.44	465	502	4.12	2.79	358	272	6.47	-1.25
Paraguay	29	34	3.54	1.59	5	5	4.96	0.00	0	0	..	..
Peru	5 998	5 692	-1.27	0.51	169	173	7.73	0.60	612	573	-1.85	-0.57
EUROPE	17 702	18 919	1.09	0.61	11 580	11 971	0.04	0.56	10 618	11 972	1.34	1.00
European Union[1]	5 540	5 773	0.47	0.40	8 188	8 648	0.96	0.82	2 687	2 942	1.42	1.02
United Kingdom	853	929	0.35	0.51	1 162	1 124	-1.62	-0.22	864	922	0.15	0.67
Norway	3 808	3 961	1.35	0.35	250	181	0.25	-2.97	2 846	2 925	0.07	0.16
Russia	5 259	5 981	2.44	1.27	836	955	-5.56	1.39	2 513	3 333	3.71	2.44
Ukraine	99	101	-9.34	0.00	512	466	-1.05	-1.32	23	21	-16.68	-2.47
AFRICA	12 516	14 354	3.66	1.18	4 601	5 961	0.15	3.12	3 114	2 729	5.18	-0.89
Egypt	2 028	2 651	5.44	2.15	652	994	5.04	5.70	54	57	18.62	-0.47
Ethiopia	59	71	10.04	1.69	2	4	4.48	7.32	1	1	-16.77	0.00
Nigeria	1 128	1 233	2.90	1.12	632	990	-11.42	3.40	5	5	-23.51	0.00
South Africa	522	554	-1.09	-0.14	314	327	6.70	1.39	173	176	0.79	-0.16
ASIA	123 217	141 452	2.51	1.37	17 162	16 816	1.82	-0.01	20 011	20 817	0.33	0.80
China[2]	61 783	71 801	2.04	1.56	4 642	4 542	3.72	-0.42	7 823	8 039	-0.09	1.40
India	12 755	14 904	5.46	1.59	71	118	14.64	2.92	1 291	746	3.83	-6.62
Indonesia	13 124	15 201	5.28	1.47	155	235	-4.36	5.48	1 319	972	0.27	-2.66
Iran	1 280	1 405	6.61	0.57	50	50	-1.99	0.84	131	120	10.22	-0.59
Japan	3 782	3 437	-1.95	-0.83	3 423	2 909	-1.35	-1.22	644	742	0.31	0.52
Kazakhstan	50	59	4.65	0.89	61	55	-3.78	-0.26	33	20	-1.98	-4.03
Korea	1 942	1 921	-1.68	0.02	1 835	1 928	2.26	0.37	607	670	-1.84	0.68
Malaysia	1 681	1 819	-0.34	0.80	650	691	2.68	0.51	366	312	2.39	-1.77
Pakistan	651	695	0.94	0.93	9	8	11.70	0.00	241	225	4.73	1.24
Philippines	2 907	3 163	-0.58	0.62	505	486	9.14	2.24	360	338	0.35	-2.19
Saudi Arabia	147	191	8.89	1.44	293	302	-0.27	1.01	49	30	3.52	0.00
Thailand	2 490	2 782	-2.31	0.89	2 092	2 031	2.69	-0.03	1 754	2 002	-4.47	1.90
Turkey	765	825	2.34	0.60	112	121	4.50	1.25	269	301	12.05	3.49
Viet Nam	7 717	9 131	4.79	1.48	435	524	8.76	0.67	2 757	3 807	2.37	2.75
OCEANIA	1 775	1 820	3.17	0.62	644	621	-0.74	-0.41	896	848	0.47	0.86
Australia	265	304	1.20	1.74	458	460	-0.47	-0.02	67	48	3.57	-1.70
New Zealand	521	542	-0.53	0.19	58	58	0.36	0.00	403	408	-0.96	0.03
DEVELOPED COUNTRIES	**29 470**	**31 028**	**0.35**	**0.44**	**22 407**	**22 685**	**0.33**	**0.40**	**14 571**	**15 837**	**0.62**	**0.71**
DEVELOPING COUNTRIES	**148 331**	**169 501**	**2.43**	**1.34**	**20 185**	**21 703**	**1.76**	**1.01**	**27 568**	**28 520**	**1.15**	**0.72**
LEAST DEVELOPED COUNTRIES (LDC)	13 922	16 319	3.63	1.46	1 301	1 421	5.47	1.69	1 983	1 866	7.57	0.12
OECD[3]	**29 156**	**30 525**	**-0.25**	**0.41**	**22 921**	**23 386**	**0.82**	**0.49**	**13 046**	**14 011**	**0.43**	**0.78**
BRICS	**81 620**	**94 730**	**2.49**	**1.53**	**6 449**	**6 456**	**1.34**	**-0.09**	**11 855**	**12 356**	**1.05**	**0.94**

