OECD-FAO Agricultural Outlook 2013-2022




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BETTER POLICIES FOR BETTER LIVES

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

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Foreword

The Agricultural Outlook 2013-2022 *is a collaborative effort of the Organisation for Economic Co-operation and Development (OECD) and the Food and Agriculture Organization (FAO) of the United Nations. It brings together the commodity, policy and country expertise of both organisations and input from collaborating member countries to provide an annual assessment of prospects for the coming decade of national, regional and global agricultural commodity markets. This year's edition contains for the first time a chapter on world cotton markets. Chapter 2 has been prepared with assistance from the Agricultural Information Institute (AII) of the Chinese Academy of Agricultural Sciences and the Ministry of Agriculture (MoA) of the Government of China. However, responsibility for the information and projections contained in this document remain those of the OECD and FAO, and do not necessarily reflect the views of the AII or of the MoA.*

The baseline projection is not a forecast about the future, but rather a plausible scenario elaborated on the basis of specific assumptions regarding the macroeconomic conditions, the agriculture and trade policy settings, weather conditions, longer term productivity trends and international market developments. The projections of production, consumption, stocks, trade and prices for the different agricultural products described and analysed in this report cover the years 2013 to 2022. The evolution of markets over the outlook period is typically described using the annual growth rate or percentage changes for the final year 2022 relative to a three-year base period of 2010-12.

The individual commodity projections are subject to critical examination by national country experts of OECD, other collaborating countries and industry experts prior to their finalisation and publication in this report. The risks and uncertainties around the baseline projections are examined through a number of possible alternative scenarios and stochastic analysis, which illustrate how market outcomes may differ from the deterministic baseline projections.

The fully documented outlook database, including historical data and projections, is available through the OECD-FAO joint internet site www.agri-outlook.org.

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

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At the FAO, the team of economists and commodity officers from the Trade and Markets contributing to this edition consisted of Abdolreza Abbassian, ElMamoun Amrouk, Pedro Arias, Boubaker BenBelhassen (EST Principal Officer), Concepcion Calpe, Emily Carroll, Merritt Cluff, Cheng Fang, David Hallam (EST Division Director), Holger Matthey (Team Leader), Seth Meyer, Masato Nakane, Jean Senahoun, Shangnan Shui, Timothy Sulser and Peter Thoenes. Marcel Adenäuer from Bonn University joined the team as a consultant. Audun Lem and Stefania Vannuccini contributed from the Fisheries and Aquaculture Department, with technical support from Pierre Charlebois. Research assistance and database preparation were provided by Claudio Cerquiglini, Berardina Forzinetti, Patrizia Masciana, Marco Milo, Fiorella Picchioni and Barbara Senfter. Several other colleagues from FAO and member country institutions improved this report through valuable details and comments. From FAO's Publishing Group, Rachel Tucker and Yongdong Fu provided invaluable assistance. Dr Chen Zhijun (TCI) provided information on climate and water in China.

Chapter 2 of the *Outlook* "Feeding China: Prospects and challenges in the next decade" was written in close collaboration between Chinese colleagues and the Secretariats at OECD and FAO. The team from the Agricultural Information Institute of the Chinese Academy of Agricultural Sciences included Xu Shiwei (Director General), Li Zhemin, Li Zhiqiang, Li Ganqiong, Wu Jianzhai, Kong Fantao and Wang Shengwei. The team from the Market and Economic Industry Division of the Ministry of Agriculture included Cai Ping (Director) and Zhao Zhuo. Wu Laping, Yu Leng, Li Guoxiang, Zhu Xinkai, Yang Jun also contributed data support, modelling advice, policy analyses and other valuable insights.

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Acronyms and abbreviations

ACP	African, Caribbean and Pacific countries
ACV	Annual coefficient of variation
AIS	Agriculture Innovation System
AMAD	Agricultural Market Access Database
AMIS	Agricultural Market Information System
ARS	Argentinean peso
ASEAN	Association of South East Asian Nations
AUD	Australian dollars
AUSFTA	Australia and United States Free Trade Agreement
BN	Billion
BNGY	Billion gallons per year
Bnl	Billion litres
BNLY	Billion litres per year
BRIC	Emerging economies of Brazil, Russian Federation, India and China
BRIIC	Emerging economies of Brazil, Russian Federation, India, Indonesia and China
BRICS	Emerging economies of Brazil, Russian Federation, India, China and South Africa
BRL	Real (Brazil)
Bt	Billion tonnes
BTL	Biomass to liquid
CAD	Canadian dollar
CAP	Common Agricultural Policy (EU)
CCC	Commodity Credit Corporation
CET	Common External Tariff
CGIAR	Consultative Group on international Agricultural Research
CIS	Commonwealth of Independent States
CN	Combined Nomenclature
CNY	Yuan (China)
COOL	Country of Origin Labelling
CMO	Common Market Organisation for sugar (EU)
CO_2	Carbon dioxide
CPI	Consumer Price Index
CRP	Conservation Reserve Program of the United States
Cts/lb	Cents per pound
Cwe	Carcass weight equivalent
DBES	Date-based export scheme
DDA	Doha Development Agenda
DDG	Dried Distiller's Grains

Dw	Dressed weight
EBA	Everything-But-Arms Initiative (EU)
ECOWAP	West Africa Regional Agricultural Policy
ECOWAS	Economic Community of West African States
EISA Act	Energy Independence and Security Act of 2007 (US)
EPA	US Environmental Protection Agency
EPAs	Economic Partnership Agreements (between EU and ACP countries)
ERS	Economic Research Service of the US Department for Agriculture
Est	Estimate
E85	Blends of biofuel in transport fuel that represent 85% of the fuel volume
EU	European Union
EU-15	Fifteen member states of the European Union
EU-27	Twenty seven member states of the European Union (including Bulgaria and Romania from 2007)
EUR	Euro (Europe)
FAO	Food and Agriculture Organization of the United Nations
FCE Act	Food, Conservation and Energy Act of 2008 US Farm Bill
FDP	Fresh dairy products
FDP	Fertiliser Deep Placement
FFV	Flex fuel Vehicles
FOB	Free on board (export price)
FR	Federal Reserve (US central bank)
FTA	Free Trade Agreement
G-20	Group of 20 developing countries (see Glossary)
GAEZ	Global Agro-Ecological Zones
GAL	Gallons
GM	Genetically modified
GDP	Gross domestic product
GDPD	Gross domestic product deflator
GEO-GLAM	Group on Earth Observations Global Agricultural Monitoring Initiative
GMO	Genetically modified organism
Ha	Hectares
HFCS	High fructose corn syrup
Hl	Hectolitre
ICARDA	International Center for Agricultural Research in the Dry Areas
IEA	International Energy Agency
IFA	International Fertiliser Industry Association
IFAD	International Fund for Agricultural Development
IFDC	International Fertiliser Development Center
IFPRI	International Food Policy Research Institute
IICA	Inter-American Institute for Cooperation Agriculture
iLUC	Indirect land-use change
IMF	International Monetary Fund
INR	Indian rupees
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
IPR	Intellectual Property Rights

Kg	Kilogrammes
Kha	Thousand hectares
KRW	Korean won
Kt	Thousand tonnes
La Niña	Climatic condition associated with the temperature of major sea currents
LAC	Latin America and the Caribbean
Lb	Pound
LDCs	Least Developed Countries
Lw	Live weight
MERCOSUR	Common Market of South America
MFA	Multi-fibre Arrangement
MFN	Most Favoured Nation
Mha	Million hectares
Mn	Million
MPS	Market Price Support
Mt	Million tonnes
MXN	Mexican peso
N	Nitrogen
NP	Nitrogen, phosphate
NPK	Nitrogen, phosphate, potassium
NAFTA	North American Free Trade Agreement
NLB	Net land balances
NZD	New Zealand dollar
OECD	Organisation for Economic Co-operation and Development
OIE	World Organisation for Animal Health
P	Phosphorus
p.a.	Per annum
PCE	Private consumption expenditure
PPP	Purchasing power parity
PR	Phosphate Rocks
PSE	Producer Support Estimate
RED	Renewable Energy Directive in the EU
RFS2	Renewable Fuels Standard in the US, which is part of the Energy Policy Act
RIN	Renewable Identification Numbers prices
Rse	Raw sugar equivalent
Rtc	Ready to cook
RUB	Russian ruble
RUK	Russian Federation, Ukraine and Kazakhstan
SAI	Sustainable Agricultural Initiative
SCP	European Food and Sustainable Consumption and Production round table
SFP	Single Farm Payment scheme (EU)
SI	Supplemental Irrigation
SMP	Skim milk powder
SPS	Sanitary and phytosanitary measures
SRES	Special Report on Emissions Scenarios
T	Tonnes
TBT	Technical Barriers to Trade

T/ha	Tonnes/hectare
THB	Thai baht
TRQ	Tariff rate quota
UDP	Urea Deep placement
UK	United Kingdom
UN	The United Nations
UNCTAD	United Nations Conference on Trade and Development
UN HLTF	UN High Level Task Force on the Food Security Crisis
UNEP	FAO United Nations Environment Program
UNICEF	The United Nations Children's Fund
URAA	Uruguay Round Agreement on Agriculture
US	United States
USD	United States dollar
USDA	United States Department of Agriculture
VAT	Value added tax
VHP	Very high polarization sugar
WAEMU	West African Economic and Monetary Union
WFP	World Food Programme
WMP	Whole milk powder
Wse	White sugar equivalent
WTO	World Trade Organisation
ZAR	South African rand
Zn	Zinc

Executive summary

Rising demand favours developing countries: For decades, global agriculture was characterised by policy-induced production surpluses in industrialised countries and stagnating growth in developing countries. Policy reforms and economic growth across the globe have been changing demand and supply fundamentals, transforming agriculture into a more market-driven sector which provides investment opportunities. Developing countries are expected to increase their share of global production and capture most of the growth in trade.

Slower production growth: Global agricultural production for commodities covered in this *Outlook* is projected to grow at 1.5% annually, on average, compared to 2.1% in the previous decade. This slower growth is expected to be exhibited by all crop sectors and livestock production. These trends reflect rising costs, growing resource constraints, and increasing environmental pressures, which are anticipated to inhibit supply response in virtually all regions.

Food price inflation has eased: The link between commodity prices and what consumers actually pay for their food is usually not straightforward. So, even though commodity prices remain high, there is some evidence that consumer food price inflation is abating. Nevertheless, with food expenditures accounting for 20-50% or more of household budgets in many developing countries, food affordability remains a concern.

Markets reflect two-speed global economy: Although relatively resilient to economic downturns, agricultural markets continue to reflect the impact of a two-speed global economy with weak recovery in developed countries and vibrant growth in many developing countries. Rising oil prices are an important but unpredictable factor in the price projections. A depreciating US dollar is expected to reduce the relative competitiveness of other exporters while increasing the purchasing power of many importers.

Prices will rise over medium term: Commodity prices are currently high by historical levels. In the near term, crop prices should fall as production rebounds, while low livestock inventories keep meat prices high. Longer term prices for both crop and livestock products are set to rise with meat, fish and biofuel prices projected to rise more strongly.

Inflation adjusted prices remain high: Average real prices for the 2013-22 period are projected well above the 2003-12 average for most of the commodities covered in this *Outlook*. However, average real prices over the next decade should be lower than the peaks experienced in recent years.

Consumption to grow: Consumption of all products covered in this *Outlook* will increase in developing countries, albeit at a slower pace, driven by growing populations, higher incomes, urbanisation and changing diets. Per capita consumption is projected to expand most rapidly in Eastern Europe, and Central Asia followed by Latin America and other Asia.

Agriculture trade continues to increase: Emerging economies will capture much of the trade growth, accounting for the majority of exports of coarse grains, rice, oilseeds, vegetable oil, sugar, beef, poultry and fish. The OECD area's share of trade will continue to decline while remaining the major exporter of wheat, cotton, pig and sheep meat and most dairy products.

Outlook uncertainties: Production shortfalls, price volatility and trade interruptions remain a threat to global food security, especially in light of low stocks. A widespread drought like that experienced in 2012 in the United States and CIS countries, on top of low stocks, could raise crop prices by 15-40%. Energy prices add another source of uncertainty, affecting both biofuel markets and input costs. World trade is even more sensitive than production to yield variability and macroeconomic drivers.

Focus on China: This edition of the *Outlook* takes a special look at China, which has a rapidly expanding agri-food sector. Faced with production constraints and rising demand, China is likely to import more of its food in future but, overall, is projected to remain self-sufficient in the main food crops.

It is projected that China's consumption growth of agricultural products will slightly outpace its production growth by some 0.3% p.a., similar to the trend of the previous decade. As a result, a further but modest opening of China's agricultural sector is anticipated, although these prospects vary by commodity.

China has made food security and self-sufficiency in rice and wheat a top policy priority. Agricultural output grew almost fivefold between 1978 and 2011. However, in recent years food prices have been rising, and output is set to slow with rising resource and labour constraints.

Increased availability of food and higher incomes have improved food security significantly with the number of undernourished falling by almost 100 million since 1990, despite adding 200 million people to its population. Reducing the number of persons undernourished remains a major challenge.

From 2001 to 2012, China's agricultural imports and exports increased from USD 27.9 bn to USD 155.7 bn. Import dependence doubled from 6.2% to 12.9% and China's net trade deficit in agriculture and food stood at USD 31 bn in 2012.

Key uncertainties for China include the ongoing sustainability of high levels of economic growth, increasing resource constraints on production and the potential for increased production variability amid rising climate unpredictability.

Global commodity projections to 2022

- ***Cereals:*** Production is expected to increase 1.4% p.a. with 57% of total growth coming from developing countries. Thailand is projected to be the leading exporter of rice followed closely by Viet Nam while the United States is expected to remain the dominant exporter of wheat and coarse grains.
- ***Oilseeds:*** Production is set to increase even faster than cereals. Palm oil should maintain a stable 34% share of total vegetable oil production.
- ***Sugar:*** Production is expected to increase by almost 2% a year with Brazil and India the leading producers. Developing countries will continue to dominate world sugar use.

- ***Cotton:*** Man-made fibres will take an ever-larger market share. India's cotton production is projected to rise 25%, making it the world's leading producer.
- ***Ethanol:*** Production is expected to increase almost 70%, with biodiesel increasing even faster but from a smaller base. By 2022, biofuel production is projected to consume 28% of total world production of sugar cane, 15% of vegetable oils and 12% of coarse grains.
- ***Meat:*** Developing countries are expected to account for 80% of the growth in global production. Per capita meat consumption growth will slow as major developing economies approach the levels of developed countries.
- ***Dairy:*** Developing countries are expected to generate 74% of global milk production gains. Still, consumption in developing countries is projected to grow faster than production, with higher exports from the United States, the European Union, New Zealand, Australia and Argentina.
- ***Fisheries:*** Capture output is projected to rise only 5% but aquaculture production to increase by 35%. By 2015, aquaculture should surpass capture fisheries as main source of fish for human consumption.

OECD-FAO Agricultural Outlook 2013

Chapter 1

Overview of the OECD-FAO Outlook 2013-2022

Introduction

The *Outlook* depicts relatively favourable prospects for world agriculture to 2022. In the near term, a dichotomy exists between world crop and livestock sectors. Crop agriculture is characterised by falling prices relative to recent peaks in response to projected large supplies and stock replenishment induced by high prices in recent years. In contrast, livestock product prices are high and increasing at the start of the outlook period, driven up by high feed costs and reduced global livestock inventories and production. Beyond the near term, markets, in general, are expected to begin to tighten and for agricultural prices to firm, with prices in real terms remaining relatively flat for most commodities. Nevertheless, agricultural commodity prices are held above pre 2007 levels, in nominal and real terms, by strong demand, higher input costs and slower productivity growth over the projection period.

Market tightening in recent years has been accompanied not only by an increase in the level of agricultural prices but also by a resurgence of commodity and food price volatility, reminiscent of the situation of the 1970s. In these circumstances, prolonged periods of low agricultural product prices driven by ever increasing productivity improvements in a context of low oil and energy prices seem now a feature of a bygone era. Instead, with energy prices high and rising and production growth declining across the board, strong demand for food, feed, fibre and industrial uses of agricultural products is leading to structurally higher prices and with significant upside price risks. The frequency of short term price surges and bouts of high volatility, accentuated in some cases by policy choices, have catapulted agriculture and its future prospects into renewed prominence. This has reflected heightened concerns not only for the public about food security and the adequacy of basic agricultural supplies to meet their future food needs, but also for many governments faced with the risk of social unrest in the event of continuing high food price inflation.

Changing fundamentals have transformed agricultural markets. These changes appear to be here to stay and will shape the evolution of agricultural markets over the medium term. Global production continues to respond to changing market signals, increasing when prices rise and declining as prices fall, while trending upwards overtime. For instance, world production for most crops is projected to increase in 2013 in response to recent high prices caused by droughts in the United States and parts of Europe. Declining production is then anticipated in the following period in response to projected lower global prices of 2013, but with world production averaging higher by the close of the projection period (Box 1.1 analyses the market impacts of the drought of 2012). However, recent global output increases have not been sufficient, in general, to drive prices back to previous trend levels i.e. pre-2007 levels. In part this has been due to adverse weather events in key producing countries that have delayed production response to high prices and stock rebuilding, but other factors are also at work. These include longer term trends of declining production growth in crop and livestock sectors across many countries that reflect, in part, fundamental changes in production conditions. These include high and rising oil and energy prices, growing resource constraints, increasing environmental pressures and under investment in R&D in past years which are anticipated to slow supply response in virtually all regions.

Box 1.1. **Effects of the 2012 droughts in the United States and CIS countries on cereals and oilseeds**

In the summer of 2012 further market disruption took place in global cereal markets. Weather conditions caused one of the most severe drought periods the United States has seen. According to the United States Department of Agriculture (USDA), drought conditions affected approximately 80% of US agricultural land. Despite preliminary expectations of a strong maize growing season due to a mild winter, early planting, and adequate rainfall levels, the drought conditions and high sustained temperatures from June through August damaged crops quite severely (US Bureau of Labor Statistics, 2012). At the same time, according to the Russian Federation's Ministry of Agriculture, a drought destroyed crops in 21 regions of the Russian Federation in an area of 5.5 Mha (around 7% of the sown area in the country). Kazakhstan and Ukraine were also severely affected, with grain and oilseed yields at much lower levels than trend.

In this scenario we use last year's Aglink-Cosimo model (OECD-FAO, 2012) to analyse the *ex post* effects of the 2012 drought. For this we introduce as a scenario shock the observed cereals and oilseeds yields for the 2012/13 marketing season, as projected in the 2012 edition of the *Outlook* report. The following Table 1.1 summarises the shocks introduced to the model, which correspond to the difference between the projected yields for 2012 of last year's *Outlook* (no drought effects) and the yields observed this year (post drought).

Table 1.1. **Yield changes in 2012 due to the drought**

% changes between this year's (observed yields) and last year's *Outlook* (projected yields without drought)

	Coarse Grains	Oilseeds	Wheat	Barley	Maize	Oats	Soyabeans	Sorghum
Kazakhstan	-28	-10	-53					
Russian Federation			-19					
Ukraine	-6	-5	-15					
United States					-25	-1	-9	-23

Source: OECD and FAO Secretariats.

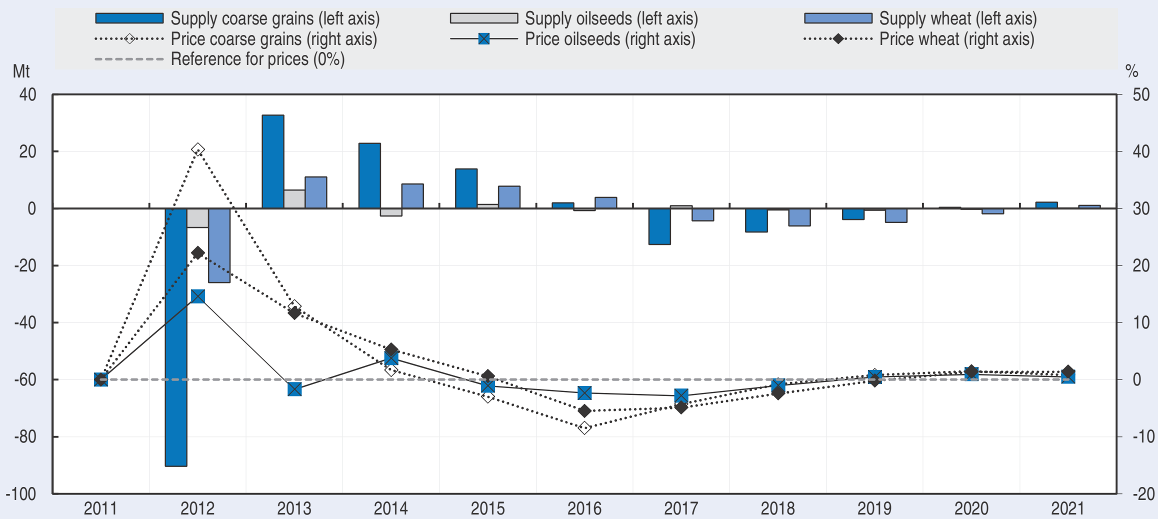
StatLink http://dx.doi.org/10.1787/888932860617

As a response to the drought, production drops considerably in the United States and CIS countries and international prices experience large increases in 2012 (Figure 1.1). The resulting price changes are very much correlated with the size of the shock and the tightness of the market. For instance, lower stock to use ratios for coarse grains compared to wheat or oilseeds provoke a larger short-term reaction on prices. While global supply of coarse grains decreases in 2012 by around 90 Mt compared to a situation without a drought, the reference price (No. 2 yellow corn US f.o.b. Gulf Ports) increases by about 40%. In the case of wheat and oilseeds, more moderate effects are observed, with production falling by 26 Mt and 7 Mt, respectively, in 2012, and with prices increasing by 22% and 15%, respectively.

Box 1.1. **Effects of the 2012 droughts in the United States and CIS countries on cereals and oilseeds** *(cont.)*

Figure 1.1. **Supply and price dynamics of a drought scenario**

Percentage changes between the counterfactual scenario and the baseline



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932858033

Sources: OECD and FAO (2012) *OECD-FAO Agricultural Outlook 2012-2021*, Paris. U.S. Bureau of Labor Statistics (2012) *Beyond the Numbers*, Volume 1, Number 17.

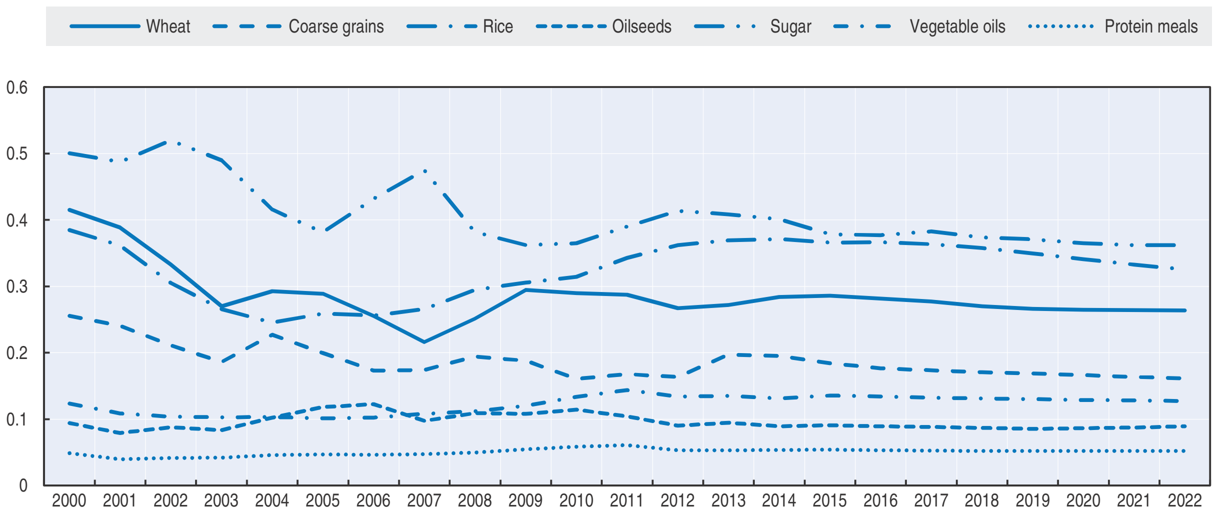
As a result, the constellation of agricultural commodity prices examined in this *Outlook* have become structurally higher with all prices projected to remain at an elevated level over the next decade. For this outlook assessment, nominal commodity price are being projected to rise moderately, and with an abatement of price volatility in the near term as markets give way to more comfortable output expectations and increasing stock cover.

The price projections are predicated on the key assumption of normal production conditions and the absence of unforeseen market shocks such as droughts and animal disease outbreaks. When this assumption is relaxed, as in the discussion of *Outlook* uncertainties in the last section of the chapter, agricultural commodity price prospects clearly become much more variable. Moreover, with stocks-to-use ratios anticipated at or near historical lows for many commodities in later years of the outlook period (Figure 1.2), there is more risk of price rises than falls, with further periods of price surges and bouts of enhanced volatility in the coming decade.[1] These short term price surges have been a feature of recent years and could occur again in the event of any substantial production shortfalls, or other restrictions on commodity flows, taking place in major producing and trading regions in the coming decade. Any such events could result in substantially higher average prices for agricultural commodities in the next decade than are currently projected.

This report assesses and analyses the prospects for the different crop, livestock, fish and agricultural products-based biofuels in the context of the changes taking place in the various factors that shape the evolution of supply and demand structures in these markets. These include increasing environmental and resource constraints, longer term sustainability goals, and ongoing adjustments in national agricultural policies as well as

Figure 1.2. **Historical and projected stocks-to-use ratios for crop products**

Trend in ratios of commodity stocks to consumption, 2000 to 2022



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932858052

stronger external influences on agriculture. The factors external to agriculture that will shape global demand and supply for agricultural commodities include slowing population growth and changing population demographics, macroeconomic shocks and the speed of recovery to sustained global economic growth, the increasing co-movement of agriculture with energy and financial markets, and enhanced climatic uncertainties. All these influences are factored into the commodity price projections and market developments that are discussed in the different commodity chapters of the report and highlighted in the Overview chapter.

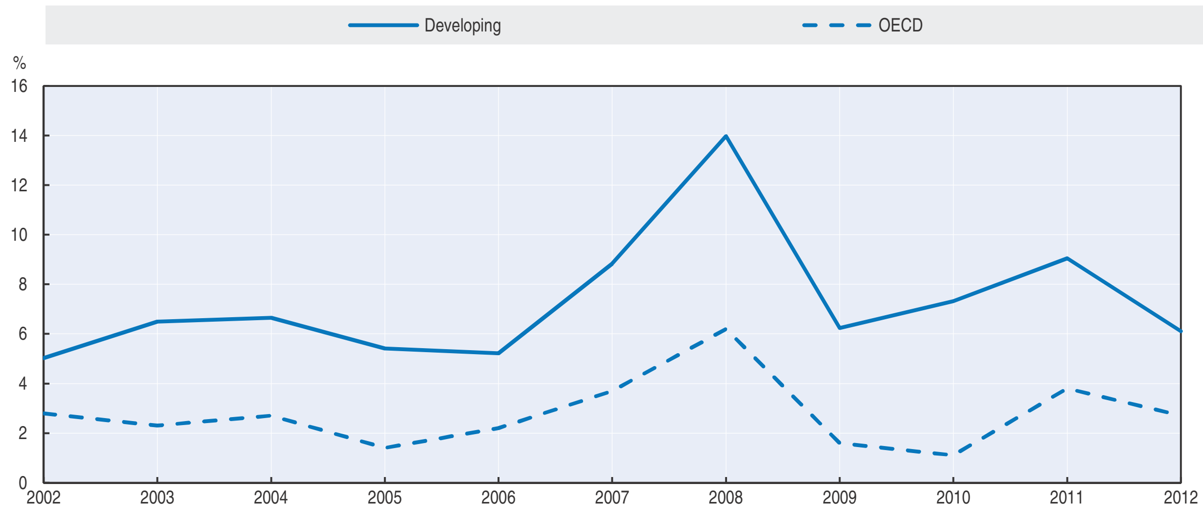
Food price inflation

Food price movements are closely watched by consumers as well as governments because of their impact on household expenditures and the cost of living. They are particularly important for developing countries and low income groups in OECD countries where food expenditures often account for a large share of household expenditures. Though the *Outlook* does not project retail food prices, it is nonetheless informative to examine recent trends.

High consumer prices have abated at the start of the *Outlook*. Food price inflation, as measured by the food component of the Consumer Price Index (CPI), slowed over the past year in both OECD and developing countries. In the OECD it fell from 3.8% to 2.7% and in developing countries in the aggregate from over 9% to 6%, with food price increases decelerating in roughly half of OECD countries and almost two-thirds of developing countries. Over the past decade food price inflation has been higher and more variable in developing countries as a whole compared to the OECD area as seen in Figure 1.3. Differences in food price inflation can be attributed to differences in the food basket utilised in the index and the underlying structure of the food systems including costs of production, in addition to the impacts of exogenous factors on supply.

Figure 1.3. **Food price inflation in OECD and developing countries**

Average annual food price inflation rates in per cent, 2002-12



Source: CPI-Food Main economic indicators, OECD, OECD Secretariat calculations based on national sources, and ILO-Laboursta, weighted by GNP-PPP per capita, Penn World Tables.

StatLink http://dx.doi.org/10.1787/888932858071

OECD countries

The regional aggregates mask substantial variation between countries. In approximately half of the OECD countries food price inflation increased, rising by over 4% in about a third of them, while overall inflation subsided in over 85% of the OECD countries. Food price inflation continued to outpace overall inflation in the OECD area, the only exceptions being Japan, the United States, Norway, and Turkey. Given the small share of food in total household expenditures in many OECD countries the contribution of food prices to overall inflation remains limited at only half a percentage point on average. However, in Chile, Mexico, Turkey, Estonia, the Czech Republic, and the Slovak Republic, food expenditure shares average about 20% and food price increases were greater than 5%. In these cases the contribution of food to overall inflation was over one percentage point. A summary of the food price inflation for selected OECD countries is shown in Figure 1.4.

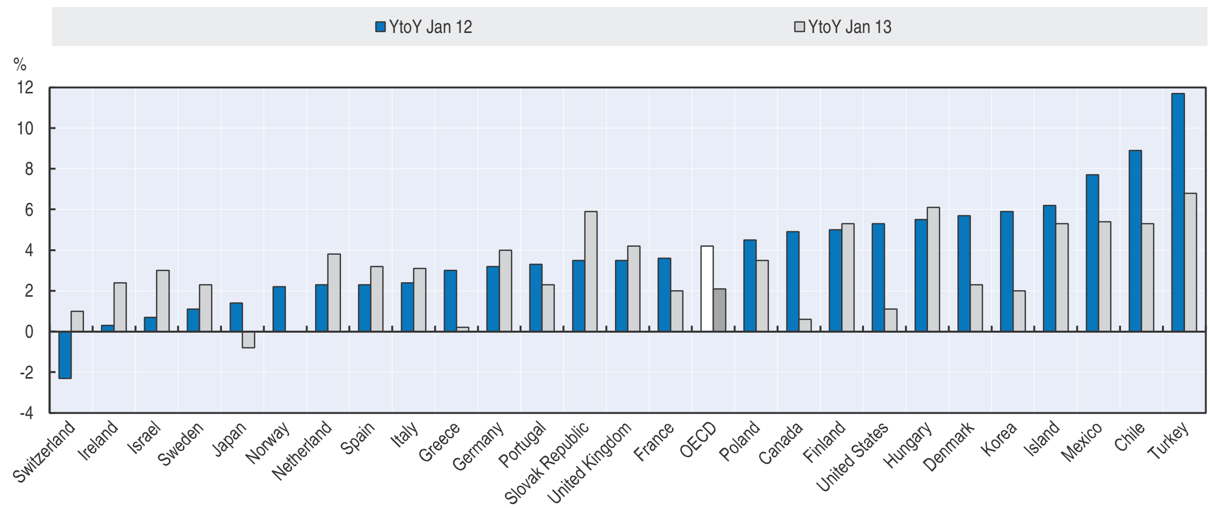
Emerging economies and developing countries

While food price increases in developing countries slowed, on average, this past year, significant differences between countries remain. Though double digit food inflation was the exception, a few countries did experience food price increases of 10% or more, Brazil (11%) and Venezuela (22%) are standout examples, but several others hover between 10% to 12% (Uruguay and Nicaragua, Ethiopia, Tanzania, and Malawi). Food price increases slowed in much of Asia, while they were mixed in Africa and in Latin America with countries equally split between those experiencing acceleration in food price increases and those experiencing a decrease over the past year. Food inflation has been generally more volatile and higher among the major emerging economies than in OECD countries over the past decade.

Given the relatively large share of food expenditures in household budgets in developing countries, ranging from 20% to 50% or more, food price changes can significantly affect overall inflation. For approximately two-thirds of the developing countries the contribution of food price increases to overall inflation was less than

Figure 1.4. **Annual food price inflation rates: Selected OECD countries**

Food price inflation per cent change



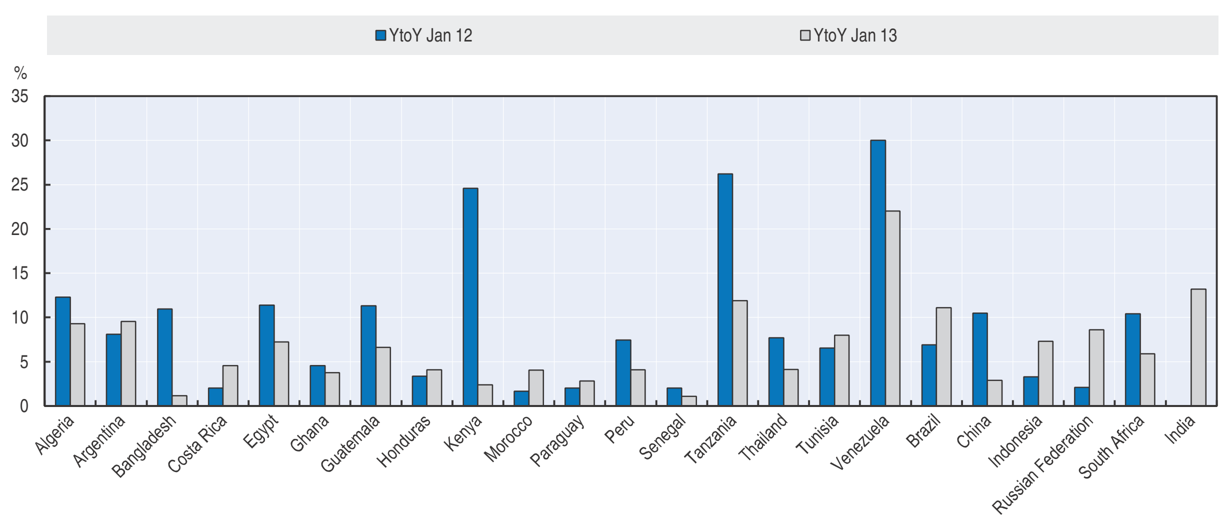
Source: MEI, OECD, January year on year changes in the consumer price index-food.

StatLink http://dx.doi.org/10.1787/888932858090

2 percentage points, whereas 20% of the countries examined experienced over three percentage points. Food price inflation for selected countries outside the OECD area is shown in Figure 1.5.

Figure 1.5. **Annual food price inflation rates: Emerging and developing countries**

Food price inflation per cent change



Note: Data are not available for India in January 2012.
Source: MEI, OECD Secretariat calculations based on national sources and Laborsta, ILO.

StatLink http://dx.doi.org/10.1787/888932858109

In general, caution must be exercised in attributing changes in the food component of the CPI directly to international food commodity prices without an analysis of the input-output structure of the food sector of each country. Commodities generally undergo a substantial transformation through transportation, storage, processing and marketing before reaching consumers at the retail level. Thus the price link between the two is often not straightforward. Normally it is the structure of the consumer's food basket and the commodity share in its composition that determines the extent of the international commodity price impacts on food prices.

Macro and policy settings

A number of factors will continue to influence the evolution of agricultural markets in the coming decade including the broader macroeconomy in which agriculture operates. World economic growth is assumed to improve modestly in 2013 and to increase further over the medium term with a recovery in private demand. The world macroeconomic situation continues to reflect the after effects of the global financial and economic crisis. There remains a two-speed dichotomy between relatively weak and hesitant economic growth, with historically high levels of unemployment, in many developed countries and much higher economic growth with already a recovery to pre-crisis levels of employment in developing countries. As a consequence, developing countries and the large emerging economies are becoming the epicentre of the world economy, as has been the case for agriculture already for many years.

Developing countries and large emerging economies now represent an increasing share of global economic activity, led by high growth in the emerging economies of China, India and other countries of Asia in particular. Although policy actions have lowered risks of crisis in the United States and in the Euro area, this is at the cost of a delayed return to recovery in many member states. For both regions, downside risks remain significant in terms of further setbacks in the Euro area and from excessive fiscal consolidation in the United States. Continued stimulus in Japan and a weaker Yen is expected to help lift it out of recession. Over the longer term, a return to steady economic growth is expected to be supportive of increasing world demand and trade in agricultural products.

Exchange rates are critical to the baseline projections as they influence relative competitiveness for exporters and affordability of purchases for importers and thus agricultural trade between regions. A depreciation of the US dollar with respect to other currencies, such as the Chinese Yuan will increase dollar denominated world prices of agricultural products. Oil and energy prices are assumed to increase over the coming decade and to remain historically high reflecting steady global economic growth. By the end of the projection period in 2022, the price of crude oil is assumed to be around USD 145 per barrel, with an average growth over the period of 2.6% p.a. and slightly above that for consumer price inflation. High energy and oil prices will have effects on both demand and supply of agricultural products, through higher agricultural supply costs and increased demand for agricultural feedstocks used for biofuels production.

Another factor strengthening demand for agricultural products is population growth. Stronger global economic growth is expected to contribute to the continued slowing in population growth through lower birth rates. The growth in world population is expected to slow to just 1% during the next decade. Developing countries are expected to continue to experience the fastest population gains, with Africa leading the group and growing at 2.3% p.a.

The changes underway in the developing countries with an increasing share of world economic activity and their greater responsiveness of consumption to income growth along with more rapid population gains and large middle classes, are expected to support increased demand and trade for food, feed, fibres and fish over the projection period. When combined with a weaker US dollar, the high economic growth in developing countries should underpin continued high agricultural prices in the coming decade. Low levels of general inflation should sustain food demand in the OECD area while high inflation will dampen demand growth in some emerging countries. Finally, the projections are based on a *status quo* assumption for agriculture and trade policies. The major assumptions underlying the baseline projections are discussed in Box 1.2. An explanation of the procedures involved in the projection of oil prices that are used in the agricultural baseline are discussed in Box 1.3.

Box 1.2. **Macroeconomic and policy assumptions**

The main assumptions underlying the baseline projection

The *Outlook* is presented as one baseline scenario that is considered plausible given a range of conditioning assumptions. These assumptions portray a specific macroeconomic and demographic environment which shapes the evolution of demand and supply for agricultural and fish products. These general factors are described below. The statistical tables, at the end of the publication, provide more detailed data for these assumptions.

The short run global economic outlook has deteriorated

Many OECD economies are still feeling the after effects of the global financial crisis. Even as economic growth has returned, the expansion has been muted. In most cases, GDP growth rates have been below recovery rates following past recessions, while unemployment rates have remained stubbornly high. In the short term, expectations have become more optimistic and expected growth rates have been revised upward moderately as the global economy is beginning to show signs of improvement. The ongoing crisis in the Euro zone has proved difficult to contain due to negative elements that interact and amplify shocks: solvency fears for banks and sovereign debt are feeding on each other due to government guarantees for banks and bank holdings of government bonds. Uncertainties about the long term viability of the monetary union also reinforce fears. Hesitant and uneven recovery is expected over the next two years. Growth in the OECD area is expected to be modest in the short term, with the Euro area remaining in recession until mid-2013. However, expectations in the medium term are for sustained economic growth to return and, in many cases, at a rate above that prevailing during 2002 to 2012.

Although conditions differ across countries, much faster growth is expected to continue in the developing countries. Developing countries have responded to low growth and uncertainty in the OECD area with policy tightening which, in addition to weaker demand from developed countries and domestic factors, has led to some slowdown in economic activity. In Sub Saharan Africa, South Africa is the main country to have been affected by the spill-over from the Euro zone crisis, as a result of strong trade and financial linkages. In general, it is expected that an easing of monetary and fiscal policy will strengthen growth in both emerging and developing countries.

In emerging markets and developing countries, unemployment rates have, on average, declined below pre-crisis levels and in those areas that did not suffer significantly from the financial crisis, such as developing Asia and Latin America, the high employment and income growth is expected to continue to support food demand.

The macroeconomic assumptions used in the *Agricultural Outlook* are based on the *OECD Economic Outlook*, (December 2012) and the International Monetary Fund's (IMF) *World Economic Outlook*, (October, 2012). Growth prospects for the OECD area in the short term are assumed to remain relatively weak, with an overall growth rate of 1.38% in 2013 just above the low rate of 1.3% in 2012. EU15 members, as a group, are expected to exhibit minimal growth averaging 0.3% in 2013. However, in the medium term, prospects appear to be better, with a slow but gradual economic recovery to an average growth rate of 1.9% p.a.

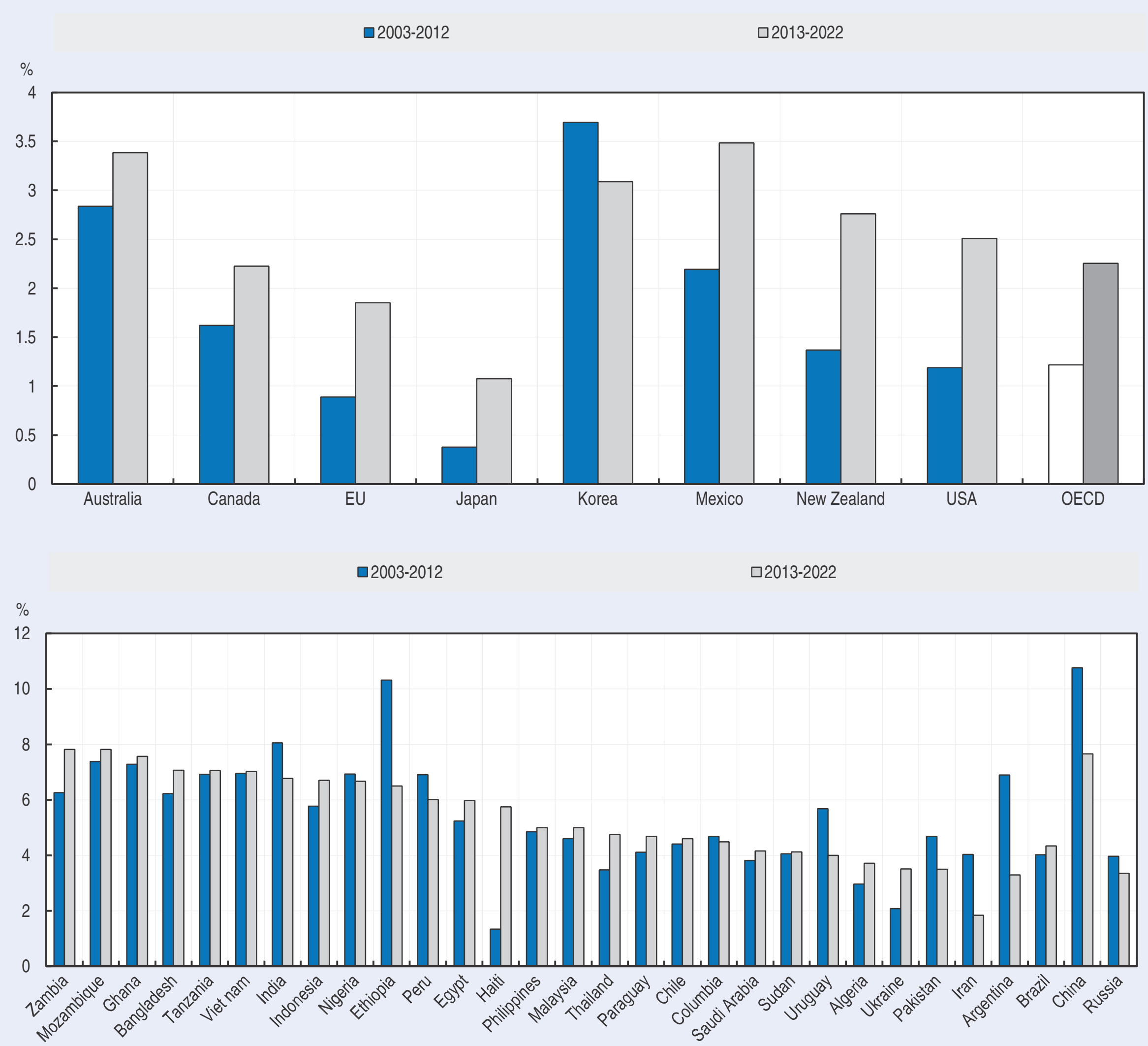
Box 1.2. **Macroeconomic and policy assumptions** *(cont.)*

Economic growth prospects for other OECD countries in the medium term are also expected to improve to average above 2.2% p.a. Among OECD members, Turkey is expected to have the strongest growth during the next ten years, averaging more than 4.3% p.a. Among the larger economies, the United States and Canada are expected to average 2.5% p.a. during the next ten years while Australia, which managed to avoid recession altogether, is expected to experience growth of around 3.4% p.a. along with Korea and Mexico (respectively 3.1% p.a. and 3.4% p.a.)

The assumptions for growth in the non-OECD area (as well as for Chile, Israel and Turkey), have been largely drawn from the IMF. Over the next ten years, China and India are expected to continue growing at an impressive 7.6% p.a. and 6.7% p.a., respectively. These countries remain the high growth leaders, with prospects for substantial market expansion. Another important emerging economy, Brazil, is also expected to grow robustly during the medium term, with GDP growth anticipated to average 4.3% p.a. These countries are effectively the main drivers of the world economy.

Figure 1.6. **GDP growth remains highly variable**

Average GDP growth rates 2003-12 and 2013-22



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932858128

Box 1.2. **Macroeconomic and policy assumptions** *(cont.)*

Population growth is expected to slow in the coming decade

World population growth is expected to slow to just 1% p.a. in the next decade. The slowdown in the growth rate is manifested in all regions. Nonetheless, an additional 742 million people needing food will inhabit the planet by 2022. Population prospects and dynamics are an important determinant of the future global economic environment, affecting both the supply and demand for agricultural commodities.

Among OECD countries, Japan's population is expected to shrink during the next decade, exhibiting a negative growth rate of -0.2% p.a. Population in Europe, including members of the European Union, continues to grow but at a low rate and is projected to decline to 0.06% p.a. by 2022. Turkey, Mexico, Australia and the United States have the highest projected population growth rates within the OECD area.

Developing countries are expected to continue to experience the fastest population growth, with Africa as a whole still growing at over 2.3% p.a. Although the population growth rate in Africa is more than double that in any other region it is also slowing in comparison to the last decade.

Inflation is expected to remain subdued throughout the OECD

With weak demand and high unemployment characterising many of the developed economies, inflation in most OECD countries, as measured by the Private Consumer Expenditure (PCE) deflator, is expected to remain low in the coming decade despite substantial monetary expansion and quantitative easing promoted by several OECD countries. Inflation for the OECD area over the next ten years is assumed to average 2.1% p.a.

In an effort to stimulate growth, Japan has announced a 2% inflation target and "*quantitative and qualitative monetary easing*", to spur consumption while combating years of deflation. Inflation is expected to be problematic in many of the high growth emerging economies. In the medium term, inflation rates between 5-6% are expected for Brazil, India and South Africa.

Inflation differential drives exchange rate

Assumptions on exchange rates are critical to the baseline projections, as they can strongly influence relative competitiveness for exporters and affordability for importers and, hence, agricultural trade across regions.

The nominal exchange rate for the period 2013-22 is mostly driven by the inflation differentials *vis-à-vis* the United States (constant exchange rate in real term). Inflation differentials between the United States and certain dynamic economies (South Africa, Brazil and India) will drive down the value of their currencies, more than 30% over the next decade. Brazil a large exporter of many agricultural products and with such a large depreciation of its currency will make it an even more formidable competitor. For the other economies, no big adjustments are projected as inflation remains under control during the projection period.

Energy prices trend upward

The world oil price assumption used in the baseline until 2014 is from the short term update of the *OECD Economic Outlook No. 92* (December 2012), while oil prices during the later years of the projection period are from the *World Energy Outlook* (IEA WEO-2012). In nominal terms, the price is supposed to increase slowly over the outlook period from USD 111 per barrel in 2012 to USD 144 per barrel by 2022, an average annual growth rate of 2.6%.

Policy considerations

Policies play an important role in agricultural and fisheries markets, with policy reforms often changing the structure of markets. Policy reforms such as decoupled payments and continued progress towards the elimination of direct price supports imply that policies will have a less direct effect on production decisions in many countries. However, import protection, domestic support and price intervention policies still loom large in many developing countries and with growing impacts that reflect these countries increasing importance in international markets and trade. The *Outlook* assumes that agricultural and trade policies will continue to be applied in line with existing legislation or announcements made. A conclusion to the DOHA Development Agenda is not assumed in this *Outlook*.

Box 1.3. **Energy prices – International Energy Agency – Methodology**

One of the important external drivers of the *Agricultural Outlook* is the crude oil price. Agricultural and energy markets have become increasingly interlinked not only through the supply side as energy is an important input but also on the demand side as the demand for biofuels has shifted outward the demand for several crops including maize, wheat, sugar and various oilseeds as feedstocks.

The oil price assumption used in the *Agricultural Outlook* is derived from the International Energy Agency's *World Energy Outlook 2012* (WEO). The WEO is derived from several assumptions including government policies, assumed GDP growth rates, demographic trends, along with technological assumptions including energy efficiency. Three different policy assumptions generate three different scenarios and three different price paths for the WEO. For the *Agricultural Outlook* we have chosen the middle price path scenario labelled in the WEO as the "New Policies Scenario". For this scenario, the WEO takes into account existing policy commitments and assumes that recently announced policies are implemented. In September 2009, G-20 leaders who gathered at the Pittsburgh Summit committed to "rationalise and phase out over the medium term inefficient fossil-fuel subsidies that encourage wasteful consumption". In November 2009, APEC leaders meeting in Singapore made a similar pledge, thereby broadening the international commitment to reform. The assumptions concerning the phase-out of fossil-fuel subsidies vary by scenario. In the scenario chosen, they are assumed to be phased out by 2020 (at the latest) in all energy-importing countries and more gradually in those exporting countries that have announced plans to do so. Under this scenario, energy demand grows by more than one-third by 2035 with most (60%) of the growth coming from China, India and the Middle East. By contrast, a renaissance underway in the US energy sector is reshaping the world's energy landscape. The United States currently relies on imports for around 20% of its primary energy demand, but rising production of oil, shale gas and bio-energy means that it is assumed to become all but self-sufficient in net-terms by 2035.

Following a sharp reduction in oil prices at the height of the financial crisis in late 2008, oil prices have risen sharply with the benchmark prices of Brent and West Texas Intermediate futures trading at around USD 115/barrel and USD 93/barrel, respectively, in early October 2012. In the New Policies Scenario international oil prices rise, in nominal terms, to USD 144/barrel in 2022. This rising trend reflects higher costs of producing oil from new sources to satisfy increasing demand.

Although the assumed oil price follows a smooth trend, prices in reality may be expected to deviate from these assumed trends – widely at times – in response to economic, energy market or geopolitical developments. The projections in the WEO are subject to a wide range of uncertainties. Key drivers in the energy markets are hard to predict, in part because they interact with each other. In the longer term, policy making is the area in which the greatest uncertainty exists, particularly when it comes to issues such as the extent to which action is taken to mitigate climate change, developments in energy subsidies, decision on nuclear power, and the pricing and production strategies of the major oil and gas exporters.

Main commodity market developments

Agricultural prices to remain at elevated levels

Higher priced agricultural products over the coming ten years, when compared to the pre-2007 decade, remain a distinct feature of this *Outlook*. The constellation of agricultural products and food prices have been on a higher plateau for several years as highlighted in the previous four *Agricultural Outlook* reports. A number of factors have been shaping the evolution of supply and demand for agricultural and fish products. These include high and rising energy and oil prices leading to increasing production costs and slowing yield and production growth. Slower production growth in combination with strong and rising demand, are projected to hold agricultural product and fish prices collectively at historically high levels. At the same time slower rates of agricultural production growth will also slowdown the replenishment of stocks making commodity markets more susceptible to high price volatility. The confluence of these supply and demand trends imply that prices of agricultural products are destined to rise over time with the main uncertainty being the extent and pace of the increase.

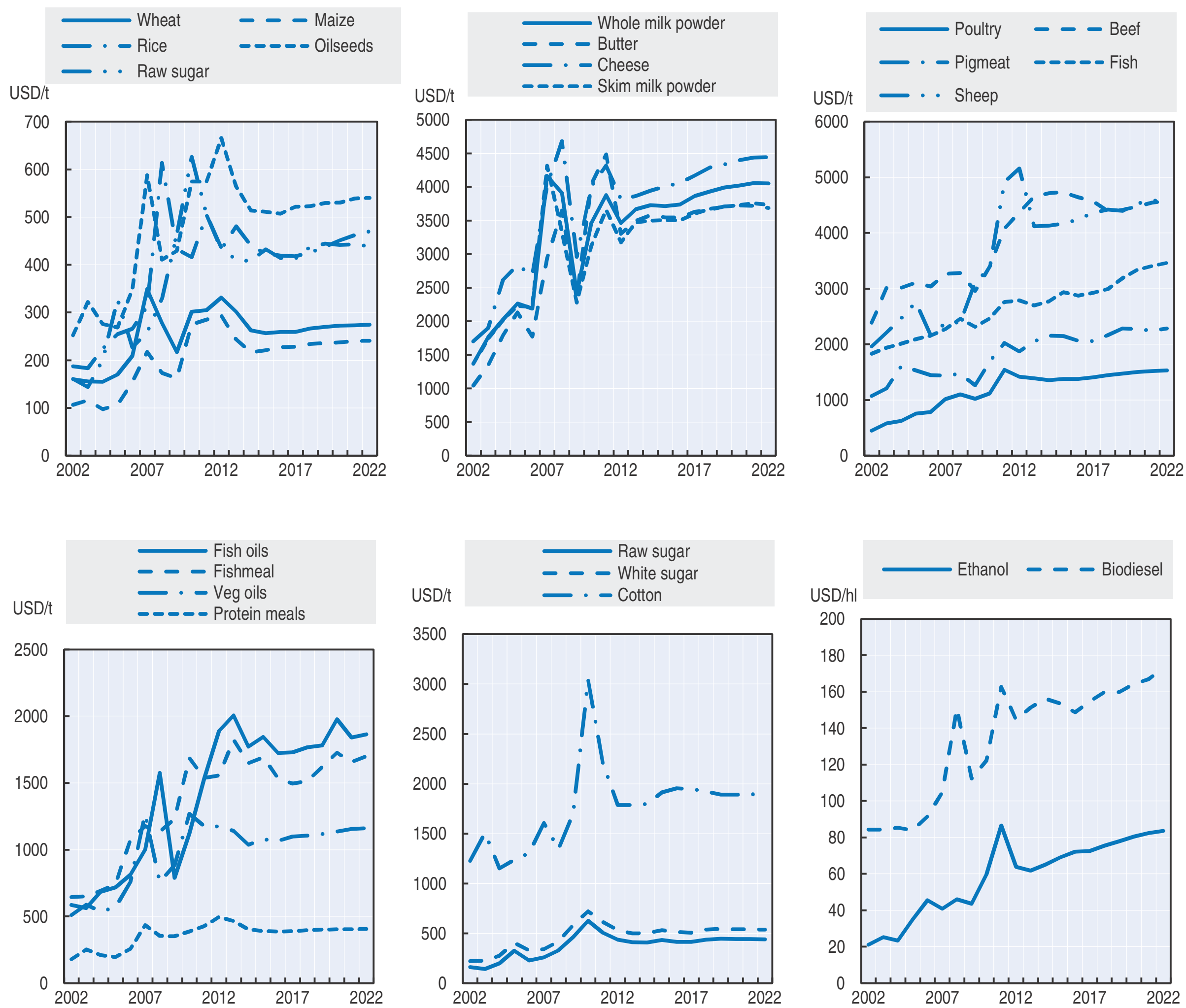
In fact many agricultural product prices are already at high levels at the start of this *Outlook*. In the absence of further market shocks, prices of most agricultural products are projected to rise only moderately over the projection period from near term levels, although the timing varies between commodities. For instance, in the case of crops, prices decline initially in response to higher global production in 2013. Prices of livestock products, on the other hand, are projected to remain at relatively high levels from the outset for several years into the projection period, in reflection of reduced inventories and higher feed costs reducing livestock producer margins and production initially. Price movements in later years reflect improved profitability and increasing production. In general, prices for both crop and livestock products are projected to firm over the coming decade due to a combination of lower production trends and stronger demand, including for biofuels, on the back of a return to steady global economic growth and a weaker US dollar. Given the projected tighter market conditions for the different agricultural products, further bouts of price surges and increased volatility remain a clear possibility in the event of any unforeseen market shocks over the course of the projection period.

The general evolution of prices for the selected commodities covered in this *Outlook* assessment over the projection period is shown in nominal terms in Figure 1.7. From Figure 1.7 it is apparent that wheat and maize prices are projected to decline sharply in the near term as production responds to high prices and then to increase gradually over the remainder of the projection period. All prices of the oilseed complex are anticipated to fall significantly in the next two crop years as production rebounds strongly from reduced levels. Oilseeds and product prices are then expected to increase moderately in following years with prices of vegetable oil and for protein meal remaining at elevated levels due to strong demand for food and fuel use of vegetable oil and for protein meal in feedstuffs. The demand for protein meal will be affected by the anticipated strong growth in non-ruminant and milk production in developing countries and by a higher incorporation rate in feed rations in these countries, especially in the LDCs. World rice prices in 2012 were lower than 2011, with the notable exception of Thailand, which reflects its rice pledging policy. Rice prices with more comfortable supplies and slowing demand are projected to remain relatively flat in nominal terms to 2022.

Global raw sugar prices have already declined by some 26% over the twelve months prior to the start of this *Outlook*, and with world white sugar prices having followed suite and fallen by 20%. Sugar prices are expected to continue to ease downwards in the near term in response to consecutive years of a large and growing global sugar surplus expanding export availabilities and increasing stock replenishment. With steady demand growth and larger ethanol production to utilise increasing sugar cane supplies in Brazil, world sugar prices are projected to turn up in following years and average higher over the projection period. A relatively large *white sugar premium* (difference between raw and refined sugar prices) at the outset is expected to narrow over the course of the outlook period, reflecting rising demand for raw sugar for processing and as additional refined sugar supplies come on stream from new toll and destination refineries. The world indicator cotton price is expected to remain relatively stable during the next decade as the

Figure 1.7. **Price trends in nominal terms of agricultural commodities to 2022**

Price trends in nominal terms for agricultural commodities to 2022



Source: OECD and FAO Secretariats.

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volatility surrounding the 2010 spike in cotton prices subsides. By 2022, world cotton prices are expected to be lower in nominal terms than at the start of the projection period.

In terms of livestock products, prices for red meats are high at the start of the outlook period due to depleted livestock inventories and high feed and production costs. They are projected to continue at high levels for beef in the near term. Higher beef production in following years with gradual livestock inventory expansion leads to some easing in prices. Pig meat prices rise in the near term and then decline for several years before rising again in a production cycle with a moderately upward trend over the projection period. Poultry prices, with a quicker production turnaround, rise less strongly than for red meats. All meat prices increase in the later years of the outlook period as demand strengthens and livestock producers moderate production growth to maintain returns. An upswing in international dairy prices at the start of the *Outlook* is expected to continue with prices, in nominal terms firming throughout the projection period. However, prices in real terms are expected to ease back after 2014, especially for butter.

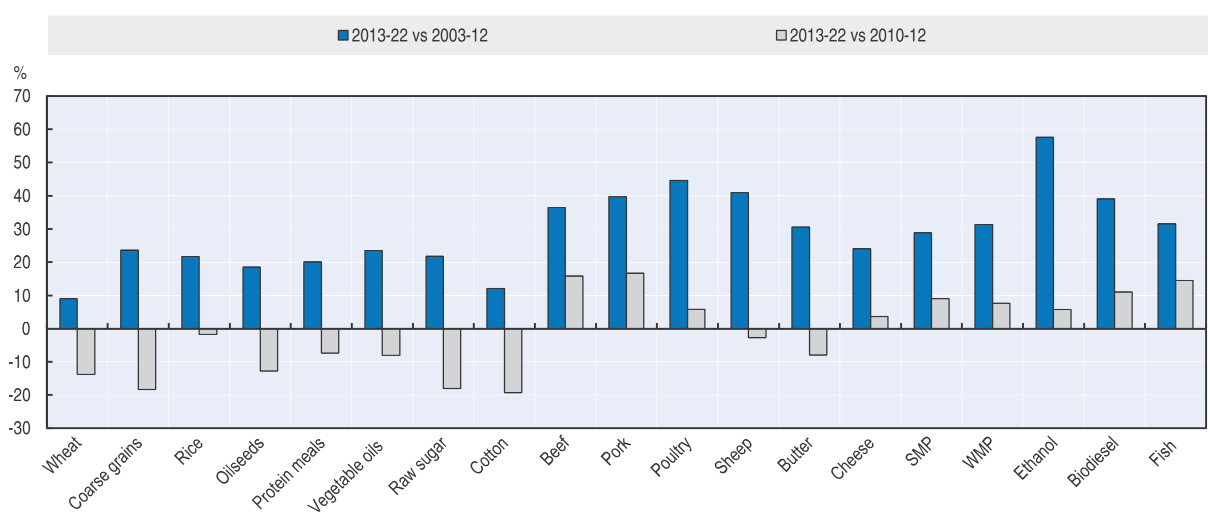
Fish product prices are projected to rise strongly over the coming decade as a result of strong demand, rising production costs and slowing production growth with continuing price volatility associated with supply swings. Rising prices are also projected for fish-meal and fish oil to 2022 with continuing rapid growth in per capita consumption and slowing production trends. Prices of biofuels are projected to continue to rise over the coming ten years with expected high crude oil prices and continuing biofuel policies around the world that promote demand. Ethanol prices are anticipated to rise more strongly than those for biodiesel.

In comparing the different product groups, prices of vegetable oils are projected to rise relative to protein meals. Oilseed and sugar prices rise more than cereal prices and cotton prices. Meat and dairy product prices rise relative to the costs of feeds of protein meals and cereals. Fish prices rise relative to meat prices and biofuel prices rise relative to the costs of the main agricultural feedstocks of cereals, vegetable oils and sugar crops.

Figures 1.8 and 1.9 present another dimension of the evolution of prices of the agricultural commodities covered in this *Outlook*. In Figure 1.8, the average level of agricultural prices in nominal terms in the projection period 2013-22 is compared with the average of prices of these products in the base period (2010-12) and in the previous decade (2003-12). Figure 1.9 makes the same price comparison but with price changes in real terms (i.e. when adjusted for inflation). The last decade includes all the recent periods of commodity price spikes associated with the food crisis of 2007-08, the heat wave in the former CIS countries in 2010 and the drought of 2012 in the US maize belt and parts of Europe. When the comparison is made with the base period of 2010-12, only in the case of livestock products, (excluding butter), fish and biofuels are the average level of prices in nominal terms higher in the projection period.

Figure 1.8. **All agricultural commodity prices to average higher in nominal terms in 2013-22 relative to the last decade but with a mixed picture compared to the base period**

Per cent change in average nominal prices in 2013-22 relative to different base periods 2010-12 and 2003-12



Source: OECD and FAO Secretariats.

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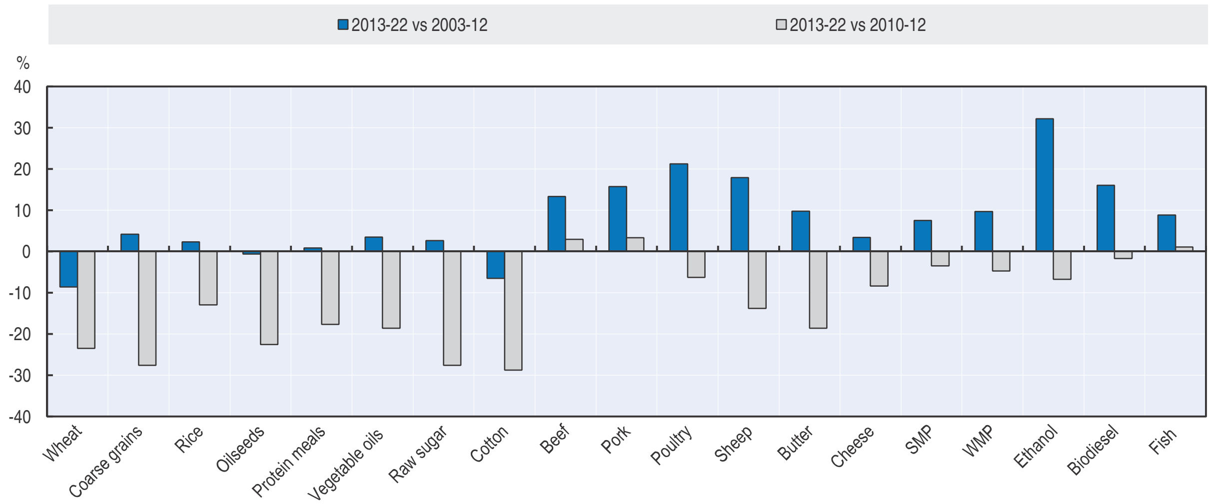
Figure 1.9. **Only beef, pigmeat and fish prices to average higher in real terms in 2013-22 relative to the base period and the previous decade**

Per cent change in average real prices relative to different base periods 2010-12 and 2003-12



Source: OECD and FAO Secretariats.

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When the comparison is made in real terms, only in the case of beef, pig meat, and fish do prices average higher in the projection period relative to the base period and the last decade (Figure 1.9). In comparison to the last decade, the prices of feedstuffs of maize and protein meals are projected to average higher, by 1-4%, over the next decade. Beef prices in real terms are projected to average 13% higher, pigmeat 16% higher and poultry meat price 21% higher in 2013-22. Milk powder prices are expected to average 8-10% higher in real terms, while fish prices are projected to be 9% higher and biodiesel and bio ethanol some 16-32% higher in real terms over the projection period compared to average levels achieved in the last decade.

In making the comparison with the average level of prices in the base period (2010-12), real price increases over the projection period are only projected for beef (3%), pigmeat (2%) and fish products (1%). For all other commodities, prices are projected to be lower in real terms. Nonetheless, growth in demand for food and feed products, along with continuing biofuel demand, is projected to hold the prices for cereals, oilseeds, sugar, cotton, fish and livestock products on a higher plane in the coming decade, and above levels achieved in the pre-2007 decade, in both nominal and real terms.

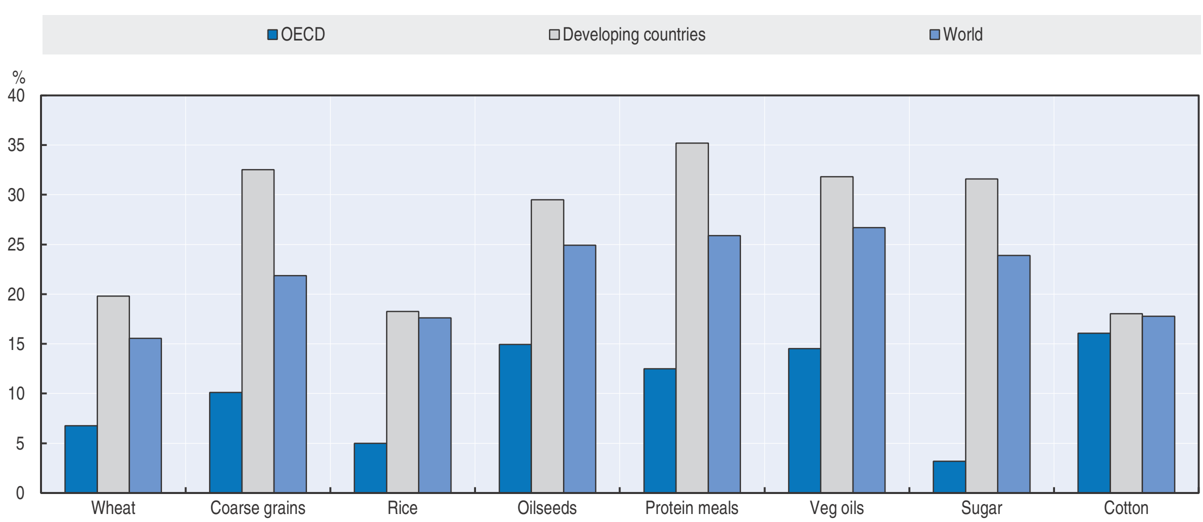
Food demand strongest in developing countries

Consumption of agricultural products has demonstrated its resilience in the face of world economic shocks and a prolongation of reduced growth prospects and high unemployment in developed countries, punctuated by periods of high and volatile prices. It is recognised as the fundamental driver of agricultural markets over the medium term. Relatively fast growth in demand over the projection period is expected to contribute to tighter markets and hold agricultural product prices on a higher level than in the past. The developing countries and emerging economies play an increasingly important role in agricultural markets to 2022 in bringing about these changing market fundamentals.

Developing countries are expected to be the leading source of demand growth for agricultural products, with the projections indicating that consumption in these countries will increase for all products covered by the *Outlook*. Higher consumption of agricultural products is being driven by growing populations and their increasing concentration in large urban centres and mega cities, rising per capita incomes, expanding middle classes, and with the growing affluence of the large emerging economies and developing countries contributing to dietary changes. These developments are expected to sustain strong demand for agricultural products of food, feed and fibre to 2022 and be reinforced eventually be a return to stable economic growth and demand in the developed countries (Figure 1.10). The developing countries with their higher income propensities to consume are projected to continue to diversify their diets with a movement away from basic staples and grains to higher protein foods, including meats and dairy products as their incomes and general affluence increase. Higher consumption of meat and dairy products also leads to increased indirect demand for coarse grains and some growth in protein meals use in feed deficit regions as domestic livestock inventories expand to meet part of the increased demand (Figure 1.11).

Figure 1.10. **Higher consumption of crop products**

Per cent change 2022 relative to average 2010-12



Source: OECD and FAO Secretariats.

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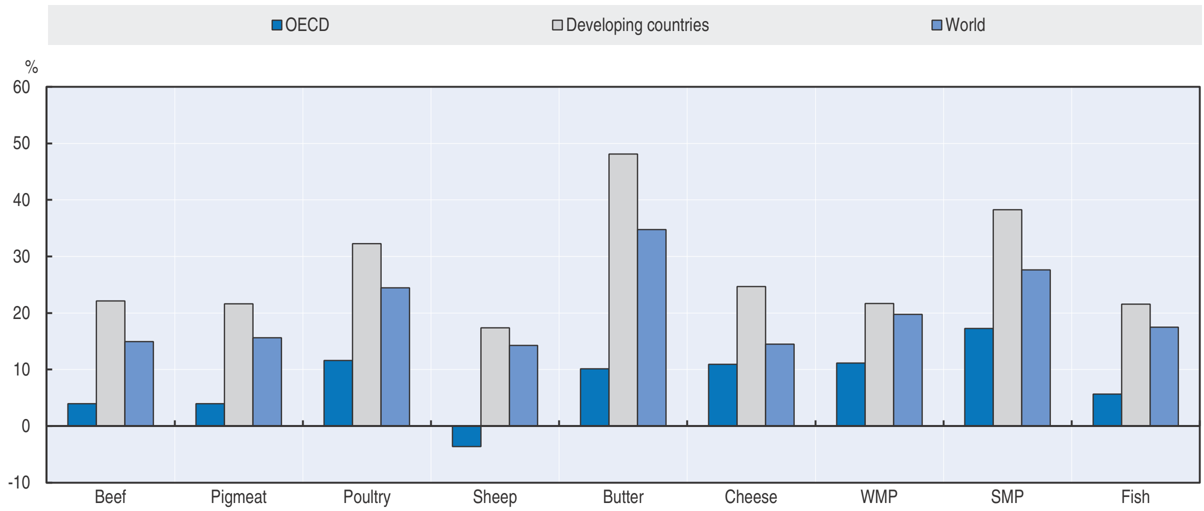
Despite faster growth, per capita consumption of agricultural products is generally lower in the developing countries than in the developed countries, although exceptions can exist depending on such things as traditional foods and consumption practices such as for rice. Per capita consumption of agricultural products is expected to continue to grow faster in the developing countries over the outlook period as they increase their overall consumption shares. However, considerable variations in per capita consumption levels exist among these countries for the different agricultural products, and these differences are expected to persist over the projection period. Aggregate food consumption in per capita terms is projected to expand most rapidly in Eastern Europe and Central Asia where income growth is projected to be the highest. Food consumption per capita is also expected to be high in Latin America and Asia, but less so in Sub-Saharan Africa, due to wide

Figure 1.11. **Higher consumption of livestock and fish products**

Per cent change 2022 relative to 2010-12



Source: OECD and FAO Secretariats.

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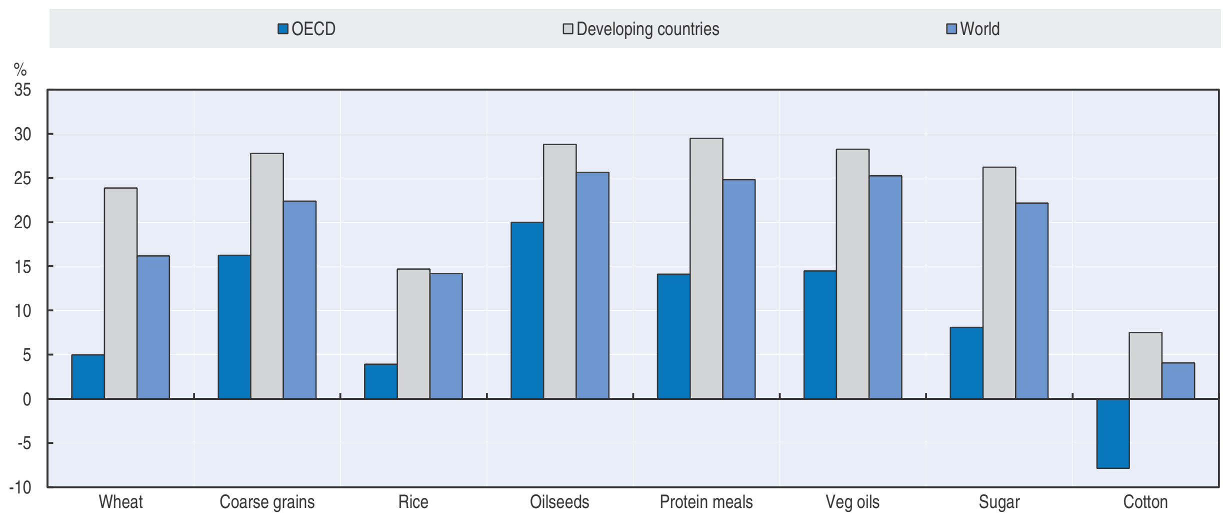
disparity in income growth and its distribution; features which have not led to strong food consumption increases in the past. For the developed countries, where food expenditures represent a low proportion of family budgets, food demand is not particularly responsive to either income changes or prices, as markets are close to saturation for many products covered in this *Outlook*. In these markets, increased human consumption of agricultural products is more dependent on population growth and changing demographics and with changes in lifestyles associated with higher incomes driving demand for variety in diets based on value added processed products, convenience foods and meals prepared and eaten outside the home. Increasing feed use in these countries is being fuelled by rising demand for livestock products for home markets and export, and the growth in livestock inventories and their composition as well as feeding practices (pasture versus prepared rations).

Global agricultural production to increase but at a slower pace

World prices are expected to be sufficiently remunerative in the next decade to encourage further investment in agricultural production and technological enhancements to permit output to continue to expand to 2022 (Figures 1.12 and 1.13). Agricultural output for the products covered in this output grew by 2.1% p.a. over the last decade and this *Outlook* projects a slowing of output growth to 1.5% p.a., but still faster that population growth, with growth in output per person estimated at 0.5% p.a. A number of factors are expected to cause production to grow less rapidly than in the past. Land available for agricultural production is becoming more limited. Although some additional land is still available to bring into crop production in a few emerging countries such as Brazil and the Russian Federation, most countries now face limits on the availability of suitable land for agriculture in part due to intensive competition from other uses. In these countries, most of the area expansion projected for specific crops in the *Outlook* is mainly the result of competing land away from other agricultural pursuits (crops or pasture) on the basis of higher net returns. This is expected to be the case for oilseeds, with additional land being attracted from other crops such as wheat and maize over the projection period. With new cultivatable land in shorter supply, or concentrated in specific regions of the developing world, much of the increase in agricultural production to 2022 will come from higher yields.

Figure 1.12. **Change in the production of crops**
Per cent change 2022 relative to 2010-12



Source: OECD and FAO Secretariats.

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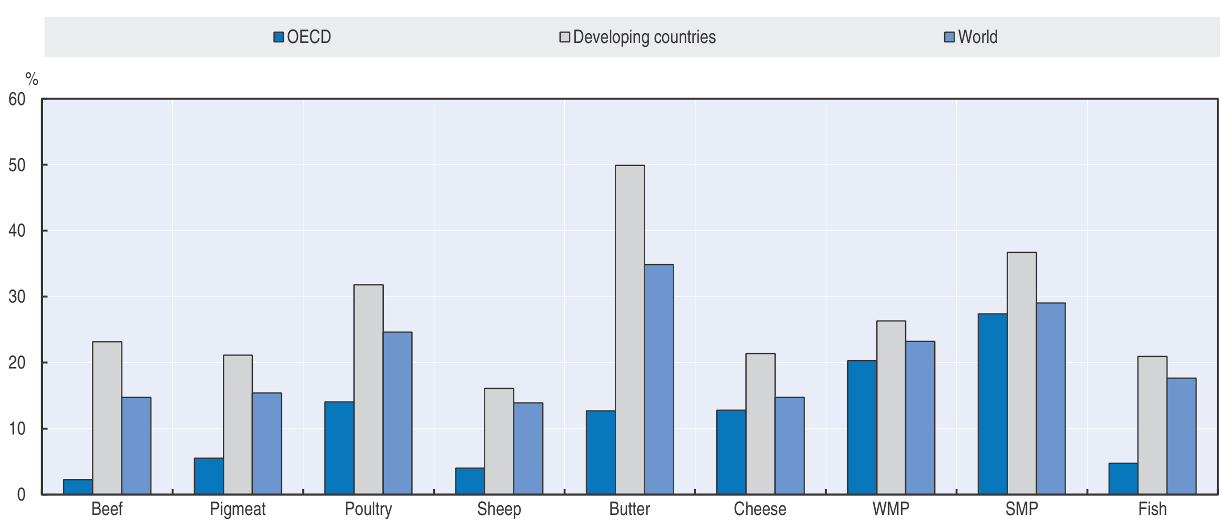
Figure 1.13. **Change in the production of livestock and fish products**
Per cent change 2022 relative to 2010-12



Source: OECD and FAO Secretariats.

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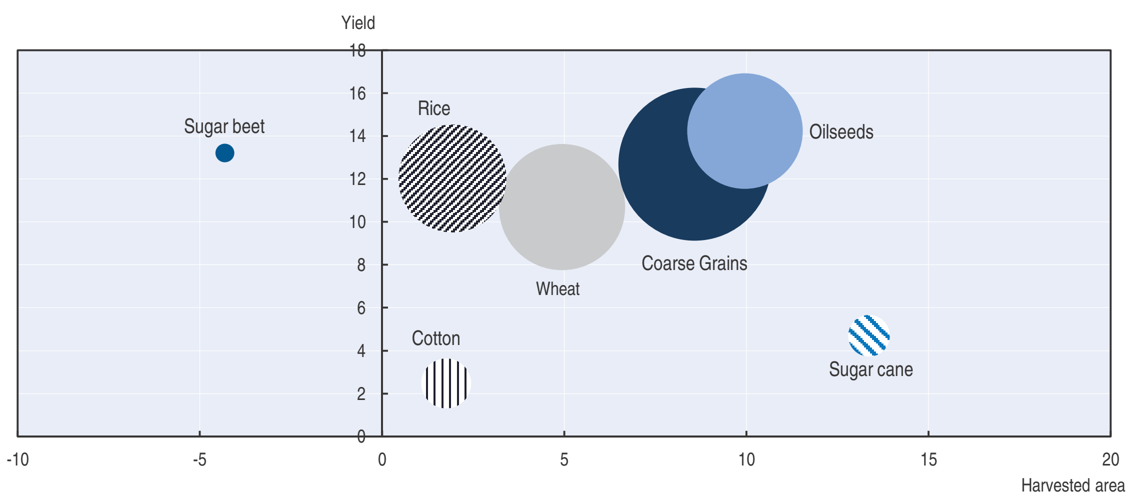
However, average world yield growth for crops and especially for cereals has been slowing at least for the past two decades, in part due to reduced investment in crop research and development and dissemination of improved varieties. Despite increasing attention now being given to agricultural productivity any improvements will take time to be realised. As a result, the trend to slower yield growth is anticipated to continue over the projection period in part due to higher costs of production and growing resource constraints.

Figure 1.14 illustrates the percentage changes in crop areas and yields of the main crops covered in the *Outlook*. Wheat and coarse grains yields are estimated to increase by about 11% on average between the base year and 2022. This is well above the yield increases forecasted for other crops such as sugar cane and cotton and below those for oilseeds. However, when considering the area expansion over the projection period, coarse grains are projected to experience a larger growth (8%) than wheat (5) or rice (2). This area expansion is larger than projected for cotton (2) and sugar beet (-4.3), but below the projections for oilseeds area. The additional demand for biofuel feedstocks over the projection period (mainly maize and rapeseed) is driving the large expansion of coarse grains and oilseeds in developed countries. In developing countries, the main driver is the feed demand for livestock production. Globally, coarse grains represent the largest share of total harvested area (35%), followed by wheat (23%) and oilseeds (20%).

Figure 1.14. **Arable crop areas and yield changes**

Per cent change 2022 relative to 2010-12



The size of the circles represents the crop area share of total area in the base year. For instance, coarse grains has the largest area share of all crops considered.

Source: OECD and FAO Secretariats.

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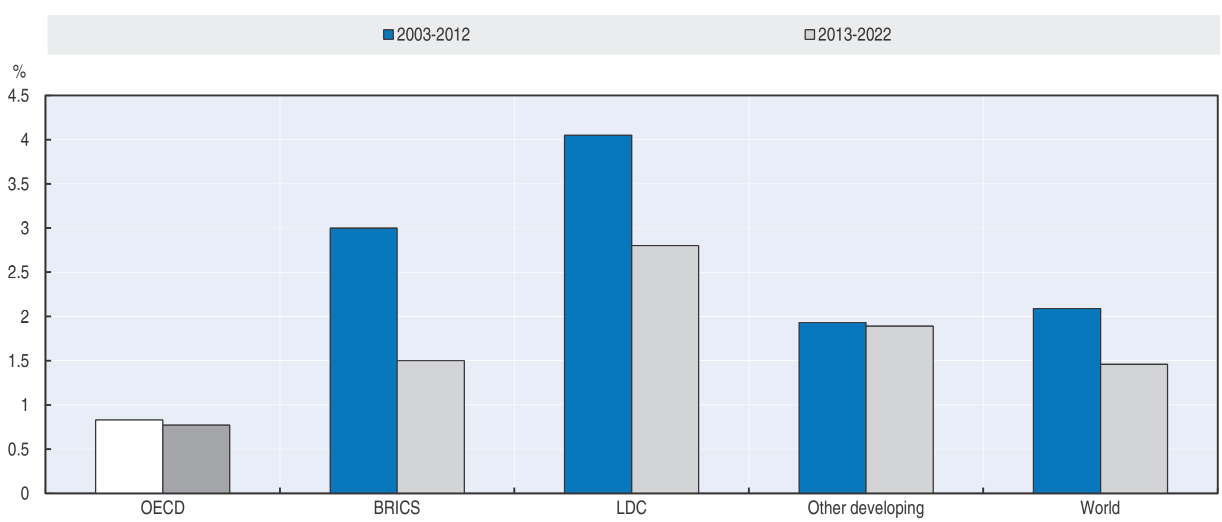
With prices of fertilisers and other farm chemicals and machinery costs closely related to oil prices, any rise in oil prices is expected to quickly translate into increasing production costs. In addition, some inputs such as water are becoming increasing constrained in availability to agriculture and more costly to procure needed supplies. Higher energy and oil prices and rising costs of other inputs are factored into the commodity price projections through higher agricultural supply costs. Higher production and supply costs will reduce the profitability of capital and input intensive agriculture and this development can be expected to further slow the growth in production. At the same time it will likely encourage production growth in countries with less intensive farming practices due to higher net returns, such as pasture-based dairy and meat operations. An exception will be countries such as the United States and Brazil, in which exchange rate depreciation will help to offset some of these cost disadvantages to preserve the competitiveness of their agricultural production on world markets. Overall, the increasing scarcity of arable land, water constraints and rising input and energy costs in agriculture all serve to highlight the critical importance of achieving higher agricultural productivity in a more sustainable manner both at the farm level and upstream and downstream sectors of the food supply chain. This will be required to ensure the increasing food supplies needed by an expanding global population and to reduce upside price pressures over the longer term.

Slower output growth is expected to be a feature of agricultural production in both the developed and developing countries' agriculture sectors in the coming decade (Figure 1.15). Developed and the large emerging economies in particular are projected to enter a period of lower yield and production growth for most crops. This will also apply to livestock sectors of meats and dairy, but with the downward adjustments perhaps less pronounced in some cases than for crops. For livestock production, these developments reflect a combination of moderately rising feed costs, higher energy costs and a growing scarcity of inputs such as water and suitable land. However, the projected growth in global agricultural production will still be sufficient to outpace the increase in global population with output per person estimated at 0.5% p.a. Short term supply response to changing prices has been faster in the past in the developed countries with their highly capital and input intensive farming practices and capacity to adjust variable input usage rapidly. Nonetheless, agricultural production over the longer term is projected to continue to grow more rapidly in the developing countries and this will further increase their share of global agricultural output to 2022.

Figure 1.15. **Average annual growth in net agricultural output to slow**

Per cent change in least squares growth 2003-12 and 2013-22



Source: OECD and FAO Secretariats.

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Many of the developing countries and emerging economies have continued to invest in their agricultural sectors and pursued policies to encourage production. They have the potential to increase land devoted to agriculture and improve productivity simply by narrowing the yield gap with the advanced economies' agricultural farming practices. Both area expansion and higher yield growth are expected to sustain the shift in market share to developing countries that has been underway for some time. However, what lies ahead is not all clear sailing for world food markets. High yield variability, due in part to more variable weather conditions and low input farming practices in some developing countries, is expected to be one of the factors behind continued market and price variability in the next decade. The implications of regional yield variability for the market outcomes projected in this report are elaborated on further in the uncertainties section at the end of the chapter. With developing countries accounting for an increasing share of global agricultural production, the developed countries' share of world production of all the commodities covered in this *Outlook* declines over the projection period. For the OECD area, growth in production is anticipated to increase by just over 1% p.a. Only in the case of certain dairy products, biofuels and fish oil does production in the developed countries continue to dominate world output, having lost this status for all the other products examined in this *Outlook* some time ago. Despite this trend, the traditional agricultural producers in developed countries with their high productivity, yields and overall technical efficiency will also continue to expand production, albeit less rapidly than in the past, to remain large suppliers over the projection period of a range of products to the world market.

Commodity projection highlights

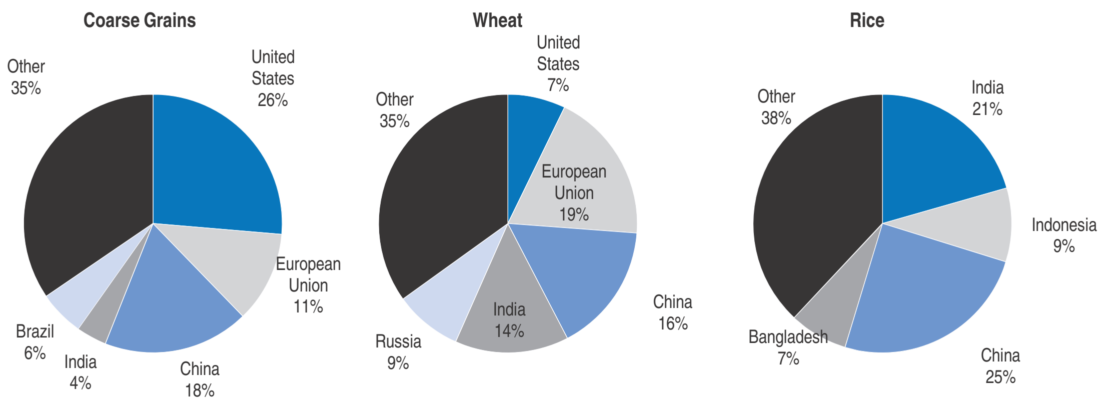
The main developments affecting the commodity markets are discussed in the commodity chapters. The following section highlights the key features of the supply and demand projections for the different commodities.

Tighter wheat and coarse grain markets than for rice

World production of wheat and coarse grains is projected to increase by 16% and 22%, respectively, above the base period of 2010-12 by 2022. In both cases, however, production growth will be influenced by a slowdown in yield growth that is not compensated by area expansion. For instance, world average wheat yields are projected to increase on average by 0.9% p.a. over 2013-22, down from 1.5% in the previous decade. For coarse grains, the projected yield growth is 0.8% p.a. for the coming decade, down from 1.7% p.a., in the last ten years. A similar phenomenon is anticipated for rice, with yields growth projected at around 1% over the projection period, less than half the 2.4% p.a. achieved during the past decade. Traditional cereal producers such as the United States, Canada, Australia and the European Union are all projected to increase cereal production to 2022, but with the developing countries of Asia, Africa and Latin America accounting for around 60% of the increase. Developing countries, which hold a dominant share of global rice production, are foreseen to account for virtually all of the projected production increase.

Wheat use is expected to remain driven by food consumption, with direct human consumption a stable 68% of total use over the outlook period and with feed use growing at a slower pace than in the past. Rising demand for coarse grains is driven by growing feed and industrial use, primarily biofuel production with government use mandates. Per capita use of rice for food is anticipated to rise only moderately. Cereal stocks rebuild from low levels on the back of larger harvests in the near term, but stocks-to-use remain below historical averages; except in the case of rice where world stocks remain at higher levels. Low stocks will help support higher prices but also expose the cereal markets to the risk of increased volatility. Figure 1.16 illustrates the production shares of wheat, coarse grains and rice production.

Figure 1.16. **Production shares for wheat, coarse grains, and rice in 2022**
Change in production share 2022 relative to 2010-12



Source: OECD and FAO Secretariats.

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Strong demand and high returns support expanded oilseed and products production

World production of oilseeds and the by-products of protein meals and vegetable oils are projected to increase by 26% over the outlook period as remunerative prices continue to attract land from other crops and with yields increasing, but at a slower rate than in the past. Production of palm oil is also projected to expand to reach a 34% share of total vegetable oil production, but with output increasing at a slower rate than in the past due to increasing land constraints in the key producing countries of Malaysia and Indonesia.

Although per capita vegetable oil use for food, which is driven mainly by population growth and rising per capita incomes, rises most rapidly in the developing countries, it will still remain below the relatively stable use rates of developed countries by 2022. Faster growth of vegetable oil use for biodiesel is expected in developed countries, particularly in the European Union to 2022 as a result of the Renewable Energy Directive (RED). Annual growth in protein meal consumption is expected to be slower in many developing and developed countries, due to existing high penetration of these meals in many animal rations. LDC countries will continue to expand the use of protein meals in feed rations. Reduced global stocks-to-use in most years of the *Outlook* will be supportive of prices over the projection period, but with considerable upside price risks in the event of any major production shortfalls.

Steady consumption growth leads to tighter sugar markets

World sugar production is projected to increase by 1.9% p.a. over the projection period to reach nearly 212 Mt in 2022, an increase of around 38 Mt over the base period. Moderate yield growth, lower than in the previous decade, will account for most of the additional production that is projected to come from sugar cane rather than sugar beets. Brazil and India will remain the leading producers based on sugarcane. Other large producers are the European Union, the United States, Australia, Thailand and China.

Strengthening global demand is driven mainly by faster consumption growth in developing countries, where more rapid population gains and rising per capita incomes support increasing sugar use which grows by 2.5% p.a. This compares to relatively stable sugar consumption growth of less than 0.5% p.a. in the mature sugar markets of many developed countries. The developing countries of Asia and Africa are expected to retain their dominant share of world sugar use. Additional ethanol production from sugarcane, especially in Brazil, and possibly from sugar beets in the European Union after removal of production quotas, will lend support to sugar markets. Stocks-to-use is expected to decline over the medium term as markets tighten, providing support for sugar prices but also increasing the risk of upside price volatility.

Global cotton markets to tighten moderately as stock drawdown continues in China

This year's *Outlook* is the first to include projections for world cotton markets, an important agricultural product for a number of developed and developing countries alike. World cotton production is expected to grow by 1.6% p.a. marginally more slowly than consumption at 1.7% p.a. to reach 27.2 Mt in 2022, as the unusually high global stocks that accumulated during 2011-13 are gradually reduced. China's cotton production is expected to decline by nearly 17%, due to policy actions, while India's production is projected to rise by 25% due mainly to increasing yields, albeit with slower yield growth than in the previous decade. A larger area planted to cotton and higher yields are expected in LDC Sub-Saharan Africa, in part due to the application of new production technology. In terms of use, overall growth in world cotton consumption to 2022 is expected to be marginally below its long term average rate and to continue to lose market share to man-made fibres (MMF). Consumption of cotton in India is expected to grow far more than in any other country and with India's textile industry poised to overtake that of China in the coming decade.

After rising sharply in 2011-13, global cotton stocks and stocks-to-use are expected to gradually decline over the projection period. Most of the changes in stockholdings are expected to take place in China, where stock reduction is anticipated, offsetting some increase in stocks in the United States and relatively stable stocks elsewhere.

Biofuels demand for agricultural feedstocks to grow less rapidly

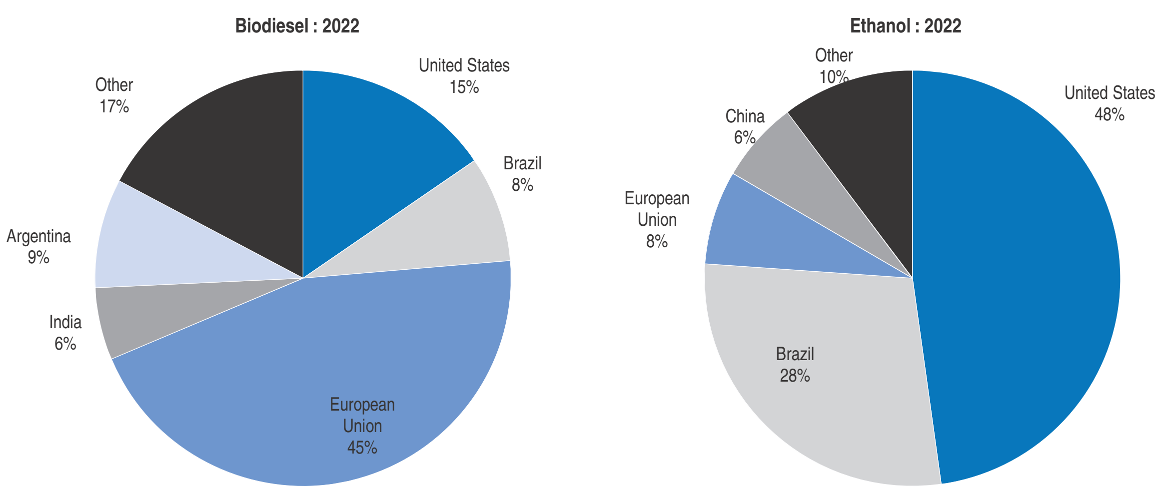
Use of agricultural feedstocks in biofuels production remains an important component of long term demand for agricultural products that holds prices at historically high levels. By 2022, world ethanol production is projected to increase by almost 70% compared to the average of 2010-12, growing by 4% p.a. to reach some 168 bnl. Production will grow less rapidly than in the previous decade, when global output grew at 18% p.a. due mainly to a slowdown in US ethanol production. The three major producers are expected to remain the United States, Brazil, and the European Union. Biofuel production is projected to consume a growing share of global production of sugar cane (29%), vegetable oil (15%), and coarse grains (12%) by 2022.

Production and use in the United States and the European Union are mainly driven by the policies in place (i.e. Renewable Fuel Standard 2 (RFS2) and the Renewable Energy Directive (RED), respectively). In the United States the total biofuel mandate is projected to be binding throughout the projection period, with over 40% of total maize use projected to go into ethanol production. The growing production of ethanol in Brazil is linked to domestic demand from the expanding fleet of flex-fuel vehicles and exports to the United States to fill its advanced biofuel mandate. Bio-ethanol production in developing countries is projected to increase by over two-thirds by 2022 with Brazil accounting for 80% of this supply increase and much of the rest coming from India and China. In the latter two countries, less than half of their ethanol production is consumed in the domestic fuel market. India's production is expected to double with molasses the major feedstock used. The growth in China is expected to come from cassava and sorghum with the likelihood of continuing restrictions on industrial use of domestic maize for ethanol production due to food security concerns.