.. 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 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Costa Rica.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**16 795**	**16 615**	**-0.08**	**0.33**	**157 267**	**180 504**	**2.28**	**1.34**	**20.5**	**21.2**	**1.13**	**0.43**
NORTH AMERICA	752	899	-3.77	0.93	8 591	9 505	1.80	1.04	23.4	24.3	1.09	0.46
Canada	25	27	-4.69	1.10	787	871	-0.39	1.13	21.0	21.3	-1.36	0.35
United States	727	872	-3.73	0.92	7 804	8 635	2.04	1.03	23.7	24.7	1.36	0.48
LATIN AMERICA	6 585	6 220	-2.61	0.24	6 768	7 511	1.74	1.20	10.5	10.7	0.73	0.44
Argentina	0	0	0.00	0.00	301	288	2.35	0.27	6.7	5.9	1.33	-0.54
Brazil	50	47	-6.16	0.18	1 781	1 894	-0.90	0.69	8.4	8.5	-1.71	0.19
Chile	1 360	1 298	-5.08	-0.37	234	232	-0.44	-0.03	12.3	11.9	-1.63	-0.15
Colombia	0	0	0.00	0.00	440	565	5.44	2.41	8.7	10.6	4.14	1.95
Mexico	188	219	-9.35	0.17	1 782	1 931	3.17	1.33	14.0	13.7	1.93	0.45
Paraguay	0	0	0.00	0.00	34	39	3.73	1.37	4.8	4.9	2.36	0.29
Peru	4 662	4 260	-1.54	0.46	886	1 032	3.61	1.80	27.3	28.7	2.20	0.94
EUROPE	2 835	2 782	5.87	0.30	15 543	15 906	-0.23	0.35	20.8	21.4	-0.38	0.45
European Union[1]	861	816	5.28	0.17	10 062	10 562	0.47	0.59	22.6	23.9	0.34	0.68
United Kingdom	0	0	0.00	0.00	1 146	1 132	-1.49	-0.33	17.0	16.1	-2.13	-0.69
Norway	907	895	10.84	0.10	277	292	0.77	0.61	51.5	49.7	-0.24	-0.20
Russia	518	605	6.98	1.15	2 992	2 923	-1.57	0.16	20.5	20.4	-1.75	0.36
Ukraine	0	0	0.00	0.00	588	546	-1.68	-1.04	13.4	13.4	-1.22	-0.36
AFRICA	685	787	0.84	0.32	13 265	16 750	2.23	2.28	10.2	10.0	-0.36	-0.04
Egypt	0	0	0.00	0.00	2 626	3 588	5.11	3.07	26.2	29.7	2.89	1.40
Ethiopia	0	0	0.00	0.00	61	74	10.80	1.94	0.5	0.5	7.84	-0.38
Nigeria	0	0	0.00	0.00	1 755	2 218	-4.27	2.08	8.7	8.4	-6.75	-0.37
South Africa	287	335	2.37	0.13	377	369	0.77	0.93	6.5	5.6	-0.70	-0.11
ASIA	5 842	5 826	1.65	0.35	112 005	129 583	2.76	1.39	24.5	26.2	1.77	0.70
China[2]	1 674	1 589	-5.00	0.83	55 982	65 926	2.63	1.51	39.1	45.0	2.12	1.35
India	662	750	10.91	1.53	10 522	13 176	5.74	2.37	7.7	8.8	4.59	1.51
Indonesia	62	64	21.00	0.00	11 887	14 396	5.68	1.89	43.9	48.1	4.40	0.99
Iran	140	134	9.62	0.17	1 060	1 200	5.26	0.76	12.8	13.0	3.88	-0.20
Japan	681	546	-0.77	-1.78	5 704	4 908	-1.86	-1.17	45.0	40.6	-1.69	-0.69
Kazakhstan	0	0	0.00	0.00	78	94	-0.16	1.55	4.2	4.6	-1.60	0.63
Korea	127	117	-0.91	-0.30	2 944	2 992	0.65	0.11	57.5	58.5	0.32	0.14
Malaysia	168	149	5.49	-1.37	1 801	2 049	0.85	1.34	56.4	56.8	-0.51	0.25
Pakistan	137	124	4.90	0.19	282	355	-2.74	0.98	1.3	1.4	-4.74	-0.74
Philippines	0	0	0.00	0.00	3 053	3 311	0.48	1.19	28.2	26.8	-1.03	-0.01
Saudi Arabia	0	0	0.00	0.00	392	464	1.91	1.26	11.4	11.8	-0.41	0.07
Thailand	430	378	-1.24	-1.86	2 181	2 293	3.00	0.28	31.3	32.6	2.61	0.22
Turkey	114	149	-2.00	2.65	490	492	0.94	-1.17	5.9	5.5	-0.63	-1.67
Viet Nam	1 172	1 324	13.71	1.17	4 030	4 373	4.30	0.64	41.8	42.0	3.25	-0.02
OCEANIA	96	102	-4.14	0.47	1 096	1 250	1.76	1.09	26.6	26.6	0.29	-0.07
Australia	26	29	-8.47	0.56	630	686	0.28	0.83	25.0	24.4	-1.09	-0.15
New Zealand	46	47	-1.14	-0.23	130	145	2.01	0.70	27.2	28.1	1.02	0.00
DEVELOPED COUNTRIES	**4 740**	**4 779**	**2.51**	**0.13**	**31 477**	**32 102**	**0.05**	**0.33**	**22.0**	**21.9**	**-0.37**	**0.13**
DEVELOPING COUNTRIES	**12 056**	**11 837**	**-0.97**	**0.41**	**125 791**	**148 402**	**2.90**	**1.58**	**20.1**	**21.1**	**1.58**	**0.50**
LEAST DEVELOPED COUNTRIES (LDC)	397	372	4.87	0.06	12 683	15 343	3.15	1.71	14.6	13.9	0.78	-0.46
OECD[3]	**5 060**	**5 016**	**-1.24**	**-0.04**	**32 776**	**33 822**	**0.50**	**0.40**	**23.6**	**23.6**	**-0.06**	**0.13**
BRICS	**3 191**	**3 326**	**-0.70**	**0.96**	**71 655**	**84 289**	**2.72**	**1.56**	**22.3**	**24.8**	**1.92**	**1.08**

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 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Costa Rica.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), “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 2018-20est	2030	2021-30	Average 2018-20est	2030	2021-30	Average 2018-20est	2030	2021-30
WORLD	**126 069**	**132 049**	**0.58**	**125 884**	**132 408**	**0.57**	**..**	**..**	**..**
NORTH AMERICA	61 336	59 620	-0.32	58 028	56 534	-0.20	..	..	..
Canada	1 968	2 220	1.03	3 256	3 369	0.55	3 085	3 095	0.43
United States	59 367	57 400	-0.37	54 773	53 165	-0.24	52 406	50 760	-0.25
LATIN AMERICA	38 512	40 075	1.26	37 725	39 754	1.22	..	..	..
Argentina	1 206	1 314	1.09	1 175	1 285	1.00	1 006	1 057	0.57
Brazil	33 659	34 270	1.27	32 208	33 671	1.27	29 790	31 296	1.29
Chile	6	13	7.74	37	59	1.26	0	0	0.00
Colombia	524	722	2.41	822	970	1.32	714	869	1.48
Mexico	285	288	-0.65	423	429	-0.16	223	233	-0.18
Paraguay	549	849	2.37	426	578	2.59	366	515	2.95
Peru	205	286	2.09	238	318	1.86	184	234	1.85
EUROPE	7 566	7 924	0.18	8 625	8 826	-0.37	..	..	..
European Union[1]	5 999	6 278	0.32	6 539	6 730	-0.37	4 599	4 668	-0.53
United Kingdom	640	619	-1.72	1 027	1 057	-1.16	691	686	-1.74
Russia	625	661	0.02	529	527	-0.12	0	0	0.00
Ukraine	157	207	2.39	194	187	2.67	82	124	3.14
AFRICA	927	1 118	2.23	973	1 162	2.14	..	..	..
Egypt	10	13	2.92	11	14	2.54	0	0	0.00
Ethiopia	109	168	4.27	109	169	4.24	45	81	4.86
Nigeria	49	70	3.74	182	191	1.21	0	0	0.00
South Africa	317	328	0.54	137	173	1.06	5	6	1.01
ASIA	17 381	22 949	2.06	20 239	25 815	1.68	..	..	..
China[2]	10 497	11 244	0.15	10 763	11 459	0.27	4 031	4 461	0.46
India	2 919	6 738	7.06	3 400	7 437	5.91	1 643	5 509	9.01
Indonesia	186	211	1.72	129	157	2.38	0	0	0.00
Iran	0	0	..	0	0	..	0	0	0.00
Japan	77	77	0.00	1 611	1 466	-1.31	888	695	-2.58
Kazakhstan	0	0	..	0	0	..	0	0	0.00
Korea	153	190	-1.04	638	655	-1.01	5	4	-2.80
Malaysia	0	0	..	0	0	..	0	0	0.00
Pakistan	698	817	0.34	40	80	0.09	0	0	0.00
Philippines	342	629	3.57	790	1 078	1.93	571	776	2.32
Saudi Arabia	0	15	24.14	88	122	1.29	0	0	0.00
Thailand	1 800	2 032	0.71	1 808	2 025	0.62	1 555	1 784	0.71
Turkey	121	168	1.89	256	361	0.84	100	100	-1.09
Viet Nam	227	321	4.65	253	347	3.54	144	233	5.71
OCEANIA	347	362	0.04	294	317	-0.32	..	..	..
Australia	337	350	0.00	287	308	-0.37	203	205	-0.55
New Zealand	3	3	0.00	0	0	..	0	0	0.00
DEVELOPED COUNTRIES	**69 642**	**68 314**	**-0.26**	**68 710**	**67 335**	**-0.24**	**..**	**..**	**..**
DEVELOPING COUNTRIES	**56 427**	**63 734**	**1.56**	**57 174**	**65 073**	**1.48**	**..**	**..**	**..**
LEAST DEVELOPED COUNTRIES (LDC)	481	626	2.95	484	630	2.92	..	..	..
OECD[3]	**69 520**	**68 362**	**-0.25**	**69 885**	**68 776**	**-0.24**	**..**	**..**	**..**
BRICS	**48 017**	**53 242**	**1.57**	**47 037**	**53 268**	**1.55**	**..**	**..**	**..**

.. Not available

Note: Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), “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 2018-20est	2030	Average 2018-20est	2030	2021-30	Average 2018-20est	2030	2021-30
WORLD	..	..	**11 662**	**10 692**	**-0.91**	**11 008**	**10 342**	**-0.94**
NORTH AMERICA	..	..	2 496	2 247	-1.13	5 941	5 354	-1.85
Canada	6.4	6.8	1 327	1 239	-0.29	90	90	0.03
United States	9.7	10.3	1 169	1 008	-2.07	5 851	5 264	-1.88
LATIN AMERICA	..	..	3 066	2 583	-0.23	2 674	2 899	0.39
Argentina	11.5	12.2	12	11	4.75	15	41	5.26
Brazil	46.7	47.1	1 578	1 459	-0.28	1 878	2 051	0.24
Chile	..	..	32	46	0.00	0	0	..
Colombia	..	..	302	253	-1.26	4	5	0.18
Mexico	0.5	0.8	140	143	0.91	2	1	0.05
Paraguay	..	..	2	0	..	124	271	1.94
Peru	..	..	191	183	0.00	159	151	0.00
EUROPE	..	..	1 833	1 743	-1.63	1 106	834	0.59
European Union[1]	5.1	6.9	926	920	-2.76	675	462	0.90
United Kingdom	4.5	6.2	626	613	-0.22	259	175	0.01
Russia	0.0	0.0	2	2	-1.95	121	136	0.57
Ukraine	..	..	50	3	0.00	14	22	0.00
AFRICA	..	..	257	232	0.00	211	189	0.00
Egypt	..	..	2	2	0.00	1	1	0.00
Ethiopia	..	..	0	1	0.00	0	0	..
Nigeria	..	..	134	122	0.00	1	0	..
South Africa	..	..	10	14	0.00	190	170	0.00
ASIA	..	..	3 972	3 842	-0.92	1 011	977	-0.82
China[2]	2.2	2.1	471	299	0.52	146	84	-8.43
India	..	..	559	741	-1.35	78	42	0.72
Indonesia	..	..	32	1	0.00	89	55	0.00
Iran	..	..	0	0	..	0	0	..
Japan	1.8	1.9	1 565	1 391	-1.38	1	2	0.00
Kazakhstan	..	..	0	0	..	0	0	..
Korea	0.0	0.0	499	465	-1.00	0	0	..
Malaysia	..	..	0	0	..	0	0	..
Pakistan	..	..	0	0	..	659	737	0.36
Philippines	..	..	449	450	0.00	1	1	0.00
Saudi Arabia	..	..	88	107	0.00	0	0	..
Thailand	..	..	24	15	-5.14	17	22	3.93
Turkey	..	..	139	199	0.00	4	6	0.00
Viet Nam	..	..	40	47	-2.26	14	22	2.24
OCEANIA	..	..	39	44	-2.30	66	90	0.02
Australia	1.1	1.2	38	43	-2.36	62	86	0.02
New Zealand	0.0	0.0	1	1	0.00	4	4	0.00
DEVELOPED COUNTRIES	..	..	**5 961**	**5 462**	**-1.36**	**7 307**	**6 456**	**-1.50**
DEVELOPING COUNTRIES	..	..	**5 702**	**5 231**	**-0.42**	**3 701**	**3 887**	**0.07**
LEAST DEVELOPED COUNTRIES (LDC)	..	..	3	4	0.00	0	0	..
OECD[3]	..	..	**6 941**	**6 494**	**-1.25**	**6 953**	**6 095**	**-1.59**
BRICS	..	..	**2 620**	**2 515**	**-0.52**	**2 412**	**2 482**	**-0.26**

.. Not available

Note: Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2021-30	Average 2018-20est	2030	2021-30
WORLD	**46 799**	**49 882**	**0.24**	**47 224**	**50 719**	**0.24**
NORTH AMERICA	8 833	8 677	-0.31	9 890	9 920	0.05
Canada	348	397	0.20	419	418	-0.47
United States	8 485	8 280	-0.34	9 470	9 501	0.08
LATIN AMERICA	8 798	9 415	1.05	7 757	8 424	1.28
Argentina	2 350	2 380	1.03	1 137	1 237	2.95
Brazil	5 698	6 169	0.90	5 678	6 150	0.89
Chile	0	0	..	0	0	..
Colombia	595	643	1.70	595	643	1.70
Mexico	0	0	..	0	0	..
Paraguay	12	26	5.56	12	26	5.56
Peru	143	198	3.87	335	368	1.90
EUROPE	15 966	14 921	-1.08	18 899	16 832	-1.60
European Union[1]	15 103	13 980	-1.20	17 403	15 435	-1.63
United Kingdom	540	627	1.00	1 174	1 084	-1.70
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	13 174	16 834	1.43	10 655	15 524	2.21
China[2]	1 076	1 141	-1.72	1 090	1 522	7.12
India	217	300	1.95	183	232	2.17
Indonesia	7 038	9 672	2.30	5 948	9 488	2.21
Iran	0	0	..	0	0	..
Japan	21	21	-0.80	14	16	0.47
Kazakhstan	0	0	..	0	0	..
Korea	702	750	-0.33	678	729	-0.30
Malaysia	1 340	1 637	1.49	762	1 120	1.75
Pakistan	0	0	..	0	0	..
Philippines	205	274	3.43	203	274	3.43
Saudi Arabia	0	0	..	0	0	..
Thailand	1 783	2 142	0.66	1 777	2 143	0.66
Turkey	0	0	..	0	0	..
Viet Nam	0	0	..	0	0	..
OCEANIA	28	35	1.52	23	20	2.87
Australia	28	35	1.51	23	20	2.87
New Zealand	0	0	..	0	0	..
DEVELOPED COUNTRIES	**24 847**	**23 654**	**-0.81**	**28 826**	**26 788**	**-1.03**
DEVELOPING COUNTRIES	**21 951**	**26 228**	**1.29**	**18 398**	**23 932**	**1.88**
LEAST DEVELOPED COUNTRIES (LDC)	0	0	..	0	0	..
OECD[3]	**26 144**	**25 047**	**-0.74**	**30 099**	**28 159**	**-0.95**
BRICS	**6 991**	**7 610**	**0.49**	**6 952**	**7 905**	**1.88**