Global biodiesel production is projected to grow slightly faster than ethanol production, at 4.5% p.a. to reach 41 bnl in 2022, but still increasing less rapidly than in the last decade. The European Union is expected to be by far the major producer and user of biodiesel. Other significant players are Argentina, the United States and Brazil, as well as Thailand and Indonesia (Figure 1.17). Total biodiesel production of developing countries is projected to increase to 14 bnl in 2022. Consumption in almost all countries of the world will be dictated by the on-going government use policies rather than commercial considerations.

Figure 1.17. **Country shares of bio-ethanol and bio-diesel production by 2022**

Per cent shares by country in 2022



Source: OECD and FAO Secretariats.

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Reduced livestock inventories sustain higher livestock product prices at outset

Lower global livestock inventories are a feature of livestock markets at the start of the *Outlook*. High feed costs and reduced forage supplies from drought in the United States and in other parts of the world in 2012 have initially lead to lower producer margins and production of meats. As feed costs fall, forage and pasture conditions improve and demand strengthens over the projection period, higher livestock sector returns provide an incentive for a moderate pace of livestock inventory expansion and increased supplies of livestock products. Livestock producers are anticipated to moderate the pace of inventory growth to maintain margins and profitability. As a result of rising energy, higher operational expenses, and rising input constraints of land and water necessary for expansion, global livestock inventories and livestock product supplies of meats and dairy products expand less rapidly over the projection period than in the past decade.

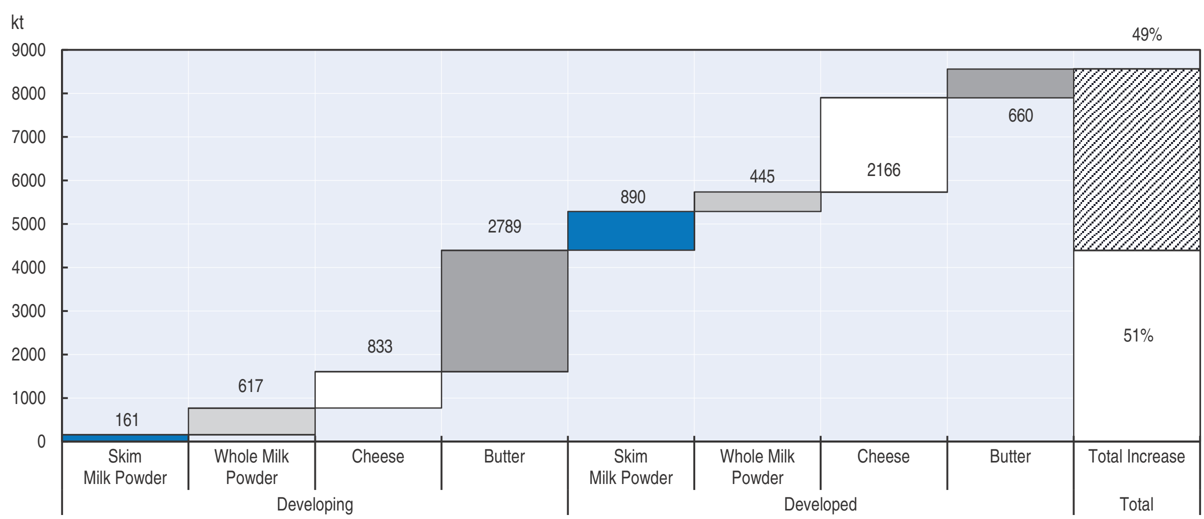
Slower production growth for dairy products despite strengthening demand

World milk production is projected to increase by 168 Mt, the majority of which (74%) is anticipated to come from developing countries. India and China alone accounts for nearly 40% of the change in global milk supplies. The average annual growth rate of global production over the projection period is estimated at 1.8% which is below the 2.3% p.a. witnessed in the last decade. The slowdown in growth reflects increasing shortages of water and suitable land in developing countries and similar limitations with increasing procurement costs with environmental restrictions in developed countries. Figure 1.18 suggests that developing countries will collectively account for 51% of the increase in dairy products over the projection period with butter production enjoying the largest increase. For the developed countries, cheese production will increase the most of all dairy products to 2022.

Consumption of dairy products in developing countries is expected to increase on average at about 2.2% p.a. and to basically match the growth in supplies. The expansion in demand reflects robust income growth and growing affluence, increasing populations, further westernisation of diets and greater access to refrigeration facilities. In contrast, consumption in the developed world is projected to increase on average by less than 1% p.a. and to be less than the growth in production.

Figure 1.18. **Production shares of dairy products to grow in developing countries**

Production growth by region and dairy product, 2022 relative to base period 2010-12



Source: OECD and FAO Secretariats.

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Meat production growth to be centred on developing countries

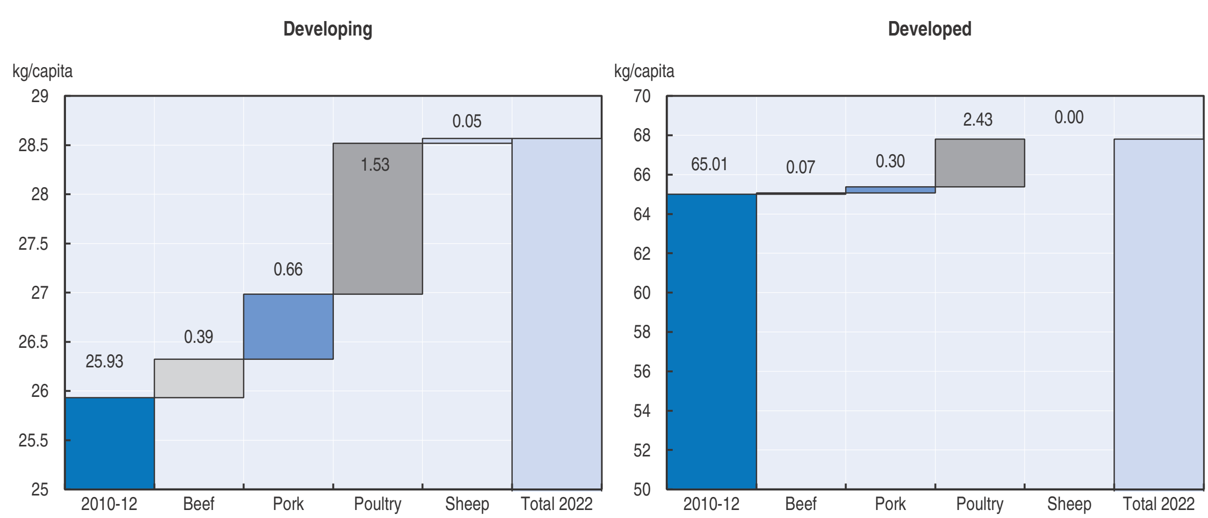
An increase in meat production over the projection period is expected to originate predominantly in developing countries, which will account for approximately 80% of the additional output to 2022. However, growth in meat supplies will be lower than in the previous decade. This will be due to a combination of factors including rising energy and feed costs that translate into higher production costs, increasing pressure from competing land uses (pasture *vs.* crops) and growing water constraints. As a consequence, world production growth is projected to slow to 1.6% p.a. during the coming ten years, compared to an average of 2.3% p.a. in the previous decade.

Larger meat production is expected to originate mostly from productivity growth, notably from improved genetics, animal health and feeding practices in both the poultry and pig meat sectors, where production cycles are shorter and technical change more rapid than for beef and sheep meat. By the same token, further productivity gains are expected to be harder to achieve in coming years, particularly in the advanced economies, as existing high levels of technical efficiency and economies of scale are bound to experience diminishing marginal returns. A notable example is expected for poultry, with a decline projected in production growth in developed economies from 3.7% p.a. over the last decade to 1.9% p.a. over the projection period to 2022. A similar phenomenon, albeit less marked, is expected for pigmeat, with production growth decelerating from 1.8% p.a. to 1.4% p.a. over the next decade. Future productivity gains in these industries will increasingly depend on how well the sector invests in research and development and technological innovation, rather than simply wider diffusion of existing technology.

Figure 1.19 reveals that despite the projected faster growth in meat consumption in developing countries, per capita consumption of meats will remain much higher, in fact more than double, in the developed countries by 2022. Per capita consumption growth is projected to be spread over all the meat types in the developing countries with the largest increase expected for poultry consumption, followed by pig meat and beef. In contrast, only marginal growth in per capita meat consumption is anticipated in the developed countries to 2022 as a result of aging populations, changing lifestyles and diets affecting consumption and will primarily be concentrated on poultry consumption.

Figure 1.19. **Growth of per capita meat consumption by region and meat type, 2022 vs. 2010-12 (kt c.w.e. or r.t.c)**

Per capita consumption shares by region and meat type, 2022 relative to 2010-12



Source: OECD and FAO Secretariats.

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Income growth in developing and BRICS countries combined with strengthening demand, with a return to steady economic growth, in the developed countries are key factors underlying the projected expansion of meat demand. Growth of global meat consumption should average 1.6% annually for the next decade, down from 2.3% p.a. in the previous decade. Despite lower growth overall, poultry meat will grow the fastest as the cheapest and most accessible source of meat protein. Poultry will still account for 46% of the additional meat consumed by 2022, relative to the base period and outpace the growth in consumption of pigmeat, beef and sheep meat.

Aquaculture to surpass capture fisheries contribution to world fish consumption

World fisheries production is projected to expand over the course of the projection period, to reach 181 Mt by 2022. This represents an increase of more than 18% above the average of the base period. Recovery of certain fish stocks due to the implementation of better management of resources as well as reduced fish discards and waste levels, as required by changes in legislation governing national fisheries, should lead to a slowdown in world capture fisheries production to just a 5% expansion over the projection period. Aquaculture production is projected to continue to expand over the projection period, albeit at a slower pace of 2.4% p.a. down from nearly 6% p.a. in the last decade, to reach 85 Mt in 2022, an increase of 35% from the base period. This slower production growth will be mainly due to lower availability and less optimal production locations; the high costs of fishmeal, fish oil and other feeds; and increasing energy costs, along with the growing scarcity of suitable sites for farming. Notwithstanding the slower production growth, aquaculture will still remain one of the fastest growing sectors when compared to other food-producing systems. The share of aquaculture in total fishery production is projected to grow from 41% on average in 2010-12 to 47% in 2022.

Consumption of fish products is expected to increase strongly over the coming decade. World per capita fish food consumption is projected to reach 20.6 kg in 2022, up from nearly 19 kg per capita, on average, in 2010-12. The average annual growth rate will be lower in the second half of the *Outlook* when fish start to become more expensive as a protein source in comparison with meats. Per capita fish consumption is projected to increase in all continents except Africa, with Oceania and Asia showing the highest growth rates. Per capita fish consumption will continue to be higher in the more advanced economies. Aquaculture's share of human consumption of fish is projected to exceed that of capture fisheries in 2015 and to reach 53% of total human consumption by 2022. Consumption of fishmeal and fish oil is expected to be constrained by production which will continue to be dependent mostly on the highly regulated capture fisheries.

Agricultural trade to increase in response to strong demand in developing countries

The projections confirm, as summarised in Table 1.2, that the emerging economies and developing countries will capture much of the growth in agricultural trade. By 2022 developing countries will account for the majority of exports of coarse grains, rice, oilseeds, vegetable oils, protein meals, sugar, beef, poultry meat, fish and fishmeal. Latin America, particularly Brazil, remains a major growth centre for agricultural production and is expected to be joined by Eastern Europe to make these two regions important suppliers of agricultural markets in the coming decade. On the import side, the food deficit regions of the Middle East, Africa and Asia are projected to have the strongest growth in food demand and agricultural imports over the coming decade due to more rapid increases in population and per capita incomes and growing affluence with large and growing middle classes in many countries.

China is the epicentre of agriculture in Asia and is driving many of the changes underway in world agriculture. China's agriculture is the subject of a special chapter in this *Outlook*. As the world's most populous country China is already one of the largest consumers and producers of agricultural products and has experienced very rapid production growth over the last 50 years. Agricultural production is based on intensive farming practices on small and fragmented farm holdings that have been able to produce large quantities of agricultural foods, fibre and fish products from limited supplies of land, water and other resources. With a policy priority for food self-sufficiency, particularly in grains, China has also achieved a high reduction in food insecurity. China is already one of the world's leading importers of a wide range of agricultural products, particularly oilseeds, cotton, and fish products, and a major exporter of many other agricultural products. The projections for China to 2022 indicate that consumption growth will likely exceed that of production in the next decade. Food demand is also expected to slow but with the mix changing towards more protein in the national diet. These trends raise a number of questions on how China will respond to emerging constraints affecting agricultural production and to what extent it will turn further to world markets for increasing agricultural and food imports. These and other issues are addressed in Chapter 2 of this report.

The OECD area's share of trade of agricultural commodities continues to decline in general as illustrated in Table 1.2. The list of agricultural products for which the OECD countries remain the main source of exports has shrunk overtime as developing countries production and trade has expanded. They now include wheat, pig meat, sheep meat, and dairy products of butter, cheese, milk powders, as well as cotton and fish oil. For imports of agricultural products, the only ones for which the OECD area remains the main destination are protein meal, fish and fish oil. For all the other products the main origins and destinations for agricultural products lies in the developing countries and emerging economies.

Despite these broad trends in favour of the increasing importance of developing countries, the traditional agricultural exporters of advanced economies such as Australia, Canada, the European Union, New Zealand and the United States will remain important players in global trade for a wide range of agricultural commodities in the coming decade. In addition to their trade in bulk agricultural commodities, these countries also have a large footprint in the faster growing trade of value added processed agricultural products.

Emerging country exporters of cereals in the developing world are projected to gain market shares in coarse grains and rice trade while traditional cereal exporters such as the US account for much of the growth in coarse grain trade over the medium term (Figure 1.20). The Russian Federation, Ukraine, Kazakhstan and other countries of Eastern Europe collectively account for 51% of the projected increase in cereal exports to 2022. As rice is largely consumed where it is produced it remains thinly traded, although the volume of trade has increased to around 8% of world consumption over the last decade or so. Global rice trade is likely to be facilitated by growing imports by African countries, where climate and infrastructure limit the ability of domestic production to satisfy growing demand. Imports of cereals are also projected to be dominated by developing countries where rising demand is expected for food and also for feed for expanding livestock production in feed-deficit countries. Key growth markets are projected to be China, Mexico, the Middle East, North Africa and South East Asia.

Table 1.2. **Share of OECD in world imports and exports of agricultural products declines**

Per cent share of world exports and imports, 2003-12 and 2013-22

Commodity	Export		Import	
	Average 2003-12	Average 2013-22	Average 2003-12	Average 2013-22
Wheat	66.07	58.59	23.61	21.73
Rice	12.98	10.33	14.46	13.82
Coarse grains	62.01	48.78	47.79	38.15
Oilseeds	50.30	46.27	38.79	26.75
Protein meals	16.54	16.99	62.84	53.19
Beef	49.75	47.44	53.21	46.81
Pig meat	78.65	83.89	55.08	45.32
Poultry meat	9.86	6.92	24.35	19.59
Sheep meat	77.49	80.58	41.71	32.92
Fish	35.89	32.85	59.30	52.56
Fish meal	38.14	35.91	41.84	39.72
Fish oil	49.52	57.71	90.63	79.85
Butter	83.35	81.00	19.20	15.15
Cheese	69.60	64.15	41.51	31.51
Skim milk powder	82.03	89.32	20.20	17.37
Whole milk powder	69.91	74.56	5.59	2.41
Vegetable oils	7.74	8.08	29.10	25.26
Sugar	18.72	12.84	26.10	22.29
Cotton	48.63	50.23	23.91	23.23

Source: OECD and FAO Secretariats.

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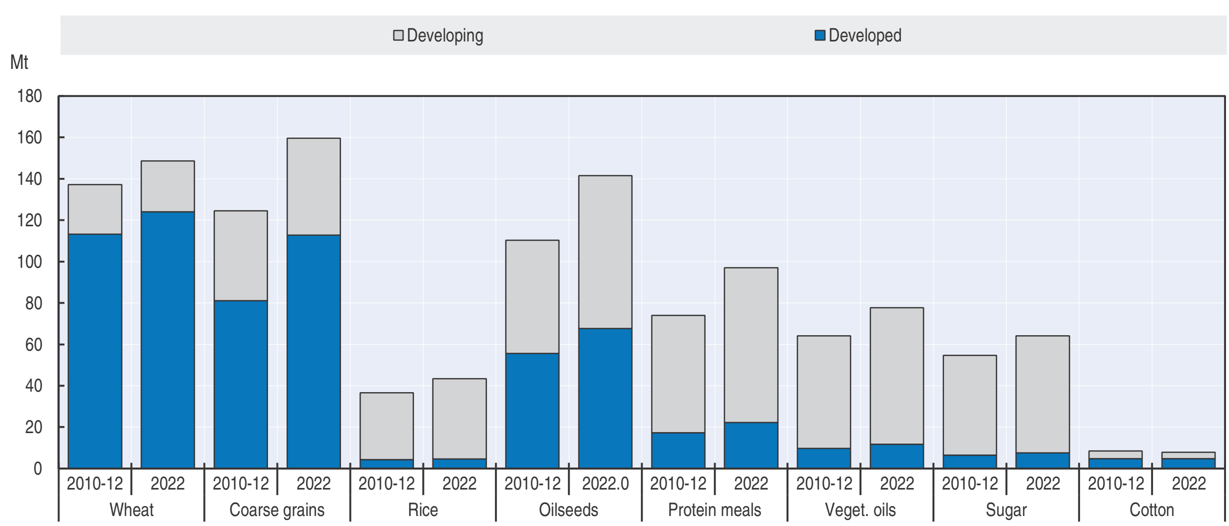
Figure 1.20. **Increasing exports of crop products**

Exports of agricultural crop commodities in million tonnes, 2010-12 and 2022



Source: OECD and FAO Secretariats.

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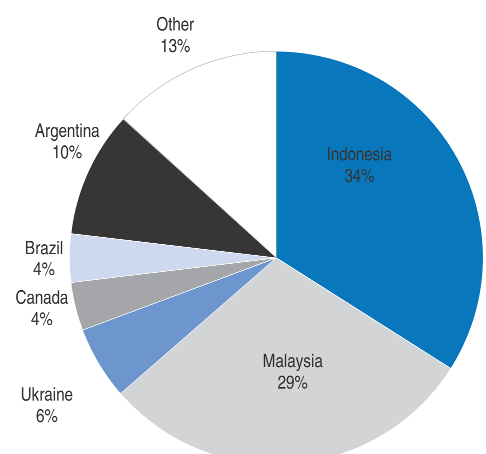
The growth in international trade in oilseeds and oilseed products has surpassed that of wheat and coarse grains for a number of years. Continued strong growth in global demand for vegetable oil and protein meals particularly in China and countries of Asia is expected to maintain oilseed and product trade above that for cereals throughout the coming decade. China is projected to maintain its dominating role in global oilseed imports which are projected to rise by 40% to nearly 83 Mt in 2022. The country's preference for importing seeds as opposed to vegetable oils and protein meals to capture the value-added through domestic crush is projected to continue, although crushing capacity is expected to stabilise. Vegetable oil exports are expected to be dominated by Indonesia and Malaysia with palm oil representing two-thirds of total vegetable oil exports in the next decade (Figure 1.21). The European Union, China and India account for the majority of the more diversified imports of these vegetable oils by 2022. China and the European Union are expected to remain the leading protein meal importers, followed by the United States and Brazil.

Figure 1.21. **Indonesian and Malaysian exports dominate vegetable oil export trade in 2022**

Per cent share of exports by country in 2022



Source: OECD and FAO Secretariats.

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There is more of a mixed picture for trade in biofuels. Global ethanol trade is set to increase strongly, while that of biodiesel only moderately. Most of this increase in ethanol shipments is due to an anticipated growing two-way trade between Brazil and the United States that under the assumptions of this *Outlook* will be generated as a result of implementation of the US advanced biofuel mandate. The United States is expected to import about 14.6 bnl of sugar cane-based ethanol from Brazil by 2022, since ethanol from this source qualifies for the US advanced biofuel mandate. At the same time, the United States is expected to export nearly 7 bnl of its maize-based ethanol by 2022. A large share of US exports is expected to go to Brazil to help meet domestic fuel demand for its growing fleet of flex-fuel vehicles.

In the case of biodiesel trade, Argentina is expected to remain the major exporter followed by Indonesia. The European Union remains the world's largest importer of biofuels throughout the projection period, particularly ethanol from Brazil and biodiesel from Argentina. Argentina and Brazil are projected to remain the world's largest biofuel exporters with exports expanding over the projection period.

Sugar export availabilities are heavily concentrated in a handful of countries with Brazil dominating the group and accounting for just over 50% of global exports in 2022. The majority of sugar entering international trade will continue to be raw sugar although refined sugar will increase its share of global sugar trade during the coming decade. Other leading sugar exporters are Thailand, Australia and Mexico. Mexican exports of sugar to the United States are projected to increase as part of a two-way sweetener trade under NAFTA. Under the integrated NAFTA market, the United States is expected to export additional quantities of lower priced isoglucose (HFCS) to Mexico that will substitute for sugar use in liquid sweetener applications such as beverage production. Mexico is projected to ship additional quantities of sugar, including that released from domestic beverage use, to the normally higher priced US sugar market. Global imports of sugar remain more diversified than for exports and are spread over a larger group of countries including the European Union, the United States, China, Indonesia, the Russian Federation, Malaysia and Korea. Imports of the Russian Federation and the European Union are projected to decline sharply in the coming decade with policy changes that favour larger domestic production and import replacement. Rising imports of sugar are anticipated in the case of China and Indonesia as domestic production fails to keep up with growing domestic use.

Lower global cotton trade is expected by 2022 as world consumption shifts away from some countries, particularly China, which nonetheless remains the world's largest importer. Higher imports are forecast for Bangladesh, Turkey, Viet Nam and Pakistan. Exports of cotton will continue to be led by the United States, with a large increase in export trade share anticipated by LDC Sub-Saharan Africa. While the US share of world trade is expected to be little different from its long-term average, LDC Sub-Saharan exports are expected to rise by 115% and its share of world trade to more than double by 2022.

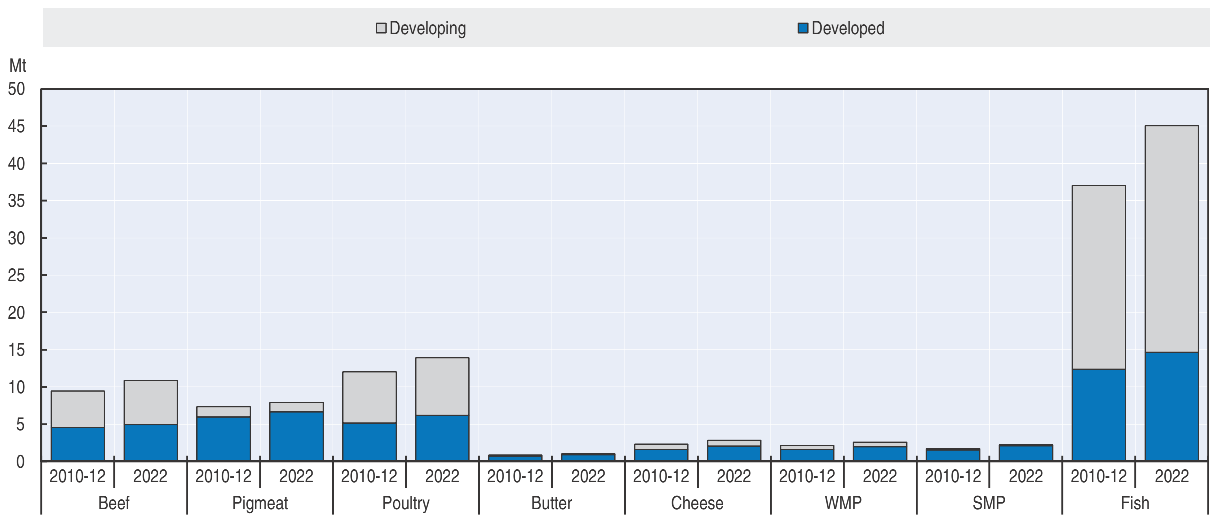
A general expansion of trade in dairy products is expected over the coming decade as many developing countries consume more processed milk products with westernisation of national diets. Of the main products, butter, cheese and SMP are likely to show average annual increases of about 1.7-2.1% p.a. The bulk of this growth will be satisfied by expanded exports from the United States, the European Union, New Zealand, Australia and Argentina. Dairy exports of the United States, comprising butter, cheese, SMP and whey powder, are projected to increase by over 55%, respectively, from base period levels. Import markets will remain fragmented with the five largest importers accounting for less than 50% of the global trade in all the main dairy products. In contrast, the five largest exporters account for, on average, over 75% of world exports.

Following a decade of decline, butter import demand is expected to grow as expanding markets in the Middle East, North Africa and China offset moderately lower demand from the Russian Federation. The Russian Federation is expected to remain the largest import market for cheese, although the fastest growing markets will be found in China and Egypt. The European Union will continue to dominate cheese exports, but with the United States and New Zealand set to gain market share. New Zealand is expected to increase its dominance of the WMP export trade accounting for about 56% of exports by 2022. Expansion in demand for SMP imports over the next decade is projected to originate mainly from Asia, with leading destinations in China and Indonesia.

World meat exports are expected to increase by around 19% by 2022, representing, an annual growth of 1.6% and considerably less than the 4.2% p.a. achieved in the previous decade. The main factor behind the decline is the expected growth of domestic meat production in the developing world, encouraging import replacement. Meat exports are expected to be led by poultry and beef shipments (Figure 1.22). The bulk of the exports are expected to originate from the United States, which will account for one-third of the increase of all meats exported when compared with the base period.

Figure 1.22. **Increasing exports of livestock and fish products**

Exports of livestock and fish products in million tonnes, 2010-12 and 2022



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932858432

The United States has greater access to FMD-free markets because Japan has raised the age that beef and beef products from the United States can be imported into Japan. This decision followed a BSE risk assessment conducted by the Food Safety Commission of Japan. As US beef is also projected to account for a larger share of the FMD-free "Pacific" market, this will affect the trade performance of its competitors in Oceania, namely Australia and New Zealand, where exports grow less rapidly. On the other hand, Oceania exports of manufacturing beef in North America are anticipated to grow. The European Union is expected to become a smaller meat exporter in the coming decade due to rising production costs. The United States is projected to become the leading meat importing country in 2022, followed by Japan, the Russian Federation, Mexico, Saudi Arabia and Korea. Australia and New Zealand are expected to remain the world's largest sheep meat exporters, to supply growing import markets mainly in the Middle East and Asia.

Fish and fishery products (fish for human consumption, fishmeal on a fish equivalent basis) will continue to be highly traded, with 36% of world fish production (including intra-EU trade and 31% excluding intra-EU trade) projected to be exported in 2022. World trade of fish for human consumption is projected to increase at nearly 2% p.a. over the next decade, a decline in respect to the level experienced in previous ten years (+3% p.a.). Developed countries' share of world imports of fish for human consumption is expected to decline, from 55% to 53%, while developing countries will continue to be responsible for around 68% of world exports. In 2022, some 53% of world fish exports for human consumption are projected to originate from Asia, with China as the world leader. Developing countries will continue to be the main importers of fishmeal (65% of the total in 2022), due to their importance in aquaculture production. China alone should represent 63% of world aquaculture production by 2022, with a 48% share of world fishmeal consumption.

Security of future food supplies will depend on increasing productivity and reducing waste

Although the global population growth rate is projected to decline to just over 1% p.a. in the next decade this will still result in an additional 752 million people being added to the planet by 2022, and placing additional demands on the global food system. Additional production will also be necessary to provide feedstocks for expanding biofuel production which has become an important source of additional demand. As noted earlier, the global scope for area expansion remains limited and geographically concentrated in a few regions. In these circumstances, most of the additional agricultural production will need to come from increased productivity, as has been the case in the past. It is estimated that by 2050 agricultural production needs to increase by 60% over the next 40 years to meet the rising demand for food, or the equivalent of an additional 1 bnt of cereals and 200 Mt of meat a year by 2050, when compared with 2005-07 levels.[2] The projections contained in this report suggest that world agricultural production while slowing is nonetheless still on track to meet these longer term supply objectives. Increasing productivity, however, will be the key to containing food prices and in reducing global food insecurity. Productivity gains in the medium term may come primarily from reducing the productivity and yield gaps in developing and least developed countries with those achieved in the developed countries. The increasing role of developing countries in agricultural production, consumption and trade should enhance food security as it spreads global production risk while generating higher incomes and domestic production in many net food importing countries. Measures to reduce food loss and waste will also be critical to meeting rising demand and improving productivity in the food supply chain.

At the same time there is a growing need to improve the sustainable use of available land, water, marine ecosystems, fish stocks, forests and biodiversity. It is estimated that some 25% of all agricultural land is highly degraded, with growing water scarcity a fact for many countries. Many fish stocks are over-exploited, or in risk of being over-exploited. There is also a growing consensus that climate change and extreme weather events will increase.

Risks and uncertainties

The baseline is *not* a forecast but rather a projection of future outcomes conditional on a specific set of assumptions about the policies in place, the responsiveness of market participants and the future values of exogenous market drivers. In the same vein, partial stochastic analysis does not attempt to forecast the implications of all possible uncertainties for future market outcomes; instead, it allows the policy maker to select specific sources of uncertainty and quantify the likely range of variation around the deterministic baseline values that derives from these identifiable sources of uncertainty.

Each year, the *Outlook* attempts to identify key risks and uncertainties which are perceived for the projection. This year, a special effort was undertaken with the Aglink-Cosimo model to perform "partial stochastic analysis" to help discern the relative importance of key specific risks. This analysis involves performing multiple simulations (up to 500) that draw alternative values from distributions for key driving variables, and analyses their impacts on selected important outcomes for variables such as prices, production, trade, etc. Partial stochastic analysis does not attempt to forecast the implications of all possible uncertainties for future market outcomes. Instead, it allows the policymaker to select specific sources of uncertainty and to quantify the likely range of variation around the deterministic baseline values that derives from these identifiable sources of uncertainty.

The objective of the partial stochastic analysis reported below is to assess how uncertainty surrounding particular key assumptions about the macroeconomic setting and crop yield levels might affect the baseline projections, and the extent to which the underlying uncertainty is transmitted to various elements of the projected agricultural market developments.[3]

In these stochastic experiments, various macroeconomic and agriculture-specific drivers, which are taken as given when calculating the deterministic baseline, are treated as uncertain, and the range of probable values around the baseline outcomes corresponding to this uncertainty is analysed. The quantification of future uncertainty assumed for these drivers is based on their variability around expected values as observed in the recent past.

Sources of uncertainty analysed

Agricultural market outcomes depend partly on global macroeconomic conditions and crop yield fluctuations. However, the future values of these variables are not known with certainty. A total of 97 variables representing these sources of uncertainty were treated stochastically in order to analyse the implications for the deterministic baseline projections.

- *Global macroeconomic drivers:* the analysis allows for uncertainty in thirty-two variables: real Gross Domestic Product (GDP), the Consumer Price Index (CPI) and the GDP Deflator in the United States, Europe,[4] China, Japan, Brazil, India, the Russian Federation and Canada;[5] national currency-US dollar exchange rates for the last seven of these countries or regions; and the world crude oil price.
- *Agricultural yields*: uncertainty affecting the yields of 14 crops in 16 major producing countries is also analysed, giving a total of 65 product-country-specific uncertain yields (see Methodology in the full publication for further explanation).

The variability of the market outcomes calculated by the model was studied to answer the following questions: Which baseline projections are more vulnerable to the underlying uncertainty in these drivers? Are some commodities more affected than others? Are the baseline projections for some countries more subject to uncertainty than others? Is more uncertainty transmitted to market outcomes from the macroeconomic drivers or from the drivers of crop yields?

Summary of results

Relative uncertainty of the macroeconomic drivers

The extent of the variability in the macroeconomic drivers obtained by repeated sampling of errors from the assumed distributions is measured by the average annual coefficient of variation (ACV). It is calculated for each variable in two steps: first, for each year of the projection period, the (annual) coefficient of variation (the standard deviation divided by the mean) capturing the spread of outcome values is calculated. In order to avoid extreme results, the values lying between the 10th and 90th percentiles are taken.

Second, these annual CVs are averaged across the projection period to create the ACV. Table 1.3 summarises the variability in the macroeconomic conditions. This variability characterises the macroeconomic uncertainty used as an input in the stochastic simulations.

Table 1.3 reveals from the magnitude of the numbers in the cells that, consistent with the economic literature and casual observation, the uncertainty characterising the CPI, the GDP deflator and real GDP is relatively small. By contrast, forecasting exchange rate fluctuations (except for the Chinese Yuan) and oil prices is very difficult. Consequently, the (past) forecast errors and spread of (future) possible projected values of exchange rates and the crude oil price are significantly larger than for the GDP deflator, real GDP and CPI.

Table 1.3. **ACVs (%) of key macroeconomic variables and the crude price, 2013-22**

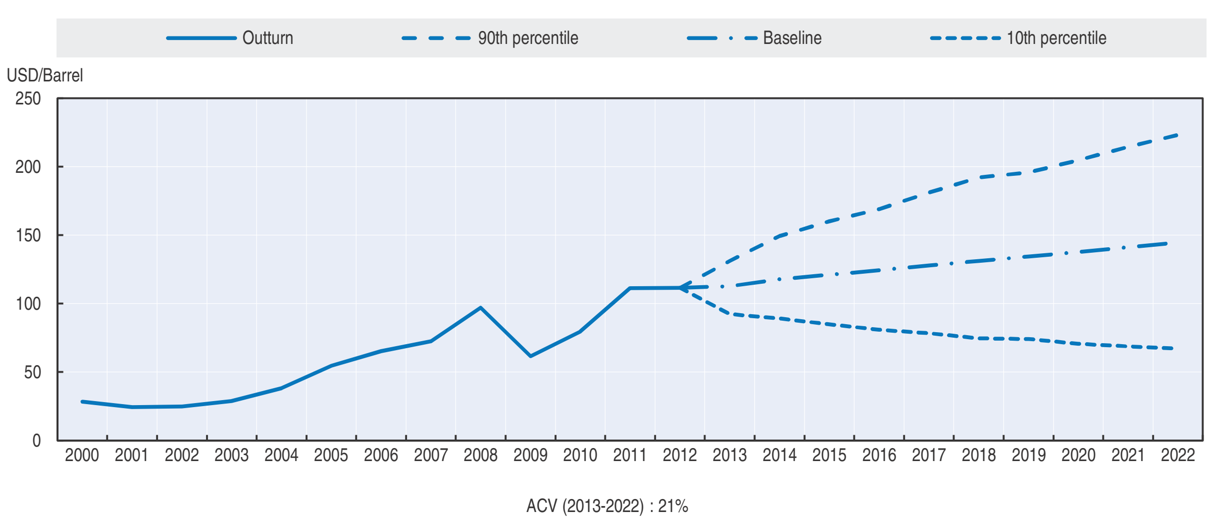
	Brazil	Canada	China	EU[1]	India	Japan	Russia	USA	World
CPI	4.4	0.5	2.9	0.8	4.4	0.9	3.4	1.2	
GDP deflator	3.5	2.6	5.5	0.5	3.6	0.9	7.8	0.5	
GDP	2.9	2.5	2.1	2.8	2.4	4.2	6.2	2.7	
National currency/USD	22.1	7.9	2.5	10.5	9.6	8.9	14.4		
Crude oil price									21.3

Note: For the CPI, GDP deflator and GDP, figures refer to EU-15. The exchange rate is the EUR-USD rate.
Source: JRC-IPTS, European Commission.

StatLink http://dx.doi.org/10.1787/888932860655

Figures 1.23 and 1.24 depict the more probable ranges the crude oil price and the EUR-USD exchange rate. The most extreme lower and upper values have been removed and the spread between the 10th and 90th percentiles is shown. The 10th and 90th percentiles of the world crude oil price projections are around USD 67 and USD 233/barrel for 2022. The 10th and 90th percentiles of thde EUR-USD exchange rate in 2022 are EUR 0.53 and EUR 0.95 per US dollar, respectively, and represent lower and upper bounds to EU competitiveness.

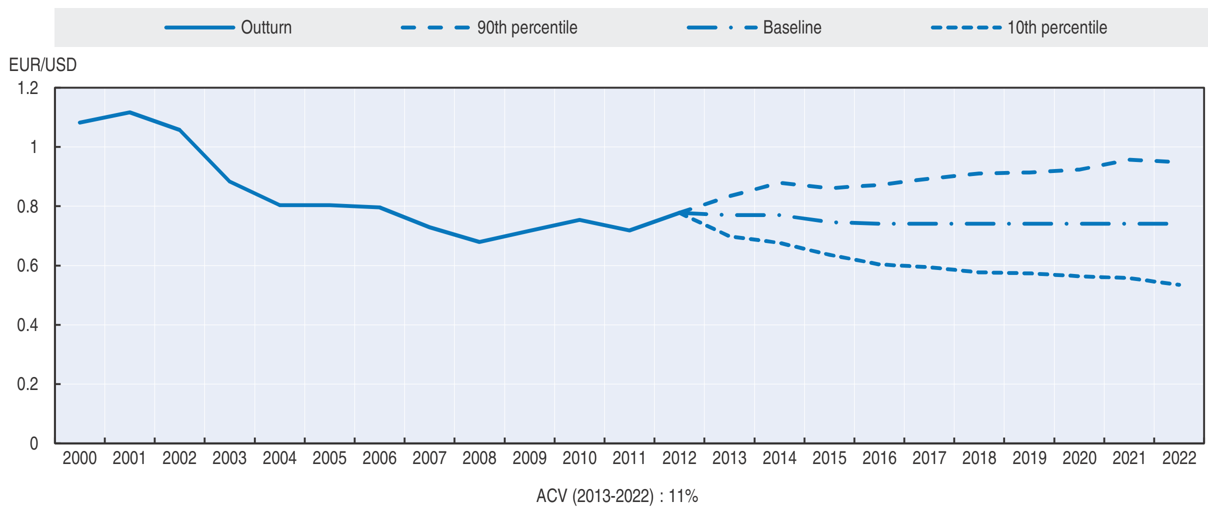
Figure 1.23. **Crude oil price (USD/barrel)**



Source: JRC-IPTS, European Commission.

StatLink http://dx.doi.org/10.1787/888932858451

Figure 1.24. **EUR/USD exchange rate**



Source: JRC-IPTS, European Commission.

StatLink http://dx.doi.org/10.1787/888932858470

Relative impact of uncertainty on market outcomes by commodity

The degree of variability observed in the AGLINK-COSIMO simulated crop yield outcomes is also summarised by the average annual coefficient of variation (ACV). Table 1.4 summarises the variability in selected crop yields due to the uncertainties analysed.

Table 1.4. **ACVs (%) of yield for selected arable crops, 2013-22**

	Argentina	Australia	Brazil	China	EU12	EU15	India	Kazakhstan	Mexico
Common wheat	**14**	**70**	**29**	**5**	**15**	**7**	**7**	**30**	**13**
Coarse grains	6	19	6	**3**					7
Maize	**15**		**12**	5	**27**	**8**			**17**
Oilseeds	9	18	5		9	4		**37**	
Rapeseed		**39**		1	**14**	**9**			
Soybeans	**20**		**12**			1			
Rice	1		1	**3**	2	**21**	**8**		
Sugar beet				**25**	**5**	9			
Sugar cane	**26**	**14**	**5**	**18**			**16**		6

	Paraguay	Russia	Thailand	Ukraine	Uruguay	USA	Viet Nam	World
Common wheat	**59**	**20**		**33**	**39**	**10**		2
Coarse grains	**22**			**22**	**27**	7		2
Maize						**15**		
Oilseeds	**19**		1	**25**	1	5	1	2
Rapeseed								
Soybeans						**11**		
Rice			**5**			**5**	**8**	1
Sugar beet		**21**				**15**		3
Sugar cane			**16**			**8**		2

Source: JRC-IPTS, European Commission.

StatLink http://dx.doi.org/10.1787/888932860674

The ACVs reported in Table 1.4 capture the variability of yields due to crop yield uncertainty only. The bold text cells correspond to yields that are treated as stochastic, and which have been "shocked" in each run according to their probability distribution. ACVs in non-bold text cells are for crops that are not treated as stochastic but whose solutions vary across runs because of uncertainty that is transmitted to them from the stochastic variables via the model. Empty cells contain zeros; these crop yields are not treated stochastically, and the uncertainty from other variables that is transmitted to them via the model is negligible.

Crop yield uncertainty is shown to be greatest in Uruguay, Paraguay, Kazakhstan and Australia and smallest in Europe, China and the United States. Average yield uncertainty at global level is much smaller than at country and regional level. It should be borne in mind that these results are based on the variability observed at the end of the 20th and beginning of the 21st centuries, and on the assumption that yield variation is not correlated between geographically separated regions.

Relative impacts of macroeconomic and crop yield uncertainty

The joint impact of the macroeconomic and yield uncertainties can be broken down according to whether it derives from macroeconomic conditions or crop yields. Table 1.5 shows the impacts for selected variables of each type of uncertainty separately, in comparison with the joint impact.

Table 1.5. **ACVs (%) for selected baseline variables, conditional on macroeconomic and crop yield uncertainty separately and jointly, 2013-22**

	Global production			Global use			World trade			World market price		
	Macro and Yield	Macro	Yield	Macro and Yield	Macro	Yield	Macro and Yield	Macro	Yield	Macro and Yield	Macro	Yield
Wheat	2.5	0.3	2.5	0.9	0.2	0.9	4.4	0.9	4.3	12.9	6.7	10.5
Coarse grains	2.4	0.3	2.3	1.0	0.2	1.0	5.0	2.1	4.5	13.4	7.5	10.7
Oilseeds	2.8	0.8	2.7	1.8	0.8	1.6	4.0	1.5	3.8	15.6	8.3	13.4
Rice	1.5	0.5	1.4	1.1	0.5	1.0	3.8	1.2	3.5	11.3	4.4	10.1
Beef	0.5	0.4	0.2	0.5	0.4	0.2	3.3	3.0	1.2	11(7)	11(6)	3(4)
Pork	0.5	0.4	0.3	0.5	0.4	0.3	2.1	1.3	1.6	9(8)	8(7)	5(5)
Poultry	0.8	0.5	0.6	0.8	0.5	0.6	3.1	2.9	1.2	7.7	6.5	4.1
Cheese	0.6	0.5	0.1	0.6	0.5	0.1	2.5	2.2	0.9	6.3	5.5	2.8
Skim milk powder	0.3	0.2	0.3	0.3	0.2	0.3	0.8	0.5	0.6	5.2	4.5	2.6
Protein meal	1.6	0.7	1.5	1.4	0.6	1.3	1.4	0.8	1.1	11.4	8.0	7.8
Vegetable oils	0.9	0.3	0.8	0.7	0.3	0.6	0.6	0.5	0.2	6.9	5.7	3.8
Ethanol	3.4	2.9	1.4	3.4	2.9	1.4	18.4	13.6	10.3	12.7	12.3	2.3
Biodiesel	3.0	2.7	0.9	3.0	2.7	0.9	19.7	18.2	6.4	10.3	9.4	4.3

Note: AGLINK-COSIMO distinguishes two world markets for these meats (Atlantic and Pacific), with trade flows being allocated to each according to the foot and mouth disease status of the exporter, preferential bilateral trade links and so on. The first ACV shown for world market prices refers to the "Atlantic" market, the second to the "Pacific" market.
Source: JRC-IPTS, European Commission.

StatLink http://dx.doi.org/10.1787/888932860693

Production and use[6] of the four crop products shown in Table 1.5 are affected largely by uncertainty in yields. This is more marked for production than for use, indicating the role played by stocks in reducing supply-side pressure on these markets. The volumes of global trade in these products are more uncertain than their production and use, with the greater part of the uncertainty coming from crop yield uncertainty. However, a degree of macroeconomic uncertainty is also transmitted to these trade volumes, and in the case of rice, uncertainty from this source alone is more comparable in magnitude with the uncertainty coming from yields. Uncertainties accumulate in world market prices, which adjust to clear global markets.

Beef, pig and poultry meat markets are less affected by the uncertainties analysed. For these products, the impacts of macroeconomic uncertainty are comparable or greater than those of yield uncertainty. More crop yield uncertainty is transmitted to pork and poultry production relative to beef, reflecting their greater use of purchased feed. Traded volumes and world market prices for meats are also more subject to macroeconomic uncertainty than to yield uncertainty. Cheese production, use, trade and world market price are much more sensitive to uncertainty from macroeconomic conditions than from yields, as the raw ingredient (milk) is a relatively small component of total cost, production processes are industrialised, and due to a relatively high income elasticity of demand, cheese markets are more influenced by demand fluctuations. For both protein meals and vegetable oils, production and use are more sensitive to uncertainty from crop yield than macroeconomic conditions. Yield uncertainty is important for traded volume and world market prices for protein meal, but for vegetable oils, macroeconomic uncertainty dominates, due to the use of this commodity as a biodiesel feedstock.

Production and use of the two biofuels are potentially more responsive to macroeconomic uncertainty (GDP and crude oil price) transmitted from the demand side of the market. However, domestic markets are relatively stable,[7] with uncertainty being transmitted massively to trade volumes, and to a lesser degree to world market prices.

Investigating specific risks

Although in this analysis the normal distribution is used to characterise the spread of uncertain values, thus assuming that a particular driver's uncertainty is symmetrically distributed around its most likely value, it is still possible to investigate the implications of asymmetric or even one-sided risks. This can be done by analysing a subset of the simulated solutions in which the values of one or more drivers lie in a particular range. For example, one could select runs that are based on unusually high rates of price inflation in a specific region, or on bumper yields for biofuel feedstock crops worldwide. A limitation of this approach is that, if a specific risk is defined very narrowly, it may result in a subset of runs that is too small to be reliable. However, that can be remedied by increasing the number of initial draws.

To illustrate this approach, two scenarios were investigated, each defined by a combination of less likely circumstances: *i)* lower-than-normal yields for three major crops in 2022; and *ii)* a lower-than-expected world crude oil price in three consecutive years, 2020-22. For each scenario, a subset of the runs corresponding to the relevant ranges of values for the drivers concerned were isolated from the full set of solutions, and the outcomes in the subset were analysed.

The use of joint probability distributions means that in the selected subsets the averages of other stochastic variables, even though they are not constrained to lie within a particular range, are different from the averages when all simulation solutions are considered, and different from the trend values assumed in the deterministic baseline. Moreover, when the subset is selected according to crop yield criteria, it is almost certain that the average values of the macroeconomic variables will also differ from those of the full set of solutions, due to sampling variation, although macroeconomics variables and crop yields are assumed to be uncorrelated.

Lower-than-average crop yields

This scenario was implemented by selecting the runs in which US maize yield, Russian wheat yield and Brazilian soybean yield in 2022 all fell between their 10th and 50th percentiles. These restrictions yielded a subset of 19 simulation solutions (4.7% of the total number of solved runs).

Although only three crop yields were forced below their most likely value by the selection criteria, the positive correlations between crop yields within regions means that the yield levels of many competing crops were also below average. Moreover, in this subset of simulations, the oil price (assumed to be uncorrelated with yields) turns out to be 7% lower than in the baseline. The average outcomes in the subset are compared with the deterministic baseline values. The key results are described below.

World market prices for grains and oilseeds are on average considerably higher in this subset of runs than in the baseline (wheat: +12%, coarse grains: +16%, oilseeds: +14%). These steep rises occur even though global production of each crop is only 2% or less below the baseline levels, thereby indicating the tightness of world grain markets. However, at country level, production is on average considerably lower than in the baseline in various key trading countries including the United States (maize: -6%), The Russian Federation (wheat: -11%, oilseeds: -11%), Brazil (soybeans: -10%, sugar cane: -11%) and Ukraine (wheat: -5%, coarse grains: -9%, oilseeds: -8%), which helps to explain the results for world market prices. These trends are not followed in the European Union, where production of major crops is higher by 2% or less, depending on the crop, since EU yields are not correlated with yields in the regions selected for this exercise.

Average world market prices of other agricultural commodities are also considerably higher than in the baseline, between 5% and 9% for the main meats and 4% for dairy products. The volume of world trade is lower for all grains and oilseeds except rice, unchanged for meats and higher for cheese and butter. Average feed costs for both ruminants and non-ruminants are considerably higher than in the baseline (+15% in Australia, +15-16% in North America, depending on the country and type of feed, and +15% in the European Union).

Ethanol production is on average 5% below the baseline, due to both the increase in feedstock prices and the loss of competitiveness vis-à-vis cheaper crude oil. However, global production of biodiesel and vegetable oils hardly changes. World market prices are on average 6% above baseline levels for ethanol and 3% higher for biodiesel, and that of vegetable oils is 4% higher. The volume of global trade in biofuels is on average much higher (ethanol: +9%, biodiesel: +17%).

Lower-than-expected world crude oil price

To investigate the implications of this specific risk, runs in which the crude oil price lay between the 30th and 50th percentiles of its distribution in the three years 2020-22 were selected. This selection criterion yielded a subset of 81 runs (20% of the solved runs), for which the average crude oil price over the three years is USD 117 (17% below the baseline value). In this subset, the macroeconomic context differs from that of the baseline: there is a small appreciation of the US dollar against the yen compared with the baseline, and the

Euro loses 2% of its value against the US dollar. By contrast, the value of the Russian rouble and the Brazilian real against the US dollar is 4% and 3% higher, respectively, than in the baseline. Finally, this lower-than-expected range of crude oil prices is associated with lower levels of GDP (-1%) in the main trading countries, including Brazil; only in China and India is real GDP virtually the same as in the baseline.

The key impacts found for agricultural commodity markets were as follows. World market prices for some biofuel feedstocks are lower than in the baseline (coarse grains: -3%, vegetable oils: -2%, wheat: -4% (three-year averages of subset averages)). However, some regional price effects for feedstocks are more marked (for example: sugar cane in Brazil: -6%, rapeseed in the European Union: -6%). World market prices for biofuels are also lower in this subset of runs than in the baseline (ethanol: -7%, biodiesel: -5%), reflecting similar price changes in key producing countries (the United States, Brazil and the European Union). The largest falls in biofuel production occur in Brazil (ethanol: -7%) and the United States (biodiesel: -5%). EU production is about 2% lower for both biofuels. The net effect of the lower competitiveness of biofuels against crude oil at global level is an average production fall of 2-3%. The annual impact of lower than expected crude oil prices on key variables is quite stable over the three years considered, and there is no apparent emergence of any trends due to oil prices over the three consecutive years.

Conclusion

This analysis provides a glimpse of how partial stochastic analysis can be used to supplement the information provided by the deterministic baseline, by showing which baseline variables are more affected by the uncertainty associated with a given set of exogenous variables. Moreover, for policies that are triggered or modified when a variable exceeds or falls short of a fixed threshold (for example, a quota becomes binding when the ceiling is reached, or a farm payment becomes payable when market return falls to a given level) partial stochastic analysis can indicate, when relevant uncertainties are taken into account, the probability that the threshold is reached, although the deterministic baseline value of the trigger variable may itself be quite distant from the threshold. It is also possible to use partial stochastic analysis to investigate the implications of specific risks, characterised by one or more uncertain variables falling within a defined range of their possible values.

The sensitivity analysis indicates that if the pattern and extent of crop yield variability that was observed over the last two decades continues over the following decade, then crop yield uncertainty will be greatest in Uruguay, Paraguay, Kazakhstan and Australia and smallest in Europe, China and the United States. Average yield uncertainty at the global level is much smaller than at country and regional level. Nonetheless, considerable uncertainty will still be transmitted to world markets for grains and oilseeds, with the uncertainty of world market prices, relative to the projected baseline, about double that of traded volumes. Crop yield uncertainty will also affect world market outturns for livestock products, especially meats, but to a smaller extent. In all these markets, yield-induced uncertainty is compounded by the uncertainty assumed in key macroeconomic variables, the most variable being exchange rates and the crude oil price.

The baseline projections for world trade in biofuels in 2022 must be viewed as particularly uncertain, even with the assumption that all mandates are filled. In these markets, the uncertainty transmitted from crop yield variability is dominated by that generated by macroeconomic variables on the demand side due to uncertainties in incomes and crude oil-based fuel prices.

At the same time, it is stressed that this type of stochastic analysis does not forecast the evolution of future uncertainties. To obtain a projection of how uncertainty is likely to evolve in future years, relevant information must be obtained elsewhere from prospective statistical studies, biophysical modelling or from a panel of experts. These projections of uncertainty could then be used as an input into the stochastic model. In the work reported here, a hypothetical scenario involving a historically-based profile of uncertainty has been run through the model, in the spirit of a sensitivity analysis, in order to assess how robust the deterministic baseline is to this particular uncertainty profile.

Notes

1. Only rice stocks to use following consecutive large harvests are approaching recent historical levels.
2. FAO (2009), *How to Feed the World in 2050*, FAO High-Level Expert Forum, Rome, 12-13 October.
3. The methodology is detailed in: Burrell, A., Z. Nii-Naate (2013): "Partial stochastic analysis with the European Commission's version of the AGLINK-COSIMO model", *JRC Scientific and Technical Reports*, European Commission, JRC76019: *http://ftp.jrc.es/EURdoc/JRC76019.pdf*.
4. EU15 only. EU15 comprises of over 90% of EU GDP.
5. These countries account for over 70% of global GDP.
6. Use includes human consumption, feed use, biofuel use and other.
7. The extent to which biofuel mandates are fulfilled in those countries concerned is fixed exogenously. For more details, see the biofuels chapter in this volume.

Chapter 2

Feeding China: Prospects and challenges in the next decade[1]

Introduction

The historic economic and social transformation of China which has been evidenced in the past three to four decades has and will continue to have huge potential implications for international agricultural markets which are the focus of this *Outlook*. China, which now holds one-fifth of the world's population, is endowed with little arable land and water supplies relative to its population base. Indicators point to continued robust growth in domestic demand for agricultural products, but also to potential challenges on the supply side. China has undertaken significant market reforms and, depending on future policy options, may engage world markets more or seek its own means to meet its increasing domestic demand.

China's success in increasing agricultural production and in feeding better its growing population in the past three decades has been remarkable. Since joining the World Trade Organization in 2001, however, trade patterns have started to change. While it remains self sufficient in specific food security commodities, China's doors have opened to certain commodities such as oilseeds and trade has grown exponentially. For some commodities, including pigmeat, dairy products, maize, and sugar, imports have grown considerably in recent years. Retail food price inflation has been significant since 2000. While it would appear that substantial room exists for productivity gains to sustain domestic market advantage, constraints of land, water, and even rural farm labour appear to limit future supply response.

On the macroeconomic side, exchange rate appreciation due to high growth in exports of labour intensive manufacturing products, has also made agricultural imports more attractive. On the other hand, China's agricultural policies are fundamentally addressed to goals of reducing the rural/urban income divide (Box 2.1), as well as enhancing food security through policies for raising agricultural production and improving productivity. Furthermore, consumption trends for both calories and protein in China, compared to the higher income economies of the OECD, indicate that the gap has significantly narrowed. Demand pressure with high income growth is expected to sustain in the medium term, but it should ease considerably compared to recent past experience.

This chapter begins by reviewing the performance of China's agriculture in recent decades and situates the sector in the context of current domestic and global conditions. It then presents the outlook for China in the context of domestic and international factors and policies which condition its medium term prospects. This includes a detailed look at certain macroeconomic and demographic factors, the emerging challenges which need to be addressed, and policy responses which will certainly underlie sectoral performance. The baseline projection for key commodities is then provided, followed by an assessment of the key risks and uncertainties that could have a major potential impact on the *Outlook*.

The baseline builds on the consensus of country and industry collaborators, which for the first time includes commodity experts at the Agricultural Information Institute of the Chinese Academy of Agricultural Sciences (CAAS). The baseline is not a forecast in the usual sense of the term but a plausible outcome intended to facilitate discussion concerning policy choices by confirming a forward looking perspective in the context of apparent risks. While neither this chapter nor the *Outlook* in general are intended to assess agricultural policy developments or to recommend policy options, the agricultural policy environment is considered in the context of the impact on markets and trade. It also excludes consideration of the industrial, infrastructure and tax policy environment.[2]

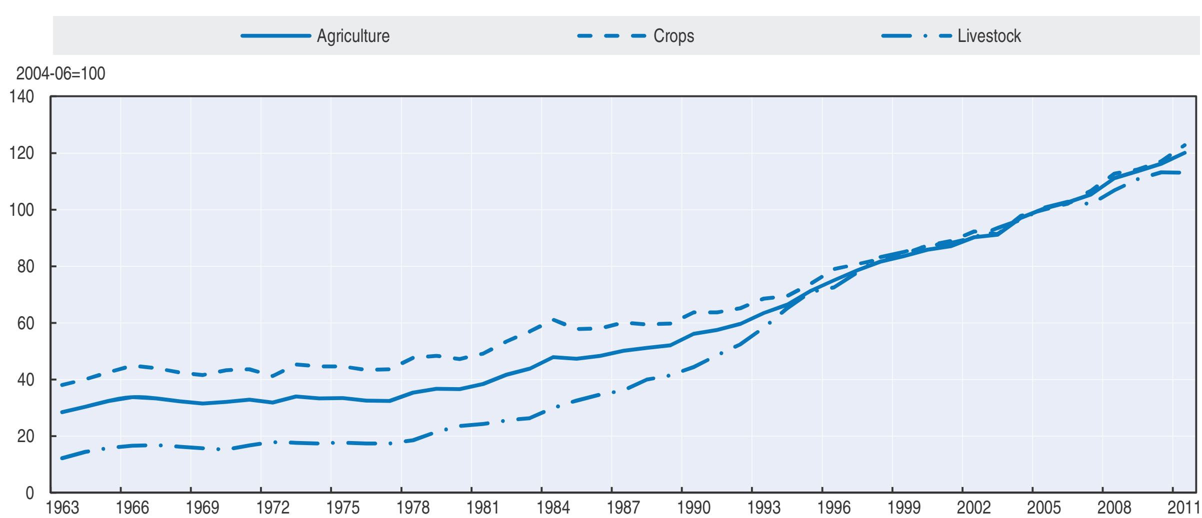
The success of China's agriculture

Over the course of the past four decades, China has displayed vigorous growth. In 2011, the Chinese economy, as measured by its gross domestic product (GDP), was almost 20 times larger in volume terms than it was in 1980. The agricultural sector, as measured by FAO's net agricultural output index grew by 4.5 times over the same period. The rapid growth in both national income and agricultural output has contributed to substantially higher national food availability and a much improved access to food. The details surrounding such success has many dimensions, including a changing policy environment, increased national investments, and improved factor productivity, all amid a rapidly changing rural, demographic and economic landscape, regional differences but also critically rising land and water constraints.

High growth in production

Growth in agriculture accelerated rapidly after the economic and rural reforms in the late 1970s (Figure 2.1). Per capita agricultural output, as measured by FAO's net agricultural production index, grew a modest 1.1% p.a. from 1961-1978. However, from 1978 to 2011, output growth averaged over 3.8% p.a. in per capita terms, with crop production growing 2.9% p.a. and livestock growing, albeit from a smaller base, by a large 5.6% p.a. in response to demand from high income growth. Livestock product growth was particularly strong during the decade post 1986, but slowed as the market matured and meat consumption levels reached higher levels. Growth in agricultural output has slowed in the past decade but is still in excess of 3% p.a. in per capita terms, almost twice the global rate of 1.7% p.a.

Figure 2.1. **Agricultural production in China**



Source: FAOSTAT.

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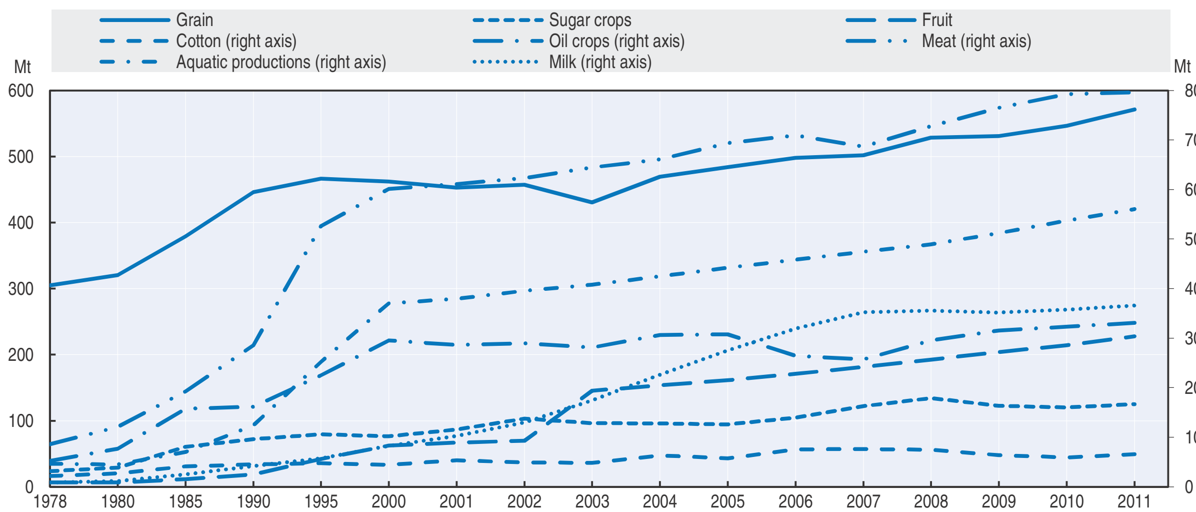
Since 1978, China's grain production (cereals, coarse grains, oilseeds) increased 93% from 305 Mt in 1978 to 590 Mt in 2012. Over this period, cotton output has risen by a factor of 2, oil crops 5, sugar crops 4, and fruits by a factor of 34. The sizeable gains in crop output have been achieved despite a decline in arable land area, due to increases in yields and increased multiple cropping. Over the period, yields have increased at trend rates for wheat at 2.3% p.a., maize at 1.7% p.a., rice at 1.2% p.a., and soybeans at 1.2% p.a. Multiple cropping – the ratio of total area sown to total arable area, reached a high in 2011 at 1.35 (based on *China Statistical Yearbook*). Production of livestock and fish products have shown significant increase, meat by a factor of 8 times, milk 16, and aquatic species by 11 times with those from aquaculture growing by 31 times since 1978 (Figure 2.2).

Figure 2.2. **Production of major agricultural products in China**



Source: National Bureau of Statistics, China.

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Higher output has been achieved as a result of high investment. Real net investment in farm capital has increased at a trend rate of over 9% per year as the government has attached a high importance to improve and modernise agricultural production systems.

- The power of agricultural machines increased by over seven-fold in the past three decades. The number of large and medium-size farm tractors, rice transplanters and corn combines in 2012 were 4.9 million, 5.1 million and 2.3 million respectively. The mechanisation level in sowing and reaping has exceeded 55%, not only for wheat, but also for rice and corn.
- Infrastructure for irrigation and water conservation has improved significantly. By 2011, the effective area with irrigation reached 62 Mha, 37% above that in 1978. The development and improvement of infrastructure in irrigation and water conservation have enhanced the ability of preventing natural disasters, providing a solid foundation for assuring agricultural production capacity.
- New prospects have been opened up in the development of modern agriculture. The pattern of agricultural development has changed with better supporting infrastructure surrounding the sector. The policy environment is more supportive to higher productivity growth with a greater emphasis on science and technology, and with facilities to improve farm productivity and higher ecological performance.

The contribution of scientific and technological progress in 2012 to growth in agriculture has reached 54.5%, doubling from 27% in the beginning of rural reform.[3] Some important agricultural technologies have emerged with breakthroughs in some core technologies such as hybrid rice, corn, and rapeseed, and transgenic anti-insect cotton. The coverage of improved varieties of farm crops has now exceeded 95% in China. Agricultural science and technology has increased the prevention of plant and animal diseases and control for insect pests, thereby decreasing crop and animal losses. Through research and innovation, agricultural and renewable resources are better managed, promoting sustainable development, and resource conservation.

Box 2.1. **China's evolving agricultural policy priorities**

China's agricultural policy framework has been evolving in line with fundamental reforms carried out since 1978 and resulting in a gradual transition from a centrally planned economy towards a socialist market economy.

During the reform period, agriculture and rural areas more generally provided two major boosts to China's development. The first came from a major transformation in the policy environment in agriculture in the early 1980s when the tightly controlled commune system was replaced by the Household Production Responsibility System (HPRS) in which individual farmers were allowed to lease land from the collectives, becoming largely autonomous in their decision, and responsible for profits or losses from their operations. The second began in the late 1980s when in order to employ workers leaving agriculture and to avoid large-scale migration to the cities, sub-national governments were encouraged to promote the growth of rural non-agricultural industries, commonly known as township and village enterprises (TVEs). These enterprises were the main vehicle for absorbing workers leaving agriculture, necessary for China's growth and development. A uniqueness of China's experience in the late 1980s and in the 1990s was that the bulk of the shift in employment took place within rural economy rather than through migration from rural to urban areas (OECD, 2005).

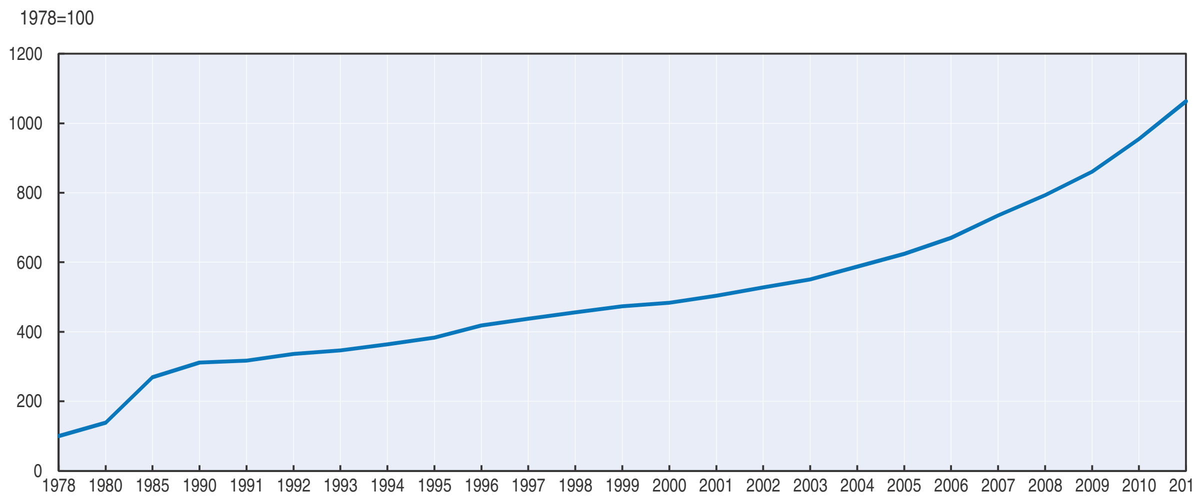
Up to the late 1990s, the principle agricultural policy objective was to increase agricultural production, especially of food grains. Gradually, more attention was given to supporting rural incomes to address the issue of the growing income gap between urban and rural populations. Accordingly, policies aimed at raising agricultural incomes were adopted with a fundamental shift from taxing agriculture to supporting it. This shift in focus coincided with China's accession to the WTO in December 2001 which placed China's support policies within a framework of internationally recognised rules and regulations. Income support policies were further strengthened through the adoption of the highest priority document of central authorities for 2004 (Document No. 1). This document put forward a set of agricultural policy measures which, through their increasing geographical and commodity coverage, became key channels for providing support to China's agriculture. An important, but also symbolic, change in China's approach to agriculture was the abolition of the long established agricultural tax, which was effectively implemented by early 2006, after 2 600 years of its application.

Following the 2004 Document No. 1, all subsequent annual versions have concentrated on various aspects of agricultural and rural development issues. The most recent ones focused on water conservation to achieve sustainable use of water resources within the next ten years (2011); on investment in agricultural science and technology to help boost agricultural production and farmers' incomes (2012); and on transition to larger-scale farms through the creation of large individual-operated farms, family farms, co-operatives and contracting arrangements between farmers and companies (2013) (OECD, 2013).

Rural incomes have increased steadily

Since reforms and the opening up of China, rural incomes have been increasing continually and living standards have been increased substantially. Based on constant prices, per capita annual income of rural residents in 2011 was ten times higher than that in 1978 (Figure 2.3). The major factors that contributed to the income growth included higher agricultural growth, better wages income for migrant workers, higher incomes from non-agricultural activities in rural areas, the elimination of the agricultural tax and increased agricultural subsidies.

Figure 2.3. **China: The growth of per capita annual income for rural residents**



Source: National Bureau of Statistics, China.

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Food security has improved significantly

According to the World Bank, poverty rates in China have fallen dramatically, from 64% in 1992 to 12% in 2009.[4] High income and agricultural output growth has enabled China to reduce its number of undernourished people. When numbers of undernourished were assessed in 1990, it was estimated that some 254 million people were undernourished, or 21% of the population. Despite the addition of about 196 million people to its population by the year 2010, the estimated number of undernourished, people fell to 158 million, or to 12% of the population (Table 2.1). Despite high success in reducing undernourishment, China still has the challenge to reduce further its number of undernourished people.

Table 2.1. **Food Insecurity in China: FAO estimates of the number of people undernourished**

	1990-92	1999-2001	2004-06	2007-09	2010-12
Number (million)	254	187	176	158	158
Percentage (%)	21	14	13	12	12

Source: *State of Food Insecurity* (2012), FAOSTAT.

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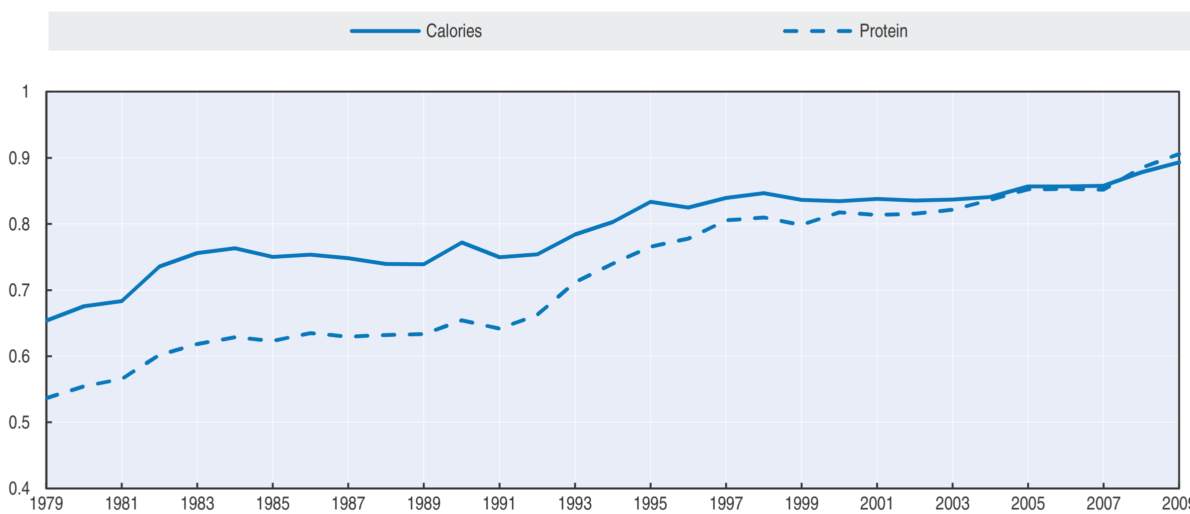
Progress in achieving higher consumption may imply that future demand pressures in China may moderate compared to the past. On average, daily calorie and protein availability per person in China were estimated at 3 038 kcal, and 94 g in 2009. This compares with the OECD average of 3 402 kcal and 104 g in 2009 respectively. Since 1978, China's calorie availability relative to that of the OECD average (ratio) has increased from 66 to 89%; for protein intake, the ratio has risen from 53 to 90% (Figure 2.4). This rapid convergence in these components, especially for protein, may indicate that China's per capita availability of calories and protein may be approaching the stable equilibrium levels for these components which is characteristic of OECD countries. As this gap closes and with low population growth, demand pressures may ease, at least as far as nutrition is concerned. However, higher availability of proteins, in the form of meat for example, may involve higher resource demands and costs from agriculture.

Figure 2.4. **China's per capita calorie and protein supply, ratio to OECD average**



Source: FAOSTAT.

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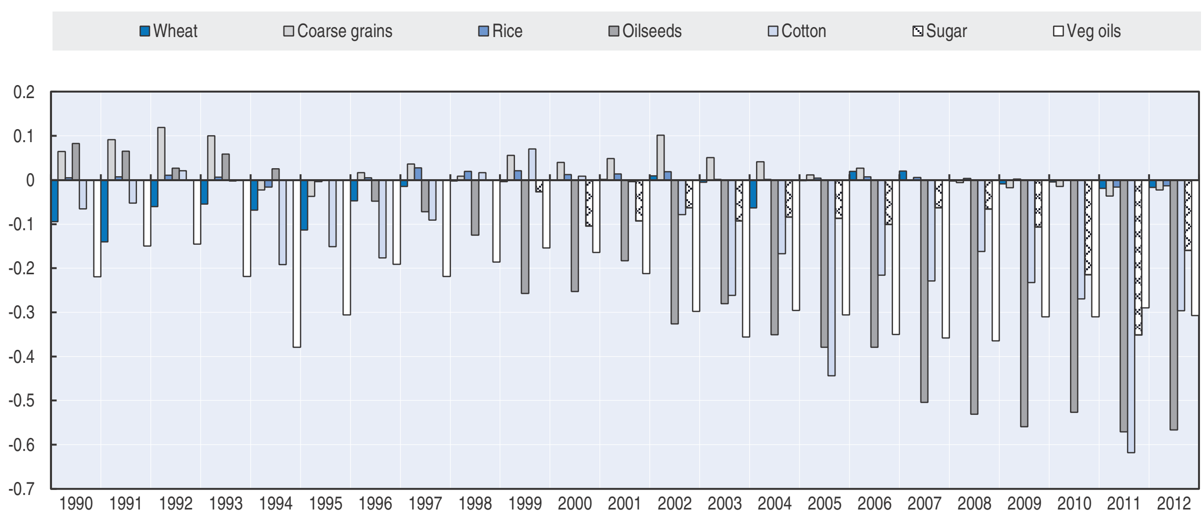
The food security situation in rural China has improved substantially, corresponding with the rise in living standards. In real terms, per capita annual income of rural residents in 2011 was 10 times higher than that in 1978. With the growth of real incomes, consumption patterns have changed considerably. Engel's coefficient (share of expenditures allocated to food) for Chinese rural households steadily dropped from 68% in 1978 to 40% in 2011, and consumption patterns have been changing towards more livestock products (Table 2.2).

Trade: Self sufficiency in food security commodities

Since China joined the WTO in 2001, the openness of its agricultural sector to global markets increased and has resulted in increased trade. From 2001 to 2012, the value of Chinese agricultural trade (total of imports and exports) increased from USD 27.9 billion to USD 155.7 billion, with an average annual growth rate of 17%. The trade dependence (i.e. trade value per unit of agricultural GDP) of Chinese agriculture increased from 15% in 2001 to 21% in 2011. Import dependence doubled from 6% to 13%. China's net trade deficit in agriculture and food widened further in 2012 to USD 31 billion, up from USD 18.5 billion in 2011.

In large part, rapid growth in both commodity supply and demand, strongly supported by its policy framework, has enabled China to achieve a high level of self-sufficiency in basic grains – wheat, rice and coarse grains (Figure 2.5) – which have been considered important for meeting food security objectives. With few exceptions, the self-sufficiency ratio for each of these commodities has ranged between 0.95 and 1.05 since 1995. It is noteworthy that since 2006 China has had a net trade deficit in these grains. However, achieving high self-sufficiency for these commodities has been attained by importing other crops/products which compete for land. For example, China has become the world's largest importer of oilseeds, with a market share in 2011-12 estimated at 54%, accounting for more than 50% of consumption by 2011; these imports have effectively freed some 28 Mha of harvested land, as measured by China's oilseed yields. Similarly for cotton, sugar, and root and tuber crops, China's net import position has deteriorated as competition for land has been steered toward food security commodities.

Figure 2.5. **China: Self-sufficiency for major crops/products**



Note: Computed as net exports/consumption, 0 indicates full self-sufficiency, -1 indicates net imports fill all domestic consumption.
Source: FAOSTAT, FAO estimates.

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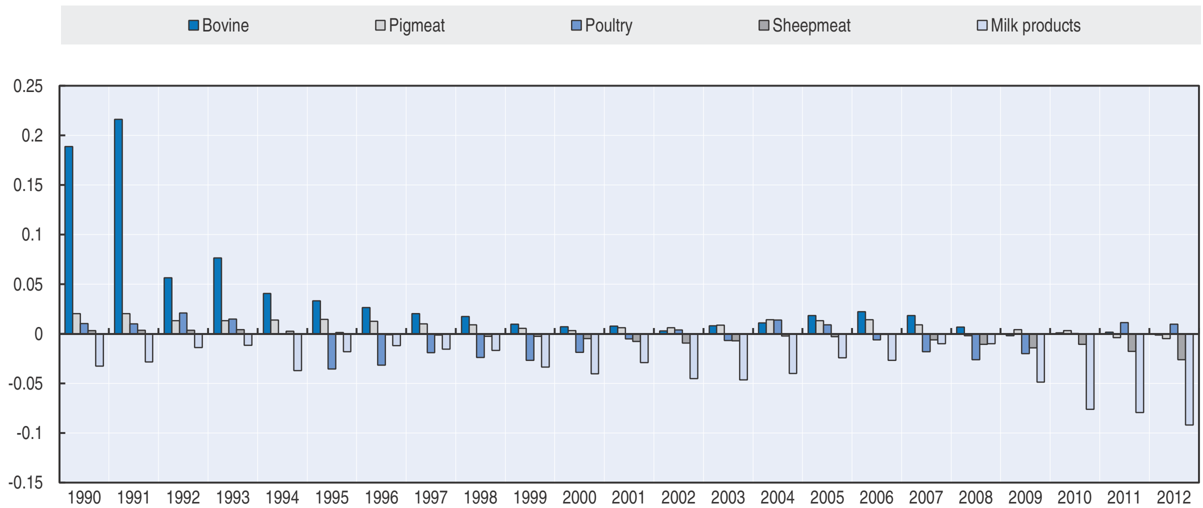
For livestock products, China has maintained near self sufficiency for all meats with net exports within 1-3% of domestic consumption (Figure 2.6). However, even with net trade at less than 1% of consumption, pigmeat imports were some 600 000 tonnes in 2012; such imports are large in the context of global pigmeat trade of about 7.8 Mt. In recent years, following China's melamine crisis and restructuring of its milk and dairy processing sector, imports of dairy products have increased substantially.

For fishery products, China is a net exporter, and by far the leading fish exporter in the world. During the last few years, China has also increased its fishery imports significantly for both domestic consumption and for its fish processing industry, as a growing share of its fishery exports consists of reprocessed imported fish.

Markets have improved

China's agricultural sector has long been influenced by government and government policy. As its state of development has changed, its priorities have evolved (Box 2.1). With

Figure 2.6. **China: Self-sufficiency in livestock products**



Note: Computed as net exports/consumption, 0 indicates full self-sufficiency, -1 indicates net imports fill all domestic consumption.
Source: FAOSTAT, FAO estimates.

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successive reforms, China's agricultural sector has been in transition from a planning economy to market based economy which has changed considerably. Prices were set in local regions and provinces, but these practices have now been changed. There are now over 4 300 wholesale agricultural product markets in China, in which over 950 markets have annual returns of more than CNY 100 million. The government has supported infrastructure construction for agricultural product markets and now a large brokerage work force of over 6 million people has been established. Leading agricultural and national business organisations play an important part in the management of agricultural product purchasing and import and export trade. Market services have become more open, unified, competitive and transparent with the establishment of agricultural product "green channel" and "one station" systems that contribute to the orderly movement of agricultural products.

The role of market information is becoming central to improved market efficiency. In 2012, the China Ministry of Agriculture started to collect price information, covering producer, wholesale and retail prices, with daily, weekly, monthly, quarterly and annual reporting integrated into a real-time monitoring system. An agricultural product monitoring and early warning system has also been established so as to help improve the sector's market responsiveness.

Recent statistical studies indicate that domestically, spatial markets for many commodities are now better integrated and hence more efficient (Box 2.2). However, the linkage between international markets and domestic markets varies significantly by commodity. Presently, of the major commodities, prices of all major commodities with the exception of pigmeat appear to be statistically integrated with global markets. However the degree of connection to global markets is low for most commodities, with soybeans showing the strongest linkage. Markets are still affected by state enterprises and by tariff rate quotas as well as minimum procurement prices and stock intervention schemes in the cases of rice and wheat.

Box 2.2. **Domestic and international market integration**[1]

Domestic market integration

Prior to 1992, agricultural prices in China were largely set by administrative processes. In 1992, China started to build its socialist market system. While prices for certain commodities remained influenced by minimum procurement prices, agricultural markets were gradually liberalised and opened to world markets. Liberalisation of meat, vegetable and fruit markets preceded those for grain, which were finally liberalised in all provinces in 2004. Recent research based on statistical analysis of price movements indicates that Chinese domestic markets are now integrated across provinces.

Recent research on domestic market integration in China

Author	Product	Data period	Result	Price transmission
Tian Zhihong (2012)	Corn	2001-10	Integrated	Producing=> deficit regions
Wang Ning (2008)	Wheat	2005.01-2007.12	Integrated	-
Li Min (2006)	Rice	2001.1-04.12	Integrated	Producing=> deficit regions
Tian Xiaochao (2011)	Hogs	2000-08	Integrated	Producing regions => deficit
Wang Yi (2007)	Apples	1998-2006	Integrated	Importing =>producing regions

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Global integration

Statistical tests with monthly wholesale market price data over the period 1996 to 2012 show that with the exception of pigmeat, domestic commodity markets for primary commodities are statistically integrated with international markets. Some domestic markets, such as rice, bovine meat, and pigmeat may also influence international markets. However the degree of market connection ranges considerably, as noted by the Timmer/Revallion Index of Market Connection (IMC), as shown in the table below. As expected, soybeans, maize and wheat show the lowest IMC values (IMC of zero indicates highest connection), whereas commodities such as rice and meat products illustrate much lower connection with international markets. Estimates made separately for the periods 1996-2004 and 2005-12, show that the IMC rose for wheat, rice and beef, and indicate that market connection deteriorated in the latter period, as international market price volatility was not reflected in domestic markets.

Indexes of market connection

	Maize	Soybean	Wheat	Rice	Chicken	Bovine meat	Pigmeat
IMC (1996-2012)	7.1	4.0	10.1	24.6	78.8	55.8	(41.4)
IMC (1996-2004)	(3.4)	2.3	5.4	17.0	(13.5)	8.9	(4.6)
IMC (1996-2004)	(10.2)	3.9	27.5	39.5	(7.0)	(46.9)	(52.3)

Note: IMC of 0 is highest connection, higher values indicate lower connection (Timmer, 1984). IMC = (1 + b1)/(b3 - b1), where in the case it is shown that international price Granger causes the domestic price PD = (1 + b1) * PD(-1) + b2*(PI - PI (-1)) + (b3 - b1) * PI(-1), where PD is domestic price, and PI is international price expressed in domestic currency. IMC results in brackets are reported but are not appropriate because statistical integration could not be established from the data during these periods.

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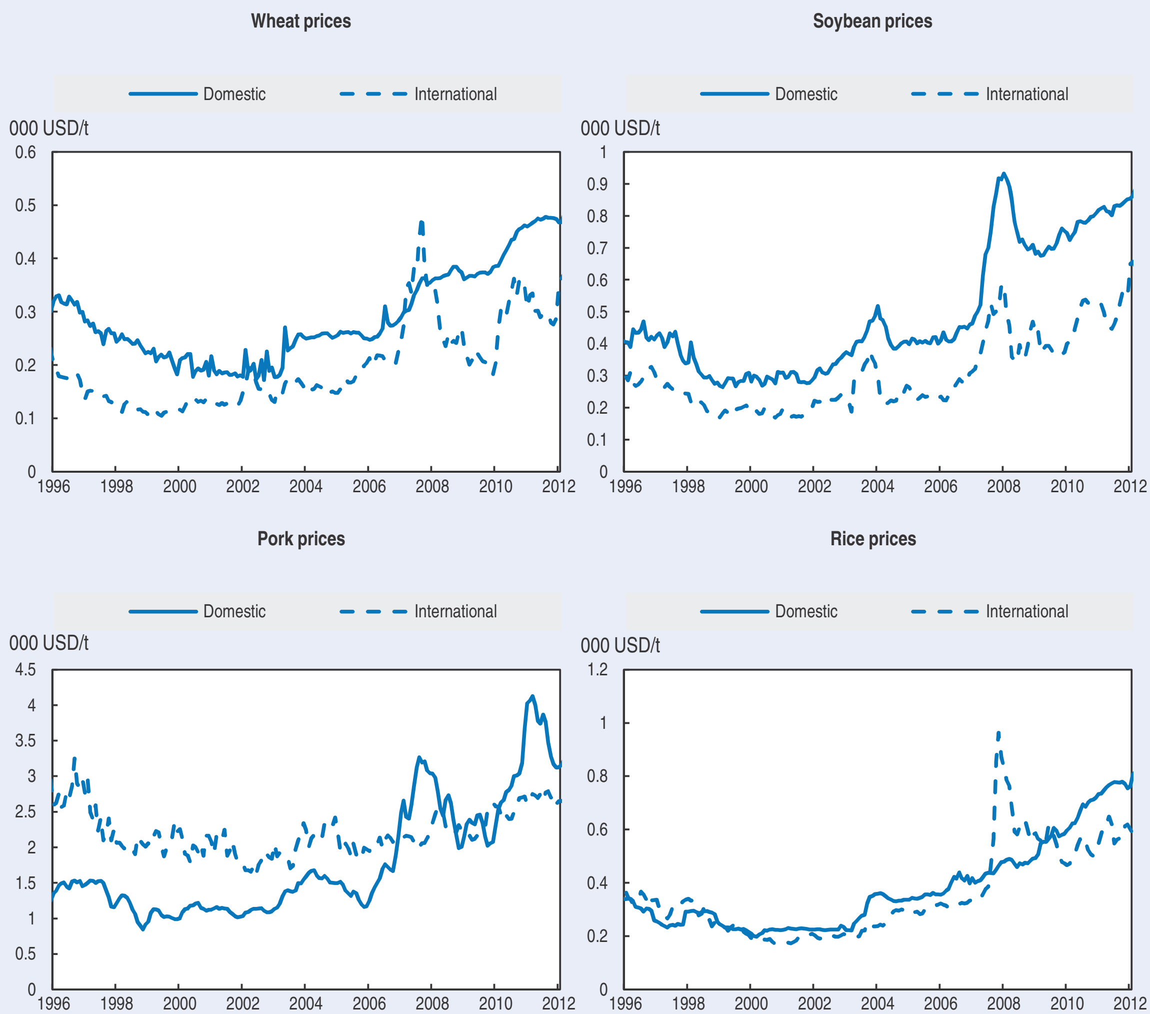
Box 2.2. **Domestic and international market integration**[1] *(cont.)*



Note: The data used is monthly prices from January 1995 to December 2012. Domestic prices are wholesale market prices from Ministry of Agriculture of China; the world prices are prices in major producing countries from FAO (*www.fao.org/economic/est/prices*). Co-integration tests use the Johannsen procedure.

Source: Data from Ministry of Agriculture, China.

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1. Provided by Wu Laping, Professor, China Agricultural University. The term "integrated" in this text refers to statistical integration where a linear combination of the two prices (made stationary by eliminating trend components) is a statistical error which is randomly distributed. For example, P – b * WP = U, where P is domestic price, WP is world price and U is random error of mean zero.

The outlook for China's agricultural sector

Key factors and constraints underlying China's outlook

The success of China's agricultural sector has been remarkable. However, recent developments in its market situation raise the questions about whether China's agriculture is at a fundamental cross road in its relationship with international markets and about how emerging forces will shape its development over the next decade. Much will depend on how rising constraints to China's agricultural production evolve, and in particular on the policy environment applied to the sector. The *Outlook* first looks at these conditioning factors which will be assumed to underpin outcomes for the next decade. These factors are many and include some contentious issues which are difficult to assess fully in terms of the extent and timing of their impact in the short, medium and long term. Within this context, the projection of China's major commodity markets is then outlined in detail.

Economic growth slower, but remains strong, stimulating demand

Growth in China's economy has been phenomenal by any standard of world economic history, with a long spurt in economic growth in the range of 8-12% p.a. over the last three decades. This growth has been largely underpinned by export-led industry, large public investments and a population-demographic dividend associated with a sharp change in fertility rates as adoption of the one-child per household policy took effect in 1979. Relatively cheap labour has situated China with a comparative advantage in labour intensive manufacturing products, resulting in imports of raw materials and large exports of finished value-added products. However, the next decade appears to be one which shows signs of slower growth as competitiveness declines.

The OECD projects strong GDP growth to gradually slow over the next ten years from the current 8% range toward 6%.[5] This still means that per capita income in China will more than double over the next decade, with an impact on domestic demand for food, particularly for those foods with higher income sensitivity. While China's Engel coefficient has declined as income has risen, and will decline much further in the next decade, it indicates a considerable impact for food demand, especially if income growth is passed down to the lower income population.

While economic growth may stimulate demand, other macroeconomic changes may further limit supply response. First, China's nominal, and especially its "real" exchange rate has appreciated. This trend is assumed to continue. The impact is to make China less competitive against international markets by reducing the Yuan price of imports. Second, labour wage rates have inflated both in urban and in rural settings, creating higher costs of production throughout the market chain, not only on farms but also in the processing and retail sectors. As further noted below, demographic projections indicate that China's working age population will decline over the next decade, increasing further pressure on wages. Higher costs create pressures on net farm incomes and, for example, place China's dominant cotton processing sector at risk compared to other international competitors.

Demographic changes will impede supply, but stimulate demand for value added products

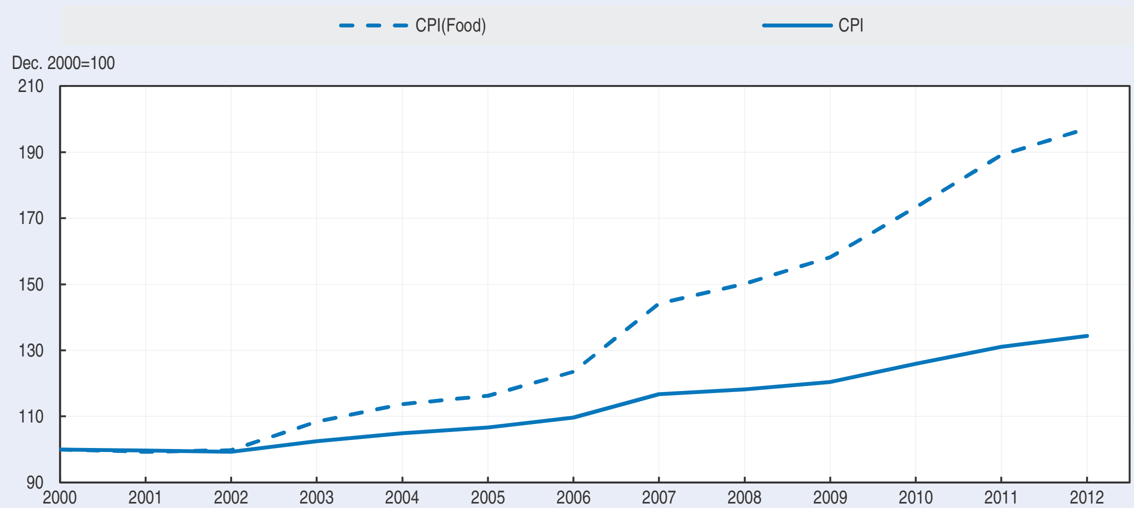
Since 1992, when it reached its historic high of 844 million, China's rural population declined to 695 million in 2012, a net fall of some 150 million people. UN population projections indicate a further net decline of 100 million people living in rural China by 2022. These are large numbers; the resulting impact on agricultural labour, farm structure, land management and especially rural economies is significant.[6]

Interaction with other demographic and economic developments yields a yet more difficult situation in the rural sector. The slowing of population growth initiated by China's family planning policy (1978), while initially leading to a population dividend with higher per capita income with proportionately fewer workers in the young and inactive segment

Box 2.3. **Macroeconomic challenges facing China in the next decade**

China is expected to continue resilient economic growth, but there are some downside risks for China. The risks include inflation, appreciation of its real exchange rate, as well as possible instability of its financial system and a plunge of property prices, all of which may be exacerbated by further external shocks, such as deepening of the euro zone crisis, or changes in US economic prospects. Inflation in China is already quite high, supported by increases in labour wages. But food price inflation has been remarkably high and will need to be contained. Food currently has a 30% weight in consumer expenditures and high inflation will impact real incomes and consumer demand, dragging economic growth down.

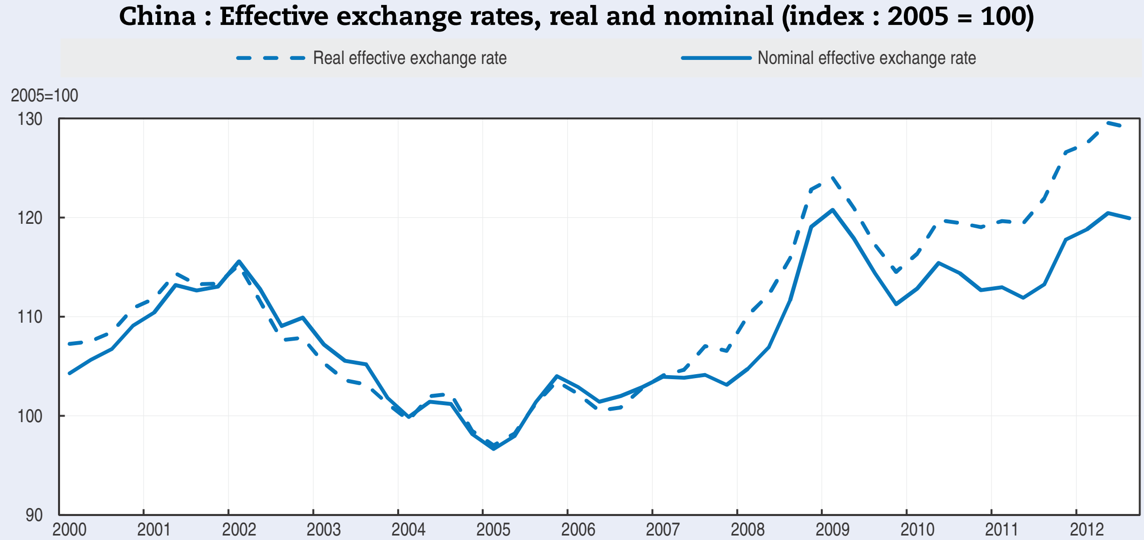
China : Consumer price indices, 2000-2012



Source: Bloomberg. StatLink http://dx.doi.org/10.1787/888932860978

China's real effective exchange rate (nominal rate adjusted for domestic inflation relative to those of trading partners) has appreciated around 30% since 2005. If this trend continues, the result will be to make imports more attractive, and may cause minimum procurement prices to underpin markets. In this case, the government would be pressured to enhance domestic support and protect their producers from international competition. This would not only affect prices and consumption of domestic products, but will deteriorate the fiscal condition and may not be sustainable for a long time.

China : Effective exchange rates, real and nominal (index : 2005 = 100)

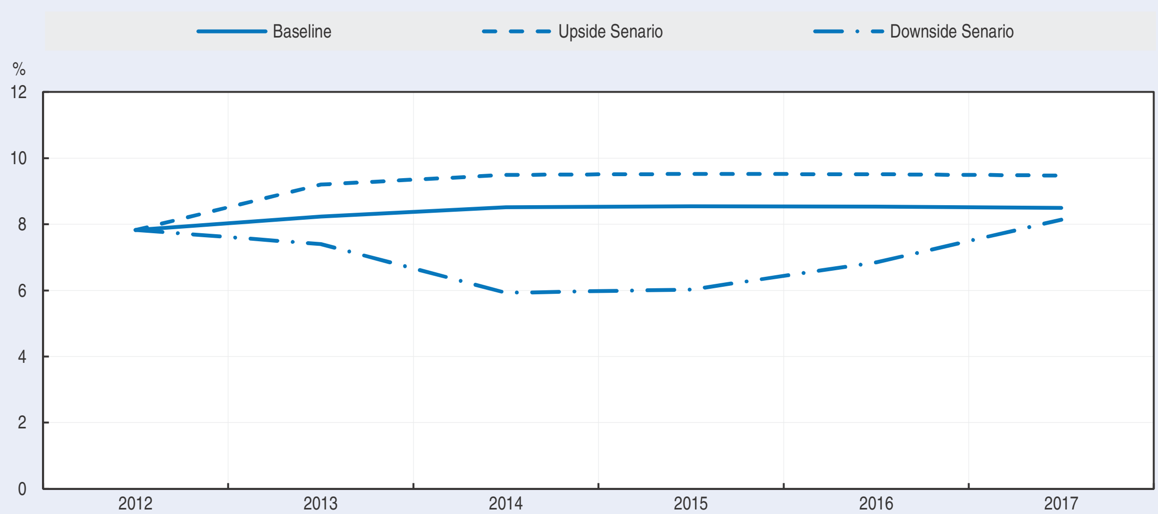


Source: IMF. StatLink http://dx.doi.org/10.1787/888932860997

Box 2.3. **Macroeconomic challenges facing China in the next decade** *(cont.)*

OECD has projected that the pace of economic growth in China will slow toward 6% per year. The upside and downside scenarios, based on IMF estimates, still indicate a range from 6 to 9%, and while a significant range, still indicates anticipated robust growth in the future. However, China's labour force recently decreased for the first time (*Financial Times*, 2013) and there are signs of labour shortage in the near future. Real average wages have increased more than three-fold since 2000 in many provinces (IMF, 2012b). The concern is that China will eventually reach the so-called Lewis Turning Point, where higher wages will lower competitiveness and compromise future economic growth (Cai and Wang, 2012; IMF, 2012b).