.. Not available

Note: Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), “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 2018-20est	2030	Average 2018-20est	2030	2021-30	Average 2018-20est	2030	2021-30
WORLD	**..**	**..**	**7 717**	**6 080**	**-1.20**	**7 063**	**5 261**	**-1.38**
NORTH AMERICA	..	..	1 825	2 156	1.76	765	914	0.23
Canada	1.4	1.5	373	334	-0.76	300	313	0.04
United States	4.1	4.7	1 451	1 822	2.30	465	601	0.33
LATIN AMERICA	..	..	192	170	0.00	1 230	1 158	-0.62
Argentina	11.1	10.2	0	0	..	1 218	1 140	-0.67
Brazil	11.3	11.2	0	0	..	12	18	3.22
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	..	..	192	170	0.00	0	0	..
EUROPE	..	..	5 063	2 875	-5.24	1 905	984	-5.98
European Union[1]	8.8	10.3	4 359	2 343	-5.53	1 835	909	-6.42
United Kingdom	4.3	5.0	705	532	-3.83	70	75	1.49
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	..	..	637	878	27.64	3 156	2 188	0.24
China[2]	0.9	0.8	622	873	28.20	608	492	-2.00
India	..	..	11	2	-1.15	45	70	1.16
Indonesia	..	..	0	0	..	1 090	184	8.30
Iran	..	..	0	0	..	0	0	..
Japan	0.1	0.1	1	1	0.17	8	6	-3.27
Kazakhstan	..	..	0	0	..	0	0	..
Korea	0.0	0.0	0	0	..	24	21	-1.35
Malaysia	..	..	0	0	..	578	518	0.97
Pakistan	..	..	0	0	..	0	0	..
Philippines	..	..	0	0	..	2	0	..
Saudi Arabia	..	..	0	0	..	0	0	..
Thailand	..	..	2	2	2.94	8	1	-4.17
Turkey	..	..	0	0	..	0	0	..
Viet Nam	..	..	0	0	..	0	0	..
OCEANIA	..	..	1	1	0.26	6	16	0.00
Australia	0.2	0.2	1	1	0.26	6	16	0.00
New Zealand	0.0	0.0	0	0	..	0	0	..
DEVELOPED COUNTRIES	**..**	**..**	**6 890**	**5 033**	**-2.84**	**2 685**	**1 921**	**-3.39**
DEVELOPING COUNTRIES	**..**	**..**	**827**	**1 047**	**16.92**	**4 378**	**3 340**	**-0.06**
LEAST DEVELOPED COUNTRIES (LDC)	..	..	0	0	..	0	0	..
OECD[3]	**..**	**..**	**6 890**	**5 033**	**-2.84**	**2 709**	**1 942**	**-3.37**
BRICS	**..**	**..**	**633**	**874**	**27.97**	**665**	**580**	**-1.54**

.. Not available

Note: Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), “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

		2020est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ARGENTINA												
Biodiesel												
Export tax	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
BRAZIL												
Ethanol												
Import tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incorporation mandate[3]	%	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0
Biodiesel												
Tax concessions[4]	BRL/hl	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Import tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CANADA												
Ethanol												
Incorporation mandate[3]	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Biodiesel												
Incorporation mandate[3]	%	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
COLOMBIA												
Ethanol												
Import tariff	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Blending target[2,5]	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Biodiesel												
Blending target[2]	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
EUROPEAN UNION												
Biofuel												
Energy share in fuel consumption[6]	%	8.1	8.2	8.1	8.3	8.4	8.7	8.9	9.1	9.4	9.7	10.1
Ethanol												
Tax concessions[4]	EUR/hl	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
Import tariff	EUR/hl	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2
Biodiesel												
Tax concessions[4]	EUR/hl	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
Import tariff	%	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
INDIA												
Ethanol												
Import tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Share of biofuel mandates in total fuel consumption	%	5.7	8.0	10.0	10.9	11.9	13.0	14.1	15.4	16.8	18.3	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]	%	10.0	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]	%	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.5
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	70 793	70 793	67 911	67 911	67 911	67 911	67 911	67 911	67 911	67 911	67 911
advanced mandate	mln L	17 943	17 943	17 943	17 943	17 943	17 943	17 943	17 943	17 943	17 943	17 943
cellulosic ethanol	mln L	2 233	2 233	2 233	2 233	2 233	2 233	2 233	2 233	2 233	2 233	2 233
Ethanol												
Import surcharge	USD/hl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Import tariff (undenatured)	%	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
Import tariff (denatured)	%	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
Blender tax credit	USD/hl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Biodiesel												
Import tariff	%	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
Blender tax credit	USD/hl	26.40	26.40	26.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: 2020est: Data for 2020 are estimated.For many countries, shares for ethanol and biodiesel are not individually specified in the legislation.Figures are based on a combination of the EU mandate in the context of the Renewable Energy Directive and the National Renewable Energy Action Plans (NREAP) in the EU member states.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Expressed in volume share.
3. Share in respective fuel type, in volume.
4. Difference between tax rates applying to fossil and biogen fuels.
5. Applies to cities with more than 500 000 inhabitants.
6. According to the current Renewable energy Directive 2009/28/EC, the energy content of biofuel other than first-generation biofuels counts twice towards meeting the target. It is assumed that other sources than biofuel will help filling the 10% transport energy target.
7. The total, advanced and cellulosic mandates are not at the levels defined in EISA. Details can be found in the policy assumptions section of the biofuel chapter.

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.43.1. Cotton projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**25 467**	**28 398**	**-0.82**	**1.51**	**8 962**	**11 296**	**-0.87**	**1.90**	**9 135**	**11 296**	**-0.74**	**1.90**
NORTH AMERICA	3 863	4 327	2.09	1.98	1	1	-11.62	0.41	3 305	3 762	4.26	2.26
Canada	0	0	..	..	0	0	-15.54	..	0	0	..	..
United States	3 863	4 327	2.09	1.98	1	1	-10.86	0.97	3 305	3 762	4.26	2.26
LATIN AMERICA	3 503	3 569	6.50	2.61	362	453	-1.05	0.24	1 873	2 393	8.65	2.70
Argentina	283	292	3.78	1.32	1	1	-19.90	-0.61	93	81	2.46	1.01
Brazil	2 833	2 903	7.77	3.03	2	1	-22.10	-0.16	1 639	2 149	8.87	2.97
Chile	0	0	..	..	0	0	..	..	0	0	..	..
Colombia	15	16	-9.47	0.00	15	11	-8.56	0.00	0	0	-62.87	..
Mexico	337	322	3.48	0.64	195	287	-1.57	0.22	137	159	14.92	0.34
Paraguay	4	5	-16.85	1.98	0	0	-10.74	..	3	3	-18.97	2.76
Peru	20	20	-7.16	0.20	43	41	-2.71	-0.24	0	0	-16.73	..
EUROPE	282	294	-2.03	0.35	256	302	-7.41	0.52	371	424	-3.46	0.30
European Union[1]	281	293	-2.04	0.35	223	268	-6.18	0.53	369	422	-3.50	0.30
United Kingdom	0	0	..	..	0	0	..	..	0	0	..	..
Russia	0	0	..	..	20	19	-16.33	0.00	1	1	39.88	0.00
Ukraine	0	0	..	..	2	2	-5.47	2.04	0	0	..	..
AFRICA	1 807	2 161	2.44	2.41	145	146	0.84	-0.20	1 533	1 918	3.45	2.49
Egypt	85	60	-8.01	0.58	103	104	10.50	0.03	69	54	1.53	-0.03
Ethiopia	63	72	7.87	1.71	1	3	-51.51	1.03	7	6	34.98	-4.13
Nigeria	62	90	-0.14	0.00	1	1	0.00	0.00	29	36	-4.19	0.00
South Africa	33	34	18.35	1.47	10	10	-7.89	-0.46	34	28	19.42	0.46
ASIA	15 653	17 268	-2.41	1.07	8 196	10 392	-0.63	2.06	1 617	2 019	-9.74	-0.27
China[2]	5 967	6 189	-2.92	0.49	1 885	2 211	-10.81	0.83	46	51	23.27	0.35
India	5 960	7 195	-0.80	1.50	418	297	12.35	-0.86	896	1 517	-9.64	0.89
Indonesia	3	3	-9.07	1.59	612	795	-0.04	2.79	0	0	-69.04	..
Iran	59	83	0.02	1.01	47	27	-4.62	1.36	0	0	..	..
Japan	0	0	..	..	50	49	-3.95	-0.85	0	0	..	..
Kazakhstan	78	81	0.11	0.16	1	1	30.59	-0.20	72	69	1.79	0.20
Korea	0	0	..	..	144	151	-8.78	1.03	2	0	11.81	..
Malaysia	0	0	..	..	169	230	2.21	1.85	56	44	-10.25	-1.81
Pakistan	1 393	1 395	-6.26	1.62	657	1 048	15.25	0.34	12	9	-30.23	-0.05
Philippines	0	0	..	..	9	10	0.48	3.52	0	0	..	..
Saudi Arabia	0	0	..	..	0	0	..	..	0	0	..	..
Thailand	1	2	0.24	2.58	190	173	-7.08	-0.07	0	0	..	..
Turkey	809	856	0.27	1.97	938	1 140	4.49	2.21	115	83	10.97	-2.17
Viet Nam	0	0	-28.91	..	1 485	2 083	16.45	3.45	0	0	..	..
OCEANIA	359	780	-13.33	2.29	1	1	-0.14	0.00	437	778	-13.52	4.25
Australia	358	779	-13.36	2.30	0	0	..	..	436	777	-13.55	4.26
New Zealand	1	1	0.00	0.00	1	1	0.00	0.00	1	1	0.00	0.00
DEVELOPED COUNTRIES	**5 775**	**6 713**	**-0.78**	**1.62**	**323**	**368**	**-6.80**	**0.29**	**4 613**	**5 287**	**-1.23**	**1.80**
DEVELOPING COUNTRIES	**19 692**	**21 685**	**-0.84**	**1.48**	**8 639**	**10 928**	**-0.60**	**1.96**	**4 522**	**6 008**	**-0.26**	**1.99**
LEAST DEVELOPED COUNTRIES (LDC)	1 351	1 632	2.08	2.82	1 478	2 076	6.68	3.87	1 048	1 307	4.40	3.07
OECD[3]	**5 673**	**6 602**	**-0.04**	**1.86**	**1 569**	**1 911**	**-0.37**	**1.44**	**4 375**	**5 214**	**0.93**	**2.15**
BRICS	**14 793**	**16 321**	**-0.56**	**1.35**	**2 335**	**2 539**	**-8.78**	**0.60**	**2 616**	**3 746**	**-1.12**	**2.02**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30
WORLD	**24 257**	**28 265**	**0.67**	**1.46**
NORTH AMERICA	**547**	**551**	**-4.63**	**-2.55**
Canada	0	0	-16.69	..
United States	546	551	-4.62	-2.55
LATIN AMERICA	**1 415**	**1 556**	**-2.52**	**1.14**
Argentina	145	136	-0.66	0.04
Brazil	650	757	-4.47	2.02
Chile	0	0	..	..
Colombia	28	27	-9.47	0.00
Mexico	411	451	0.37	0.48
Paraguay	2	2	-13.54	-0.10
Peru	63	60	-5.16	-0.10
EUROPE	**163**	**172**	**-7.31**	**0.66**
European Union[1]	130	139	-4.94	0.84
United Kingdom	0	0	..	..
Russia	20	18	-16.67	-0.94
Ukraine	2	2	-6.40	2.04
AFRICA	**335**	**389**	**-1.15**	**0.99**
Egypt	119	109	-1.48	0.35
Ethiopia	54	70	3.54	2.36
Nigeria	27	55	5.26	0.00
South Africa	15	16	-4.38	1.97
ASIA	**21 794**	**25 594**	**1.20**	**1.60**
China[2]	7 837	8 303	0.00	0.62
India	4 994	5 975	0.95	1.52
Indonesia	622	798	0.18	2.79
Iran	107	110	-1.13	1.09
Japan	50	49	-4.03	-0.43
Kazakhstan	13	13	-0.16	-0.05
Korea	142	151	-8.56	1.04
Malaysia	113	186	26.79	2.94
Pakistan	2 167	2 433	-0.49	1.05
Philippines	9	10	-0.54	3.52
Saudi Arabia	0	0	..	..
Thailand	187	175	-7.64	-0.05
Turkey	1 515	1 913	1.68	2.35
Viet Nam	1 478	2 083	16.30	3.45
OCEANIA	**3**	**3**	**-13.66**	**-0.03**
Australia	2	2	-17.13	-0.04
New Zealand	1	1	0.00	0.00
DEVELOPED COUNTRIES	**1 570**	**1 779**	**-0.55**	**0.34**
DEVELOPING COUNTRIES	**22 686**	**26 486**	**0.76**	**1.54**
LEAST DEVELOPED COUNTRIES (LDC)	**1 739**	**2 401**	**5.29**	**3.57**
OECD[3]	**2 828**	**3 285**	**-1.28**	**0.92**
BRICS	**13 516**	**15 070**	**0.00**	**1.04**