China : Annual GDP growth rate scenario



Source: IMF and FAO calculations.

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of the population, has led quickly to a more rapid ageing of the population structure. Emigration out of rural communities, encouraged by higher wages in urban communities, particularly for more highly educated and younger labourers, has left a higher age labour force in rural China. Policies surrounding land tenure may also limit the incentives for younger producers to remain in rural areas and invest in productivity enhancing technologies. Effectively, this situation will continue to deprive the sector of the modern, skilled workforce which it needs for more complex and larger scale farming operations, including using modern machinery and equipment, diagnosing diseases and pests, employing investment and marketing tools, and managing effectively complex operating units. The net result will limit productivity in the future, curbing supply potential, and limiting farm sector competitiveness.

On the demand side, population growth will continue, albeit at a slower rate of 0.3% p.a. compared to 0.5% p.a. in the past decade. The rapid increase in urban population will continue to impact on food demand patterns. While the total population increase is projected by the UN to be some 38 million people to 1.392 billion by 2022, urban population may increase by 138 million over this period. In 2011, the average net income of urban dwellers was almost three times that of rural dwellers. As noted in Table 2.2, consumption patterns are strikingly different. Not only does food consumption appear higher in urban contexts, which are associated with higher incomes, consumption of meat, dairy and fish products are also much higher. These demographic trends will support changes in diet structure, implying growth in the demand for feed grain and protein meal. They also place higher demand for modern and efficient food marketing chains which establish quality and safety regimes that must be met by supply chains reaching down to the primary sector. Nevertheless, as measured by current data on apparent consumption, consumption of both meat and fish in China on a per capita basis is similar to many OECD countries and an appropriate issue is how much the composition of protein intake will change over the coming decade.

Table 2.2. **China: Food consumption by category, rural vs. urban**

	1990	1995	2000	2005	2011
	(kg per year/person)				
Rural					
Grains (unprocessed)	262.1	256.1	250.2	208.8	170.7
Meat and poultry	12.6	13.1	17.2	20.8	20.9
Dairy products	1.1	0.6	1.1	2.9	5.2
Fish	2.1	3.4	3.9	4.9	5.4
Vegetable oils	3.5	4.3	5.5	4.9	6.6
Vegetables	134	104.6	106.7	102.3	89.4
Urban					
Grains (unprocessed)	158.4	117.6	99.8	93.3	97.8
Meat and poultry	25.2	23.7	25.5	32.8	35.2
Fresh milk	4.6	4.6	9.9	17.9	13.7
Fish	7.7	9.2	11.7	12.6	14.6
Vegetable oils	6.4	7.1	8.2	9.3	9.3
Vegetables	138.7	116.5	114.7	118.6	114.6

Notes: Note data exclude consumption outside the household; weights of measurement may differ from data of other sources.
Source: National Bureau of Statistics, China.

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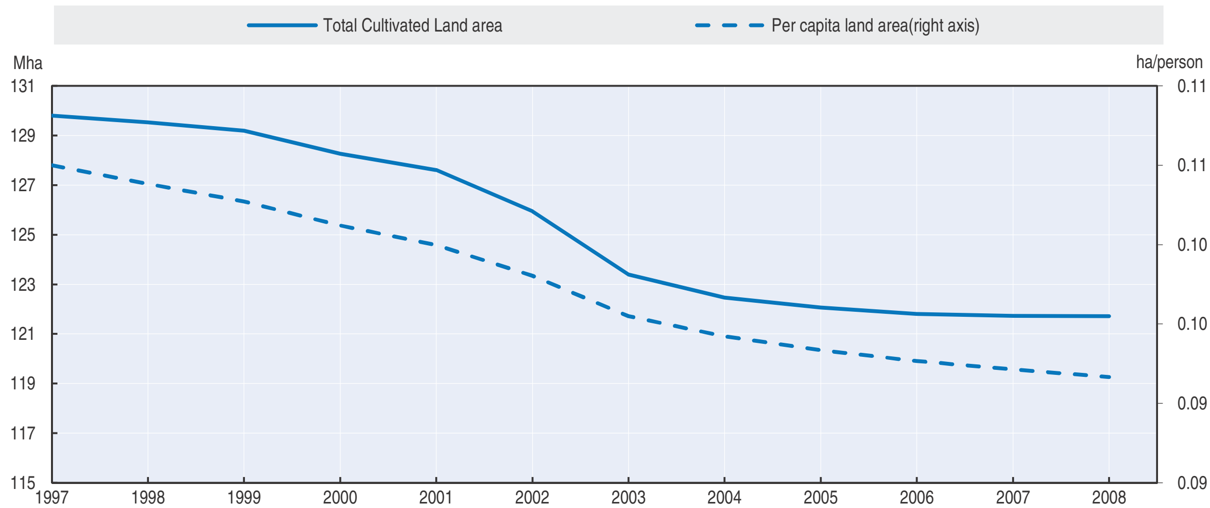
Reduction in arable land will abate, but reduction in quality foreseen, slowing crop yield growth

The previous section noted that quality labour input in rural China is becoming scarce and more expensive. However, as long recognised, China's land and water issues are the primary constraints to the expansion of agricultural production. Although China has the world's third largest area of arable land, on a per capita basis per capita arable land availability is less than one half of the global average (0.09 *vs.* 0.22 ha per capita), and about one quarter of the average for OECD countries (0.35 ha per capita).

Recently, cultivated land area (arable land including permanent crops) has decreased rapidly. According to the statistics of Chinese Ministry of Land and Resources, national cultivated land decreased from 129.8 Mha in 1997 to 121.7 Mha in 2008, a 6.2% decline (Figure 2.7). During the 10th Five-Year Plan (2001-05) for agriculture, cultivated area decreased mainly due to planned ecological cropland conversion. However, the 11th Five-Year Plan (2006-10) arrested this decline and established a legally binding minimum "Red-line" area of 120 Mha. Under the 12th Five-Year Plan, the Red-line continues to apply until 2015. This *Outlook* assumes it will be extended to at least 2022 and effectively sustain land in agriculture over the period. However, pressures from increased urbanisation will likely prevent any expansion in arable area, and with multi-cropping rates near their maximum, competition for land will remain high.

Figure 2.7. **China: Cultivated land area**



Source: National Bureau of Statistics, China.

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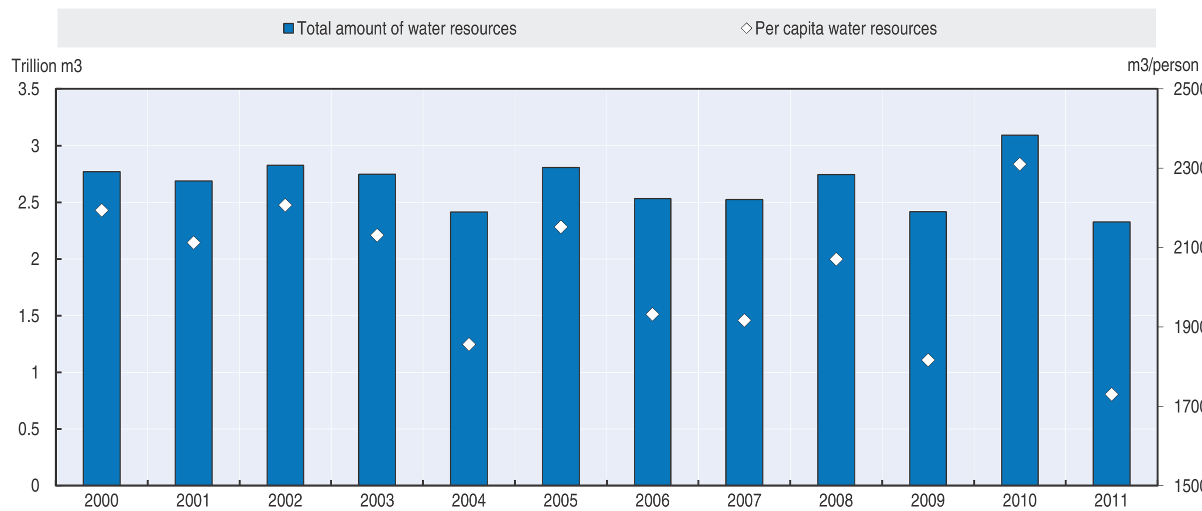
The quality of cultivated land is also deteriorating. According to current estimates of cultivated land resources, 70% are in low-yield farmland. There is a declining trend in soil quality. Due to serious water/land erosion and soil salinisation/acidification, land degradation has risen to more than 40% of total arable land area. In the northern oasis agricultural area, salinisation problems have become increasingly prominent. In the Ningxia Yellow River Irrigation area, salinisation of the soil has become one of the important issues that affect agricultural production, and the northern part of Yinchuan saline-alkali soil affects more than 49% of the total cultivated area. Second, wind erosion and desertification is increasing. Affected by global warming, reduced rainfall, depletion of surface runoff and groundwater levels, the northern region, especially the northern farming and animal husbandry areas, faces very serious soil wind erosion and desertification problems. Soil pollution has become serious in many areas. In city suburbs, farmland suffers pollution from sewage, garbage and other pollutants. Near mines, farmland suffers pollution from slag and harmful mining drainage. Farmland near factories suffers from pollution by industrial emissions and sewage. According to recent statistics, nearly 20% of the total arable land in China is polluted to various degrees. These indicators suggest that productivity will be affected and that the costs of production may need to rise to repair environmental damage.

Less and more variable water resources – impact of climate change is evident

China has water shortage problems, with relatively low levels of precipitation and high annual variations (Figure 2.8). Its total water resources ranked fourth in the world, but per capita water resource was only one quarter of the world average for the period 2000-11. China's average annual total water resources is 2.7 trillion cubic meters; in 2010, water resources reached 3.1 trillion cubic meters but in 2011 it was only 2.3 trillion cubic meters. The difference between these two years is 33%. Per capita water supplies of 2 194 cubic meters in 2000 decreased to 1 730 m^3 in 2011, and annual average per capita water resource was only 2 036 m^3.

Although the share of agriculture's water use has trended down in the last decade, it is still more than 60% of total water use. Under the conditions of climate change, reduction of agricultural water availability may affect the stability of food production. According to some experts, the production of one tonne of grain consumed about 1 300 m^3 of water in China, but less than 1 000 m^3 of water is needed to produce the same quantity of grain in developed countries. Since 2000, the water gap in China's agricultural irrigation system was about 40 billion m^3, equivalent to the water demand of 30 Mt of grain, accounting for about 5% of the current grain production. Water shortage, including issues related to water pollution may also affect future expansion of aquaculture production.

Figure 2.8. **The fluctuation in water resources in China**



Source: National Bureau of Statistics, China.

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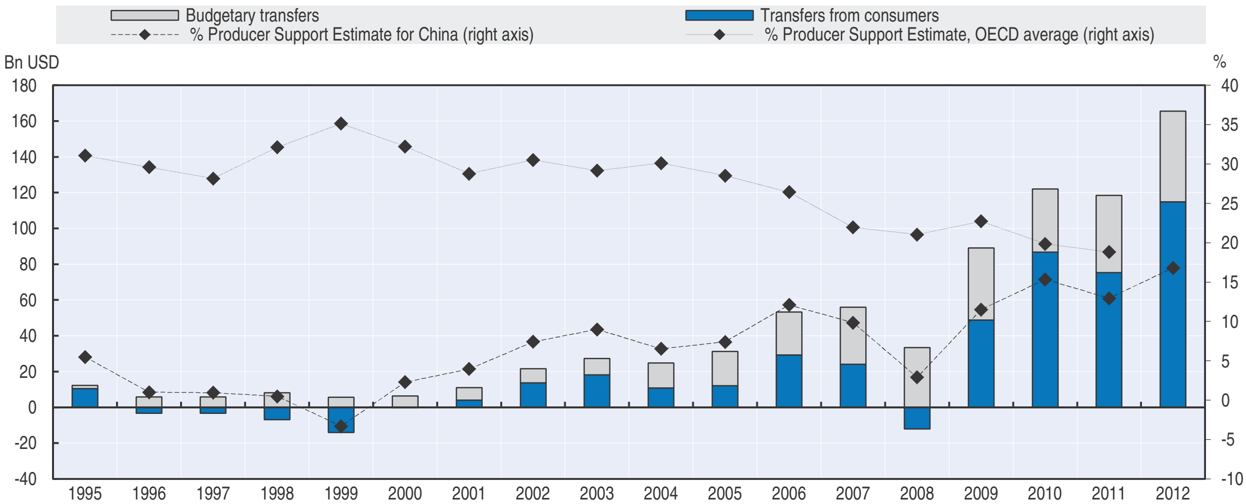
The policy environment will remain supportive

This *Outlook* assumes that the current policy framework will remain intact over the next decade. While government policy has promoted the reform of domestic and, in some cases, international market linkages, the OECD's measure of Producer Support Estimate (PSE) for China has been rising, showing higher transfers in the form of subsidies and price support to producers.[7] While still below the OECD average, the estimate of support has risen since 2000 (Figure 2.9). These transfers reflect the intent of policy to support farmers and rural communities, given large pressures for adjustment.

OECD's PSE for China indicate the nature and extent of measures to increase farmers' incomes. Transfers from consumers associated with minimum procurement prices for rice and wheat and with a growing range of commodities covered by market intervention mechanisms are a main channel for providing support. These may keep prices higher than what they otherwise would be, effectively transferring income to producers, from consumers. In particular, if minimum procurement prices are adjusted for domestic inflation, they will support prices far beyond international price levels and effectively draw in imports up to tariff quota levels, if not beyond. While the amount of transfers provided through this channel has been trending up since the end of the 1990s, it has fluctuated significantly over the last ten years, partly as a result of the government's policy to balance producers' and consumers' interests in the context of reducing price volatility compared to international markets. Thus, high international prices for agricultural commodities, as in 2007 and 2008, were only partly transmitted to domestic markets, resulting in a significant fall in measured market price support to farmers. In 2008, market price support was negative as international prices rose

Figure 2.9. **China: PSE level and composition, 1995-2012**



Source: OECD (2013), "Producer and Consumer Support Estimates", OECD Agriculture statistics (database).

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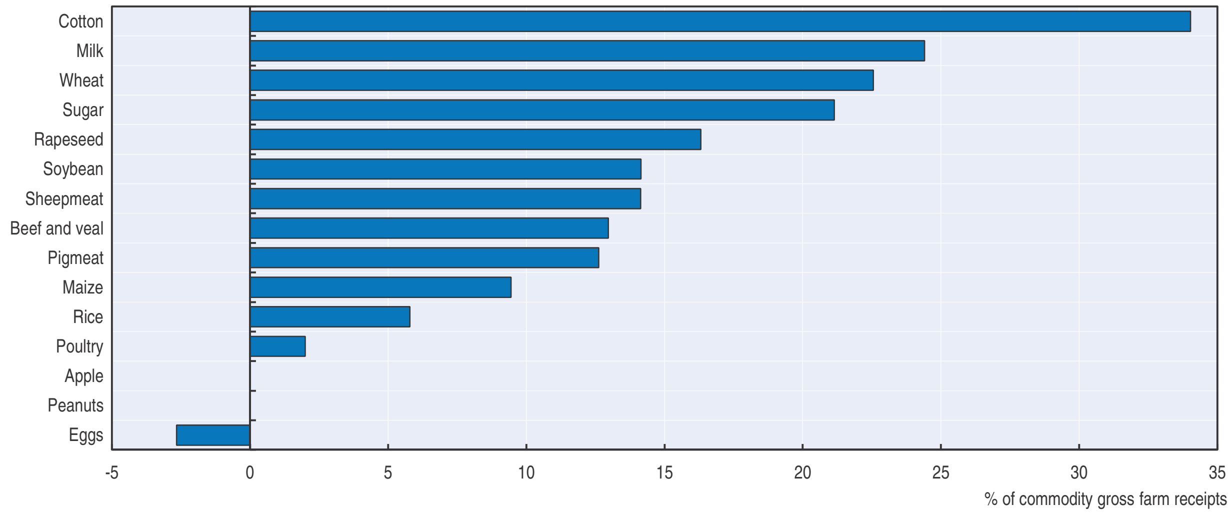
above domestic levels, but has increased since then as international prices have fallen from peak levels and as minimum procurement prices have risen.

Budgetary transfers for producers have been growing constantly since the end of the 1990s and are provided mostly through direct payments for grain producers, payments compensating increase in prices of agricultural inputs, in particular fertilisers and fuels, payments enhancing use of improved seeds and through subsidies for purchases of agricultural machinery. A positive feature of these transfers is that to an increasing extent they are provided through direct payments at a flat rate per unit of land which is effective in supporting farmers' income and have limited influence on production and trade. If these two channels are summed up and related to gross farm revenues (% PSE), it turns out that the level of support in China has been growing closer to the OECD average (Figure 2.9). The level of commodity specific transfers from consumers and taxpayers measured as a percentage of gross farm receipts from the production of a given commodity (Producer Single Commodity Transfer, SCT), shows that the importance of transfers varies considerably by commodity from above 20% for cotton, wheat, milk and sugar, to zero for exportable apples and peanuts and even slightly negative for eggs (Figure 2.10).

Notwithstanding these OECD measures of support, China's domestic support remains well within its WTO commitments. Subsidies under the Green Box at USD 88 billion and USD 100 billion in 2009 and 2010 respectively. Under the Amber Box, non-specific subsidies were 1.6% for non-specific products in these years, and product specific subsidies were less than 8.5% of agricultural output values.[8]

China's medium term policy priorities and its success in achieving these goals will have a large impact on the structure and output of its agricultural sector over the next decade. A summary of the stated priorities is presented in Box 2.4. By identifying clear policy objectives and measurable, quantitative targets, progress towards these goals will be easier to monitor and evaluate over time.

Figure 2.10. **China: Producer single commodity transfers, 2010-12**



Source: OECD (2013), "Producer and Consumer Support Estimates", OECD Agriculture statistics (database).

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Box 2.4. **China's medium term policy priorities**

China's medium term policy priorities are enunciated in its 12th Five-Year Plan for National Economic and Social Development of the People's Republic of China (2011-15) and National Modern Agriculture Development Plan (2011-15), which strive to solve the "Sannong" issues: agriculture, rural community, and farmers. These priorities focus on the following areas.

- Safeguard national grain security, transform agricultural development, and improve agricultural production capacity.
- Increase farmers' income and living standards, narrowing the gap of living standards between urban and rural areas.
- Ensure food quality and safety.
- Protect agricultural resources and promote environmental sustainability.

The 12th Five-Year Plan targets include the following.

- Grain-sown area will stay at above 106.7 Mha, and overall production capacity will reach above 540 Mt.[1] Ensure general self-sufficiency in food production.
- Per capita annual net income of rural residents will grow more than 7% and the impoverished population will be significantly reduced.
- New added farmland effective irrigation area will reach 2.7 Mha and efficient utilisation coefficient of agricultural irrigation water will increase to 0.53, grassland degradation will be effectively curbed.
- Improve resource utilisation and land productivity, strengthen risk prevention and emergency management capacity development.

The main measures taken by the government will focus on the following.

- Strengthen agricultural development and institutional reform.
- Enhance policy support and protection for agriculture.
- Promote the opening-up of agricultural markets.
- Improve and develop the legal system supporting the agriculture and food sectors.

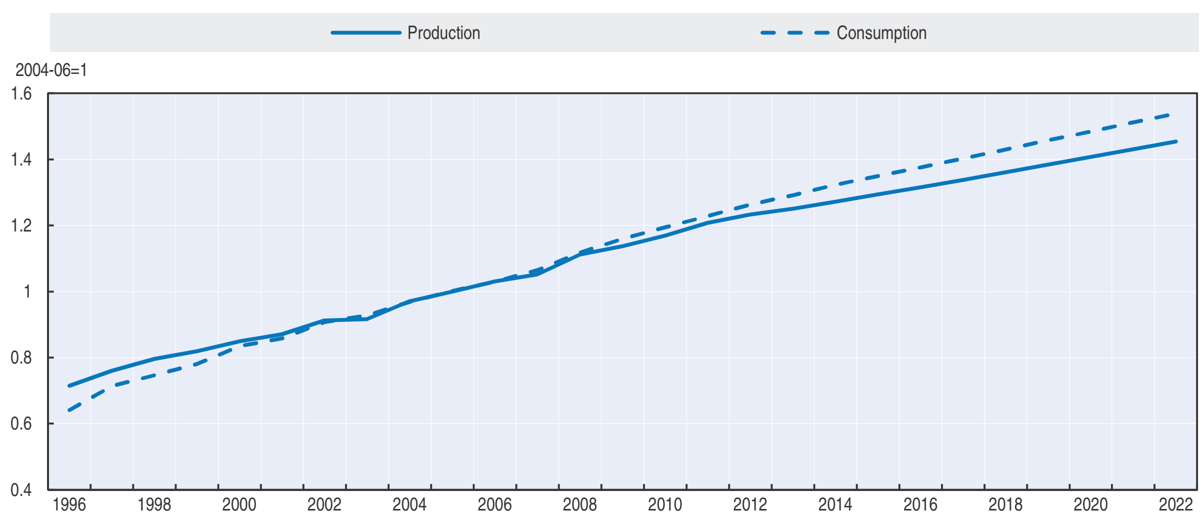
1. The definition of grain used in China's documents includes rice (paddy), wheat, maize and other coarse grains, soybeans and tubers (dry basis).

The commodity outlook for China 2013-22

Overview

The leading question concerning the commodity outlook for China, in the context of the underlying driving factors and growing production constraints as described in the previous section, is whether supply growth will be able to respond to growth in demand. According to this *Outlook*, the answer varies by commodity. Overall, the *Outlook* portrays consumption growth as exceeding production growth (Figure 2.11). As reflected by indexes of net agricultural production and consumption of commodities contained in the *Outlook*, a slow growing import situation is foreseen over the next decade. This trend was evident in the previous decade when agricultural production grew at 3.2% p.a., compared to consumption, which grew at 3.4% p.a. Over the next decade, growth is again expected to slow down, with agricultural production growing by 1.7% p.a. and consumption by 1.9% p.a. These trends anticipate a further, but modest opening of China's agricultural sector, the details of which can be examined by commodity in the following sections.

Figure 2.11. **China: Consumption growth will modestly exceed production growth**



Source: OECD and FAO Secretariats.

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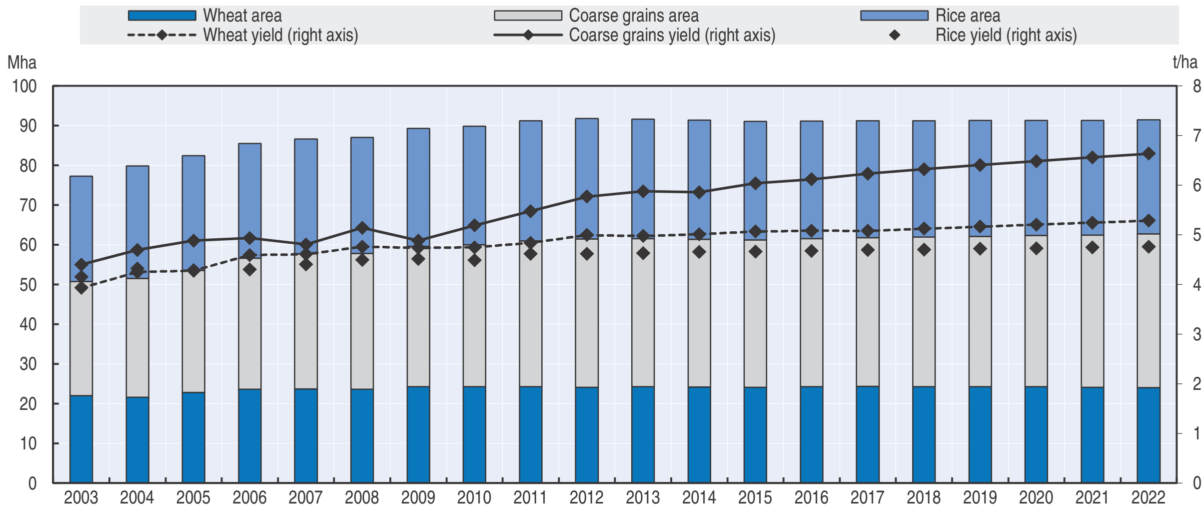
Cereals

Production – growth will slow

By 2022, the wheat area is projected to be 1% lower than the base period (Figure 2.12). China's wheat production is projected to be 127 Mt by 2022, about 8% higher than the production in the base period of 2010-12, but with slower annual growth relative to the previous decade (Figure 2.13). The production increase is attributed to yield growth. Annual yield growth for wheat is projected at only 0.6%, which is lower than that of the period 2003-12 (2.3%). As the area is decreasing slightly, how to improve productivity will be a key issue in the coming years. But raising yields will also bring pressures. Wheat stocks increase slowly over the projection period, exceeding the five-year average but lower than the period before 2003, reaching 51 Mt by 2022 (Figure 2.13). The ratio of wheat stocks to utilisation will approach 40%, which is about the same level as in 2013.

Figure 2.12. **China: Slight decrease in area with slow yield growth**



Source: OECD and FAO Secretariats.

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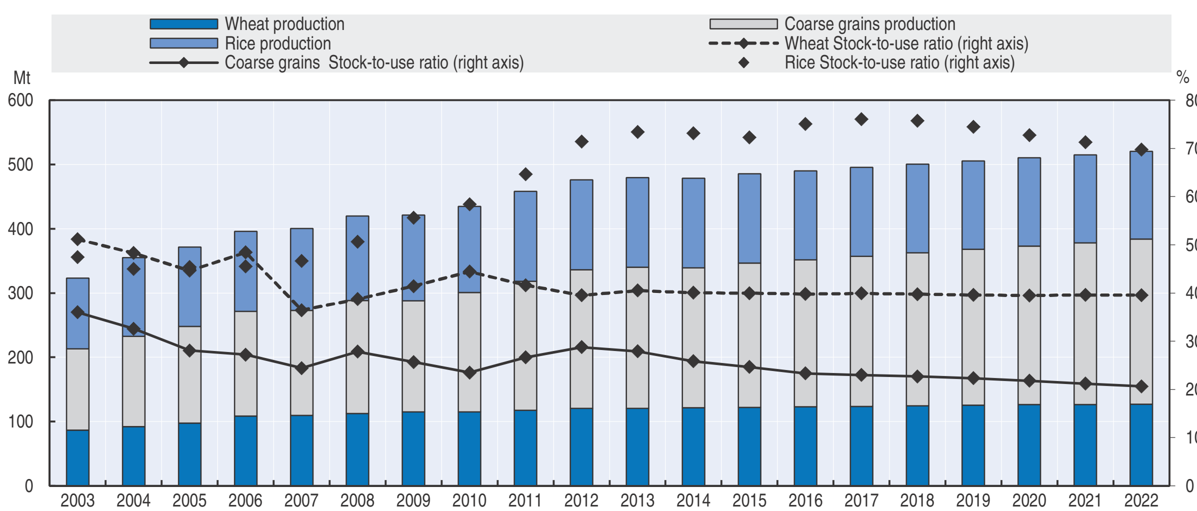
Figure 2.13. **Cereal production and stock ratios in China**



Source: OECD and FAO Secretariats.

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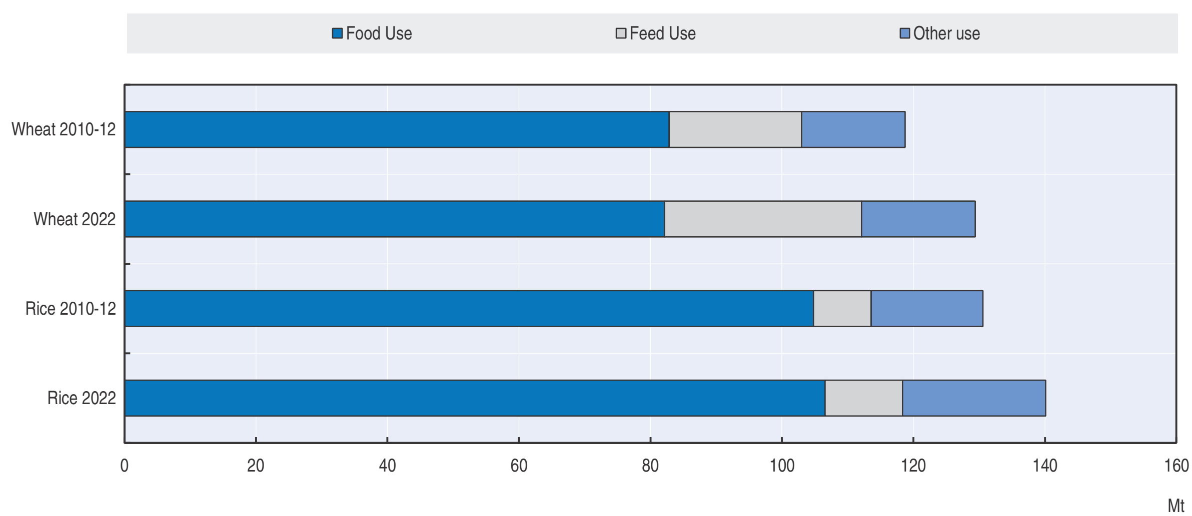
The coarse grain area is projected to be 6% higher than the base period, with an increase of maize at 8%. Coarse grain yields are projected to increase by 1.5% p.a., well below historical trends (Figure 2.12). China's coarse grain production is projected to attain 257 Mt by 2022, up 28% from the base period (Figure 2.13). Competition for land, and land quality concerns remain limiting factors to production growth, but coarse grain will take a higher share of land area. The key driver of growth is high demand for feed for a growing livestock sector. Stocks of coarse grain are projected to 56 Mt by 2022, about 1% below the 2013 level. The ratio of coarse stocks to utilisation will drop to 23%, 3 percentage points lower than 2013 (Figure 2.13).

Rice production in China is projected to reach 137 Mt by 2022, 1% lower than the production in the base period (Figure 2.13). The annual growth rate during the *Outlook* period is projected at -0.2%, significantly lower than the 2.3% p.a. of the previous decade.

The main driver behind this contraction is identified as the declining harvested areas at a pace of about -0.5% p.a., an annual yield growth of just 0.3% (Figure 2.12). Rice stocks are projected to remain around the 100 Mt level over the *Outlook*. Although the stock-to-use ratio for rice should fall to 70% by 2022, it remains at a relatively high level (Figure 2.13).

China's total wheat consumption is projected to reach 129 Mt by 2022. Wheat is expected to remain as a commodity that is predominantly consumed for food, about 63% of total use by 2022, 3% below the share in 2013 as more will be used as feed. Per capita food consumption is projected to reach 59 kg per person, roughly 1 kg decrease from 2013, and about 6 kg lower than the world average level. China's wheat feed utilisation is expected to reach 30 Mt by 2022, growing at a much slower pace than during the historical period, and representing 23% of total use, about 2 percentage points higher than in 2013. Feed use of wheat in China rose rapidly in the last decade from only 5.5 Mt to 26 Mt in 2012 given rising demand for feed and a more favourable price of wheat compared to coarse grains. Other use of wheat is projected to increase from 15 Mt in 2013 to 17 Mt in 2022 (Figure 2.14).

Figure 2.14. **China: Wheat feed consumption increases, rice food consumption stagnant**



Source: OECD and FAO Secretariats.

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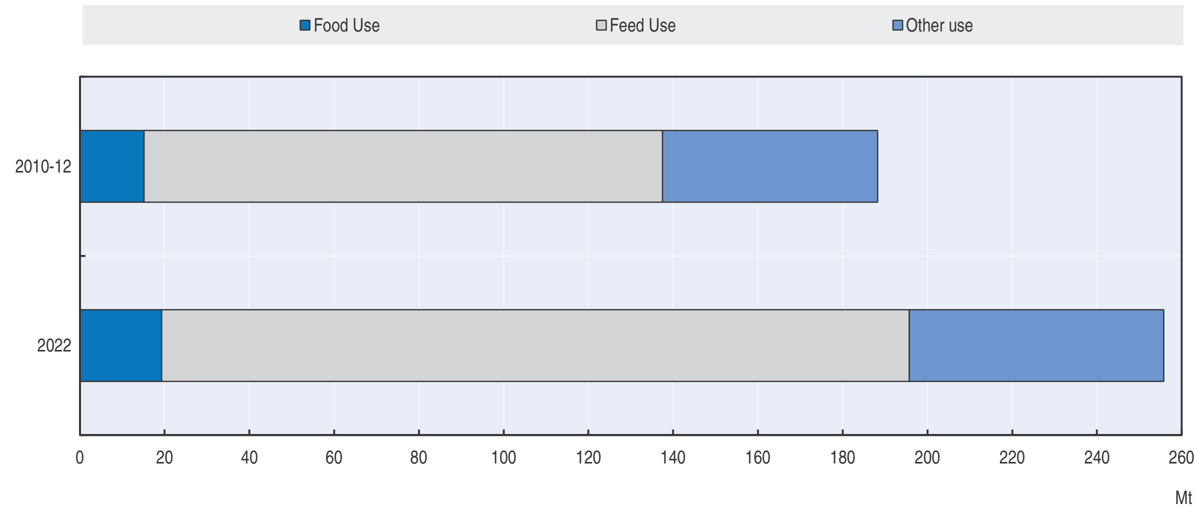
China's utilisation of coarse grains is projected to increase by 35% by 2022, compared to base period and reach 270 Mt, driven mainly by expansion in demand for feed. The projected annual growth (2.1%) is less than observed over the previous decade (5.2%) largely because China will exercise strict control over the industrial usage of maize. Food use is projected to reach 19 Mt, which is a rise of 2 kg per capita over the period. Total feed use is projected at 176 Mt, growing at 2.6% p.a., slightly more than the 2.5% growth in non-ruminant meat output (Figure 2.15).

Rice consumption is set to increase a modest 0.3% p.a. over the *Outlook*. Rice is consumed chiefly as food (78%), and consumption is set to reach 107 Mt in 2022, up slightly from 106 Mt in 2013. However in per capita terms rice food consumption is projected to decline by 0.2% p.a. to 76.5 kg. This decline continues the trend of the previous decade as consumers spend additional income on other foods.

Figure 2.15. **China: Coarse grain feed consumption increasing with meat production**



Source: OECD and FAO Secretariats.

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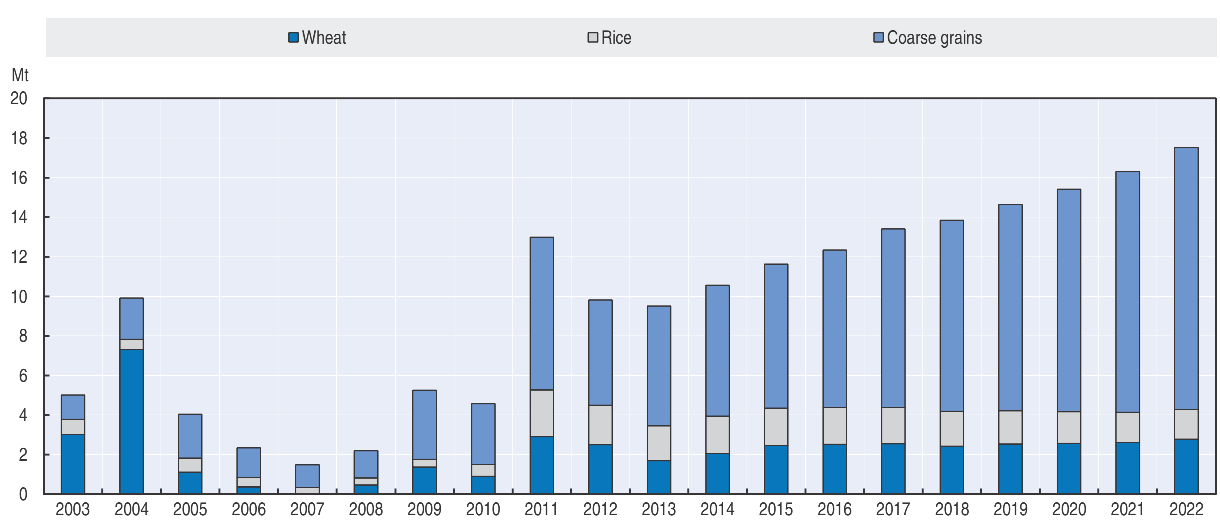
Increasing imports of wheat and maize

China's export of cereals will continue at a very low level, but imports will expand except for rice. China's import of wheat in 2022 is projected to expand to 2.8 Mt, up from an average of 2.1 Mt in the base period, still maintaining China at about 98% self sufficiency. However, imports of coarse grains are projected to reach 13.2 Mt, and beyond the limit of China's tariff quotas. This sharp rise is mainly driven by stronger import demand for feed. Imports may also be affected by the decision to allow imports of maize for industrial purposes. China's import of rice, contrary to wheat and coarse grains, is projected to decline to 1.5 Mt, somewhat lower than the average of the base period 2010-12. The sharp increase during the period 2011-12 will not be sustained because of sufficient domestic supply and accumulated stock (Figure 2.16).

Figure 2.16. **China's cereals imports**



Source: OECD and FAO Secretariats.

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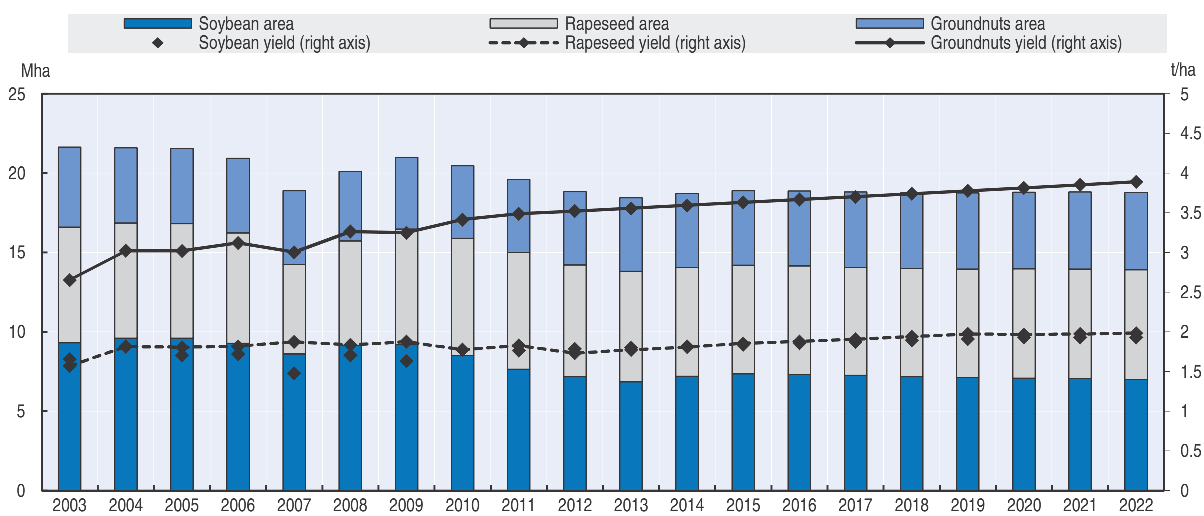
Oilseeds and oilseed products

The oilseed sector in China is relatively less supported by the government than other crops, and tariffs are low. China's oilseeds production is projected to exceed 48 Mt by 2022, about 8% higher than the production in the base period (Figure 2.18). Compared to the previous decade, growth is expected to increase moderately, mostly driven by a small increase in area, with the exception of rapeseed. Annual yield growth for oilseeds is projected at 1.1%, slightly lower than that of the last decade (1.3%). Largely due to higher yield levels, soybean production is projected to reach 13.5 Mt by 2022, 14% above the level of 2013, recovering from the decrease trend during 2003-12. Rapeseed plantings in China are expected to decline to 6.9 Mha, about 2% lower than the current level, mainly due to high marginal costs of planting increases and sustained profitability of competing crops such as maize. The yield of rapeseed is projected to grow at 1.3% p.a. and expected production will reach 13.7 Mt by 2022, increasing about 11%. Groundnut production, another important oilseed of China, is projected to reach 19 Mt by 2022, 15% higher than in 2013, growing at the same stable pace as during the historical period, while the annual yield growth rate is expected to be 1% (Figure 2.17).

Figure 2.17. **China's main oilseed area and yield growth**



Source: OECD and FAO Secretariats.

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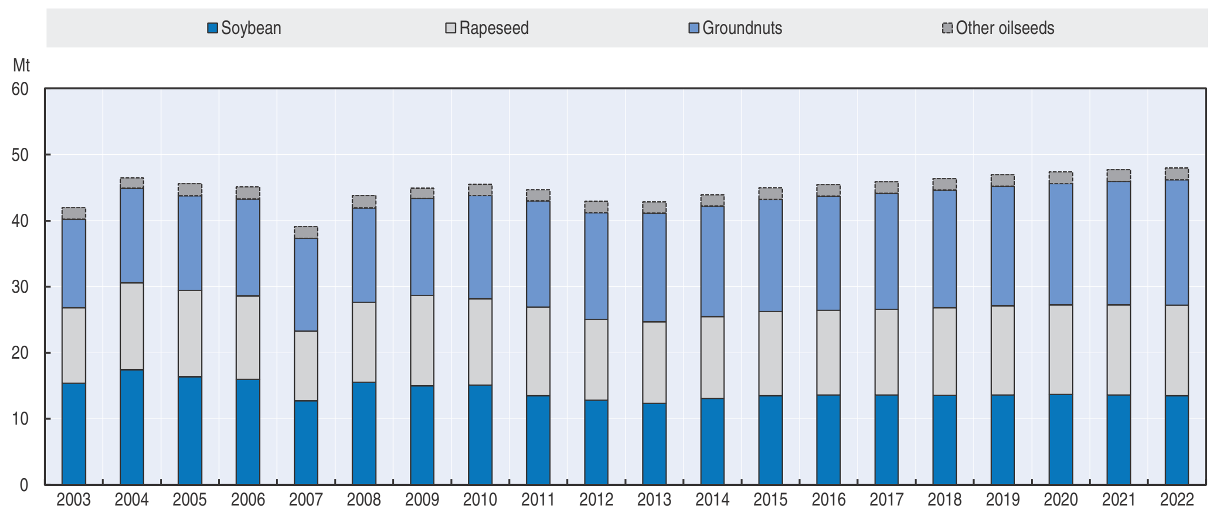
Increased consumption has lead to a concurrent increase in China's oilseeds stocks. However, over the projection period, stocks stabilise around 18.3 Mt by 2022, which represents an annual growth rate of only 0.1%, significantly lower than the growth rate during the previous ten years (16.5% p.a.). The ratio of oilseeds stocks to utilisation will approach 14.2%, about 2-3 percentage points below that of recent levels.

China's vegetable oil production, relying on both domestically grown and imported seed, is projected to reach 25.7 Mt by 2022, up 21% from the base period (Figure 2.19). The annual growth rate during the next decade is projected at 1.7%, well below the level of the previous decade (5.4% p.a.). Vegetable oil consumption is expected to grow by 1.6% p.a., about one-third of the rate observed during 2003-12 (4.5% p.a.). Vegetable oil in China is consumed mainly as food and is expected to reach 36.6 Mt by 2022, up 16% from 2013, accounting for 99% of total domestic use. Per capita consumption is projected to reach 26 kg, an increase of around 13% from 2013, while the annual growth rate (1.4% p.a.) is slower than the level during the last decade (4.0% p.a.).

Figure 2.18. **China's oilseed production and composition**



Source: OECD and FAO Secretariats.

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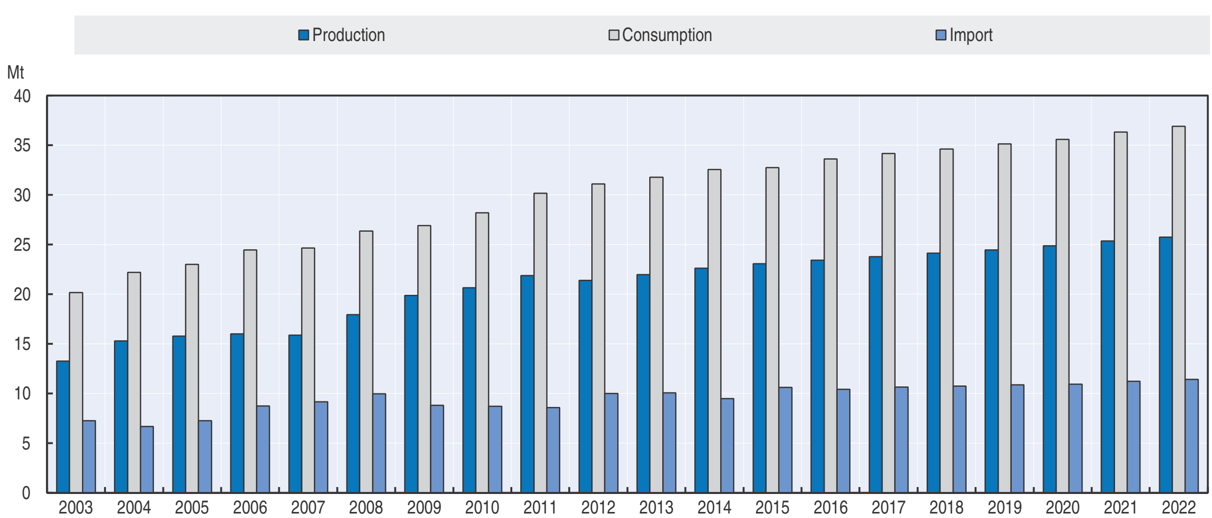
Figure 2.19. **China's vegetable oil production, consumption and imports**



Source: OECD and FAO Secretariats.

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China's oil meal output is projected to increase by 21%, reaching almost 75 Mt by 2022. Oil meal production continues to rely on crush of both domestically grown and imported seed. The annual growth of production is expected to be 2%, markedly lower than the level during 2003-12 (7.4%). This reflects the much higher base level of production and the fact that demand driven by livestock industries will grow also at a slower pace than before.

Imports of oilseeds rise to over 80 Mt

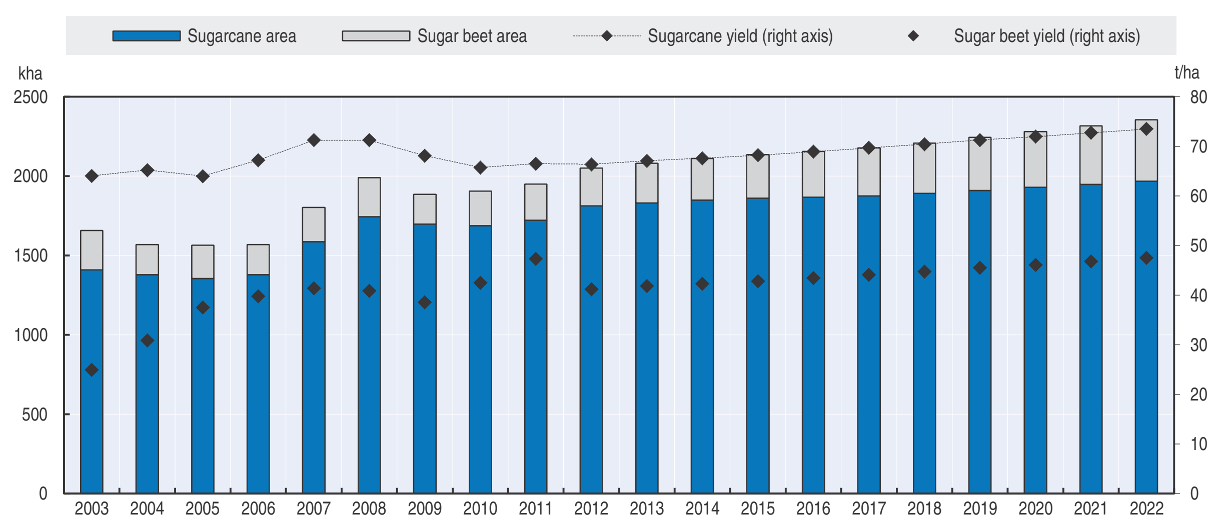
China's export of oilseeds will continue to decrease and remain at a very low level. Imports will reach 83 Mt, 41% higher than the base period level, and will account for 59% of global trade, up from around 54% in the base period. Import growth should slow down compared to the last decade, on account of the deceleration in growth of the crushing sector, as demand growth for both protein meal and vegetable oil eases, from a higher base. The annual growth rate is expected at 2.6%, down from 13.3% p.a. in the previous ten years. As for vegetable oils, China's imports are expected to reach 11.4 Mt, up 25% from base period values, with an annual growth rate (1.6% p.a.) less than half of the previous decade (3.5% p.a.). Because China covers a considerable part of its oil requirements via the crushing of imported oilseeds, the annual growth of imports will also be somewhat slower than that of production and consumption (Figure 2.19). With respect to protein meals, China's imports are projected to expand to 5.8 Mt by 2013, significantly up 267% from the base period, because of the development of the livestock industry and the relative small scale in the base year.

Sugar

China's sugar production is projected to expand faster in the coming ten years to reach 16.4 Mt, about 28% higher than the production in the base period (Figure 2.21). Annual growth for sugar production is projected at 2.7%, about the same as that of the last decade. Perennial sugarcane production continues to dominate sugar beets in the production of sugar. Although sugar beet production is expected to grow at 6.5% per year, markedly faster than sugarcane (1.8% p.a.) over the next ten years, sugarcane will still account for 89% of total sugar output by 2022.

Sugarcane planting area in China is expected to reach 2 Mha by 2022, up 13% from the base period, with a yield growth rate at 1% p.a. during the projection period, higher than the level in the previous ten years (0.4% p.a.). Sugar beet area is projected to increase to 0.4 Mha by 2022, about 55% above the current year, and the annual yield growth rate over the next ten years is expected to be at 1.5%, higher than that of the last decade (0.7%) (Figure 2.20).

Figure 2.20. **China's sugar area and yield growth**



Source: OECD and FAO Secretariats.

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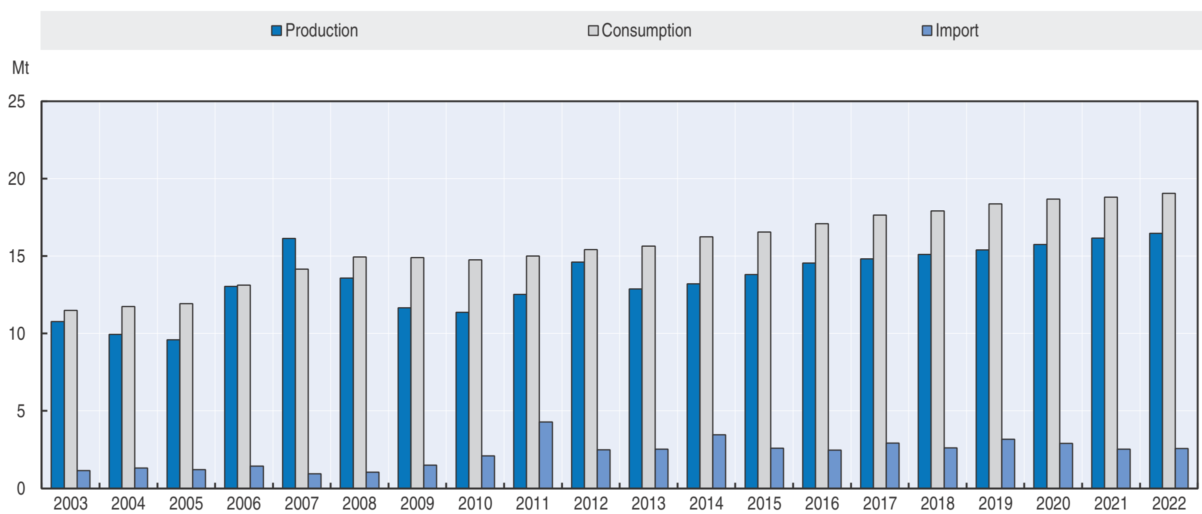
China's sugar consumption is projected to reach 19.1 Mt by 2022, up 27% from the base period, due to rising incomes and growing populations. Per capita sugar consumption is projected to increase to 14 kg per person, roughly 3 kg higher than in the base period.

Imports of sugar to rise above import quotas

China's import of sugar in 2022 is projected to reach 2.6 Mt. China's recent import growth should slow down significantly compared to the last decade, and remain below the peak reached in 2011. The sharp increase of imports during 2011/12 and 2012/13 will not be sustained in the *Outlook* because of sufficient sugar stocks, which expanded to 4.1 Mt in 2012/13, almost double the level during the last ten years, and production is increasing with demand (Figure 2.21).

Figure 2.21. **China's sugar production, consumption and imports**



Source: OECD and FAO Secretariats.

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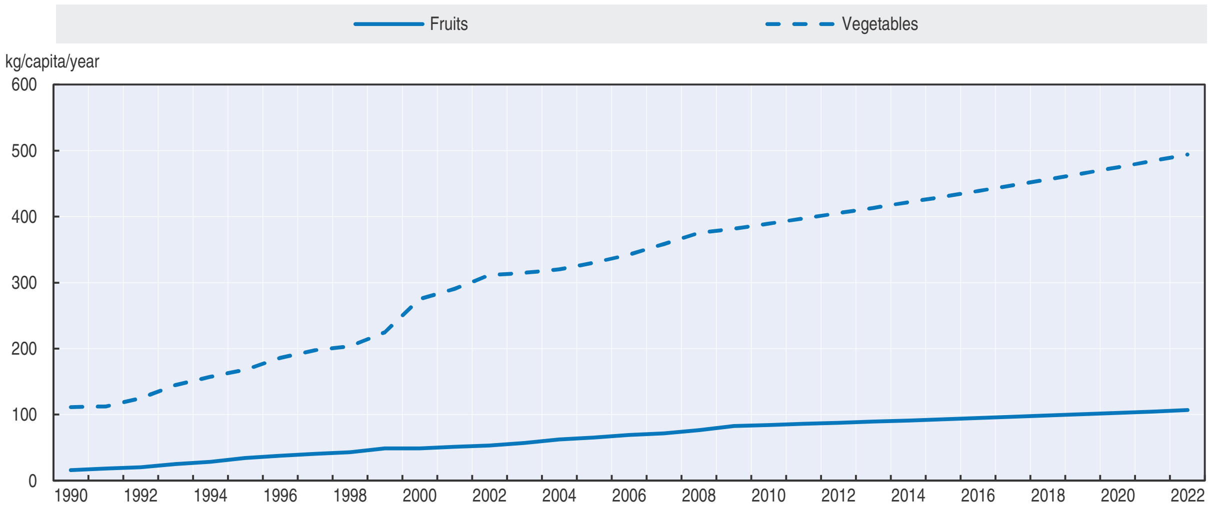
Vegetables and fruit

The *Outlook* does not include international markets for vegetables and fruits. These markets can be very important in the agricultural sectors of certain countries, and this is very much the case for China in terms of farm value and growth. In the last decade, per capita consumption of vegetables grew at a rate of 6% p.a., and that for fruits grew at 3.5% p.a. (Figure 2.22). It is anticipated production in these sectors will both grow in the 2-3% p.a. range over the next decade, with slower growth due to rising water and labour constraints. The crop areas of these commodities measured 20 Mha for vegetables and 12 Mha for fruits in 2011, representing almost 20% of total crop area sown in that year. It is projected that total area to these crops will rise to 38 Mha by 2022, further pressuring area competition with other crops for scarce land and water resources.

Figure 2.22. **China: Per capita vegetable and fruit consumption is rising rapidly**



Source: OECD and FAO Secretariats.

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Cotton

China's cotton production is projected to decrease as a result of a decline in area to 5.8 Mt by 2022, about 17% lower than in the base period of 2010-12. By 2022, the harvested area for cotton is projected to be 20% lower than the base period. Yield will continue to expand, but at a slower pace than in the past, reaching 1.40 t/ha by the end of the projection period (Figure 2.23).

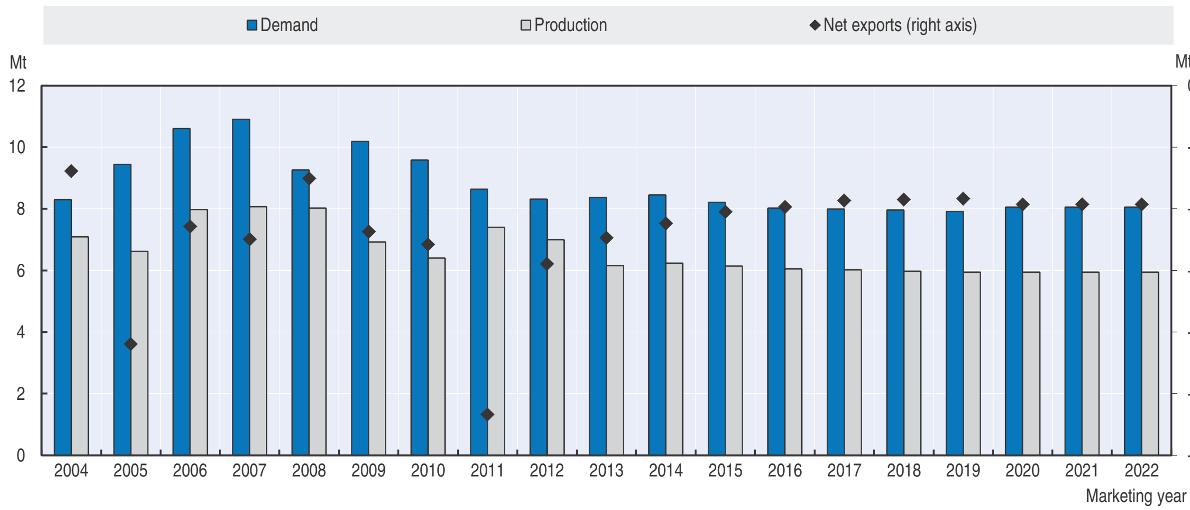
Figure 2.23. **China: Decrease in area and yield growth also slows**

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932858907

While domestic consumption of textile products is likely to increase, the intensification of competition in cotton spinning products, especially from India and other countries with low cost labour, the use of cotton in China will decline. Total cotton utilisation is projected to reach 8 Mt by 2022, decreasing at a rate of 0.4% p.a. over the *Outlook* period, which is significantly different to the trend shown in the last decade.

Figure 2.24. **Production, utilisation and net trade for cotton in China**



Source: OECD and FAO Secretariats.

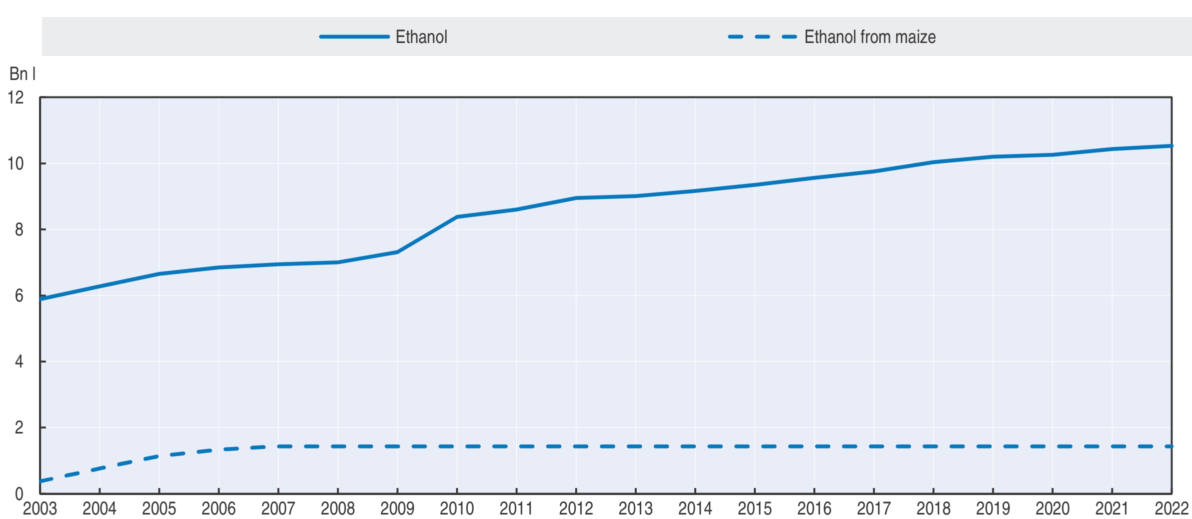
StatLink http://dx.doi.org/10.1787/888932858926

Due to the decrease of domestic utilisation, cotton imports will experience a further reduction and is projected to decrease to 1.9 Mt by 2022, 1.7 Mt (46%) lower than in the base period 2010-12.

Bio-fuels

In the previous decade, ethanol production grew from just under 6 bnl to 9 bnl by 2012. About three-quarters of ethanol production is used in non-fuel uses, although fuel use has been increasing. Production feed stocks have been primarily cassava and specific grains such as sorghum. The rapid increase in production of ethanol from maize, before 2007, raised concerns, given the sensitivity of using this food security crop for non-food purposes. Further increases in ethanol production from maize have been prohibited since 2007.

Figure 2.25. **China: Ethanol production grows slowly, with no direct impact on maize**



Source: OECD and FAO Secretariats.

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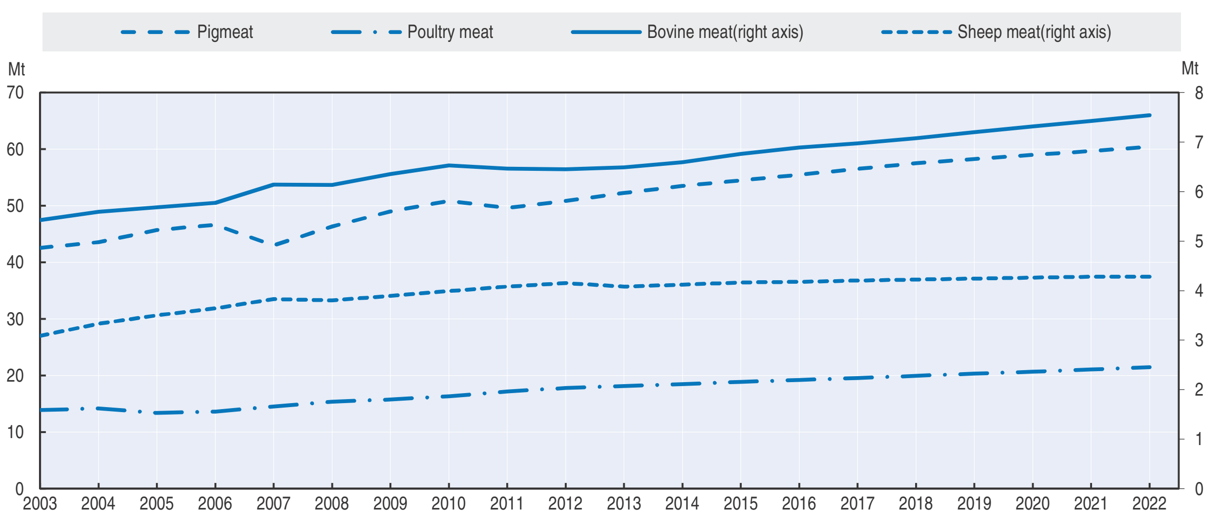
Production of ethanol is anticipated to rise to 10.5 bnl by 2022, a rise of 1.8% annually over the *Outlook* period. Production of ethanol from maize will remain less than 1.5 bnl with the remaining production using feedstocks from other crops (Figure 2.25). Trade in ethanol is anticipated to remain negligible over the *Outlook* period.

Meat

In response to increasing demand, total meat production in China should reach 93 Mt by 2022, an increase of 1.5% p.a. over the *Outlook* period. This is somewhat lower than the 2.3% p.a. in the previous decade. Pigmeat production is projected to increase by 1.6% on average each year, while that for poultry and sheepmeat may grow 1.9% and 0.5% respectively. Bovine meat is anticipated to grow 1.7% p.a. However, each of the meat categories will grow more slowly than in past ten years, as higher prices slow consumption growth. In terms of share in total meat production, on a retail weight basis, pigmeat will remain by far the highest at 63%, followed by poultry at 25%, bovine meat at 7%, and sheep at 5% (Figure 2.26).

Figure 2.26. **China: Meat production – Pigmeat will continue to dominate**



Source: OECD and FAO Secretariats.

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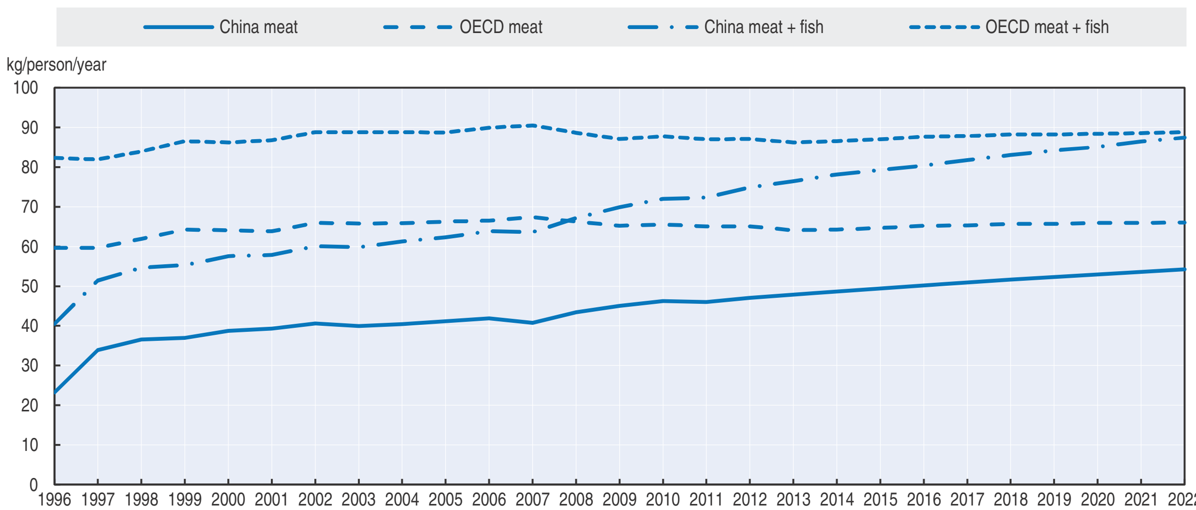
Consumption growth will mirror production growth for China's meat sector. Total meat consumption on a retail weight basis will grow by 1.6% p.a., which is lower than 2.5% p.a. in the last ten years. Per capita consumption will increase by 7 kg p.a. over the period. Pigmeat will capture 66% of the additional meat consumption over the projection period, and poultry meat will experience the fastest increase rate of increase at 1.7% p.a. Total meat consumption in China will be about 54 kg/capita p.a., compared to 64 kg/capita in OECD countries (Figure 2.27). However, average pigmeat consumption in China will be some 34 kg/capita (retail weight basis) compared to the OECD average of 22 kg/capita. OECD consumers eat much more poultry at 28 kg/capita compared to China at 14 kg/capita, and much more bovine meat at 14 kg/capita compared to China at 4 kg/capita. When assessing meat consumption comparatively in this manner, account should be taken of fish consumption, which has grown rapidly in China in recent years (see Fish and food section). It is projected that over the *Outlook* period, China's total of meat and fish consumption may converge to the average of OECD countries in per capita terms (Figure 2.27).

Figure 2.27. **China: Per capita meat consumption is rising towards OECD levels**



Source: OECD and FAO Secretariats.

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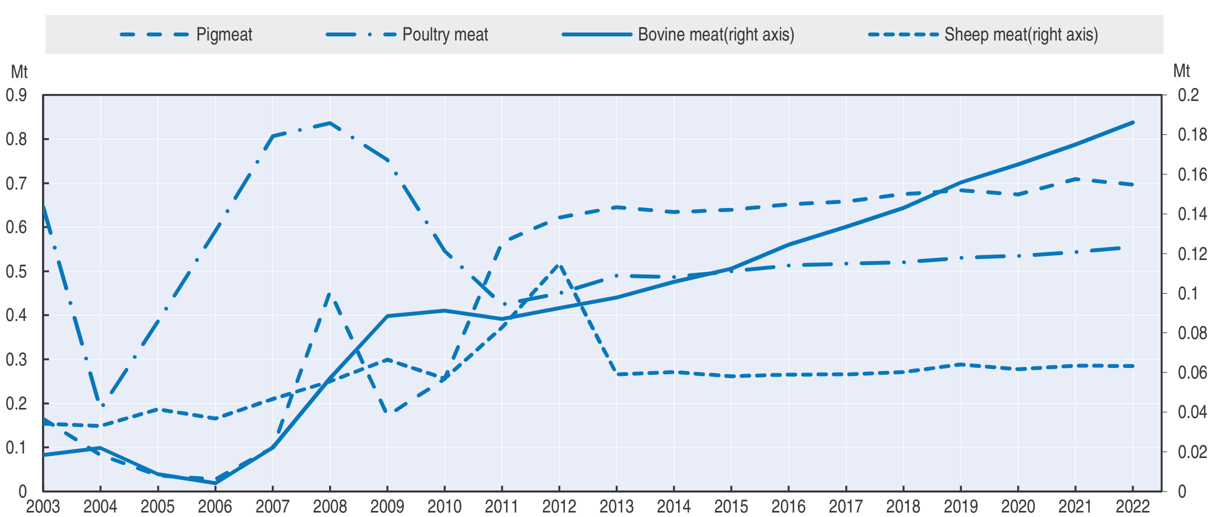
With strong meat prices through the projection, Chinese meat imports are expected to increase by 3% p.a. and reach 1.7 Mt by 2022, driven by population and income growth and high income elasticity of demand. Bovine meat will become the fastest growing import sector with a growth rate of 7% p.a. (Figure 2.28).

Figure 2.28. **China: Bovine will be the fastest meat import sector**



Source: OECD and FAO Secretariats.

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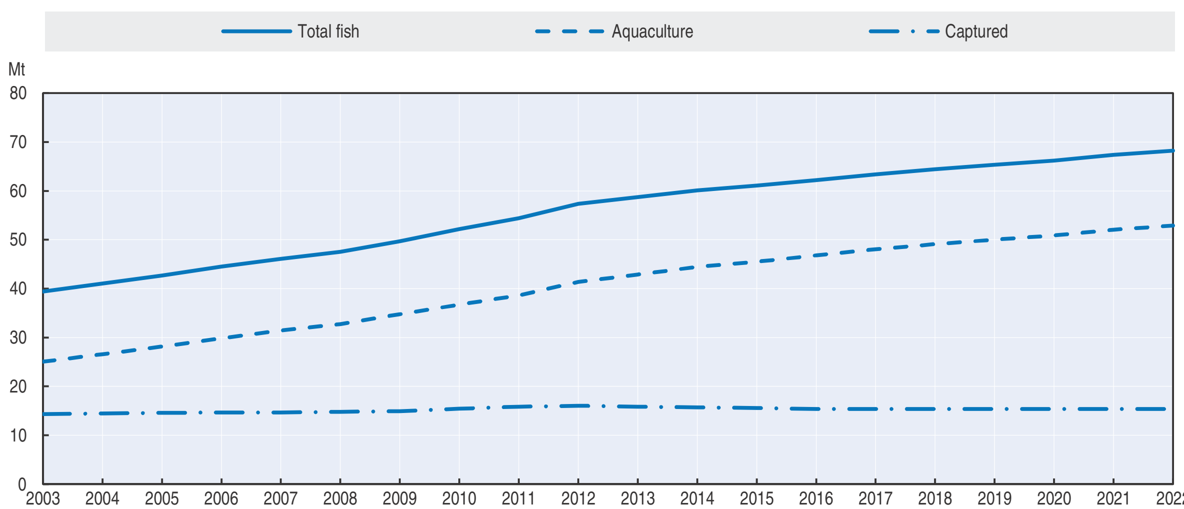
Fish and seafood

China capture and aquaculture fisheries production is projected to reach about 69 Mt by 2022, a growth of 26% above the average level for 2010-12. The increase will be driven by aquaculture, which will rise by 37% over the *Outlook* period compared to a 3% decline of capture fisheries. Aquaculture production is projected to reach about 53 Mt, or 63% of global aquaculture production (Figure 2.29). However, due to water and land constraints, a slowing down of aquaculture growth is anticipated, from an average annual rate of 5.4% per year in the last decade to 2.4%. Notwithstanding the slower growth rate, aquaculture will continue growing faster than the animal food-producing sectors. There are significant concerns, however, that expanding aquaculture production at this rate will encounter considerable environmental challenges. Environmental issues are attracting more attention, and the government is setting new regulations and enhancing technological innovation to strengthen sustainability and environmental responsibility in aquaculture (12th Five-Year Plan for Chinese Fishery). For capture fisheries also, the government is setting regulations to improve fishery resources through volume controls, curbing illegal, unreported and unregulated fishing (IUU), as well as encourage structural adjustment and efficiency.

Figure 2.29. **China: Aquaculture drives total fishery production increase**



Source: OECD and FAO Secretariats.

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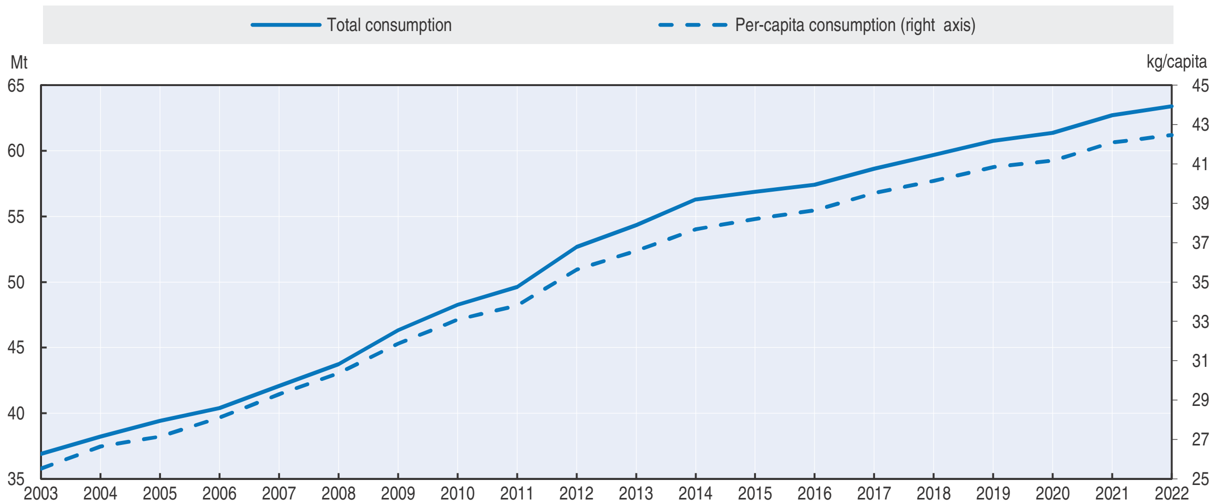
Due to growing demand, per capita fish consumption is expected to expand over the next decade, reaching 42.6 kg in 2022, growing at the rate of 1.5% p.a. Total fish consumption is projected to reach 63 Mt in 2022, 26% more than the average level for 2010-12 (Figure 2.30). But growth is expected to slow to 1.8% p.a. over the projection period compared to 3.7% p.a. in the previous decade.

Rising fish consumption reflects the change in availability of fish and other alternative products. Growth in consumption will be the result of complex interactions between several factors, including rising living standards, population growth and dietary changes linked to rapid urbanisation with an increase in demand for animal food.

Imports and exports of fish are expected to expand moderately over the *Outlook* period. Fish imports for human consumption will reach 4.4 Mt, growing by 2.1% p.a. in the next decade and its share of domestic consumption in China will gradually rise from 7% to 8%. China will remain the world's leading exporter with total exports reaching almost 10 Mt by 2022, an increase of 28%. A significant share of fish exports will continue to consist of reprocessed imported raw material.

Figure 2.30. **China: Fish consumption grows more slowly**



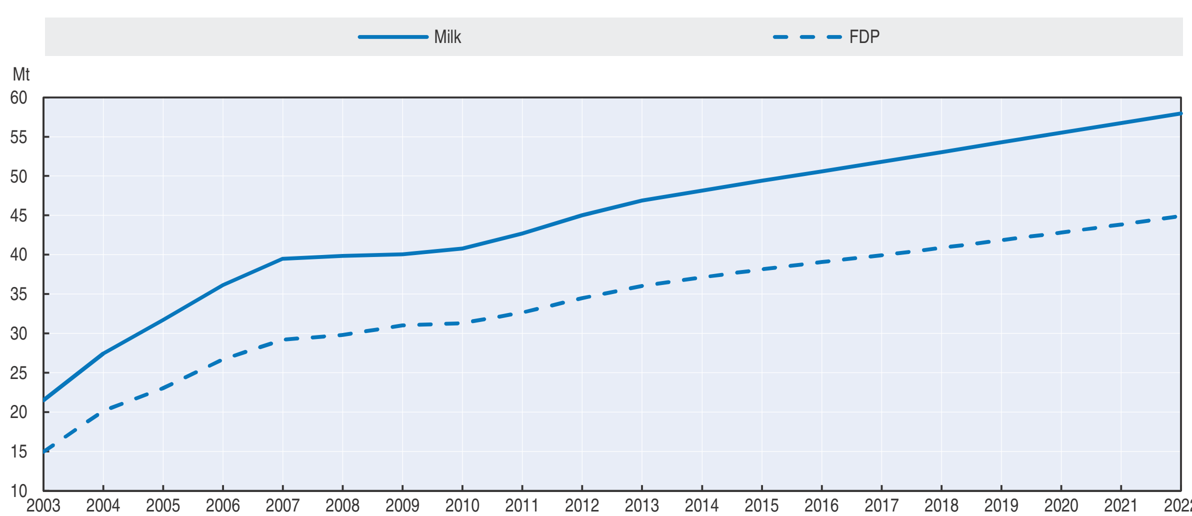
Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932859040

Dairy

Milk production over the *Outlook* period reflects considerably slower growth from the last decade with an average growth rate estimated at 2.4% p.a. Total production will reach almost 58 Mt by 2022 (Figure 2.31). Although the growth rate is lower than the 6.9% level witnessed in the last decade, the dairy sector remains among the fastest growing sectors covered in the *Outlook*. Slower growth is largely due to reform of the production-processing chain following the melamine crisis in 2008-09. The projection includes lower growth of cow inventories with per cow productivity growth at 0.7% p.a.

Figure 2.31. **Growth of milk production in China slows**



Source: OECD and FAO Secretariats.

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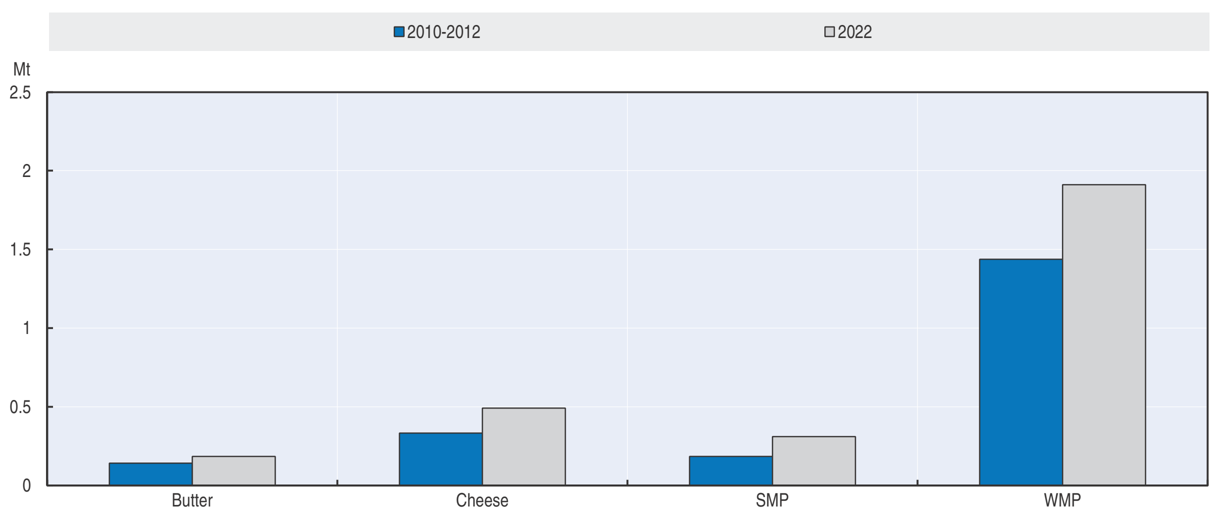
Whole milk powder (WMP) and cheese production will experience the largest increase of 32%, while skim milk powder (SMP) and butter will gain 3% and 21% respectively. Production of fresh dairy products will absorb most of the additional milk production, growing by 36% compared to the base period 2010-12.

Although dairy product consumption is expected to increase by around 38% from the 2010-12 base period, this is much slower than the past decade, since the base is now much higher. While consumption of all dairy products will increase considerably, fresh dairy production will account for most of the volume increase.

Figure 2.32. **Growth of dairy product consumption in China**



Source: OECD and FAO Secretariats.

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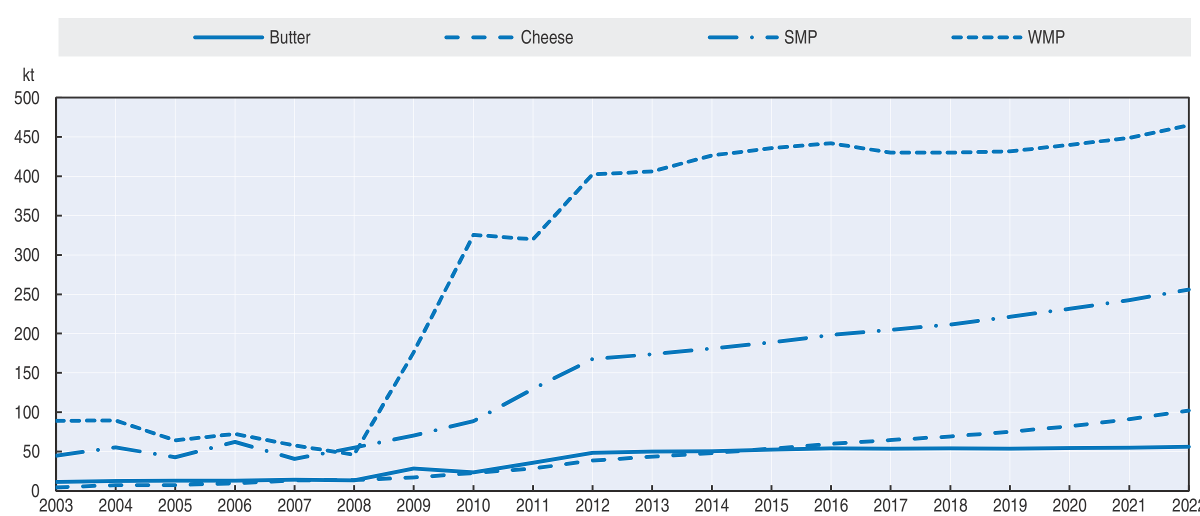
Figure 2.33. **China: Dairy product imports will remain high over the outlook period**



Source: OECD and FAO Secretariats.

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Per capita consumption of butter is expected to grow by 1% p.a. while cheese, fresh dairy products, SMP and WMP gain 3%, 2%, 3% and 2% respectively over the *Outlook* period. This increase is mostly driven by income levels and the growing influence of multinational companies which are introducing new retail products and processing efficiencies, as well as government programmes that promote, for example, school milk consumption.

The total dairy product import growth (in milk equivalent) is projected to rise by about 60% in 2022 compared to the base period, largely as a result of slower growth in domestic production. The rate of import growth of milk products significantly differs among categories (Figure 2.33). Imports of SMP and WMP account for 88% of total dairy product imports. These products are primarily used in the processing of foods where animal proteins and fats are required.

Risks and uncertainties

The *Outlook* provides a plausible projection for China's markets, given the assumptions underlying the conditions of these markets. As such, it would appear that China, despite a strong demand context, with high growth in incomes, will continue to meet its main policy objectives for food self-sufficiency, especially for food security sensitive products, including wheat, rice and vegetable oils. If high income growth is sustained, China's food security situation is most certainly to improve. According to this *Outlook*, achieving these objectives with a slowdown in the growth of crop yields will require an increase in imports of maize for feeding a growing livestock sector. Sugar imports may also rise above tariff quotas. However, the *Outlook* projections suggest that while income growth and urbanisation continue at a fast pace, their marginal impact has been slowing.

Three broad types of scenarios are examined which illustrate the sensitivities of the *Outlook* to possible risks. One potential risk concerns the overall macroeconomic projection. Another concerns issues such as those related to increasing constraints on land and water, or due to rising environmental issues, which may inhibit agriculture's ability to meet rising demand. A third scenario examines risks related to climate change and the potential domestic and international market impacts that could result from potentially lower and more variable crop yields. This section seeks to evaluate these risks with stylised model based scenario analysis with the OECD-FAO global commodity model.

Impacts of alternative economic growth

China's last recession was in 1993. Since that year, economic growth has ranged between 5% and 15% every year, at a trend growth rate of 9.6% per year. The assumption underlying the projection of this *Outlook* is that economic growth will slow to a trend rate of 7.4% p.a. This may seem to be a considerable slow down, but at this trend rate Chinese per capita incomes will still double over the projection period. Sustaining the previous trend growth would obviously add to the demand pressure on China's commodity markets. Given current policy objectives, this growing demand would likely require higher coarse grain and oilseed imports to feed the growing livestock sector, as well as to meet further growth in vegetable oils production. A naïve higher growth scenario, where GDP growth remains at 9.6% p.a. over the *Outlook* period, was conducted with the OECD-FAO commodity model. Results illustrate potential outcomes, whereby meat consumption rises by 6% and production by 4.5% by 2022, inducing an increase in meat imports of some 65% compared to the baseline. Higher meat production induces higher feed grain production, and a 14% rise in imports of coarse grain. In this scenario, world coarse grain prices rise almost 4%, but Pacific pigmeat prices rise by 8%.

A weaker growth scenario is generally viewed as more likely than a stronger growth scenario. The issue concerns how long China's high growth can be sustained. The development literature refers to the "Lewis Turning Point" or the condition in which fast growing developing economies outrun the labour market competitiveness that has driven export led growth. Recent literature suggests that this point would not be experienced in China within the horizon of this *Outlook*. However, in recognition of this issue, a low growth scenario, with a strong drop in growth by 2016, to 4% p.a. out to 2022 provides alternative assessment of the sensitivities of the *Outlook* to lower growth. This scenario portrays a drop in meat production and consumption by 6% and 7.5% respectively, and a drop in meat imports by 45% by 2022 compared to the baseline. Pacific pigmeat prices fall by almost 5% in this scenario. These economic growth scenarios are extreme, but illustrate the sensitivity of the China's and global markets to its economic performance.

Impacts of increasing constraints to production

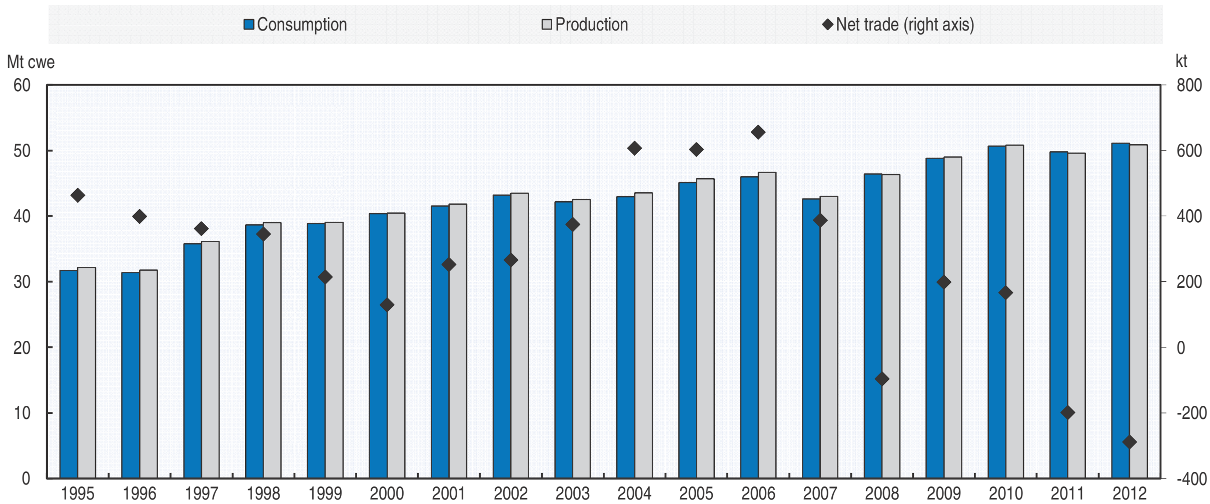
While the *Outlook* illustrates that China will achieve its basic targets for self-sufficiency and grain production, it is apparent that environmental challenges exist with relatively limited, and potentially shrinking, arable land and depleting water resources. In this context, policy choices could be made, for example, to: *a)* import more meat, for example to contain environmental problems associated with livestock production and limit the growth in feed requirements, and/or *b)* lower competition for land and land stress associated with high intensity crop production by importing more coarse grain, to meet rising demand. With arable land potentially falling to the limit of the "red line", importing coarse grain area would reduce intensity of crop production and perhaps enable further growth in other rapidly growing high value vegetable and fruit crops. These scenarios illustrate the types of choices available to address issues of domestic resource constraints, but imply higher imports from global markets.

a) Increase pigmeat imports

China has been emerging as a major player in the world pigmeat market. Its market presence is not only due to its leading position as the world's largest pork producer and consumer, but also increasingly due to the volatility of its pigmeat trade, which has cycled between a trade surplus of over 600 Kt in 2006, and a deficit of over 200 Kt in 2012 (Figure 2.34).

Per capita pigmeat consumption in China increased to 38 kg in 2010, up 13% in ten years. It is expected that total consumption will continue its upward trend over the *Outlook* period, with average annual growth estimated at 1.6%. Coarse grain consumption in China represented roughly 18% (213 Mt) of world consumption in 2012 and is estimated to continue growing by 1.3% over the *Outlook* period. Historically, China has been mostly self-sufficient in pigmeat and coarse grains. Over the *Outlook* period, China's average self-sufficiency levels for pigmeat and coarse grains are roughly 100% and 95%, respectively. Maintaining these self-sufficiency levels in both commodities over the ten-year period will be a challenge. Management of land and water constraints, for example, will play a major role in China's ability to remain self-sufficient. In the next decade, China's pig population will rise to almost 550 million head, further stressing the environment, often in areas surrounding cities.

Figure 2.34. **China pork production consumption and trade**



Source: OECD and FAO Secretariats.

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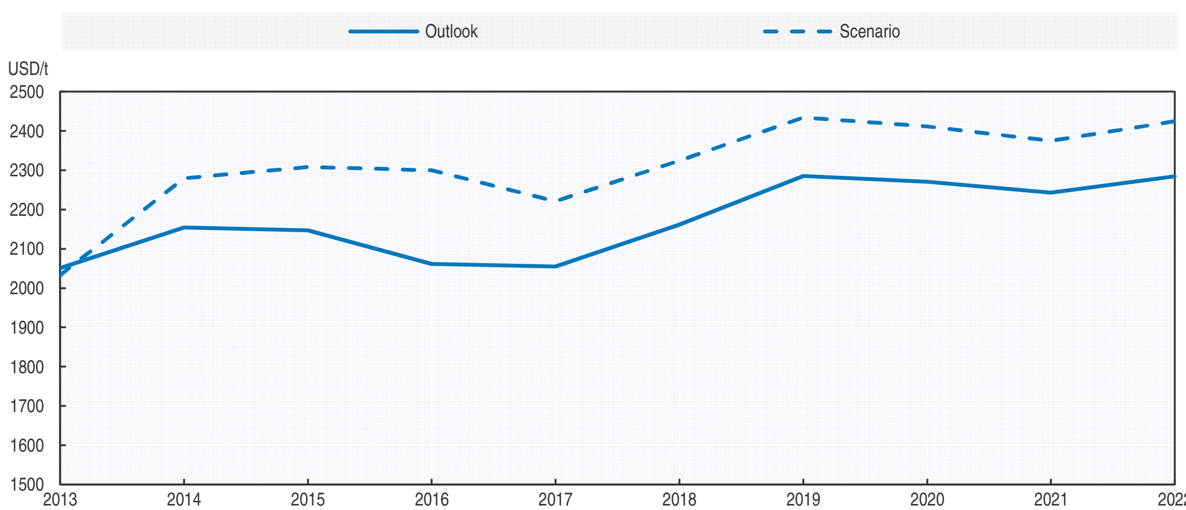
Figure 2.35. **Impact on global pork prices of higher imports by China**



Note: The price reference chosen is for the Pacific markets. Price impacts in other markets are similar.
Source: OECD and FAO Secretariats.

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A scenario analysis was undertaken that assumes lower growth in pigmeat production such that pigmeat and coarse grain self-sufficiency levels are both at 95%.[9] Chinese pigmeat production decreases by an annual average of 2.3 Mt (a 1% annual decline in self-sufficiency). As a counterbalance to this lower production, Chinese pigmeat imports increase by an annual average of 1.5 Mt. These imports are distributed among current top Chinese pork suppliers: the European Union, the United States, Canada, and Brazil.

The increase in Chinese pigmeat imports is sufficient to have international price effects. On average, the Atlantic and Pacific pigmeat prices would increase by 5% and 8%, respectively, over the *Outlook* period and EU prices would be 5% higher. Also, with Chinese pigmeat imports more than doubling over the *Outlook* period, domestic prices become more closely linked to international prices, rising 6% and resulting in some reduction in domestic consumption.

b) Opening coarse grain markets

With land quality erosion and with urbanisation pressure to reduce arable land, one option is to reduce crop production and cropping intensity. In the last decade, China opened its markets to oilseed imports, largely recognising its land base was insufficient to support growing demand for both protein meals and vegetable oils. In so doing, it facilitated the achievement of self-sufficiency in basic food security crops – wheat, rice and maize by reducing competition for land. The imports of oilseeds were the equivalent of some 28 Mha by 2012, and according to the projection of this *Outlook*, would replace some 34 Mha by 2022. Higher demand growth for livestock products requires higher supplies of feed, and imports of maize have been increasing in recent years. This trend is anticipated to continue as production for higher income sensitive meat and dairy products grows. Growing area allocation to feed grains will pressure other crops. One option is to open markets for coarse grain, allowing yet higher imports.

To illustrate the impact which the opening of coarse grain markets would have on China and international markets, a scenario was undertaken in which the price of maize in China was set at the world reference price, plus fixed trading cost.[10] Compared to this *Outlook* projection, the scenario aligns domestic prices with international prices and clears domestic markets with trade. The results indicate that imports of coarse grain could be 28 Mt higher than the baseline projection by 2022. Increased imports would reduce domestic grain prices by some 17% and raise international market prices by 8%. In this scenario, domestic rice and wheat prices would decline by about 3%, while their international market counterparts rise about 1% for rice and 3% for wheat compared to the baseline projection. Lower feed grain prices enable livestock sectors to expand, by about 1% for pigmeat and milk, 1.6% for poultry, and 0.2% for bovine meat. In the scenario area harvested for grains in China remains near 2012 levels compared to an increase of about 0.7% p.a. in the baseline projection. This scenario is highly stylistic, and results are only indicative. However, they show that, similar to oilseeds, without an increase in crop and animal productivity, higher consumer demand will place increasing pressure on China's resource base, and may induce significant imports from international markets.

Impacts of climate change

The *Outlook* provides a "single line" projection for key outcomes under strict assumptions concerning underlying driving forces. These, however, are subject to high uncertainty or variations, such as is the case for crop yield outcomes. The current impact associated with climate change has not been effectively evaluated, and most studies which have, include time frames beyond that of this *Outlook*. However, given the intensity of land and water use, and the growing fragility of these productive assets, it is anticipated that climate change will play a large role in China's future. As shown by simplified scenario analysis, even small changes in China's markets have potential for global impact. Alternative yield trends, with higher variation could impact China's self-sufficiency targets and perhaps as importantly may impact world markets, as apparently small percentage variations in domestic production could invoke large changes in trade.

In the past 100 years, average annual mean temperature in China increased by 0.5-0.8 C. According to some studies, it may further increase by 1.3-2.1 C by 2020, and by

2.3-3.3 C by 2050 in comparison with 2000. The frequency and intensity of extreme weather events are most likely to increase; water scarcity and droughts in the northern part may increase, and water logging and floods in the southern part may also increase. Food availability will be impacted by changes in temperature, water availability, extreme weather events, soil condition, and pest and disease patterns. While the temperature rise and fertilisation function of CO_2 may bring some benefits to crop production, it is likely that if no proper adaptive action is taken, production of the three major food crops in China, i.e. rice, wheat and maize, may decline. It has been estimated by some sources that total food production in China could be reduced by 14-23% in comparison with 2000.[11] Such a scenario would have large implications for domestic and international markets, further underscoring the basic fact that China's resource base, on a per person basis, is and will continue to be both intensively used and fragile.