.. Not available

Note: Marketing year: See Glossary of Terms for definitions. Average 2018-20est: Data for 2020 are estimated.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Consumption for cotton means mill consumption and not final consumer demand.
5. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ARGENTINA												
Export tax equivalent of export barriers	%	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tariff equivalent of import barriers	%	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
BRAZIL												
Producer Minimum Price, lint cotton	BRL/t	5 501.5	6 318.1	7 070.4	8 028.4	8 314.1	8 392.7	8 495.0	8 621.2	8 797.2	8 990.2	9 202.7
Tariff equivalent of import barriers	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
EUROPEAN UNION												
Area for coupled payment	kha	301.7	301.7	301.7	301.7	301.7	301.7	301.7	301.7	301.7	301.7	301.7
Coupled payment per ha[1]	EUR/ha	830.0	830.0	830.0	830.0	830.0	830.0	830.0	830.0	830.0	830.0	830.0
Tariff equivalent of import barriers	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 2018-20est: Data for 2020 are estimated.

1. If the area is higher than the ceiling, the amount is proportionally reduced.

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**236 758**	**278 679**	**2.10**	**1.53**	**16.3**	**17.4**	**0.59**	**0.62**
NORTH AMERICA	5 566	5 816	0.94	0.28	12.6	12.3	0.46	-0.31
Canada	961	1 005	0.95	0.32	16.7	16.2	1.65	-0.47
United States	4 605	4 811	0.94	0.27	12.1	11.9	0.28	-0.30
LATIN AMERICA	14 026	15 143	-0.35	0.81	12.2	12.5	-0.52	0.23
Argentina	619	692	0.92	0.95	9.4	9.4	-0.75	0.01
Brazil	6 062	5 577	-3.74	-0.49	12.0	11.0	-3.97	-0.51
Chile	281	299	0.77	0.73	14.0	15.4	1.11	0.77
Colombia	1 381	1 660	3.50	1.50	22.2	23.1	2.13	0.23
Mexico	402	451	0.51	0.94	3.4	3.4	-0.28	0.02
Paraguay	1 018	1 177	5.47	1.29	40.5	36.3	-0.07	-1.09
Peru	1 696	2 099	3.15	1.98	33.8	38.5	2.10	1.14
EUROPE	27 087	28 388	1.07	0.47	17.8	17.6	0.00	-0.07
European Union[1]	11 787	12 213	0.62	0.17	13.6	12.6	-1.27	-0.58
United Kingdom	1 172	1 277	0.80	0.80	24.7	25.6	1.48	0.27
Russia	7 214	7 315	2.20	0.51	24.7	26.4	1.42	0.51
Ukraine	5 317	5 955	1.87	1.04	28.7	30.0	1.14	0.44
AFRICA	91 504	114 495	2.83	2.16	39.4	40.1	0.36	0.31
Egypt	1 170	1 505	2.27	2.45	8.2	9.3	0.50	1.20
Ethiopia	2 486	3 467	4.32	3.16	18.6	20.2	0.85	0.90
Nigeria	32 546	41 105	2.77	2.08	69.2	71.9	0.50	0.30
South Africa	497	584	1.21	0.99	5.9	6.2	-1.23	0.37
ASIA	97 472	113 550	2.23	1.36	10.4	10.7	0.32	0.24
China[2]	43 497	46 973	1.53	0.57	15.3	15.3	-0.08	0.02
India	13 776	17 645	2.85	2.21	7.2	8.1	1.10	0.95
Indonesia	9 600	11 765	2.37	1.81	19.0	19.1	1.35	-0.21
Iran	976	1 141	0.30	1.42	10.1	10.8	-0.70	0.63
Japan	733	711	-1.44	-0.13	6.3	6.2	-0.76	0.02
Kazakhstan	799	970	3.30	1.65	22.7	25.3	0.79	1.02
Korea	268	263	3.59	-0.42	5.3	5.4	3.99	-0.01
Malaysia	39	45	5.38	1.70	3.7	3.3	1.87	-1.03
Pakistan	1 056	1 379	3.38	2.47	3.7	4.3	1.14	1.56
Philippines	1 070	1 247	2.97	1.48	9.7	9.3	1.43	-0.58
Saudi Arabia	78	70	-1.03	-0.95	4.8	5.3	6.71	0.97
Thailand	10 958	13 273	4.38	1.87	5.4	5.8	0.00	0.63
Turkey	752	738	-2.34	-0.12	6.7	5.9	-4.93	-1.00
Viet Nam	4 159	5 323	3.01	2.26	3.9	3.7	0.12	-0.88
OCEANIA	1 102	1 286	1.20	1.37	22.3	22.7	-0.54	0.16
Australia	249	277	-0.34	0.48	10.1	9.2	-1.67	-0.85
New Zealand	138	146	2.85	0.49	11.9	12.6	-0.02	0.56
DEVELOPED COUNTRIES	**36 714**	**38 885**	**1.07**	**0.53**	**14.4**	**14.3**	**-0.01**	**-0.12**
DEVELOPING COUNTRIES	**200 043**	**239 794**	**2.30**	**1.70**	**16.8**	**18.0**	**0.70**	**0.72**
LEAST DEVELOPED COUNTRIES (LDC)	44 948	55 735	2.82	2.28	31.8	32.3	0.69	0.44
OECD[3]	**22 997**	**24 139**	**0.67**	**0.32**	**11.7**	**11.3**	**-0.36**	**-0.29**
BRICS	**71 045**	**78 095**	**1.28**	**0.84**	**11.9**	**12.1**	**-0.10**	**0.16**

Note: Calendar year. Average 2018-20est: Data for 2020 are estimated. Production and consumption are expressed on dry weight basis.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "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 2018-20est	2030	2011-20	2021-30	Average 2018-20est	2030	2011-20	2021-30
WORLD	**89 184**	**111 013**	**2.99**	**2.02**	**7.9**	**9.1**	**1.80**	**1.29**
NORTH AMERICA	10 582	12 798	4.68	1.69	6.0	7.3	4.02	1.82
Canada	7 774	9 195	4.56	1.45	15.3	17.3	3.90	1.01
United States	2 808	3 602	5.23	2.33	4.9	6.2	4.01	2.05
LATIN AMERICA	8 293	9 470	2.87	1.39	11.5	12.2	1.00	0.53
Argentina	826	1 005	8.69	1.72	0.9	1.1	11.58	1.65
Brazil	3 111	3 337	0.00	0.84	16.2	17.0	-0.10	0.48
Chile	76	89	2.35	1.24	4.9	5.5	4.05	0.97
Colombia	216	244	1.49	1.32	6.7	7.0	-0.28	0.34
Mexico	1 980	2 241	7.31	1.39	10.8	11.2	3.90	-0.01
Paraguay	91	109	4.78	1.47	11.1	11.6	3.87	0.25
Peru	310	336	2.52	1.03	9.7	10.9	2.05	1.00
EUROPE	8 390	11 025	3.78	2.66	3.6	5.0	3.08	2.72
European Union[1]	4 191	6 148	6.88	3.87	4.4	6.6	3.85	3.35
United Kingdom	533	583	1.54	0.77	3.9	4.0	4.40	0.09
Russia	2 660	3 222	1.65	1.67	1.9	2.1	0.57	1.18
Ukraine	362	389	-2.99	0.86	1.4	1.3	-1.25	-0.49
AFRICA	19 577	24 716	2.97	2.19	11.5	12.0	0.48	0.44
Egypt	267	295	-0.23	1.11	5.5	6.0	0.61	0.72
Ethiopia	2 064	2 612	-0.05	2.41	14.5	16.3	-2.46	1.59
Nigeria	3 600	4 887	5.34	2.78	12.6	14.0	2.43	0.92
South Africa	94	144	3.83	4.18	1.9	1.7	-4.18	-0.93
ASIA	39 640	49 708	2.61	2.05	7.3	8.6	2.00	1.43
China[2]	4 786	5 270	0.76	0.91	1.5	1.9	2.13	1.98
India	21 871	28 507	3.15	2.31	15.8	18.5	1.91	1.39
Indonesia	190	214	-5.16	2.72	1.1	1.0	-2.05	-1.07
Iran	1 024	1 198	3.21	1.85	11.5	13.0	1.38	1.07
Japan	81	86	0.14	0.91	1.5	1.6	-2.02	0.53
Kazakhstan	69	90	-1.57	2.31	0.5	0.6	-5.45	1.01
Korea	22	31	6.24	3.10	1.4	1.4	0.58	0.03
Malaysia	0	0	..	..	3.5	3.7	1.51	0.45
Pakistan	1 279	1 412	6.71	1.43	6.7	6.4	1.85	-0.26
Philippines	77	93	1.87	1.83	1.3	1.2	-2.00	-0.73
Saudi Arabia	17	14	3.28	-0.93	6.2	6.9	0.92	1.00
Thailand	245	268	1.93	0.92	3.9	3.9	5.11	-0.21
Turkey	1 501	1 822	2.53	1.76	14.1	14.0	1.15	-0.29
Viet Nam	332	383	1.04	1.86	3.2	3.4	0.29	1.32
OCEANIA	2 703	3 297	1.11	1.53	2.1	2.4	3.21	1.19
Australia	2 657	3 245	1.10	1.53	1.6	1.9	5.55	1.40
New Zealand	31	33	1.18	0.54	4.1	4.5	0.43	0.84
DEVELOPED COUNTRIES	**22 248**	**27 832**	**3.74**	**2.05**	**3.8**	**4.9**	**3.00**	**2.19**
DEVELOPING COUNTRIES	**66 936**	**83 181**	**2.74**	**2.01**	**8.8**	**10.0**	**1.58**	**1.12**
LEAST DEVELOPED COUNTRIES (LDC)	18 029	22 610	3.00	2.07	11.9	12.4	1.50	0.44
OECD[3]	**21 950**	**27 410**	**4.41**	**2.07**	**5.6**	**6.9**	**3.20**	**1.59**
BRICS	**32 522**	**40 481**	**2.31**	**1.94**	**8.6**	**10.2**	**1.84**	**1.59**

.. Not available

Note: Calendar year. Average 2018-20est: Data for 2020 are estimated. Production and consumption are expressed on dry weight basis.

1. Refers to all current European Union member States (excludes the United Kingdom)
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.
3. Excludes Iceland and Costa Rica but includes all EU member countries.
4. Least-squares growth rate (see glossary).

Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", *OECD Agriculture statistics* (database). dx.doi.org/10.1787/agr-outl-data-en

Table C.47. Information on food price changes

	Total inflation % change (year-on-year)		Food inflation % change (year-on-year)[3]		Expenditure share of food		Food contribution to total change in inflation[4]	
	2020	2021	2020	2021	2020	2021	2020	2021
OECD								
Australia[1]	2.2	..	2.7	..	12.8	12.8	0.3	..
Austria	2.0	0.8	1.2	-1.1	12.0	12.0	0.1	-0.1
Belgium	1.4	0.3	1.1	1.2	17.4	17.4	0.2	0.2
Canada	2.4	1.0	3.8	0.1	11.5	11.5	0.4	0.0
Chile	3.5	3.1	5.1	7.8	18.9	18.9	1.0	1.5
Colombia	3.6	1.6	5.1	5.5	34.7	34.7	1.8	1.9
Czech Republic	3.6	2.2	6.3	0.6	17.0	17.0	1.1	0.1
Denmark	0.7	0.6	0.0	0.3	11.5	11.5	0.0	0.0
Estonia	1.6	0.2	2.8	0.1	21.7	21.7	0.6	0.0
Finland	1.0	0.9	1.8	0.4	13.4	13.4	0.2	0.1
France	1.5	0.6	1.9	1.0	14.7	14.7	0.3	0.1
Germany	1.7	1.0	2.4	1.9	10.4	10.4	0.3	0.2
Greece	0.9	-2.0	-0.1	-0.4	17.1	17.1	0.0	-0.1
Hungary	4.7	2.7	6.9	3.4	19.6	19.6	1.3	0.7
Iceland	1.7	4.3	1.3	6.7	14.9	14.9	0.2	1.0
Ireland	1.3	-0.2	-1.1	-2.1	11.7	11.7	-0.1	-0.2
Israel	0.3	-0.4	-0.9	-0.1	14.3	14.3	-0.1	0.0
Italy	0.5	0.4	0.6	0.6	16.3	16.3	0.1	0.1
Japan	0.7	-0.6	0.7	-0.1	19.0	19.0	0.1	0.0
Korea	1.5	0.6	1.8	6.5	14.4	14.4	0.3	0.9
Luxembourg	1.9	1.9	1.5	1.2	11.1	11.1	0.2	0.1
Mexico	3.2	3.5	3.4	5.1	18.9	18.9	0.6	1.0
Netherlands	1.8	1.6	1.8	0.5	11.3	11.3	0.2	0.1
New Zealand[1]	2.5	..	2.3	..	17.4	17.4	0.4	..
Norway	1.8	2.5	2.1	0.7	13.3	13.3	0.3	0.1
Poland	4.3	2.6	7.5	0.8	24.1	24.1	1.8	0.2
Portugal	0.8	0.3	0.8	1.0	18.1	18.1	0.1	0.2
Slovak Republic	3.0	0.7	4.4	-0.5	18.4	18.4	0.8	-0.1
Slovenia	2.1	-0.7	3.4	0.1	17.0	17.0	0.6	0.0
Spain	1.1	0.5	2.0	1.7	18.2	18.2	0.4	0.3
Sweden	1.3	1.6	2.4	1.9	13.9	13.9	0.3	0.3
Switzerland	0.2	-0.5	-1.0	-0.3	10.8	10.8	-0.1	0.0
Turkey	12.2	15.0	9.0	18.1	26.8	26.8	2.4	4.9
United Kingdom	1.8	0.9	1.4	-0.7	11.8	11.8	0.2	-0.1
United States	2.5	1.4	0.7	3.7	7.8	7.8	0.1	0.3
OECD Total[2]	2.4	1.5	1.9	3.1	..	..	..	..
Enhanced Engagement								
Brazil	4.2	4.6	5.8	16.2	22.5	22.5	1.3	3.6
China	5.4	-0.3	20.6	1.4	33.6	33.6	6.9	0.5
India	7.5	4.1	13.6	1.9	35.4	35.4	4.8	0.7
Indonesia	2.7	1.6	4.3	2.8	19.6	19.6	0.8	0.6
Russia	2.4	5.2	2.1	8.0	32.8	32.8	0.7	2.6
South Africa	4.4	3.2	3.8	5.3	18.3	18.3	0.7	1.0