Conclusion

The prospects for China's agriculture, and potential implications for global markets have been studied often in the past several decades. The challenge is clear: feeding China in the context of its rapid economic growth and limited resource constraints is a daunting task with both potential risks and opportunities for global markets. The *Outlook* projects that the challenge will remain omnipresent in market assessments over the coming decade, and deserves ongoing monitoring and analysis.

China has been thus far very successful at meeting its key goals. How can this success be sustained? Continuing the success, given rising issues of land degradation, water depletion, pollution, rural labour shortages and such poses significant policy challenges for the next decade. Nevertheless, China is anticipated in this *Outlook* to meet its production targets, and make further gains in food security indicators, albeit at likely higher support for agriculture. As for global agriculture, enhancing productivity growth will remain a key priority for China. An important issue for the longer term relates to the extent of expansion which will be required to meet rising demand, the growth of which is set to slow considerably by 2022. China has opened several key markets, and trade will continue to expand vigorously in some cases to help meet higher demand.

The *Outlook* projects a further opening of markets in the next decade, both for China, as for many other countries. As markets are increasingly integrated markets, global information sharing to support policy cohesion will be critical in best utilizing global resources to feed the world's population sustainably in the longer term.

Notes

1. This chapter has been developed and written in collaboration among FAO, OECD, the AII of CAAS, and the Ministry of Agriculture of China. However, the data, analysis and projections are those of FAO/OECD and do not necessarily represent those of its collaborating partners.
2. For the latest review of agricultural policy developments in China as well as OECD and selected emerging economies, see OECD (*forthcoming*), *Agricultural Policy Monitoring and Evaluation 2013*.
3. Contribution rate to growth by science and technology is computed from output growth compared to input growth of factors of production, including labour, material, and land. This estimate therefore also includes improved efficiencies from better management, factor consolidation, and improved infrastructure.
4. Percentage of population below USD (2005) 1.25 per day. World Development Indicators (see data.worldbank.org).

5. See OECD (2012), *China in focus: Lessons and challenges*.
6. See Barrett, C., (ed.) (2013), Chapter 17 “When China runs out of farmers” by Luc Christiansen.
7. The PSE methodology focuses on transfers targeting farmers individually and the agricultural sector as a whole, thus does not include other policies which create more favourable conditions for the Chinese farmers such as: support for the agro-processing industry, economy-wide development of infrastructure, subsidies for rural health and educations systems as well as for rural pension systems.
8. Data provided by the Ministry of Agriculture, China.
9. See Chapter 7 on meat for more detail on the specifications and results of this scenario.
10. See Box 4.3 in Chapter 4 on cereals for more explanation of the scenario and results.
11. See China National Development and Reform Committee, *National Strategy on Climate Change*, June 2007.

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Chapter 3

Biofuels

Market situation

World ethanol prices[1] declined early in 2012 but regionally, market conditions varied. In the United States, ethanol prices began to rebound later in the year as the extent of the drought in the United States became apparent, driving up feedstock prices. In Brazil, an improved sugar cane crop in the latter half of the year improved supplies and pulled down domestic ethanol prices.

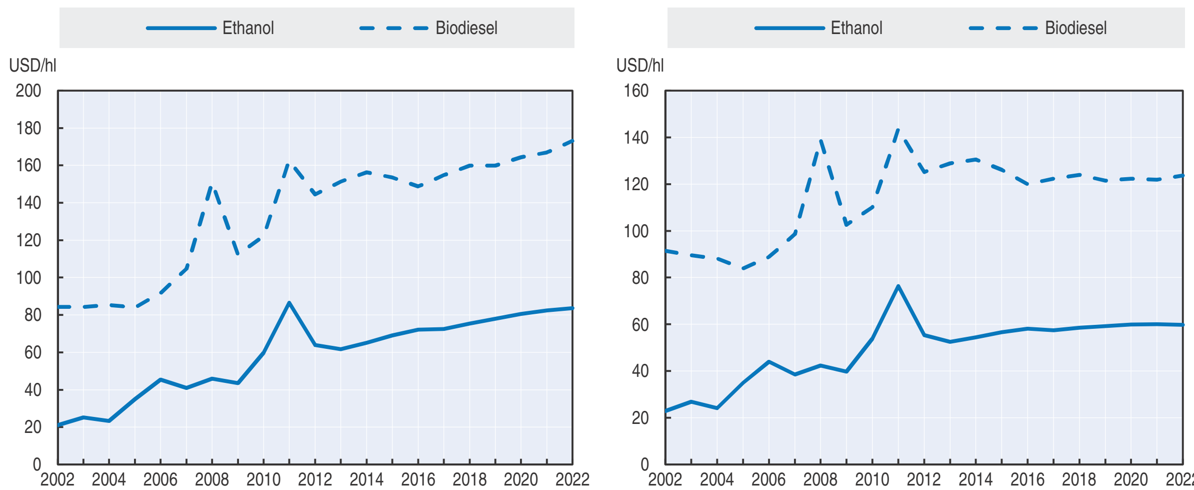
World biodiesel prices[2]fell in 2012 off record highs in 2011, in a context of strong vegetable oil prices – partly due to the drought in the United States – and high crude oil prices. Contrary to ethanol, global biodiesel production did increase in 2012. The four major biodiesel producing regions (the European Union, the United States, Argentina and Brazil) increased their supply and production in Malaysia recovered from a historical low in 2011.

Projection highlights

- Ethanol and biodiesel prices (Figure 3.1) are projected to return to an increasing trend given the expected high crude oil prices and biofuel policies around the world that promote biofuel demand. However, evident uncertainties around the implementation of policies will continue to significantly affect biofuel markets.
- Global ethanol and biodiesel production are both expected to expand, mainly driven by demand promoting policies and reach respectively 168 bnl and 41 bnl by 2022. This amount should require 12%, 29% and 15% of world coarse grains, sugar cane and vegetable oil production respectively. Ethanol markets are dominated by the United States, Brazil and, to a smaller extent, the European Union. Biodiesel markets should be dominated by the European Union and more marginally by the United States, Argentina and Brazil.
- At the end of the outlook period, biodiesel should become more competitive in the United States because the ethanol RIN[3] prices are expected to increase strongly in order to bring ethanol prices to the energy equivalent of gasoline since the E15[4] blend wall is expected to be reached. The European Union should remain shy of its objective of 10% renewable fuel in the transport sector by 2020. According to the outlook, the increase in production of second generation biofuel will remain very limited and for that reason the European Union should only reach 8.6% of transport fuel by 2022.
- Biofuel production in most developing countries serves mainly the purpose of energy independence except for Brazil, Argentina, Indonesia, Malaysia and Thailand; these will also be important exporters of ethanol or biodiesel. Brazil will also remain a large consumer of ethanol on the basis of the assumption that Petrobas will stop freezing the retail price of gasoline and also that the minimum blend requirement rises from 20% to 25% since May 2012. The consumption of ethanol by flex-fuel car owners in Brazil should therefore increase significantly as a result of the anticipated growing crude oil price. The cultivation of non-edible crops to produce biofuels is expected to remain on a project or small-scale level in most developing countries.

Figure 3.1. **Strong ethanol and biodiesel prices over the Outlook period**

Evolution of prices expressed in nominal terms (left) and in real terms (right)



Notes: Ethanol: Brazil, Sao Paulo (ex-distillery), Biodiesel: Producer price Germany net of biodiesel tariff.
Source: OECD and FAO Secretariats.

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Market trends and prospects

Prices

A strong decline in the world price of sugar at the beginning of the outlook, caused by a recovery in sugar cane production in Brazil and lower imports of sugar from China and the Russian Federation, has put downward pressure on the world ethanol prices in the short term (Figure 3.1). In order to re-equilibrate the ethanol market, the Brazilian authorities have increased the maximum amount of ethanol in low blend from 20% to 25% in May 2012. The American market is integrated into the world market since 1 January 2012 following the elimination of the large specific tariff. Further the expiring tax credits for blending ethanol lead to increasing ethanol blending activities in order to get as much of that subsidy as possible. As a consequence the American price of ethanol also fell in 2012, in spite of the large increase in the price of maize. The combination of these two factors and difficulties in the introduction of E15 blends generated, with some delays, an explosion in the ethanol RIN price at the beginning of 2013.

Since both the sugar and maize prices are slightly falling in real terms (but from high levels) over the projection period, they will not contribute to the projected increase of the world ethanol price in real terms over the medium term. The world crude oil price is expected to increase in real terms by 7% between 2012 and 2022. This will lead to an increase in demand and consumption of ethanol by owners of flex-fuel cars in Brazil of almost 50% over the same period putting upward pressure on the world price of ethanol in the medium-term. This result is based on the assumption that Petrobas will stop freezing the retail price of gasoline.

National ethanol policies, in particular the United States, are strongly impacting on biofuel prices. Until now, the US Environment Protection Agency (EPA) has not reduced the total and advanced mandates[5] despite large reductions in the cellulosic biofuel mandate. It was assumed in the baseline that the fulfilment of the cellulosic mandate will pass from

1.4% to 27% between 2012 and 2022. Considering the increasing size of the cellulosic mandate in the Renewable Fuel Standard final rule (RFS2), it was assumed that the EPA will reduce the total and advanced mandates by a portion of the reduction in the cellulosic mandate. That portion is assumed to start at 29% in 2013-14 and to reach 87% in 2022-23. In spite of this large reduction in the advanced mandate, the other advanced gap (define as advanced minus biodiesel and cellulosic ethanol) has the potential of increasing by almost 50% in the medium term compared to the implicit numbers in RFS2. Since maize based ethanol is not eligible to fulfil this mandate, most of it will be satisfied with imported sugar cane based ethanol from Brazil. This will also put upward pressure on the world price of ethanol in the medium term.

Further, the interaction between the biodiesel and ethanol markets is projected to become quite relevant. In the United States, contrary to maize based ethanol, biodiesel is eligible to capture a share of the other advanced gap. The ability of the US biodiesel producers to do so is enhanced by the biodiesel blender tax credit that was reinstated for 2013,[6] and by the ethanol blend wall. In the United States the maximum amount of ethanol that can be mixed with gasoline in low blends is 15% for cars built after 2001. Since older cars will eventually leave the fleet, the amount of ethanol being consumed in low blend mix is continuously increasing until 2020 in this baseline. This is based on the assumption that E15 blends will have no difficulties reaching consumers, which is not necessarily the case at present. In the absence of an E15 market, the E10 blend wall will influence the American ethanol market right from the outset of the Outlook. Under these circumstances and total motor fuel consumption being on a decreasing trend the American biofuel policy would absolutely need an E85 market to be functional. Even if the E15 market becomes operational, a flex-fuel car sector would be needed in the last three years of the Outlook in order to satisfy all the ethanol mandates. This is only possible if the ethanol to gasoline consumer price ratio falls to the energy content of ethanol. This should be the case in the last three years of the baseline and is realised through an increase in the retail price of gasoline to reflect the rising cost caused by the higher price of Renewable Identification Number (RIN) for ethanol. The ethanol RIN price reaches sufficiently high levels to make biodiesel competitive on the market for the other advanced gap, while at the same time reducing demand for American imports of Brazilian ethanol.

Two other considerations influence this result. The amount of biodiesel consumed in the United States is much smaller than the amount consumed by low blend vehicles and for that reason the price ratio does not have to fall to the energy content of biodiesel relative to diesel which, in any case, is much higher than for ethanol (0.92 versus 0.67). The other incentive to use more biodiesel comes from a particularity of the American biofuel policy which states that a unit of biodiesel counts for 1.5 units of mandate. The competition for the other advanced gap by biodiesel in the last three years of the baseline mitigates to some extent the upward pressure on the world ethanol price generated by the large increase in the American other advanced gap.

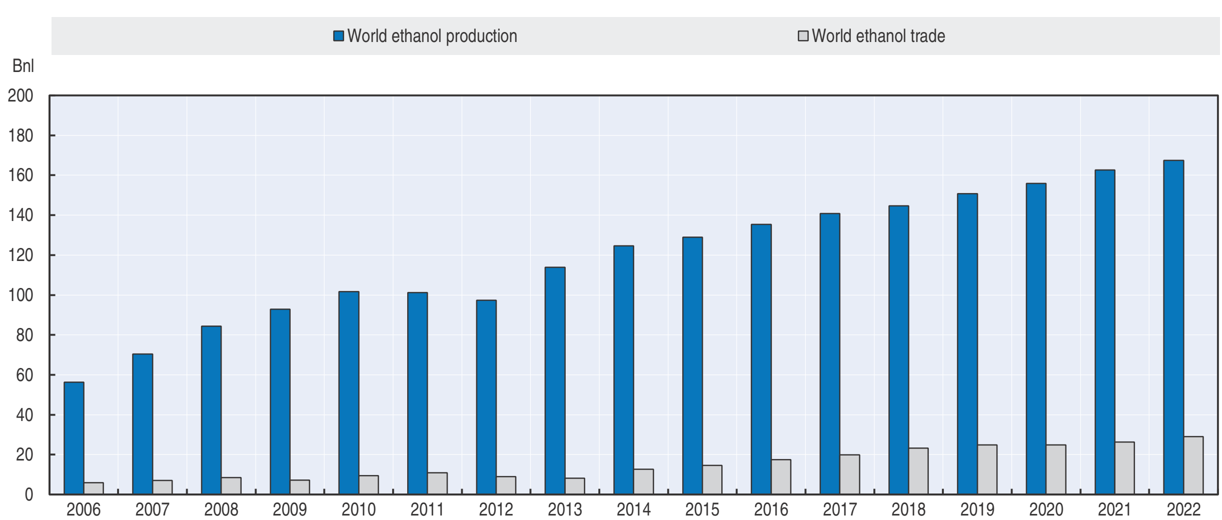
The net effect of all these factors is an increase in the world price of ethanol in real terms by 8% between 2012 and 2022, slightly higher than the 7% increase in oil prices assumed in this *Outlook*. The United States maize based ethanol price should not grow as much because the United States is projected in the second half of the *Outlook* to become a large exporter of this type ethanol and would have to support increasing transport costs. This ability to export would be mostly determined by the high world price of ethanol caused by the increasing demand generated by the growing imports from the United States to fill the other advanced gap. Therefore, the *Outlook* suggests, like last year, a policy driven two-way trade for United States ethanol. The United States exports will not necessarily all go to Brazil, since Canadian and European production is expected to be much smaller than consumption. The exact amount going to Brazil will be strongly influenced by the conclusion of the actual trade dispute[7] between the United States and the European Union.

The world biodiesel price declined in 2012 from the high level recorded in 2011. The vegetable oil price, which is the main feedstock used to produce biodiesel, remained high in 2012 partly because of the reduction in supply caused by the American drought. It generally takes two years following such a drought for the world price ratio between biodiesel and vegetable oil to return to the long term equilibrium. For the rest of the *Outlook* period, this ratio is fairly stable. Since the vegetable oil price is falling in real terms, the biodiesel price also falls in real terms but from historically high levels. The crude oil price has a much smaller influence on the world biodiesel price than on the world ethanol price simply because consumption is determined by government regulation and rarely by demand from the market in most countries covered in the baseline.

Production and use of biofuels

Global ethanol production has fallen in calendar year 2012 for the first time since 2000, due to declines in the United States and in Brazil. With lower prices of maize and sugar anticipated in 2013-14, a large increase in production is anticipated in both countries. By 2022, world ethanol production is projected to increase by almost 70% compared to the average of 2010-12 and reach some 168 bnl by 2022 (Figure 3.2). The three major producers are expected to remain the United States, Brazil and the European Union (Figure 3.3). Production and use in the United States and the European Union are mainly driven by the policies in place (i.e. RFS2 and the Renewable Energy Directive (RED), respectively). The growing use of ethanol in Brazil is linked to the development of the flex-fuel industry and the import demand of the United States to fill the advanced biofuel mandate as well as to their increase in blending minimums.

Figure 3.2. **Development of the world ethanol market**



Source: OECD and FAO Secretariats.

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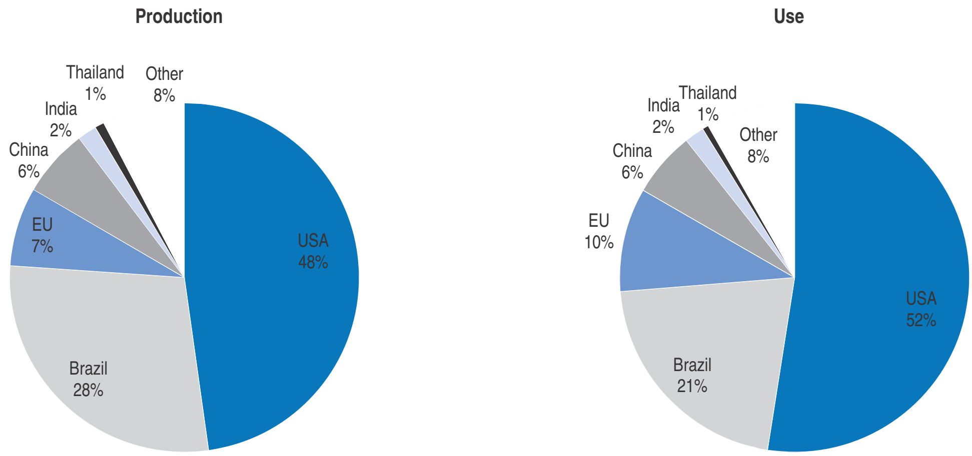
Figure 3.3. **Regional distribution of world ethanol production and use in 2022**



Source: OECD and FAO Secretariats.

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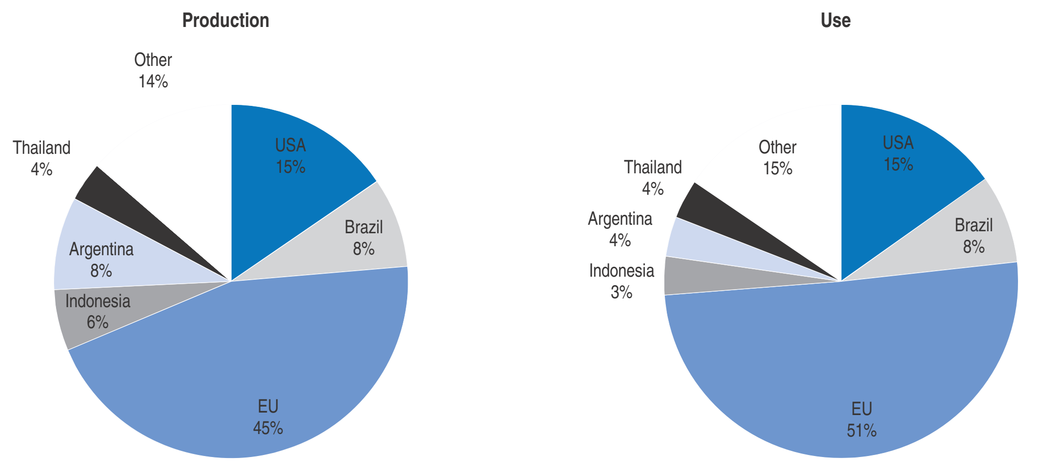
In calendar year 2012, ethanol production stagnated in developing countries mainly due to the supply reduction in Brazil that was partially offset by other developing countries, where increases were observed (Argentina, India, African and other South American countries). The ethanol production in developing countries is projected to increase from 42 bnl in 2012 to 72 bnl in 2022, with Brazil accounting for 80% of this supply increase and a large part of the rest coming from China, where less than half of their ethanol production is consumed in the fuel market, the rest is consumed as alcohol in many food and non-food preparations. The growth in China should come from cassava and sorghum since the use of maize for ethanol production is no longer allowed to increase.

Global biodiesel production is expected to reach 41 bnl in 2022. The European Union is expected to be by far the major producer and user of biodiesel (Figure 3.4). Other significant countries are Argentina, the United States and Brazil, as well as Thailand and Indonesia. Consumption in almost all countries will be dictated by the on-going policies.

Biodiesel production in developing countries, contrary to ethanol, did increase slightly beyond the trend of previous years with most of the growth taking place in Brazil, Indonesia, Thailand and Malaysia, with the latter recovering from a strong production decline in 2011. Total biodiesel production of developing countries is projected to stay constant in 2013 at about 10 bnl and increases thereafter to 14 bnl by 2022.

In the United States, the total biofuel mandate is projected to be binding throughout the projection period.[8] Ethanol use will, however, not be equal to the total mandate minus the biodiesel mandate in 2013 and in the last three years of the *Outlook* because biodiesel will capture parts of the other advanced mandate since its RIN should be cheaper than those of ethanol. In 2013, this is primarily due to the biodiesel blender tax credit, which is assumed not to be renewed in the baseline. For 2020-22, it is due to the effect of the E15 blend wall on the ethanol RIN market. Nevertheless, consumption of ethanol is expected to increase strongly, almost doubling between the average of 2010-12 and 2022 (from 46 bnl to 88 bnl). Most of the increase will be due the cellulosic mandate (growing from 0.05 bnl to 16.4 bnl) and the other advanced gap (growing from 1.1 bnl to 14.4 bnl).

Figure 3.4. **Regional distribution of world biodiesel production and use in 2022**



Source: OECD and FAO Secretariats.

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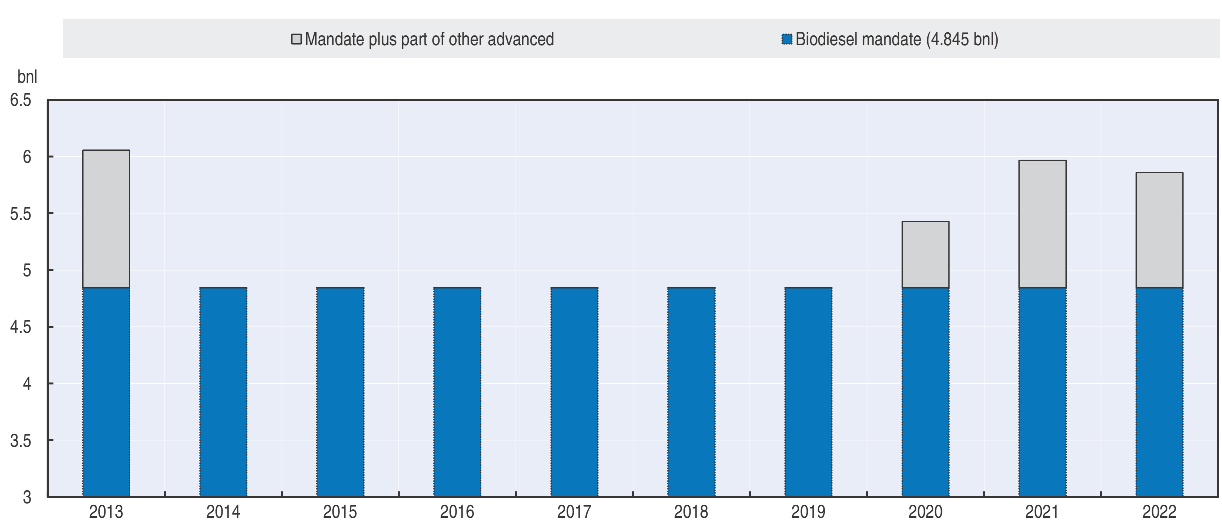
The mandate for biodiesel, as defined in the United States RFS2, was extended from 3.8 bnl to 4.8 bnl effective in 2012 and subsequent years. Consumption will be higher in four of the ten years of the outlook for the reasons explained above (Figure 3.5). By 2022, consumption should therefore reach 6 bnl, strongly influenced by the assumed level of fulfilment of the cellulosic ethanol mandate and the difficulty of overcoming the ethanol blend wall. The EPA could deliberately choose a lower level to avoid the effect of the blend wall on the ethanol market and this would return biodiesel consumption to the mandate level. In any case, biodiesel from tallow or other animal fat is expected to represent about 45% of total US production and an increasing share of the oil used to produce biodiesel will be coming from a better extraction of the oil in distiller's dry grains (DDGs) a by-product of ethanol production.

Figure 3.5. **The effective US biodiesel mandate is larger than in RFS2 in four years of the Outlook**



Source: OECD and FAO Secretariats.

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The European Union RED[9] states that renewable fuels (including non-liquids) should increase to 10% of total transport fuel use by 2020 in the European Union on an energy equivalent basis. The *Outlook* assumes that only 7.6% can be reached by 2022 from first generation biofuels. However, since each unit of second generation biofuel (including those produced from used cooking oil) consumed counts double for the purpose of the Directive, the fulfilment percentage becomes 8.6% in 2022.[10] In that context, European Union fuel ethanol production mainly from wheat, coarse grains and sugar beet is projected to reach 12.3 bnl in 2022 and ethanol fuel consumption amounts to an average share of 8.1% in gasoline types for transport fuels. Second generation ethanol is not assumed to play a major role throughout the projection period (only 3.5% of total production by 2022). As a result the ethanol deficit of the European Union is expected to double during the course of the *Outlook*.

Given mandates and tax reductions by European member states, total biodiesel use is projected to reach 18.3 bnl by 2022, representing an average share of biodiesel in diesel type fuels of 7.4%. Domestic biodiesel production should increase to keep pace with demand. Second generation biodiesel production is assumed to remain very small (only 1% of total production by 2022) while the amount produced from used cooking oil should reach 18% of the total in 2022. For both ethanol and biodiesel these results would obviously be seriously modified if the European Union decides to go ahead with the biofuel proposal announced on 17 October 2012. This proposal was analysed by the European Commission and a summary is presented in Box 3.1.

Box 3.1. **Latest EC biofuel proposal: Limited impact on world prices**

On 17 October 2012, the European Commission (EC) published a proposal to limit land conversion to biofuel production and to improve the climate benefits of biofuels used in the European Union. The aim is to reduce indirect land use change (ILUC) by limiting the amount of first generation biofuels that can be counted towards the 10% renewable energy target to 5%. In addition, advanced biofuels with no or low ILUC are promoted by weighting their contribution towards fulfilling the target more favourably. Biodiesel produced from waste oil will continue to be accounted for twice its energy content, but second generation biofuels will be weighted by a factor of four.

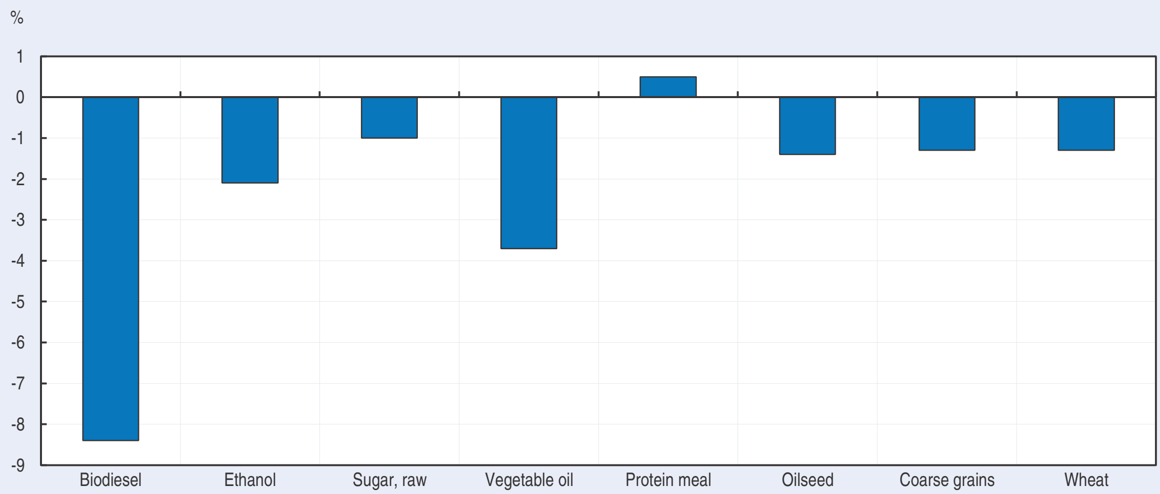
The scenario and the baseline discussed in this box were published by the EC in *Prospects for agricultural markets and income in the EU 2012-2022*. In this scenario, the share of first generation biofuels is set at a maximum of 5% of fuel use on an energy basis. The proposal promotes second generation biofuels via the accounting procedure. However, because of the limited availability of waste oil and little progress in the production of second generation biofuel, it was assumed that the increase in the share of these biofuels would not be significant. The share of biodiesel from waste oils in fuel use would increase by only 0.3% in this scenario (but a 27% increase in production compared to the baseline), while the share of second generation would only increase by 0.2% (100% increase in production by definition). Therefore, with this proposal, the renewable energy share in transport is 8.1% which is slightly smaller than in the EC baseline in 2022 in spite of the more favourable accounting procedure.

Biodiesel consumption is 10% lower than in the EC baseline, but maintains a significant share (6.4%) of diesel use while ethanol consumption falls by 28% in 2022. Respectively, 43% and 68% of the decline in biodiesel and ethanol use is reflected by lower imports. Reduction in domestic production makes the rest of the adjustment. These lower imports reduce the world prices of biodiesel and ethanol by 8.4% and 2.1% respectively in 2022 (Figure 3.6).

Box 3.1. **Latest EC biofuel proposal: Limited impact on world prices** *(cont.)*

The main feedstocks used in the European Union (EU) for biofuel production are vegetable oil, maize, wheat and sugar beets. Lower first generation biofuel production in the EU reduces demand and prices of these commodities (Figure 3.6). However, since the European Union is integrated into the world market, the effects on EU prices are similar to those at the world level. The impacts on these sectors are transmitted to some extent to other sectors through substitution or joint product effects. The lower vegetable oil price reduces the crusher's margin leading to lower demand and price of oilseeds. Reduced crushing will lower meals supply and increase the price. The reduction in the world ethanol price generates a shift in favour of more sugar production in countries like Brazil for example. This increases supply and lowers the world sugar price. In general, when the price of feed falls, this leads to higher livestock production and lower prices of meats. The impact on the price of sugar, oilseeds and cereals is small.

Figure 3.6. **Change in world prices between the EC outlook and the biofuel proposal scenario, 2022**



Source: European Commission.

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Argentina is expected to increase biodiesel production (37%) and exports (14%) over the *Outlook* period. For Brazil, the increasing other advanced gap in the United States offers a strong growth opportunity for ethanol production and exports. Ethanol production is projected to increase by 22 bnl or 87% while net exports (exports minus imports) will rise from 1.8 bnl to 11.8 bnl, a six-fold increase.

In recent years, an increasing number of developing countries have implemented ambitious biofuel targets or even mandates. Their motivation is based mainly on two objectives – achieving a high level of energy supply security/independency and increasing domestic value added products for export. Only a few of these countries act as notable exporters. For biodiesel, these are Argentina, Indonesia and Malaysia and for ethanol, Brazil, Pakistan and Thailand. The *Outlook* assumes increasing biofuel production in developing countries, but only 50% of the levels of ambitious national targets or mandates are expected to be achieved. The *Outlook* also assumes that national authorities will not insist on these mandates if large parts would have to be imported. One limiting factor is the availability of alternative feedstocks such as jatropha which are not yet suitable to produce biofuels on a larger scale.

Trade in ethanol and biodiesel

Global ethanol trade is set to increase strongly. Most of this increase is due to the growing ethanol trade between Brazil and the United States. The United States is expected to import about 14.6 bnl of sugar cane based ethanol mostly from Brazil[11] by 2022, since it the cheapest alternative to fill the advanced biofuel mandate. At the same time, the United States is expected to export 6.6 bnl of maize based ethanol by 2022. The European Union is set to import an additional 2 bnl of ethanol while biodiesel imports are projected to increase to the level reached in 2011 (3.1 bnl) by 2016 and decrease to the base year level in 2022 again (2.3 bnl). This outcome for biodiesel partly reflects the limitations generated by the sustainability criteria required by the European Union as rapeseed oil, palm oil and soybean oil feedstock do not fulfil in their default values the minimum greenhouse gas emission reduction by 50% applicable as of January 2017. It also partly reflects the inability of North America to generate a large surplus of biodiesel over the entire period of the *Outlook*.

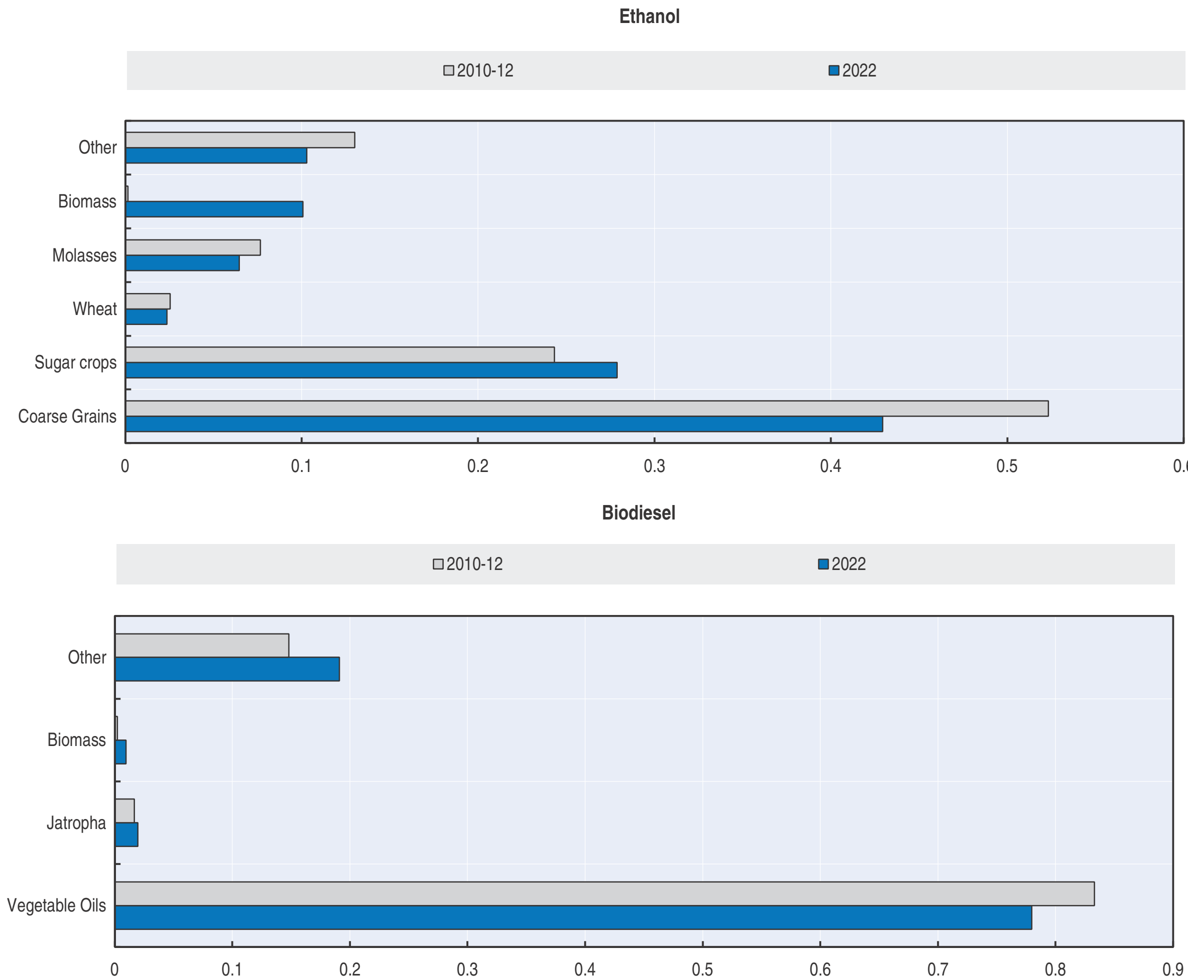
Developing countries are net exporters for both biodiesel and ethanol. Argentina (2 bnl), Indonesia (0.8 bnl) and Malaysia (0.1 bnl) are projected in the *Outlook* to be the largest net exporters of biodiesel by 2022 while Brazil (12 bnl), Pakistan and Thailand (0.5 bnl each) are expected to be the largest net exporters of ethanol among developing countries.

Feedstocks used to produce biofuels

Coarse grains and sugar cane will remain the dominating ethanol feedstock while vegetable oil continues to dominate biodiesel production (Figure 3.7). The share of coarse grain based ethanol production in global ethanol production in 2022 is expected to lose about ten percentage points to 43%, which corresponds to 12% of global coarse grain production. Sugar crops (cane and beets but mostly cane) share of world ethanol production should increase from 24% to 27% and should require 28% of global sugar cane production in the last four years of the *Outlook*. Production from other sources is mostly composed of residues of all kinds and in particular of wood as well as from roots and tubers.

While the share of ethanol produced from wheat and molasses decreases slightly, biomass based ethanol is projected to account for almost 10% of total ethanol production by 2022, mostly all stemming from production in the United States and based on the assumption of a fulfilment rate of 27% of the cellulosic mandate in 2022. It is also assumed that by 2022, 60% of this amount will not be produced from crop residue but from crops like switchgrass. The share of biodiesel produced from vegetable oil in global biodiesel production is expected to decrease from 83% to 78%, which corresponds to 15% of global vegetable oil production in 2022 (Figure 3.7). Production from other sources is mostly composed of used cooking oil and animal tallow.

Figure 3.7. **Share of feedstocks used for biofuels production**[1]



1. Sugar crop includes ethanol produced from sugar beets in the European Union.

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Risks and uncertainties

The global biofuel projections are strongly influenced by biofuel policies around the world and many decisions have to be taken each year which cannot be anticipated today. The *Outlook* assumes certain decisions, for example of the EPA on the waiving of mandates in the United States, but these decisions might be different in reality. Last year's *Outlook* provided a detailed analysis of alternative EPA options. The same is true for the EU biofuel policies as seen in Box 3.1.

Given the sustainability criteria, national authorities increasingly aim at replacing the first generation of biofuels produced from agricultural feedstocks progressively by advanced biofuels produced from lignocellulosic biomass, waste material or other non-food feedstocks. Since these technologies are still far away from being able to fulfil future goals and their development strongly depends on current investors' decisions, spending on research and development and on the continuation of biofuel policies, this sector is highly uncertain.

Ethanol markets have been strongly influenced by the level of crude oil prices over the past few years. Since ethanol production is expected to represent a sizeable part of the demand for agricultural feedstock, the uncertainties in the fossil energy sector become uncertainties for the ethanol and agricultural sectors. Finally, the sector is also vulnerable to perturbations in agricultural production caused by unfavourable climatic conditions. In order to better ascertain this risk and the mitigating factors already included in the United States biofuel policy, two scenarios were produced with AGLINK-COSIMO and are presented in Box 3.2.

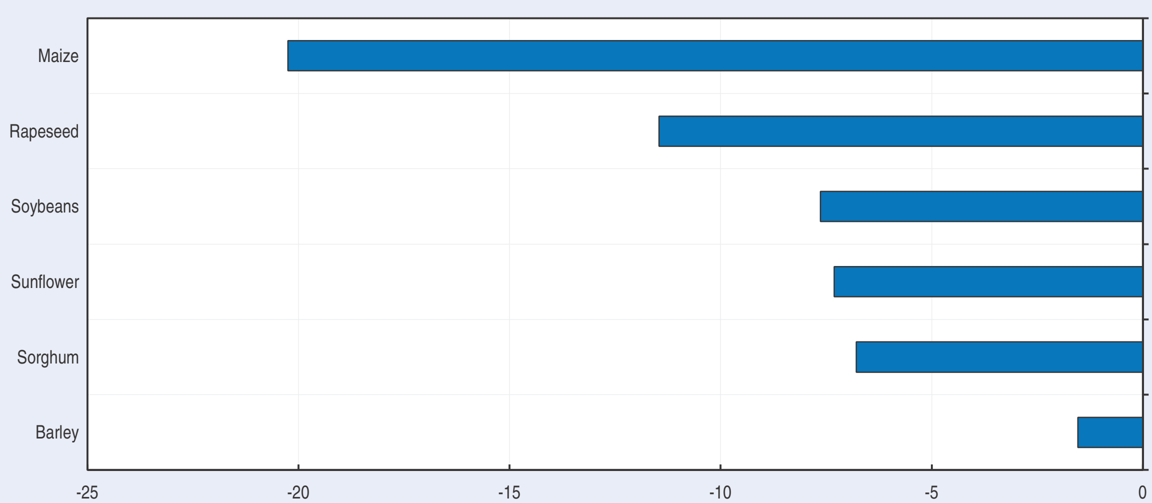
Box 3.2. **The flexibility in the US mandates through the roll-over provision**

The calendar year quantitative national mandates are laid out in the Energy Independence and Security Act of 2007. These mandates are, however, subject to some flexibility. Besides the flexibility given to the Environmental Protection Agency (EPA), which can waive part of any mandate in any given year, biofuel blenders are allowed to "rollover" or run a "deficit" of Renewable Identification Numbers (RIN is the mechanism used to insure consumption of biofuel equal the quantities specified in the mandates) into the following year.

Up to 20% of a given mandate may be met with RINs produced in the previous year. This allows a certain "stock holding" of obligations which can be drawn down in years where RIN prices rise. The blender can hold an additional stock of RINs as a hedge against rising biofuel and RIN costs or other compliance issues. On an individual basis, blenders may fall short of the mandate in a particular year if in the following year they make up for that "deficit" and fully comply with the mandate in the current year. Running a deficit in the current year introduces considerable rigidity in the following year for blenders, as failure to comply with mandates can result in a fine of USD 37 500 per day plus any economic benefit derived from non-compliance. Such flexibility in the mandate should mitigate swings in feedstock and biofuel prices from transient shocks in energy prices and crop production.

To illustrate this, a reproduction of the 2012 drought in the United States which led to a 20% decrease of maize yields compared to normal levels was simulated in the AGLINK-COSIMO model. The drought was simulated in 2016 for those crops where a yield reduction in 2012 was observed as shown in Figure 3.8.

Figure 3.8. **Yield shocks in the United States applied to 2016**



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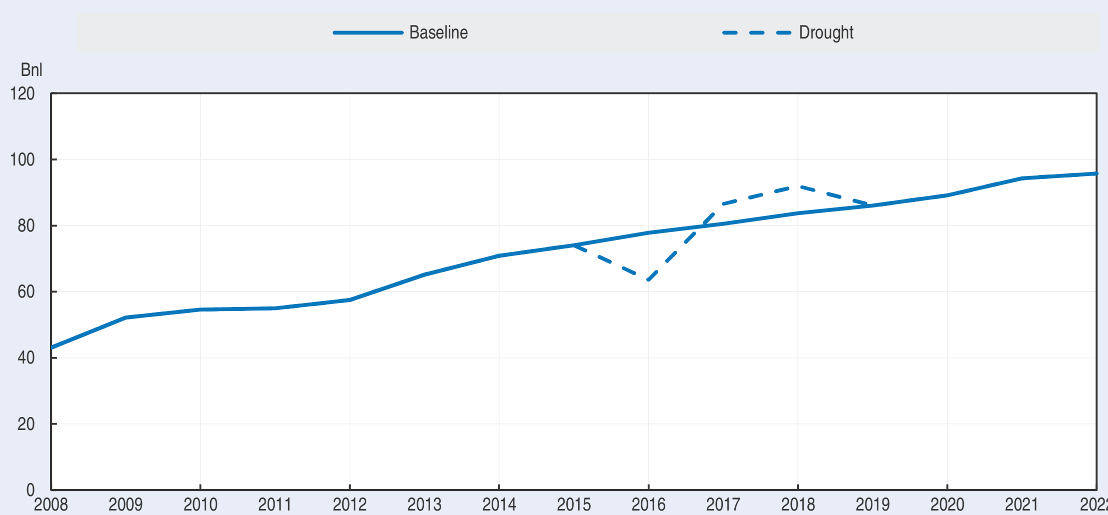
Box 3.2. **The flexibility in the US mandates through the roll-over provision** *(cont.)*

The simulations were carried out firstly with no rollover flexibility allowed and secondly with the maximum deficit allowed for maize based ethanol and biodiesel – 20% of the respective mandates in 2016. That deficit is not entirely recovered in the subsequent year because another 10% deficit was assumed in 2017. The net effect in 2017 and 2018 is a consumption of ethanol and biodiesel 10% above the mandate because blenders had to process the 20% deficit of the 2016 mandate and are borrowing 10% of the 2017 mandate which will be processed in 2018. All those changes are summarised through the effective total biofuel mandate presented in Figure 3.9. This assumption was chosen in order to evaluate the maximum mitigation effect that the rollover provision might have on feedstock prices.

Figure 3.9 shows the impacts on US ethanol production of the simulated yield shocks in 2016. Subsequently, Figure 3.10 presents the role of rollover flexibility on maize prices, showing that half of the price spike for maize is mitigated (18% versus 35%). The price for ethanol in the United States in 2016 rises sharply if no rollover is allowed, while with active rollover there are almost no price effects observed. This is due to the fact that the downward shift in demand caused by the rollover mitigates almost perfectly the effect on price that a downward shift in supply (caused by the higher price of maize) would have generated.[1] But contrary to maize, the ethanol price spike is transferred to the following years when the RINs that have not been filled in 2016 need to be produced. This also contributes to higher demand and price of maize in subsequent years.

Figure 3.9. **Impacts of 2016 drought scenario on US ethanol production**



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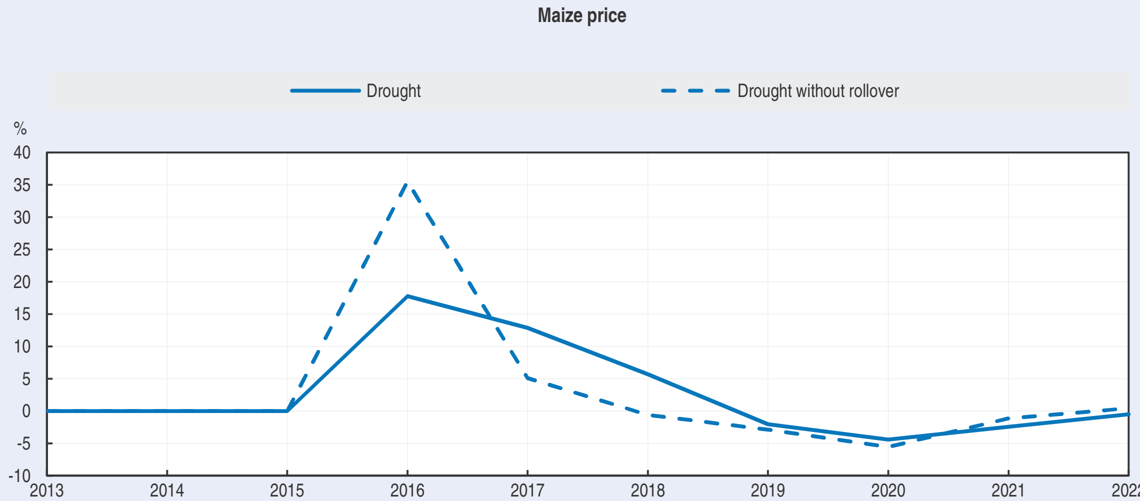
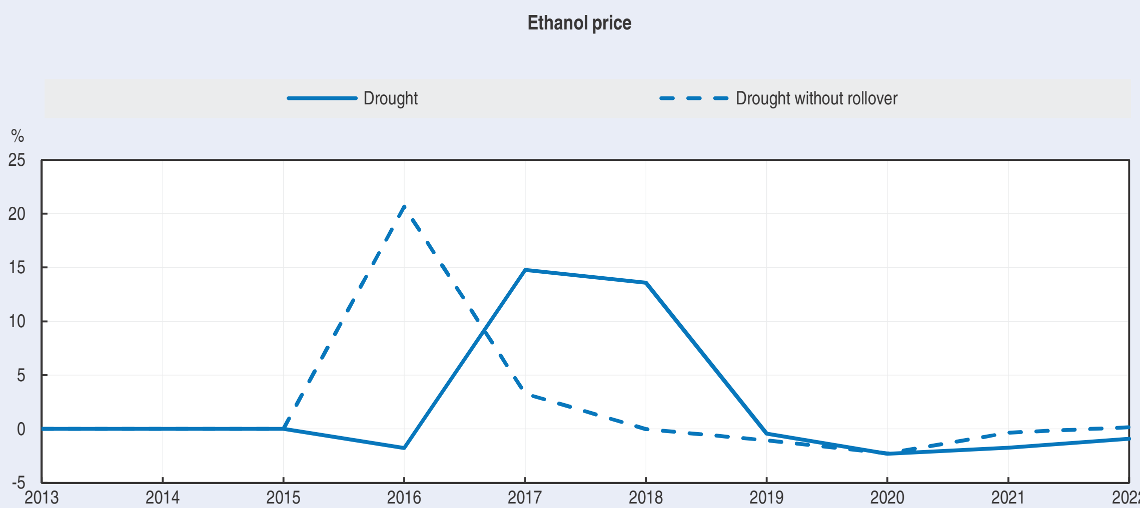
On the biodiesel and vegetable oil markets, the effects are comparable but lower, given the smaller sectors in the United States and the smaller reduction in soybean yield simulated.

Clearly, this application of the AGLINK-COSIMO model shows that the flexibility in US biofuel mandates built in through the rollover provision, mitigates price spikes in feedstock markets as it spreads the increase in the maize price over multiple years (Figure 3.10). Therefore the maize price increases over the period 2016-22 are quite similar (3.7% with rollover and 4.3% without).

Box 3.2. **The flexibility in the US mandates through the roll-over provision** *(cont.)*

Figure 3.10. **Price impacts of the 2016 drought scenario with and without rollover flexibility**





Source: OECD and FAO Secretariats.

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1. In fact the maximum amount of rollover used lead to a small decline of the ethanol price in 2016.

Notes

1. Brazil, Sao Paolo (ex-distillery).
2. Producer price Germany net of biodiesel tariff.
3. RIN stands for Renewable Identification Number and is the market mechanism used in the United States to insure the mandates are fulfilled. A RIN is one unit of mandate consumed. When market conditions are not favourable to the consumption of ethanol the RIN price increases. Since blenders recover this additional cost by increasing the price gasoline, consumption of ethanol becomes more favourable. The RIN price will increase until the gasoline price has increased sufficiently to allow the consumption of the ethanol mandates.
4. E15 is expected to become the low blend in the United States at the end of the *Outlook*. E15 means that 15% ethanol is included in the fuel. By 2020 the physical amount that it represents is expected to become lower than the sum of all the ethanol mandates and thus requiring E85 or flex-fuel cars. Even though it is assumed that some consumers will consume E85 even though the price of ethanol has not fallen to the energy equivalent of gasoline, by 2020 the marginal consumers will require that level of price in order to consume the last amount of the ethanol mandates.
5. According to the Renewable Fuel Standards final rule (RFS2) there are four biofuel mandates; total, advanced, biodiesel and cellulosic. The difference between total and advanced is the conventional gap which can be met with maize based ethanol. A detailed explanation of RFS2 is available in the *OECD-FAO Agricultural Outlook 2012-21,www.oecd.org/site/oecd-faoagriculturaloutlook/*.
6. The blender tax credit was also reinstated retroactively for 2012. Having being done after the fact it was assumed to be market neutral.
7. The European Union has launched an anti-dumping and anti-subsidy action against exports of American ethanol. A key element of the case is the credit from the US federal excise tax on gasoline. That credit has not been renewed in 2012 and in 2013 and the same is assumed in all the years of the *Outlook*.
8. If only the ethanol conventional gap existed the mandate would not be binding in most years of the *Outlook* because of the high crude oil price.
9. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF
10. This assumption responds to likely market developments and is in line with the recently published *Prospects for Agricultural Markets and Income in the EU 2012-2022*.
11. Even though AGLINK-COSIMO is not a spatial model, Brazil is the only country in the *Outlook* that will generate a large enough surplus of ethanol to cover the largest share of the United States import demand.

OECD-FAO Agricultural Outlook 2013

Chapter 4

Cereals

Market situation

Supply and demand balances of major cereals were tight in the 2012 marketing year,[1] with global production of wheat and coarse grains falling short of global utilisation and pulling down stocks. Severe droughts in 2012 in the United States, and across a large part of Europe and into central Asia have been the main cause of the reduced wheat and coarse grains crops.

For 2013, world wheat production is expected to record the second largest crop after that of 2011. The increase is mainly driven by an expansion in area in response to high prices and an expected recovery in yields from below-average levels in 2012 in some countries, notably the Russian Federation, Kazakhstan and Ukraine. By contrast, the outlook in the United States is less favourable as severe drought conditions during the early stages of the growing season in the Southern Plains reduced winter survival rates and yields in affected areas.

Early prospects for world coarse grains production in 2013 are favourable as the production of maize in the United States, the world's largest maize producer, is likely to surpass pre-drought levels with recovery in yields and early indications suggesting the largest planned maize area since 1936.

Rice supplies in 2012 were sufficient to allow for a continued rebuilding of stocks. India emerged as the world's leading rice exporter in 2011 through the release of significant stocks built up over the previous four years of export restrictions and reduced competition from Thailand, where exporters' competitive edge had been eroded by the government's high producer price policies. In the near future, Thailand is expected to increase rice exports and recover its world leading position.

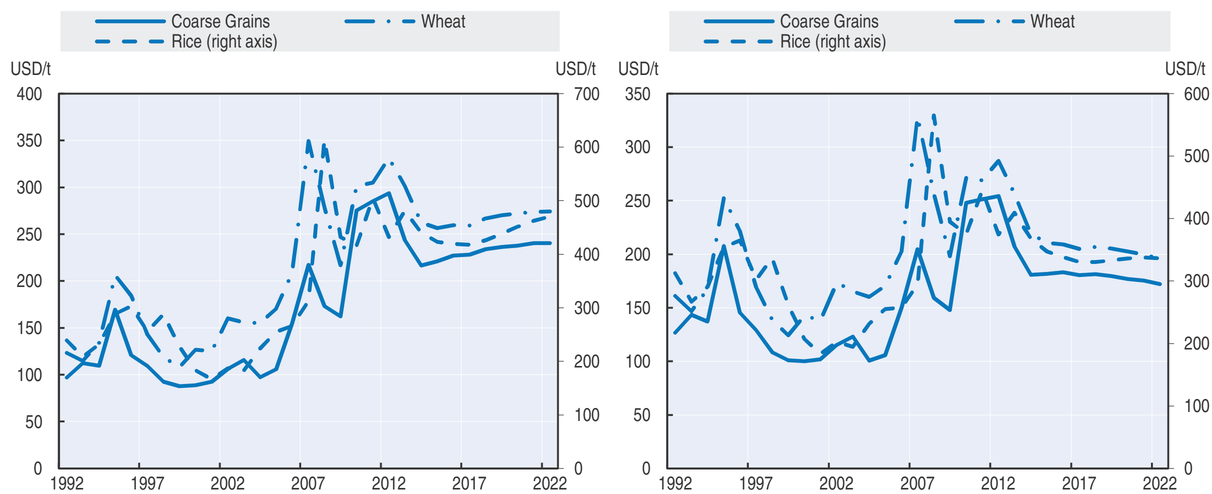
Projection highlights

- World grains prices could remain under downward pressure in the short-term and continue to ease in real terms over the *Outlook* period following a slower than expected economic recovery of the world. Crude oil prices slightly grow in real terms over the *Outlook* period and this could weigh on grain markets.
- Wheat and coarse grains yields are estimated to increase by about 12% on average between the base year and 2022. In terms of area expansion, coarse grains are projected to experience a faster growth than wheat or rice.
- Short-term supply and demand imbalances (as measured in terms of changes in stocks) are solved within the first few years of the outlook but stock-to-use and stock-to-disappearance ratios remain well below historical averages over the baseline. This raises serious concerns about the vulnerability of cereal markets to unexpected shocks, especially from the supply side (e.g. severe drought episodes in major producing regions).

- The additional demand for biofuel feedstocks over the projection period (mainly maize) is driving the large expansion of coarse grains in developed countries. In developing countries, the main driver is the feed demand for livestock production.
- Exports of wheat, coarse grains and rice are set to increase over the projection period with new Asian rice exporters expected to make major inroads.

Figure 4.1. **Grain prices stabilise over the medium term**

Evolution of prices expressed in nominal and real terms



Note: The left figure shows nominal prices and the right figure shows real prices.
Source: OECD and FAO Secretariats.

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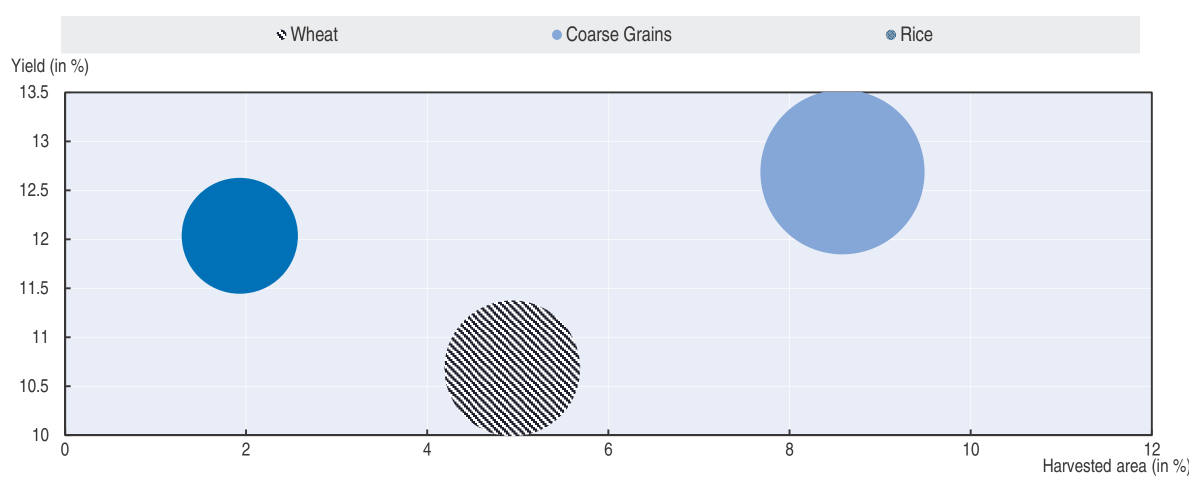
Figure 4.2. **Moderate yield increases and weak area expansion for cereals over the medium term**

Evolution of global cereal harvested area and yields over the projection period



Source: OECD and FAO Secretariats.

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Market trends and prospects

Prices

Extreme droughts in 2012 in Central Asia, Eastern Europe, and the United States led to tighter supplies of wheat and coarse grains and a spike in prices. However, as early prospects for 2013 cereal production are favourable, wheat prices are expected to fall below USD 265/t in 2014. Starting from this level, wheat prices are projected to approach USD 274/t in nominal terms by 2022. Although the trend is fairly stable, average nominal prices for the projection period are expected to increase relative to the previous decade. In real terms, however, wheat prices decrease from current high levels over the next decade by around 2% p.a. (Figure 4.1).

Maize yields and production in the United States are expected to recover to trend values in 2013, allowing for a sizeable rebuilding of depleted stocks. Over the *Outlook* period, coarse grain prices are projected to slightly increase in nominal terms to reach USD 241/t by 2022 (Figure 4.1). The price differential between wheat and maize is expected to converge even further to a 1.1-1.2 range. The primary factor behind this would be the tighter projected supply and demand balance for coarse grains relative to wheat. This is directly linked to the increasing sources of demand for coarse grains, most-importantly ethanol production in developed countries and feed use in developing countries.

Rice export prices fell in 2012 in the major exporting economies. This was not the case for Thailand, where government purchases under the "pledging programme" (Box 4.1) supported prices. Due to this disconnect between the Thai and world prices, the benchmark price used for the projections was replaced by the Viet Nam price (i.e. white 5% broken, f.o.b. Ho Chi Minh).[2] In the medium-term rice prices are expected to decrease until 2017, before strengthening slightly in real terms until 2022. This generally stable trend reflects ample supply in a few rice exporting countries in Southeast Asia to meet growing import demand from other developing countries.

Production

Wheat and coarse grains yields are estimated to increase by about 12% on average between the base year and 2022 (Figure 4.2). This is well above the yield increases forecasted for other crops such as sugar cane and cotton and below those for oilseeds (Figure 1.9 in the Overview). In terms of area expansion over the projection period, coarse grains are projected to experience a faster growth than wheat or rice.

World wheat production is projected to reach 784 Mt by 2022, about 16% higher than in the 2010-12 period, but with slower annual growth relative to the previous decade (Figure 4.4). The underlying factor for this deceleration is an anticipated slower pace in yield growth and less area expansion, which can be explained by the rapid uptake of coarse grain demand (feed and fuels) over the baseline and competition for land with wheat. Within this overall trend, large area expansions are projected for Kazakhstan, the Russian Federation and Ukraine.

Driven by the droughts in the United States and the Russian Federation, carryover stocks into 2013 are below the previous three-year average. With the assumption of normal weather patterns, wheat stocks are expected to gradually recover over the projection period, reaching 206 Mt in 2022. At this higher level, the ratio of world wheat stocks to its utilisation will approach 26% in 2022. Most of the build-up with respect to the base period is expected to occur in the CIS countries. Figure 4.4 includes the wheat supply and demand

Box 4.1. **Thailand's rice exports reduced by its rice pledging programme**

Thailand's rice pledging programme, first introduced in 1981, was re-instated in October 2011 by the newly elected Thai government. The programme allows producers to mortgage their rice for a three-month period and receive a loan equivalent to the value of the rice pledged, calculated at pre-determined programme prices.

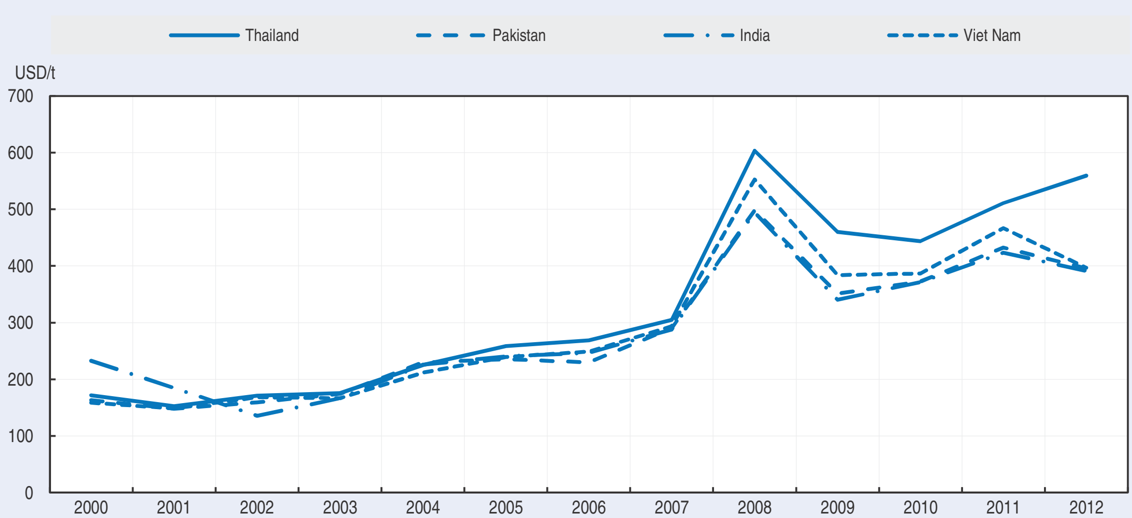
Farmers have the option to redeem their produce by repaying the loan plus a minimum interest rate, which they would do if market prices rise above the programme levels, or forfeit it altogether. As a result, the programme acts as a minimum support level to producers. In normal circumstances, the programme prices are set at levels that do not exceed those prevailing in the market, providing a floor against unexpected slumps and containing the volumes to be procured and stored by the government.

In both 2011/12 and 2012/13, the guaranteed prices were set at levels well above the corresponding market levels. As a result, large volumes entered the programme in 2011/12, with 7.0 Mt from the main crop and a further 14.5 Mt from the secondary crop.[1] For 2012/13, the volumes mortgaged have been projected even higher, with farmers expected to mortgage 15.0 Mt from the main crop alone. The government has had to make large budgetary outlays to cover the costs associated with the programme. Some THB 435 billion (USD 14.0 billion) were allocated to cover the running of the scheme for the 2011 main crop alone.

The programme is reported to have attracted massive flows of rice supplies from neighbouring countries and to have encouraged Thai producers to shift to higher yielding hybrids at the expense of quality rice cultivation. Moreover, Thai consumer and export prices were boosted above those of competitors as large supplies were kept in government stocks, creating additional market tightness. In 2012, the differences between Thai and the other main export prices exceeded USD 160/t (Figure 4.3).

This situation has undermined Thailand's competitiveness. In the 2011 marketing year, Thailand lost its leadership among rice exporting countries, after several decades of uninterrupted primacy. Exports declined 35% from the 2010 level, resulting in a slide to third position among rice exporters, behind India and Viet Nam.[2]

Figure 4.3. **Export prices of rice 25% broken**



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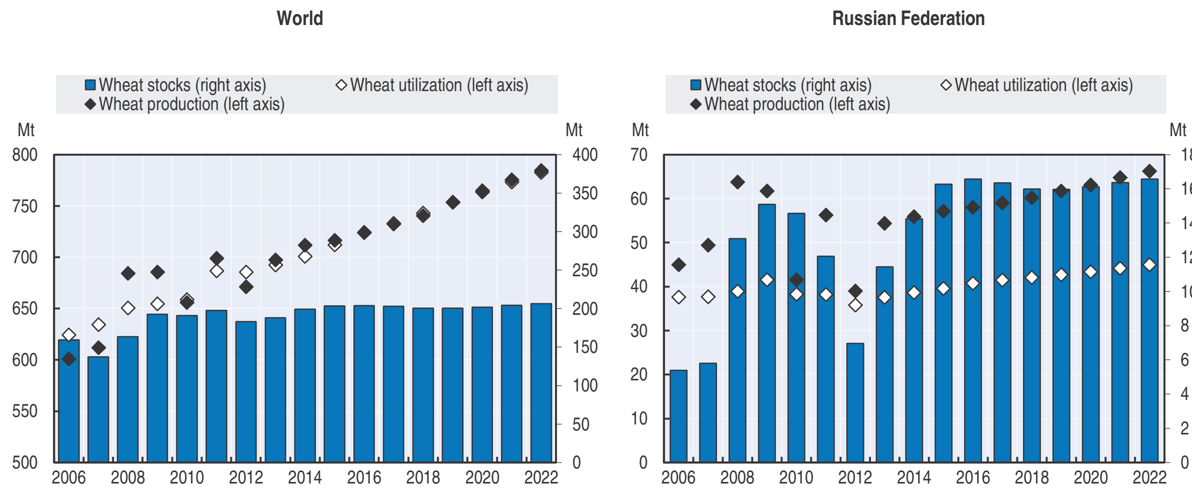
1. Thai government divides the pledging programme into two periods according to the multiple cropping of rice in the country. While no limits were imposed on the value or volume of the rice that could be mortgaged under the main crop paddy pledging scheme, farmers' participation in the secondary crop mortgage scheme was subject to a 33 t and THB 500 000 per household ceiling.
2. In view of the rice market distortions in Thailand, the 2013 Outlook has changed the world reference price from the one in Bangkok to a similar rice traded in Ho Chi Minh, Viet Nam.

Figure 4.4. **A gradual recovery of wheat stocks led by production increases in the Russian Federation**

Evolution of supply, demand and stocks; World and Russian Federation



Source: OECD and FAO Secretariats.

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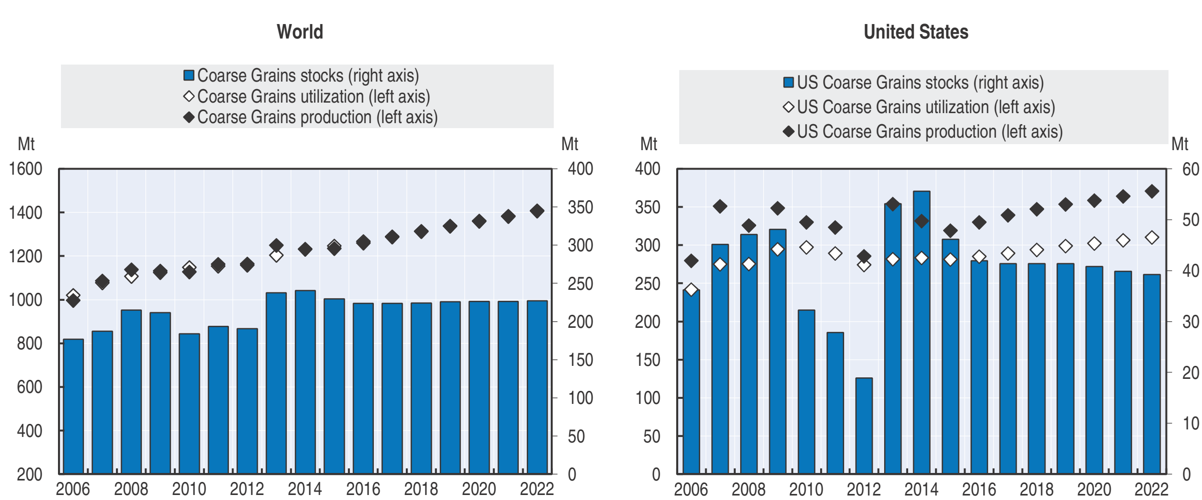
projections for the Russian Federation. A strong recovery from the drought in 2012 and a consistent production surplus over the medium term will lead to a gradual increase of stocks and exports.

World production of coarse grains is projected to reach 1 407 Mt by 2022, up 22% from the 2010-12 base period (Figure 4.5) with significant increases projected for Argentina, Brazil, China, the Russian Federation, Ukraine and the United States. As in the case of wheat, yields are projected to increase at a slower rate than in the past, therefore limiting the scope for production growth. An increasing oil price is assumed to impact the cost of

Figure 4.5. **A rapid recovery of coarse grains stocks led by higher production of US corn**

Evolution of coarse grains supply, demand and stocks; World and United States



Source: OECD and FAO Secretariats.

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fertiliser and chemicals among other inputs, and resource pressures on water and land availability are anticipated to intensify in coming decades. Assuming normal weather conditions and minor impacts of the proposed changes in agricultural policies (Box 4.2), the recovery of coarse grains production in the United States is comparable to that for wheat production in the Russian Federation (Figure 4.4). Nevertheless, world coarse grain production in 2013 is expected to exceed utilisation, helping stocks to rebuild from their critically low levels. Wheat stocks and exports represent a much higher share of production in the Russian Federation, which makes the reaction to short-term market imbalances much more sluggish over time.

The ratio of world stocks of coarse grains to utilisation is projected to fall to 16% in 2022, well below historical averages. More importantly, the ratio of major exporters' stocks-to-disappearance of coarse grains is projected to approach historical lows of 12% in 2022. This situation is largely due to the tightness of the coarse grains markets. It may also be the case that stock levels are becoming less significant as a means of supply because of the development of information technology and transport logistics worldwide. At the same time, prices are projected on a higher plateau than for the last decade which indicates the on-going influence of tight markets.

Box 4.2. **US farm bill proposals for grain producers: from direct to risk-based payments***

The Agriculture Reform, Food and Jobs Act of 2012 was approved by the US Senate on 21 June 2012. This Bill would eliminate and streamline numerous programmes while strengthening the tools available to producers to help manage risks and conserve natural resources. More specifically for grain commodities, the proposal introduces the following measures.

- Elimination of Direct Payments (DP), Counter-Cyclical Payments (CCPs) and the Average Crop Revenue Election (ACRE) Program at the end of the 2012 crop year (the 2008 Farm Bill was extended to the end of the 2013 crop year by the American Taxpayer Act of 2012). Also eliminated was the Supplemental Revenue Assistance Payments (SURE) Program which covered crop losses that occurred through 30 September 2011.
- Farmers will have access to a single, risk-based coverage programme called Agricultural Risk Coverage (ARC) that complements crop insurance to protect against both price and yield losses. Farmers will make a one-time irrevocable choice between revenue-based coverage at the individual farm level or at the county-level. Payments to farmers will be available only when actual revenues are below a benchmark revenue, which will be calculated using the Olympic average of national average market prices and yields for the previous five crop years. For rice and peanuts, the trigger prices will be USD 286/t and USD 530/t, respectively.
- Capping of ARC payments to USD 50 000 per entity for covered commodities (separate USD 50 000 for peanuts) and tightening eligibility requirements by erasing the distinction between farm and non-farm Adjusted Gross Income (AGI), making producers with a three-year total AGI average of USD 750 000 ineligible for programme benefits.
- Continuation of the Marketing Loan Program (MLP) as a way to help provide farmers with operating capital for their farms.
- Introduction of a Supplemental Coverage Option (SCO) which will allow producers to purchase additional coverage on an area-wide yield or revenue loss basis. The coverage option establishes a trigger on coverage offered only if losses exceed 21% for producers enrolled in ARC and 10% for all other producers.

Box 4.2. US farm bill proposals for grain producers: from direct to risk-based payments* *(cont.)*

On July 2012, the Federal Agriculture Reform and Risk Management Act of 2012 was approved by the US House Committee on Agriculture. The main difference to the provisions of the Senate bill is the producer option for Price Loss Coverage (PLC) or Revenue Loss Coverage (RLC) as an alternative to the ARC programme. Both PLC and RLC payments occur when prices or revenues, respectively, fall below a certain trigger level.

According to recent estimates by the University of Missouri (FAPRI, 2012), the two bills have much in common and the consequences of the two bills would be similar in many respects. Apart from the ACRE Program, both bills replace payments that are not tied to current prices or production levels with new programmes that offer support linked to current levels of production and prices. Average levels of federal farm programme spending are expected to be reduced under both bills, and most commodity market impacts are expected to be relatively small. Regarding the distributional effects, on the one side, the House Committee bill provides substantially more support than the Senate bill to producers of some grain commodities, including wheat, rice and barley, which may stimulate production. Alternatively, corn and soybean production would be greater under the Senate bill. It is important to stress that programme benefits will be very sensitive to market conditions and producer participation decisions, as the various programmes provide protection against different types of financial risk. Under each bill, average net farm income and agricultural real estate values are expected to decline slightly relative to what would happen under a simple continuation of current farm programmes.

* Since the preparation of this box, the 2008 Farm Bill was extended through 2013 with only a few changes. Currently, new versions of a 2013 Farm Bill are under consideration in both the Senate and the House. A final version of the Bill is not expected before the summer.

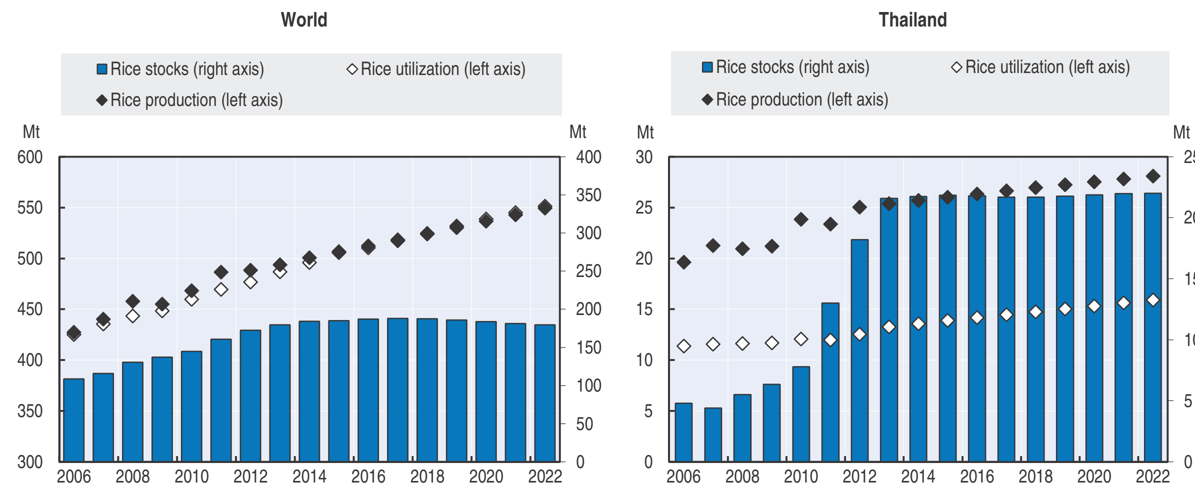
Source: "Impact of Selected Provisions of the House Agricultural Committee and Senate Farm Bills", *FAPRI Report* 05-12, August 2012.

In 2012, global rice production growth stalled markedly, reflecting unfavourable monsoon rains in India and poor growing conditions in South America and parts of Africa. However, large production gains were recorded by China and Southeast Asian countries. Among developed countries, the season ended positively in Australia, Japan, and, especially, the United States where high temperatures propelled yields. By the end of the *Outlook*, world rice production is projected to increase to 549 Mt. Improvements of yields are projected to be the main factor underpinning world production gains, although new investments in the sector in Africa would contribute to a 3 Mha area expansion worldwide. Developing countries, which hold a dominant share of global rice production, would account for virtually all of the projected production increase. Significant contributions are to be made by India and Asian LDCs but also by African countries. Myanmar is a good example, as it engages in joint ventures to boost rice exports. China, the largest rice producer, is expected to cut output by 3 Mt to 137 Mt by 2022, to bring production closer into line with the long-term decline in domestic consumption. Developed countries as a whole are projected to step up rice production, with much of the increase concentrated in the United States.

With global production surpluses, world rice stocks have been increasing strongly since 2008, boosted by positive production outcomes and the desire of a few governments to maintain increased rice reserves for their public distribution systems or to support farmers' incomes. The example of Thailand projects excessive stocks caused by its pledging scheme (Figure 4.6).

Figure 4.6. **World rice stocks have been gradually increasing, indirectly affected by the Thai pledging programme**

Evolution of rice supply, demand and stocks; World and Thailand



Source: OECD and FAO Secretariats.

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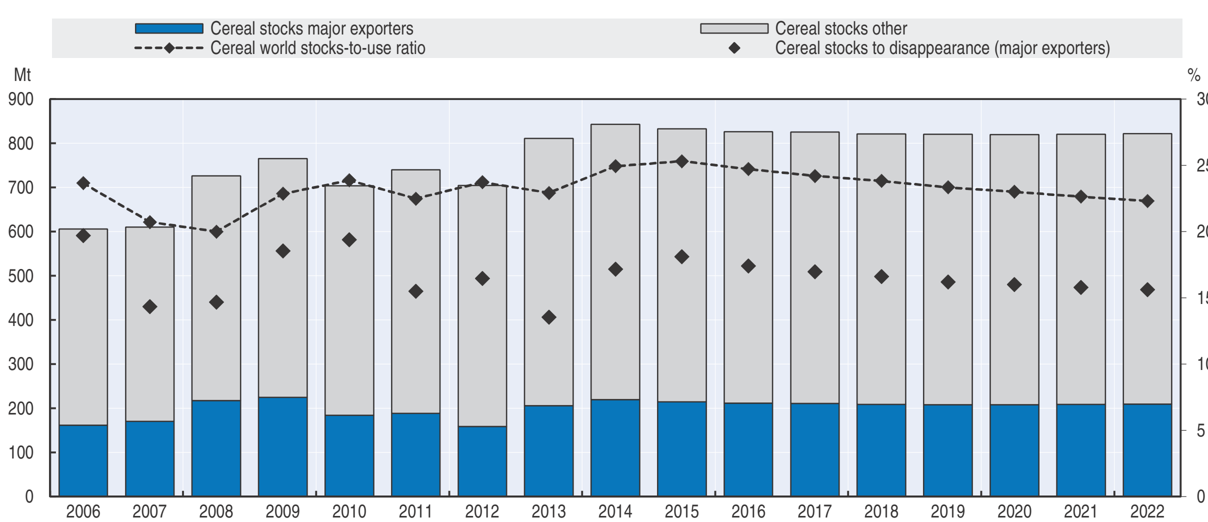
The ratio of world cereal stocks to its utilisation will approach 22% in 2022 (Figure 4.7) which is one percentage point below the base period but two percentage points higher than in the 2007-08 food crisis period. Similarly, the ratio of major exporters' wheat stocks-to-disappearance (i.e. defined as domestic utilisation plus exports in the eight major grains exporting countries) is projected to approach 16%.

Figure 4.7. **Cereal stock-to-use remain at low levels, rebuilding of stocks takes time**

Evolution of cereals stocks (wheat, coarse grains and rice), stock-to-use and stock-to-disappearance ratios



Source: OECD and FAO Secretariats.

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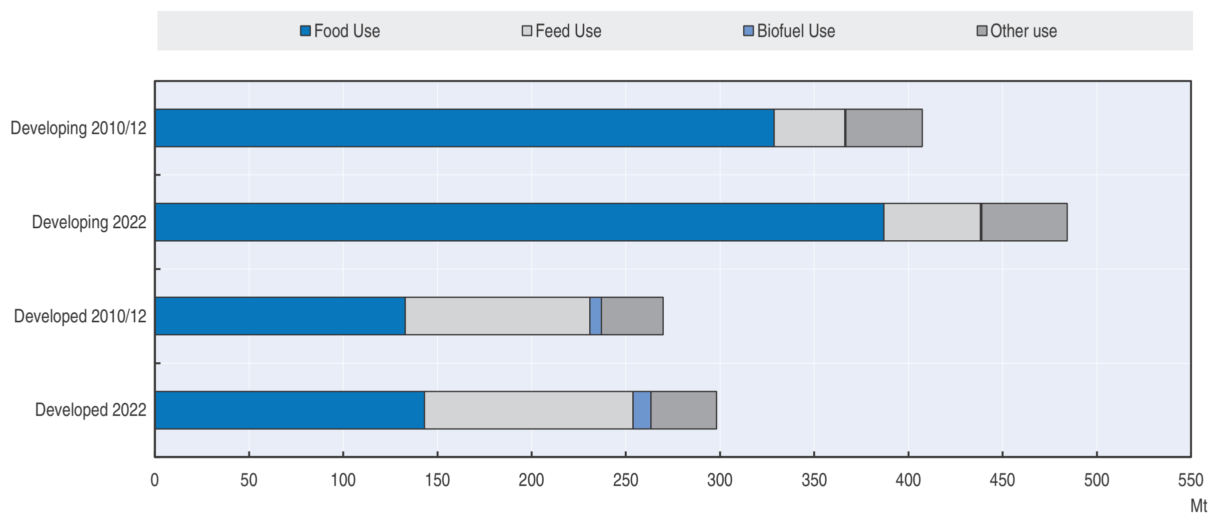
Use of cereals

Total wheat utilisation is projected to reach nearly 782 Mt by 2022, 298 Mt in developed countries and 484 Mt in developing countries (Figure 4.8). Food consumption remains as the main use, with direct human consumption at around 68% of total utilisation over the *Outlook* period. At this level, per capita food consumption is projected at around 66 kg per capita p.a. World feed utilisation of wheat is expected to reach 162 Mt by 2022, growing at a slightly slower pace than in the past, and still representing about 21% of total use (37% in developed countries and 11% in developing countries). Wheat use for biofuels in developed countries increases from 2.3% in the base period to 3.2% of utilisation by 2022. The projected increase will be driven largely by growth in EU wheat-based ethanol production.

Figure 4.8. **Increasing food and feed demand for wheat in developing countries**

Evolution of wheat utilisation shares in developed and developing countries between the base year and 2022



Note: Under "other use," we include other non-disaggregated industrial demand sources (e.g. processing of starch or straw).
Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932859477

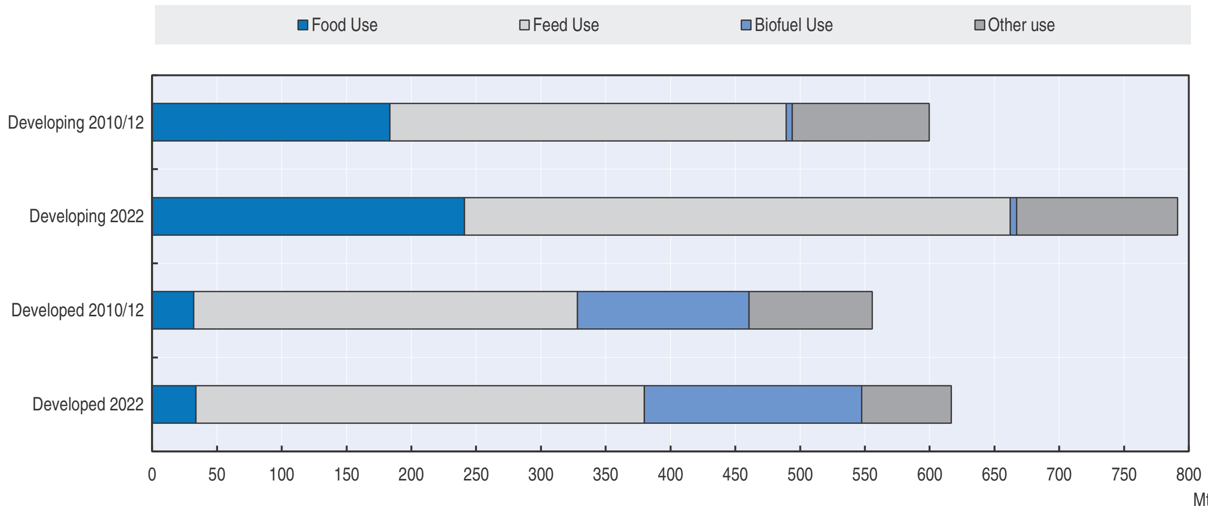
World utilisation of coarse grains is projected to increase 19% by 2022 compared to the 2010-12 base period and reach 1 408 Mt, driven largely by expansions in demand for feed, which accounts for the largest share of total utilisation (Figure 4.9). Considerable increases in demand for biofuels in developed countries and food in developing countries are also expected, the latter following population growth. The projected annual growth of coarse grains consumption (1.7%) is lower than in the previous decade (2.4%).

The strong developments in feed use are mostly driven by strong growth in China (54 Mt compared to the base period), United States (28 Mt) and Brazil (20 Mt). Looking at industrial usages, maize-based ethanol production in the United States is projected to continue expanding after reaching the target of the Energy Independence and Security Act of 2007, with a considerable increase in ethanol exports. World use of coarse grains for production of biofuels are projected to reach 173 Mt, representing 12% of total world coarse grains production. Within the United States, the share of maize used for ethanol production rises to 48% of total domestic production.

World rice utilisation is projected to increase from 469 Mt in 2010-12 to 551 Mt in 2022. Growth is predicted to slow down to 1.4% p.a. over the projection period, compared with

Figure 4.9. **Increasing biofuel and feed demand for coarse grains**

Evolution of coarse grains utilisation shares in developed and developing countries between the base year and 2022



Note: Under "other use," we include other non-disaggregated industrial demand sources (e.g. processing of starch or straw).

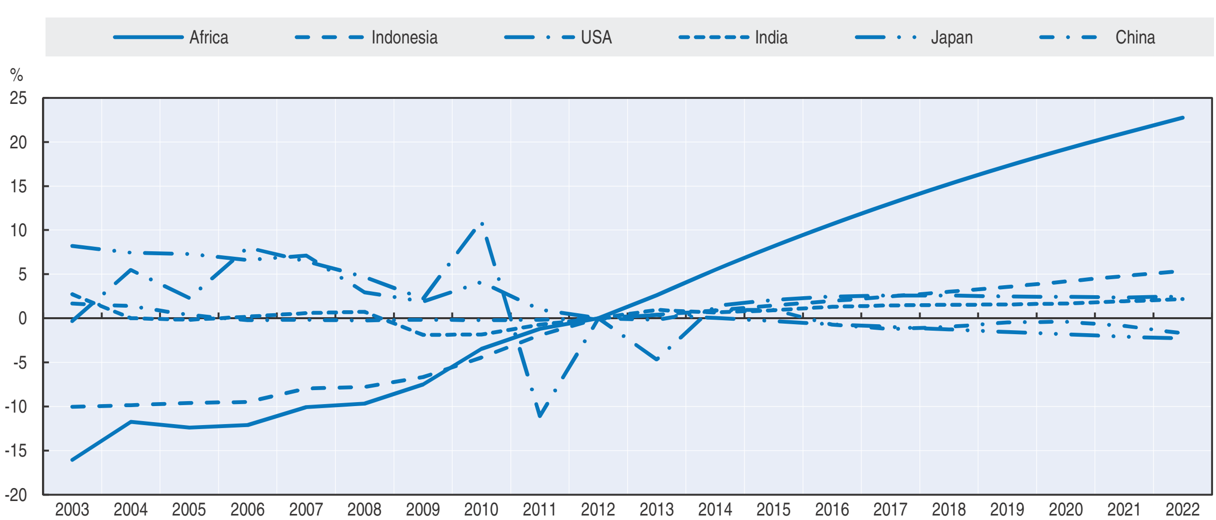
Source: OECD and FAO Secretariats. StatLink http://dx.doi.org/10.1787/888932859496

1.8% p.a. in the past ten years. Rice is consumed chiefly as food (84%), thus the increase is driven mainly by demand for human consumption.

Although population remains the main driver of demand growth in the next ten years, per capita consumption (for food and other uses) is also anticipated to increase, albeit by a modest 0.4% p.a., to 71 kg. Underpinned by dynamic economic growth and urbanisation, particularly noteworthy is the fast shift of African diets in favour of rice over other traditional grains, which is expected to boost the region's average per capita intake from 24 kg in the base year 2010-12 to 30 kg p.a. in 2022 (Figure 4.10). The trend is distinctive since for wheat, another imported

Figure 4.10. **Per capita consumption of rice follows divergent trends, becoming the important food crop in Africa and other developing countries**

Evolution of rice food per capita consumption, % changes versus 2012



Source: OECD and FAO Secretariats. StatLink http://dx.doi.org/10.1787/888932859515

Table 4.1. **Rice food per capita consumption**
Evolution (kg)

	2010-12	2022
Africa	24	30
China	78	77
Japan	59	57
Indonesia	161	173
India	71	74
United States	12	13

Source: OECD and FAO Secretariats.

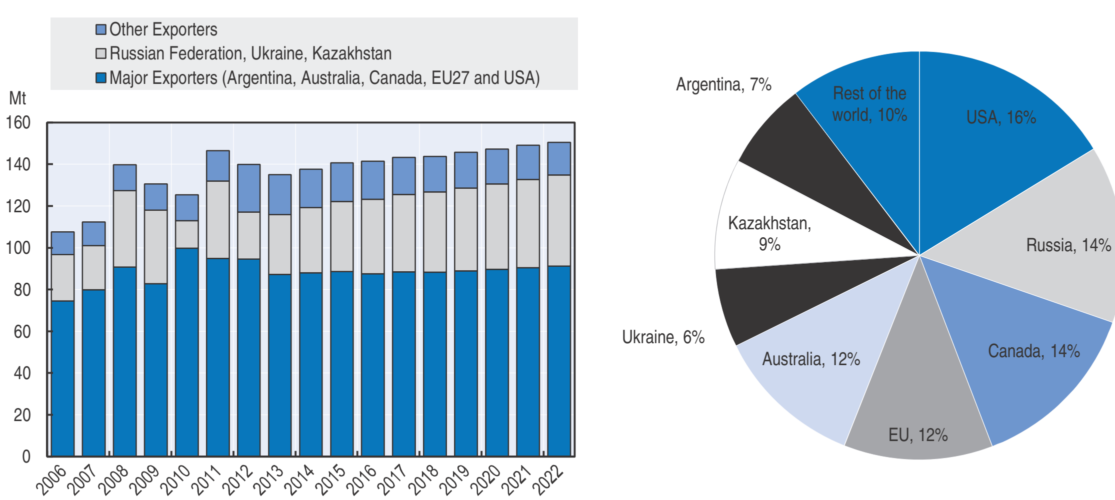
StatLink http://dx.doi.org/10.1787/888932860750

grain, the per capita food consumption in Africa will stay around 50 kg p.a. Although declines in per capita rice food consumption have occurred in China for several years, it is projected to keep rising for Asia as a whole. Likewise, developed countries are anticipated to increase their consumption of rice from 12.6 kg in the base year to 13.3 kg in 2022.

Trade of cereals

World wheat exports are expected to contract quite significantly in 2012 due to poor harvests in Kazakhstan, the Russian Federation and Ukraine. After this, they are projected to recover steadily, reaching 150 Mt in 2022 or 10% higher than the base period. The Russian Federation almost doubles its wheat exports over the *Outlook* period with an additional 9.8 Mt with respect to the base year (Figure 4.11). Conversely, wheat exports from India are expected to decrease over the same period, after reaching a record volume in 2012. It is important to note that the projections for India are quite uncertain, since the country is currently holding large wheat stocks (16 Mt in 2013) and it is not clear if and when they will be released. The largest increases in wheat imports are expected in Egypt, Turkey, Indonesia and the Islamic Republic of Iran. Imports in Egypt, the world's leading wheat importer, need to increase given its high population growth and stretched irrigated land.

Figure 4.11. **Wheat exports in CIS countries show the largest share gain over the medium term**
Evolution of wheat exports for major exporters, CIS countries and others (left) and export shares in 2022 (right)



Source: OECD and FAO Secretariats.

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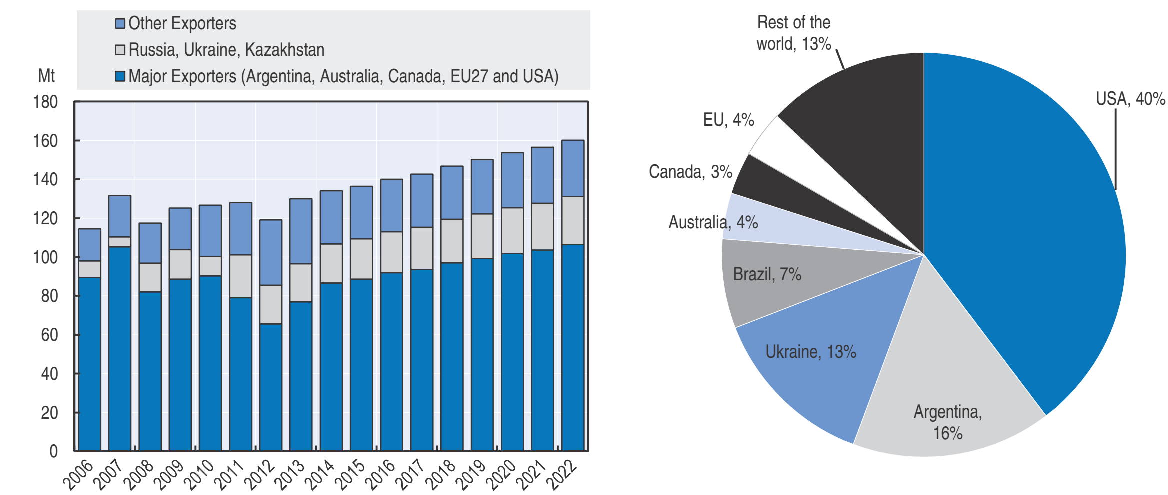
World coarse grains trade prospects are very dynamic, with exports rapidly increasing from 2013, reaching 160 Mt by 2022. This represents a 29% increase with respect to the 2010-12 base period and a 2.3% annual increase, almost one percentage point higher than in the previous decade. The United States leads this expansion with an additional 25 Mt of maize exports, assuming normal weather conditions (Figure 4.12).

On the import side, a sharp rise in imports by China as well as higher imports by Japan, Mexico and Saudi Arabia are expected to be offset by reductions in imports by the European Union and the Republic of Korea. Japan is the world's largest importer of maize, and more than 90% of its imports have been from the United States. However, it should be noted that Japan has been trying to stabilise and diversify food imports, while improving the environment for agricultural investment. With poor harvests in the United States in 2012, one-quarter of Japan's maize imports came from countries such as Argentine, Brazil and Ukraine.

Figure 4.12. **Rapid expansion of coarse grains exports**

Evolution of coarse grains exports for major exporters, CIS countries and others (left) and export shares in 2022 (right)



Source: OECD and FAO Secretariats.

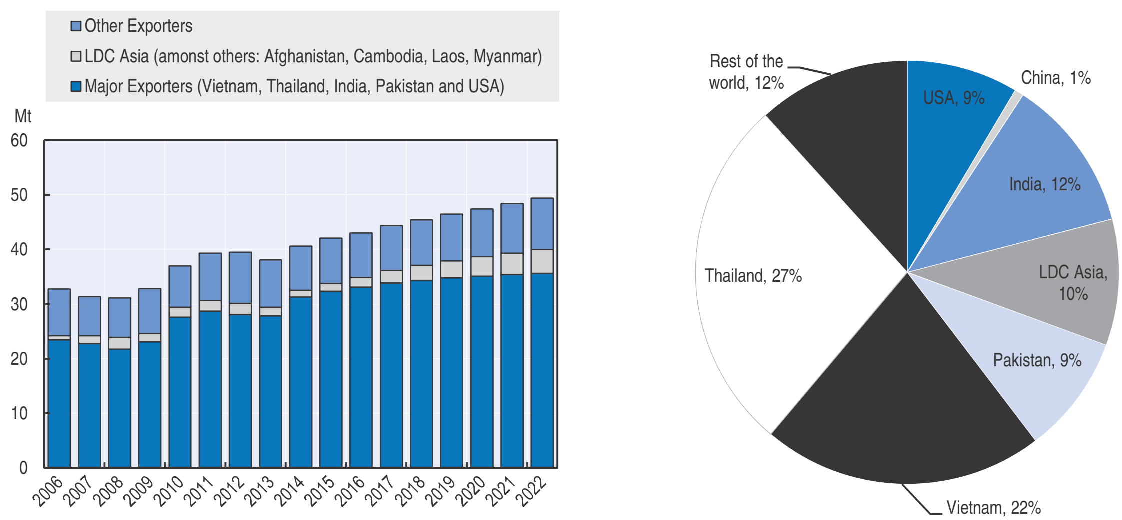
StatLink http://dx.doi.org/10.1787/888932859553

Although rice is largely consumed where it is produced, in recent years the reliance on the international market has been growing, with trade now representing around 8% of total production. Between 2013 and 2022, rice trade is projected to increase by 2% p.a, passing from 37 Mt to 45 Mt. Despite the large gains in production expected in Africa, even stronger increases in consumption are projected to consolidate the region as the major destination for rice trade, absorbing more than half of the volume traded. Imports to sub-Saharan Africa, in particular Nigeria, are expected to surge, notwithstanding the fact that many countries have launched rice self-sufficiency initiatives.

Whereas Viet Nam was previously expected to become the largest rice exporter, the current *Outlook* foresees a return of Thailand to its traditional leading exporter position through the baseline (Figure 4.13). The Thai government appears less committed to buying all domestically produced paddy rice at high prices, a policy that has severely depressed the country's exports in 2011 and 2012. In addition, the need to generate funds for the official purchasing programme and to free space for the procurement of the new crop are anticipated to prompt the government to sell large volumes from public rice inventories in 2013.

Other Asian countries, in particular Myanmar and Cambodia, are expected to make major inroads in the international rice market. LDC Asia in total is expected to expand exports by 16% p.a. over the *Outlook* period to reach 4 Mt in 2022. By contrast, exports by India, which emerged as the top exporter in 2011 with over 9 Mt, are projected to decline in the medium term, as domestic food requirements rise faster than production.

Figure 4.13. **New Asian rice exporters make major inroads in the rice market**
Evolution of rice exports for major exporters, LDC Asia and others (left) and export shares in 2022 (right)



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932859572

Main issues and uncertainties

Weather events, including climate change, continue being the main source of uncertainty in agriculture. Droughts and floods cause considerable declines in grain yields. This year we have observed the effects on grains markets of an almost "perfect storm", with extreme droughts in both the United States and CIS countries. With stocks at very low levels, the weather conditions for the crop year in the Southern Hemisphere become much more relevant.

Natural resources are likely to be a major bottleneck in the medium-term. Even if not modeled explicitly, water availability and land degradation constraints are implicit in the *Outlook* projections. This is a known issue in highly populated regions such as China (Box 4.3) and fast growing regional agricultural markets. Productivity growth is mostly achieved by moving the technological frontier, i.e. by innovating and applying more efficient technologies to agriculture.

Biofuel policies in developed countries have sizeable effects on markets (e.g. the US, Brazilian and EU biofuel policies). Lately, biofuel policies are being revised in pioneer countries such as the European Union and the United States. It is still uncertain how those policies will develop in the medium-term (e.g. waiving of cellulosic mandate in the United States) and what role sustainability criteria for the production of biofuels will play in the future. These policy

Box 4.3. **Implications of opening coarse grain markets in China**

Largely as a result of rapid urbanisation, arable area has fallen in China. The government has instituted a "redline" at 120 Mha to prevent any further exit of land from agriculture in order to support its policy objectives of food security and rural development.[1] Competition for land has nevertheless been intense. Higher crop output has been achieved through growth in yields, as well as increased multiple cropping. Multiple cropping refers to the number of crop cycles that are undertaken on a given land base over the course of a year. Estimates vary, but from FAO data sources, evidence shows that on average over 1.4 crops are harvested per hectare of arable area. Higher yields, often achieved through high fertilizer inputs and high rates of irrigation, in addition to intensive land use through multiple cropping, are thought to be factors contributing to land degradation and ground water depletion.

The 12th Five Year Plan specifies the target that "cultivated" area of wheat, rice, coarse grain, soybeans and tubers should exceed 106.7 Mha. The *Outlook* affirms that these targets should be met or exceeded in the next decade. However, the question arises as to what would happen if higher imports of grain were encouraged as a means of reducing pressure on the resource base. For example, since 2000 oilseed imports have surged, accounting for the equivalent of some 28 Mha of land. Had trade not been encouraged, the growth in China's livestock output could not have been achieved, and the impact on its resource base would have been considerably greater.

The scenario undertaken here explores the further opening of the coarse grain market in China, to better understand the potential impacts on domestic and international markets. To affect the scenario, the assumption was made to set domestic coarse grains prices at a fixed rate above world reference prices (No. 2 yellow corn US f.o.b. Gulf Ports) based on the average historical differences in 2011 and 2012 and allow imports to enter such that the domestic market clears. The results of the scenario suggest that in an open market, imports of coarse grain would rise to 41 Mt by 2022, compared to the baseline projection of 13 Mt, and domestic coarse grains prices would decrease by 17% (Table 4.2). As a result, coarse grain area in China would remain around 2012 levels, thereby containing future resource pressure, instead of increasing at a 0.7% rate p.a. as the *Outlook* portrays. Lower prices for feed would induce higher livestock output, with domestic pig meat production rising by 1%, poultry by 1.62%, bovine meat by 0.2% and milk production by 0.9%. The impact on international markets sees world maize prices increase at the end of the baseline by 8%. World rice and wheat prices also increase by 1.3% and 2.8% respectively.

Table 4.2. **Domestic and international effects of open coarse grain markets in China**

Changes in 2022 between the counterfactual scenario and the baseline

		China			World		
		Coarse grains	Rice	Wheat	Coarse Grains	Rice	Wheat
Supply	%	-5.1%	0.2%	-0.4%	0.20%	0.1%	
Demand	%	5.0%	0.1%	-0.8%	0.19%	0.1%	0.1%
Domestic price	%	-17.3%	-2.8%	-2.7%	-	-	-
International price	%	-	-	-	8.2%	1.3%	2.8%
Net Trade	Mt	-27.3	0.1	0.6	-	-	-

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It should be borne in mind that in this counterfactual case, much depends on the nature of the baseline projection, which portrays a tight coarse grain market over the next decade: maize prices rising relative to other crops, given high demand for feed from the livestock sector, and the need to assure supplies of wheat and rice preventing land reallocation to greater production of coarse grain. As such, the scenario illustrates the growing tension of meeting the feedstock needs of China's growing livestock base, and at the same time achieving food security in basic food crops. Higher productivity, in terms of crop yields, will be required if China is to succeed in meeting these goals.

1. Morton K. (2012) *Learning by Doing: China's Role in the Global Governance of Food Security*, *RCCP Working paper #30*, Research at the College of Asia And the Pacific and Senior Fellow In the Department of International Relations.

decisions have very large effects on coarse grains markets in developed economies, which feed through to developing countries and can raise food security concerns.

Consumption patterns are uncertain and may shift away from long-term trends. The move towards healthier diets in developed countries, in some cases reinforced by new policies (e.g. taxes on fat content), might imply important changes to the consumption of saturated fats and, in turn, affect feed grain markets. Conversely, per capita meat consumption in fast growing developing countries can increase rapidly from very low levels.

Domestic policies in grains are unpredictable. For instance, it is uncertain how the US farm bill will affect grain markets in the near future. Moreover, rice policies and management of stocks in Asia have proven to be volatile. Despite the expanding trade, rice is still thinly traded and mainly used to satisfy domestic demand. While a few food security measures through regional co-operation are unfolding (Box 4.4), policy interventions and regional population growth may influence the world trade and prices. For example, Viet Nam will compete with Thailand for the leading exporter towards 2022, but it will be difficult to meet domestic growth in consumption and at the same time increase exports since production is already close to capacity (i.e. relatively high yields).

The stability of food grain prices is politically important, especially for major importing countries. Following the recommendation by G20 Agricultural Ministers, the Agricultural Market Information System (AMIS) was launched in 2011 to share information about production, stocks and markets for major grains, with regular market monitoring reports and analyses. The collaboration of international organisations such as the FAO, OECD, World Bank and the International Grains Council, with major producing and importing countries to respond to future food grain crises is expected to play a role in relieving market pressures and reducing price volatility. Extensive collaboration during the 2011-12 price spikes helped to avoid unilateral actions that might have exacerbated the situation.

Box 4.4. **Regional food reserve initiatives**

The policy and practice of maintaining national food reserves (especially of rice) has been widely practiced. Large government stocks primarily serve domestic objectives and do not add much liquidity to international markets. Moreover, maintaining large domestic reserves can be an expensive, and not necessarily effective, food security strategy. There is a growing interest in regional co-operation on emergency food reserves, as some developing countries may not have the capacity to operate national emergency reserves. Unlike buffer stocks of the various international commodity agreements that attempt to dampen price movements,[1] emergency food reserves can make food available to vulnerable groups in times of crisis. In addition, emergency reserves of relatively small quantities of staple foods will not disrupt normal private sector market development which is important for long term food security.[2]

In 1979, South East Asian countries established the ASEAN Emergency Rice Reserve (AERR) consisting of national food security stocks voluntarily designated or earmarked to address food emergencies, but the reserve stocks were small and no releases were reported. This initiative was followed in 2003 by a pilot project launched by the ASEAN countries plus China, Japan, and Korea, known as the East Asia Emergency Rice Reserve (EAERR), which has provided emergency assistance on several occasions for floods and cyclones. Building on these two initiatives, the ASEAN Plus Three Emergency Rice Reserve (APTERR) came into force in July 2012.

Box 4.4. **Regional food reserve initiatives** *(cont.)*

In the Sahel and West Africa, a regional food reserve strategy has been set up to provide the overall framework for an all West African solidarity initiative to tackle food crisis. The activities include the establishment of a regional food reserve (feasibility study adopted in September 2012) as well as the creation of a regional network of national agencies in charge of food stock management. An agreement to establish the Regional Co-operation Framework of National Food Stock agencies, known as RESOGEST, was signed in March 2012. The Sahel and West Africa Club Secretariat (SWAC), housed at the OECD, supported the feasibility study by conducting a mapping survey of regional stock infrastructure and capabilities. These humanitarian initiatives are not intended to influence international prices but they can play an important role in improving the availability and accessibility of food grains during a regional food emergency.

APTERR consists of the earmarked and stockpiled emergency rice reserve, as well as a reserve of funds such as future contracts or donations in cash or in kind. These cash alternatives can be used to purchase rice when a natural disaster occurs. The initial amount earmarked by the countries totaled 787 000 t, while the first emergency assistance (a cash advance of USD 200 000 voluntarily contributed by Japan) was extended to the victims of typhoon Pablo in the Philippines in January 2013. Work is underway at the APTERR Secretariat in Thailand to establish a permanent scheme with rules and procedures for the release of emergency rice reserves and replenishment of the earmarked rice.

1. Gilbert, C. (2011), "International Agreements for Commodity Price Stabilisation: An Assessment", *OECD Food, Agriculture and Fisheries Papers, No. 53*, OECD Publishing. *http://dx.doi.org/10.1787/5kg0ps7ds0jl-en*.
2. FAO et al. (2011), *Price Volatility in Food and Agricultural Markets: Policy Responses*, Policy Report including contributions by FAO, IFAD, IMF, OECD, UNCTAD, WFP, the World Bank, the WTO, IFPRI and the UN HLTF.

Notes

1. See the glossary for the definition of crop marketing years for wheat, coarse grains and rice in various countries.
2. The Vietnamese rice price is considered to be more suitable as an international reference price since it is not only compatible with the prices of India, Pakistan and other major exporters, but also because its historical movements are consistent with the Thai price.

Reference

Dawe, D. (ed.), (2010), *The Rice Crisis: Markets, Policies and Food Security*, FAO, Rome.

OECD-FAO Agricultural Outlook 2013

Chapter 5

Oilseeds[1] and oilseed products

Market situation

Starting with very high vegetable oil and oilseed prices since 2010, the 2012 drought in the United States led to even higher prices. Since soybeans contain about 80% meal and only 20% oil, the impact of the drought was much stronger on the world price of protein meal than on the price of vegetable oil. Because of this shortage of oilseeds, crushing margins were comparably low during the 2012 crop marketing year.[2]

At 14%, the stock to use ratio[3] in 2012 is low by historic comparison as well as compared to coarse grains and wheat. Even under the normal weather conditions assumed in the *Outlook* it is expected to remain at this level making it difficult to buffer the market efficiently in case of production shortfalls.

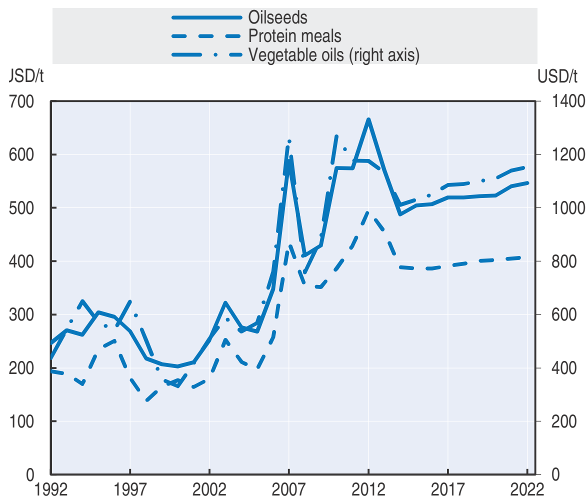
Global supply of vegetable oil remained relatively stable in the 2012 crop year based on growing palm oil production and a more limited impact of the US drought on the global oilseed oil production. The present tightness in the market is mostly due to strong demand for food and biodiesel uses.

Projection highlights

- Assuming normal yields in all producing regions, world production of oilseeds should rebound in marketing years 2013 and 2014 resulting in a sharp reduction of international oilseeds and products prices. After this correction, prices are expected to increase slowly based on strong food and fuel demands of vegetable oil and a solid feed demand for protein meal.
- Relative profitability of oilseeds versus coarse grains is expected to favour the distribution of land toward oilseeds and lead to a 26% increase in world production when combined with yield gains. With 93% of global exports in 2022, the Americas should confirm their role as the oilseeds basket of the world. China is expected to further solidify its position as the leading oilseeds importer but its share of world oilseeds crush is expected to stabilise at 25% of world total.
- After a period of over-proportional growth in palm oil production, its share in total oilseed oil output is projected to stabilise at around one third of the total vegetable oil production. World vegetable oil production remains very concentrated in the coming decade as growth originates in the main producing regions. Demand for food remains strong based on income and population growths, fuel uses are supported by consumption mandates.
- Global protein meal output is projected to increase by 25% or 67 Mt. Two-thirds should come from four countries: Argentina, Brazil, China and the United States. Compared to the past decade, consumption growth of protein meal slows down significantly reflecting both slower absolute growth in global livestock production and slower growth in the relative use of protein meal in feed rations, signalling a less rapid structural transformation process in the livestock sector in the coming decade.

Figure 5.1. **Oilseeds prices remain at higher plateau**

Evolution of prices expressed in nominal and in real terms



Note: The left figure shows nominal prices and the right figure shows real prices.
Source: OECD and FAO Secretariats.

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Market trends and prospects

Prices

After the initial downward correction, all prices of the oilseed complex are expected to increase over the medium term due to strong demands for vegetable oil and protein meal (Figure 5.1). The demand for protein meal is driven by the growth in non-ruminant and milk production in developing countries and by a greater incorporation rate of protein in feed rations in these countries. The demand for fuel use of vegetable oil will be driven by mandates since biodiesel consumption is not expected to be economically viable compared to diesel despite the assumed high crude oil price. The assumption that the United States biodiesel sector will be able to capture part of the advanced biofuel mandate from 2020 adds additional strength to the vegetable oil price in the outer years.

Also in real terms, these prices are expected to fall from their current high levels (Figure 5.1). Over the medium term, oilseed and vegetable oil prices are expected to stabilise at about the levels seen before the recent price spike and protein meal price falls almost 10% below the 2009 level. These corrections bring crush margins back to their long term average level as of 2016.

The lower growth in the protein meal price is the result of the complex nature of the oilseed market. Meal demand is fueled by increasing milk, pork, poultry and egg production in developing and certain developed countries. It is also driven by the high price of fishmeal caused by the growing aquaculture production and by a somewhat stagnating fishmeal supply due to fishing quotas. Finally, demand remains strong because meat and bone meal is still prohibited as farm animal feed in many countries. Supply of protein meal is determined by the combined drivers of meal and oil markets because of their joint product nature. The expected growth in the oil market carries over into meal leading to a very strong supply and flat prices.

Since maize production requires higher inputs of fertiliser and energy than oilseeds, even the projected faster price gains in maize are not expected to offset its cost disadvantages, resulting in a better profitability for oilseeds over the *Outlook* period. This results in the distribution of land toward them and a more marked reduction in the production growth of maize compared to oilseeds.

Oilseed production and crush

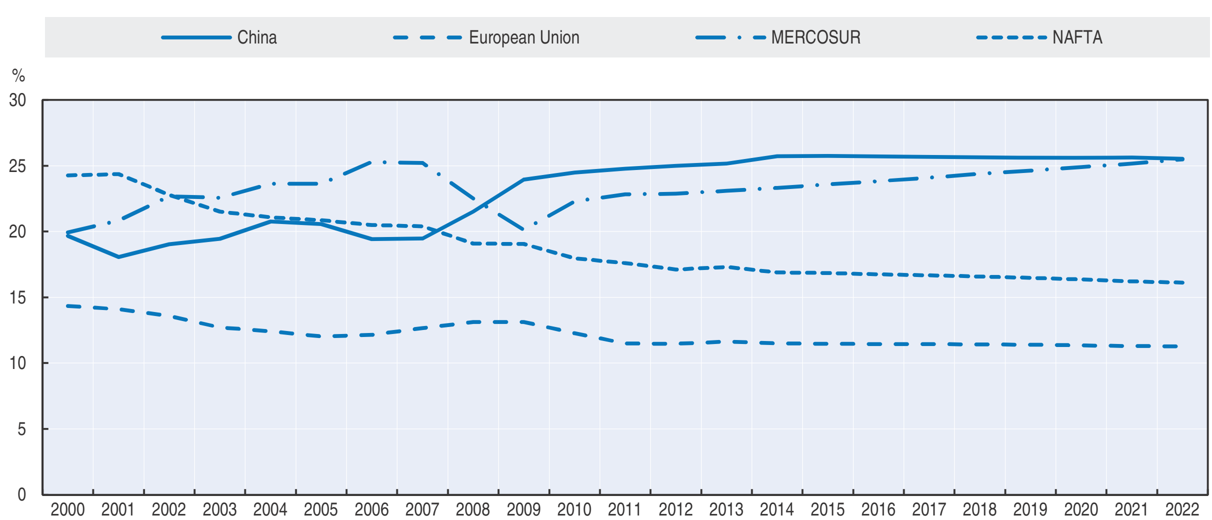
The oilseeds' share of world area for the commodities covered in the *Outlook* is expected to grow slightly between the 2010-12 average and 2022, yet slower than it was the case in the previous decade. Global area expansion of 10% combined with 14% yields improvements should generate a 26% increase in world oilseed production over the coming decade.

MERCOSUR countries (Argentina, Brazil, Paraguay and Uruguay) are expected to reach 38% of world production in 2022 compared to an average of 35% in 2010-12. In spite of a small decline, the United States should remain the leading oilseeds producer, with a global share of 21% by 2022. The Black Sea countries (the Russian Federation, Ukraine and Kazakhstan) are expected to maintain their 6% share throughout the *Outlook* period.

In a context of increasing use of biodiesel to meet the Renewable Energy Directive, European Union oilseeds production should increase by 21% over the projection period and maintain its 7% share of world total. This should be driven by both expansion of the land planted with rapeseed and by yield increases. Australia and Canada are also expected to increase production sufficiently to maintain their share of world production.

Which regions of the world will crush these oilseeds depends on many factors, including transport costs, trade policies, GMO acceptance, processing costs (labour and energy) and infrastructure installations (ports, roads, etc). In this *Outlook*, it is anticipated that China will continue to increase oilseed crush but its share of the world total stabilises around 25% (Figure 5.2). However, since the bulk of the anticipated increase in crushing is expected from imported oilseeds, China's imports need to reach 83 Mt in 2022. Such a large amount has a significant impact on the world price of oilseeds, but also on the price of other crops through supply and demand substitution (Box 5.1).

Figure 5.2. **Share of global oilseed crush among leading regions**



Source: OECD and FAO Secretariats.

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Large production increases in MERCOSUR gradually reach 25% of the world total crush by the end of the *Outlook* period. Underpinned by its biodiesel policies, the European Union's production share should only fall slightly over the *Outlook* period. The downward trend in the share of the NAFTA countries (the United States, Canada and Mexico) should continue but at a slower pace.

Based on the projected smaller rate of growth in global oilseed production, annual average growth in world oilseed crush is expected to be 2.2% compared to 3.8% in the previous decade. This, in absolute terms, translates into an expansion of 89 Mt over the *Outlook* period (2010-12 average compared to 2022). The largest expansion in crush volume is projected to come from the MERCOSUR countries with 31 Mt followed by China at 24 Mt.

Since prices are expected to remain on the higher plateau and there are no new stock holding policies by any major producer or consumer country, global stock-to-use ratio (including protein meal stocks on an oilseeds equivalent basis) is expected to remain close to 14% over the entire *Outlook* period. This limited capacity to compensate potential production shortfalls in a major producing region contributes to the continued risk of price volatility in the oilseed sector.

Vegetable oil production and consumption

World vegetable oil production is expected to increase by 25% or 39 Mt over the *Outlook* period, relative to the 2010-12 average. It is likely to remain very concentrated with eight major producers (Indonesia, Malaysia, China, the European Union, the United States, Argentina, Brazil and India) accounting for almost 80% of total production throughout the projection period. Malaysia's and Indonesia's palm oil output is projected to grow on average at about 1.9% p.a., a slower rate than in the past as land restrictions, environmental constraints and labour costs become more constraining. Due to this lower growth in production, the share of palm oil in total vegetable oil output should stabilise at about 34%. Based on its use of imported seeds in domestic crush, China ranks third in vegetable oil production.

Population growth and rising per capita income are expected to lead to an average 2.1% p.a. growth of food vegetable oil use in developing countries. Annual food vegetable oil use per capita is expected to average 19 kg across developing countries, but no more than 9.5 kg in least developed countries by 2022. As a group, developed countries are showing a stable consumption level of 24-25 kg but individual countries differ based on tastes and preferences in their diets.

In developed countries, continuing sustained demand for non-food uses, in particular for biodiesel production, is expected to lead to an average annual growth of vegetable oil use of 1.5% p.a. This rate is much slower than over the previous decade when biofuel policies were taking effect. The share of vegetable oil consumption used for world biodiesel production is expected to increase from 12% in 2010-12 to 15% in 2022 (Figure 5.3).

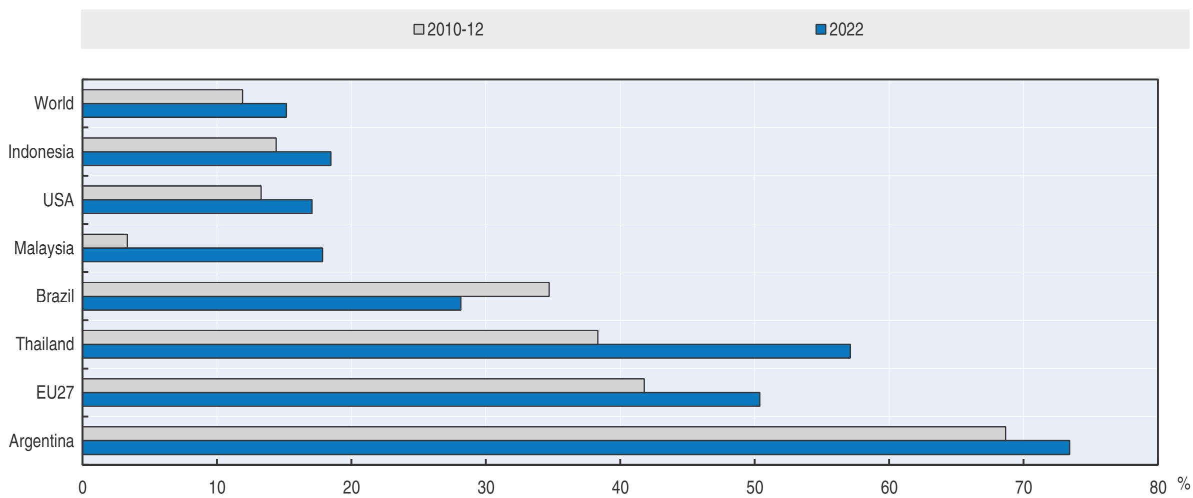
Argentina is expected to maintain an export-oriented biodiesel industry: consumption of vegetable oil for biodiesel production is expected to reach 2.9 Mt by 2022, i.e. 73% of domestic vegetable oil use. In the European Union and Thailand, vegetable oil for biodiesel production is expected to account for more than 50% of domestic vegetable oil consumption by 2022.

Globally, the use of edible vegetable oil for biodiesel production is expected to expand by about 11 Mt to 30 Mt p.a. over the *Outlook* period. This constitutes a 61% increase over the base period and takes up almost one-third of the total production growth of vegetable oil. The European Union is expected to remain the largest producer of biodiesel with a declining but still dominant share of global output throughout the decade. Other important producing countries are Argentina, Brazil and the United States.

The use of maize oil for biodiesel production has emerged in the United States and is expected to amplify over the *Outlook* period. This maize oil is extracted during the processing of maize into ethanol and sweeteners in wet milling plants. Since only about 10% of ethanol is produced in wet milling plants, the largest part of maize oil production is derived as a by-product of maize sweeteners[4] (about two-thirds).

Figure 5.3. **Biodiesel to use a large share of vegetable oil**

Share of vegetable oil consumption used for biodiesel production



Source: OECD and FAO Secretariats.

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Oilseed meal production and consumption

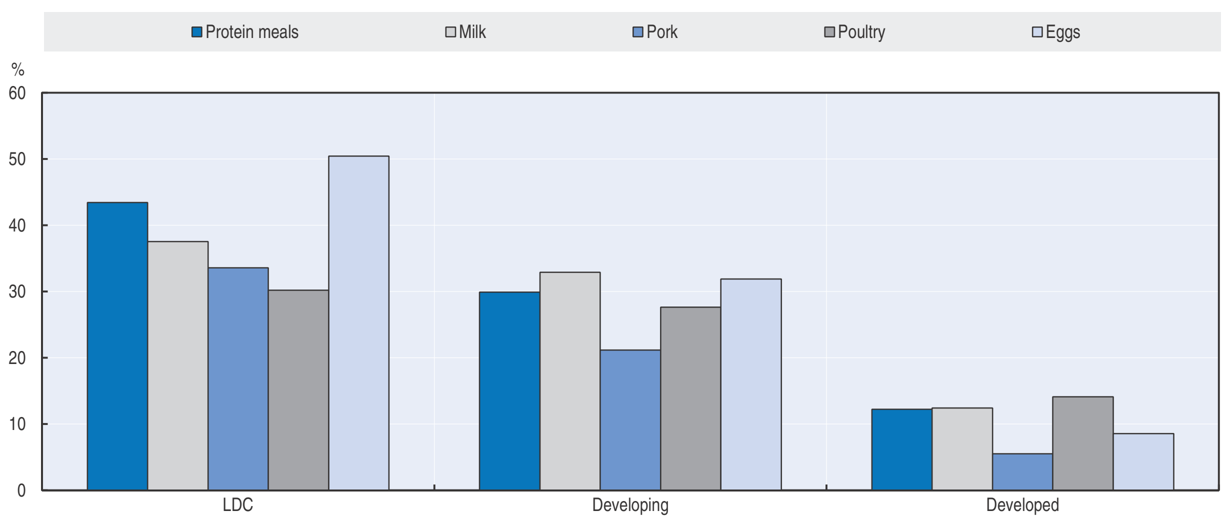
Global meal output is projected to increase by 25%, reaching almost 339 Mt by 2022. Production remains highly concentrated, with six countries (Argentina, Brazil, China, the European Union, India and the United States) accounting for almost 80% of global production. Two-thirds of the 67 Mt increase will come from only four countries: Argentina, Brazil, China and the United States. In China and the European Union, meal production will continue to rely on both domestically grown and imported seeds.

Global meal consumption should rise by 26%, with developing countries accounting for over 80% of the increase and reaching 65% of global consumption by 2022. Compared to the past decade, annual consumption growth is expected to slow down markedly reflecting firstly the lower growth of developing countries livestock industries and secondly, the slower growth in the inclusion of protein meal in feed rations.

In LDCs, protein meal use remains low, but its use is projected to grow faster in the coming ten years than over the previous decade due to the faster development of livestock production and increasing feed intensity of protein meal. While this projected development represents a positive development for these countries, it is not a driving factor in the global protein meal market since the increase in LDC consumption accounts for only 2% of total growth. As for developed countries, growth in animal production is expected to follow the slow growth path of the past and the penetration rate of protein meal in feed rations remains stable (Figure 5.4).

China and the European Union are expected to remain the leading protein meal consumers followed by the United States and Brazil. The strong protein meal demand increase in China cannot be met entirely by additional domestic production leading to 6 Mt of imports by 2022. In the United States, meal use is expected to expand, following a period of decline that was caused by rising availability of dried distillers grains (DDG). Approaching the RFS2 maximum amount of ethanol that can be produced from maize in 2015, DDG supply will eventually stabilise contributing to rising demand for protein meal. The Russian Federation livestock industry is projected to increase the amount of protein meal used in the feed rations yet still remaining much below the use rate of other developed countries.

Figure 5.4. **Growth in protein meal consumption relative to animal production, (2010-12 vs. 2022)**



Source: OECD and FAO Secretariats.

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Trade in oilseeds and oilseed products

The average annual growth rate of the world oilseeds trade over the next decade is expected to slow to less than one-third of what was reached during the previous decade. This development is a direct result of the projected deceleration in the Chinese crushing sector. The country is expected to expand its crush by only about 24 Mt in the coming decade compared to an increase of 41 Mt in the previous decade.

Imports by the second largest importer, the European Union, remain stable as increased crush demand is met primarily by rising domestic oilseeds production. Many smaller importers are expected to expand their imports significantly relative to the base period, but in absolute volumes these additional shipments are small. Purchases by China and the European Union account for 72% of world imports by 2022.

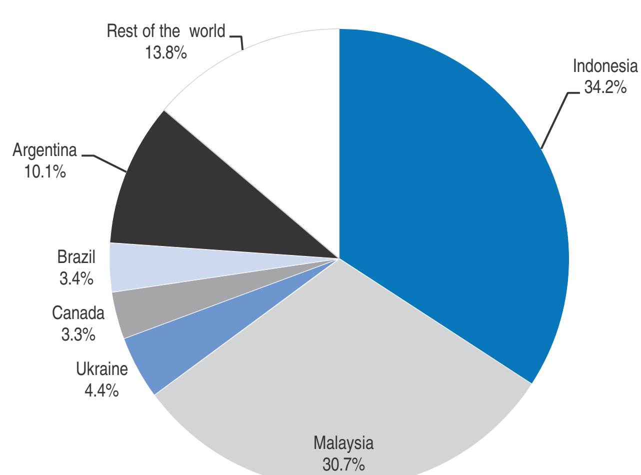
In terms of global oilseed exports, growth over the decade is expected to be smaller for developed countries (23%) than for developing countries (32%). Exports from the United States should grow by 17% over the projection period, while Brazil's shipments should increase by 22%. A similar growth is expected for Canada (29%) as a growing exportable surplus is produced through continued gains in the popularity of cultivating canola in the prairies. Argentina's exports, starting from a lower base, are expected to increase significantly, by 54%. Overall, world trade in oilseeds remains highly concentrated, with these four leading exporters holding an 85% market share in 2022. Adding Paraguay's exports, which are growing over 60% in this *Outlook*, pushes this concentration ratio to 90%.

Vegetable oil imports are less concentrated than oilseeds but there are three main market players. The European Union, China and India are expected to represent about 46% of world imports in 2022. With a projected increase in imports of 25% and 51%, China's and India's import dependency rates reach 31% and 62%, respectively. Because of an 8 Mt increase in domestic oilseed crush, the European Union's imports of vegetable oil increase much less in the next decade than in the previous one.

The vegetable oil deficit of least developed countries will continue to grow along with the domestic usage. The share of domestically produced vegetable oil in this market is expected to stay at around 40% over the *Outlook* period as domestic production in these countries covers only about 40% of the strong demand growth. Their imports are expected to increase from 4.9 Mt in 2010-12 to 6.6 Mt by 2022.

Vegetable oil exports continue to be dominated by a few players (Figure 5.5). Indonesia and Malaysia will continue to account for almost two-thirds of total vegetable oil exports during the coming decade. Argentina is expected to be the third largest exporter with a share of about 10% despite exporting 66% of its domestic production in 2022, as the country favour exports of products rather than oilseeds.

Figure 5.5. **Share of vegetable oil exports in 2022**



Source: OECD and FAO Secretariats.

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For meal, the projections point to a slowdown in trade expansion from 45% in the previous decade to 31% in the next decade. Deceleration should be slightly more pronounced in developed than in developing countries. Between 2010-12 and 2022, 93% of the anticipated expansion in global imports is projected to occur in the developing world.

The large increase in meal consumption in China is anticipated to change its trade balance from a small net exporter at the beginning of the century to a net importer of about 6 Mt in 2022. The EU trade deficit should remain mostly stable as the additional seeds produced to obtain the necessary oil for biodiesel will also increase the domestic supply of protein meal.

Argentina will remain by far the largest meal exporter because, among the large producers, it is the only country with a very small consumption base. This low level of consumption is directly tied to the composition of its livestock sector which requires small amounts of protein meal. The five significant American producers, Argentina, Paraguay, Brazil, the United States and Canada, account for a large share of protein meal trade, reaching 73% of world exports by 2022.

Risks and uncertainties

In addition to the issues and uncertainties common to most commodities (macroeconomic environment, crude oil prices, weather conditions), each sector has its specific supply and demand sensitivities.

Major uncertainties in the vegetable oil sector originate from the United States and European Union biofuel policies, as they determine a large share of the demand in these countries. The uncertainties related to the proposal by the European Commission to limit the amount of first generation biofuels that can be counted towards the 10% renewable energy targets to 5% are analysed and presented in the biofuel chapter of this document.

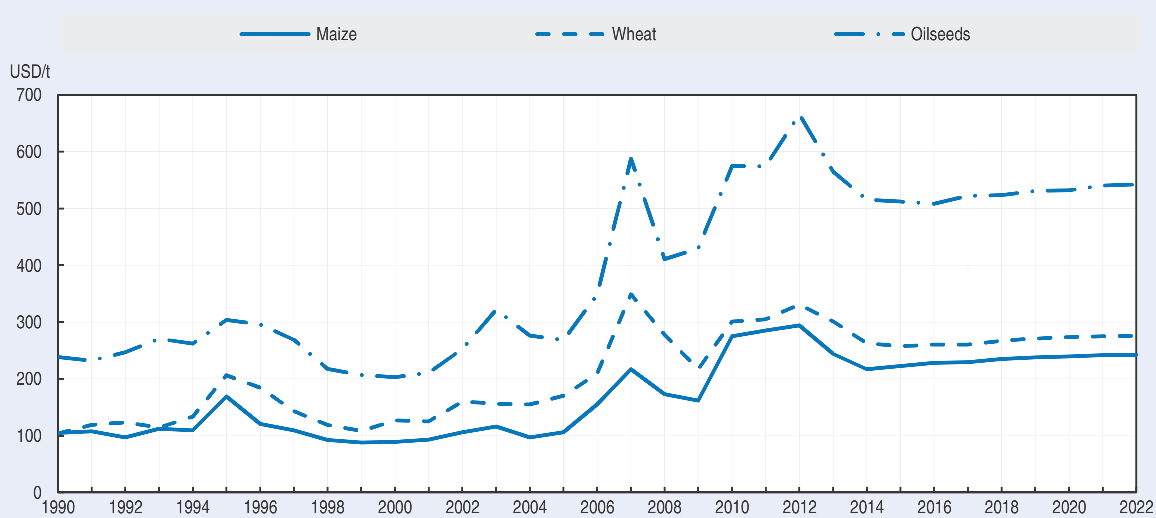
Since biodiesel is considered an advanced biofuel in the United States Renewable Fuel Standard mandates, all the uncertainties related to that policy are also relevant for the vegetable oil market. The main uncertainties are the yearly decision the Environment Protection Agency (EPA) has to take regarding to the cellulosic, advanced and total mandates. Until now, none of the reduction in the cellulosic mandate has translated into reduction in the advanced and total mandates. It was assumed in the *Outlook* that this would not be the case as of 2014. However, if the EPA continues current practices, the size of the American biodiesel market could increase substantially. The other factor affecting the incentives for blenders to use more biodiesel is the ethanol blend wall. In the *Outlook*, it is assumed that E15 blends will be introduced in the market. This is far from being a certainty.

For protein meal, the European Commission announced on 14 February 2013 that processed animal protein (PAP) from poultry and pigs would be allowed in fish farming. There is also a statement indicating that the Commission "intends proposing another measure to reintroduce the use of PAP pork and poultry to poultry and pig farming" as of 2014. Both measures could affect the outlook for oilmeal consumption in the European Union.

Box 5.1. **The influence of China's oilseed imports on the world price of cereals and oilseed**

As illustrated in Figure 5.6, world prices of cereals and oilseeds have experienced a higher price plateau since the crop year 2006. Many factors were identified as having contributed to this new plateau including the growth in demand from developing countries. China joined the WTO in 2001 and since then has become a more active player in international agricultural markets. The influence of China on the world cereal prices has been downplayed on the basis of the relatively small modification in its trade balance between its WTO accession and the period of the higher price plateau. On average, between 2001 and 2005 the combined annual trade balance of wheat and coarse grains of China was a 5.6 Mt surplus, falling to a 0.1 Mt per year deficit on average during the 2006-10 period, a 5.7 Mt difference. This amount represents only 0.3% and 2.3% of 2010 world production and imports, respectively. Given these small shares, a large impact on international prices is unlikely. For oilseeds, the Chinese authorities appear to have eased production targets in favour of sustaining self-sufficiency in cereals (Chapter 2). This shift has led to a substantial increase in the oilseeds trade deficit from 19.8 Mt on average for 2001-05 to 42.6 Mt for 2006-10, a 22.8 Mt difference which represents 6% and 21% of 2010 world production and imports, respectively. This quantity is sufficient to have a sizable impact on the world price of oilseeds. Considering the grain/oilseed substitution possibilities on the supply and demand side, it is highly probable that China had a much stronger impact on the world price of cereals through the change in the oilseeds trade balance than through the change in the cereals trade balance itself.

Figure 5.6. **World prices of cereals and oilseeds**



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932859686

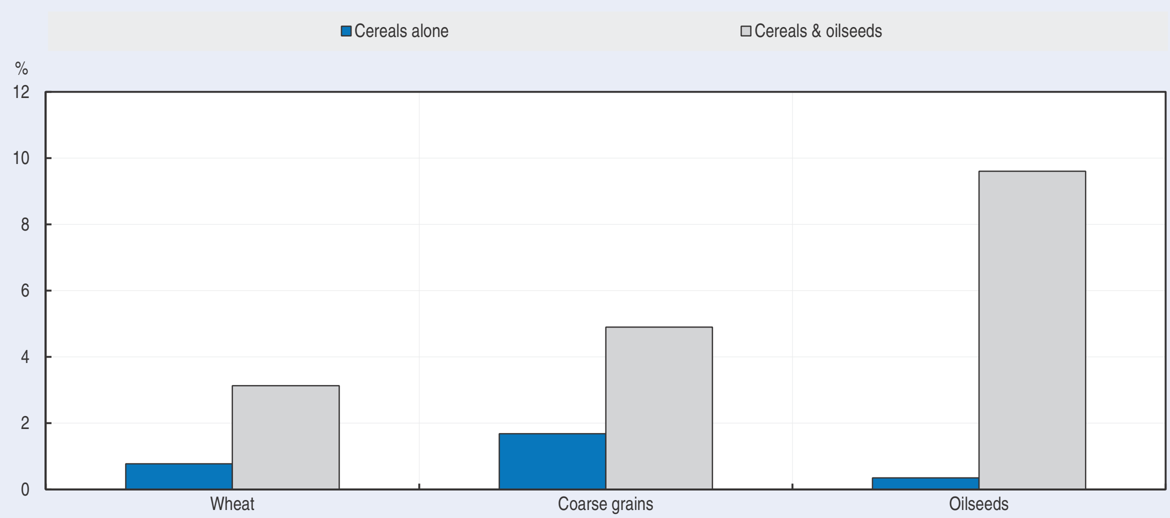
In order to examine this likely impact of the change in China's cereal trade balance, the AGLINK-COSIMO model was used to simulate a similar change over the *Outlook* period. The simulation involved a gradual improvement in the cereal trade balance over the 2014-22 period similar in scale to the deterioration experienced over the historical period; i.e. 5.7 Mt. In order to avoid any other second round effects from other sectors in the Chinese market, the simulation involved a simultaneous reduction in imports and increase in Chinese production. The impacts on the world prices in the last year (2022) are not very large (1.7% for maize) and would tend to validate the argument that the cereals trade balance of China did not contribute very much to the new higher price plateau.

Box 5.1. **The influence of China's oilseed imports on the world price of cereals and oilseed** *(cont.)*

A second scenario involved simultaneous improvements in the trade balances of cereals and oilseeds. Since oilseeds demand is basically derived from the vegetable oil and protein meal demand, changing Chinese crush demand alone in this simulation would have only resulted in a replacement of oilseed imports by vegetable oil and protein meal imports. To perform the desired scenario, a reduction in demand for vegetable oil and protein meal in China was also needed. As a result, oilseeds crush demand as well as vegetable oil and protein meal demand were reduced simultaneously in order to reduce the oilseeds trade deficit by about 23 Mt while maintaining the Chinese trade deficit in vegetable oil and protein meal at their baseline levels. The large reduction in Chinese oilseeds imports generated a 10% reduction in the world price of that commodity (Figure 5.7). Through land substitution and reallocation of land between countries, the decline in oilseeds prices generated a 7.7 Mt increase in world cereals production in 2022. This combined with the improvement in China's cereal trade balance led to a 5% (almost USD 12/t) reduction in the world price of maize and a 3% reduction in the price of wheat (USD 8.5/t).

Three observations can be drawn from this analysis. First, two-thirds of China's influence on world cereal prices comes from their imports of oilseeds. Second, even in a scenario with a partial reduction in China's trade deficit, the negative impact on world prices was significant (10%, 5% and 3% for oilseeds, coarse grains and wheat, respectively). Third, China's influence on these world prices may accentuate in the future given that trade deficits are projected to exceed those during the 2006-10 period.

Figure 5.7. **The decline in world prices from a reduced Chinese trade deficit for only cereals or cereals and oilseeds**



Source: OECD and FAO Secretariats.

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Notes

1. The projections for oilseeds are not comparable to those published last year because cotton seed was separated from the oilseeds total. It is part of a new cotton component. Cotton seed meal and oil are still included in the protein meal and vegetable oil aggregates.
2. See the glossary for the definition of crop marketing years for oilseeds and products in various countries.
3. Including stocks of oilseed meal (oilseed equivalent basis).
4. As a result, maize oil production from sweeteners of most components of the AGLINK-COSIMO model has been added to the total vegetable oil production.

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OECD-FAO Agricultural Outlook 2013

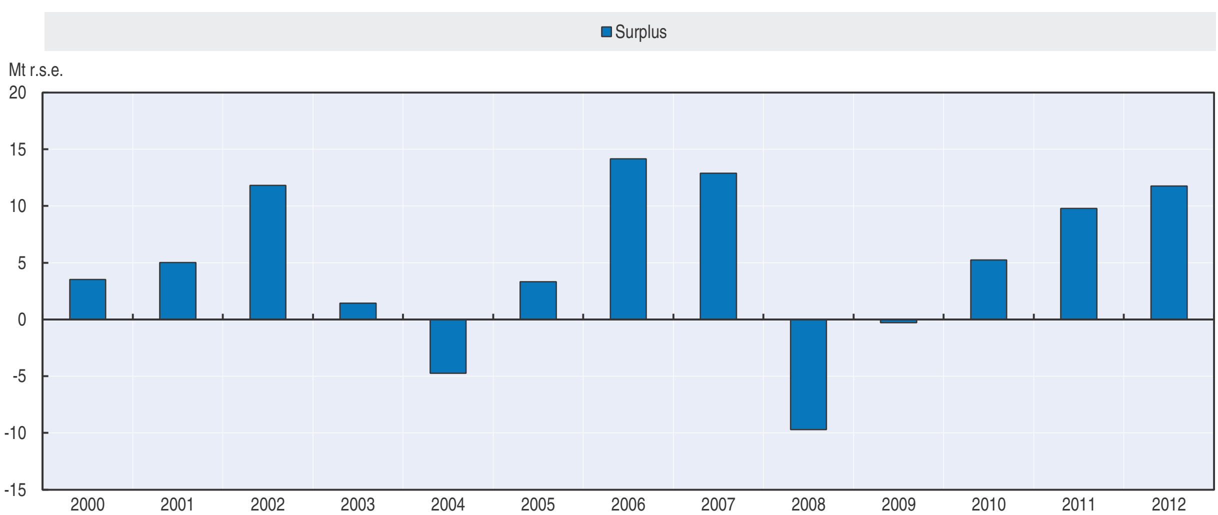
Chapter 6

Sugar

Market situation

World sugar market fundamentals are decidedly bearish at the start of the *Outlook*. World prices have continued to follow a downward trend in the last 12 months, and with lower price volatility, as markets adjust to a third consecutive year of a global sugar surplus (Figure 6.1). Higher global production can be largely attributed to a recovery in output the world's largest producer, Brazil, although harvests were also larger in the European Union, the United States, Mexico, India and China. As a result, world raw sugar prices have fallen by 26% in the last 12 months and white sugar prices by 20%. Sugar prices are expected to continue to ease back through the remainder of 2012/13 on the back of abundant supplies and increasing stock cover.* The replenishment of stocks will elevate stocks-to-use to a six-year high at the start of the *Outlook* and effectively signal the end of the period of low stocks, which has been a feature of the past four years.

Figure 6.1. **World sugar balance moves into a third consecutive production surplus**



Source: International Sugar Organisation database.

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Projection highlights

- World sugar production is projected to increase by nearly 2% p.a. over the projection period to reach nearly 212 Mt in 2022, an increase of around 38 Mt over the base period. Moderate yield increases, and lower than in the previous decade, will account for most of the additional production, rather than expansion of the area under sugar crops. Nearly all of the increase in sugar production is projected to originate from sugar cane rather than sugar beets. The developing countries of Brazil and India will remain the

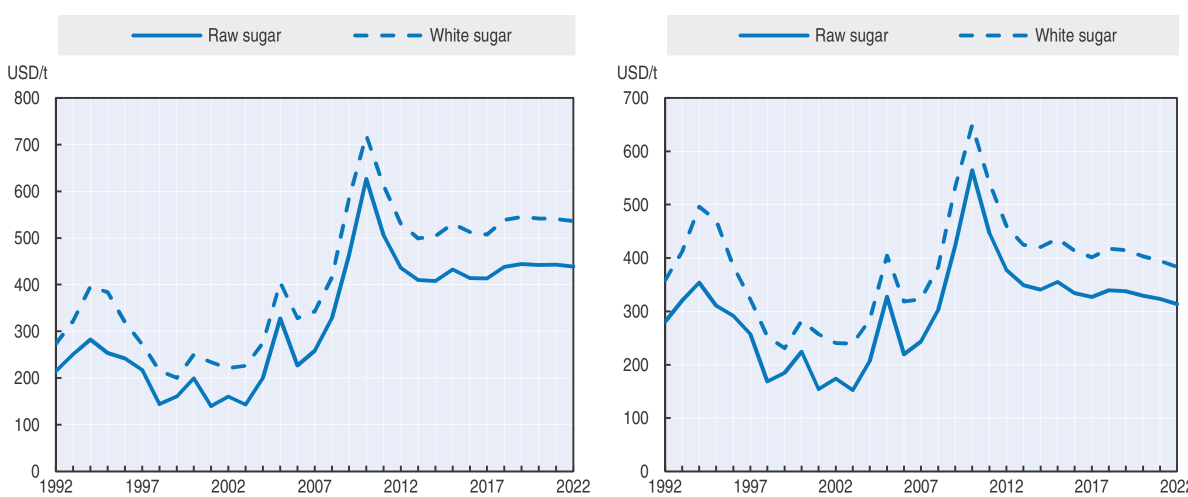
* See the Glossary for the definition of crop marketing years for sugar and products.

leading producers based on sugar cane. Global consumption of sugar is projected to grow at around 1.9% p.a., slightly slower than in the previous decade, to reach 204 Mt in 2022/23. The sugar deficit regions of Asia and Africa are anticipated to retain their dominant share of world sugar use.

- World sugar prices are expected to continue to drift downwards in 2013/14 before commencing a turnaround and following a moderately upward trend in following years, as sugar producers adjust production and consumption continues to grow. The world indicator raw sugar price (Intercontinental Exchange No. 11 contract nearby futures) is projected at USD 439/t (USD 20 cts/lb) in nominal terms, in 2022/23. Although lower than the average world sugar price in the base period (2010-12), sugar prices are expected to remain on a raised plateau and to average higher over the projection period in nominal and real terms (when adjusted for inflation) than in the decade prior to the food crisis of 2007/08.
- Refined or white sugar prices have also eased back at the start of 2013 and are expected to follow a similar pattern to raw sugar prices over the projection period. The indicator world white sugar price (Euronet, Liffe futures Contract No. 407, London) is projected to reach USD 537/t (USD 24 cts/lb) in nominal terms, in 2022/23. A relatively large *white sugar premium* at the outset is expected to narrow in 2013/14 and to average around USD 97/t over the course of the *Outlook* period, as additional white sugar supplies come on stream from new refineries (Figure 6.2).

Figure 6.2. **World prices to decline initially but to remain on a higher plateau**

Evolution of world sugar prices in nominal (left figure) and real terms (right figure) to 2022[1]



Notes: Raw sugar world price, Intercontinental Exchange contract No. 11 nearby futures price; Refined sugar price, No. 5. Euronext Liffe, Futures Contract No. 407, London.

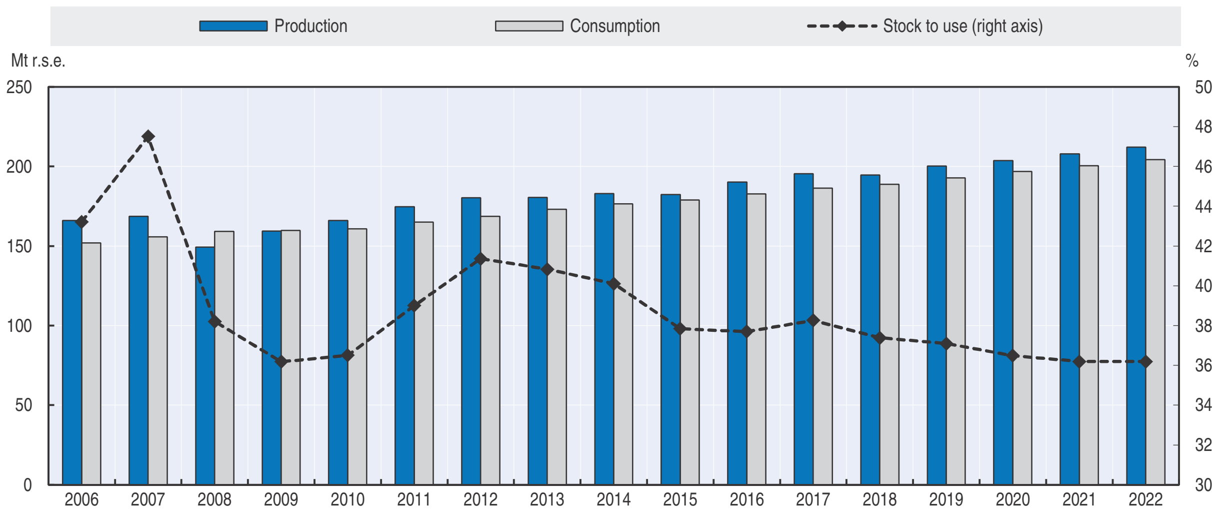
1. Real sugar prices are nominal world prices deflated by the US GDP deflator (2005 = 1)

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932859743

- Larger production in Brazil, and elsewhere, lead to additional stock replenishment and higher global stocks in the near term, adding to downward pressure on sugar prices. With variable production and steady demand growth, world sugar stocks and stocks-to-use show more variation in following years. Nonetheless, they are projected to follow a declining trend and to average lower than at the start of the *Outlook* period, and in comparison to the previous decade, providing support for sugar prices in the later years of the projection period (Figure 6.3).

Figure 6.3. **Global sugar stocks-to-use to rise in near term and then contract in following years**



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932859762

- Most of the growth in sugar exports is expected to be captured by cane sugar producers in developing countries led by Brazil and Thailand, and with imports spread over a wider group of countries.
- The *Outlook* for high fructose corn syrup (HFCS) or isoglucose, a caloric sweetener that competes with sugar in certain end uses such as beverages, is for further growth in production and consumption by around 15%, respectively, to 2022/23, when compared to the base period. Most of the additional production will originate in the United States, with HCFS competiveness determined by the price of maize and the European Union following the expected removal of production quotas during the projection period. These countries will also be the leading consumers along with China and Mexico, the latter as part of two way trade in sugar and HFCS with the United States in an integrated sweetener market under NAFTA.

Market trends and prospects

Prices

Sugar prices have declined at the start of the *Outlook* period and are projected to continue to drift in a lower range in the near term before starting to strengthen moderately in following years. World sugar prices are expected to average higher, and to remain on an elevated plateau over the medium term, in both nominal and real terms, compared to the decade prior to 2007. Higher average sugar prices will be underpinned by stronger demand with a return to steady global economic growth and further population gains, rising production of ethanol from sugar cane in Brazil and elsewhere, the depreciation of the US dollar, slowing production trends and the expectation of lower stocks-to-use by 2022. Slowing yield growth and increasing constraints on the availability of suitable land for expansion of sugar production in many producing countries, other than perhaps Brazil, will help support sugar prices at elevated levels as consumption continues to increase. Brazil as the leading world sugar producer and dominant exporter effectively sets the floor price for sugar in world markets based on its relatively low production costs. The world raw sugar indicator price is projected at USD 439/t (USD 20 cts/lb) and that for white sugar at USD 537/t (USD 24 cts/lb), respectively in 2022. On the assumption of normal production conditions and weather, both raw and white sugar prices are expected to follow a similar oscillating pattern over the projection period with the white sugar premium narrowing to average around USD 97/t. This lower premium (difference between white and raw sugar price) or refining margin reflects the expected growth in refining capacity as additional destination and toll sugar refineries come on stream in various locations around the world. Many of these refineries are dependent on high quality (VHP) raw sugar for processing with increasing demand helping to lift the price of raw sugar. The additional white sugar supplies generated by the refineries, in turn, put downward pressure on the refined product price and this narrows the margin or white sugar premium between the two prices over time.

Sugar price volatility has receded since the commencement of the current crop year as the market has adjusted to the large increase in supplies, a growing surplus of export availabilities and rising stock cover. Price movements have tended to be unidirectional and consistently downwards in this period. Despite this near term trend, further periods of high sugar price volatility remain likely over the projection period. This will be the case as stocks-to-use tighten over time and with global production continuing to be more variable than consumption. Adding to the variability of sugar cane and sugar beet harvests is the fact that the vast majority of production and trade in sugar remains concentrated in a hand full of countries; with Brazil alone playing a dominant role in both activities. Any changes in crop prospects in Brazil or these other producing countries will have an influence on world markets and can quickly affect world sugar prices.

In addition to sugar supply characteristics that can promote market volatility, other factors are also contributing to such an outcome. Sugar prices are increasingly displaying co-movement with other commodities, financial markets and particularly the volatile energy and oil markets. Higher oil and energy prices are projected in the coming decade, leading to rising input prices, higher sugar factory operating expenses and an increase in overall sugar production costs. There is also a closer link with oil markets and petroleum prices on the demand side, particularly in Brazil, where more than half the enormous sugar cane crop is projected to be used for ethanol production.

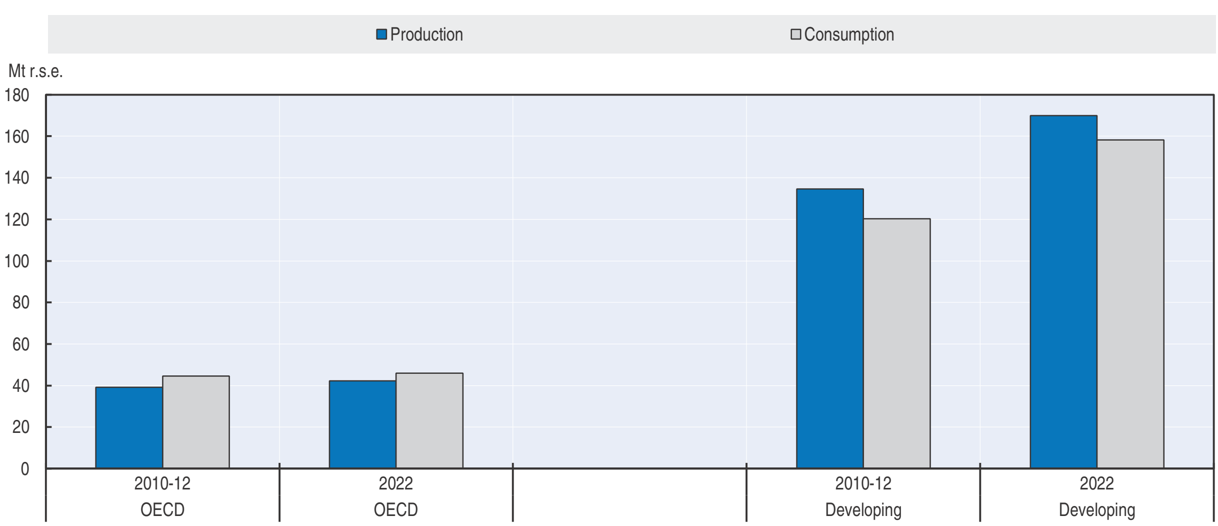
With Brazil's growing fleet of flex-fuel motor vehicles, ethanol from sugar cane is a leading petrol substitute in one form (hydrous ethanol) and also a petrol extender through blending possibilities in another (anhydrous ethanol). In addition, sugar factories in Brazil are increasingly relying on the co-generation of electricity from bagasse (leaves and residue of the sugar cane crush) to meet their operational energy needs with any surplus sold to the national electricity grid. These developments are also occurring in other sugar cane producing countries. As a consequence of the projected growth in ethanol production, particularly in Brazil, for domestic and export markets, as well as the increasing cogeneration of electricity, sugar production and export availabilities may become more closely linked to unstable energy markets. An additional factor influencing the volatility of sugar markets are sugar policies that, in some instances, result in production cycles and periodic large switches between imports and exports to the world market, as in the case of India and some neighbouring countries. Sugar trade policies by insulating national markets from world market changes and transferring domestic market shocks to international markets also have the potential to exacerbate world sugar market price variation. As many of these policies remain in place they will be a potential source of international sugar market volatility in the coming decade.

Production and use of sugar

Sugar prices in the decade ahead are expected to remain sufficiently remunerative to encourage further investment in sugar crops leading to increased production, mainly from higher yields. Sugar cane is expected to account for virtually all the additional sugar production and to represent nearly 88% of sugar output in 2022, with only a minimal additional contribution from sugar beets over the same period. The small addition from sugar beets will mainly reflect larger projected crops in the European Union and the Russian Federation.

World sugar production is projected to grow by 1.9% p.a. to reach 212 Mt by 2022/23, up nearly 38 Mt or 22% above the average for the base period (2010-12). The developing countries which account for the bulk of world sugar production and consumption, will be responsible for most of the increase in output and use to 2022. The OECD area's share of both production and use increases only marginally over the projection period (Figure 6.4). In view of Brazil's dominate role, the share of its large and expanding sugar cane harvest which is allocated to the production of ethanol will be a decisive factor for global sugar production and world prices over the coming decade.

Figure 6.4. **The developing countries have dominant shares of global production and consumption**



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932859781

Global consumption of sugar is projected to grow slightly more slowly than in the previous decade, to reach 204 Mt in 2022/23. The developing countries will continue to have the fastest growth in consumption, fuelled by rising incomes, urbanisation, and growing populations, although with considerable variation between countries. The sugar deficit regions of Asia and Africa are expected to be responsible for most of the expansion in sugar consumption over the coming decade, which is projected to increase faster than the world average. Competing with sugar use as substitutes in food consumption are high fructose corn syrup (HFS) and other high intensity sweeteners (HIS) made up of artificial sweeteners (such as aspartame and saccharin) and natural sweeteners (such as stevia). Use of these other sweeteners has grown more rapidly than for sugar in the last decade and for specific end uses, but with sugar continuing to dominate the overall sweetener market. This situation is projected to continue over the coming decade. Production and use of HFCS is projected to increase by around 15%, respectively, by the close of the coming decade, boosted by rising demand in the European Union, Mexico and China and to a lesser extent in the United States where market penetration is already substantial.

In terms of sugar offtake, China, in particular, is expected to become a larger consumer as use of sugar increases for food preparations, beverages and related food manufacture in meeting the needs of large urban populations and as diets become more westernised over time. Sugar demand should also increase as competition from intense sweeteners and other caloric sweeteners becomes less intense and as direct household consumption of sugar expands. A continuation of Chinese policies restricting the production of artificial sweeteners (mainly saccharin) and isoglucose from maize would limit their competition with sugar in different end uses (Box 6.1). The rapid expansion in sugar off-take is in contrast to the situation in many developed countries where sugar consumption is projected to show little or no growth consistent with their status as mature or saturated sugar markets. In these markets, population demographics, with slowing population growth, general ageing and dietary changes based on increased health consciousness are impeding sugar use. The share of industrial consumption of sugar covering food preparations, chemical industry requirements, and biofuel production is expected to increase further in Europe and America.

Brazil as the world's leading sugar producer, with its relatively low production costs and vast land resources suitable for increased sugar production, occupies a central role in the sugar outlook. As noted earlier, increased production in Brazil in 2012/13 accounted for most of the global sugar surplus at the start of the *Outlook* period. However, reduced investment in new sugar plants and plantations following the global financial crisis, along

Box 6.1. **Will China import more sugar?**

With rapid economic growth and rising demand, China has experienced a surge in import demand for a wide range of commodities. Sugar, with the exception of two recent years, has not been a part of this trend. When China gained accession to the WTO/GATT in 2001, it established a tariff rate quota (TRQ) of 1.95 Mt for sugar imports and was widely expected to become a major structural importer of sugar.[1] In reality, however, sugar imports have remained relatively unchanged, fluctuating between 1-2 Mt p.a. This is also expected to be the case for 2012/13.

A main factor influencing China's sugar imports has been the fluctuations in domestic production which vary between self-sufficiency and a deficit situation. The volume of imports has also been influenced by the government's strategy of releasing stocks when there is a production shortfall and accumulating stocks in times of surplus production. Such practices have helped moderate import growth within the 1-2 Mt range and this has been facilitated by sugar production growing broadly in line with demand.

However, continuing high economic growth, rapid urbanisation and low per capita consumption of sugar, which is more than 50% below the world average of 30 kg per person, all suggest a large growth potential on the demand side. At the same time, limited resources of suitable land and increasing water scarcity have raised doubts whether production of sugar can continue to keep up with the anticipated growth in demand.

Box 6.1. **Will China import more sugar?** *(cont.)*

Key drivers

The *Outlook* for sugar demand and sugar imports in coming years will depend primarily on three factors: government policy on intense sweeteners such as saccharin; the policy on industrial use of maize; and sugar production response in China. Artificial, non-caloric sweeteners such as saccharin have traditionally represented a high proportion of sweetener demand in China. At the beginning of 2000, the government imposed controls on the production and sale of saccharin, primarily for public health reasons. These controls reduced demand dramatically and, in response, there was a strong increase in demand for starch-based caloric sweeteners from maize (HFCS) to fill the gap. The latter now makes up around one-quarter of the sweetener market in China.

With the tight supply situation for maize in 2010 and the need to import, the conversion of maize by industrial processors into HFCS and bio-ethanol was temporarily restricted by the government due to food security concerns. While food security will likely remain paramount in deciding how domestic food grains are used, a more liberal attitude to maize imports could create the potential for further expansion in HFCS supplies and use.

Over the last two decades sugar cane has been responsible for the majority of growth in domestic sugar production, accounting for around 95% of supplies, while beet sugar production has for the main part contracted. The increase in sugar cane supply has been overwhelmingly concentrated in the Guangxi province, whereas sugar beet production has expanded in the Xinjiang province only.

The Government has given considerable attention to boosting sugar production by increasing yields with the introduction of improved varieties, and through better farming practices, as well as by providing increasing support in the form of subsidies to farmers. All of this assistance has lead to a steady growth in sugar crop yields, although yields show considerable variation between provinces. This would imply that China can continue to improve yields in some producing areas, but this may require significant additional investment to be achieved, such as irrigation.

The area devoted to sugar crops has displayed a more cyclical pattern as growers switch between sugar and other crops, depending on the relative returns of each. If sugar production is to keep pace with the projected increase in demand, the area under sugar cane, and possibly also sugar beets, will need to expand, even when taking into account further improvements in yields. This may be difficult to achieve given a shortage of arable land, in general, and limited potential to increase cane area in the key producing province, competition for land from other crops and the high water requirement for sugar cane in a growing water scarcity environment. While attempts are being made to increase sugar beet area and its share of sugar production, this crop has higher production costs than cane and will need additional investment to improve productivity and overall competitiveness. The heavy involvement of the government in the sector makes it difficult to predict with any certainty the future level of Chinese imports. Nevertheless, if sugar demand continues to grow at the current pace it would seem more likely that China will become increasingly dependent on sugar imports to meet its growing domestic needs. This could effectively make China the world's largest sugar importer over the coming decade.

Box 6.1. **Will China import more sugar?** *(cont.)*

Scenario results

Table 6.1 presents some of the main results of a scenario in which sugar consumption increases much faster than domestic production leading to a widening gap over the coming decade to be covered by increasing imports. Imports are assumed to grow each year and to reach 5.2 Mt in 2022. The results are compared with the baseline in which domestic demand grows only slightly faster than production and imports remain just above the TRQ limit over the entire projection period, rising to 2.6 Mt in 2022. Table 6.1 presents the results in terms of percentage differences of a comparison of the baseline projection with the scenario of much higher domestic consumption than production. They illustrate that as consumption grows over time, rising from 2.2% p.a. in the baseline to 3.1% p.a. in the scenario, imports increase by an average of nearly 71% over the projection period. Imports enter at the over quota tariff and world prices increase progressively over the projection period as imports grow in size. Sugar producers outside China whose production responds to world price signals could be expected to react to the higher sugar prices in their planting decisions. This is expected to be the case for Thailand and Australia, in particular, leading to an increase in their production and exports which have a location advantage over Brazil in serving this sugar deficit region of Asia.

Table 6.1. **Higher sugar imports by China**

% changes compared to baseline

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Production	0.2	0.4	0.6	0.9	1.0	1.1	1.1	1.2	1.3	1.3
Imports	30.1	39.1	55.4	73.0	65.3	87.4	72.5	87.7	98.6	101.1
Consumption	4.5	9.6	8.9	11.9	11.9	13.4	13.4	14.4	14.9	14.6
Exports	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ending Stocks	2.2	-1.1	0.0	-2.5	-3.5	-2.2	-2.1	-0.9	-3.4	-2.6
Domestic price	2.3	3.7	4.3	5.1	4.6	5.4	4.9	5.5	5.7	6.0
World price	1.1	2.1	2.1	2.4	2.1	2.3	2.2	2.4	2.3	2.5

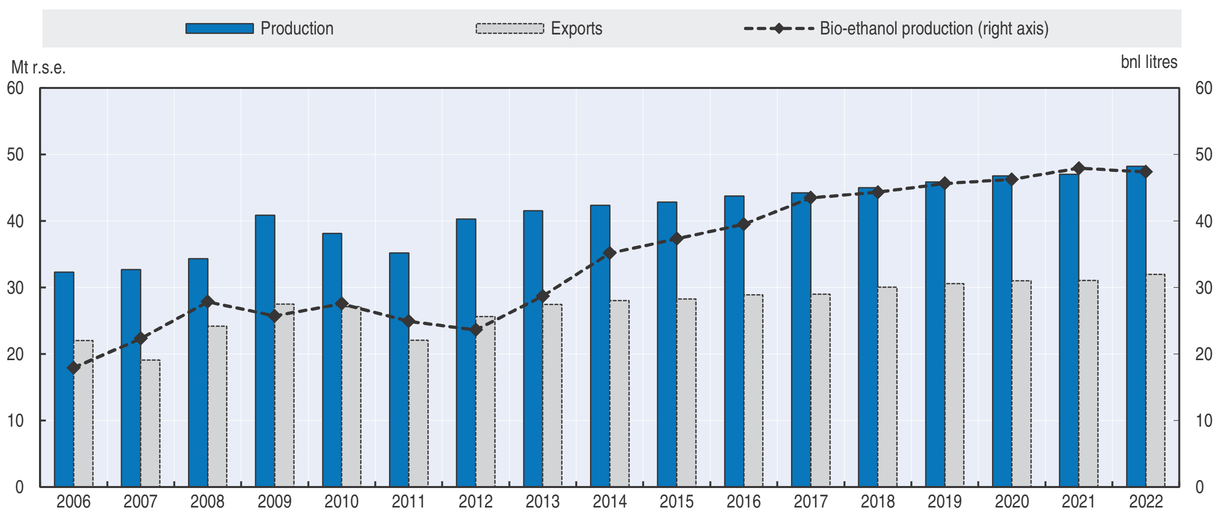
Source: OECD-FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860788

1. The demand for sweeteners in China is expected to grow rapidly over the coming decade. The share that is consumed as sugar will depend on the availability of sugar substitutes including intense sweeteners, such as saccharin which has been subject to government controls on health grounds, and starch sweeteners (HFCS) from maize supplies. At present, the government sets a target for the production and sales of saccharin to the four state-approved producers. These controls have lead to a halving of saccharin consumption over the last decade.

with increasing production costs and infrastructure bottlenecks, and consecutive adverse weather events have slowed the pace of expansion of the industry in recent years. Given these difficulties, the Government approved the provision of a USD 2.2 billion loan package in 2012 to assist with the replacement of ageing sugar cane and to bring new land into production. This assistance is expected to stimulate some further growth but not overcome all of the industry problems (Box 6.2). As a result, Brazil's sugar production is expected to grow more slowly at 1.6% p.a. over the coming decade. Nonetheless, this growth will be sufficient to boost production to 48 Mt by 2022, an increase of 27% or 10 Mt over the base period. Consumption of sugar is projected to grow by around 1.5% p.a., to reach 16.2 Mt in the same period. The government has taken decisions on ethanol recently (raising the blend rate to 25% and adjusting gasoline pricing), that are expected to encourage additional ethanol production and use. These changes are expected to be supportive of the world sugar market and prices (Figure 6.5).

Figure 6.5. **Sugar production and exports to increase in Brazil as ethanol output expands**



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932859800

Box 6.2. **Some causes and impacts of rising sugar production costs**

One of the main features that has characterised the world sugar market over the last decade is a steady rise in the cost of producing sugar. The trend has affected the major producing regions and involved both beet and cane-based sugar industries. At the same time, prices and productivity gains have not been sufficient enough to offset the rising costs, leading to increasing pressure on the profitability of the industry. This has been more evident in the case of Brazil, the world's largest sugar producer and exporter, where the cost of production more than double between 2001 and 2011. Given the dominance of Brazil's position in the world sugar market, international sugar prices tend to reflect the cost of producing sugar in that country.

What are the main drivers behind the increase in the cost of producing sugar? First, a key factor to be highlighted is soaring energy prices, which have not only affected Brazil but also most, if not, all of the main sugar producing regions. Globally, crude oil prices increased, on average, by 14% per year between 2002 and 2012, while fertiliser (e.g. urea) and steel prices (a proxy for capital costs) went up by 13% and 11%, respectively, over the same period. Given that the sugar industry is a heavy user of energy-related inputs such as fertilisers and diesel, production costs per tonne of sugar had to reflect the increases in the input prices.

In addition to the rise in the cost of energy-related inputs, rising labour wages added to the pressure faced by the sugar industry worldwide. The rapid economic growth that Brazil, and many other developing sugar producing countries, has enjoyed over the last decade translated into higher wages for labour, in part driven by a general increase in domestic inflation. For example, the average annual growth in wage rates was recorded at more than 10% in Brazil and China, between 2000 and 2011, while it was about 7% to 8% in Thailand and India in the same period. While input prices, including interest rates and labour wages have risen significantly, the sugar industry was not able to generate enough productivity growth to mitigate these higher costs. Indeed, expansion in Brazil actually slowed down after 2008, with cane production growing at only 4.2%, compared with a 9.6% growth between 2005 and 2008. A similar trend is also emerging with respect to the sugar industry in India.

Box 6.2. **Some causes and impacts of rising sugar production costs** *(cont.)*

An additional factor to consider when looking at the determinants of cost of production is the change in currency value. For instance, the appreciation of the Brazilian currency, the *Real,* against the United States dollar since 2004 has pushed up the cost of production expressed in US dollar terms, further squeezing producer margins.

Finally, the cost of production for sugar is also influenced by factory costs. However, these have increased at a much slower rate due to the concomitant rise in the value of by-products, such as beet pulp, bagasse, molasses and co-generation of electricity from bagasse. Energy savings through electricity generation in sugar cane factories have not been possible for sugar beet factories. Rising factory input costs, together with a decline in the rate of expansion of the sugar industry and an appreciation of local currencies, notably the Brazilian *Real*, have translated into a higher marginal cost of production. As a result, international sugar prices had to fluctuate around a higher rate than their historical trend to cover marginal costs and incite marginal suppliers, notably Brazil, to produce more sugar.

Impact of higher cost of production on the sugar market

The increase in the cost of sugar production in Brazil creates both challenges and opportunities for the world sugar market. Since international sugar prices need to be supported at a higher level to induce production in Brazil, other producers could become competitive and boost their supplies to their domestic and/or international markets. Also, in the face of rising costs, many producing countries, including Brazil, have recently invested heavily in mechanisation, substituting capital for labour with the hope of reducing per unit cost. The impact of such a large scale change in field processes is difficult to predict, but it is certain that Brazil could regain some of its lost competiveness as it reaches the full potential of mechanisation with enhanced productivity over time.

In order to assess the effect of higher costs of sugar production in Brazil, a simulation was carried out where it was assumed that sugar cane yields in Brazil were 10% below their baseline level, as a result of a reduced usage of inputs. Under this scenario, Brazil's sugar exports decline by 4.5% in 2022, prompted by lower production, leading to an increase in international sugar prices of about 8.5% by the end of the projection period, when compared with the baseline (Table 6.2). These results illustrate the relatively large impact of Brazil's production cost on international prices. Despite higher prices, other producers are not able to completely offset the fall in Brazilian sugar exports, which keeps prices at a relatively high level through the projection period. Clearly, any gains in productivity through the adoption of efficient technologies and/or production process will bring about lower prices.

Table 6.2. **Impact of lower sugar cane yields in Brazil on domestic and world sugar markets**

% change compared with baseline

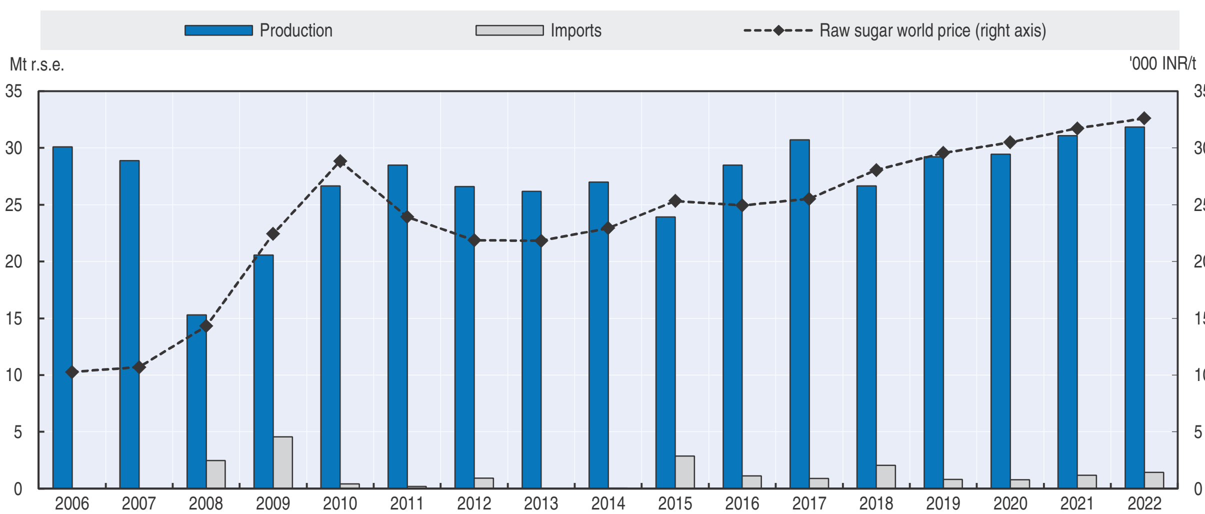
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Production	-7.0	-6.1	-4.8	-4.3	-4.7	-4.3	-5.2	-5.2	-4.6	-4.2
Consumption	-2.3	-3.0	-2.9	-3.3	-3.8	-2.7	-3.2	-3.4	-3.7	-3.8
Exports	-9.1	-7.5	-5.7	-4.9	-5.1	-5.1	-6.2	-6.1	-5.1	-4.5
Ending Stocks	-3.4	-5.3	-6.4	-5.5	-5.1	-4.7	-5.1	-5.4	-5.5	-5.1
Domestic price	4.9	6.1	6.8	6.4	6.4	7.5	7.3	7.9	8.6	8.5
World price	4.91	6.08	6.82	6.37	6.42	7.50	7.29	7.86	8.60	8.52

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860807

India is the second largest sugar producer and the world's leading sugar consumer. Sugar production is expected to continue to be subject to the longstanding production cycle despite initiatives taken by the government to partially deregulate the domestic sugar market but not yet extended to sugar and cane prices. In the meantime, the cycle continues with domestic prices currently in decline and high cane prices leading to arrears in payments to growers by mills that are anticipated to impact plantings in 2013/14. India's production, although variable, is projected to grow at 2.3% p.a., on average, to reach 31.8 Mt in 2022. Relatively strong consumption growth of 2.7% p.a. is anticipated for the decade ahead, with consumption rising to 32.7 Mt, or some 9 Mt above the average for the base period (Figure 6.6). The effects of the production cycle, although assumed to diminish with the passage of time and possible market deregulation, never-the-less continue to result in periodic switches in India's sugar trade from imports to exports depending on the phase of the cycle.

Figure 6.6. **A less dramatic production cycle in India?**



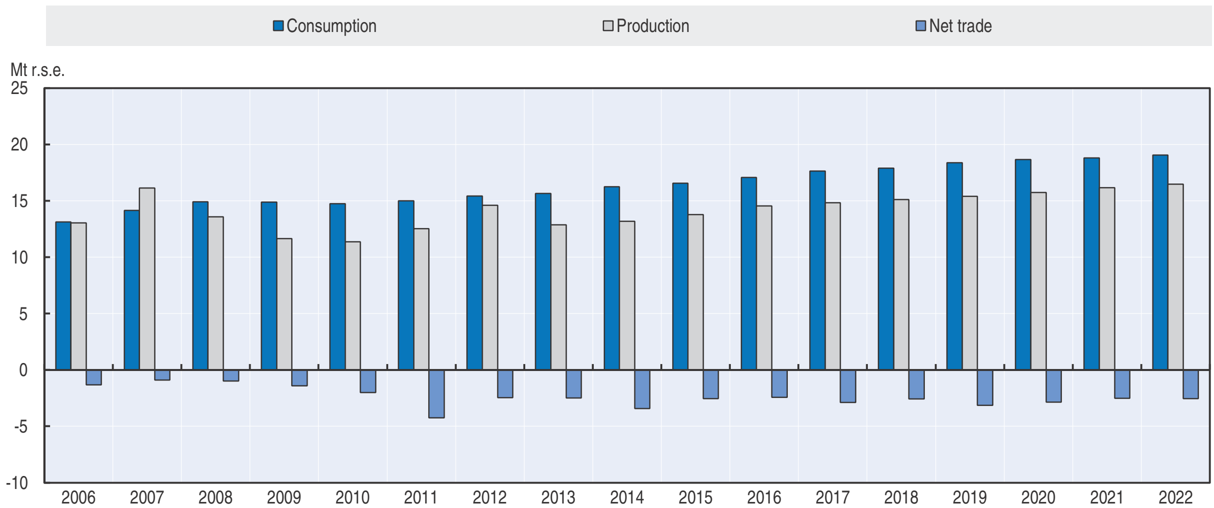
Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932859819

Thailand, the world's second largest sugar exporter, has embarked on a major expansion drive with production of cane and sugar surging in recent seasons. Although the pace of production growth is expected to moderate in coming years, it is still projected to increase at a relatively rapid 3.9% p.a., partly on the assumption that sugar cane maintains its current price advantage over other crops such as cassava in the longer term. Sugar production is projected to reach nearly 14 Mt in 2022, a bit less than 4 Mt or 37% higher than the base period. Sugar consumption under the existing domestic pricing arrangements grows by 2.3% p.a. to reach 3.6 Mt in the same period.

China's sugar production with higher domestic prices surged at the start of the *Outlook* period to a level of 14.6 Mt, and closely match the country's fast growing consumption needs in that period. With sugar per capita consumption significantly below the world's average it is expected that China's sugar demand will continue to grow rapidly over the coming decade for both direct and indirect uses. Production, on the other hand, is not expected to keep pace with higher demand growth. This outcome reflects a shortage of suitable arable land and rising water constraints for sugar cane expansion and the higher production costs for sugar beets, in the absence of considerable investment, such as irrigation, to improve productivity. By 2022, domestic sugar production and consumption are projected at 16.5 Mt and 19.1 Mt, respectively (Figure 6.7).

Figure 6.7. **China's sugar consumption to grow faster than production, lifting imports**



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932859838

In other parts of Asia, sugar production in Japan is projected to increase by 1.4% p.a., and mainly from sugar beet production, but will continue to fall short of annual consumption requirements of 2.2 Mt. Per capita consumption of sugar is projected to continue to fall slightly in the coming decade. In the case of Indonesia, despite a number of government initiatives over the years to encourage higher self-sufficiency in sugar production, this goal is not expected to be fully realised in the coming decade. Sugar production is projected to reach 3.6 Mt in 2022 while consumption grows to 7.6 Mt in the same period, leaving a widening shortfall to be covered by imports. Raw sugar imports of Korea, with no domestic production, are projected to increase by 27% over the coming decade essentially to meet rising domestic requirements, as exports of refined white sugar remain relatively stable.

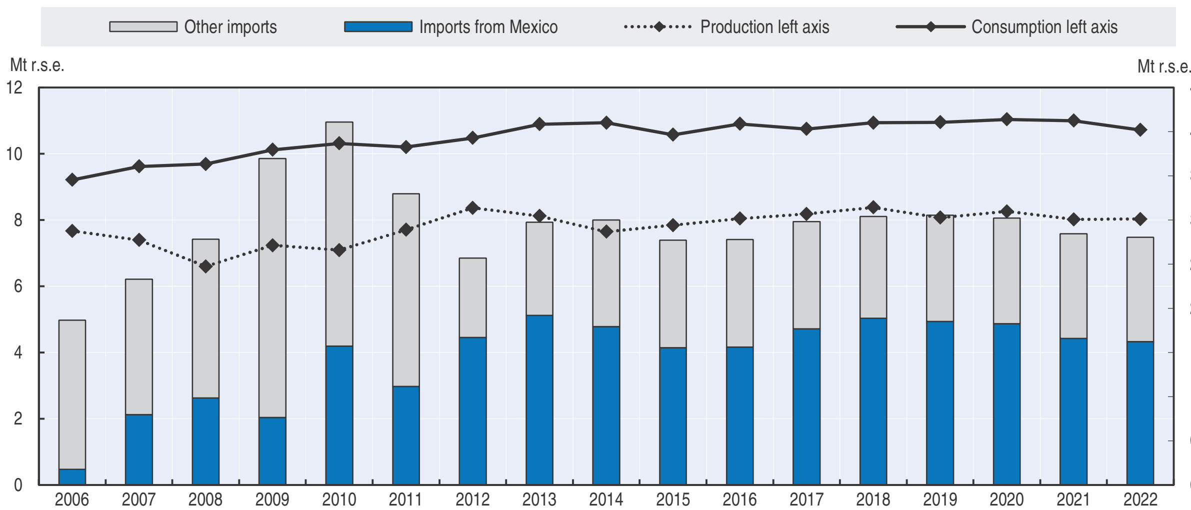
It has been assumed in developing the sugar projections for the European Union that sugar and isoglucose (HFCS) production quotas expire at the conclusion of the 2014/15 marketing year, as proposed initially by the European Commission. However, as noted in the uncertainties section, discussions are currently underway in the European Union to prolong the operation of quotas for a further period of between three to five years. The removal of production quotas, when this does occur during the projection period, will lead to some fundamental changes in the domestic market. A system of production quotas have operated in the EU sugar market for many years dating back to the origins of the sugar regime in 1968. These quotas govern how much sugar domestic producers can sell in the internal market. As part of the fundamental sugar policy reforms initiated in November 2005, the production quota system was simplified and sugar producers were encouraged to renounce quota of 6 Mt, *white sugar equivalent* (wse), by 2010. The quota on production is currently limited to a total production in the European Union of 13.3 Mt (wse) which is allocated across member states. Out-of-quota production of sugar is what is produced in excess of the quota. The level of this production varies from year to year and depends mainly on growing conditions and yields. The sugar made from out of quota production cannot (normally) be sold for food use in the European Union and must be sold for industrial uses (chemicals or biofuels), exported within annual limits or applied against the following year's quota entitlement. Production quotas also apply to isoglucose (HFCS) in the Community which competes with sugar in mainly beverage and food preparations.

With the removal of quotas, sugar production from sugar beets that is available for sale in the European Union is projected to increase from the quota level of 13.3 Mt (wse) to around 18 Mt by 2022. This occurs as production adjusts within the European Union to expand in those regions with lower comparative costs and contracts elsewhere. Although domestic prices are projected to be commensurably lower with this reform, all the additional production will now be available for sale on the domestic market and producers will receive the sugar price for all the sugar beet production they would be able to sell to factories to produce sugar. This may slow the growth in future supplies of sugar beet available for use in biofuels production unless it remains competitively priced in this end use. Consumption of sugar in the European Union is projected to decline by nearly 1 Mt to 2022. This occurs, despite lower domestic sugar prices, due to increased competition in consumption from HFCS which doubles in production to 2022, and effectively takes some of the sugar market for specific end uses. The closer balance between EU sugar production and consumption, following quota removal, will have important implications for future preferential sugar trade.

Like the European Union, the United States sugar market remains heavily influenced by the policy environment under which it operates. The United States Department of Agriculture (USDA) operates a price support scheme for sugar by managing the amount of domestically produced sugar (from sugar cane and sugar beets) and imported sugar that can be sold on the domestic market. During the past few years, the US market under the North American Free Trade Agreement (NAFTA) has been relatively tight in terms of sugar supplies and this has precluded the need to apply the various safeguard measures designed to prevent the market from becoming oversupplied and placing high support (loan rate) prices under pressure. This situation has changed over the last year with the arrival of bumper harvests in the United States and Mexico and some additional imports that have weighed heavily on domestic sugar prices. As a result, the domestic premium over world prices has fallen sharply at the start of the *Outlook* period. Nonetheless, this is expected to be only a temporary oversupply situation with a larger premium being re-established and projected to continue over the coming decade. US sugar production is projected to grow moderately at 0.3% p.a. to reach 8 Mt in 2022, while domestic consumption continues to slow growing at a reduced rate over the same period to reach 10.7 Mt. This difference will be sufficient to accommodate some rise in sugar shipments from Mexico (partly in exchange for increased HFCS supplies from the United States) without triggering safeguard measures as US domestic prices remain above support levels (Figure 6.8).

Higher prices in Mexico linked to high US support prices in a fully integrated market under NAFTA, are expected to encourage a modest increase in sugar cane area and expanded sugar production. Sugar consumption is projected to also increase moderately in coming years to reach 5.1 Mt in 2022, as beverage and food manufacturers continue to substitute lower cost HFCS, mainly sourced from the United States, for domestic sugar. This process effectively releases Mexican sugar for sale to the US market or third country

Figure 6.8. **The consumption gap in the US to be filled by Mexican exports**



Source: OECD and FAO Secretariats.

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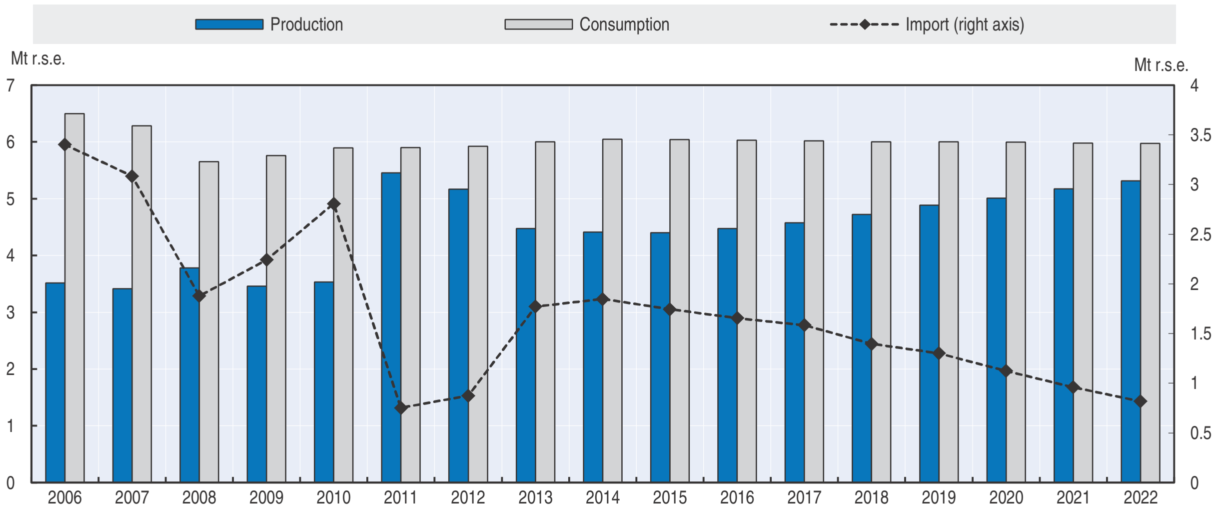
markets, whenever it is profitable to do so. Consumption of HFCS in Mexico while increasing in the coming decade is not expected to reach the same level of penetration as in the United States.

Production of sugar in Australia is expected to continue its path of recovery from past disruptive weather events as the industry seeks to adjust through improving productivity to lower returns caused by the appreciation of the Australian currency. Some expansion of cane area, additional farm consolidation and adoption of improved varieties to promote higher yields, lead to sugar production increasing moderately by 1.1% p.a. to reach about 5 Mt in 2022, although still below the record production of 5.6 Mt achieved in 1997/98. Consumption of sugar shows little growth over the period to end up at 1.1 Mt, maintaining the strong export orientation of the industry.

Sugar production in the Russian Federation has benefited from increased government support in the form of production subsidies and tariffs on imports aimed at achieving 80% self-sufficiency in meeting domestic consumption requirements. While the Russian Federation has experienced larger crops in the lead up to the *Outlook*, a lack of sugar storage in the country has lead to sharply lower prices. This problem of insufficient storage is expected to be rectified over time to facilitate the more orderly marketing of larger harvests. Sugar beet production in the Russian Federation is projected to grow by 1.7% p.a. on average to 2022, increasing sugar output by 13% to around 5.3 Mt. With stable sugar consumption of around 6 Mt p.a., the higher production will still leave the Russian Federation with a small deficit in most years to cover from other sources (Figure 6.9).

Aggregate sugar production in Africa is projected to increase more rapidly at 3% p.a. in the coming decade in comparison with the last ten years to reach around 11.8 Mt in 2022. The production gains are anticipated mainly in South Africa, Egypt, Sudan, Mozambique and Tanzania. The faster pace of production will still be less than the growth in projected demand, and thus preserve the region's sugar deficit status to 2022. Consumption of sugar in Africa is projected to grow by 3.2% p.a., driven by rising incomes and growing populations, and to reach around 21.4 Mt in 2022.

Figure 6.9. **Higher production in the Russian Federation leads to shrinking imports**



Source: OECD and FAO Secretariats.

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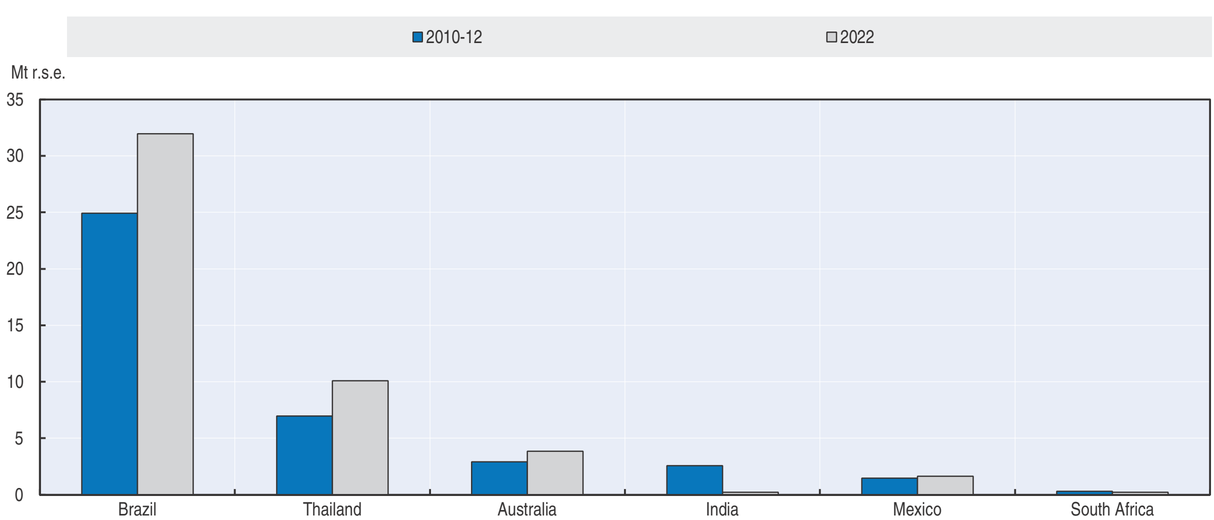
Trade

Over the last two decades, world sugar trade has grown rapidly from around 25 Mt p.a. to over 55 Mt, on average, in the base period of 2010-12. A number of structural changes have taken place that will continue to influence the evolution of trade over the coming decade. In terms of export availabilities, these include an increasing concentration of sugar trade with the dominance of Brazil as the world largest exporter, and some structurally driven changes arising from sugar policies (Figure 6.10). Imports of sugar, however, remain more diversified being spread over a larger group of countries (Figure 6.11).

Figure 6.10. **Sugar exports have become more concentrated and dominated by Brazil**



Source: OECD and FAO Secretariats.

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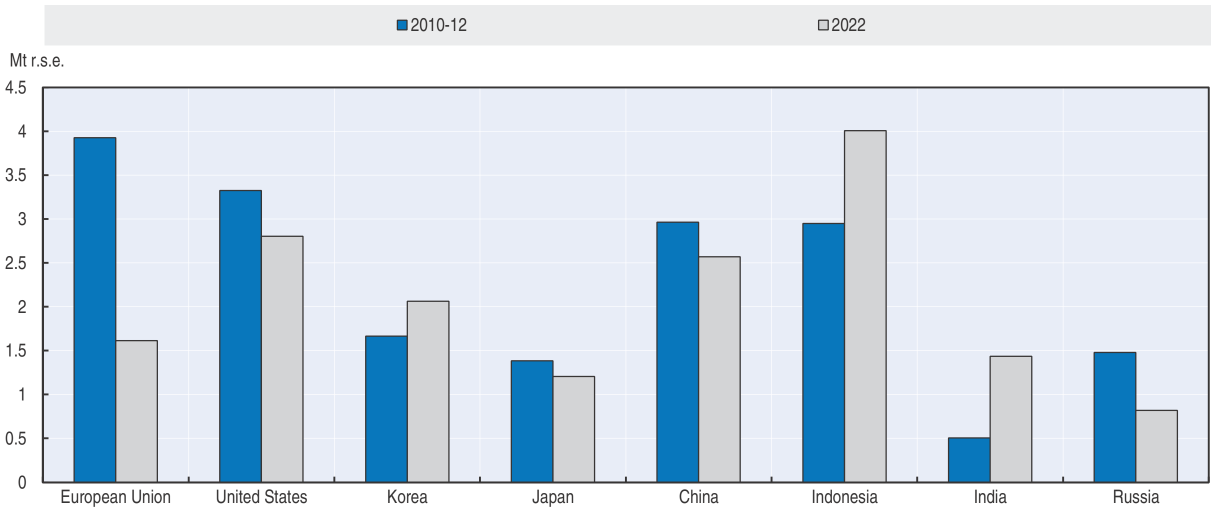
Figure 6.11. **Sugar imports remain more diversified and lead by Indonesia, the US and China**



Source: OECD and FAO Secretariats.