Table C.47. Information on food price changes *(cont.)*

	Total inflation % change (year-on-year)		Food inflation % change (year-on-year)3		Expenditure share of food		Food contribution to total change in inflation4	
	2020	2021	2020	2021	2020	2021	2020	2021
Non OECD								
Algeria	1.4	4.2	-1.0	4.0	43.8	43.8	-0.4	1.7
Bangladesh	5.6	5.0	5.1	5.2	28.6	28.6	1.5	1.5
Bolivia	1.2	1.2	1.2	1.2	27.6	27.6	0.3	0.3
Botswana	2.2	2.3	3.2	0.5	23.7	23.7	0.8	0.1
Bulgaria	4.2	-0.6	8.0	-0.4	37.2	37.2	3.0	-0.1
Costa Rica	1.6	1.0	-0.3	3.8	21.4	21.4	-0.1	0.8
Dominican Republic	2.1	6.2	7.6	8.9	29.2	29.2	2.2	2.6
Ecuador	-0.3	-1.0	-0.7	1.0	23.0	23.0	-0.2	0.2
Egypt	7.2	4.8	2.6	-0.5	26.3	26.3	0.7	-0.1
El Salvador	2.1	-0.7	3.4	0.1	26.0	26.0	0.9	0.0
Ethiopia	18.7	19.2	21.0	23.2	57.0	57.0	12.0	13.2
Ghana	7.8	9.9	7.8	12.8	37.0	37.0	2.9	4.7
Guatelama	1.8	5.2	1.3	9.2	28.6	28.6	0.4	2.6
Haiti	20.7	18.7	24.9	22.5	50.4	50.4	12.5	11.3
Honduras	3.5	4.2	1.2	3.7	31.8	31.8	0.4	1.2
Iraq	1.0	0.9	-2.8	-3.1	35.0	35.0	-1.0	-1.1
Jordan	-0.4	-0.3	-1.9	-0.8	35.2	35.2	-0.7	-0.3
Kenya	5.8	5.7	9.6	7.4	36.0	36.0	3.5	2.6
Madagascar	3.9	5.0	3.0	5.7	60.0	60.0	1.8	3.4
Malawi	11.8	7.7	17.6	9.7	50.0	50.0	8.8	4.9
Malaysia	1.6	-0.2	0.9	1.5	56.3	56.3	0.5	0.8
Moldavia	6.9	0.2	11.5	1.3	60.0	60.0	6.9	0.8
Morocco	1.3	0.0	1.4	-0.8	40.4	40.4	0.6	-0.3
New Caledonia	-0.1	-0.7	0.9	4.4	21.0	21.0	0.2	0.9
Nicaragua	6.3	2.2	6.0	5.9	26.1	26.1	1.6	1.5
Niger	0.3	..	-0.2	..	40.0	40.0	-0.1	..
Nigeria	12.1	16.5	14.9	20.6	51.8	51.8	7.7	10.7
Pakistan	15.4	5.7	17.8	6.7	37.5	37.5	6.7	2.5
Panama	0.4	-1.1	-0.5	1.0	33.6	33.6	-0.2	0.3
Paraguay	2.8	2.6	2.4	5.4	39.1	39.1	0.9	2.1
Peru	1.9	2.9	2.8	3.7	25.0	25.0	0.7	0.9
Philippines	3.0	2.2	2.4	5.4	39.0	39.0	0.9	2.1
Romania	4.8	3.0	3.6	2.9	37.4	37.4	1.3	1.1
Rwanda	7.3	2.8	15.8	2.0	39.0	39.0	6.2	0.8
Senegal	2.0	0.9	2.0	0.6	53.4	53.4	1.1	0.3
Singapore	0.3	0.2	1.6	1.5	21.7	21.7	0.3	0.3
Sri Lanka	5.7	3.3	12.4	7.9	41.0	41.0	5.1	3.2
Chinese Taipei	1.8	1.8	2.6	..	23.7	23.7	0.6	0.0
Tanzania	3.7	3.5	5.7	2.8	38.5	38.5	2.2	1.1
Thailand	1.0	-0.4	1.9	0.6	33.0	33.0	0.6	0.2
Tunisia	5.9	4.9	4.4	4.9	28.7	28.7	1.3	1.4
Uganda	3.4	3.7	3.1	-1.2	27.2	27.2	0.8	-0.3
Zambia	12.5	21.5	15.4	25.6	52.5	52.5	8.1	13.4

.. Not available

1. No data available for January 2021 in Australia and New Zealand.
2. Excludes Costa Rica.
3. CPI food: definition based on national sources.
4. Contribution is food inflation multiplied by expenditure share, expressed in %.

Source: OECD and national sources.

OECD-FAO Agricultural Outlook 2021-2030

The *OECD-FAO Agricultural Outlook 2021-2030* is a collaborative effort of the Organisation for Economic Co-operation Development (OECD) and the Food and Agricultural Organization (FAO) of the United Nations, prepared with input from Member governments and international commodity organisations. It provides a consensus assessment of the ten-year prospects for agricultural commodity, fish and biofuel markets at national, regional and global levels, and serves as a reference for forward-looking policy analysis and planning.

The *OECD-FAO Agricultural Outlook 2021-2030* presents the trends driving food and agricultural markets over the coming decade. While progress is expected on many important fronts, in order to realize the 2030 Agenda and achieve the sustainable development goals (SDGs), concerted actions and additional improvements will be needed by the agricultural sector.

More information can be found at www.agri-outlook.org.

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