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First and foremost among the factors accounting for the growth in world sugar trade has been the rapid expansion of Brazil's sugar cane production and sugar industry. This growth has lead to a rapid surge in its sugar exports from 1-2 Mt in the beginning of the 1990s to an average of 25 Mt in the base period. A further rise is projected with exports to increase by 28% to reach nearly 32 Mt by 2022. This level of projected trade reflects further growth in cane production and higher export returns as the *Real* currency is projected to weaken over the coming decade. The majority of Brazil's exports have been of high quality raw (VHP) sugar and this has been accompanied by substantial investment in refining capacity around the world to further refine the raw sugar into white sugar. The historical emphasis on raw sugar shipments by Brazil is projected to continue over the coming decade, with raw sugar exports rising to 20.4 Mt in 2022, although the share of white sugar exports will also increase to meet demand in those destinations without installed refining capacity.

In other developments, expanding domestic sugar output is projected to result in substantially higher exports by Thailand that expand by a projected 45% to reach over 10 Mt in 2022. Moderately higher exports are projected for Australia to reach 3.8 Mt and for Mexico shipments increase to around 1.6 Mt, all by 2022. Increasing use of HFCS in Mexico is projected to release additional quantities of sugar for export to primarily the US market that would otherwise be intended for domestic consumption. In the case of the Russian Federation, higher production leads to substantial import replacement, with imports declining to 0.8 Mt from an average of 1.5 Mt in the base period. For Indonesia, imports continue to expand to reach a projected 4 Mt by the close of the projection period, making it a substantial sugar importer. Faster growth in sugar demand is projected to outstrip the growth in production of sugar in China and with imports projected to rise to 2.6 Mt by 2022 and to remain above China's TRQ level established at the time of its accession to GATT/WTO, throughout the projection period. As part of its accession agreement on joining the GATT/ WTO in December 2011, the Russian Federation undertook to review its existing sugar trade arrangements with a view to further market liberalisation. Further production growth in the Russian Federation is expected to result in additional import replacement of raw sugar.

Under the current sugar regime, the European Union has an import requirement of around 4 Mt of sugar p.a. The majority of these large imports, which can impact world sugar markets, enter duty free under preferential agreements while others are subject to import duties. With the elimination of production quotas sometime during the course of the projection period, the European Union is projected to become more self-sufficient in sugar production. Existing import requirements are projected to shrink substantially to a projected 1.6 Mt in 2022 (with exports of 1.3 Mt). This change could have potentially large and negative implications for existing preferential suppliers to the EU market from the EPA and EBA countries due to the erosion of preferences with the lower return that they could expect to receive from such shipments. EU sugar refiners, which rely on imports of raw sugar for further refining, will also face increased uncertainties as to the quantity of future raw sugar imports that will be available following quota removal.

Main issues and uncertainties

A substantial easing in prices is expected in the world sugar market at the beginning of the *Outlook* period with record production leading to a large sugar surplus and an acceleration of stock building. This more comfortable supply situation has been accompanied by a reduction in sugar price volatility. However, global stocks-to-use of sugar is expected to tighten over the *Outlook* as steady demand growth eats away the production surplus. With a tighter market balance expected in coming years, sugar price volatility is likely to be a continuing feature of the global sugar market. Any unforeseen production shocks in major producing countries such as Brazil, India and Thailand could radically change the *Outlook* and lead to further periods of price surges and bouts of high market volatility, to the detriment of all market participants.

The projection of continuing structurally higher and remunerative world sugar prices is predicated on the assessment that sugar demand will remain resilient and strenghthen over the *Outlook* period and with growth concentrated in the developing countries. Higher demand in these countries, driven by population growth, rising incomes and continuing urbanisation, is expected to outpace the growth in supply, on average, and hold prices above the pre-2007 decade level. For this outcome to be realised, an additional factor in the equation is the projected strong demand and increasing allocation of sugar cane in Brazil for ethanol production. The demand for ethanol in Brazil is based on meeting the needs of a large and growing fleet of flex-fuel vehicles capable of running on petrol or hydrous ethanol (or any blend of the two fuels) and increasing exports primarily to the United States and the European Union, driven by government use mandates in those countries. However, any extended disruption in the demand for ethanol could have serious repercussions for the world sugar market as large sugar cane supplies initially destined for ethanol production are switched or redirected into additional sugar production and exports. These additional exports in a time of existing sugar surplus would have adverse impacts on the world sugar market, potentially returning it to the depressed prices of the past.

Less specific uncertainties for sugar concern the prospects for the global economy and the implications of the uncertain situation in Europe and the slow recovery in the United States on the growth in the rest of the world in weighing down prices. Any marked slowdown in world economic growth and activity would have an adverse impact on industrial demand for sugar (food manufacture, preparations and beverages, chemical use and for biofuels), which have come to dominate sugar use in developed countries and which is also becoming more important in the fast growing developing and emerging countries as well.

A further factor contributing to uncertainties in the *Outlook* is the continuing heavy role played by government interventions in sugar markets in many countries. Due to these policies, world sugar price changes do not feed through to prices in local markets immediately. Policy instruments, to support local sugar industries and reinforced by border measures, can mean that the transmission of world price signals to domestic markets can be slow or even minimal in some cases. Depending on the size of national markets, changes in domestic support policies and border measures can impact world sugar markets and, thus, remain a significant uncertainty for the sugar *Outlook*. In the period ahead, policy uncertainties include the duration of sugar production quotas in the European Union after 2015, the next US multi-year farm legislation to replace the FCE Act of 2008, as extended for one year, possible deregulation of sugar prices in India to address the longstanding production cycle, continuing controls on industrial processing of maize (and HFCS production) in China and future bilateral and multi-country free trade agreements, some of which contain provisions affecting sugar trade.

Chapter 7

Meat

Market situation

The market situation for the meat sector is generally characterised by high nominal output prices, underpinned on the demand side by rising incomes from rapid growth in the developing countries, and on the supply side by high input costs, notably for feed grains, energy related inputs and labour. The combined effect of higher output prices and increased production costs tend to favor production in developing countries, where low input production systems prevail. Meat production growth has slowed, notably for poultry which in the past has experienced the highest rates of output increases. Meat demand in developing countries continues to be strong as higher incomes and urbanisation lead to food consumption changes favouring increased proteins from animal sources in diets. Consumption levels have risen substantially in many emerging economies, particularly in China and other fast growing Asian countries in the last decade. However, per capita meat consumption has been stagnant in the OECD area over the last ten years. While growth in both production and trade is envisaged in the short term for poultry, pig, sheep and buffalo meats, bovine meat markets will initially be constrained by depleted herd numbers in major exporting regions, notably in the developed countries. Developing countries will continue to strengthen their role in dictating changes in global meat production, trade and consumption.

Projection highlights

- Meat prices will remain high in real terms over the next decade due to changing market fundamentals of slower production growth and stronger demand. Market tightening arises from the combined effect of high feed grain prices over the past six years which have substantially moved through the supply chain leading to reduced livestock producer margins and depleted livestock inventories in some of the major meat producing countries. At the same time, demand remains firm from rising incomes and population growth particularly in the emerging economies of the BRICS and more generally in many other developing countries.
- Global meat production is expected to grow at a moderate pace this decade, constrained by higher input costs and competing demand for land and water from alternative crops. Meat production growth is projected to slow to 1.6% p.a., compared to 2.3% p.a. in the previous decade. In the past decade, the key driver behind the fast pace of meat production growth was the poultry sector, but it will also be largely responsible for the rapid deceleration in meat production over the next decade. Poultry meat production growth slows from 3.7% p.a. in the last ten years to 1.9% p.a. in the projection period. Meat production growth is dominated by developing countries, which will account for approximately 80% of the additional output to 2022.
- World meat consumption continues to enjoy one of the highest rates of growth among major agricultural commodities. But in some parts of the globe, demand appears to be reaching saturated levels in per capita terms, leading to a slowdown in growth. The

Figure 7.1. **World prices[1] in both nominal and real terms expected to remain strong**

1. US Choice steers, 1100-1300 lb dressed weight, Nebraska. New Zealand lamb schedule price dressed weight, all grade average. US Barrows and gilts, No. 1-3, 230-250 lb dressed weight, Iowa/South Minnesota. Brazil average chicken producer price ready to cook.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932859933

Table 7.1. **Annual changes (% p.a.) in world meat production, exports and consumption per capita**

	Production		Exports		Per capita consumption	
	2003-2012	2013-2022	2003-2012	2013-2022	2003-2012	2013-2022
All meats	2.3	1.6	4.3	1.6	1.3	0.6
Beef and veal	1.2	1.5	1.7	1.6	0.2	0.5
Pig meat	1.8	1.4	4.8	0.8	0.7	0.4
Poultry	3.7	1.9	6.7	2.1	2.5	0.9
Sheep meat	2.1	1.3	0.3	1.3	1.0	0.3

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860826

pattern of slowing consumption growth may strengthen over the next decade. Although demand growth for poultry is also expected to slow in coming years, it remains the leader in the meat complex, due to its status as the cheapest and most accessible source of meat protein. As such, it is expected to account for nearly half of the additional meat consumed by 2022 relative to the base period (average 2010-12). In developing countries, annual per capita meat consumption will increase by 2.6 kg r.w.t. over the period, with poultry accounting for 60% of this increase. Growth is led by the emerging economies of the BRICS which is projected to post a 4 kg r.w.t. gain in consumption, and if India is excluded, the average gain is a large 8 kg r.w.t. per person, reaching over 60 kg r.w.t. by 2022, and approaching the level of 66 kg r.w.t. in the OECD area. While remaining high in per capita terms, consumption in the OECD area has largely been stagnant for the last decade, due to various factors including population aging and changing demographics as well as increased health and dietary awareness.

- World meat exports are expected to increase by 19% by 2022; i.e. an annual increase of 1.6% which compares to 4.3% p.a. in the previous decade. Poultry and bovine meat shipments are the primary drivers of export growth, which together account for 80% of the additional trade.

Market trends and prospects

Prices

In real terms, meat prices in 2012 stood at 15-20-year highs (Figure 7.1). They are projected to remain on a high plateau during the *Outlook* period, but will fall from current levels by 2022, with nominal prices for beef and sheep meat projected to be around USD 4 500/t c.w.e., respectively. Pigmeat and poultry meat prices are anticipated to increase to USD 2 243/t c.w.e. and USD 1 518/t r.t.c., respectively, in the same period (Figure 7.1).

A key factor that underpins high meat prices is rising production costs, notably feed. Feed costs will remain at high levels over the *Outlook* and impede supply response to rising demand. Meat-to-feed price margins as well as feed conversion ratios are expected to improve in the next decade, but these efficiency gains will not be strong enough to fully compensate for the detrimental effects on supply of high feed costs. For poultry meat, where supply typically shows a faster response to price and cost changes, adjustment to higher feed costs has already taken place, and real prices over the next decade are anticipated to remain flat, largely following the pattern of real feed prices

Production

World meat production is projected to grow more slowly relative to previous years, at 1.6% p.a. during the projection period. The deceleration is due not only to high feed and energy costs, but also the result of competition for land, water and labour from alternative crops which are also experiencing relatively high prices. Most of the production growth for meats will take place in the developing world (Table 7.1 and Figure 7.2)

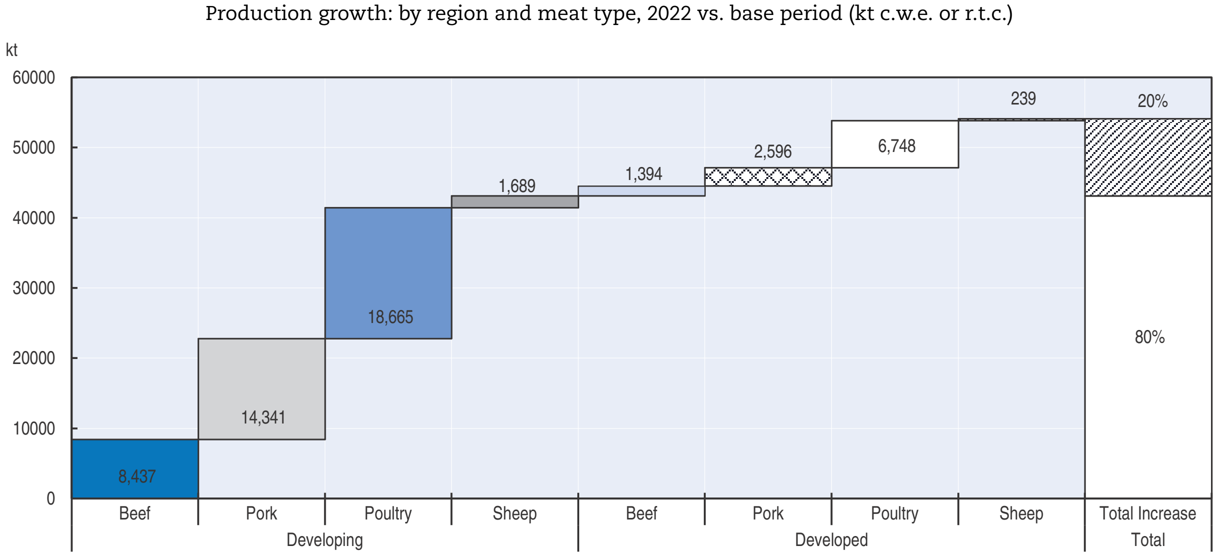
The projection indicates a strong deceleration of poultry meat output growth compared to past decades where it was the engine behind the notable expansion of total meat production. On a retail weight basis, poultry overtook pigmeat as the world's largest meat sector. Rapid growth was attained in a context of high efficiency in the conversion of grain to meat, and high productivity gains arising from increased technical efficiency and economies of scale. These gains are expected to be increasingly harder to obtain in coming years as existing production technologies are widely diffused. Global poultry production, which grew by a fast 3.7% p.a. in the last decade, is projected to grow 1.9% p.a. over the *Outlook*, reaching 129 Mt, or 37% of the global meat supply. Pigmeat production is projected to grow 1.4% p.a., reaching 127 Mt, or 36% of the world's meat supply. Global beef production, which has stagnated in recent years, is anticipated to start growing more rapidly as national herds rebuild, and may increase by 1.5% p.a. over the *Outlook* attaining 77 Mt, compared to a growth rate of only 1.2% p.a. in the previous decade. The share of beef meat in the global meat supply should remain at about 22% over the next decade. Sheep meat, at a 5% share, is projected to grow by 1.3% p.a., reaching 16 Mt by 2022.

Productivity growth in the meat complex, which has been significant in recent years, is expected to decelerate in the next decade. In developed countries, further improvements in breeding and herd management practices, and especially improved feeding practices that have enabled rapid growth in meat production will be harder to come by as potential gains from technical efficiency and scale are progressively being achieved. For these countries, future productivity gains will depend increasingly on innovation and technology generation; i.e. on further investment in research and development (R&D). Conversely, in developing countries increasing productivity from wider diffusion of existing technology and the realisation of economies of scale is still anticipated in coming years, except perhaps in many African countries, where national extension services are poorly equipped and credit provision is poor.

In most of the BRICS economies, continuing productivity gains are expected from technology adaptation and diffusion, but with gains from scale expected to be harder to obtain because the industry is already highly concentrated. In addition to increased farm productivity, improvements in supply chain management, and in particular, cold chain management has and will continue to have a positive impact on the growth of the sector. Much room for improvement exists in regions where investments on manufacturing and other infrastructure have been limited, such as Sub-Saharan Africa.

Figure 7.2. **Meat production growth dominated by developing countries**

Production growth: by region and meat type, 2022 vs. base period (kt c.w.e. or r.t.c.)



Source: OECD and FAO Secretariats.

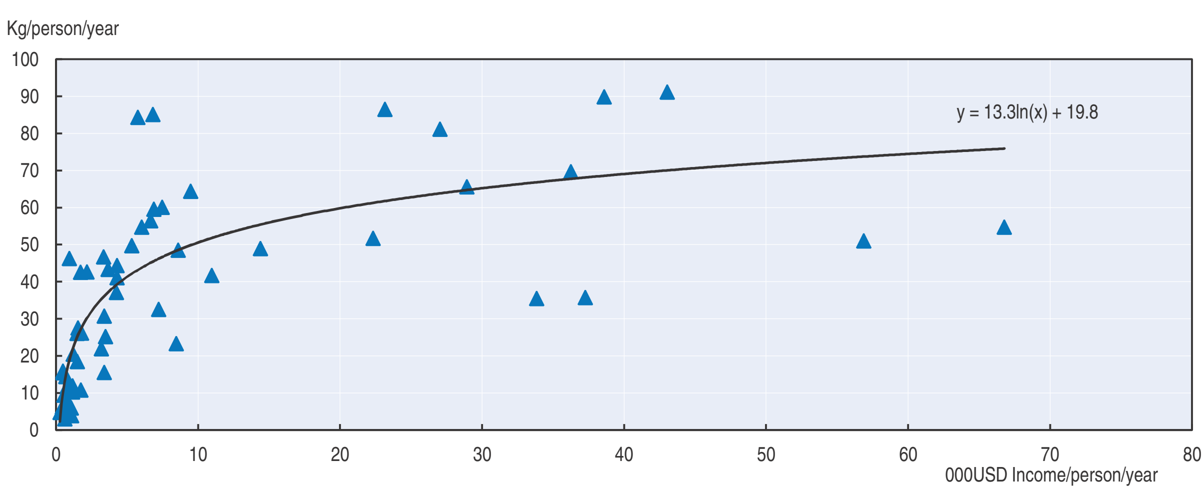
StatLink http://dx.doi.org/10.1787/888932859952

Consumption

In the longer term, the principal driver of production is product demand, with time lags associated with biological and technical limits depending on the type of meat. The demand for meat is determined by many factors, including cultural habits and religious observances. These factors do not change much over a decade. For example, India is largely a vegetarian country, and its per capita meat consumption is less than 5 kg per capita r.w.t. p.a. People in many countries do not eat pigmeat at all. Location also affects meat demand, as for instance in coastal areas or near large bodies of water, where the local population may have greater access and appetite for fish and related products. Countries with specific types of pasture land and climate may raise more sheep. Population demographics may also play an important role. People in cities tend, although not in all cases, to eat more meat than in the countryside. Countries in fast transition to higher urban and lower rural populations may see meat consumption rising more rapidly. Changing age structure affects the evolution of consumption as older people tend to consume less than younger people.

In the context of globalisation and the so-called westernisation of diets, key drivers of meat demand are real prices and incomes. Income growth provides not only additional spending power but also access to modern appliances which may or may not impact meat consumption such as access to refrigeration (Box 7.1). Especially at low levels of income, the sensitivity of meat demand to changes in income is very high. As incomes rise however, changes have less impact on meat demand. As shown in Figure 7.3, per capita meat consumption rises steeply with higher annual per capita incomes to about USD 6 000, but beyond that level consumption growth flattens considerably as income rises further. Of course, there is a wide variation around the curve fitted to the data, given that many other factors are also affecting meat consumption. The various factors at work in conditioning meat demand are very much evident in the projections for meat consumption in the *Outlook*.

Figure 7.3. **Sensitivity of meat consumption to income declines as income grows**



Source: FAO and OECD Secretariats. Data for 2012 by country and regions of the AGLINK-COSIMO model.

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Box 7.1. Will increasing household refrigeration lead to higher meat consumption in China?

Meat demand in China has increased rapidly with important consequences for domestic feed demand and world agricultural commodity markets. While real prices of meat increased by 42%, per capita income in China rose almost by 250% from 1998 to 2012, driving per capita consumption of beef, pigmeat and poultry to increase by over 40%, from 34.2 kg r.t.w. in 1997-99 to 44.3 kg r.w.t. estimated in 2011-13 (Table 7.2). The *Outlook* projects that meat consumption in China will increase another 20% over the next ten years, based on factors such as continued high income growth, price prospects, changing diets and urban migration.

Table 7.2. Per capita consumption and real prices

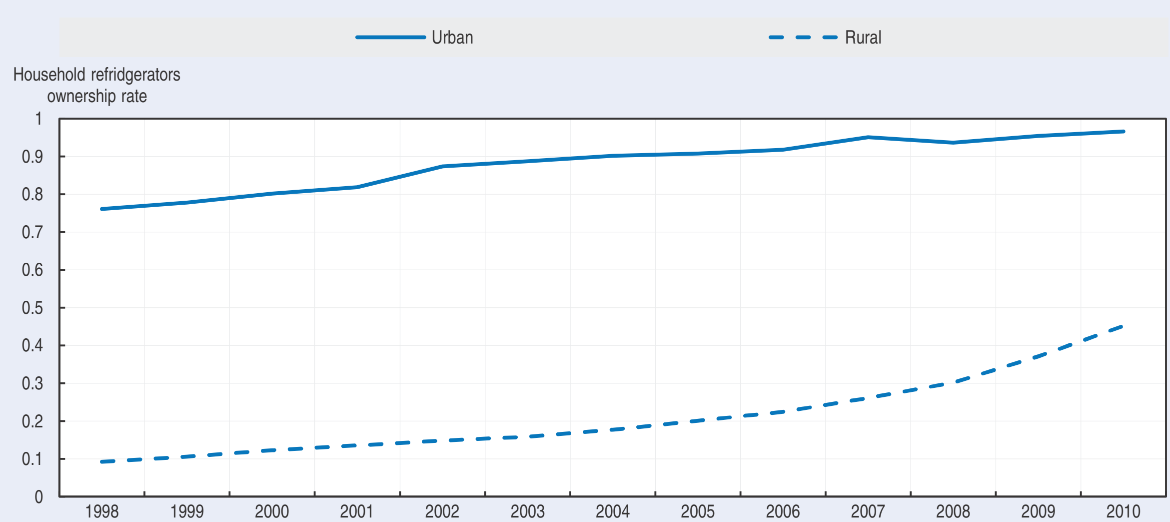
	1997-99	2004-06	2011-13	2022
Consumption, kg per person r.t.w.				
Beef	2.6	3.0	3.3	3.8
Pig meat	23.6	26.6	29.5	34.1
Poultry	8.0	9.2	11.4	13.6
Total	34.2	38.8	44.3	51.5
Real consumer prices, 2012 CNY per kg				
Beef	20.0	25.1	47.5	49.0
Pig meat	20.3	21.3	27.1	23.2
Poultry	14.7	14.6	19.4	17.3
Weighted average	19.0	20.0	26.7	23.6

Source: OECD and FAO Secretariat.

StatLink http://dx.doi.org/10.1787/888932860845

Rapid expansion of household refrigerator ownership has been evident over the last several decades. The increase in refrigerator purchases is explained in part by rising household incomes, but also by subsidised consumer purchases. Purchases of refrigerators were subsidised in Shandong, Henan and Sichuan Provinces from late 2007 and were implemented throughout China by early 2009. Refrigerator ownership has expanded most rapidly in rural areas (Figure 7.4).

Figure 7.4. Recent growth in refrigerator ownership in China



Source: Chinese Statistical Yearbook, various years.

StatLink http://dx.doi.org/10.1787/888932859990

Box 7.1. **Will increasing household refrigeration lead to higher meat consumption in China?** *(cont.)*

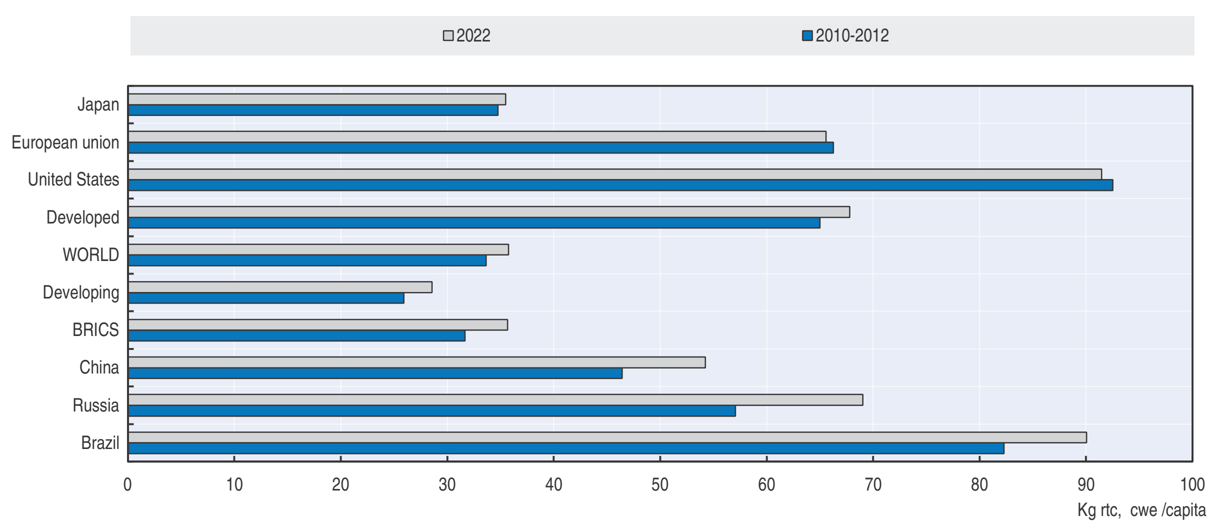
The effects of refrigerator ownership on home meat consumption have not been widely studied, even though this has been a major trend in China for many years. Available studies are dated and have mixed results (Lyon and Durham, 1999; Gale et al., 2005; Zhao and Thompson, 2013).[1] Some studies suggest refrigerators have led to an increase in meat purchases by allowing consumers to store meat longer, making consumption more convenient and practical. Other studies suggest a negative relationship as refrigerators reduce meat waste while, at least temporarily, the purchase restricts consumer expenditures on meat.

The *Outlook* suggests that meat demand in China will continue to increase over the next ten years but these projections may over or underestimate actual growth depending on the net effect of increased household refrigeration. In rural China, the potential for increased household refrigeration is still very large. If, for example, the net effect is positive, there could be a stronger expansion in future meat demand than might otherwise be expected based on price, income and diet trends. Greater than anticipated increases in meat demand would lead to higher prices of meats in China as well as some combination of increased meat production, with more use of grain and oilseed meal in feed, or more meat imports compared to the current *Outlook* projections.

1. Gale, F., P. Tang, X. Bai, and H. Xu. 2005. "Commercialization of Food Consumption in Rural China", *Economic Research Report*, ERS. Lyon, C. and C. Durham (1999), "Refrigeration and Food Demand in China: Can Refrigerator Ownership Help Predict Consumption of Food Products in China?" In: *Chinese Agriculture and the WTO*, Proceedings of the WCC-101, 2-3 December. Zhao, J. and W. Thompson. 2013. "The Effect of Refrigerator Use on Meat Consumption in Rural China", *Selected Paper*, Southern Agricultural Economics Association Annual Meeting, Orlando, Florida.

World meat consumption is projected to increase to 347 Mt by 2022, which on a per capita basis represents an increase of 6% relative to the base period. Though this growth is lower than in previous decades, meat consumption remains one of the fastest growing foods among the major agricultural commodities. In developing countries, where consumers will eat 84% of the additional meat consumed, per capita consumption will increase by 10% relative to the base period, with poultry accounting for 60% of the increase. Consumers in developed countries will eat on average 4% more meat per capita, with poultry accounting for 87% of the additional meat consumed (Figure 7.5 and Table 7.1).

Figure 7.5. **Increase in meat consumption, by region between 2022 and the base period**



Source: OECD and FAO Secretariats.

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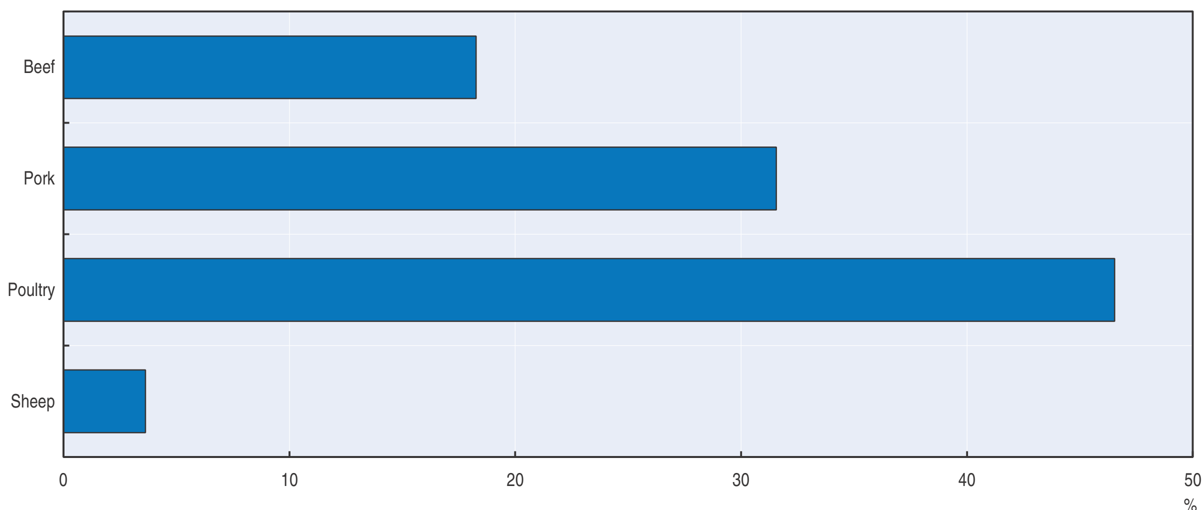
Poultry and pigmeat are the most popular meat products consumed worldwide today, occupying two-thirds of the "meat basket". Generally speaking, half of the global increase in meat consumption is accounted for by poultry meat (Figure 7.6). Consumers in developed countries, with an aging population and already high rates of per capita consumption, are not projected to significantly increase animal protein intake. Also, consumers in developed countries are increasingly more concerned by meat production systems, food safety and animal welfare which may also impact on their consumption pattern. In developing countries, conversely, per capita consumption growth continues to increase with income and population growth.

Figure 7.6. **Poultry shares of the additional meat consumed continue to dominate**

Share in percentages by meat type, 2022 vs base period



Source: OECD and FAO Secretariats.

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Pigmeat consumption is currently the highest, but eventually poultry meat is expected to gain some market share during the projection period. The combined share of bovine and sheep meats consumed in the world will remain unchanged at 27%. While red meats will see a progressive erosion of their share in the meat basket, there is one exception to this rule in buffalo meat. Buffalo meat originates from the culling of the Asian water buffalo which is used for milk production and traction. Buffalo meat is much cheaper than bovine beef and yet has similar organoleptic properties; it has found acceptance among consumers in developing countries and has become an attractive proposition to traders, notably from India where slaughter of bulls and unproductive heifers is allowed.

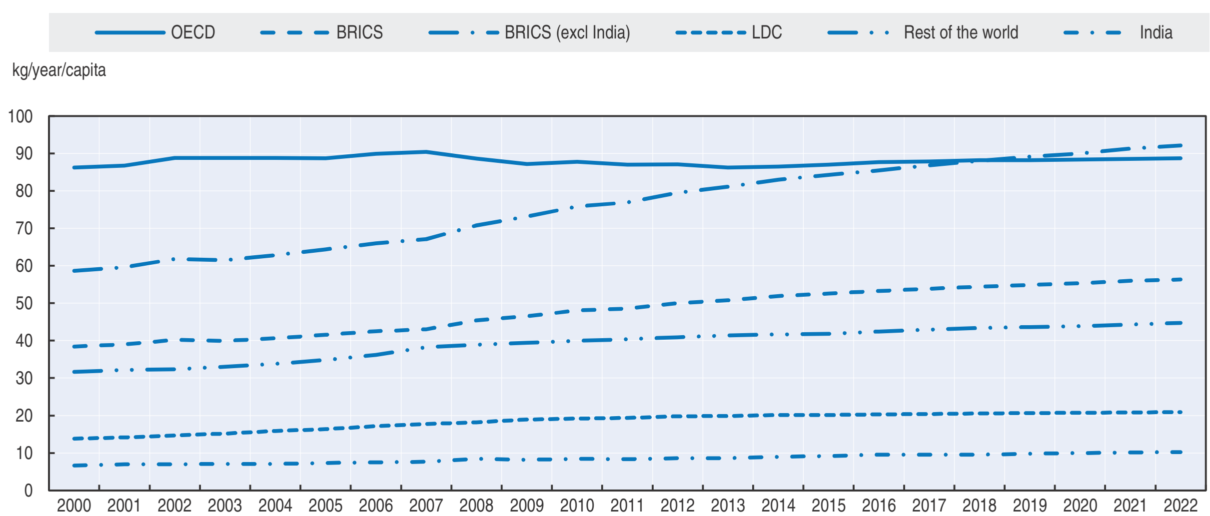
One longer term question is whether there may be a limit to per capita meat consumption growth.* Given current trends, convergence in consumption patterns is occurring, albeit slowly and from a highly dispersed base. It is highly unlikely that countries would tend to one "standardised" consumption basket, but given various conditioning factors, what will be the various levels of meat consumption as economies mature? OECD

* This is because meat is relatively inefficient in terms of delivering calories and proteins. It may take 6-8 tonnes of grain/protein ration to produce a tonne of bovine meat c.w.e., 3-4 tonnes to produce a tonne of pigmeat c.w.e., and 2-3 tonnes to produce a tonne of poultry meat r.t.c. In addition, water requirements for livestock production are high, manure handling may be expensive and polluting, and greenhouse gas emissions can cause environmental problems.

countries provide a benchmark of a "mature" market. Including fish in the basket, the OECD area reached a peak meat and fish consumption of some 90 kg r.w.t. per capita in 2007, OECD consumption is expected to stay around 89 kg r.w.t. per capita by 2022, where it has remained for much of the last decade (Figure 7.7). Consumption in the BRICS has grown rapidly and is projected to rise by almost 6 kg r.w.t. per capita over the next decade. If India, which will add less than 2 kg r.w.t. per capita by 2022, is excluded, the average consumption of the group will rise by almost 13 kg r.w.t. per capita to 92 kg r.w.t. per capita by 2022, exceeding the OECD average. The combined group of OECD and BRICS (excluding India) comprise over 3 billion people for whom little additional aggregate meat and fish consumption is expected beyond 2022. Less certain are the long-term growth rates in countries with much lower per capita meat and fish consumption by the end of the projection period such as India (10 kg r.w.t.per capita by 2022) and the LDCs (21 kg r.w.t. per capita by 2022).

Figure 7.7. **Trends in per capita meat and fish consumption (r.w.t.)**

Per capita consumption in kg per year by region



Source: OECD and FAO Secretariats. Data on a retail weight basis.

StatLink http://dx.doi.org/10.1787/888932860047

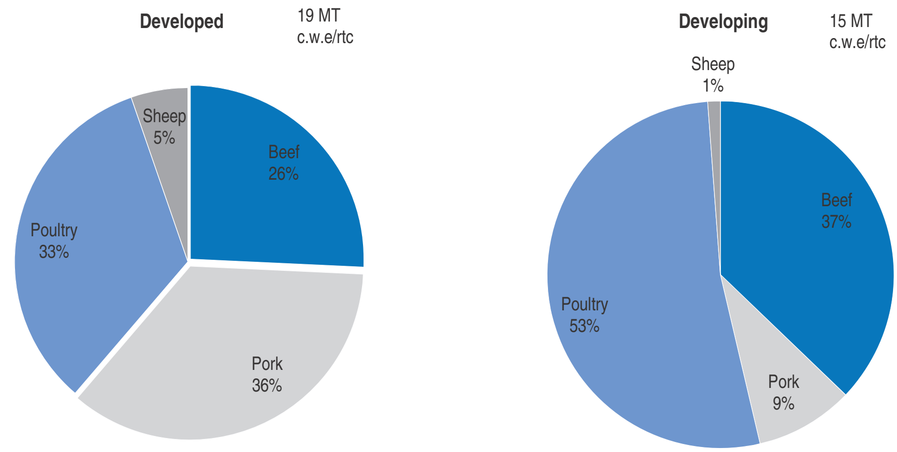
Trade

The primary drivers of trade reflect comparative production advantages and local demand factors affecting both importers and exporters. Export growth will be led by poultry and bovine meat shipments. World meat exports are expected to increase to 35 Mt, a 19% growth by 2022 compared to the base period. This is an annual increase of 1.6% which compares to 4.3% p.a. in the previous decade. World imports of meat continue to be dominated by several countries notably Japan, the Russian Federation, Mexico, Saudi Arabia and Korea. World exports will originate from both developed and developing countries, though pigmeat trade will continue being dominated by developed countries (Figure 7.8).

Led by Brazil, the United States and India, beef trade is expected to continue to increase during the *Outlook* period. Beef exports from the United States will expand, *inter alia* from greater access to Japan which has relaxed its cattle slaughtering age restriction. Brazilian beef exports are projected to undergo a steady growth in line with an expected expansion of domestic output and sustained import demand from the Middle East. Australia beef exports are also expected to rise as a result of increased demand from the United States, South-East

Figure 7.8. **Share of export of beef, pigmeat, poultry and sheep in 2022 by regions**

Overall meat export to reach nearly 34 Mt by 2022 a 13% increase from the base period 2010-12



Source: OECD and FAO Secretariats.

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Asia and the Middle East. India has substantially expanded its exports of buffalo meat, with export unit values on average one dollar per kg cheaper than other beef. This price margin gives it a substantial competitive edge in Asia and the Middle East, where developing countries, notably Viet Nam, have seen a rapid surge of buffalo meat imports. Brazil and India exports will account for half the increase in exports by 2022, compared to the base period.

Aggregate growth in pigmeat trade will be relatively modest during the *Outlook* period, but some changes in the composition of trade are expected. North American pork shipments will increase faster than those from the rest of the world, and the region will become the dominant player in world markets, particularly in the Pacific market. Exports from Brazil, which until recently were expanding rapidly, will slow as a result of an increase in domestic consumption. Eastern Europe, South America and China are expected to remain the main destination of Brazil exports. Russian imports are projected to be stable as government policy stimulates domestic production which is gradually matching the growth in Russian demand. EU exports will stagnate due to the combined effect of a strong Euro and higher production costs due to among others higher oil prices and the implementation of stricter animal welfare requirements. Nevertheless, the European Union will maintain its position as a large pigmeat trader. Japan remains the leading pigmeat importer despite its ageing and declining population. Net imports by China, where half of the world's pigmeat is produced and consumed, is expected to nearly double during the *Outlook* period. Nevertheless, the additional pigmeat imported would represent a small fraction of the vast Chinese market.

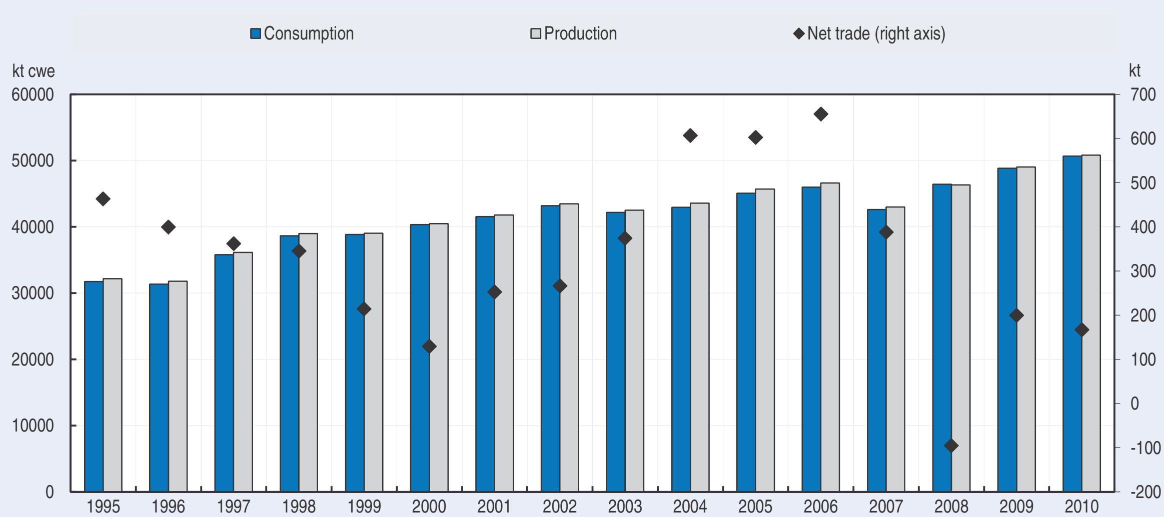
China's net trade position *vis-à-vis* pigmeat is a key uncertainty for world markets. Due to its extraordinary volumes both in terms of production and consumption, unforeseen events in China could easily induce import surges of pigmeat from the world market, with potential to severely impact international markets. Government policies will continue to support the pork industry through the scaling up of production and the modernisation of markets. These include buying into intervention stocks, setting up futures markets, and supporting R&D and the scaling up of production facilities. Maintaining its self-sufficiency levels in pigmeat over the ten year period will be a challenge for China. Management of land and increasing water constraints, for example, will play a major role in China's ability to remain self-sufficient in this meat (Box 7.2).

Box 7.2. **Increased Chinese pork import implications for world markets**

China is an emerging major player in the world pork market. In 2012, domestic production and consumption reached historical highs, representing over 45% of world totals. China's market presence is not only due to its leading position in pork production, but also increasingly due to the volatility it introduces to global trade balances and prices through import fluctuations. Over the past decade, China's domestic production and consumption has been increasing, although net trade has oscillated significantly (Figure 7.9).

Per capita pork consumption in China increased to 38 kg in 2012, up 13% in ten years. It is expected that pork consumption will continue its upward trend over the *Outlook* period, with average annual growth estimated at 1.6%. Coarse grain consumption in China represented roughly 18% (213 Mt) of world consumption in 2012, and is estimated to continue growing by 1.3% p.a. Historically, China has been mostly self-sufficient in pork and coarse grains. China's average self-sufficiency levels for pork and coarse grains are roughly 100% and 95%, respectively, and are expected to remain at these levels over the coming decade. Maintaining these self-sufficiency levels in both commodities over the ten-year period will be a challenge. Management of land and water constraints, for example, will play a major role in China's ability to remain self-sufficient.

Figure 7.9. **China pork production consumption and trade**



Source: OECD-FAO Secretariats.

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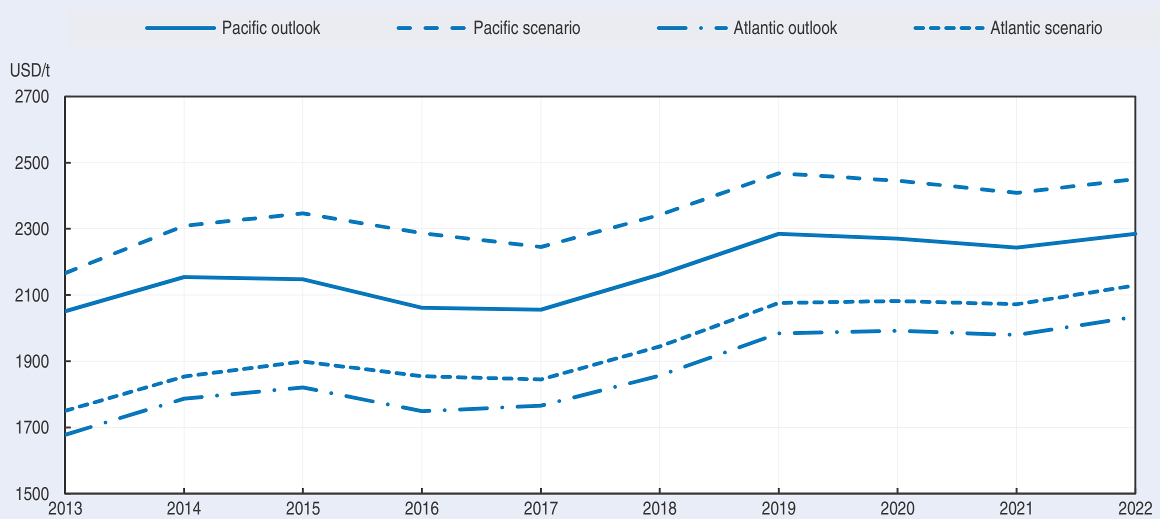
To examine the implications of lowering China's self-sufficiency in pork, a scenario analysis was undertaken that assumes lower growth in pork production until pork and coarse grain self-sufficiency levels are equal at 95%. Chinese pork production decreases, when compared to the baseline, by an annual average of 2.3 Mt (a 1% annual decline in self-sufficiency). As a counterbalance to this lower production, Chinese pork imports increase by an annual average of 1.5 Mt. These are distributed as follows among top Chinese pork suppliers: Pacific exporting countries (68% to 60%), the European Union (30% to 25%), and Brazil (2% to 15%) from 2013 to 2022. In 2012, following Chinese government approval of sanitary standards compliance, certain pork slaughterhouses from the Brazilian state of Santa Catarina gained access to the Chinese market. Year-to-date trade data indicate Brazil captured roughly 1% of Chinese imports. This scenario allows for a continued 1% annual growth in the share provided by Brazil over the *Outlook* period.

The increase in Chinese pork imports is sufficient to have international price effects. Since the Chinese imports are distributed among the European Union, the United States, Canada, and, to some degree, Brazil, prices would increase in both the Atlantic and Pacific pork markets (Figure 7.10). On average, the Atlantic,

Box 7.2. **Increased Chinese pork import implications for world markets** *(cont.)*

Pacific, and European Union pork prices would increase by 5%, 8%, and 5%, respectively, over the *Outlook* period. Also, with Chinese pork imports more than doubling in the scenario, it is assumed that domestic pork prices become more linked to world prices. These price increases are somewhat fully transmitted to the domestic pork price in China (6% annual average increase), resulting in some reduction in domestic consumption.

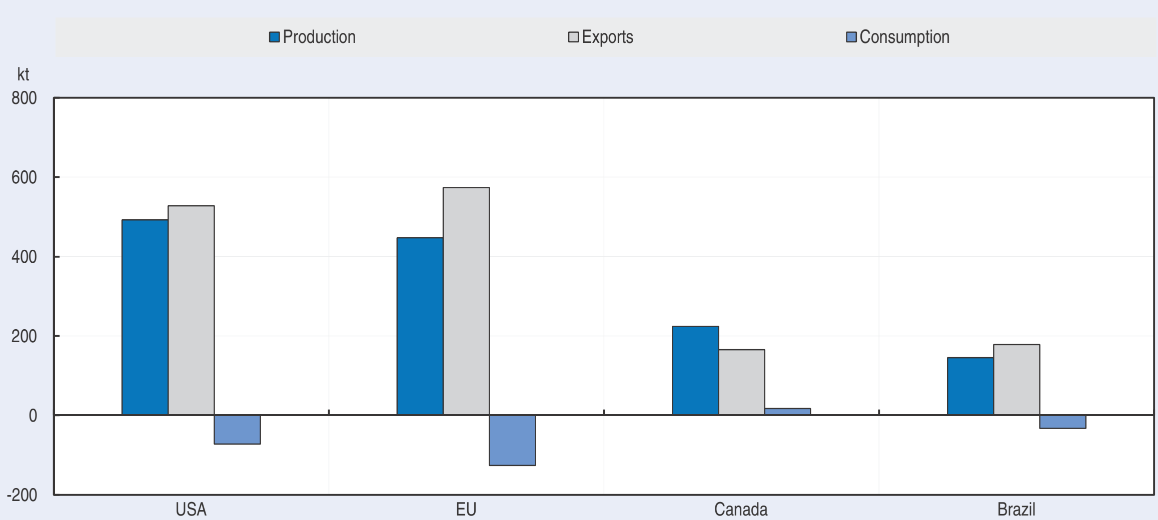
Figure 7.10. **Projected world pork prices under the scenario analysis**



Source: OECD-FAO Secretariats. **StatLink** *http://dx.doi.org/10.1787/888932860104*

By the end of the projection period, the higher world prices increase pork production in the United States, the European Union, Canada and Brazil by 4%, 2%, 9%, and 4%, respectively. The United States would see the most significant increase in pork export volume by 2022 followed by the European Union, Canada, and Brazil (Figure 7.11). Consumption would fall slightly in each of these countries. With higher domestic pork prices, the Chinese pork consumption falls by an annual average of 730 kt (-1.3%), somewhat mitigating the increase in Chinese imports.

Figure 7.11. **Projected pork production, consumption and exports under scenario analysis: volume changes from the baseline in 2022**



Source: OECD-FAO Secretariats. **StatLink** *http://dx.doi.org/10.1787/888932860123*

Box 7.2. **Increased Chinese pork import implications for world markets** *(cont.)*

Lower growth in pork production over the *Outlook* period decreases domestic feed demand. Since the Chinese coarse grain market is highly self-sufficient, the decreased demand is mostly absorbed by domestic production and stocks with little impact on world markets. This results in lower domestic coarse grain prices, increasing food consumption, production of coarse grain based sweeteners, and other uses (Table 7.3).

Table 7.3. **Projected Chinese coarse grain supply and demand under scenario analysis: % and volume changes from the baseline**

	%/yr	Kt/yr
Production	-0.4	-864
Feed demand	-0.9	-1 380
Food demand	0.5	86
Sweetener demand	0.8	76
Other demand	0.2	137
Net trade	-2.6	240
Stocks	-0.1	-84
Domestic price	-1.2	-

Source: OECD-FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860864

In poultry, a slowing down of annual trade growth is anticipated, from an annual rate of 6.7% in the last decade to 2% p.a. during the *Outlook* period. The largest contributors to growth are the United States and Brazil, both of which will strengthen their dominance of world trade. By 2022, the United States and Brazil are projected to generate two-thirds of the expansion of world poultry trade. Elsewhere, an interesting development is heavy investments by the private sector in the Ukraine, with an expectation to be able to fulfil a growing demand in domestic and export markets. World poultry import growth will be led by countries in the Middle East and Southeast Asia. Purchases by the Russian Federation, once the world's largest importer, will progressively decline following higher domestic production. Mexican imports will remain stable as per capita consumption has matured. Similarly, imports by the European Union are anticipated to stagnate due to favourable domestic demand and prices developments as the industry quickly adapts to changes in cost conditions.

Australia and New Zealand continue to be the world's largest sheep meat exporters over the *Outlook* period. Mutton exports from Australia are expected to grow faster than those of New Zealand lamb, driven by increasing demand from an expanding middle class in the Middle East and Asia. Demand in the European Union, another important market, will initially remain weak due to the on-going economic downturn. In New Zealand, lower prices and higher profitability of dairy farming will continue to encourage the conversion of sheep farms to dairy operations, albeit at a slower rate than in previous years, reducing the growth of export availability throughout the projection period. Conversely, attractive wool prices are expected to stimulate Australian sheep production and exports of mutton.

Key issues and uncertainties

Macroeconomic conditions and environmental pressures are two sources of uncertainty affecting meat markets in the medium term. More specific to the meat sector is the ever present danger of animal disease outbreaks. The potential sensitivity of market outcomes to this last issue needs particular attention. Any reduction in feed costs could also influence the meat sector. For example, the re-introduction of animal proteins in feedstuffs for fish such as the European Union is proposing to introduce in June 2013, could decrease feed grain use in the fishery sector and release supplies to the benefit of the meat sector.

In terms of macroeconomic conditions, meat remains one of the food commodities most sensitive to income growth, especially in low to mid-income countries where demand remains responsive to income growth. A slowing of economic growth in these countries will have considerable impact on markets. These impacts can be diverse and offsetting in nature. For example, while lower income growth may reduce the demand for meat, it may also create lower demand for fuel and reduce energy prices, with knock on effects to biofuel and feedstock prices and output with which meat production may compete.

Livestock inventories in this *Outlook* are projected to increase considerably. Environmental pressures and the associated mitigation costs are rising for the production of virtually all meats. New environmental taxes and legislation that condition production to environmental protection may affect investment in the sector. The livestock sector, and more precisely ruminants, is considered a key contributor to Anthropogenic Greenhouse Gas (GHG) emissions. More research is necessary to better assess and improve the environmental performance of the livestock sector, including the significant environmental services it can provide, with the aim of using resources more efficiently and creating more sustainable forms of production (e.g. improving off-take ratios – the ratio of meat output per livestock unit).

A number of animal disease incidents in the past have demonstrated the potential to adversely disrupt domestic and regional meat production and trade. Several cases of BSE have had widespread market impact. Swine influenza or swine "flu" caused considerable public concern in recent years. The African Swine Fever (ASF), a highly contagious hemorrhagic disease of pigs, could bring billions of dollars in loss to pigmeat industries if it should spread to European and Asian countries. With no vaccine or cure for the disease, mass culls and vigilant hygiene are currently the only defense. Countries and regions therefore value their disease-free status and make strenuous efforts to sustain it. Foot and Mouth Disease (FMD) is a case in point. The world beef and pigmeat trade is historically characterised by an Atlantic market and a higher price "FMD free" Pacific market. MERCOSUR member countries generally export to the lower price Atlantic market but access to the more lucrative Pacific market remains a strong incentive for MERCOSUR countries to seek the same "FMD free" status. The integration of the MERCOSUR into the Pacific market would bring significant changes to global meat production and consumption (Box 7.3).

Disease outbreaks of zoonotic scope, such as the Chinese highly pathogenic avian influenza H7N9 or the H7N3 Mexican outbreak, also loom as potential factors that could impact markets significantly not only across meat sectors, but also consumer behaviour. The 2003 episode of Bovine Spongiform Encephalopathy (BSE) in the United States is an example where impacts on world meat trade have proved severe when the country

Box 7.3. **Market impacts of MERCOSUR achieving "Foot and Mouth Disease (FMD) Free" status**

World beef and pork trade is generally characterised by an Atlantic market and a higher price "FMD free" Pacific market. MERCOSUR member countries generally export to the lower price Atlantic market but access to the more lucrative Pacific market is a strong incentive for MERCOSUR countries to seek the same "FMD free" status.

This scenario analysis estimates the impacts of MERCOSUR countries' integration into the Pacific market, thereby increasing competition for the price premium markets. MERCOSUR member countries are the main red meat suppliers in the Atlantic market and a partial shift to Pacific markets would leave current importers (Europe, the Middle East, South America) with a significant reduction in supply, forcing arbitrage between the Pacific Rim and Atlantic markets. This arbitrage is implemented in the model with no quality premium given to the Pacific beef and pork prices.

This price and market unification lead to an average annual decrease in Pacific Rim beef and pork prices of -15.2% and -8.3%, respectively, over the *Outlook* period (Table 7.4). The tariff rate quotas that North America has maintained through the Uruguay Round Agreement Act (URAA) would become binding from 2015, preventing the full reduction in domestic prices. Domestic pork sectors in the Pacific Rim do not have this protection, resulting in a more complete price transmission. Atlantic beef and pork prices would increase by an annual average of 9.5% and 6.8%, respectively, over the *Outlook* period.

Table 7.4. **Impact of MERCOSUR's integration into the FMD free status red meat market**

Price differences with respect to the baseline (%), annual average 2013-22.

	Beef	Pork
Pacific	-15.2	-8.3
Australia	-13.1	-7.5
Canada	-10.4	-7.7
Mexico	-11.6	-6.6
New Zealand	-14.8	-7.4
United States	-10.4	-7.6
Atlantic	9.5	6.8
Argentina	3.4	5.2
Brazil	6.6	5.4
Russia	9.5	6.8
Uruguay	8.7	6

Source: OECD-FAO Secretariats.

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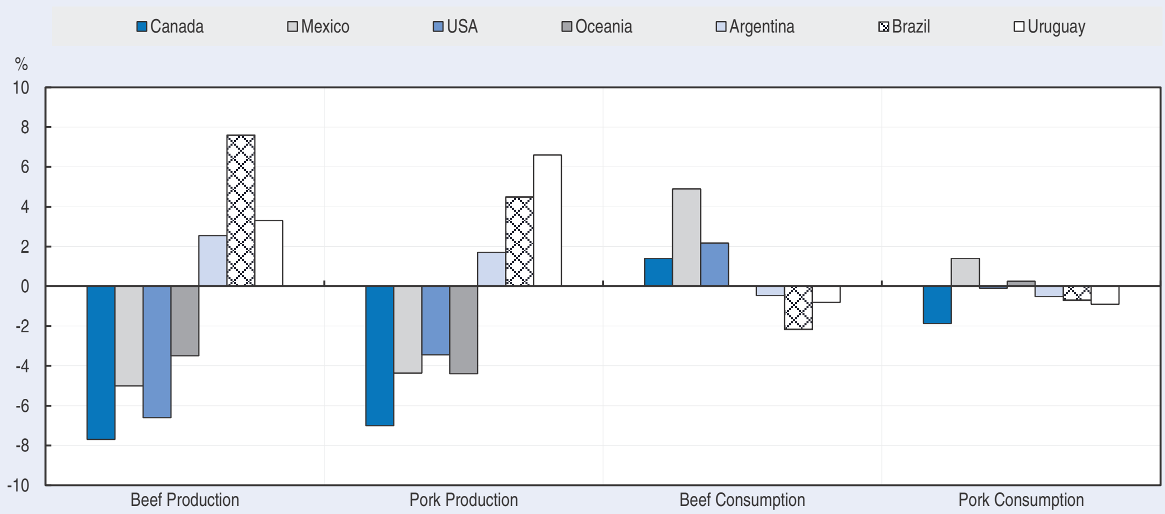
These price impacts bring significant changes to global production and consumption (Figure 7.12). Latent production capacity and price sensitive supply allows Brazil to realize the most pronounced increase in production (776 kt beef and 236 kt pork annually on average). US beef production decreases by an annual average of 6.2% over the *Outlook* period. Dependence on international pork exports results in a more pronounced decrease for Canadian pork production, relative to Mexico, the United States and Oceania.

Box 7.3. **Market impacts of MERCOSUR achieving "Foot and Mouth Disease (FMD) Free" status** *(cont.)*

Figure 7.12. **Impacts on production and consumption**

(% change from outlook, annual average 2013-22)



Source: OECD-FAO Secretariats.

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Despite lower Pacific pork prices, pork consumption decreases in Canada and the United States. This is attributable to the relatively larger decrease in Pacific beef prices and the high degree of substitutability between the two red meats. This is not the case for Oceania and Mexico as pork consumption increases marginally. Table 7.5 summarises total consumption and production impacts and demonstrates how consumption is more price elastic than production in the short-term, due to the lengthy biological lag in red meat production.

Table 7.5. **Red meat production and consumption (changes relative to outlook)**

	Consumption	Production	Production
	(2013-14)	(2013-14)	(2013-22 avg)
Atlantic	-602 kt	386 kt	1692 kt
Pacific	784 kt	-330 kt	- 1 924 kt

Source: OECD-FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860902

The global trade redistribution that could result from MERCOSUR integrating into the Pacific Rim red meat market was estimated at up to 2.5 Mt annually. Larger price adjustments in the beef sectors, relative to pork, result in higher beef trade redistribution. For example, Brazil and Argentina red meat exports expand by 53% and 20%, respectively (Table 7.6).

Its large market share, low exports relative to domestic production and highly sensitive price responsiveness positions the United States to lose to the largest export market share. Decreases in red meat exports from Canada, Australia, and New Zealand are smaller in comparison. Mexican cattle exports, however, increase marginally. This is due to Mexico not being subject to a US import limit of live animals and US prices remaining relatively higher than Pacific prices throughout the period of analysis.

Box 7.3. **Market impacts of MERCOSUR achieving "Foot and Mouth Disease (FMD) Free" status** *(cont.)*

Table 7.6. **Total red meat (including live animals) exports and imports ('000 t), annual average 2013-22**

	Export			Import		
	Baseline	Scenario	% change	Baseline	Scenario	% change
Pacific						
Australia	1 590.2	1 498.0	-5.8	354.5	372.6	5.1
Canada	3 033.3	2 191.3	-27.8	490.2	597.5	21.9
New Zealand	530.6	509.2	-4.0	52.2	54.6	4.7
United States	3 994.9	2 798.7	-29.9	2 675.3	2 828.9	5.7
Mexico	463.6	514.1	10.9	968.2	1 286.7	32.9
Atlantic						
Argentina	485.5	580.1	19.5	42.1	39.7	-5.6
Brazil	2 277.9	3 473.2	52.5	105.0	105.0	-
Russia	0.0	0.0	-	2 018.0	1 799.3	-10.8

Source: OECD-FAO Secretariats.

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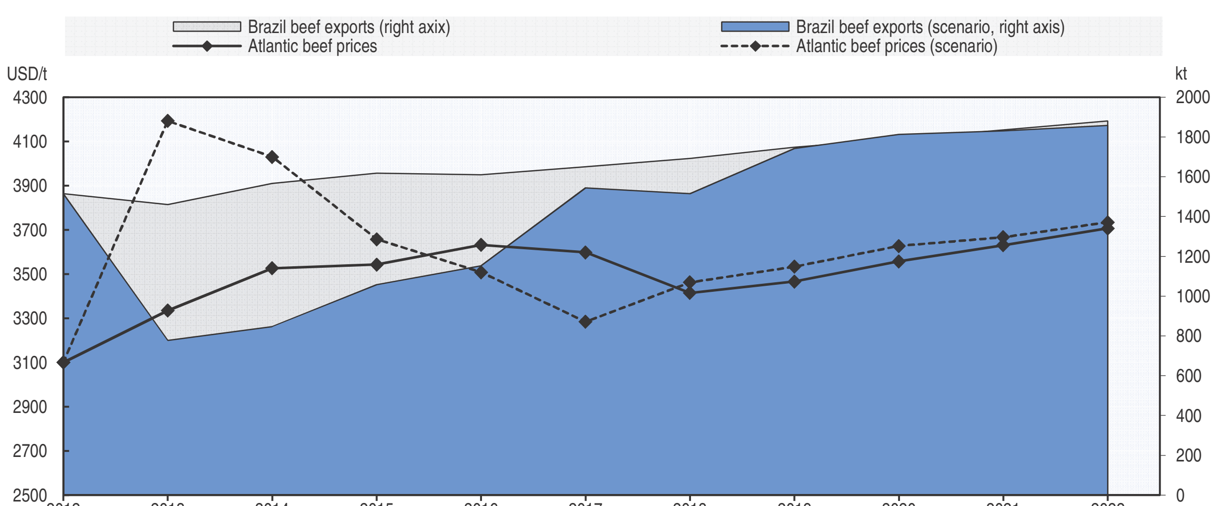
affected is a large exporter. BSE in the United States resulted in beef net exports falling by 60% in 2004 and only returning to pre-BSE levels in 2008. An isolated case of BSE in Brazil in 2012 did not affect exports but, for illustrative purposes, a decrease in Brazilian beef exports comparable to the US experience was simulated over the 2012-16 period using the AGLINK-COSIMO model. The simulated decrease in exports resulted in tighter global supplies and an increase in Atlantic beef prices of nearly 20% in 2012 (Figure 7.13). Higher beef prices in the Atlantic market would lead to reduced consumption, increased exports, or reduced imports for most countries; the exception here is Brazil, where low domestic prices would have stimulated domestic consumption.

Figure 7.13. **Brazil: scenario on BSE Impacts on beef exports and prices**



Source: OECD-FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860161

The world meat market is also highly fragmented from country-specific legislation on food safety and any new import restrictions pose a significant risk to the validity of the projections. These projections assume that no import bans with significant and long lasting effects on trade will occur during the *Outlook* period.

Chapter 8

Fish and Seafood[1, 2]

Market situation

The fish market is adjusting to recent supply and demand imbalances which have caused price fluctuations. The uncertain demand in many developed countries, representing the main importers of fish for human consumption, has encouraged exporters to develop new markets in a number of emerging economies that still show healthy demand. After a period of strong growth in 2011 and early 2012, the fish sector experienced a slower expansion. Preliminary data indicate that total fishery production continued to rise in 2012 setting a new record at 157 Mt, due to a 6% rise in aquaculture production over 2011. Subsequent to the 5% increase experienced in 2011, capture fisheries declined by more than 3% in 2012 due to lower catches of anchoveta in South America. These reduced catches also triggered a decline in fishmeal and fish oil production with subsequent strong price increases, negatively affecting poultry, pig and fish producers reliant on these products as feed ingredients.

During 2012, the value of trade set a new record at more than USD 129.3 bn, but it was only a modest increase over 2011 (+1.5%) as international prices of fish and fishery products for human consumption have been under downward pressure in 2012. This was due to farmed fish species, while prices of captured fish have increased. The price dip was the result of a reduced consumer demand in many key markets. These tendencies were reflected in the FAO Fish Price Index, which shows international fish prices sliding by almost 6% in 2012 compared to 2011 for total fisheries products, but by more than 17% if taking into account only farmed fish.

Projection highlights

- The fish market outlook for the decade ahead reflects the response to growing production costs in a context of steady demand, particularly from developing countries. Higher nominal prices are expected for fish, fishmeal and fish oil.
- World fisheries and aquaculture production is expected to reach about 181 Mt by 2022, a 18% growth compared to the 2010-12 base period. Most of the production gains will come from aquaculture, which will increase by 35% over the *Outlook* period. However, aquaculture production growth is anticipated to slow to 2.4% p.a., compared to 5.9% for the previous decade.
- During the *Outlook* period, the annual growth rate of fish consumption will slightly decelerate (from 1.8% to 0.6%) due to higher fish prices and a slowing of population growth. Additional fish consumption expansion will mostly originate from developing countries, which will also continue to dominate production and exports.

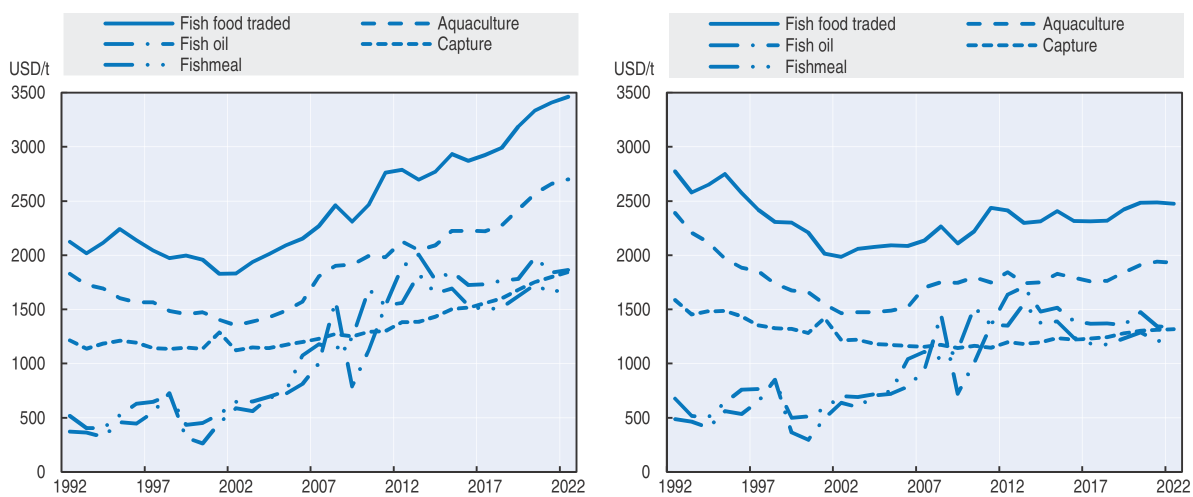
Market trends and prospects

Prices

The fish sector is expected to enter into a decade of higher prices and production costs, with fisheries prices projected to increase over the medium term in nominal and real terms (Figure 8.1).This tendency will be the outcome of several factors affecting the underlying positive trend in demand, such as income and population growth, increasing meat prices and a generally weak US dollar. As well there are supply reducing factors such as, a limited potential for increased capture fisheries production and cost pressure from some of the most important input factors such as energy, fishmeal, fish oil and other feeds (crucial ingredients for fed aquaculture species). The average price for capture fisheries landings (excluding fish for reduction) should increase faster than for fish raised in aquaculture (39% *versus* 33%) during the *Outlook* period. However, the overall price of fish caught in the wild will remain lower than that for farmed fish, partially explained by the increasing share of lower value fish in overall catches.

Figure 8.1. **World prices in real terms expected to remain high**

Nominal (left figure) vs real (right figure) fish prices



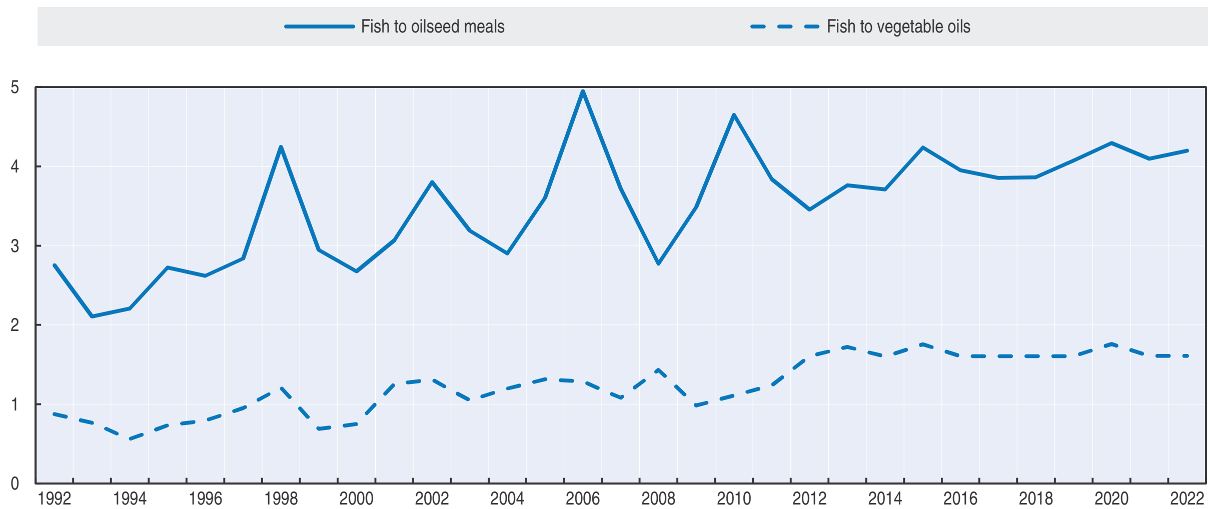
Note: Fish food traded: world unit value of trade (sum of exports and imports). Aquaculture: FAO world unit value of aquaculture fisheries production (live weight basis). Capture: FAO estimated value of world ex-vessel value of capture fisheries production excluding for reduction. Fishmeal: 64-65% protein, Hamburg, Germany. Fish oil: any origin, N.W. Europe.
Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860180

Driven by stronger global demand than supply, prices of fishmeal and fish oil will continue to increase in nominal terms between the 2010-12 base period and 2022, by 6% and 23%, respectively. However, since prices of fishmeal are starting from very high levels, a small decline is expected in selected years of the *Outlook*. Real prices are expected to weaken, while remaining at a higher plateau in historical terms. The tight supplies of fishmeal and fish oil are expected to contribute to an increase in the price ratio between fish and oilseed products over the medium term. In the case of meal, the expected rise in the price ratio is due to the persistent preference for fishmeal in certain stages of animal rearing (e.g. for pigs and salmon). The price ratio of fish oil to oilseed oils is also expected to increase because of the growing demand for the omega 3 fatty acids contained in fish oil (Figure 8.2). This growth in the price ratios will be exacerbated in *El Niño* years (assumed in the model for 2015 and 2020[3]), which will further constrain supply and support higher prices. This climatic phenomenon reduces production of fishmeal and oil derived from anchoveta and other species in the affected region.

Figure 8.2. **Price ratios between fish and oilseeds expected to increase**

Ratio



Source: OECD and FAO Secretariats.

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Coarse grains and fishmeal are both used as ingredients for raising fed aquaculture species. The price ratios of aquaculture species relative to those two important feeds have been on a downward trend at least since 1990. Before 2006 this was due to the strong growth in productivity of the aquaculture sector. After 2006 the decline was also due to the passage of feed prices to a higher plateau. This structural change affected the profitability of all animal raising activities and it is only recently that the supply of red meat has fallen sufficiently to reverse the trend. Since meats are strong substitutes to fish, the increasing ratio in meat is expected to contribute to a similar change in the price trend of the aquaculture sector at least in relation to coarse grains. The ratio of the price of fish raised in aquaculture to the fishmeal price will gradually stabilise over the projected period and should return to the levels before the *El Niño* of 2010 and the drought experienced in 2012.

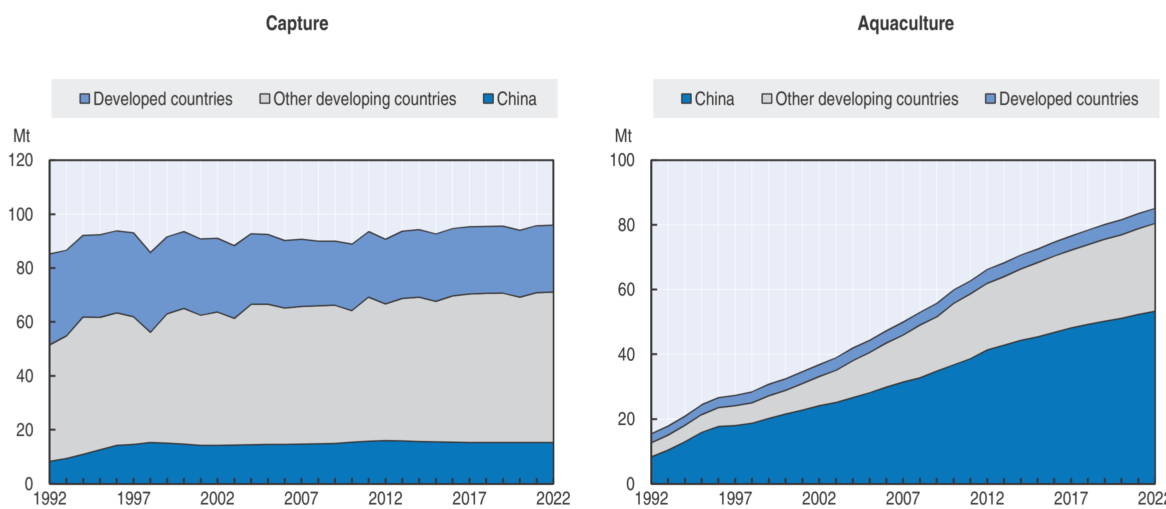
The average price of traded fish products for human consumption will continue its increasing trend, growing by 30% during the *Outlook* period. It will also grow in real terms, while remaining below the levels reached at the beginning of the 1990s. For individual fisheries commodities, the price volatility could be more pronounced due to supply swings caused by changes in catch quotas, the cyclical production of certain species and/or disease outbreaks as well as fluctuations in feed costs. Over the next decade, as it comes to represent a larger share of total fish supply, aquaculture could have a stronger impact on price formation in the sector overall. Furthermore, high feed prices could alter the species composition in aquaculture, towards those requiring less expensive or no feed.

Production

Under the set of assumptions used in this *Outlook* and boosted by higher demand for fish, world fisheries production is projected to continue expanding over the baseline period, reaching 181 Mt in 2022 (Figure 8.3), of which 161 Mt is destined as food for human consumption. This represents an increase of about 18% over the 2010-12 base period, at an annual growth rate of 1.2% p.a., a reduction compared to the 2.1% p.a. of the previous decade. Notwithstanding the slower growth rate, total fishery production volume will continue to exceed that of the individual beef, pork or poultry sectors.

Figure 8.3. **Developing countries will continue to dominate fish production**

Fishery production in live weight equivalent



Source: OECD and FAO Secretariats.

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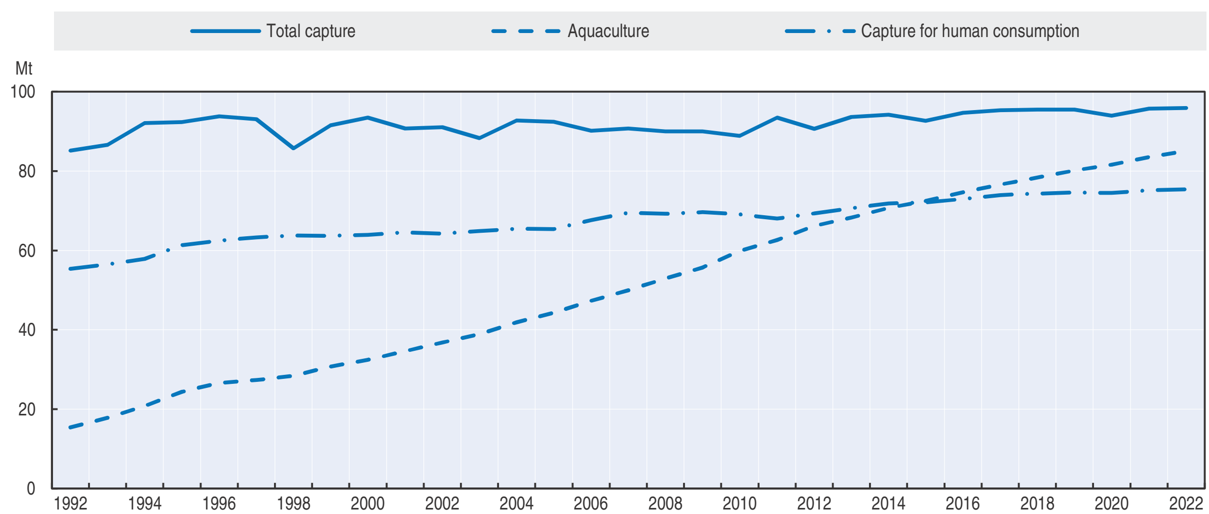
Capture fisheries production is projected to slightly grow by 5%, going from about 91 Mt to around 95 Mt over the next decade. Improvement is tied to stock recovery resulting from improved resource management. Other factors include some growth in the few countries not subject to strict production quotas and enhanced use of fishery production, including reduced discards, waste and losses as required by changes in legislation or stimulated by higher prices in the market. In 2015 and 2020, a 3-4% decline of capture fisheries is projected as a consequence of the *El Niño* phenomenon. The bulk of production will originate from Asian countries, which will slightly increase their share in world capture fisheries from 54% to 55% over the *Outlook* period, while the share of OECD countries is expected to decline from 29% to 27%.

Additional growth in fishery production will originate predominantly from aquaculture, expected to reach 85 Mt in 2022, a 35% increase compared to the average level for 2010-12. Its average annual growth rate should decelerate from 5.9% in the previous decade to 2.4% going forward. This decreased growth will be mainly caused by water scarcity, less optimal production location availability and the high costs of fishmeal, fish oil and other feeds, as around 50%[4] of the global aquaculture is dependent upon the supply of external feed inputs. In spite of the slower growth rate, aquaculture will still remain one of the fastest growing food-producing sectors.

Aquaculture is projected to increase from 41% of total production in the 2010-12 base period to 47% in 2022. In terms of fish destined for human consumption,[5] aquaculture should surpass 50% of the total for the first time by 2015, and this share should reach 53% by 2022 (Figure 8.4). Products derived from aquaculture will also contribute to a growing share of international trade while continuing to play a key role in food security with significant production, obtained also through integrated farming, of low-value freshwater species, mainly destined for domestic consumption. Aquaculture is expected to continue expanding in all continents in terms of new areas and species, as well as intensifying and diversifying the product range and forms in order to better respond to consumer needs. However, the global distribution of aquaculture production will continue to remain imbalanced, with China dominating world aquaculture production with an expected share of 63% in 2022. Through an alternative scenario, Box 8.1 examines the possible impact of a decelerated growth in Chinese aquaculture production. Asian countries, in particular China, India, Viet Nam and Indonesia, will produce 89% of world aquaculture volume, while OECD countries, with Norway and Chile as main producers, will have only an 8% share of the total in 2022.

Figure 8.4. **In 2015 aquaculture becomes the major source for human consumption**

Fishery production in live weight equivalent



Source: OECD and FAO Secretariats.

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Fishmeal and fish oil can be manufactured from whole fish, in particular small bony species including anchoveta, or from fish by-products resulting from processing such as heads, tails, bones and other offal. Due to the growing fish demand for human consumption and stricter management measures for anchoveta and other species, the portion of wild fish utilised to produce fishmeal and fish oil will gradually decline to around 16% by the end of the *Outlook* period. That share will be slightly smaller in the assumed years of *El Niño* due to reduced catches of anchoveta. In 2022, fishmeal and fish oil production should reach 7.0 Mt and 1.1 Mt, respectively, with an increase of 15% and 10% compared to the base period. About 95% of the additional gain for fishmeal will be obtained from fishmeal derived from fish by-products. Sustained demand and high prices for fishmeal, combined with reduced availability of raw material from whole fish and growing value-added fishery products for human consumption, will lead to more residues, which in the past were very often simply discarded, being used in fishmeal manufacturing. Fishmeal produced from fish by-products should represent 49% of world total fishmeal production in 2022 (Figure 8.5). This can affect the composition and quality of the resulting fishmeal with, in general, more minerals and less protein, which may hinder increased use in feeds. However, this issue is not something considered in the current *Outlook* baseline.

Box 8.1. **Possible impact of slower growth in China's aquaculture production**

China plays a dominant role in the world fishery sector, being by far the largest producer, exporter and processor, as well as one of the major importers of fish and fishery products. In particular, China has significantly increased its aquaculture production during the last two decades and, at present, it produces more than 60% of world aquaculture production (excluding aquatic plants). If in the past decades the focus for Chinese aquaculture has been on the expansion of farming areas and increasing output, more recently the focus has shifted to the structural adjustment of farmed species and quality enhancement.

The rapid growth of aquaculture production in China over the last 20 years may slow down as the industry has reached the limit of available land suited for this activity, especially for freshwater species. Technological improvements have compensated for the lack of new land and this is expected to continue to some extent over the medium term. In this *Outlook*, Chinese aquaculture production is expected to grow at an annual rate of 2.4% p.a., lower than the 5.4% p.a. of 2003-12 and the 8.2% p.a. of 1993-2002.

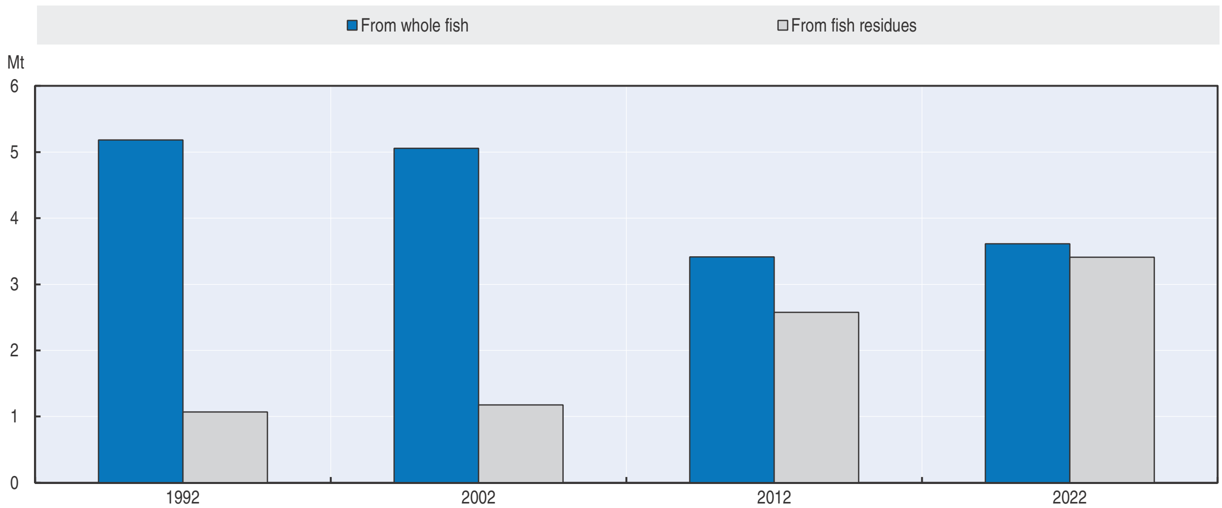
An alternative scenario has been produced with the FAO fish model assuming a reduced growth path for most freshwater species. At present, freshwater species represent more than 60% of total aquaculture fisheries production in China. In the model, these species have been grouped into four main fresh and brackish (water in estuary with low-salt content) water species. Beyond "Carps, barbels and other cyprinids", representing by far the largest group, and "Tilapia and other cichlids", a particular case is represented by "Shrimps and prawns" because they are produced in fresh, brackish and salt water. Of all the freshwater species, shrimps have the highest per unit value by far. All other freshwater species are included in a residual category in the model called "other freshwater species". In this alternative slower growth scenario, it is expected that the economic rent (and the price) of the available land suited for aquaculture production will increase and that this higher rent should favour the production of the highest per unit value species such as shrimps. On that basis, it is assumed that shrimp production will maintain the same growth rate as that projected in the *Outlook*. The second highest value species ("other freshwater") will only grow at half the baseline rate. Tilapia will only increase at a one quarter of the rate of the *Outlook*, while carp production will not grow.

These slower growth paths will lead to an annual growth rate of 1.4% p.a. As a result, by 2022, total aquaculture production will be 10% lower than in the *Outlook*, a reduction of 5.3 Mt (lw). The impact on fish prices in China will be significant. Producer prices of aquaculture species will increase by 24%, while wholesale price of all species (farmed or wild) will increase by 18.5% and consumer prices by 7%. In response to these higher prices, fish consumption will decline by 3.1%, or 2 Mt (lw). The difference between the changes in production and consumption will be reflected in a reduction of the trade balance of 3.3 Mt. As a result, the world price of fish will increase by 13%. This growth in world price will affect, to some extent, producers and consumers in all the other countries. Their fish consumption will fall by almost 2.3 Mt, and their aquaculture production will grow by 0.85 Mt. With very tight production quota in most countries, world capture production will only rise by 0.15 Mt.

The impact on the fishmeal market is not straightforward due to two characteristics of the Chinese market. First, most Chinese fishmeal production is obtained from fish residues (89% in 2022). So when aquaculture production is diminished, fish residue and fishmeal production are automatically reduced. Secondly, in this scenario the species subject to the largest reduction in production growth do not consume very much fishmeal. The net reduction in demand is therefore not very large. The net effect of these two factors lead to a 10% increase in Chinese fishmeal imports in that scenario. This combined with the increase in demand for fishmeal caused by higher aquaculture production of other countries generate a 8% increase in the world fishmeal price in 2022. This last result would have been completely different if instead carp production had been maintained at the baseline level and shrimp production had been kept at the 2012 level.

Figure 8.5. **Increasing share of fishmeal obtained from fish by-products**

Fishmeal production in product weight



Source: OECD and FAO Secretariats.

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Consumption

Linked to the expansion of fish production and increasing demand, together with modern distribution channels, world fish food consumption is projected to continue to slowly expand over the next decade reaching around 161 Mt by 2022, a 22% increase compared to the 2010-12 base period. Per capita fish consumption will rise from 18.9 kg, on average, in the base period to 20.6 kg by 2022. However, the annual growth rate will be lower than the previous decade, declining from an average of 1.8% to about 0.6%. The decrease in growth rate will be more pronounced in the latter half of the projection period as fish becomes more expensive relative to red meats.

Per capita fish consumption should rise on all continents, except in Africa where population growth will outstrip supply. The highest growth rates are expected in Asia. Notwithstanding the increased availability of fish to most consumers, the rise in fish consumption will not be homogenous among countries and within countries in terms of quantity and variety consumed. This heterogeneity reflects the different levels of availability of fish and other foods in different regions, including the accessibility of fishery resources in adjacent waters as well as the interaction of several socio-economic and cultural factors affecting demand, including food traditions, tastes, income levels, seasons, prices, infrastructures and marketing facilities.

Being already mature markets with high initial levels, fish consumption is expected to show little to no growth (+4% by 2022 on average compared to the base period) in many developed countries. This limited increase reflects, among other things, slowing population growth and dietary shifts that are already underway. Developing countries will account for most of the additional fish consumption, being responsible for more than 91% of the total increase. This outcome will be due to the combination of several factors affecting demand for animal proteins, including rising living standards, population growth, rapid urbanisation, a growing recognition of fish as healthy and nutritious food, and technological development in food, processing, packaging and distribution. Improvements in preservation and storage are particularly important as, being highly perishable, fish needs specific handling and preservation techniques. In spite of this additional growth, annual per capita fish consumption in developing countries will continue to be considerably lower than that of more developed regions (19.8 kg compared with 24.2 kg), even though this gap will narrow over the next decade. Per capita fish consumption in OECD countries will remain relatively flat while increasing for the BRICS, from 19.8 kg to 23.3 kg, mostly because of the significant expansion in domestic aquaculture production.

Consumption of fishmeal and fish oil will be constrained by the rather stable production with markets characterised by the traditional competition in the use of fishmeal between aquaculture and livestock and between aquaculture and dietary supplements for direct human consumption for fish oil.

Trade

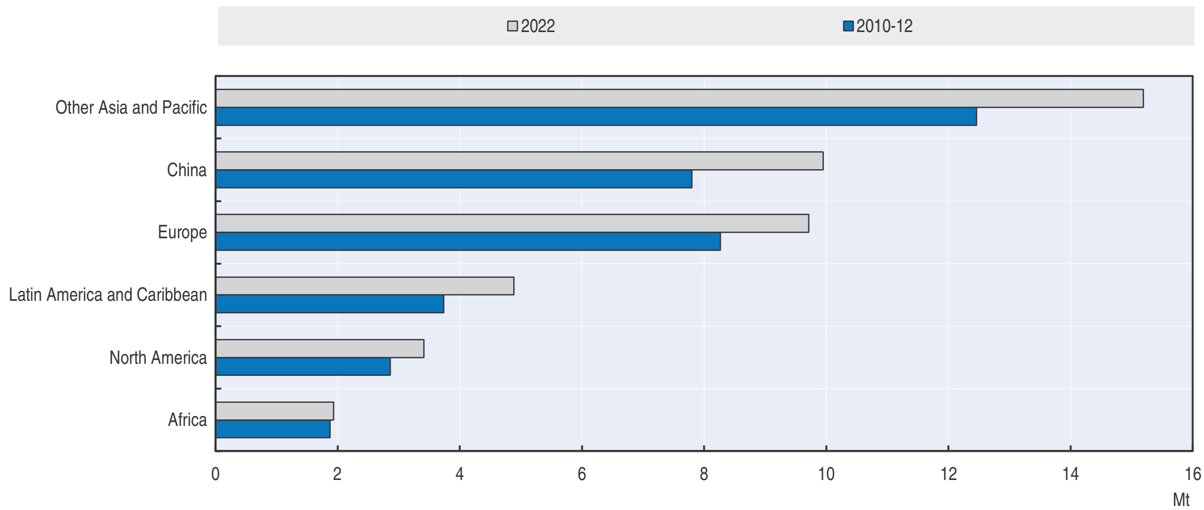
Fish and fishery products are and will continue to be among the most traded food commodities worldwide. Sustained demand, trade liberalisation policies, globalisation of food systems, improved logistics and technological innovations will further expand international fish trade, even if at a slower rate than in the previous decade. About 36% of total fishery production including intra-EU trade (31% excluding intra-EU trade) is expected to be exported by 2022 in the form of various food and feed items, reflecting the sector's growing degree of openness to, and integration in, international trade. The fishery supply chain is expected to remain complex as fish products often cross national boundaries several times before final consumption due to the increasing outsourcing of processing to countries such like China, India, Indonesia, Thailand and Viet Nam, where comparatively low wages and production costs provide a competitive advantage.

Trade of fish for human consumption is projected to reach 45.1 Mt in live weight equivalent, representing an increase of 22% over the *Outlook* period. However, the annual growth rate of exports is expected to decline from 3.1% for the last decade to 1.8% p.a. over the next ten years. This is partly due to increasing prices which reduce consumption growth, higher transportation costs and slower expansion of aquaculture production. Trade in fish and fishery products is characterised by a wide range of product types and participants. The role of fishery trade varies among countries and is important for many economies, in particular for developing nations, which are the key suppliers to world markets, contributing 68% of global fishery exports for human consumption by 2022. Additional growth in fish exports is projected to come predominantly from Asian countries, which will account for about 61% of the additional output. By 2022, Asian countries are expected to increase their share in world exports for human consumption from 52% to 54% as a result of growing investment in the aquaculture sector. China will consolidate its position as the leading global exporter of fish products (Figure 8.6) and will account for over 22% of world trade of fish for human consumption, in quantity terms, by the end of the projection period.

Developed economies will continue to be increasingly dependent on imports of edible fish to meet their consumption and, by 2022, the ratio of fish imports over total fish consumption will grow to 69% from 64% in the base period. However, the share of developed countries in world fish imports for human consumption will slightly decline from 54% to 52% during the next decade. In the same period, developing countries will increase their imports of edible fish by 28%, which will consist of fish for domestic

Figure 8.6. **Major role of China and other Asian countries in fishery exports**

Exports of fish for human consumption in live weight equivalent



Source: OECD and FAO Secretariats.

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consumption, particularly in emerging economies, as well as unprocessed fish to be used as raw material for their processing industries which are then subsequently exported.

Trade of fishmeal is expected to remain rather stable throughout the projection period, with a limited growth of 6%. Peru and Chile will remain the leading exporters of fishmeal, but their combined share in total exports will decline from 55% to 49% over the projection period. Asian countries will remain the main importers of fishmeal (66% of the total by 2022) due to their sizeable aquaculture production. China alone will account for 32% of global fishmeal imports, although slightly declining from 34% of 2010-12. Fish oil exports are projected to decrease by 1% over the period under review. European countries will remain the leading importers of fish oil with a 51% share of world fish oil imports, with Norway accounting for 19% of the imports by 2022 to be mainly used in its salmon industry.

Main issues and uncertainties

The medium-term fish projections analysed in this chapter are a conditional scenario of likely developments based on a number of specific economic and policy assumptions. These include the macroeconomic environment, international trade rules and tariffs, frequency and effects of *El Niño* phenomenon, absence of abnormal fish-related disease outbreaks having an impact on aquaculture production, fishery quotas, longer term productivity trends and the absence of unforeseen market shocks.

A number of uncertainties remain. A major unknown factor for the projections is the impact of the ongoing financial turmoil and economic recession in selected markets with likely more significant repercussions on consumption and commercialisation of higher valued fish species. Variations in oil, energy and feed prices, exchange rates, inflation, access to credit and subsequent investments can have significant impacts on the competitive status and performance of national fishery industries. Other uncertainties include future changes in fishery polices and in trade and fishing agreements which could unleash a period of greater price volatility. Future prices might also be influenced by the introduction of more rigorous regulations related to environment, food safety, traceability and animal welfare.

Vulnerability to climate change and extreme weather events could also have a major impact on the fisheries and aquaculture sector, with significant shortfall of production due to natural disasters. In a context of global socio-economic pressures on natural resources and ecosystems, new climate adaptation strategies will likely be part of improved fisheries governance. It will be important to conserve aquatic ecosystems and to safeguard fish stocks, and to promote productivity through technological innovation, investment in R&D and incentives from the fisheries management system. Considerable efforts are underway to rebuild fisheries, a task which is high on the international policy agenda.

Aquaculture production is particularly vulnerable to adverse impacts of disease, pollution and degraded local environments. In recent years, disease outbreaks have stricken fish farming (among affected species: salmon, shrimp and bivalves) in several countries in Asia (including China, India, Thailand, Viet Nam), South America (Ecuador, Chile), Europe (France, Spain) and Africa (Mozambique, Madagascar), resulting in partial or sometimes total loss of production. Moreover, such disease outbreaks impacts consumers' image of the sector and the quality of the fish.

Restructuring of fish food chains may impact the location of production and processing as well as trade flows. Improved management and efficiencies throughout the food value chain are essential for the sustainability and future growth of the fisheries industry. The fishery sector will be increasingly globalised with supermarket chains and large retailers emerging as important players in setting requirements for the products they buy and in controlling international distribution channels. Processing is adding more value and is becoming more intensive, geographically concentrated, vertically integrated and linked with global supply chains. Processors are becoming more integrated with producers to enhance the product mix, obtain better yields and respond to evolving quality and safety requirements in importing countries. The outsourcing of processing activities at regional and world levels is significant, its extent depending on species, product form, costs of labour and transportation. This trend might be affected by increasing oil prices and a subsequent rise of transportation costs as well as by the wage growth being experienced in selected countries, in particular in Asia, which might lead to changes in distribution and processing facilities and increases in fish prices.

The future role played by fisheries and aquaculture in world food security is constrained by an array of specific problems including weak governance, ineffective fisheries management practices, conflicts over the use of natural resources, the difficulties in incorporating the priorities and rights of small-scale fishing communities, and injustices relating to gender discrimination and child labour. The further growth of the aquaculture industry will rely on many factors including the accessibility to areas and water resources as well as to technology and finance; the sustainability, availability and cost of fish seeds (e.g. eggs, spawn, offspring, fry, larvae, etc.) and feeds in the requisite quality and quantities; antibiotic use; assessment of environmental impacts including pollution, fish diseases and escapees; food safety and traceability issues; and policy decisions and legislation. For example, aquaculture has had and will most probably continue to have difficulties establishing itself as a growth sector in many developed countries due to regulatory restrictions with respect to sites and environmental impacts (e.g. pollution, fish diseases and escapees).

Future growth of aquaculture will also depend on how the sector will invest to enhance productivity in a sustainable manner through technological development and better management practices. Improvements in genetics, breeding and nutrition are particularly important, and will have a major effect on the composition of feeds used by the aquaculture industry. Today about 45 Mt of feed are used for farming fed aquaculture species. According to some estimates,[6] feed for aquaculture currently makes up 5% of global feed production and it could represent a share of about 8% to 10% in the near future. With rising fishmeal and fish oil prices, the search for greater efficiency and substitutes is ongoing and further improvements are expected. In recent years, the percentage of fishmeal and fish oil in compound feeds has been a clear downward trend while their international prices were increasing. In the near future, fishmeal and fish oil will be more frequently used as strategic ingredients to enhance growth at specific stages of production, e.g. in fry. In response to growing prices of fishmeal and fish oil, as feed tonnages increase, feed companies will continue to stretch available quantities of fishmeal and fish oil further by substituting with other ingredients. However, depending on the alternatives used, their substitutions with other ingredients may affect the health properties and taste of farmed fish.

It is also important to note that, based on a recent revision of the feed ban rules, from 1st June 2013, Processed Animal Protein (PAP) from pigs and poultry is to be re-authorised by the EU for use as feed or feed ingredient in aquaculture. The prohibition on intra-species recycling remains valid and strict rules on the control of intra-species recycling must be adhered to. This ban indicates that the fish species cannot be used as feed in aquaculture for that same species of fish. The reintroduction of non-ruminant PAP in feeds for fish farming may permit the EU to diminish its dependence on other sources of proteins such as fishmeal for fish feed. Given the high price of fishmeal, PAP from these sources could be a much cheaper feed ingredient. The extent of this practice will depend on biological considerations and on the level of acceptance of producers and consumers. In order to assess the possible impact of this new policy, a scenario analysis was performed with the fish model since the possible effects of this change in regulation are not included in the *Outlook* baseline.

The amount of PAP available from those two sources surpass by many times the total consumption of fishmeal in the European Union. However, for the reasons indicated this scenario assumes a gradual and incomplete replacement of fishmeal by PAP. It was assumed that the minimum use of fishmeal would not go below 25% of the baseline consumption of fishmeal, which is the case in the last three years of the scenario. The results indicate that the world price of fishmeal would drop by 9.7% in the last three years of the simulation. Since fish oil is a joint product of fishmeal, its price would increase by 1%. The lower price of fishmeal would be sufficient to increase world aquaculture production by 0.4% by 2022 and this would generate a reduction of 0.9% in the world price of fish product traded.

Notes

1. The terms "fish and seafood" or simply "fish" indicate fish, crustaceans, molluscs and other aquatic invertebrates, but excludes aquatic mammals and aquatic plants.
2. For the third time, this *Outlook* publication includes a chapter illustrating the main results of the dynamic policy specific partial equilibrium model on fish. At present, it is a standalone model using the same macroeconomic assumptions, the same feed and food prices employed or generated by the agricultural market model Aglink-Cosimo. The baseline is deterministic and assumes normal weather and production conditions, with the exception of the impact of the *El Niño* phenomenon set for selected Latin American countries in 2015 and 2020.
3. In the fish model, production of capture fisheries is kept exogenous for most countries as being tightly managed, while it is endogenous responding to prices for other countries not subject to quotas and it is endogenous with no price elasticity for the South American countries affected by *El Niño*. This is a naturally occurring climatic event resulting in warmer sea surface temperatures in the Pacific Ocean and off the coast of South America that generally reduces fish catches, in particular of anchoveta (*Engraulis ringens*), a species mainly used for fishmeal and fish oil processing.
4. Tacon, A.G.J.; Hasan, M.R.; Metian, M. Demand and supply of feed ingredients for farmed fish and crustaceans: trends and prospects. *FAO Fisheries and Aquaculture Technical Paper*, No. 564. FAO, 2011. pp. 87.
5. Fish destined to human consumption/food indicates total fish production excluding non-food uses, such as fish destined to reduction into fishmeal and fish oil, fish destined to direct feeding to aquaculture and livestock, fish used as bait and others.
6. Alltech: *www.alltech.com/home*.

OECD-FAO Agricultural Outlook 2013

Chapter 9

Dairy

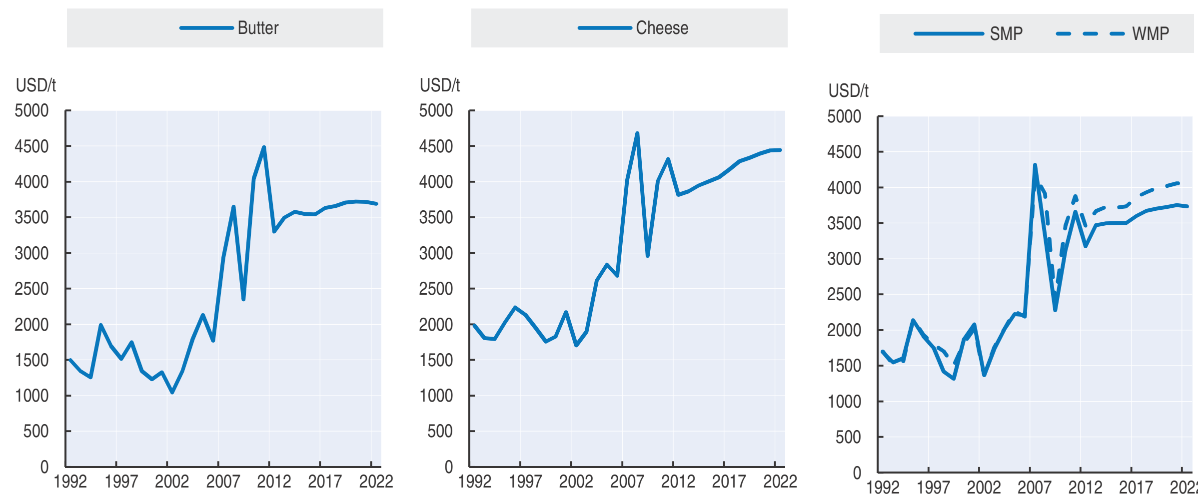
Market situation

Driven by robust growth in import demand from developing countries, international dairy prices rose strongly through 2010 and into the first half of 2011, peaking at levels close to those of the 2007/08 commodity boom. High returns and excellent pasture conditions in Oceania, and parts of South America, generated a supply response triggering a fall in prices. This decline in prices continued through to the second half of 2012. It was accompanied by an expansion in export volumes. With demand continuing to expand, especially from China, prices bottomed out at levels much higher than during the previous downturn in 2009. The 2012 droughts in the United States and the Russian Federation drove up grain prices, lead to lower dairy output growth in the United States and the European Union, and higher dairy prices. In early 2013, the recovery in prices intensified as reports of much drier weather conditions in Oceania began to impact market expectations of product availability. While the short term supply situation is tight, it is expected to ease over the medium term assuming normal weather conditions, keeping prices below the elevated levels of 2011.

Projection highlights

- World milk production is projected to increase by 168 Mt in 2022 when compared to the base years (2010-12), the majority of which (74%) is anticipated to come from developing countries. India alone accounts for 29% of the change in global milk supplies. The average annual growth rate for the projection period is estimated at 1.8% which is below the 2.3% witnessed in the last decade. The slowdown in growth reflects growing shortages of water and suitable land among developing countries.
- Consumption of dairy products in milk equivalent in developing countries is expected to increase on average at around 2% p.a. The expansion in demand reflects robust income growth, expanding populations, further westernisation of diets and greater access to refrigeration facilities. By contrast, consumption in the developed world is projected to increase on average by less than 1% p.a.
- An upswing in international dairy prices is underway – nominal prices in general are expected to continue firming throughout the projection period but in real terms will ease from 2014, especially for butter. The *Outlook* for the next decade sees real prices averaging significantly higher than over the 2003-12 period.
- A general expansion of trade in dairy products is expected over the coming decade. Of the main products, butter, cheese and SMP are likely to show average annual increases between 1.6-2.1% p.a. The vast bulk of this growth will be satisfied by expanded exports from the United States, the European Union, New Zealand, Australia and Argentina. This *Outlook* sees a major expansion in US dairy exports of butter, cheese, SMP, and whey powder with increases of 54%, 35%, 63% and 29%, respectively, from the 2010-12 base period.

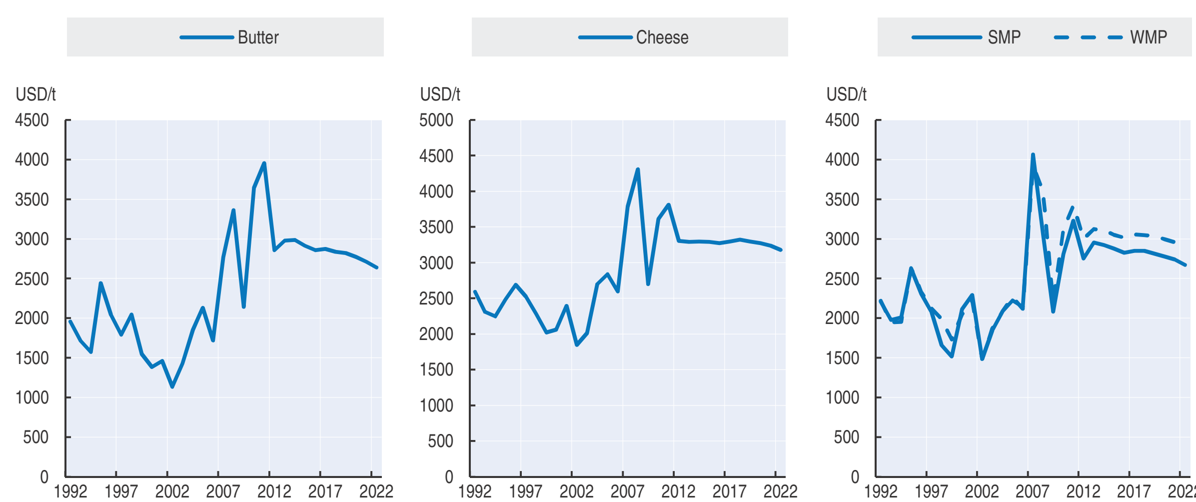
Figure 9.1. **World dairy prices in nominal terms**



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860294

Figure 9.2. **World dairy prices in real terms (2005 USD)**



Source: OECD and FAO Secretariats.

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Market trends and prospects

Prices

An upswing in international dairy prices is underway. It began in late 2012 as drought in the United States and the Russian Federation triggered a sharp rise in grain prices, while demand for dairy products continued to expand. Prices are expected to continue to increase in 2013 and 2014 as higher grain prices and much drier weather conditions in Oceania add further pressure to dairy supply growth (Figure 9.1).

Over the medium term, increasing incomes and further westernisation of diets are expected to result in continued expansion of demand, especially from Asia, North Africa and the Middle East.

Grain prices in real terms are expected to ease over the medium term, compared with the drought elevated levels of 2012/13, facilitating continued growth in world dairy supplies while a decline in the real price of vegetable oils exerts some downward pressure on the real butter price.

Overall these trends are expected to result in a moderate increase in real dairy prices through to 2014 with prices then easing through the remainder of the *Outlook* period, especially for butter (Figure 9.2). Real prices are expected to average higher than in the previous decade.

Factors contributing to the higher real prices are higher grain, oilseed, and energy costs faced by grain based dairy exporters in the United States and the European Union, compared with the previous decade. Output from lower cost, pasture based exporters in Oceania and South America will remain insufficient to meet rising demand from the developing world.

The *Outlook* price projections reflect the usual assumptions of stability in weather and in economic and policy conditions. Under these “normal “conditions, prices are not expected to reach the peak levels of 2007/08 or 2011. However, actual price outcomes are likely to exhibit significant annual variations around the projection trend.

Production

World milk production is projected to increase by 168 Mt, the majority of which is anticipated to come from developing countries (74%). India alone account for 29% of the change in global milk supplies. However, the rate of growth in world supplies over the outlook eases from 2.3% to 1.8% p.a. compared with the previous decade. The slowdown in growth reflects growing shortages of water and suitable land among developing countries. For example, milk growth in China, the third largest milk producing country declines from 7% to 2% p.a. over the *Outlook*, compared with the previous decade.

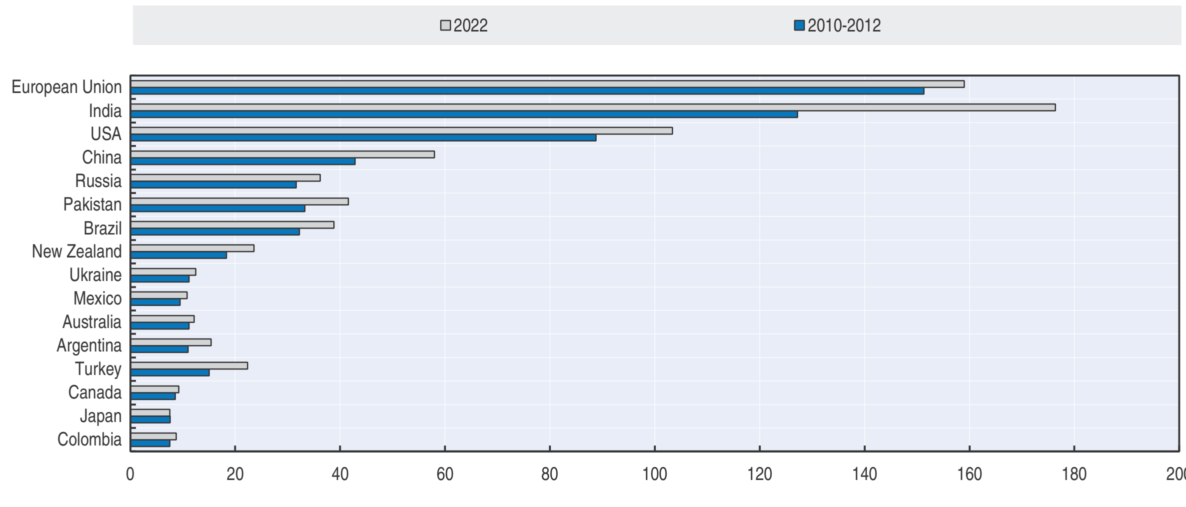
By contrast average milk output growth among developed countries is projected to increase modestly at 1% p.a. compared with 0.8% p.a. in the previous decade, reflecting strong yield growth suggested by experts in the Russian Federation and Ukraine. The yield gains projected for the Russian Federation and Ukraine will require an 80% improvement in the rate of growth in milk output per cow compared with the previous decade. This gain in productivity looks to be very challenging, especially in comparison with the milk yield growth expected in most other countries.

However, milk production growth among developing countries is still set to increase at more than twice the rate of developed countries, 2.5% p.a. compared with 1%. This reflects: the faster rate of demand growth in the developing world (1.6-2.8% p.a., depending on the commodity); the perishable nature of fresh dairy products; and import barriers, which reduce the amount of imports demanded by developing countries.

The growing importance of developing countries in world dairy markets is illustrated by the fact that Indian output, which includes buffalo milk production, is projected to exceed that of the European Union by 2018 and the gap will continue to widen (Figure 9.3).

The increase in milk output among least developing countries will continue to be dominated by expanding cow inventories, whereas in most developed countries cow inventories are declining, due in large part to increased competition from crops. Nearly all gains in milk production in developed countries are achieved through higher output per cow, with New Zealand being a notable exception to this trend. Milk yields among

Figure 9.3. **Outlook for milk production**



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860332

developing countries remain very low putting pressure on available land. There remains a huge gap between milk yields in the developed and developing world.

The rate of expansion in New Zealand, the largest exporter, is expected to fall sharply compared with the previous decade from 3.8% to 1.5% p.a., as a combination of higher exchange rates, increasing costs and environmental factors constrain milk output growth. For example, higher exchange rates and increasing costs result in marginal returns to New Zealand dairy farmers over the coming decade averaging 11.3% lower than during 2003-12.* Due to environmental restrictions, future conversion of more beef and sheep land to dairying is likely to involve increasingly higher development costs and will be constrained by the need to get community agreement for new irrigation schemes.

Australian milk output is expected to expand at about 1% p.a. on average over the next decade with all of the increase coming from higher milk yields, reflecting ongoing productivity gains. Cow numbers show a slight decline as a fall in marginal returns (-5.7% p.a.) removes any incentives for farmers to expand herds despite an improvement in water availability compared with the previous decade.

Among leading exporters, Argentina displays the fastest growth rate at 2.7% p.a. with 1.7% accounted for by higher milk output per cow. Improved returns, greater economies of scale, gains in management efficiency and increased investment are the main factors behind the anticipated performance.

Sluggish growth in EU milk production is projected over the coming decade (0.3% p.a.) in response to slow growth in domestic demand and relatively high costs. The latter constrains its ability to participate in the faster growing export markets. While the ending of milk quotas in 2015 will enable some member states that are currently constrained by quota, such as Ireland and Germany, to increase their output, most member states are currently operating well below quota levels (Box 9.1). The *Outlook* does not anticipate any

* The margin return indicator here is defined as the nominal milk price adjusted for any output linked support divided by the cost of production.

Box 9.1. **Production impact of European milk quota abolition**

In November 2008, the European Union (EU) agreed to phase-out its system of milk quotas by 1 April 2015. Milk quotas were originally introduced in 1984 to limit surplus production following the high level of farmer response to high support prices. Phasing-out this system will allow farmers to be more responsive to market signals in addition to achieving efficiency gains from restructuring.

The decision to abolish milk quotas followed significant reductions in support prices for butter and skimmed milk powder over the period 2004-08 and the introduction of limits on intervention purchases when prices fall below "support levels". These changes were phased-in as part of the 2003 CAP reform package, which saw a general shift away from price support towards direct payments to farmers. These developments, together with an improvement in global dairy markets, resulted in EU milk prices approaching world levels by 2008. This change in policy and market environment was an important element in the decision to abolish quotas.

To smooth the transition path to quota elimination, it was decided to increase milk quotas by 1% annually beginning 1 April 2009, with the last increase scheduled to take place on 1 April 2013. Given how significant EU milk production is relative to world trade, how the ending of milk quotas in 2015 will impact on actual production and trade is of considerable interest.

Developments in production since 2008 suggest that the impact may be minimal. Overall EU output has been consistently lower than quotas (EU Commission, December 2012).[1] For example, for the quota years 2010/11 and 2011/12, EU milk production was reportedly 6% and 4.7%, respectively, below quota. This has varied at the member country level, with a small number of countries operating at or above their quota levels while the majority are below quota.

A further indicator of potential production impact, at least in the short run, is the milk quota price. If production was being significantly restricted, current quota prices should be high. Yet, in the vast majority of member states, the milk quota price is reported to be either very low or zero (EU Commission, 2012).

The ending of quotas is likely to see production increasing in those countries currently operating close to or in excess of quota levels. The aggregate effect on EU output is expected to be small: as any decline in price should lead to a fall in production among the larger number of member states whose producers are currently operating well below quota. As a consequence the chance of a significant shock to world dairy markets from the expiry of EU dairy quotas is expected to be minimal.

1. Evolution of the market situation and the consequent conditions for smoothly phasing-out the milk quota system – second soft landing report, European Commission, December 2012.

significant change in this situation in the lead up to quota elimination. Once quotas are eliminated output is projected to increase by 0.8% and 0.7% in 2015 and 2016 respectively with output growth thereafter declining to 0.3% p.a. On average farmers in the European Union are projected to face a decline of about 10% in their marginal returns, compared with the last decade, which is a key factor in the sluggish output response.

The United States dairy industry is projected to continue expanding at a similar rate to that of the last decade (1.6% p.a. compared with 1.8% p.a.) with all of the gains coming through higher milk yields, reflecting growth in productivity. US milk yield growth is the highest among the top five exporting countries. Steady growth in the US dairy industry primarily reflects farmers anticipated response to unchanged average marginal returns.

Consumption

Consumption of dairy products in developing countries is expected to increase by between 1.6%-2.8% p.a., over the *Outlook* period, with consumption of fresh dairy products (the largest category) showing the most dynamism at 2.6%. The expansion in demand reflects robust income growth, expanding populations, further westernisation of diets and greater access to refrigeration facilities.

By contrast, consumption in the developed world is projected to increase on average at less than 1% p.a. This low rate of growth is mainly due to slow income and population growth and lower income elasticities than in developing countries. The latter is a consequence of the existing relatively high levels of per capita consumption (Figure 9.4). In the case of Canada which shows an actual decline in per capita consumption, relatively high prices due to its supply management policy are also an important factor.

Cheese consumption in the United States provides an exception with growth projected at 1.7% p.a. By 2022, US cheese consumption levels per capita are equal to those in the European Union. The increasing use of cheese in the US processed and fast food industries accounts for most of the projected rise in consumption.

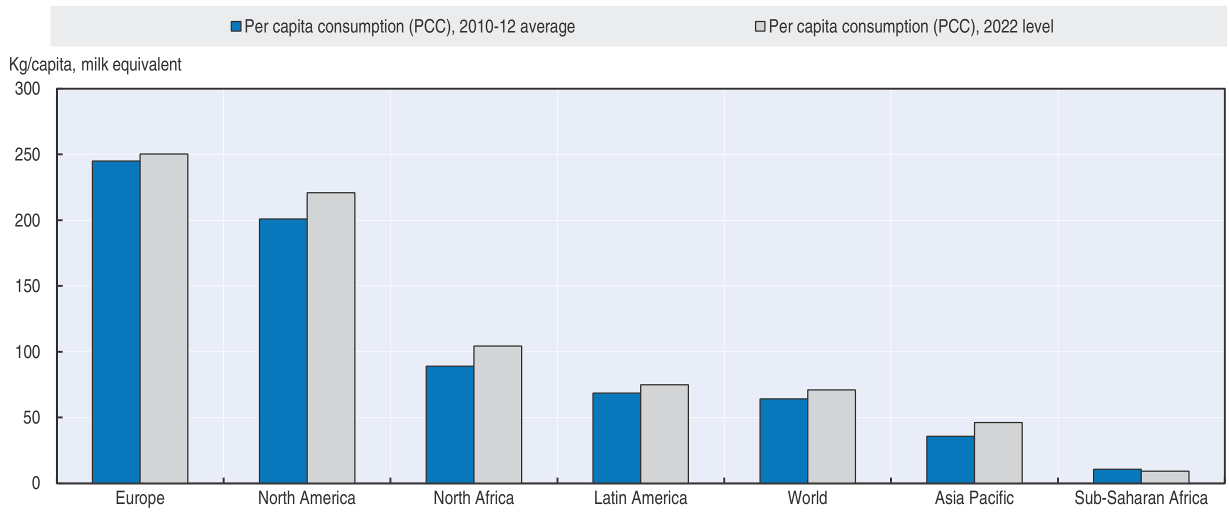
With the exception of cheese, developing countries account for the largest share of dairy product consumption. This is especially true of whole milk powder where the developing countries share is close to 90%. Whole milk powder consumption in developing countries is principally driven by the strong demand for reconstituted milk which can be used to meet underlying demand for a large variety of dairy products and is typically a reflection of a shortage of fresh milk supplies in tropical countries. Cheese consumption on the other hand continues to be dominated by the developed world, principally the European Union and the United States, with a share of over 75%. The *Outlook* sees cheese following the same trend as other dairy products with a faster increase in consumption among developing countries but from a much lower base.

Following a general decline over the past decade, SMP consumption among developed countries is set to increase over the *Outlook* especially in the United States (2.1% p.a.). Reasons for this include the slower projected rate of decline in dairy cow inventories and greater use of SMP as an ingredient in food products. However, in the European Union the annual growth in SMP consumption is still very slow at 0.3% and behind butter at 0.6%.

SMP consumption growth in developing countries is well in excess of production leading to a strong demand for SMP imports. In order to satisfy this demand extra butter must be produced in developed countries, mainly OECD countries. The increase in butter availability is reflected in increased butter consumption generally as real butter prices weaken to clear the world market. A decline in the real vegetable oil price from 2014 also adds to this price pressure as vegetable oil would otherwise reduce the growth rate of butter consumption, in for example the table spreads market.

Dairy product consumption in Asia, on a per capita basis, remains very low by comparison with Europe and North America, providing huge potential to increase consumption as income growth in Asia continues at 6-8% p.a.

Figure 9.4. **Major dairy product consumption (in milk equivalent)**



Note: The coefficients used to calculate the consumption in milk equivalent are: Butter 18.2, Cheese 9.247, Skim milk powder 11.944, and Whole milk powder 8.37.
Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860351

Trade

A general expansion of dairy products export trade is expected over the coming decade. Of the main products, butter, cheese, and SMP are likely to show average annual increases of about 1.6-2.1% p.a. The vast bulk of this growth will be satisfied by expanded exports from the United States, the European Union, New Zealand, Australia and Argentina.

Import markets will remain fragmented with the five largest importers accounting for less than 50% of the global trade in all the main dairy products. In contrast, the five largest exporters account for over 75% of world exports.

Over the past decade butter import demand has fallen, as increased demand from developing countries was more than offset by a fall in demand from the Russian Federation, the European Union and the United States. The *Outlook* projects a continued and somewhat faster rate of expansion in butter import demand from developing countries, principally in the Middle-East, North Africa and China; whereas import demand from the developed countries contracts at a much slower rate, due to a relative improvement in butter consumption growth in the Russian Federation. By 2022 Egypt is expected to surpass the Russian Federation as the largest import market for butter. Overall, the result is a net expansion in global butter import demand over the next decade. However, butter import demand from developing countries remains much lower than for other dairy products.

New Zealand is expected to retain its number one position in world butter exports with a market share of about 49.1% in 2022 down from 50% in 2010-12. The European Union's share of butter exports is set to remain at about 16% while the United States should increase its share to about 8.5% by 2022, from 6.5% in 2010-12.

Import demand for cheese is expected to continue growing, at over 2% p.a. Factors behind this expansion include the growing use of cheese in processed foods; fast foods (e.g. pizzas, hamburgers); and expansion of fast food chains.

The Russian Federation and Japan will remain the number one and two import markets for cheese, respectively but the fastest growing markets are to be found in China and Egypt. The European Union will continue to dominate cheese exports but the United States and New Zealand are set to gain market share.

WMP imports display the slowest rate of expansion at 1.1% p.a. as consumers switch to cheaper SMP. By comparison SMP imports are projected to grow by 2.1% p.a.

China will remain the largest WMP importer but growth is expected to slow as increasing supplies of fresh milk become available and consumer incomes increase at a slower rate. North Africa and Latin America, the two other major import markets for WMP, are not anticipated to experience much growth in demand: due to relatively slower income growth, especially compared with China, and the high price of WMP compared with SMP.

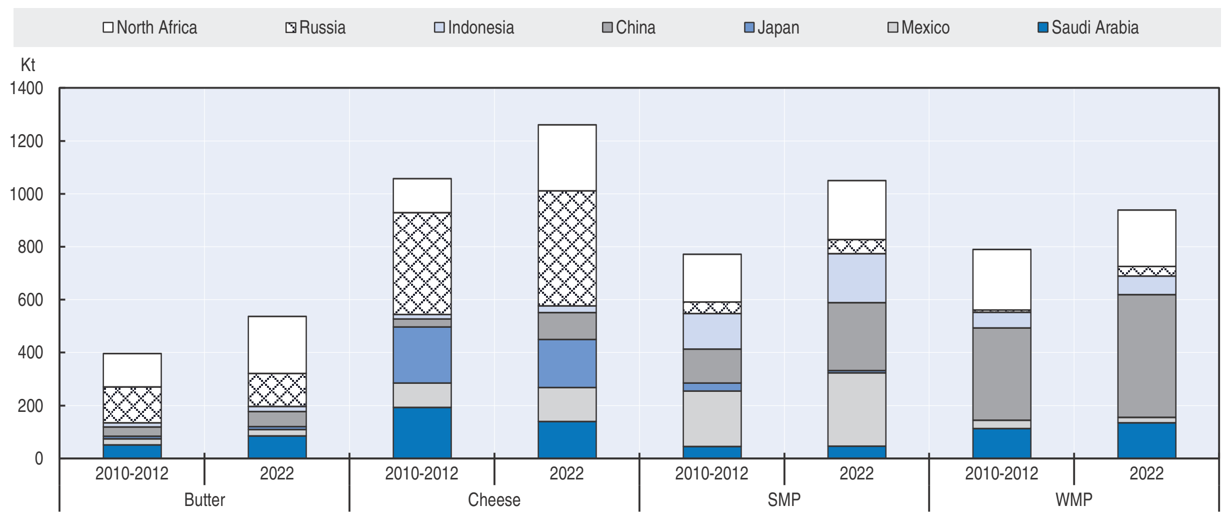
New Zealand is expected to increase its dominance of the WMP export trade, accounting for about 56% of exports by 2022. Argentina, the third largest WMP exporter, also increases its market share to 10% from 8.7% in the base period (2010-12). By comparison, the European Union is projected to lose market share as its exports of WMP stagnate, due in part to a switch in focus to SMP, casein and cheese exports. In part this reflects the ability of the EU exporters to leverage their large domestic fats markets. The European Union tends to be closer to the major export markets for SMP and cheese so transport costs will be part of the explanation for this switch in focus.

Expansion in demand for SMP imports over the next decade originates mainly from Asia, especially China and Indonesia. An important end use for SMP in China is infant milk formula. In December 2012, the Chinese government announced a unilateral lowering of the tariff on infant milk formula and milk powder used for infant milk formula from 15% to 5%. This is expected to facilitate continued strong growth in SMP demand from China over the *Outlook*. However, Mexico will remain the largest importer of SMP underpinned by the government's social programme to improve the nutritional diet of the poor through consumption of milk powder (Figure 9.5).

Demand for whey powder imports by China, which can be used as a cheaper protein alternative to milk powders in some applications, is expected to remain strong over the projection period at 4.4% p.a.

The United States and the European Union are expected to strengthen their positions as the number one and two exporters of SMP, respectively. New Zealand exports of SMP are projected to stagnate as it focuses more on WMP, and cheese exports. The continued use of a large amount of SMP in the production of casein, which enjoys a steadily increasing demand from the United States, also limits SMP exports.

Figure 9.5. **Major dairy product importer**

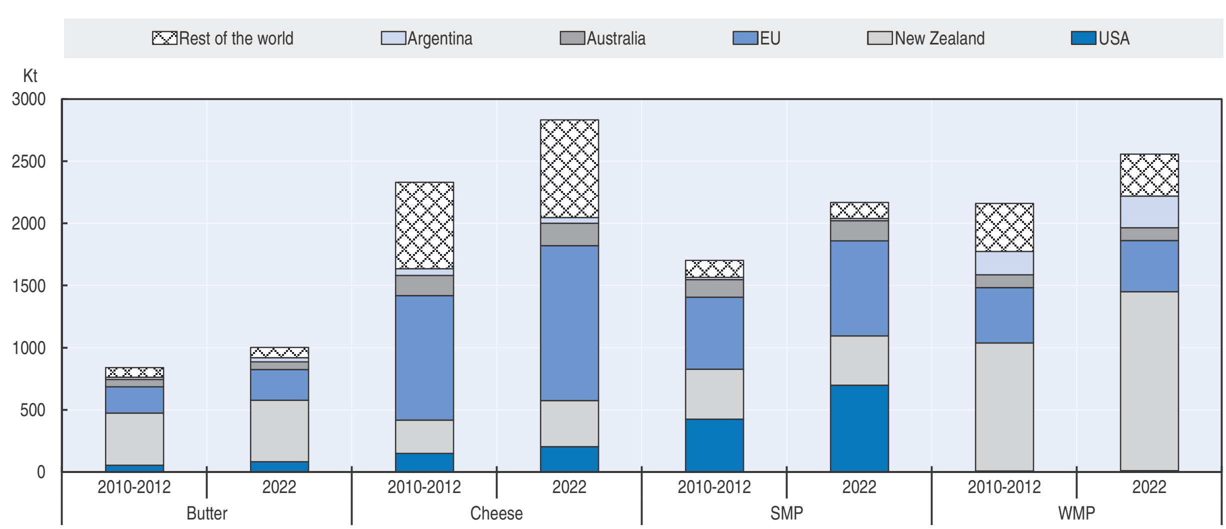


Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860370

Among the major exporters, the United States alone gains market share across all export categories in which it trades (Figure 9.6). US exports of butter, cheese, SMP and whey powder increase by 54%, 35%, 63% and 29%, respectively, from the 2010-12 base period. The assumed favourable real exchange rate outlook of the United States when compared with New Zealand, the European Union and Australia, relative to the base period 2010-12, is a key driver. While US imports of butter and cheese decline, they remain the largest importer of casein. Consumption of casein, a milk protein, continues to grow in response to increasing demand from the food industry where it is valued for its functional properties.

Figure 9.6. **Major dairy product exporters**



Source: OECD and FAO Secretariats.

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Risks and uncertainties

Underlying this *Outlook* for international dairy prices is the assumption of continued strong growth in incomes among developing countries especially in the Middle East, North Africa, South East Asia and China. Any slow-down in economic activity in any of these regions could trigger a significant downturn in dairy prices.

As we have seen in recent years unusual weather events can have a major impact on dairy markets through their impact on feed grains or pasture conditions. The *Outlook* assumes normal weather conditions from 2013; however, as climate change models increasingly predict an increase in the incidence and severity of extreme weather events, the probability of abnormal conditions may be increasing.

Applied tariffs among developing countries are often set below their bound WTO levels and thus can be varied at short notice. During the last international dairy cycle a number of important dairy importing countries in Asia and North Africa lowered their tariffs as prices rose in 2007 and 2008 and then increased tariffs again when prices fell in 2009. This behaviour served to exacerbate price fluctuations on world markets and could reoccur during the *Outlook* period.

In 2015, the European Union system of milk quotas is scheduled to end. The *Outlook* projects a smooth transition because actual output at the time is projected to remain well below EU quota levels. Faster restructuring of the EU dairy industry, as compared to the baseline assumption, could result in a more competitive and export-oriented EU dairy industry.

Current US dairy support policies are under review as part of the proposed new United States Farm Bill (Box 9.2). The proposed reforms could result in a re-coupling of support measures to some extent, potentially increasing output and US exports.

Dairy demand and export opportunities could also be affected by the outcome of various FTA and RTA agreements currently under discussion. In particular, the Trans-Pacific Partnership agreement negotiations are scheduled to be concluded within the next few years and should create a free trade zone in dairy products involving North America, Oceania, Viet Nam, Malaysia, Chile, Singapore, Brunei, and Peru. Such an agreement would boost international demand and dairy exports.

Box 9.2. **Margin protection proposals for US dairy producers**

In recent years, US dairy farmers have argued that simple price-based support has failed to protect them from the large increases in feed costs since 2006. To address this situation, the National Milk Producers Federation (NMPF) initially proposed in 2010 to replace existing dairy price programmes with margin-based protection programmes,[1] subject to a production disincentive scheme. Participation in the margin-based protection programmes would be voluntary and partly financed by farmers. These ideas were incorporated in the 2012 Farm Bill proposals to be considered by the 112th US Congress[2] in 2013 for resolution.

Box 9.2. **Margin protection proposals for US dairy producers** *(cont.)*

The Dairy Production Margin Protection Program (DPMPP) would involve two margin protection plans: Basic Margin Protection (BMP) and the Supplemental Margin Protection (SMP). Any payments made under the BMP would be fully subsidised by the government, but farmers would have to cover a portion of the administrative costs. Under the BMP, farmers would normally be guaranteed a target operating margin for 80% of their historically determined base level of production. In the event that feed costs exceeded the milk price, a fixed rate margin would apply. The SMP programme would offer progressively higher levels of protection above the BMP level. It would apply to between 25% and 90% of actual levels of production. In order to access the SMP programme, a farmer would have to first sign up for the BMP programme and they would be expected to contribute to the SMP at an increasing rate, as the level of margin protection and/or production coverage escalates. The exact level of subsidisation by the government would depend on the annual premium rates farmers faced.

Any participant in the BMP or SMP programmes would also have to sign up to the Dairy Market Stabilization Program (DMSP). The DMSP would reduce market returns on production above certain threshold levels as the actual operating margin falls below statutory defined levels. Once triggered, the DMSP would continue to operate until either the margin rises above a set level or US prices for cheddar cheese or US non-fat dry milk relative to world prices rise above threshold levels.

Estimates by the Congressional Budget Office on the budgetary impact of the proposed switch from price to margin production-based support suggest that the new measures may reduce costs. This would, in large part, be dependent on the level of farmer participation. Market impacts are less clear, with margin-based protection having the potential to ensure profitability and encourage expanded production. Preliminary research, carried out by FAPRI (2012), using suggested levels of margin protection put forward by proponents of the scheme suggests that market impacts, on average, are likely to be small but could be significant in periods of depressed margins.[3]

1. Margin here refers to the difference between the milk price and feed costs.
2. Some of the details of the schemes, not considered here, differed from those originally proposed by the NMPF.
3. Scott Brown, "The effects of modified Dairy Security Act of 2011 on dairy markets", FAPRI, April 2012.

Chapter 10

Cotton

Market situation

World cotton prices in 2012 were influenced by competing forces, with world demand rising after a two-year decline and elevated stock levels creating uncertainty about future prospects. High prices for grains and oilseeds helped sustain cotton prices, which nonetheless were below those a year earlier for virtually the entire marketing year. World cotton stocks rose for the third consecutive year, but most of the increase was accounted for by official reserve building in China. Consumption continued to decline in China – the world's largest industrial consumer by a large margin – but rose in a number of other countries as China's yarn exports rose sharply. Lower world production is widely foreseen in the coming year, with early reports indicating an intention of US farmers to plant 4 Mha, a 19% decline. China's area is also expected to decline, despite a relatively high support price.

Projection highlights

World cotton use is expected to grow at a rate slightly below the long term average of 1.9% over the coming decade. In 2007, world consumption reached a peak of 26.7 Mt, and following significant declines during 2008-11 – and with a relatively slow recovery – this peak is not likely to be surpassed again until nearly 2022. Increased demand by India's textile industry account for about 70%, the expected increase in consumption from the base period.

- World production is expected to grow marginally more slowly than consumption, reflecting the large global stocks that accumulated between 2010 and 2012. World cotton area grows throughout the outlook, but remains below recent peaks seen in 2004 and 2011. Yields rise around the world, but global average yield grows very slowly as global output switches from relatively high-yielding countries to relatively low-yielding ones.
- World trade declines in the outlook, with exports in 2022 3.2% below those in the base period. The United States retains its position as the world's largest exporter accounting for about one-third of world trade. LDC Sub-Saharan Africa replaces India as the world's second largest source of cotton exports.
- China retains its position as the world's largest import market for cotton throughout the *Outlook*. But, by 2022 China's share of world trade is foreseen at about half of its base period 41% share. Bangladesh and Viet Nam each nearly double their share of world trade by 2022.

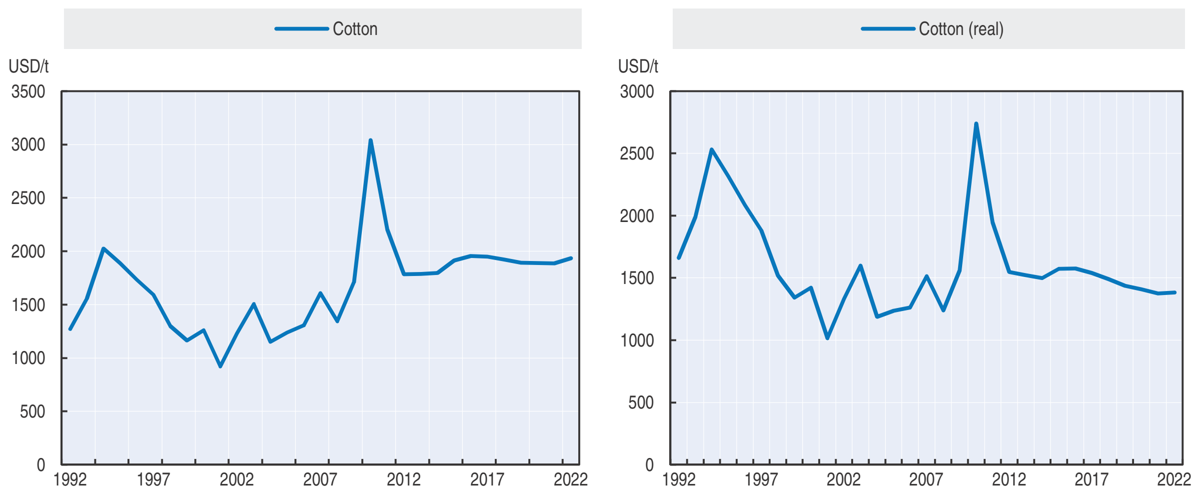
Market trends and prospects

Prices

The benchmark A Index measure of cotton prices delivered to Asian ports is expected to average below its 2011 level (USD 2 204/t) during 2012, despite a mid-season recovery (Figure 10.1). World cotton markets in 2012 continue to feel the effects of the 2010 price spike, with year-to-year price comparisons still affected by relatively high prices during

Figure 10.1. **Cotton prices rise between 2000-09 and 2013-22**

Evolution of world cotton prices in nominal (let figure) and real terms (right figure) to 2022[a]



Notes: Cotlook Ltd. A Index: [a]) Real cotton prices are nominal world prices deflated by the US GDP deflator (2005 = 1).
Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860408

2011. After rising 78% in 2010, the A Index fell 28% in 2011 and is estimated down an additional 19% in 2012. Relatively stable prices are expected in the outlook, generally rising through 2022, but remaining below USD 2 000/t in every year.

China's efforts to ensure its producers receive USD 3 200/t resulted in a significant accumulation of stocks starting in 2011. In addition to a significant share of the domestic crop, the reserve authorities have purchased cotton from outside of China. The withdrawal of millions of tons of cotton from world markets has supported world prices, particularly after December 2012, as the world economy strengthened. China has signalled its intention to hold much of these stocks for the foreseeable future, mitigating the negative price effects of such large stocks.

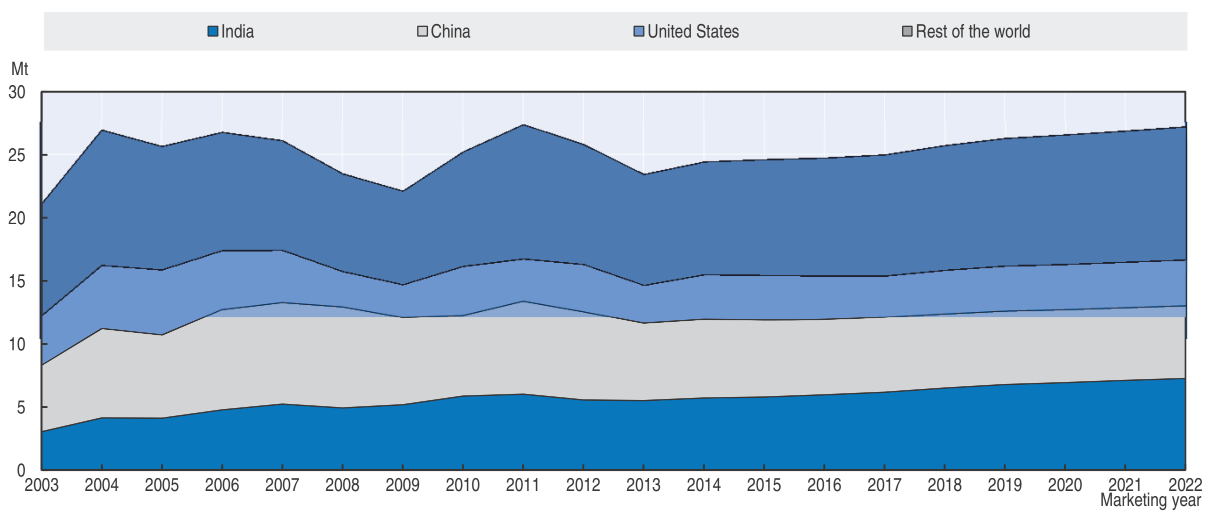
The *Outlook's* highest level for world cotton prices is 17% below the base period average, but the base period includes the year with the highest price ever (2010). Cotton prices in 2013-22 are expected to be significantly higher than in previous decades. They are expected to average USD 1 935/t, 47% more than in 2000-09. However, this is a smaller long term gain compared with wheat and corn, which are forecast to average 71% and 107% higher than in 2000-09. Cotton prices shifted downward relative to a variety of other commodities during 2000-09, including crops that compete with cotton for planted area, like wheat, corn, and soybeans. Cotton prices are not expected to rise enough in the Outlook to return to their earlier relative price levels.

Production of cotton

World cotton production is projected to grow 1.7% annually in the *Outlook*, reaching 27.2 Mt in 2022. However, this total is expected to be only 3.9% higher than production in the base period. Following the 2008 global financial crisis and subsequent cotton price volatility, world cotton production starts from an unusually low level in 2013. Cotton yields are expected to rise in most countries, but the simple global average yield is expected to rise only 1.7% over the *Outlook* as global production becomes increasingly concentrated in countries with relatively low yields.

Output is expected to fall in China, the world's largest producer since 1982 (Figure 10.2). While achieving high per hectare yields, China's cotton producers – particularly in its eastern provinces – utilise relatively labour-intensive technology. With a high share of labour in production costs, China's steadily rising wages have constrained profits for cotton growers, while rising subsidies for grain production have further eroded the relative attractiveness of producing cotton. Fragmented land holdings limit the ability of eastern cotton growers to adopt mechanised production, while demographic trends indicate continued declines in rural population and rising wages are likely in the future. Mechanisation has been more applicable for the larger producing units in China's Xinjiang province, where per hectare yields are the highest of any province. Xinjiang's share of China's total cotton output recently surpassed 50%, and is expected to continue to grow as cotton area elsewhere in China shrinks.

Figure 10.2. **World cotton production by major producer**



Source: OECD and FAO Secretariats.

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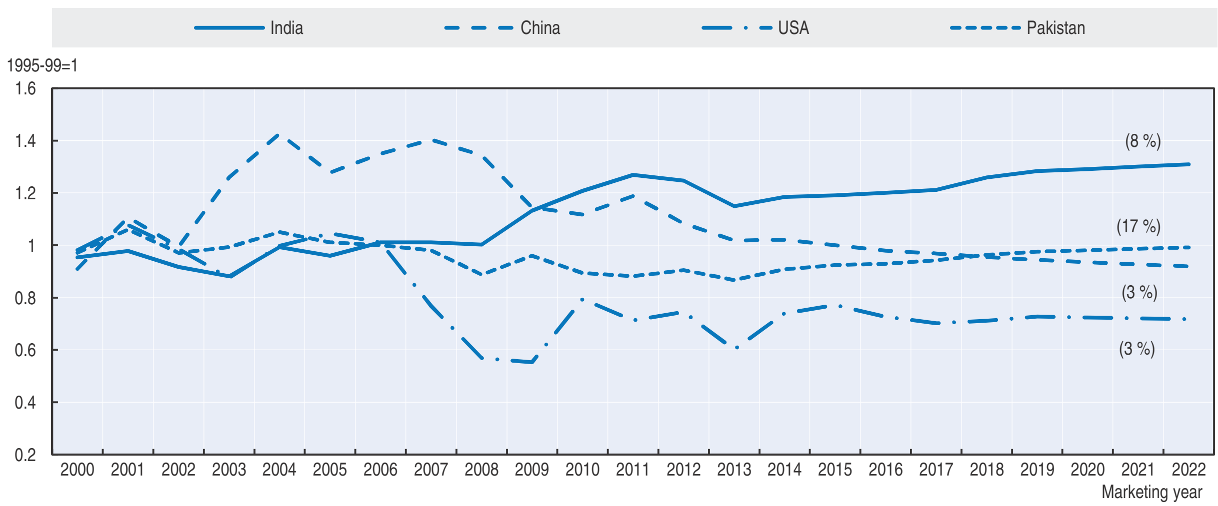
India is expected to replace China as the world's largest cotton producer by 2017, as Indian farmers continue to apply new and existing technology to capture currently unrealised yield potential, and a growing domestic market shields producers from the possible impact of export restraints. While there is a scientific debate around the use of Genetically Modified (GM) crops, the adoption of GM cotton in India has been part of shift in practices and technology that led India's cotton production to more than double between 2000 and the base period. While GM adoption there is nearly complete, yields are expected to continue to grow, albeit at far below the 7.9% annual rate realised during 2000-09. With cotton area in India also rising slightly faster than harvested area for all grains and oilseeds, India accounts for the largest share the expected gain in world production through 2022 (Figure 10.3).

Pakistan accounts for the second largest share of increased global production, and like India is expected to realise slightly faster growth in cotton area than in total grains and oilseeds area. However, this growth over 2013-22 will begin at a relatively lower base than in India. Cotton accounts for a larger share of Pakistan's area planted than in India, but this share fell after 2005 (Figure 10.3). Pakistan has lagged India considerably in the adoption of GM cotton, and cotton's share of planted area in the base period is down 11% from the last half of the 1990s.

Figure 10.3. **Cotton area relative to area for total grains and oilseeds in major producing countries**

Index: 1995-99 average cotton share of cropland = 1.0 (actual shares projected in 2022 in parentheses)



Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932860446

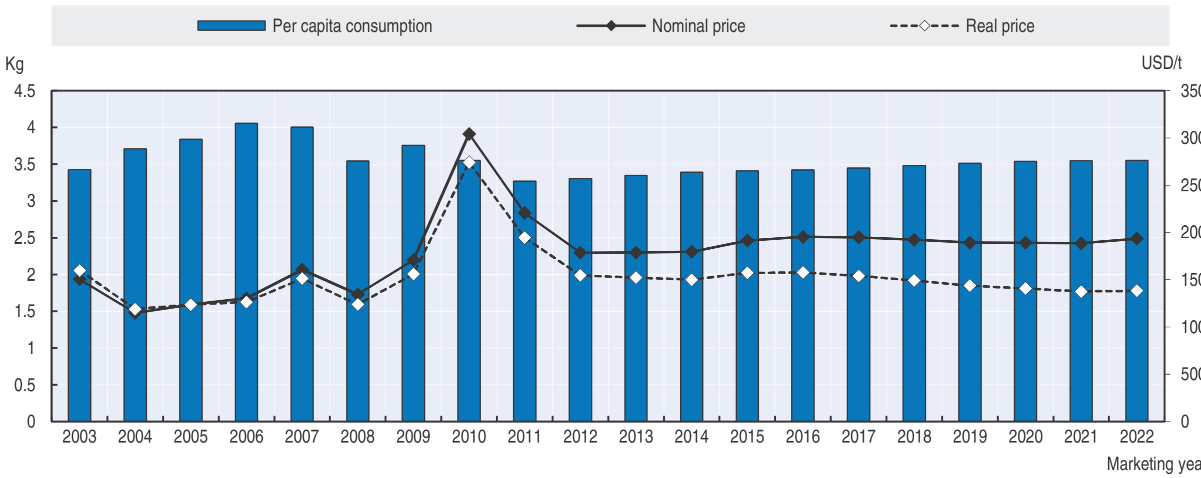
Globally, area planted to cotton is equivalent to about 4% of the area planted to grains, oilseeds, and sugar crops. Total global area planted to these crops is expected to grow slowly during 2013-22 (0.6% annually), about half the rate of cotton area's expansion. However, cotton's share of this area total is still foreseen to be slightly lower in 2022 than in the base period, 4.1% compared with 4.4%. The volatility of cotton prices in recent years means that 2013 is expected to be an unusually low point for cotton area, magnifying the outlook growth rate. During the last half of the 1990s, cotton accounted for 4.6% of this global area total, but with substantial increases in productivity, a smaller share of crop area is now needed to sustain growing cotton production.

Consumption of cotton

Total demand for cotton is expected to reach 27.7 Mt in 2022, surpassing its previous record-high by 1 Mt. While growing, cotton consumption is expected to grow more slowly than it has over the very long term, and significantly more slowly that the 3.0% rate realised during 2000-09. While consumption grows faster than the world's population in the *Outlook*, consumption on a per capita basis in 2022 is nonetheless expected to remain below the peaks seen in the last half of the 1980s and again during 2004-07 (Figure 10.4).

In recent years, cotton consumption has been disrupted by global economic volatility (Box 10.1), an unprecedented price shock, and policy changes in China (Box 10.2). From a peak of 26.7 Mt in 2006 and 2007, world cotton consumption is estimated to have fallen 13% to 23.3 Mt in 2012. The outlook for world economic growth in the coming decade is more favourable than during the base period and cotton prices have stabilised at more

Figure 10.4. **World per capita consumption of cotton remains below peak**



Source: OECD and FAO Secretariats.

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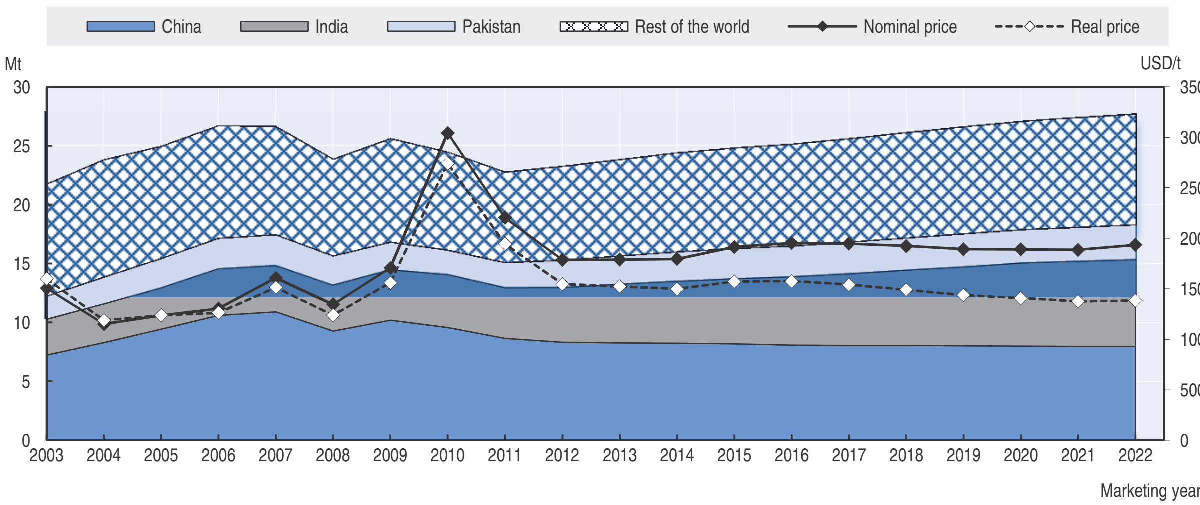
favourable levels relative to competing fibres. However, cotton prices are expected to remain high by historical standards and the global shift of textile production away from China's highly developed infrastructure may raise the average cost of supplying textiles to importing countries, attenuating consumption gains.

China is expected to remain the largest consumer of cotton fibre, its position since the 1960s. But China's share of world consumption is expected to decline, continuing a shift underway since 2007 (Figure 10.5). The age structure of China's population points to a decline in new labour-force entrants in coming years. With wages already rising steadily, China's comparative advantage is shifting away from labour-intensive industries like clothing. Government policies in minimum wages, pollution control, and investment will likely support this trend. Compounding this, the price of cotton in China has risen substantially relative to the world price since 2010 due to support policies for cotton farmers (Box 10.2). China's cotton consumption in 2022 is projected at 7.9 Mt, down 10% from the base period.

India's textile industry is the largest beneficiary of China's shift away from processing cotton fibre into textiles. India recently became the world's largest exporter of cotton yarn, and by 2021 will have the world's largest domestic market in population terms. India's increased consumption between the base period and 2022 is equivalent to 70% of the total global increase. At 7.5 Mt, its consumption continues on its trend of a growing world share, which rises from 19% to 27%, almost equivalent to China's.

The fastest growth among major consumers is expected in Bangladesh and Viet Nam. Consumption is expected to grow at a 5-6% rate in each country as their textile industries continue the rapid expansion each has enjoyed since 2000. While Bangladesh had been widely expected to see a reduction in its textile exports after the phase-out of the Multi-fibre Arrangement (MFA) in 2005, its garment exports and cotton spinning have instead flourished. Cotton consumption in Bangladesh grew at a 7.4% rate during 2003-12, and at a 14.7% rate in Viet Nam.

Figure 10.5. **World cotton consumption rebounds, but relatively slowly**



Source: OECD and FAO Secretariats.

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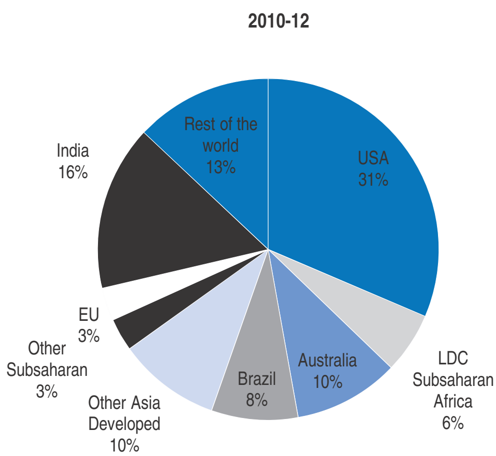
Cotton trade

Cotton trade is expected to grow only slowly during the *Outlook*. Trade gains will be constrained by the relatively slow growth in cotton consumption, but even more by the shift in cotton consumption from China – a major importer – to India – which is self-sufficient in cotton. Traditionally, cotton has been a relatively highly trade-dependent crop, with a ratio of world trade to world consumption of 30-45%, compared with ratios below 20% for grains and below 30% for soybeans. In the outlook, exports are expected to grow at about half the rate of world consumption, reaching 8.2 Mt by 2022. The ratio of trade to consumption is expected to fall fairly constantly, ending at 29% compared with a 36% ratio in the base period.

The leading exporter throughout the *Outlook* will be the United States, while India's exports are expected to shrink significantly from their relatively high base period levels, and LDC Sub-Saharan Africa will replace India as the world's second largest exporter (Figure 10.6). The latter changes are relatively significant shifts between current conditions and the ten-year outlook, but from another perspective they represent the reassertion of longer term trends. In the decades before its post-2000 surge in productivity and production, India was a very minor factor on world markets. India frequently imposed export quotas to maintain low cotton prices for its textile industry, and was a net importer for seven consecutive years between 1998 and 2004. More recently, India has at times accounted for as much as 24% of the world's cotton exports. By 2022, its share is forecast to fall to 1.5% as consumption gains once again outpace growth in output.

LDC Sub-Saharan Africa is expected to see a recovery of its share of world trade by 2022, growing from 6% to 14%. However, the region's share of world trade has been relatively variable in the last few decades, typically ranging between 7% and 13%. Cotton consumption is very limited throughout Sub-Saharan Africa, and many countries export virtually all of their production. From a high of 941 000 t in 2004, LDC Sub-Saharan Africa's production fell below 400 000 t by 2009 as relative cotton prices reached new lows. With the stabilisation of world cotton prices, and expected yield gains in the region, production, exports, and share of world trade are expected to rise through 2022, but are still forecast below peak levels.

Figure 10.6. **World cotton trade shares by exporter, 2010-12 and 2022**



Source: OECD and FAO Secretariats.

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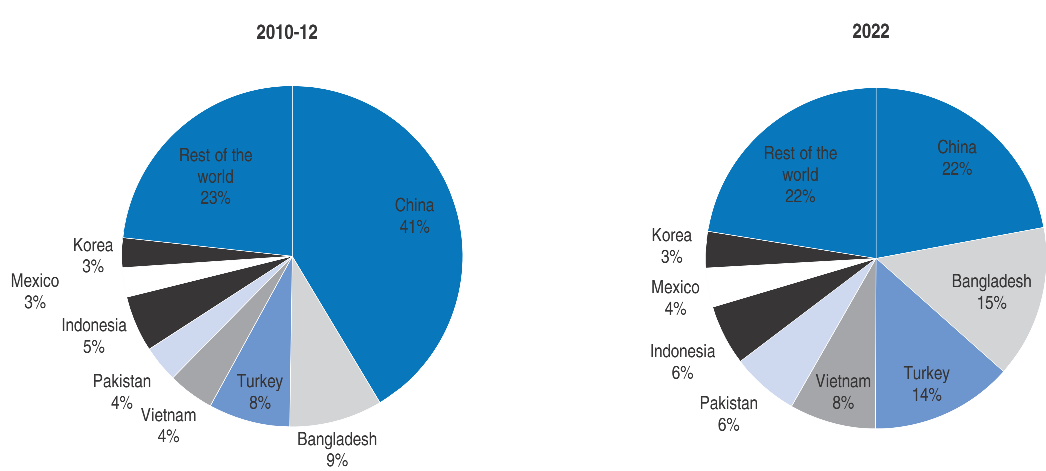
Unlike exports, shifts in the composition of importers represent the development of new trends in the world cotton economy. China is expected to retain the role as world largest importer that it has held since shortly after the end of the MFA drove its consumption up sharply, but at a reduced level (Figure 10.7). As China's share of world imports falls from 41% in the base period to 23% in 2022, Bangladesh and Viet Nam are expected to nearly each double their share, surpassing China in total. As China's role in world textile production diminishes, cotton consumption is expected to grow more rapidly in a variety of countries. With relatively limited domestic cotton supplies, consumption gains in Bangladesh and Viet Nam are expected to translate nearly entirely into increased imports.

Figure 10.7. **World cotton trade shares by importer, 2010-12 and 2022**



Source: OECD and FAO Secretariats.

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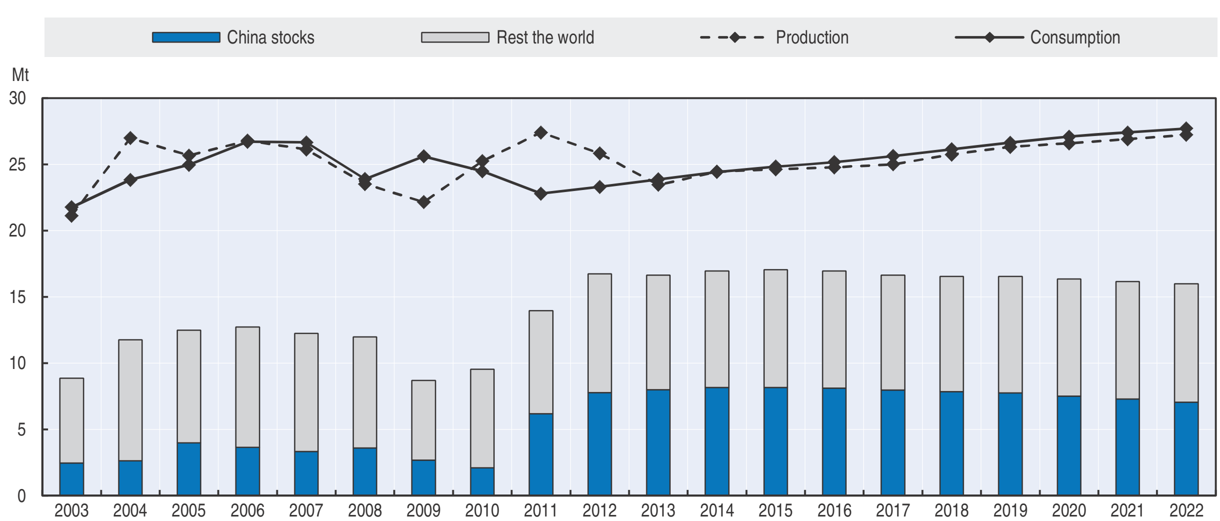
Main issues and uncertainties

The level of consumer demand and its relationship to industrial demand for cotton fibre is an important source of uncertainty in the *Outlook*. The consumption of cotton projected in the outlook is ultimately a derived demand: textile mills consume cotton to produce yarn used in clothing and other consumer goods. Due to textile trade, the geographic distribution of the consumption of these consumer products can differ significantly from the distribution of cotton fibre consumption. Due to substantial value-added in the production of consumer products, and substantial opportunities to substitute other fibres for cotton, the relationship between consumer spending on clothing and the volume of cotton consumed can vary significantly (Box 10.1). World cotton consumption over the long run has grown at a 1.9% annual rate, and is expected to grow 1.7% in the *Outlook*. World consumption typically does not grow smoothly at the long run rate, but has periods of relatively high or low growth. If the *Outlook's* assumptions of relatively strong economic growth and no significant technical change prove incorrect, then cotton consumption might grow at a different rate.

China's cotton price policy is another important source of uncertainty in the *Outlook*. As the world's largest producer, consumer, and importer in the base period, China is important to understand under any circumstances. Its recent policy changes have increased the importance to the outlook of assumptions regarding developments there (Box 10.2). During 2011 and 2012, China provided substantially more support to its cotton farmers than earlier, and did so primarily through maintenance of high domestic cotton prices. The *Outlook* assumes the continuation of similar policies through 2022, and only a gradual decline in the high government stocks that accumulated through March 2013 (Figure 10.8). There are signs that China is considering increasing the role of non-price policy instruments in its support for cotton farmers. The result could be higher consumption by China's textile industry, and more rapid changes in stock levels. These changes would have implications for the outlook in other countries as well.

Figure 10.8. **World and China cotton stocks fall relatively slowly**



Source: OECD and FAO Secretariats.

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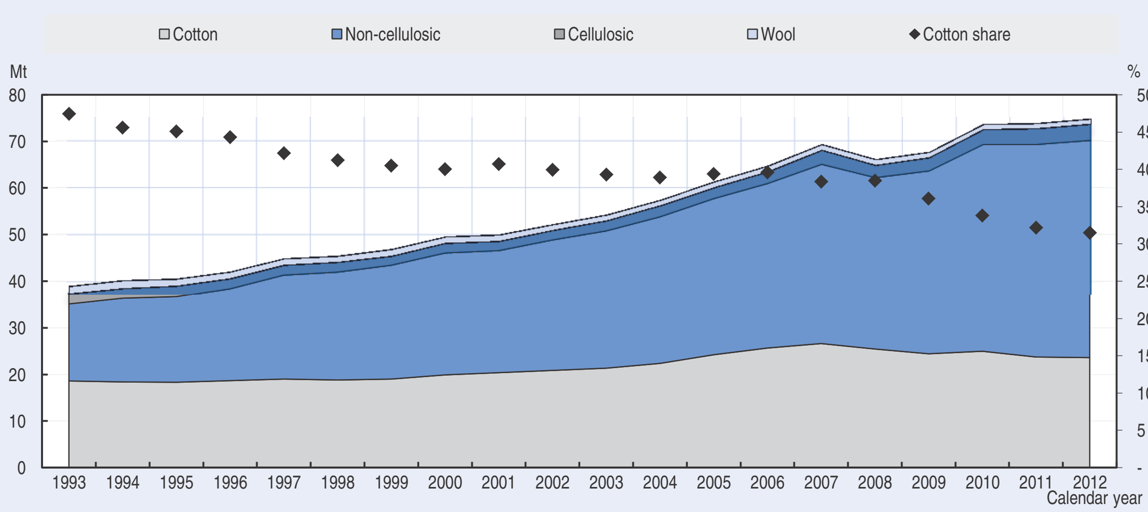
Prospects for productivity gains around the world are another uncertainty, particularly in India. The adoption of GM crops has been associated with a rebound of total factor productivity in cotton in China, and significantly higher yields, area, and output in India. In the United States, GM adoption and boll weevil eradication have reduced the cost of growing cotton, and in Australia the adoption of GM varieties specific to Australia has also raised productivity. It is likely that these factors account for some of the downward shift of cotton prices relative to other commodity prices since 2000. Many countries have been more cautious in their approach to GM adoption, motivated in part by trade restrictions some countries maintain on imports of food and feed products based on GM crops. Similar restrictions are not applied to cotton fibre, yarn, or other textile products, but GM adoption has been slow in many countries nonetheless.

Future productivity gains are possible through the adoption of other technology and farming practices as well. Thus, the completion of GM adoption by India's farmers in recent years does not necessarily mean that further significant yield gains are not possible. For example, newer GM traits have progressed to near-final approval stages. If the yield increases foreseen in this outlook are not realised, cotton prices and cotton area in other countries would likely be higher.

Box 10.1. **Cotton loses share to synthetic fibres**

Cotton was the world's leading textile fibre for most of the 20th century, relinquishing first place to polyester only in the early 1990s. Since the introduction of man-made fibres (MMF) in the 1920s, cotton's share of world fibre consumption has been trending downward. The commercialisation of polyester and other non-cellulosic fibres in the 1960s marked a period of particularly rapid structural change, and loss in fibre share for cotton. Subsequently, generic promotion for cotton, changes in agricultural policies, and changes in taste slowed the shift away from cotton in the 1980s and 1990s.

Figure 10.9. **World fibre consumption by major fibre and cotton share of total**



Source: International Cotton Advisory Committee.

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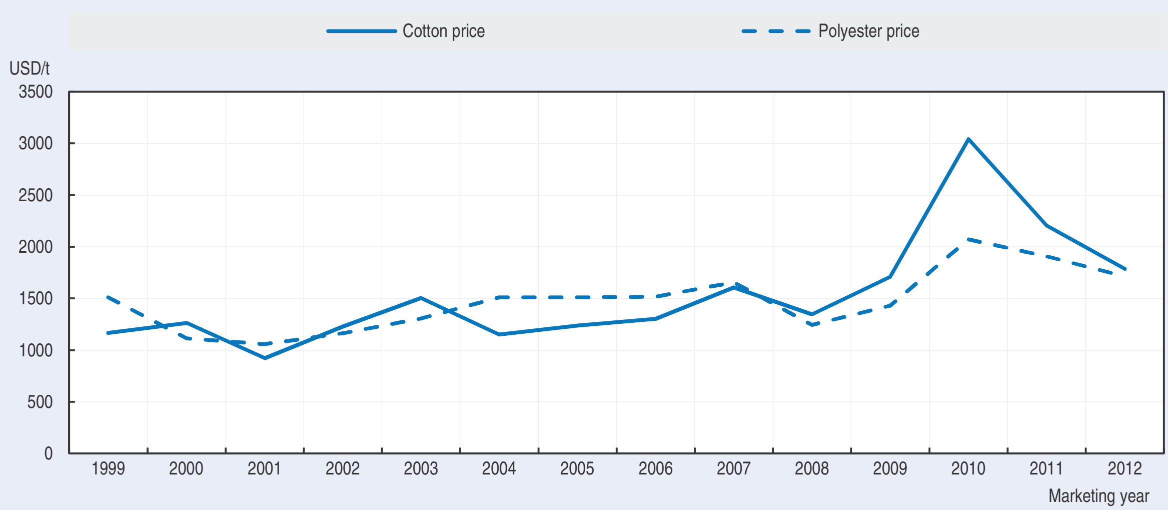
Box 10.1. **Cotton loses share to synthetic fibres** *(cont.)*

Global fibre consumption is highly correlated with economic activity, and with the sharp deceleration in the world economy in 2008 world fibre consumption fell for the first time in nearly two decades (Figure 10.9). Subsequently, MMF resumed its former expansion, but cotton consumption has declined in nearly every year. The result has been a relatively sharp decline in cotton's share of world fibre consumption, from 38% in 2008 to an estimated 31% in 2012.

Volatility in cotton prices is one reason for the loss of cotton's fibre share. A nearly unprecedented spike in cotton prices in 2010 dramatically altered the relative profitability of cotton and other fibres in 2010 and 2011 (Figure 10.10). The wide swings in cotton prices also resulted in a record default of contracts to purchase cotton. The five-fold increase in reported defaults from past averages resulted in increased transactions costs in cotton trade. The volatile cotton price also reduced the predictability of margins for textile producers and retailers. Finally, high support prices in China have limited the ability of the world's largest textile industry to profitably spin cotton rather than MMF. Other countries have increased their consumption in response to some extent, but few textile exporters can match China's infrastructure and economies of scale in textile production.

Figure 10.10. **World cotton and polyester prices**



Source: *Cotton Outlook*, China National Cotton Information Center, and US Department of Agriculture calculations based on data from *Cotton Outlook*.

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Box 10.2. **China's evolving cotton policy**

China has been the world's largest producer and consumer of cotton since the 1980s. Since China's WTO accession in 2001, it has consistently been the world's largest importer of cotton, further intensifying its crucial role in the world market. Variations in China's external demand for cotton have had significant global price impacts.

While explicit floor prices and subsidies for inputs were established and expanded for grains after 2004, China's cotton producers did not have the same market support. Subsidies for cotton farmers have been largely restricted to payments for "superior seeds". Also, purchases and sales of cotton were undertaken by the government to stabilise cotton prices in some years, but without guarantees (Table 10.1). Cotton policy in China has undergone an important change since 2010, following a global spike in cotton prices that had a significant negative impact on the country's textile industry. Unable to stem an unprecedented rise in world prices, the government halted sales from its cotton reserve stocks early in the marketing year. The subsequent rise in prices imposed significant costs on textile producers around the world in 2010.

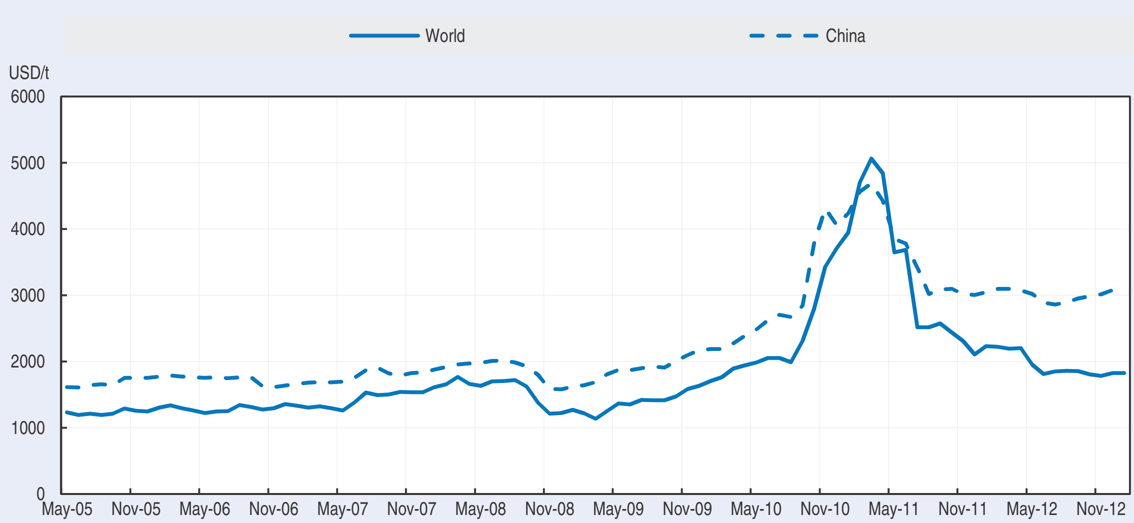
Box 10.2. **China's evolving cotton policy** *(cont.)*

The following year marked a watershed in China's cotton policies with significant global impacts. For MY2011, the government announced an open-ended commitment to purchase cotton if harvest period prices were below a CNY 19 800/t trigger (about USD 3 000/t). The trigger price was raised again for MY2012 in response to higher labour costs. Despite increased subsidies for transportation of cotton from Xinjiang province to the domestic textile industry in China's eastern provinces, the higher cotton prices resulted in a decline in China's cotton consumption and a sharp increase in its stocks as world prices have fallen significantly below China's support levels (Figure 10.10).

A significant share of China's domestic cotton production for MY2011 and MY2012 has been diverted to government reserves (Table 10.1). Ending stocks are forecast in MY2012 to have more than tripled in two years, with the increase equivalent to 25% of world consumption. By maintaining high domestic cotton prices and stockpiling, China has diverted global demand for cotton products to textile mills outside of China, while building domestic stocks to a level that could significantly affect prices for years to come. Market volatility has negatively affected global demand for cotton, but rising mill use outside of China and rising yarn imports within China highlight the impact of China's price policy.

Significant structural change in cotton production will have to occur before production costs in most of China's provinces come closer to current world levels. Production in Xinjiang is more mechanised, but cotton there has long relied on transportation subsidies and favorable policies in storage and procurement. At the same time production faces these issues, China's textile industry will have to adjust to expected tighter and higher cost labour markets. Cotton policy in China will likely continue to evolve to meet these shifting challenges.

Figure 10.11. **World and China cotton prices monthly, 2005-12**



Source: Beijing Cotton Outlook, Cotlook Ltd. and the International Monetary Fund.

StatLink http://dx.doi.org/10.1787/888932860598

Box 10.2. **China's evolving cotton policy** *(cont.)*

Table 10.1. **China's domestic cotton intervention purchases and sales for government reserves**

	Reserves			Share of production
	purchases	sales	net change	
	Thousand tons			%
2004	140	0	140	2
2005	10	0	10	0
2006	303	150	153	2
2007	0	0	0	0
2008	2 800	1 200	1 600	20
2009	0	1 400	-1 400	-20
2010	0	1 000	-1 000	-16
2011	3 130	0	3 130	42
2012	6 314	4 050	2 264	32
2013	-	-	1 742	28

Source: ICAC Review of the World Cotton Situation, various issues, Cotton Outlook, various issues and USDA (2013).

StatLink http://dx.doi.org/10.1787/888932860940

Glossary of terms

A-H1N1

This is an influenza virus that had never been identified as a cause of infections in people before the current H1N1 pandemic. Genetic analyses of this virus have shown that it originated from animal influenza viruses and is unrelated to the human seasonal H1N1 viruses that have been in general circulation among people since 1977.

Average Crop Revenue Election (ACRE) program

A new programme introduced with the 2008 US FCE Act allowing farmers to choose revenue-based protection against yield and market fluctuations.

AMAD

Agricultural Market Access database. A co-operative effort between Agriculture and Agri-food Canada, EU Commission-Agriculture Directorate-General, FAO, OECD, The World Bank, UNCTAD and the United States Department of Agriculture, Economic Research Service. Data in the database is obtained from countries' schedules and notifications submitted to the WTO.

APEC

Asia-Pacific Economic Co-operation – a forum for 21 Pacific-rim member economies that seeks to promote open trade and practical economic co-operation throughout the Asia-Pacific region. Co-operation is based on three pillars: trade and investment liberalization, business facilitation, and economic and technical co-operation. The primary goal is to support sustainable economic growth and prosperity in the region. Established in 1989, membership comprises Australia; Brunei Darussalam; Canada; Chile; People's Republic of China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; Philippines; Russia; Singapore; Chinese Taipei; Thailand; United States; and Viet Nam.

Aquaculture

The farming of aquatic organisms including fish, molluscs, crustaceans and 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.

Australia-US Free Trade Agreement (AUSFTA)

A Bilateral Agreement negotiated between the United States and Australia that came into force on 1 January 2005. AUSFTA covers goods, services, investment, financial services, government procurement, standards and technical regulations, telecommunications, competition-related matters, electronic commerce, intellectual property rights, labour and the environment.

Avian influenza

Avian influenza is an infectious disease of birds caused by type A strains of the influenza virus. The disease, which was first identified in Italy more than 100 years ago, occurs worldwide. The quarantining of infected farms, destruction of infected or potentially exposed flocks, and recently inoculation are standard control measures.

Atlantic beef/pigmeat market

The Atlantic market consists of countries producing and trading livestock, bovine and porcine, that are Foot and Mouth Disease (FMD) free with vaccination or contain FMD free zones. Most countries part of this market are located around the Atlantic rim and typically trade grass fed bovine and grain fed porcine. The main countries that are part of that market are: South America, EU, Russia, North Africa, Iran, Israel, Kazakhstan, Malaysia, Peru, Philippines, Saudi Arabia, Turkey, Ukraine, Uruguay, Vietnam, South Africa.

Baseline

The set of market projections used for the outlook analysis in this report and as a benchmark for the analysis of the impact of different economic and policy scenarios. A detailed description of the generation of the baseline is provided in the chapter on Methodology in this report.

Biofuels

In the wider sense defined as all solid, fluid or gaseous fuels produced from biomass. More narrowly, the term biofuels comprises those that replace petroleum-based road-transport fuels, i.e. bioethanol produced from sugar crops, cereals and other starchy crops that can be used as an additive to, in a blend with or as a replacement of gasoline, and biodiesel produced mostly from vegetable oils, but also from waste oils and animal fats, that can be used in blends with or as a replacement of petroleum-based diesel.

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 feedstocks 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).

Bovine Spongiform Encephalopathy (BSE)

A fatal disease of the central nervous system of cattle, first identified in the United Kingdom in 1986. On 20 March 1996 the UK Spongiform Encephalopathy Advisory

Committee (SEAC) announced the discovery of a new variant of Creutzfeldt-Jacob Disease (vCJD), a fatal disease of the central nervous system in humans, which might be linked to consumption of beef affected by exposure to BSE.

BRICs

Refers to the emerging economies of Brazil, the Russian Federation, India and China.

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.

Cereals

Defined as wheat, 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.

Coarse grains

Defined as barley, maize, 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.

Conservation Reserve Program (CRP)

A major provision of the United States' Food Security Act of 1985 and extended under the Food and Agriculture Conservation and Trade Act of 1990, the Food and Agriculture Improvement and Reform Act of 1996, and the Farm Security and Rural Investment Act of 2002 is designed to reduce erosion on 40 to 45 million acres (16 to 18 million hectares) of farm land. Under the programme, producers who sign contracts agree to convert erodable crop land to approved conservation uses for ten years. Participating producers receive annual rental payments and cash or payment in kind to share up to 50% of the cost of establishing permanent vegetative cover. The CRP is part of the *Environmental Conservation Acreage Reserve Program*. The 1996 FAIR Act authorised a 36.4 million acre (14.7 million hectares) maximum under CRP, its 1995 level. The maximum area enrolled in the CRP was increased to 39.2 million acres in the 2002 FSRI Act.

Commonwealth of Independent States (CIS)

The heads of twelve sovereign states (except the Baltic states) have signed the Treaty on establishment of the Economic Union, in which they stressed that the Azerbaijan Republic, Republic of Armenia, Republic of Belarus, Republic of Georgia, Republic of

Kazakhstan, Kyrgyz Republic, Republic of Moldova, Russian Federation, Republic of Tajikistan, Turkmenistan, Republic of Uzbekistan and Ukraine on equality basis established the Commonwealth of Independent States.

Common Market Organisation (CMO) for sugar

The common organisation of the sugar market (CMO) in the European Union was established in 1968 to ensure a fair income to community sugar producers and self-supply of the Community market. At present the CMO is governed by Council Regulation (EC) No. 318/2006 (the basic regulation) which establishes a restructuring fund financed by sugar producers to assist the restructuring process needed to render the industry more competitive.

Crop year, coarse grains

Refers to the crop marketing year beginning 1 April for Japan, 1 July for the European Union and New Zealand, 1 August for Canada and 1 October for Australia. The US crop year begins 1 June for barley and oats and 1 September for maize and sorghum.

Crop year, cotton

Refers to the crop marketing year beginning 1 August for all countries.

Crop year, oilseeds

Refers to the crop marketing year beginning 1 April for Japan, 1 July for the European Union and New Zealand, 1 August for Canada and 1 October for Australia. The US crop year begins 1 June for rapeseed, 1 September for soyabeans and for sunflower seed.

Crop year, rice

Refers to the crop marketing year beginning 1 April for Japan, Australia, 1 August for the United States, 1 September for the European Union, 1 November for Korea and 1 January for other countries.

Crop year, sugar

A common crop marketing year beginning 1 October and extending to 31 September, used by ISO (International Sugar Organisation).

Crop year, wheat

Refers to the crop marketing year beginning 1 April for Japan, 1 June for the United States, 1 July for the European Union and New Zealand, 1 August for Canada and 1 October for Australia.

Decoupled payments

Budgetary payments paid to eligible recipients who are not linked to current production of specific commodities or livestock numbers or the use of specific factors of production.

Developed countries

See summary table at the end of the Glossary.

Developing countries

See summary table at the end of the Glossary.

Direct payments

Payments made directly by governments to producers.

Doha Development Agenda

The current round of multilateral trade negotiations in the World Trade Organisation that were initiated in November 2001, in Doha, Qatar.

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.

Eastern Europe

Refers to Russia, Ukraine and Kazakhstan.

Economic Partnership Agreements (EPAs)

Free trade agreements currently being negotiated between the EU and the African, Caribbean Pacific (ACP) group of developing countries to replace the Cotonou Agreement which expired in 2007.

El Niño

In this publication, El Niño is used to indicate a broader term of quasi-periodic ocean climate conditions including La Niña, Southern Oscillation, or ENSO, which are characterized by anomalies in the temperature of the surface of eastern coast of Latin America (centred on Peru) -warming or cooling known as *El Niño* and *La Niña* respectively- and air surface pressure in the tropical western Pacific (the Southern Oscillation), often around Christmas time. The abnormal warm ocean climate conditions are accompanied by dramatic changes in species abundance and distribution, higher local rainfall and flooding, massive deaths of fish and their predators (including birds).

Energy Independence and Security Act (EISA) 2007

US legislation passed in December 2007 that is designed to increase US energy security by lessening dependence on imported oil, to improve energy conservation and efficiency, expand the production of renewable fuels, and to make America's air cleaner for future generations.

Ethanol

A biofuel that can be used as a fuel substitute (hydrous ethanol) or a fuel extender (anhydrous ethanol) in mixes with petroleum, and which is produced from agricultural feed-stocks such as sugar cane and maize.

Everything-But-Arms (EBA)

The Everything-But-Arms (EBA) Initiative eliminates EU import tariffs for numerous goods, including agricultural products, from the least developed countries. The tariff elimination is scheduled in four steps from 2006/07 to 2009/10.

Export credits (with official support)

Government financial support, direct financing, guarantees, insurance or interest rate support provided to foreign buyers to assist in the financing of the purchase of goods from national exporters.

Export restitutions (refunds)

EU export subsidies provided to cover the difference between internal prices and world market prices for particular commodities.

Export subsidies

Subsidies given to traders to cover the difference between internal market prices and world market prices, such as for example the EU *export restitutions*. Export subsidies are now subject to value and volume restrictions under the *Uruguay Round Agreement on Agriculture*.

FCE Act, 2008

Officially known as the Food, Conservation and Energy Act of 2008. This US farm legislation replaces the FSRI Act of 2002 and covers the period 2008-13.

FSRI Act, 2002

Officially known as the Farm Security and Rural Investment Act of 2002. This US farm legislation replaces the FAIR Act of 1996, covering a wide range of commodity programs and policies for US agriculture for the period 2002-07.

G-20

Group of twenty which brings together important developed and developing economies to discuss key issues in the global economy. Established in 1999 and consists of Finance Ministers and Central Bank Governors from 20 of the world's largest national economies.

Gur, jaggery, khandasari

Semi-processed sugars (plantation whites) extracted from sugarcane in India.

Health Check Reform of the Common Agricultural Policy

On 20 November 2008 the EU agriculture ministers reached a political agreement on the Health Check of the Common Agricultural Policy. Among a range of measures, the agreement abolishes arable set-aside, increases milk quotas gradually leading up to their abolition in 2015, and converts market intervention into a genuine safety net. Ministers also agreed to increase modulation, whereby direct payments to farmers are reduced and the money transferred to the Rural Development Fund.

High Fructose Corn Syrup (HFCS)

Isoglucose sweetener extracted from maize.

Industrial oilseeds

A category of oilseed production in the European Union for industrial use (i.e. biofuels).

Intervention purchases

Purchases by the EC Commission of certain commodities to support internal market prices.

Intervention purchase price

Price at which the European Commission will purchase produce to support internal market prices. It usually is below 100% of the intervention price, which is an annually decided policy price.

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; otherwise, they may be sold on the world market with the aid of *export restitutions*.

Inulin

Inulin syrups are extracted from chicory through a process commercially developed in the 1980s. They usually contain 83 per cent fructose. Inulin syrup production in the European Union is covered by the sugar regime and subject to a production quota.

Isoglucose

Isoglucose is a starch-based fructose sweetener, produced by the action of 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. Isoglucose production in the European Union is covered by the sugar regime and subject to a production quota.

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. Calculated on the basis of conversion factors from landed to nominal weight and on rates prevailing among national industries for each type of processing.

Loan rate

The commodity price at which the *Commodity Credit Corporation* (CCC) offers *non-recourse loans* to participating farmers. The crops covered by the programme are used as collateral for these loans. The loan rate serves as a floor price, with the effective level lying somewhat above the announced rate, for participating farmers in the sense that they can default on their loan and forfeit their crop to the CCC rather than sell it in the open market at a lower price.

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 allotments (US sugar program)

Marketing allotments designate how much sugar can be sold by sugar millers and processors on the US internal market and were established by the 2002 FSRI Act as a way to guarantee the US sugar loan program operates at no cost to the Federal Government.

Marketing year, oilseed meals

Refers to the marketing year beginning 1 October.

Marketing year, vegetable oils

Refers to the marketing year beginning 1 October.

Market Price Support (MPS) Payment

Indicator of the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers arising from policy measures creating a gap between domestic market prices and *border prices* of a specific agricultural commodity, measured at the farm gate level. Conditional on the production of a specific commodity, MPS includes the transfer to producers associated with both production for domestic use and exports, and is measured by the price gap applied to current production. The MPS is net of financial contributions from individual producers through producer levies on sales of the specific commodity or penalties for not respecting regulations such as production quotas (*Price levies*), and in the case of livestock production is net of the market price support on domestically produced coarse grains and oilseeds used as animal feed (*Excess feed cost*).

Methyl Tertiary Butyl Ether (MTBE)

A chemical gasoline additive that can be used to boost the octane number and oxygen content of the fuel, but can render contaminated water undrinkable.

Milk quota scheme

A supply control measure to limit the volume of milk produced or supplied. Quantities up to a specified quota amount benefit from full *market price support*. Over-quota volumes may be penalised by a levy (as in the European Union, where the "super levy" is 115% of the target price) or may receive a lower price. Allocations are usually fixed at individual producer level. Other features, including arrangements for quota reallocation, differ according to scheme.

Non-Recourse loan programme

Programme to be implemented under the US FAIR Act of 1996 for butter, non-fat dry milk and cheese after 1999 in which loans must be repaid with interest to processors to assist them in the management of dairy product inventories.

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.

Oilseed meals

Defined as rapeseed meal (canola), soyabean meal, and sunflower meal in all countries, except in Japan where it excludes sunflower meal.

Oilseeds

Defined as rapeseed (canola), soyabeans, sunflower seed, peanuts and cotton seeds in all countries, except in Japan where it excludes sunflower seed.

Pacific beef/pigmeat market

The Pacific meat market consists of countries or zones within countries that produce and trade livestock free from/of Foot and Mouth Disease (FMD) without vaccination. FMD status is given by the OIE according to strict guidelines (*www.oie.int/en/animal-health-in-the-world/official-disease-status/fmd/*) and include, 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.

Payment-In-Kind (PIK)

A programme used in the US to help dispose of public stocks of commodities. Under PIK, government payments in the form of Commodity Credit Corporation (CCC)-owned commodities are given to farmers in return for additional reductions in harvested acreage.

PROCAMPO

A programme of direct support to farmers in Mexico. It provides for direct payments per hectare on a historical basis.

Producer Support Estimate (PSE)

Indicator of the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at farm gate level, arising from policy measure, regardless of their nature, objectives or impacts on farm production or income. The PSE measure 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 PSE is a gross notion implying that any costs associated with those policies and incurred by individual producers are not deducted. It is also a nominal assistance notion meaning that increased costs associated with import duties on inputs are not deducted. But it is an indicator net of producer contributions to help finance the policy measure (e.g. producer levies) providing a given transfer to producers. The PSE includes implicit and explicit payments. The percentage PSE is the ration 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. The nomenclature and definitions of this indicator replaced the former Producer Subsidy Equivalent in 1999.

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 mandate of 10% for the renewable energy share in transport fuels.

Renewable Fuel Standard (RFS and RFS2)

A standard in the United States for the use of renewable fuel use in the transport sector in the Energy Act (EISA). RFS2 is a revision of the RFS programme for 2010 and beyond.

Saccharin

A low calorie, artificial sweetener used as a substitute for sugar mainly in beverage preparations.

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.

Set-aside programme

European Union programme for cereal, oilseed and protein crops that requires and allows producers to set-aside a portion of their historical base acreage from current production. Mandatory set-aside rates for commercial producers are set at 10% until 2006.

Single Farm Payment

With the 2003 CAP reform, the EU introduced a farm-based payment largely independent of current production decisions and market developments, but based on the level of former payments received by farmers. To facilitate land transfers, entitlements are calculated by dividing the reference amount of payment by the number of eligible hectares (incl. forage area) in the reference year. Farmers receiving the new SFP are obliged to keep their land in good agricultural and environmental condition and have the flexibility to produce any commodity on their land except fruits, vegetables and table potatoes.

SPS Agreement

WTO Agreement on Sanitary and Phyto-sanitary measures, including standards used to protect human, animal or plant life and health.

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, Russia, Ukraine and Brazil are considered. For rice Vietnam, 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 public stockholding.

Tariff-rate quota (TRQ)

Resulted from the Uruguay Round Agreement on Agriculture. Certain countries agreed to provide minimum import opportunities for products previously protected by non-tariff barriers. This import system established a quota and a two-tier tariff regime for affected commodities. 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 the concessionary access level.

Uruguay Round Agreement on Agriculture (URAA)

The terms of the URAA are contained in the section entitled the "Agreement on Agriculture" of the Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations. This text contains commitments in the areas of *market access*, domestic support, and *export subsidies*, and general provisions concerning monitoring and continuation. In addition, each country's schedule is an integral part of its contractual commitment under the URAA. There is a separate agreement entitled the Agreement on the Application of Sanitary and Phyto-sanitary Measures. This agreement seeks establishing a multilateral framework of rules and disciplines to guide the adoption, development and the enforcement of sanitary and phyto-sanitary measures in order to minimise their negative effects on trade.

Vegetable oils

Defined as rapeseed oil (canola), soyabean oil, sunflower seed oil, coconut oil, cotton oil, palm kernel oil, peanuts oil and palm oil, except in Japan where it excludes sunflower seed oil.

Voluntary Quota Restructuring Scheme

Established as part of the reform of the European Union's Common Market Organisation (CMO) for sugar in February 2006 to apply for four years from 1 July 2006. Under the scheme, sugar producers receive a degressive payment for permanently surrendering sugar production quota, in part or in entirety, over the period 2006-07 to 2009-10.

WTO

World Trade Organisation created by the Uruguay Round agreement.

Summary table for developed and developing countries

DEVELOPED	North America		Canada, United States
	Europe		Albania, Andorra, Belarus, Bosnia and Herzegovina, Croatia, European Union, Faeroe Islands, Gibraltar, Holy See, Iceland, Monaco, Montenegro,Norway, Republic of Moldova, Russia, San Marino, Serbia, The former Yugoslav Republic of Macedonia, Ukraine, Switzerland
	Oceania developed		Australia, New Zealand
	Other developed		Armenia, Georgia, Israël, Japan, Kasakhtan, Kyrgyzstan, Republic of Azerbaijan, South africa, Tajikistan, Turkmenistan, Uzbekistan
DEVELOPING	Africa	North Africa	Algeria, Egypt, Libyan Arab Jamahiriya, Morocco, Tunisia
		Sub-saharian Africa	Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, CapeVerde, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mayotte, Mozambic, Namibia, Niger, Nigeria, Republic of the Congo, Réunion, Rwanda, Saint Helena, SaoTome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, Soudan, Swaziland, Tanzania, Togo, Uganda, Western Sahara, Zambia, Zimbabwe
	Latin America and Caribbean		Anguilla, Antigua and Barbuda, Argentina, Aruba, Bahamas, Barbados, Belize, Bolivia, Brazil, British Virgin Islands, Cayman Islands, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Falkland Islands (Malvinas), French Guiana, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Montserrat, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, South Georgia/Sandwich Islands, Suriname, Trinidad and Tobago, Turks and Caicos Islands, United States Virgin Islands, Uruguay, Venezuela
	Asia and Pacific		Afghanistan, American Samoa, Bahrain, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, China Taiwan, Christmas Island, Cocos (Keeling) Islands, CookIslands, Democratic People's Republic of Korea, Fiji Islands, French Polynesia, GAZA, GazaStrip (Palestine), Guam, HongKong, India, Indonesia, Iran, Iraq, Israel, Johnston Islands, Jordan, Kiribati, Korea, Kuwait, Lao People's Democratic Republic, Lebanon, Macau, Malaysia, Maldives, Marshall Islands, Micronesia (Federated States of), Mongolia, Myanmar, Nauru, Nepal, Neutral Zone, New Caledonia, Niue, Norfolk Island, Northern Mariana Islands, Oman, Pacific Islands, Pakistan, Philipinnes, Palau, Palestine Occupied Tr, Papua New Guinea, Pitcairn Islands, Qatar, Samoa, Saudia arabia, Singapore, Solomon Islands, Sri Lanka, Syrian Arab Republic, Thailand, Timor-Leste, Tokelau, Tonga, Turkey, Tuvalu, United Arab Emirates, US Minor Outlying Islands, Vanuatu, Vietnam, Wallis and Futuna Islands, WestBank, Yemen
	LDC		Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambic, Myanmar, Nepal, Niger, Rwanda, Samoa, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, Soudan, Tanzania, Timor-Leste, Togo, Tuvalu, Uganda, Vanuatu, Yemen, Zambia
BRICS			Brazil, Russia, India, China, South Africa

Methodology

This section provides information on the methodological aspects of the generation of the present *Agricultural Outlook*. It discusses the main aspects in the following order: 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. A third part presents how production costs are taken into account in the model's supply equations. Then the 4th part presents the methodology developed for the stochastic analysis conducted with the AGLINK-COSIMO model.

The generation of the *OECD-FAO Agricultural Outlook*

The projections presented and analysed in this document are the result of a process that brings together information from a large number of sources. The use of a model jointly developed by the OECD and FAO Secretariats, based on the OECD's Aglink model and extended by FAO's Cosimo model, facilitates consistency in this process. A large amount of expert judgement, however, is applied at various stages of the Outlook process. The *Agricultural Outlook* presents a single, unified assessment, judged by the OECD and FAO Secretariats to be plausible given the underlying assumptions, the procedure of information exchange outlined below and the information to which they had access.

The starting point of the outlook process is the reply by OECD countries (and some non-member countries) to an annual questionnaire circulated in the fall. Through these questionnaires, the OECD Secretariat obtains information from these countries on future commodity market developments and on the evolution of their agricultural policies. The starting projections for the country modules handled by the FAO Secretariat are developed through model based projections and consultations with FAO commodity specialists. External sources, such as the IMF, the World Bank and the 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 of the present report. The sources and assumptions for those assumptions are discussed in more detail further below.

As a next step, the modelling framework jointly developed by the OECD and FAO Secretariats is used to facilitate a consistent integration of this information and to derive an initial set of global market projections (baseline). In addition to quantities produced, consumed and traded, the baseline also includes projections for nominal prices (in local currency units) for the commodities concerned. Unless otherwise stated, prices referred to in the text are also in nominal terms. The data series for the projections are drawn from

OECD and FAO databases. For the most, part information in these databases has been taken from national statistical sources. For further details on particular series, enquiries should be directed to the OECD and FAO Secretariats.

The model provides a comprehensive dynamic economic and policy specific representation of the main temperate-zone commodities as well as rice, cotton and vegetable oils. The Aglink and Cosimo country and regional modules are all developed by the OECD and FAO Secretariats in conjunction with country experts and, in some cases, with assistance from other national administrations. The initial baseline results for the countries under the OECD Secretariat's responsibility are compared with those obtained from the questionnaire replies and issues arising are discussed in bilateral exchanges with country experts. The initial projections for individual country and regional modules developed by the FAO Secretariat are reviewed by a wider circle of in-house and international experts. In this stage, the global projection picture emerges and refinements are made according to a consensus view of both Secretariats and external advisors. On the basis of these discussions and of updated information, a second baseline is produced. The information generated is used to prepare market assessments for biofuels, cereals, oilseeds, sugar, meats, fish and sea food, dairy products and cotton over the course of the *Outlook* period, which is discussed at the annual meetings of the Group on Commodity Markets of the OECD *Committee for Agriculture*. Following the receipt of comments and final data revisions, a last revision is made to the baseline projections. The revised projections form the basis of a draft of the present *Agricultural Outlook* publication, 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 2013, prior to publication. In addition, the Outlook will be used as a basis for analysis presented to the FAO's *Committee on Commodity Problems* and its various *Intergovernmental Commodity Groups*.

The Outlook process implies that the baseline projections presented in this report are a combination of projections developed by collaborators for countries under the OECD Secretariat's responsibility and original projections for the 42 countries and regions under the FAO Secretariat's responsibility. 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.

Sources and assumptions for the macroeconomic projections

Population estimates from the 2010 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 (except Turkey, Chile and Israel) as well as Brazil, Argentina, China and Russia are consistent with those published in the *OECD Economic Outlook No. 92*, December 2012 and *No. 91*, June 2012. For other economies, historical macroeconomic data were obtained from the IMF, *World Economic Outlook*, October 2012. Assumptions for 2013-22 are based on the recent medium term macroeconomic projections of the OECD Economics Department, projections of the *OECD Economic Outlook No. 91* 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 2005 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 1 USD. 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* is based on information from the *OECD Economic Outlook No. 92* until 2014 (short term update) and the growth rate of the International Energy Agency, *World Energy Outlook*, November 2012, for future paths.

The representation of production costs in AGLINK-COSIMO

Changes in production costs are an important variable for farmers' decisions on crop and livestock production quantities, in addition to output returns and, if applicable, policy measures.

While supply in AGLINK-COSIMO is largely determined by gross returns, production costs are represented in the model in the form of a cost index used to deflate gross production revenues. In other words, supply equations in the model in most cases depend on gross returns per unit of activity (such as returns per hectare or the meat price) relative to the overall production cost level as expressed by the index. Consequently, equations for harvested areas in crop production and for livestock production quantities take the following general forms:

$$AH = f\left(\frac{RH}{CPCI}\right);\ QP = f\left(\frac{PP}{CPCI}\right)$$

with:

AH	area harvested (crop production)
RH	returns per hectare (crop production)
CPCI	commodity production cost index
QP	production quantity (livestock production)
PP	producer price (livestock production)

Among others, energy prices, increased by rising crude oil prices, have fostered attention to agricultural production costs in agricultural commodity models. Energy prices can significantly impact on international markets for agricultural products as production costs for both crops and livestock products are highly dependent on energy costs. Fuels for tractors and other machinery, as well as heating and other forms of energy are directly used in the production process. In addition, other inputs such as fertilisers and pesticides have high energy content, and costs for these inputs are driven to a significant extent by energy prices. It is therefore important to explicitly consider energy prices in the representation of production costs.

The production cost indices employed in AGLINK-COSIMO for *livestock products* is constructed from three sub-indices representing non-tradable inputs, energy inputs, and other tradable inputs, respectively. While the non-tradable sub-index is approximated by the domestic GDP deflator, the energy sub-index is affected by changes in the world crude oil price and the country's exchange rate. Finally, the tradable sub-index is linked to global inflation (approximated by the US GDP deflator) and the country's exchange rate. This relationship is shown in the following equation:

$$\begin{aligned} CPCI_{r,t} &= CPCS_{r,t}^{NT} * GDPD_{r,t} / GDPD_{r,bas} \\ &+ CPCS_{r,t}^{EN} * \left(XP_t^{OIL} * XR_{r,t}\right) / \left(XP_{bas}^{OIL} * XR_{r,bas}\right) \\ &+ \left(1 - CPCS_{r,t}^{NT,1} - CPCS_{r,t}^{EN,1}\right) * (XR_{r,t} * GDPD_{USA,t}) / (XR_{r,bas} * GDPD_{USA,bas}) \end{aligned}$$

with:

CPCI	commodity production cost index for livestock
$CPCS^{NT}$	share of non-tradable input in total base commodity production costs
$CPCS^{EN}$	share of energy in total base commodity production costs
GDPD	deflator for the gross domestic product
XP^{OIL}	world crude oil price
XR	nominal exchange rate with respect to the US Dollar
r,t	region and time index, respectively
bas	base year (2000 or 2005 or 2008) value

The production cost index is different for each *crop products* and is constructed from five sub-indices representing seeds inputs, fertiliser inputs, energy inputs, other tradable inputs and non-tradable inputs, respectively.

$$\begin{aligned} CPCI_{r,t}^{c} &= CPCS_{r,t}^{NT} * GDPD_{r,t} / GDPD_{r,bas} \\ &+ CPCS_{r,t}^{EN} * \left(XP_t^{OIL} * XR_{r,t}\right) / \left(XP_{bas}^{OIL} * XR_{r,bas}\right) \\ &+ CPCS_{r,t}^{FT} * \left(XP_t^{FT} * XR_{r,t}\right) / \left(XP_{bas}^{FT} * XR_{r,bas}\right) \\ &+ CPCS_{r,t}^{TR} * (XR_{r,t} * GDPD_{USA,t}) / (XR_{r,bas} * GDPD_{USA,bas}) \\ &+ CPCS_{r,t}^{SD} * PP_{r,t}^{c}(-1) / PP_{r,bas}^{c} \end{aligned}$$

with:

$CPCI^{C}$	commodity production cost index for crop product c
$CPCS^{NT}$	share of non-tradable input in total base commodity production costs
$CPCS^{EN}$	share of energy in total base commodity production costs
$CPCS^{FT}$	share of fertiliser in total base commodity production costs
$CPCS^{TR}$	share of other tradable input in total base commodity production costs
$CPCS^{SD}$	share of seeds input in total base commodity production costs
GDPD	deflator for the gross domestic product
XP^{OIL}	world crude oil price
XP^{FT}	world fertiliser price

PP^c producer price for crop product c

XR nominal exchange rate with respect to the US Dollar

c Crop product

r,t region and time index, respectively

bas base year (2000 or 2005 or 2008) value

The shares of the various cost categories are country specific. They were estimated based on historic cost structures in individual countries. Shares vary depending on the development stages of the countries and regions. Developed countries tend to have higher shares of energy, fertiliser and tradable inputs than developing nations.

The fertiliser price is an index produced by the World Bank (Pink Sheets). It is formed as an index as follows:

$XP^{FT} = 0.2*DAP+0.16*MOP+0.02*TSP+0.62*Urea$

With:

US Diammonium Phosphate (DAP)

Canada Potassium Chloride (MOP)

Triple superphosphate (TSP)

Urea (Black Sea)

And is represented by an equation in the AGLINK-COSIMO model:

$$\log(XP_t^{FT}) = CON + elas_{FT}^{OIL} * \log(XP_t^{OIL}) \\ + elas_{FT}^{crop} * \log(0.5*XP_{t-1}^{CG} + 0.2*XP_{t-1}^{WT} + 0.2*XP_{t-1}^{OS} + 0.1*XP_{t-1}^{RI})$$

With:

XP^{OIL} world crude oil price

XP^{FT} world fertiliser price

XP^{CG} world coarse grain price

XP^{WT} world wheat price

XP^{OS} world oilseed price

XP^{RI} world rice price

The methodology of stochastic simulations with AGLINK-COSIMO

The AGLINK-COSIMO model is a forward-looking medium term economic model which is used to perform simulations over a 10-year horizon. It is necessary to feed into the model a set of assumptions for exogenous variables. While a single set of assumptions is used for the deterministic baseline, multiple sets of exogenous variables generated by random samplings, are fed into the model for stochastic experiments. The model is simulated for each set of assumptions and, thus, multiple sets of solutions are obtained. Implications of uncertainties for the baseline projections can be inferred from statistical information of the random outputs of the simulations.

For the stochastic analysis conducted for this year which assessed the uncertainty arising from macroeconomic variables and crop yields, the quantification of uncertainty surrounding 32 macroeconomic drivers was based on the errors in the OECD-FAO's 18-month-ahead forecasts of these variables between 2003 and 2011. Crop yield uncertainty was based on the differences between yields as predicted by the yield equations in AGLINK-COSIMO and actual yields over the eighteen years up to 2011.

In each case, a normal (Gaussian) distribution was assumed for the variability characterising uncertainty. This means that a variable's uncertainty is assumed to be symmetric around its most likely value. If policy makers want to investigate the implications of a skewed risk distribution (for example, greater upward price risk due to depressed yields or volatile crude oil prices), a non-symmetric distribution could be assumed.

The joint probability distribution of the uncertain macroeconomic drivers was derived, based on correlations between forecast errors observed in the past. Crop yield uncertainty was assumed to be correlated between crops within the same region, but not between regions (see Table 1).

In the next step, 500 independent "draws" were made from these joint distributions, resulting in 500 different sets of possible "error" values for the 97 stochastic drivers, for each year of the simulation period. The trend values of these drivers as used for the deterministic baseline were then "shocked" by these errors, yielding 500 sets of possible values for the 97 exogenous drivers.

AGLINK-COSIMO was then run 500 times,* each run corresponding to a different set of underlying assumptions about macroeconomic conditions and crop yields. In the last step, the variability of the market outcomes calculated by the model was studied to answer a number of policy-relevant questions.

Table 1. **Yields treated as stochastic and correlation groupings**

Commodity	EUROPE		BLACK SEA AREA			SOUTH AMERICA				NORTH AMERICA		SOUTH EAST ASIA		Australia	China	India	Total countries per crop
	EU-15	EU-N12	Kazakhstan	Ukraine	Russia	Argentina	Brazil	Paraguay	Uruguay	Mexico	USA	Thailand	Vietnam				
Durum wheat	X	X															**2**
Common wheat	X	X	X	X	X	X	X	X	X	X	X			X	X	X	**14**
Coarse grains				X				X	X						X		**4**
Barley	X	X				X								X			**4**
Maize	X	X				X	X			X	X						**6**
Oats	X	X															**2**
Rye	X	X															**2**
Oilseeds			X	X				X									**3**
Rapeseed	X	X												X			**3**
Sunflower seed	X	X			X	X											**4**
Soybean						X	X				X						**3**
Sugarbeet	X	X			X						X				X		**5**
Sugarcane						X	X				X	X		X	X	X	**7**
Rice	X										X	X	X		X	X	**6**
Total crops in each block	**19**		**8**			**15**				**8**		**3**		**4**	**5**	**3**	**65**

Note: Cells marked by a cross indicate which crop yields in which countries are treated as uncertain. Countries are grouped into regions, within each of which yield correlations between crops are allowed for. Yields in three countries (Australia, China and India) are assumed uncorrelated with those of other countries/regions.
Source: Institute for Prospective Technological Studies (European Commission) calculations.

* Convergence was achieved by 414 runs, giving a convergence rate of 83%.

Statistical Annex

Part I. Annex A

Table A.1. Economic assumptions

Calendar year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
REAL GDP[1]												
Australia	%	2.8	3.0	3.2	3.8	3.7	3.5	3.4	3.3	3.2	3.1	3.1
Canada	%	2.6	1.8	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1
Chile	%	5.7	4.4	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
European Union	%	1.1	0.3	1.5	1.9	2.0	1.9	1.8	1.8	1.8	1.8	1.8
Japan	%	1.8	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.3
Korea	%	4.1	3.1	4.4	3.3	3.2	3.1	3.0	3.0	2.9	2.7	2.6
Mexico	%	4.4	3.3	3.6	3.3	3.4	3.4	3.5	3.5	3.6	3.6	3.6
New Zealand	%	1.0	2.4	2.9	2.5	2.6	2.7	2.8	2.8	2.8	2.9	2.9
Norway	%	1.8	2.5	2.0	4.2	4.0	3.9	3.7	3.6	3.4	3.3	3.1
Switzerland	%	1.9	1.1	2.3	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.3
Turkey	%	6.9	3.5	4.0	4.3	4.4	4.4	4.3	4.3	4.3	4.3	4.3
United States	%	2.1	2.0	2.8	2.9	2.7	2.5	2.4	2.4	2.3	2.3	2.4
Algeria	%	2.7	3.4	3.3	3.4	3.9	4.0	3.7	3.7	3.7	3.7	3.7
Argentina	%	6.3	0.5	3.3	3.0	3.2	3.3	3.4	3.4	3.4	3.3	3.3
Bangladesh	%	6.3	6.1	6.7	7.1	7.2	7.3	7.0	7.0	7.0	7.0	7.0
Brazil	%	3.9	4.0	4.1	4.8	4.6	4.5	4.3	4.2	4.1	4.1	4.0
China	%	9.1	8.5	8.9	9.0	8.5	8.1	7.7	7.2	6.8	6.5	6.1
Egypt	%	3.0	3.0	4.5	6.0	6.5	6.5	5.9	5.9	5.9	5.9	5.9
India	%	7.3	6.0	6.4	6.7	6.9	6.9	6.7	6.7	6.7	6.7	6.7
Indonesia	%	6.2	6.3	6.5	6.6	6.7	6.8	6.7	6.7	6.7	6.7	6.7
Iran	%	2.3	0.8	1.5	1.8	2.0	2.0	1.8	1.8	1.8	1.8	1.8
Malaysia	%	5.5	4.7	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Pakistan	%	3.3	3.2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Russian Federation	%	4.0	3.8	4.1	4.4	3.9	3.5	3.2	3.0	2.9	2.8	2.8
Saudi Arabia	%	6.0	4.2	3.8	4.3	4.3	4.2	4.1	4.1	4.1	4.1	4.1
South Africa	%	2.9	3.0	3.9	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Ukraine	%	4.1	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Uruguay	%	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
OECD[2,3]	%	2.0	1.4	2.2	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2
PCE DEFLATOR[1]												
Australia	%	2.4	2.8	2.3	2.6	2.7	2.7	2.7	2.7	2.7	2.6	2.6
Canada	%	1.7	1.1	1.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
Chile	%	2.6	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
European Union	%	2.4	1.9	1.7	2.1	2.0	2.0	1.9	1.9	2.0	2.0	1.9
Japan	%	-1.1	-0.6	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Korea	%	2.9	2.4	2.8	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Mexico	%	4.6	4.3	3.9	3.7	3.6	3.5	3.5	3.5	3.5	3.2	3.2
New Zealand	%	2.1	1.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Norway	%	1.4	1.2	2.1	3.3	3.2	3.1	3.1	3.1	3.1	2.9	2.9
Switzerland	%	0.2	0.0	0.3	1.8	1.9	1.9	2.0	2.0	2.0	2.0	2.0
Turkey	%	7.9	6.5	5.3	5.0	5.0	5.0	5.1	5.1	5.1	5.1	5.1
United States	%	2.1	1.8	2.0	1.7	1.9	1.9	2.0	2.0	2.1	2.0	2.0
Algeria	%	5.6	5.0	4.5	4.0	4.0	4.0	4.1	4.1	4.1	4.1	4.1
Argentina	%	14.7	14.1	11.3	11.7	11.0	10.9	11.2	11.2	11.2	11.2	11.2
Bangladesh	%	9.1	6.7	6.3	5.9	5.5	5.5	5.8	5.8	5.8	5.8	5.8
Brazil	%	6.4	5.5	5.2	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5
China	%	4.9	2.9	3.6	3.8	3.9	3.9	4.0	4.0	4.0	4.0	4.0
Egypt	%	10.5	10.7	12.1	10.0	8.0	6.5	9.1	9.1	9.1	9.1	9.1
India	%	10.4	9.6	8.3	6.4	5.1	5.0	6.2	6.2	6.2	6.2	6.2
Indonesia	%	5.0	5.1	4.9	4.7	4.5	4.0	4.5	4.5	4.5	4.5	4.5
Iran	%	19.7	21.8	18.3	15.5	15.5	15.5	16.2	16.2	16.2	16.2	16.2
Malaysia	%	2.3	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Pakistan	%	11.6	10.4	11.0	12.0	13.0	13.0	12.2	12.2	12.2	12.2	12.2
Russian Federation	%	9.9	5.7	3.9	3.7	3.8	3.8	3.9	3.9	4.0	4.0	4.0
Saudi Arabia	%	5.1	4.6	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
South Africa	%	5.0	5.2	5.0	4.8	4.7	4.7	4.8	4.8	4.8	4.8	4.8
Ukraine	%	6.4	7.4	5.3	5.0	5.0	5.0	5.1	5.1	5.1	5.1	5.1
Uruguay	%	7.6	7.6	7.1	6.0	6.0	6.0	6.3	6.3	6.3	6.3	6.3
OECD[2,3]	%	2.1	1.8	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2

Table A.1. Economic assumptions *(cont.)*

Calendar year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
GDP DEFLATOR[1]												
Australia	%	3.2	1.7	2.3	2.6	2.7	2.7	2.7	2.7	2.7	2.6	2.6
Canada	%	2.4	1.4	1.8	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2
Chile	%	4.3	2.8	3.2	3.1	3.0	3.1	3.1	3.1	3.1	3.1	3.1
European Union	%	1.4	1.6	1.7	2.1	2.1	2.1	2.0	1.9	1.9	1.9	1.8
Japan	%	-1.7	-0.5	0.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Korea	%	2.2	1.6	1.5	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Mexico	%	4.4	4.0	4.2	3.7	3.6	3.5	3.5	3.5	3.5	3.2	3.2
New Zealand	%	2.9	2.0	1.9	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Norway	%	5.3	2.0	2.6	3.3	3.2	3.1	3.1	3.1	3.1	2.9	2.9
Switzerland	%	0.3	0.2	0.4	1.8	1.9	1.9	2.0	2.0	2.0	2.0	2.0
Turkey	%	6.9	7.2	5.1	4.5	4.7	4.5	4.7	4.7	4.7	4.7	4.7
United States	%	1.8	1.8	1.9	1.7	1.9	1.9	2.0	2.0	2.1	2.0	2.0
Algeria	%	13.7	3.8	2.2	1.8	1.7	1.5	1.8	1.8	1.8	1.8	1.8
Argentina	%	16.3	14.1	11.3	11.7	11.0	10.9	11.2	11.2	11.2	11.2	11.2
Bangladesh	%	7.4	6.6	6.4	6.0	5.6	4.9	5.7	5.7	5.7	5.7	5.7
Brazil	%	7.0	5.3	5.1	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5
China	%	5.3	2.4	1.5	3.8	3.9	3.9	4.0	4.0	4.0	4.0	4.0
Egypt	%	10.4	12.2	10.8	9.1	7.9	6.4	8.5	8.5	8.5	8.5	8.5
India	%	8.9	8.8	8.6	7.5	7.1	7.1	7.6	7.6	7.6	7.6	7.6
Indonesia	%	7.7	7.3	8.0	7.8	7.6	7.5	7.7	7.7	7.7	7.7	7.7
Iran	%	17.9	16.8	14.6	12.8	13.0	13.4	13.4	13.4	13.4	13.4	13.4
Malaysia	%	4.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Pakistan	%	13.9	10.4	11.0	12.0	13.0	13.0	12.2	12.2	12.2	12.2	12.2
Russian Federation	%	11.9	6.4	4.5	3.7	3.8	3.8	3.9	3.9	4.0	4.0	4.0
Saudi Arabia	%	13.8	-0.3	-1.6	-0.7	-0.4	-0.3	-0.8	-0.8	-0.8	-0.8	-0.8
South Africa	%	7.1	5.3	5.1	4.9	4.7	4.7	4.9	4.9	4.9	4.9	4.9
Ukraine	%	11.9	9.4	6.5	6.5	7.0	6.5	6.6	6.6	6.6	6.6	6.6
Uruguay	%	8.3	5.8	6.6	6.0	5.6	5.5	5.9	5.9	5.9	5.9	5.9
OECD[3]	%	1.6	1.7	1.9	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1
WORLD OIL PRICE												
Brent crude oil price[4]	USD/barrel	100.7	112.8	117.8	121.1	124.5	127.8	131.1	134.4	137.8	141.2	144.6
EXCHANGE RATES												
Australia	AUD/USD	1.01	0.96	0.96	0.97	0.98	0.98	0.99	1.00	1.00	1.01	1.02
Canada	CAD/USD	1.01	1.00	1.00	1.01	1.01	1.02	1.02	1.02	1.02	1.03	1.03
Chile	CLP/USD	492.11	476.00	479.00	487.00	487.00	487.00	489.79	492.59	495.42	498.25	501.11
European Union	EUR/USD	0.75	0.77	0.77	0.75	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Japan	JPY/USD	82.27	79.42	79.42	78.87	78.24	77.54	76.80	76.04	75.28	74.53	73.78
Korea	000 KRW/USD	1.13	1.09	1.09	1.10	1.12	1.13	1.14	1.16	1.17	1.18	1.19
Mexico	MXN/USD	12.75	13.23	13.23	13.41	13.55	13.66	13.76	13.86	13.95	14.01	14.06
New Zealand	NZD/USD	1.30	1.22	1.22	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
Algeria	DZD/USD	74.76	79.75	82.22	84.23	86.16	87.63	89.72	91.85	94.04	96.28	98.57
Argentina	ARS/USD	4.19	4.78	4.78	4.87	4.91	4.92	4.93	4.94	4.95	4.96	4.98
Bangladesh	BDT/USD	75.79	86.98	91.01	94.79	98.43	101.65	105.69	109.89	114.26	118.80	123.52
Brazil	BRL/USD	1.80	2.07	2.07	2.15	2.23	2.31	2.39	2.47	2.56	2.64	2.73
China	CNY/USD	6.51	6.23	6.23	6.26	6.29	6.32	6.35	6.38	6.42	6.47	6.52
Egypt	EGP/USD	5.78	6.42	7.51	8.18	8.68	9.09	9.92	10.83	11.81	12.89	14.06
India	INR/USD	47.85	53.21	56.22	58.61	60.26	61.73	64.07	66.50	69.02	71.63	74.34
Indonesia	000 IDR/USD	9.08	9.50	9.27	9.22	9.15	9.06	8.95	8.85	8.74	8.64	8.54
Iran	000 IRR/USD	11.53	14.30	15.57	16.79	18.10	19.52	21.11	22.81	24.66	26.66	28.82
Malaysia	MYR/USD	3.12	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Pakistan	PKR/USD	86.42	99.46	110.88	124.01	139.13	155.99	174.57	195.36	218.63	244.67	273.81
Russian Federation	RUB/USD	30.31	31.74	31.74	31.83	31.94	32.09	32.26	32.47	32.70	32.95	33.22
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	7.59	8.65	8.99	9.32	9.63	9.95	10.30	10.67	11.05	11.44	11.85
Ukraine	UAH/USD	7.97	8.35	8.64	8.90	9.17	9.44	9.74	10.04	10.36	10.68	11.01
Uruguay	UYU/USD	20.10	19.95	20.81	21.68	22.58	23.50	24.48	25.51	26.57	27.68	28.84

Table A.1. Economic assumptions *(cont.)*

Calendar year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
POPULATION[1]												
Australia	%	1.4	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1
Canada	%	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8
Chile	%	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6
European Union	%	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
Japan	%	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3
Korea	%	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2
Mexico	%	1.2	1.1	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.9	0.8
New Zealand	%	1.1	1.1	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9
Norway	%	0.7	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Switzerland	%	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Turkey	%	1.2	1.1	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.9	0.8
United States	%	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Algeria	%	1.4	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0
Argentina	%	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7
Bangladesh	%	1.3	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0
Brazil	%	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.6
China	%	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1
Egypt	%	1.7	1.7	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3	1.3
India	%	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0
Indonesia	%	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.7
Iran	%	1.1	1.1	1.0	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6
Malaysia	%	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.3
Pakistan	%	1.8	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.5
Russian Federation	%	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.3
Saudi Arabia	%	2.2	2.1	2.1	2.0	2.0	2.0	1.9	1.8	1.8	1.7	1.6
South Africa	%	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5
Ukraine	%	-0.6	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.6	-0.6
Uruguay	%	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3
OECD[3]	%	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4
World	%	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	0.9	0.9

Note: For OECD member countries (except Turkey, Chile and Israel), 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. 92, December 2012. For other economies, historical macroeconomic data were obtained from the IMF, World Economic Outlook, October 2012. Assumptions for the projection period draw on the recent short term update of the OECD Economics Department, projections of the OECD Economic Outlook No. 91, projections of the IMF, and for population, projections from the United Nations World Population Prospects Database, 2010 Revision (medium variant). Data for the European Union are euro area aggregates except for population.

Average 2010-12est and 2012est: Data for 2012 are estimated.

1. Annual per cent change. The price index used is the private consumption expenditure deflator.
2. Annual weighted average real GDP and CPI growth rates in OECD countries are based on weights using purchasing power parities (PPPs).
3. Excludes Iceland.
4. Short term update for crude oil price from the OECD Economic Outlook No.92, December 2012 and projections from IEA World Energy Outlook 2012.

Source: OECD and FAO Secretariats.

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Table A.2. World prices

		Average 2010/11-2012/13est	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
CEREALS												
Wheat[1]	USD/t	312.5	301.3	262.3	256.5	259.4	259.3	266.6	270.0	272.3	273.4	274.2
Coarse Grains[2]	USD/t	284.6	243.4	216.4	221.1	227.2	228.2	234.1	236.4	237.7	240.3	240.6
Rice[3]	USD/t	451.1	480.9	440.3	423.2	419.3	417.9	426.1	438.0	451.1	462.5	470.3
OILSEEDS												
Oilseeds[4]	USD/t	605.0	564.1	514.0	511.2	507.0	521.7	523.0	530.0	530.5	538.9	540.0
Protein meals[5]	USD/t	436.9	464.3	403.9	389.0	387.0	390.2	396.2	401.7	403.6	404.2	406.1
Vegetable oils[6]	USD/t	1 206.6	1 141.4	1 038.3	1 077.6	1 065.2	1 097.7	1 104.9	1 117.6	1 136.1	1 154.6	1 160.3
SWEETENERS												
Raw sugar[7]	USD/t rse	522.7	410.2	408.0	432.4	414.0	413.4	437.8	444.5	441.8	442.8	438.7
Refined sugar[8]	USD/t rse	621.0	498.8	503.7	530.7	512.5	507.4	538.7	545.2	541.3	540.6	536.4
HFCS[9]	USD/t	524.4	340.8	388.4	431.2	442.2	405.1	374.0	363.0	369.7	365.9	357.1
Molasses[10]	USD/t	182.1	195.6	194.3	206.1	196.3	185.5	194.0	195.6	198.6	193.5	193.3
MEAT												
Beef and veal												
Price, EU[11]	USD/t dw	4 716.8	5 245.1	5 674.0	6 192.6	6 014.4	6 338.9	6 398.4	6 763.0	7 215.3	7 300.7	7 256.1
Price, United States[12]	USD/t dw	3 946.5	4 654.1	4 716.4	4 730.5	4 639.9	4 568.5	4 393.9	4 414.8	4 475.5	4 546.1	4 570.3
Price, Brazil[13]	USD/t pw	3 252.9	3 334.8	3 526.2	3 543.1	3 632.1	3 598.1	3 414.4	3 465.8	3 557.1	3 630.3	3 706.5
Pigmeat												
Price, EU[14]	USD/t dw	2 037.3	2 473.5	2 659.0	2 739.6	2 601.1	2 600.0	2 807.4	2 956.6	2 982.3	2 954.2	2 928.2
Price, United States[15]	USD/t dw	1 860.4	2 051.1	2 154.6	2 147.3	2 061.2	2 055.4	2 162.0	2 285.3	2 270.7	2 243.5	2 284.9
Price, Brazil[16]	USD/t dw	1 511.7	1 677.3	1 787.4	1 820.8	1 749.0	1 765.4	1 856.6	1 984.3	1 991.6	1 979.3	2 034.3
Poultry meat												
Price, EU[17]	USD/t rtc	2 477.8	2 321.9	2 265.7	2 300.0	2 300.6	2 349.1	2 411.2	2 461.1	2 503.6	2 533.1	2 525.5
Price, United States[18]	USD/t rtc	1 133.6	1 167.9	1 157.2	1 174.0	1 171.5	1 193.6	1 220.7	1 241.4	1 260.3	1 272.6	1 279.3
Price, Brazil[19]	USD/t rtc	1 358.2	1 389.1	1 354.5	1 375.0	1 378.2	1 407.4	1 444.8	1 474.8	1 499.6	1 518.4	1 531.6
Sheep meat												
Price, New Zealand[20]	USD/t dw	4 481.2	4 119.4	4 128.2	4 165.7	4 244.9	4 362.0	4 420.2	4 397.6	4 533.0	4 566.0	4 636.2
FISH AND SEAFOOD												
Product traded[21]	USD/t	2 671.3	2 698.1	2 769.9	2 933.0	2 870.8	2 923.0	2 990.8	3 187.4	3 335.4	3 408.1	3 462.7
Aquaculture[22]	USD/t	2 034.8	2 047.6	2 092.0	2 225.1	2 224.9	2 221.5	2 273.0	2 422.4	2 568.2	2 658.3	2 700.9
Capture[23]	USD/t	1 324.5	1 386.3	1 431.8	1 501.8	1 513.7	1 555.2	1 601.5	1 681.3	1 750.2	1 798.1	1 842.8
Meal[24]	USD/t	1 594.2	1 824.8	1 648.4	1 691.6	1 534.7	1 496.5	1 514.8	1 620.7	1 727.6	1 655.2	1 700.0
Oil[25]	USD/t	1 514.7	2 004.9	1 772.8	1 844.5	1 725.2	1 730.0	1 767.4	1 782.3	1 978.3	1 840.4	1 864.1
DAIRY PRODUCTS												
Butter[26]	USD/t	3 943.5	3 499.5	3 576.8	3 547.8	3 543.7	3 631.7	3 659.3	3 709.3	3 722.0	3 717.9	3 688.5
Cheese[27]	USD/t	4 047.0	3 865.9	3 946.4	4 004.8	4 061.3	4 168.1	4 286.3	4 334.8	4 394.0	4 438.0	4 444.8
Skim milk powder[28]	USD/t	3 317.5	3 471.7	3 498.1	3 502.0	3 502.8	3 599.9	3 673.1	3 703.8	3 727.8	3 754.6	3 733.0
Whole milk powder[29]	USD/t	3 600.1	3 669.9	3 727.3	3 717.0	3 736.9	3 863.0	3 930.4	3 991.6	4 020.2	4 055.8	4 053.7
Whey powder wholesale price, United States[30]	USD/t	1 042.3	1 139.2	1 168.8	1 173.1	1 176.1	1 199.9	1 209.0	1 230.9	1 243.5	1 265.0	1 272.9
Casein[31]	USD/t	8 463.6	8 706.9	8 819.9	8 823.4	8 935.0	9 127.5	9 330.7	9 436.4	9 507.5	9 570.0	9 673.8
BIOFUEL												
Ethanol[32]	USD/hl	70.1	61.7	65.2	69.0	72.1	72.6	75.5	77.9	80.5	82.4	83.5
Biodiesel[33]	USD/hl	143.1	151.4	156.2	153.5	148.8	154.7	159.8	159.8	164.3	167.0	173.0
COTTON												
Cotton[34]	USD/t	2 344.2	1 788.4	1 795.5	1 914.8	1 954.0	1 947.9	1 923.7	1 892.3	1 890.7	1 885.3	1 935.2

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 meat and dairy products on calendar year basis (e.g. 09/10 is calendar year 2009).
Average 2010/11-2012/13est: Data for 2012/13 are estimated.

1. No.2 hard red winter wheat, ordinary protein, United States f.o.b. Gulf Ports (June/May), less EEP payments where applicable.
2. No.2 yellow corn, United States f.o.b. Gulf Ports (September/August).
3. Milled 5% broken, f.o.b. Ho Chi Minh (January/December).
4. Weighted average oilseed price, European port.
5. Weighted average meal price, European port.
6. Weighted average price of oilseed oils and palm oil, European port.
7. Raw sugar world price, ICE contract No11 nearby, October/September.
8. Refined sugar price,Euronext,Liffe,Contract No. 407 London,Europe,October/September.
9. United States wholesale list price HFCS-55 , October/September.
10. Unit import price, Europe (October/September)
11. EU average beef producer price.
12. Choice steers, 1100-1300 lb lw, Nebraska - lw to dw conversion factor 0.63.
13. Brazil average beef producer price.
14. EU average pigmeat producer price.
15. Barrows and gilts, No. 1-3, 230-250 lb lw, Iowa/South Minnesota - lw to dw conversion factor 0.74.
16. Brazil average pigmeat producer price.
17. EU average producer price.
18. Wholesale weighted average broiler price 12 cities.
19. Brazil average chicken for slaughter producer price.
20. Lamb schedule price, all grade average.
21. World unit value of trade (sum of exports and imports).
22. World unit value of aquaculture fisheries production (live weight basis).
23. FAO estimated value of world ex vessel value of capture fisheries production excluding for reduction.
24. Fishmeal, 64-65% protein, Hamburg, Germany.
25. Fish oil any origin, N.W. Europe
26. F.o.b. export price, butter, 82% butterfat, Oceania.
27. F.o.b. export price, cheddar cheese, 39% moisture, Oceania.
28. F.o.b. export price, non-fat dry milk, 1.25% butterfat,Oceania.
29. F.o.b. export price, WMP 26% butterfat, Oceania.
30. Dry whey, West region, United States.
31. Export price, New Zealand.
32. Brazil, Sao Paulo (ex-distillery).
33. Producer price Germany net of biodiesel tariff.
34. Cotlook A index, Middling 1 3/32", c.f.r. far Eastern ports (August/July)

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861092

Table A.3.1. World trade projections, imports

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Wheat												
World Trade	**kt**	**135 767**	**135 001**	**137 596**	**140 729**	**141 445**	**143 209**	**143 691**	**145 789**	**147 290**	**149 054**	**150 442**
OECD[1]	kt	31 159	29 268	29 898	30 557	30 990	31 394	31 489	31 453	31 435	31 410	31 395
Developing countries	kt	107 641	107 096	109 731	112 074	112 700	114 180	114 793	116 864	118 400	120 182	121 662
Least Developed Countries	kt	15 038	16 091	15 978	16 505	16 461	16 777	16 882	17 332	17 716	18 119	18 479
Coarse grains												
World Trade	**kt**	**123 208**	**132 101**	**136 111**	**138 439**	**142 023**	**144 694**	**148 865**	**152 285**	**155 793**	**158 473**	**162 150**
OECD[1]	kt	54 006	52 141	52 112	52 626	54 160	53 440	55 362	56 644	57 578	57 733	58 532
Developing countries	kt	88 433	99 586	104 065	106 355	108 800	112 503	115 268	117 806	120 916	123 897	127 743
Least Developed Countries	kt	2 354	3 552	4 001	4 374	4 397	4 660	4 911	4 947	5 005	5 002	5 063
Rice												
World Trade	**kt**	**36 879**	**36 503**	**39 388**	**40 653**	**41 239**	**42 070**	**42 669**	**43 284**	**43 845**	**44 447**	**45 041**
OECD[1]	kt	4 989	5 230	5 412	5 528	5 640	5 759	5 879	5 989	6 092	6 190	6 298
Developing countries	kt	32 051	31 420	34 119	35 226	35 687	36 397	36 874	37 377	37 834	38 314	38 826
Least Developed Countries	kt	6 928	6 690	7 623	7 723	7 730	7 681	7 639	7 596	7 559	7 486	7 451
Oilseeds												
World Trade	**kt**	**110 714**	**119 621**	**121 133**	**124 798**	**126 778**	**128 589**	**130 563**	**132 361**	**135 366**	**138 337**	**141 194**
OECD[1]	kt	33 185	33 790	33 168	33 571	33 768	33 931	34 238	34 512	34 877	35 328	35 719
Developing countries	kt	85 357	93 382	95 435	98 769	100 621	102 284	103 958	105 461	108 120	110 709	113 200
Least Developed Countries	kt	381	327	324	332	334	340	345	347	350	351	356
Protein Meals												
World Trade	**kt**	**73 198**	**75 154**	**77 480**	**79 885**	**82 188**	**84 226**	**86 467**	**88 822**	**91 217**	**93 738**	**96 187**
OECD[1]	kt	41 942	42 701	43 301	43 645	44 272	44 512	44 973	45 350	45 658	46 003	46 395
Developing countries	kt	34 390	36 030	38 216	40 622	42 669	44 801	46 901	49 149	51 543	53 981	56 381
Least Developed Countries	kt	527	544	616	670	725	768	821	868	922	978	1 035
Vegetable Oils												
World Trade	**kt**	**64 207**	**66 539**	**66 879**	**68 395**	**69 409**	**71 010**	**72 450**	**74 009**	**75 636**	**76 931**	**78 226**
OECD[1]	kt	16 832	17 198	17 150	17 128	17 286	17 767	18 029	18 523	19 151	19 206	19 263
Developing countries	kt	47 752	49 710	50 246	51 821	52 723	53 889	55 138	56 289	57 377	58 698	60 018
Least Developed Countries	kt	4 923	5 080	5 331	5 451	5 622	5 771	5 945	6 103	6 265	6 425	6 599
Sugar												
World Trade	**kt**	**49 741**	**49 493**	**50 605**	**51 686**	**51 811**	**53 056**	**53 508**	**54 214**	**54 821**	**55 395**	**56 710**
OECD[1]	kt	13 504	12 605	12 240	11 177	11 464	11 550	11 385	11 378	11 283	11 028	10 975
Developing countries	kt	33 706	34 171	35 648	37 926	37 814	38 990	39 846	40 597	41 408	42 338	43 801
Least Developed Countries	kt	5 586	6 141	6 332	6 313	6 748	6 902	6 866	7 238	7 575	7 723	7 995
Beef[2]												
World Trade	**kt**	**7 429**	**7 819**	**8 121**	**8 130**	**8 310**	**8 559**	**8 680**	**8 968**	**9 123**	**9 225**	**9 333**
OECD[1]	kt	3 292	3 726	3 773	3 724	3 819	3 896	3 887	3 976	4 054	4 062	4 081
Developing countries	kt	3 977	4 029	4 265	4 355	4 507	4 677	4 798	4 990	5 073	5 174	5 291
Least Developed Countries	kt	167	130	290	332	389	455	439	456	411	373	325
Pigmeat[2]												
World Trade	**kt**	**6 566**	**7 103**	**7 096**	**7 172**	**7 304**	**7 317**	**7 367**	**7 417**	**7 449**	**7 565**	**7 643**
OECD[1]	kt	3 204	3 359	3 335	3 371	3 436	3 421	3 441	3 442	3 398	3 375	3 371
Developing countries	kt	3 109	3 610	3 496	3 569	3 646	3 676	3 702	3 740	3 790	3 894	3 944
Least Developed Countries	kt	157	205	180	196	202	212	220	234	248	262	276
Poultry												
World Trade	**kt**	**11 997**	**12 008**	**12 180**	**12 398**	**12 660**	**12 921**	**13 189**	**13 472**	**13 771**	**14 129**	**14 523**
OECD[1]	kt	2 541	2 591	2 555	2 546	2 523	2 508	2 498	2 497	2 482	2 468	2 448
Developing countries	kt	8 659	8 779	8 938	9 100	9 354	9 601	9 856	10 143	10 445	10 779	11 149
Least Developed Countries	kt	927	1 007	1 043	1 080	1 111	1 153	1 199	1 248	1 305	1 363	1 425
Fish												
World Trade	**kt**	**37 012**	**38 300**	**39 171**	**39 836**	**40 396**	**41 439**	**42 253**	**42 954**	**43 617**	**44 392**	**45 082**
OECD	kt	20 249	20 397	20 657	21 046	21 382	21 689	22 015	22 281	22 572	22 869	23 229
Developing countries	kt	16 494	17 574	18 147	18 399	18 562	19 252	19 693	20 085	20 437	20 874	21 146
Least Developed Countries	kt	717	705	698	691	693	689	689	680	683	690	698
Fishmeal												
World Trade	**kt**	**3 129**	**3 269**	**3 233**	**3 103**	**3 156**	**3 138**	**3 081**	**3 060**	**2 946**	**3 004**	**3 015**
OECD	kt	1 237	1 361	1 301	1 196	1 244	1 226	1 210	1 206	1 150	1 209	1 184
Developing countries	kt	1 979	2 016	2 035	2 030	2 030	2 029	1 990	1 980	1 927	1 925	1 966
Least Developed Countries	kt	20	16	17	17	17	17	18	18	18	18	18
Fish oil												
World Trade	**kt**	**836**	**822**	**813**	**771**	**794**	**807**	**812**	**808**	**771**	**783**	**787**
OECD	kt	686	686	665	633	631	632	631	624	601	596	594
Developing countries	kt	258	236	254	240	263	276	282	287	270	285	292
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Butter												
World Trade	**kt**	**822**	**860**	**882**	**905**	**924**	**930**	**940**	**956**	**972**	**988**	**1 008**
OECD[1]	kt	134	144	141	138	139	138	139	139	139	138	137
Developing countries	kt	553	572	589	612	632	644	662	677	695	713	733
Least Developed Countries	kt	11	9	8	8	8	8	8	8	9	9	10

Table A.3.1. World trade projections, imports *(cont.)*

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cheese												
World Trade	**kt**	**2 356**	**2 390**	**2 427**	**2 521**	**2 585**	**2 628**	**2 686**	**2 737**	**2 792**	**2 837**	**2 869**
OECD[1]	kt	776	780	801	814	821	830	833	839	842	847	822
Developing countries	kt	1 255	1 343	1 375	1 434	1 502	1 555	1 598	1 623	1 656	1 695	1 748
Least Developed Countries	kt	60	70	70	79	90	97	106	108	112	117	123
Whole milk powder												
World Trade	**kt**	**2 225**	**2 299**	**2 317**	**2 340**	**2 372**	**2 376**	**2 405**	**2 431**	**2 469**	**2 508**	**2 559**
OECD[1]	kt	66	53	56	58	58	57	58	58	60	62	63
Developing countries	kt	2 176	2 239	2 255	2 275	2 308	2 314	2 338	2 360	2 393	2 431	2 477
Least Developed Countries	kt	227	215	219	223	228	231	236	240	245	249	255
Skim milk powder												
World Trade	**kt**	**1 624**	**1 784**	**1 826**	**1 869**	**1 917**	**1 953**	**1 998**	**2 036**	**2 076**	**2 121**	**2 156**
OECD[1]	kt	289	321	326	330	336	338	341	346	351	356	338
Developing countries	kt	1 501	1 655	1 697	1 738	1 785	1 824	1 866	1 901	1 937	1 981	2 036
Least Developed Countries	kt	94	99	99	103	107	111	115	119	123	127	132
Cotton												
OECD	kt	1 447	1 770	1 784	1 844	1 864	1 888	1 928	1 961	2 003	2 048	2 091
Developing countries	kt	8 072	7 410	7 369	7 414	7 461	7 475	7 655	7 816	7 861	7 968	8 075
Least Developed Countries	kt	784	803	864	917	972	1 031	1 096	1 166	1 200	1 244	1 289

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 2010-12est: Data for 2012 are estimated.

1. Excludes Iceland but includes all EU27 member countries.
2. Excludes trade of live animals.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861111

Table A.3.2. World trade projections, exports

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Wheat												
OECD[1]	kt	91 620	84 488	82 697	83 164	81 753	82 370	82 041	82 554	82 968	83 553	84 036
Developing countries	kt	23 936	24 578	26 404	26 828	26 552	26 261	25 646	25 987	25 860	25 646	25 099
Least Developed Countries	kt	46	42	37	34	32	30	29	27	26	25	24
Coarse grains												
OECD[1]	kt	60 298	58 679	66 665	68 462	70 838	71 944	74 543	75 809	77 705	78 932	81 261
Developing countries	kt	43 500	46 327	42 656	42 946	43 413	44 331	45 159	46 746	47 696	48 492	49 169
Least Developed Countries	kt	4 251	2 046	1 662	1 623	1 598	1 537	1 485	1 461	1 441	1 440	1 420
Rice												
OECD[1]	kt	4 062	3 910	3 983	4 073	4 183	4 259	4 341	4 437	4 547	4 677	4 797
Developing countries	kt	32 365	32 561	35 398	36 582	37 060	37 813	38 329	38 846	39 294	39 760	40 228
Least Developed Countries	kt	2 048	1 636	1 291	1 492	1 850	2 364	2 818	3 238	3 632	4 021	4 434
Oilseeds												
OECD[1]	kt	51 994	57 375	56 419	58 200	59 057	58 881	59 783	60 060	60 773	61 943	62 761
Developing countries	kt	54 831	57 139	59 489	61 774	62 330	64 152	65 096	66 444	68 595	70 236	72 128
Least Developed Countries	kt	106	70	76	77	79	81	86	97	109	126	143
Protein Meals												
OECD[1]	kt	12 902	11 886	12 909	13 575	14 038	14 498	14 925	15 473	15 915	16 205	16 624
Developing countries	kt	56 744	58 845	60 018	61 536	63 116	64 511	66 193	67 851	69 643	71 693	73 567
Least Developed Countries	kt	200	341	313	328	385	426	493	547	586	630	682
Vegetable Oils												
OECD[1]	kt	5 695	5 280	5 384	5 513	5 606	5 695	5 855	5 945	5 948	5 966	6 058
Developing countries	kt	54 384	56 252	56 452	57 693	58 566	59 907	60 937	62 135	63 550	64 569	65 585
Least Developed Countries	kt	256	158	151	148	144	141	138	135	133	131	130
Sugar												
OECD[1]	kt	6 896	7 264	7 314	8 216	7 447	7 366	7 828	7 588	7 673	7 496	7 445
Developing countries	kt	48 158	49 581	50 427	50 287	51 305	52 744	52 654	53 499	53 973	54 468	55 737
Least Developed Countries	kt	1 213	1 832	2 037	1 684	1 788	1 780	1 877	1 963	2 011	2 003	2 057
Beef[2]												
OECD[1]	kt	3 853	3 869	3 842	3 717	3 847	3 924	3 922	4 044	4 129	4 158	4 196
Developing countries	kt	4 007	4 031	4 348	4 480	4 520	4 659	4 755	4 875	4 917	4 967	5 019
Least Developed Countries	kt	4	2	2	2	2	2	2	2	2	2	2
Pigmeat[2]												
OECD[1]	kt	5 787	6 167	6 217	6 278	6 397	6 397	6 430	6 461	6 481	6 592	6 675
Developing countries	kt	1 133	1 133	1 141	1 171	1 187	1 197	1 206	1 222	1 235	1 233	1 233
Least Developed Countries	kt	1	1	1	1	1	1	1	1	1	1	1
Poultry												
OECD[1]	kt	5 361	5 582	5 581	5 669	5 855	5 940	6 059	6 199	6 274	6 419	6 600
Developing countries	kt	6 861	6 957	7 123	7 246	7 315	7 487	7 632	7 759	7 972	8 172	8 372
Least Developed Countries	kt	23	2	2	2	2	2	2	2	2	2	2
Fish												
OECD	kt	12 398	12 747	12 937	12 950	13 242	13 559	13 845	14 206	14 258	14 571	14 652
Developing countries	kt	24 626	25 984	26 548	27 081	27 384	28 142	28 697	29 008	29 423	29 912	30 484
Least Developed Countries	kt	1 441	1 452	1 478	1 544	1 533	1 552	1 583	1 645	1 709	1 755	1 795
Fishmeal												
OECD	kt	900	1 072	1 072	1 031	1 041	1 044	1 032	1 055	1 025	1 043	1 051
Developing countries	kt	2 198	2 254	2 255	2 133	2 240	2 253	2 222	2 218	2 113	2 209	2 241
Least Developed Countries	kt	83	105	105	105	105	105	105	105	105	105	105
Fish oil												
OECD	kt	410	471	476	468	464	478	480	478	461	459	464
Developing countries	kt	470	475	475	429	468	475	483	481	442	468	473
Least Developed Countries	kt	3	2	2	2	2	2	2	2	2	2	2
Butter												
OECD[1]	kt	680	690	712	733	748	749	757	772	788	802	822
Developing countries	kt	94	97	99	100	101	104	105	107	109	111	113
Least Developed Countries	kt	6	7	8	7	7	7	7	7	7	7	7
Cheese												
OECD[1]	kt	1 413	1 513	1 531	1 609	1 662	1 683	1 711	1 738	1 771	1 801	1 823
Developing countries	kt	732	682	703	716	723	739	760	779	795	807	815
Least Developed Countries	kt	0	0	0	0	0	0	0	0	0	0	0
Whole milk powder												
OECD[1]	kt	1 565	1 725	1 741	1 759	1 783	1 768	1 787	1 804	1 845	1 885	1 940
Developing countries	kt	573	558	560	564	569	584	590	598	595	593	588
Least Developed Countries	kt	7	7	7	7	7	7	7	7	7	7	7
Skim milk powder												
OECD[1]	kt	1 491	1 601	1 644	1 684	1 731	1 760	1 799	1 834	1 872	1 917	1 953
Developing countries	kt	138	129	131	131	130	131	132	133	133	133	132
Least Developed Countries	kt	3	3	3	3	3	3	3	3	3	3	3
Biofuel[3]												
Ethanol World Trade	Mil l	3 749	4 605	9 522	11 155	11 869	14 245	15 827	15 129	14 147	14 788	12 259
Biodiesel World Trade	Mil l	2 029	1 659	1 870	2 021	2 278	2 199	2 184	2 071	1 855	2 050	2 152

Table A.3.2. World trade projections, exports *(cont.)*

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cotton												
OECD	kt	3 962	3 814	3 850	3 868	3 851	3 793	3 841	3 924	4 002	4 013	4 052
Developing countries	kt	3 619	2 899	2 839	2 873	2 943	3 014	3 146	3 230	3 225	3 336	3 422
Least Developed Countries	kt	655	852	860	918	980	1 062	1 148	1 235	1 284	1 349	1 413

Note: Average 2010-12est: Data for 2012 are estimated.

1. Excludes Iceland but includes all EU27 member countries.
2. Excludes trade of live animals.
3. Sum of all positive net trade positions

Source: OECD and FAO Secretariats.

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Table A.4.1. Biofuel projections: Ethanol

	PRODUCTION (Mn l)		Growth (%)[1]	DOMESTIC USE (Mn l)		Growth (%)[1]	FUEL USE (Mn l)		Growth (%)[1]	SHARE IN GAZOLINE TYPE FUEL USE (%)				NET TRADE (Mn l)[2]	
										Energy Shares		Volume Shares			
	Average 2010-12est	2022	2013-22	Average 2010-12est	2022	2013-22	Average 2010-12est	2022	2013-22	Average 2010-12est	2022	Average 2010-12est	2022	Average 2010-12est	2022
NORTH AMERICA															
Canada	1 572	1 474	-0.85	1 920	2 202	0.20	1 920	2 202	0.20	3.2	3.5	4.7	5.1	-349	-729
United States	47 906	79 997	3.79	46 383	87 773	4.39	44 216	85 393	4.51	5.8	10.9	8.4	15.5	1 624	-7 874
of which second generation	37	16 353	..	..	..	..	..	..	..	..	..	..	..	..	..
EUROPE															
European Union	6 554	12 261	6.76	8 243	16 098	7.18	5 683	13 803	8.99	3.1	8.1	4.5	11.7	-1 689	-3 837
of which second generation	42	425	..	..	..	..	..	..	..	..	..	..	..	..	..
OCEANIA DEVELOPED															
Australia	349	427	-0.71	372	453	-0.67	372	453	-0.67	1.3	1.6	2.0	2.4	-23	-26
OTHER DEVELOPED															
Japan	101	101	0.15	950	1 551	4.61	350	966	8.84	0.0	0.0	0.0	0.0	-877	-1 450
of which second generation	79	78	..	..	..	..	..	..	..	..	..	..	..	..	..
South Africa	367	319	-1.19	190	199	0.08	4	6	1.02	..	..	..	..	177	121
SUB-SAHARIAN AFRICA															
Mozambique	36	72	6.94	34	45	2.35	2	15	8.60	..	..	..	..	2	27
Tanzania	34	42	2.92	43	50	2.89	3	19	9.69	..	..	..	..	-9	-8
LATIN AMERICA AND CARRIBBEAN															
Argentina	355	1 015	8.04	512	1 154	7.62	344	980	9.76	3.4	6.6	5.0	9.6	-157	-139
Brazil	25 373	47 376	5.10	23 549	35 558	4.23	21 886	33 642	4.45	46.4	56.8	56.2	66.2	1 823	11 818
Columbia	352	598	3.63	409	603	2.55	342	539	2.89	..	..	..	..	-58	-5
Mexico	210	252	0.99	342	404	0.99	0	0	..	0.0	0.0	0.0	0.0	-132	-151
Peru	181	402	3.15	90	193	2.99	70	173	3.35	..	..	..	..	90	209
ASIA AND PACIFIC															
China	8 643	10 531	1.83	8 566	10 090	0.96	2 133	3 890	3.72	1.5	1.8	2.2	2.7	77	441
India	2 258	2 971	2.41	2 294	3 057	2.62	262	964	11.65	..	..	..	..	-36	-86
Indonesia	193	260	2.96	156	225	2.26	31	95	6.08	..	..	..	..	38	35
Malaysia	89	96	0.16	91	96	0.11	0	0	4.93	..	..	..	..	-2	-1
Philippines	129	269	5.57	425	547	0.68	230	362	1.00	..	..	..	..	-297	-279
Thailand	781	1 461	4.28	640	958	3.83	461	783	4.90	..	..	..	..	141	502
Turkey	84	130	3.37	123	143	1.29	50	68	2.78	..	..	..	..	-39	-13
Viet Nam	345	690	2.77	257	437	2.12	94	264	3.72	..	..	..	..	88	253
TOTAL	**100 130**	**167 391**	**4.10**	**99 776**	**167 293**	**4.12**	**79 051**	**145 202**	**4.77**	**6.2**	**10.7**	**9.0**	**15.2**	**3 749**	**12 259**

Note: .. : Not available.

Average 2010-12est: Data for 2012 are estimated.

1. Least-squares growth rate (see glossary).
2. For total net trade exports are shown.

Source: OECD and FAO Secretariats.

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Table A.4.2. Biofuel projections: Biodiesel

	PRODUCTION (Mn l)		Growth (%)[1]	DOMESTIC USE (Mn l)		Growth (%)[1]	SHARE IN DIESEL TYPE FUEL USE (%)				NET TRADE (Mn l)[2]	
							Energy share		Volume share			
	Average 2010-12est	2022	2013-22	Average 2010-12est	2022	2013-22	Average 2010-12est	2022	Average 2010-12est	2022	Average 2010-12est	2022
NORTH AMERICA												
Canada	248	346	-3.91	319	665	0.43	0.9	1.8	1.1	2.3	-71	-318
United States	3 721	6 267	1.65	3 477	6 158	1.76	1.4	2.2	1.8	2.7	244	109
EUROPE												
European Union	10 707	18 282	6.28	13 430	20 530	5.03	5.2	7.4	6.5	9.1	-2 723	-2 248
of which second generation	52	225	..	..	..	..	..	..	..	..	..	..
OCEANIA DEVELOPED												
Australia	649	734	1.10	649	734	1.10	2.9	2.4	3.6	3.0	0	0
OTHER DEVELOPED												
South Africa	72	98	2.38	72	98	2.38	..	..	..	..	0	0
SUB-SAHARIAN AFRICA												
Mozambique	66	84	0.78	9	49	5.81	..	..	..	..	57	36
Tanzania	61	96	4.29	0	58	119.70	..	..	..	..	61	38
LATIN AMERICA AND CARIBBEAN												
Argentina	2 524	3 451	2.01	784	1 467	2.98	5.6	8.4	7.0	10.3	1 740	1 984
Brazil	2 599	3 337	2.85	2 603	3 278	2.70	4.9	4.6	6.0	5.7	-4	59
Columbia	537	926	3.54	537	925	3.55	..	..	..	..	0	1
Peru	68	105	1.68	213	316	2.64	..	..	..	..	-145	-211
ASIA AND PACIFIC												
India	276	776	9.15	347	1 205	10.54	..	..	..	..	-71	-429
Indonesia	1 353	2 279	3.70	341	1 432	10.10	..	..	..	..	1 012	847
Malaysia	125	783	13.64	50	650	14.82	..	..	..	..	75	133
Philippines	142	378	9.43	142	378	9.43	..	..	..	..	0	0
Thailand	706	1 465	4.93	706	1 465	4.93	..	..	..	..	0	0
Turkey	11	17	2.73	11	17	2.73	..	..	..	..	0	0
Viet Nam	18	103	11.18	18	103	11.21	..	..	..	..	0	0
TOTAL	**24 011**	**40 620**	**4.46**	**23 837**	**40 620**	**4.46**	**3.0**	**4.0**	**3.7**	**4.9**	**2 029**	**2 152**

Note: ..: Not available.
Average 2010-12est: Data for 2012 are estimated.
1. Least-squares growth rate (see glossary).
2. For total net trade exports are shown.
Source: OECD and FAO Secretariats.

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Table A.5. Main policy assumptions for biofuel markets

		2012/13est	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
ARGENTINA												
Biodiesel												
Export tax	%	18.3	20.1	21.7	20.8	19.3	21.2	22.9	22.9	24.0	24.0	24.0
BRAZIL												
Ethanol												
Import tariffs	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incorporation mandate[1]	%	14.3	16.1	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8
Biodiesel												
Tax concessions[2]	BRL/hl	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Import tariffs	%	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
CANADA												
Ethanol												
Tax concessions[2]	CAD/hl	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Import tariffs	CAD/hl	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Incorporation mandate[1]	%	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Direct support												
Federal	CAD/hl	7.0	6.0	5.0	4.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Provincial	CAD/hl	4.3	4.3	4.3	4.3	4.3	0.0	0.0	0.0	0.0	0.0	0.0
Biodiesel												
Tax concessions[2]	CAD/hl	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
Incorporation mandate[1]	%	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Direct support												
Federal	CAD/hl	14.0	12.0	10.0	8.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0
Provincial	CAD/hl	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COLOMBIA												
Ethanol												
Import tariffs	%	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
Blending target[3,4]	%	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[4]	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
EUROPEAN UNION												
Biofuel												
Energy share in fuel consumption[5]	%	4.5	5.0	5.4	5.8	6.2	6.6	7.0	7.5	8.0	8.3	8.6
Ethanol												
Tax concessions[2]	EUR/hl	20.5	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3
Import tariffs	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[2]	EUR/hl	20.1	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4
Import tariffs	%	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 tariffs	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
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
Biodiesel												
Import tariffs	%	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8
Share of biofuel mandates in total fuel consumption	%	1.9	2.8	3.7	4.6	5.5	6.4	7.3	8.2	8.2	8.2	8.2
INDONESIA												
Ethanol												
Import tariffs	%	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3
Blending target[4]	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biodiesel												
Blending target[4]	%	3.0	3.0	3.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
MALAYSIA												
Ethanol												
Import tariffs	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blending target[4]	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biodiesel												
Blending target[4]	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
PERU												
Ethanol												
Import tariffs	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blending target[4]	%	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8
Biodiesel												
Import tariffs	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blending target[4]	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Table A.5. Main policy assumptions for biofuel markets *(cont.)*

		2012/13est	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
THAILAND												
Ethanol												
Import tariffs	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blending target[4]	%	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Biodiesel												
Blending target[4]	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UNITED STATES												
Renewable Fuel Standard[6]												
Total	Mn l	62 648	66 820	72 068	74 402	77 809	80 371	83 816	85 926	88 825	93 932	97 698
advanced mandate	Mn l	10 410	12 310	15 287	17 621	21 028	23 590	27 035	29 145	32 044	37 151	40 917
cellulosic ethanol	Mn l	53	189	757	1 514	3 028	3 208	4 698	6 450	8 889	12 613	16 353
biodiesel	Mn l	4 845	4 845	4 845	4 845	4 845	4 845	4 845	4 845	4 845	4 845	4 845
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 tariffs (undenatured)	%	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
Import tariffs (denatured)	%	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
Blenders 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 tariffs	%	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
Blenders tax credit	USD/hl	0.00	26.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: 2012/13est: Data for 2012/13 are estimated.

For many countries, shares for ethanol and biodiesel are not specified individually in the legislation.

Figures are based on a combination of the EU mandate in the context of Renewable Energy Directive and the National Renewable Energy Action Plan (NREAP) in the EU member states.

1. Share in respective fuel type, energy equivalent.
2. Difference between tax rates applying to fossil and biogen fuels.
3. Applies to cities with more than 500 000 inhabitants.
4. Expressed in volume share.
5. 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.
6. The total, advanced and cellulosic mandates are not at the levels defined in EISA. As those mandates are subject to uncertainties regarding EPA implementation, the following assumptions were taken to construct the baseline: The total and advanced mandates have been reduced by a portion of the shortfall in cellulosic production. That portion starts at 29% in 2013/2014 and reaches 87% in 2022/2023.

Source: OECD and FAO Secretariats.

StatLink *http://dx.doi.org/10.1787/888932861187*

Table A.6. World cereal projections

Crop year

		Average 2010/11-2012/13est	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
WHEAT												
World												
Production	mt	675.3	697.4	711.8	716.5	724.1	732.4	740.4	753.6	764.6	775.4	784.5
Area	mha	220.9	222.8	225.5	225.4	225.9	226.6	226.9	228.6	230.0	231.1	231.8
Yield	t/ha	3.1	3.1	3.2	3.2	3.2	3.2	3.3	3.3	3.3	3.4	3.4
Consumption	mt	677.1	692.2	700.8	712.0	723.8	733.1	742.9	753.6	763.4	773.2	782.4
Feed use	mt	135.5	140.8	143.5	145.4	149.9	151.7	154.0	156.0	157.8	160.1	162.0
Food use	mt	461.6	471.2	475.7	483.4	489.4	495.4	502.0	509.4	516.3	523.2	530.1
Biofuel use	mt	6.8	6.7	6.9	7.2	7.5	7.8	8.1	8.8	9.5	9.7	10.1
Other use	mt	73.2	73.6	74.7	76.0	77.0	78.1	78.8	79.4	79.8	80.1	80.2
Exports	mt	137.2	135.0	137.6	140.7	141.4	143.2	143.7	145.8	147.3	149.1	150.4
Closing stocks	mt	190.4	188.1	199.1	203.6	203.9	203.2	200.7	200.7	201.9	204.2	206.2
Price[1]	USD/t	312.5	301.3	262.3	256.5	259.4	259.3	266.6	270.0	272.3	273.4	274.2
Developed countries												
Production	mt	346.9	362.6	368.4	367.6	370.9	374.6	377.1	382.8	387.7	392.7	396.3
Consumption	mt	269.8	272.7	275.7	278.5	283.4	285.9	288.9	291.4	293.9	296.1	298.1
Closing stocks	mt	73.1	70.0	79.3	83.3	84.5	85.3	84.3	84.8	86.0	88.0	89.6
Developing countries												
Production	mt	328.4	334.8	343.4	348.8	353.2	357.8	363.3	370.8	377.0	382.7	388.2
Consumption	mt	407.3	419.6	425.0	433.5	440.3	447.2	454.0	462.2	469.4	477.0	484.3
Closing stocks	mt	117.4	118.1	119.8	120.3	119.4	117.9	116.4	115.9	116.0	116.2	116.6
OECD[2]												
Production	mt	275.1	278.1	281.0	278.0	279.3	280.8	280.9	283.6	285.8	287.9	288.8
Consumption	mt	220.2	222.2	223.2	224.3	227.4	228.8	230.9	232.3	233.6	234.4	235.1
Closing stocks	mt	50.8	45.3	50.2	51.4	52.5	53.5	53.0	53.3	53.9	55.2	56.3
COARSE GRAINS												
World												
Production	mt	1 149.9	1 249.1	1 232.6	1 234.3	1 259.7	1 287.6	1 312.5	1 337.5	1 359.4	1 382.0	1 407.1
Area	mha	324.2	333.8	332.5	330.9	333.0	336.1	339.0	342.6	345.7	348.6	352.0
Yield	t/ha	3.5	3.7	3.7	3.7	3.8	3.8	3.9	3.9	3.9	4.0	4.0
Consumption	mt	1 155.5	1 203.9	1 231.7	1 247.3	1 267.6	1 289.6	1 314.1	1 338.0	1 361.1	1 384.0	1 408.2
Feed use	mt	602.0	644.6	660.2	668.1	679.4	693.1	708.7	721.6	735.2	750.7	767.1
Food use	mt	215.5	226.2	230.3	234.8	239.2	244.6	250.4	256.4	262.6	268.6	274.9
Biofuel use	mt	137.0	156.7	163.0	163.7	166.1	166.3	167.2	170.2	171.8	172.1	172.6
Other use	mt	161.9	136.7	138.3	139.9	141.4	143.4	145.3	146.6	147.8	148.5	149.2
Exports	mt	124.6	130.0	134.0	136.4	140.0	142.6	146.8	150.2	153.7	156.4	160.1
Closing stocks	mt	189.4	237.7	240.6	229.6	223.7	223.8	224.2	225.7	226.1	226.2	227.2
Price[3]	USD/t	284.6	243.4	216.4	221.1	227.2	228.2	234.1	236.4	237.7	240.3	240.6
Developed countries												
Production	mt	585.1	648.3	627.5	618.3	632.8	646.2	657.4	667.1	674.9	683.2	693.0
Consumption	mt	555.7	557.6	563.3	564.9	572.6	580.8	589.9	598.1	604.4	610.8	616.7
Closing stocks	mt	80.9	109.5	114.3	106.4	103.2	102.5	102.0	102.0	101.3	100.3	100.1
Developing countries												
Production	mt	564.7	600.7	605.1	616.0	626.9	641.4	655.1	670.4	684.6	698.8	714.1
Consumption	mt	599.7	646.3	668.4	682.4	695.0	708.8	724.3	739.9	756.7	773.2	791.4
Closing stocks	mt	108.5	128.2	126.3	123.2	120.5	121.3	122.2	123.8	124.9	125.9	127.1
OECD[2]												
Production	mt	539.0	593.4	571.5	561.6	574.5	586.6	596.6	605.0	611.4	618.2	626.6
Consumption	mt	548.8	547.6	553.0	554.3	561.3	569.1	577.9	585.9	592.0	598.1	604.3
Closing stocks	mt	76.7	105.6	109.5	100.9	97.4	96.4	95.9	95.8	95.1	94.0	93.6

Table A.6. World cereal projections *(cont.)*

Crop year

		Average 2010/11-2012/13est	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
RICE												
World												
Production	mt	481.1	493.7	500.5	506.7	512.4	518.2	524.0	530.3	536.4	542.9	549.3
Area	mha	161.7	162.1	162.6	162.9	163.3	163.6	163.9	164.1	164.4	164.6	164.9
Yield	t/ha	3.0	3.0	3.1	3.1	3.1	3.2	3.2	3.2	3.3	3.3	3.3
Consumption	mt	468.7	486.7	496.1	505.7	510.4	517.2	524.4	531.8	538.7	545.2	551.3
Feed use	mt	16.1	17.4	18.3	18.9	19.6	20.3	20.9	21.5	22.1	22.7	23.3
Food use	mt	397.3	410.3	416.7	424.0	428.7	434.2	440.3	446.8	452.8	458.2	463.0
Exports	mt	36.6	36.5	39.4	40.7	41.2	42.1	42.7	43.3	43.8	44.4	45.0
Closing stocks	mt	159.4	179.6	184.1	185.0	187.1	188.0	187.5	186.0	183.7	181.4	179.5
Price[4]	USD/t	451.1	480.9	440.3	423.2	419.3	417.9	426.1	438.0	451.1	462.5	470.3
Developed countries												
Production	mt	18.1	17.5	18.3	18.2	18.3	18.3	18.4	18.5	18.7	18.8	19.0
Consumption	mt	18.6	18.6	19.1	19.3	19.5	19.6	19.7	19.8	19.9	20.0	20.1
Closing stocks	mt	4.7	4.6	5.1	5.4	5.5	5.7	5.8	6.0	6.3	6.5	6.8
Developing countries												
Production	mt	463.0	476.2	482.2	488.5	494.1	499.9	505.6	511.8	517.7	524.1	530.3
Consumption	mt	450.1	468.1	476.9	486.4	490.9	497.6	504.7	512.0	518.8	525.1	531.2
Closing stocks	mt	154.7	175.0	179.0	179.7	181.5	182.3	181.7	179.9	177.4	174.9	172.7
OECD[2]												
Production	mt	21.6	21.0	21.7	21.7	21.8	21.8	21.9	22.0	22.2	22.3	22.5
Consumption	mt	22.5	22.3	22.7	22.9	23.0	23.1	23.2	23.4	23.5	23.6	23.7
Closing stocks	mt	6.4	6.1	6.6	6.9	7.1	7.2	7.4	7.6	7.8	8.1	8.3

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010/11-2012/13est: Data for 2012/13 are estimated.

1. No.2 hard red winter wheat, ordinary protein, United States f.o.b. Gulf Ports (June/May), less EEP payments where applicable.
2. Excludes Iceland but includes all EU27 member countries.
3. No.2 yellow corn, United States f.o.b. Gulf Ports (September/August).
4. Milled, 5% broken, f.o.b. Ho Chi Minh (January/December).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861206

Table A.7.1. Wheat projections: Production and trade

Crop year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**675 293**	**784 493**	**1.89**	**1.29**	**135 767**	**150 442**	**3.57**	**1.13**	**137 247**	**150 442**	**3.75**	**1.13**
DEVELOPED COUNTRIES	**346 874**	**396 282**	**1.42**	**0.98**	**28 126**	**28 780**	**2.02**	**0.35**	**113 311**	**125 343**	**4.01**	**1.42**
NORTH AMERICA	84 005	85 746	0.37	-0.03	3 151	3 879	6.11	1.69	48 228	45 323	0.63	0.41
Canada	25 264	29 024	1.02	0.39	76	74	23.66	-0.42	17 482	20 869	1.78	1.35
United States	58 741	56 722	0.12	-0.25	3 075	3 805	5.86	1.73	30 745	24 455	-0.04	-0.33
EUROPE	207 725	244 904	1.89	1.18	9 062	8 649	-2.86	-0.61	35 123	48 956	9.03	2.65
European Union	136 945	148 593	1.13	0.66	6 007	5 527	-1.55	0.22	17 940	17 746	6.15	-0.55
Russian Federation	45 580	66 220	1.98	2.15	421	53	-15.24	1.56	11 285	21 147	9.16	5.44
Ukraine	18 315	22 233	10.39	2.15	443	986	-19.62	-2.93	5 291	9 366	33.34	4.01
OCEANIA DEVELOPED	26 895	25 395	2.28	0.38	464	425	3.72	-1.22	21 379	17 651	5.02	0.00
Australia	26 456	24 956	2.23	0.39	0	0	..	..	21 378	17 651	5.02	0.00
New Zealand	439	439	6.29	-0.21	464	425	3.72	-1.22	1	0	..	..
OTHER DEVELOPED[1]	28 249	40 237	1.34	2.58	15 450	15 827	5.25	0.65	8 581	13 413	8.97	3.09
Japan	724	996	-2.29	1.72	5 990	5 430	1.21	-0.41	0	0	..	..
South Africa	1 791	2 349	1.06	1.71	1 624	1 537	5.76	0.12	239	244	6.99	-0.12
DEVELOPING COUNTRIES	**328 419**	**388 211**	**2.39**	**1.61**	**107 641**	**121 662**	**4.02**	**1.33**	**23 936**	**25 099**	**2.20**	**-0.17**
AFRICA	22 147	31 472	1.65	2.65	38 201	43 774	4.34	1.92	880	67	0.19	-19.06
NORTH AFRICA	17 593	25 081	0.98	2.39	23 613	25 604	5.11	1.68	250	43	-1.73	-1.03
Algeria	3 083	4 557	1.81	2.99	5 800	5 776	2.93	0.63	0	0	0.00	-0.74
Egypt	8 079	10 843	1.69	2.13	10 613	12 708	5.43	2.41	0	0	0.00	0.51
SUB-SAHARAN AFRICA	4 554	6 392	4.74	3.72	14 588	18 170	3.18	2.27	630	24	1.04	-27.79
LATIN AMERICA and CARIBBEAN	27 740	31 910	0.45	2.21	20 405	22 268	1.06	0.73	14 207	17 215	3.18	2.36
Argentina	13 853	15 707	-2.10	2.61	0	0	..	..	8 890	10 485	-1.80	3.48
Brazil	5 591	5 925	1.06	2.29	6 123	7 564	0.79	1.53	2 307	2 906	37.50	0.92
Chile	1 393	1 391	-2.66	0.45	725	1 046	10.43	3.41	0	0	0.00	-0.24
Mexico	3 535	4 223	4.11	1.06	3 927	3 024	0.90	-1.43	752	1 030	9.35	0.45
Uruguay	1 540	2 290	20.73	3.18	27	184	-13.42	-6.91	990	1 737	70.41	1.97
ASIA and PACIFIC	278 533	324 829	2.66	1.46	49 035	55 621	5.21	1.12	8 849	7 817	0.83	-3.72
Bangladesh	997	1 522	-2.71	4.38	2 740	2 634	4.57	-0.04	0	0	-31.43	-27.99
China[2]	117 720	127 106	3.54	0.60	2 100	2 784	-1.58	3.94	303	239	-21.11	-0.25
India	87 517	111 829	3.64	2.56	64	5	-26.06	1.84	2 747	3 796	-30.66	-3.18
Indonesia	0	0	0.00	-1.12	5 720	6 714	2.93	1.59	25	30	2.46	-0.23
Iran, Islamic Republic of	14 100	13 843	-0.49	-0.07	2 014	3 632	19.43	0.22	300	51	95.02	-19.21
Korea	38	28	21.05	0.00	5 049	4 494	5.31	0.99	50	52	-9.66	0.00
Malaysia	0	0	0.00	0.71	1 260	1 447	-1.04	1.56	116	97	-3.03	-0.22
Pakistan	23 874	28 260	2.58	1.45	200	204	-11.13	0.24	900	895	19.26	-1.23
Saudi Arabia	1 120	1 305	-12.09	1.47	2 200	3 001	72.57	2.00	0	0	-64.68	-0.79
Turkey	20 525	21 380	0.27	0.57	3 317	4 711	27.70	2.65	3 267	2 229	12.44	-2.58
LEAST DEVELOPED COUNTRIES (LDC)	**11 501**	**16 631**	**3.29**	**3.30**	**15 038**	**18 479**	**3.93**	**1.61**	**46**	**24**	**-19.74**	**-5.89**
OECD[3]	**275 095**	**288 795**	**0.87**	**0.42**	**31 159**	**31 395**	**3.24**	**0.71**	**91 620**	**84 036**	**2.83**	**0.02**
BRICS	**258 199**	**313 429**	**3.23**	**1.63**	**10 332**	**11 943**	**-2.44**	**1.81**	**16 882**	**28 332**	**5.72**	**3.09**

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

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Table A.7.2. Wheat projections: Consumption, food use, per capita

Crop year

	CONSUMPTION (kt)		Growth (%)[4]		FOOD USE (kt)		Growth (%)[4]		PER CAPITA (kg)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**677 051**	**782 430**	**1.48**	**1.39**	**461 561**	**530 084**	**0.74**	**1.34**	**66.2**	**68.0**	**-0.43**	**0.33**
DEVELOPED COUNTRIES	**269 761**	**298 085**	**0.84**	**1.01**	**132 892**	**143 068**	**0.23**	**0.58**	**96.4**	**100.0**	**-0.24**	**0.24**
NORTH AMERICA	42 307	43 870	1.03	0.06	28 297	30 671	0.23	0.68	81.4	80.7	-0.68	-0.13
Canada	8 667	8 223	1.55	-0.61	2 741	2 891	-1.03	0.35	79.8	76.6	-2.05	-0.50
United States	33 640	35 647	0.90	0.23	25 556	27 780	0.37	0.71	81.6	81.2	-0.53	-0.09
EUROPE	186 138	204 314	0.76	1.07	81 311	85 161	-0.05	0.30	109.7	113.9	-0.24	0.23
European Union	126 765	136 360	0.56	0.83	55 881	58 786	0.32	0.47	111.0	114.2	-0.07	0.28
Russian Federation	37 423	44 929	0.77	1.94	14 652	15 481	-1.09	-0.14	102.6	110.3	-0.94	0.03
Ukraine	13 477	13 813	2.64	0.94	5 276	5 165	-0.86	-0.47	116.7	121.3	-0.22	0.07
OCEANIA DEVELOPED	6 809	7 641	0.00	0.83	2 064	2 614	-0.83	1.07	76.3	85.2	-2.38	-0.07
Australia	5 908	6 777	-0.55	1.05	1 746	2 291	-1.03	1.24	77.2	88.8	-2.65	0.05
New Zealand	901	864	4.30	-0.72	318	323	-0.33	-0.04	72.1	65.8	-1.45	-0.98
OTHER DEVELOPED[1]	34 506	42 260	1.14	1.86	21 220	24 622	1.45	1.41	80.8	90.2	0.91	1.07
Japan	6 652	6 412	0.81	-0.04	5 526	5 407	0.63	-0.03	43.7	43.6	0.61	0.17
South Africa	3 103	3 624	1.61	1.37	2 949	3 453	1.31	1.39	58.5	65.1	0.35	0.94
DEVELOPING COUNTRIES	**407 290**	**484 345**	**1.94**	**1.62**	**328 669**	**387 016**	**0.95**	**1.63**	**58.7**	**60.8**	**-0.39**	**0.47**
AFRICA	59 376	75 153	3.56	2.25	50 810	64 479	2.73	2.32	51.0	50.4	0.32	0.03
NORTH AFRICA	40 423	50 696	3.37	2.04	33 559	41 831	2.30	2.06	200.0	216.9	0.75	0.81
Algeria	8 800	10 275	2.72	1.59	7 633	8 875	1.95	1.66	212.2	216.6	0.44	0.51
Egypt	18 226	23 751	3.56	2.27	15 759	20 161	2.34	2.21	190.9	207.2	0.53	0.74
SUB-SAHARAN AFRICA	18 952	24 457	3.98	2.69	17 251	22 648	3.61	2.83	20.8	20.8	1.00	0.33
LATIN AMERICA and CARIBBEAN	34 417	36 878	-0.19	1.09	30 366	32 724	-0.13	1.15	50.9	49.3	-1.28	0.21
Argentina	4 895	5 183	-4.37	0.17	3 977	4 380	-5.08	0.22	97.8	98.4	-5.91	-0.56
Brazil	9 899	10 620	-0.92	2.07	9 371	10 142	-1.00	2.16	47.7	47.6	-1.95	1.46
Chile	2 107	2 431	-0.65	1.64	1 909	2 180	0.06	1.61	110.6	116.1	-0.91	0.86
Mexico	6 710	6 217	1.66	-0.14	5 327	4 736	2.48	-0.33	46.4	37.0	1.21	-1.28
Uruguay	637	715	4.83	1.48	391	426	1.29	1.12	115.7	121.1	1.04	0.74
ASIA and PACIFIC	313 497	372 314	1.89	1.56	247 492	289 813	0.74	1.54	61.8	65.5	-0.38	0.65
Bangladesh	3 354	4 259	0.81	2.04	3 154	4 186	0.80	2.54	21.0	24.5	-0.38	1.42
China[2]	118 758	129 391	1.98	0.67	82 833	82 156	-1.02	0.07	61.5	59.0	-1.52	-0.20
India	82 167	108 691	1.77	2.66	73 619	98 654	1.63	2.81	59.3	69.6	0.19	1.62
Indonesia	5 211	6 618	2.05	2.05	4 483	5 483	2.02	1.75	18.5	20.6	0.92	0.91
Iran, Islamic Republic of	15 330	17 167	0.16	0.71	12 561	13 559	1.24	0.49	167.9	165.4	0.06	-0.29
Korea	4 804	4 469	4.48	0.28	2 317	2 345	0.29	0.03	47.9	46.9	-0.17	-0.25
Malaysia	1 061	1 339	-1.53	2.07	841	1 072	-1.90	2.19	29.1	31.7	-3.58	0.74
Pakistan	23 474	27 547	1.59	1.56	21 424	25 672	1.78	1.58	121.2	121.3	-0.03	-0.03
Saudi Arabia	3 420	4 286	4.73	2.22	2 698	3 475	5.32	2.28	96.1	100.3	2.47	0.39
Turkey	20 541	23 816	0.63	1.37	15 217	17 341	1.34	1.21	206.7	211.2	0.03	0.25
LEAST DEVELOPED COUNTRIES (LDC)	**26 772**	**35 018**	**3.94**	**2.46**	**23 870**	**31 412**	**3.47**	**2.70**	**28.0**	**29.1**	**1.19**	**0.53**
OECD[3]	**220 233**	**235 115**	**0.78**	**0.69**	**118 589**	**126 255**	**0.51**	**0.59**	**92.8**	**93.5**	**-0.16**	**0.10**
BRICS	**251 350**	**297 256**	**1.60**	**1.61**	**183 425**	**209 887**	**0.00**	**1.37**	**61.6**	**65.3**	**-0.88**	**0.70**

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

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Table A.8.1. Coarse grain projections: Production and trade

Crop year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**1 149 852**	**1 407 105**	**2.27**	**1.56**	**123 208**	**162 150**	**2.03**	**2.29**	**124 559**	**160 083**	**1.44**	**2.32**
DEVELOPED COUNTRIES	**585 103**	**693 022**	**0.68**	**1.10**	**34 774**	**34 407**	**-0.54**	**0.98**	**81 059**	**110 914**	**-0.67**	**2.81**
NORTH AMERICA	336 064	397 136	0.75	1.16	4 011	3 472	-0.41	0.02	44 354	68 920	-4.92	4.07
Canada	22 918	26 477	-1.34	1.38	1 021	899	-10.45	0.52	5 499	5 437	2.26	2.08
United States	313 146	370 659	0.92	1.14	2 990	2 573	5.96	-0.15	38 855	63 483	-5.80	4.27
EUROPE	217 774	260 636	0.51	1.05	9 409	10 315	1.95	3.40	27 511	34 576	8.30	1.37
European Union	145 112	160 571	-0.20	0.42	7 892	8 867	4.30	4.40	8 781	5 960	-0.69	-3.88
Russian Federation	26 062	37 497	-1.01	1.71	372	551	-13.12	-0.04	2 976	2 860	5.10	2.22
Ukraine	28 119	41 688	6.17	3.39	102	102	3.97	-9.98	13 918	21 523	17.73	2.90
OCEANIA DEVELOPED	13 084	14 300	-0.97	0.69	27	5	7.39	-22.45	6 590	5 873	1.50	1.89
Australia	12 470	13 613	-1.09	0.67	0	0	..	..	6 584	5 867	1.50	1.89
New Zealand	614	687	2.64	1.17	27	5	8.70	-22.45	6	6	28.68	-0.01
OTHER DEVELOPED[1]	18 181	20 950	2.87	1.10	21 328	20 614	-1.30	0.06	2 604	1 545	8.31	-5.93
Japan	203	203	-1.52	-0.14	18 947	17 885	-1.30	-0.25	0	0	..	..
South Africa	12 776	14 819	3.55	1.27	278	2	-13.66	-41.83	2 137	1 247	10.37	-5.55
DEVELOPING COUNTRIES	**564 749**	**714 082**	**4.18**	**2.03**	**88 433**	**127 743**	**3.22**	**2.68**	**43 500**	**49 169**	**6.28**	**1.34**
AFRICA	107 771	135 733	3.92	2.55	16 903	27 071	2.83	2.85	4 524	1 521	10.65	-3.46
NORTH AFRICA	12 465	14 653	0.41	1.64	13 482	19 214	4.43	2.53	50	41	-4.77	-0.74
Algeria	1 646	2 284	3.85	2.50	2 738	3 590	3.22	1.15	0	0	0.00	-0.08
Egypt	7 864	8 860	0.32	1.49	6 238	9 488	4.82	3.13	0	0	0.00	-0.22
SUB-SAHARAN AFRICA	95 305	121 080	4.47	2.67	3 421	7 856	-1.74	3.68	4 474	1 481	10.99	-3.52
LATIN AMERICA and CARIBBEAN	142 878	181 611	3.69	1.64	26 101	33 429	3.64	2.07	33 870	41 645	10.07	1.34
Argentina	30 697	40 689	5.15	2.96	0	0	..	..	18 595	25 641	5.75	3.46
Brazil	63 548	80 032	5.00	0.80	874	1 440	1.95	2.29	12 592	11 444	20.56	-2.81
Chile	2 018	2 374	1.06	1.15	1 298	1 967	0.94	2.34	123	85	2.72	-2.22
Mexico	28 710	35 554	0.03	1.86	10 885	13 619	2.46	2.64	196	243	28.64	24.51
Uruguay	903	1 299	5.38	1.29	63	39	5.56	-1.48	100	141	2.11	1.51
ASIA and PACIFIC	314 100	396 739	4.51	2.04	45 430	67 244	3.15	2.93	5 107	6 003	-7.41	3.04
Bangladesh	1 705	2 073	28.04	1.90	128	1 196	-4.38	5.88	0	0	0.00	-0.41
China[2]	200 681	256 811	5.36	1.90	5 370	13 238	17.53	9.10	141	110	-42.23	-5.46
India	42 403	53 293	2.25	2.83	10	7	-28.12	3.40	3 328	4 272	26.43	4.68
Indonesia	18 311	24 260	7.23	2.37	2 257	3 983	8.92	1.01	59	109	4.82	-0.10
Iran, Islamic Republic of	5 010	5 843	-0.12	2.34	4 671	6 130	10.28	1.08	0	0	0.00	-1.50
Korea	195	272	-7.18	2.20	8 011	8 304	-1.46	0.20	0	0	11.07	2.12
Malaysia	97	90	4.17	1.40	3 003	3 924	2.93	1.76	8	6	0.89	-1.72
Pakistan	4 059	5 075	4.17	2.07	26	23	-4.61	-1.65	0	0	-28.79	0.94
Saudi Arabia	475	494	2.25	1.08	9 176	11 982	2.53	1.89	0	0	0.00	-0.13
Turkey	12 374	14 869	-0.37	1.73	553	1 783	-1.42	8.67	254	180	-2.58	-3.56
LEAST DEVELOPED COUNTRIES (LDC)	**72 756**	**94 187**	**6.02**	**2.73**	**2 354**	**5 063**	**-0.57**	**3.60**	**4 251**	**1 420**	**12.50**	**-3.10**
OECD[3]	**539 013**	**626 590**	**0.36**	**1.00**	**54 006**	**58 532**	**0.05**	**1.45**	**60 298**	**81 261**	**-3.73**	**3.07**
BRICS	**345 470**	**442 452**	**4.20**	**1.76**	**6 904**	**15 239**	**7.50**	**7.46**	**21 174**	**19 933**	**6.10**	**-1.27**

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

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Table A.8.2. Coarse grain projections: Consumption, feed use, per capita

Crop year

	CONSUMPTION (kt)		Growth (%)[4]		FEED USE (kt)		Growth (%)[4]		PER CAPITA (kg)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**1 155 480**	**1 408 175**	**2.38**	**1.74**	**601 983**	**767 062**	**0.50**	**1.92**	**30.9**	**35.2**	**0.88**	**1.21**
DEVELOPED COUNTRIES	**555 737**	**616 741**	**1.14**	**1.19**	**296 117**	**345 923**	**-2.02**	**1.40**	**23.3**	**23.6**	**0.30**	**-0.02**
NORTH AMERICA	306 112	332 219	2.47	1.19	107 385	138 319	-5.06	2.18	32.3	34.0	2.32	-0.37
Canada	19 104	21 853	-2.13	1.35	13 547	15 825	-4.59	1.90	62.7	65.6	-2.95	-1.33
United States	287 008	310 366	2.85	1.18	93 838	122 494	-5.13	2.22	29.0	30.5	3.98	-0.13
EUROPE	206 230	236 054	-0.32	1.26	158 272	174 235	0.14	0.90	20.0	19.5	-0.92	0.14
European Union	149 826	163 416	-0.08	1.00	113 233	117 794	-0.25	0.42	18.9	19.1	0.44	0.09
Russian Federation	23 878	35 088	-2.59	1.66	21 120	29 114	1.50	1.98	14.6	9.5	-9.42	-1.24
Ukraine	14 670	20 123	1.03	3.77	9 405	13 223	1.31	4.09	45.0	50.8	2.15	1.49
OCEANIA DEVELOPED	6 873	8 433	-1.32	0.16	6 035	6 585	-1.93	0.54	21.8	20.9	3.77	-2.14
Australia	6 239	7 746	-1.64	0.14	5 512	6 014	-2.34	0.50	21.1	20.4	5.44	-2.06
New Zealand	634	687	2.50	0.43	523	572	3.38	0.93	25.3	24.0	-3.35	-2.47
OTHER DEVELOPED[1]	36 522	40 035	0.04	1.08	24 425	26 784	0.26	1.17	20.8	20.9	-0.47	0.10
Japan	18 856	18 154	-1.21	-0.18	14 128	13 270	-1.16	-0.38	2.5	2.6	-1.19	0.00
South Africa	10 981	13 557	1.93	2.38	4 976	6 890	3.17	3.71	94.5	92.6	-0.57	-0.07
DEVELOPING COUNTRIES	**599 743**	**791 433**	**3.64**	**2.19**	**305 866**	**421 139**	**3.55**	**2.38**	**32.8**	**37.8**	**0.94**	**1.35**
AFRICA	119 211	160 555	3.61	2.72	25 935	34 262	4.67	2.41	77.3	83.8	0.54	0.78
NORTH AFRICA	26 156	33 692	2.54	2.21	18 475	24 256	3.10	2.27	39.4	43.5	0.01	0.97
Algeria	4 500	5 855	4.88	1.73	3 657	4 838	6.01	1.75	19.7	21.1	-0.26	0.59
Egypt	14 062	18 305	1.74	2.36	9 513	12 551	1.86	2.41	48.3	52.8	-0.13	0.96
SUB-SAHARAN AFRICA	93 055	126 863	3.93	2.86	7 460	10 006	9.69	2.78	84.9	90.9	0.50	0.66
LATIN AMERICA and CARIBBEAN	132 977	172 841	2.56	1.85	74 487	102 698	2.92	2.04	75.6	81.4	1.15	0.80
Argentina	11 789	15 036	4.48	2.51	6 425	9 261	6.54	2.84	94.1	92.7	2.12	1.82
Brazil	50 523	69 709	3.07	1.63	33 121	52 932	3.02	2.71	62.5	52.8	2.62	-2.11
Chile	3 179	4 242	1.12	1.85	2 539	3 469	1.24	1.95	18.8	20.5	0.88	0.78
Mexico	39 408	48 871	0.69	2.02	16 442	16 797	-0.15	-0.08	170.5	212.7	0.57	2.31
Uruguay	822	1 187	4.88	1.43	277	441	3.95	1.59	21.5	25.4	-1.52	0.54
ASIA and PACIFIC	347 555	458 037	4.09	2.14	205 444	284 178	3.65	2.50	15.3	18.0	0.36	1.42
Bangladesh	1 757	3 255	21.45	3.18	983	2 209	29.90	3.80	4.1	4.8	12.44	1.03
China[2]	200 711	270 120	5.19	2.10	122 372	176 413	3.73	2.65	11.2	13.9	1.78	1.59
India	37 550	49 242	1.18	2.65	5 640	7 809	4.41	3.74	21.6	25.7	-1.08	1.67
Indonesia	20 075	28 000	7.25	2.35	9 065	14 249	13.75	2.81	29.5	32.4	0.85	0.84
Iran, Islamic Republic of	9 181	12 082	3.55	1.78	8 696	11 477	3.79	1.84	1.3	1.4	-1.11	0.08
Korea	8 249	8 582	-1.50	0.29	6 051	6 438	-1.60	0.43	4.4	4.3	-0.12	-0.15
Malaysia	3 196	4 003	3.26	1.94	2 997	3 788	3.41	2.04	1.6	1.4	-1.20	-0.86
Pakistan	4 152	5 067	5.33	1.98	1 662	2 039	8.08	2.21	9.4	10.0	0.94	0.61
Saudi Arabia	9 650	12 417	2.91	1.98	9 404	12 129	3.18	2.01	3.4	2.9	-2.45	-1.41
Turkey	12 707	16 404	-0.68	2.46	10 244	13 567	-0.58	2.69	17.4	18.1	-0.21	0.46
LEAST DEVELOPED COUNTRIES (LDC)	**69 336**	**97 254**	**5.40**	**2.93**	**8 330**	**11 817**	**12.37**	**2.56**	**58.8**	**67.4**	**1.93**	**1.20**
OECD[3]	**548 806**	**604 262**	**1.24**	**1.16**	**279 289**	**319 753**	**-2.42**	**1.19**	**33.9**	**39.5**	**1.19**	**1.29**
BRICS	**323 643**	**437 715**	**3.47**	**2.05**	**187 230**	**273 158**	**3.34**	**2.63**	**20.5**	**22.8**	**0.14**	**0.89**

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861282

Table A.9.1. Rice projections: Production and trade

Crop year

	PRODUCTION (kt)		Growth (%)[5]		IMPORTS (kt)		Growth (%)[5]		EXPORTS (kt)		Growth (%)[5]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**481 059**	**549 330**	**2.40**	**1.18**	**36 879**	**45 041**	**3.17**	**2.00**	**36 626**	**45 041**	**3.45**	**2.00**
DEVELOPED COUNTRIES	**18 085**	**19 012**	**0.60**	**0.67**	**4 829**	**6 215**	**2.16**	**2.20**	**4 261**	**4 813**	**1.24**	**2.26**
NORTH AMERICA	6 594	7 351	-0.51	1.62	992	1 300	3.14	2.54	3 363	3 841	0.02	2.66
Canada	0	0	..	..	380	413	2.95	0.90	0	0	..	..
United States	6 594	7 351	-0.51	1.62	612	886	3.31	3.41	3 363	3 841	0.02	2.66
EUROPE	2 562	2 702	3.65	0.64	1 456	1 939	0.07	3.32	416	206	13.78	-1.41
European Union	1 731	1 771	1.30	0.29	1 008	1 550	3.28	3.92	168	151	2.00	-0.27
Russian Federation	707	789	11.18	1.33	184	120	-8.47	4.57	237	44	41.77	-5.14
Ukraine	108	123	9.28	1.54	57	45	-9.35	-3.04	8	9	36.10	3.06
OCEANIA DEVELOPED	615	760	7.48	0.97	212	201	8.22	0.29	260	477	6.76	0.93
Australia	615	760	7.48	0.97	171	160	10.44	0.36	260	477	6.76	0.93
New Zealand	0	0	..	..	41	41	1.62	0.00	0	0	..	..
OTHER DEVELOPED[1]	8 314	8 199	0.34	-0.13	2 168	2 775	2.77	1.48	221	289	-0.20	2.46
Japan	7 749	7 506	0.23	-0.30	853	903	1.22	0.00	173	181	-0.37	0.00
South Africa	2	7	0.00	12.07	967	1 357	3.76	1.61	0	0	0.00	-0.23
DEVELOPING COUNTRIES	**462 975**	**530 318**	**2.47**	**1.20**	**32 051**	**38 826**	**3.33**	**1.97**	**32 365**	**40 228**	**3.78**	**1.98**
AFRICA	16 811	28 074	4.17	5.06	11 220	14 576	3.49	2.44	489	87	-10.30	-10.03
NORTH AFRICA	3 835	3 718	-1.49	-1.15	769	1 780	14.52	14.47	390	0	-12.79	-53.88
Algeria	1	1	0.00	1.20	85	101	2.28	1.74	0	0	0.00	-0.25
Egypt	3 801	3 679	-1.56	-1.17	400	1 223	90.46	28.15	390	0	-12.79	-55.03
SUB-SAHARAN AFRICA	12 976	24 356	6.50	6.43	10 451	12 796	2.99	1.48	99	87	3.86	0.00
LATIN AMERICA and CARIBBEAN	18 345	22 982	1.30	2.24	3 905	5 081	0.80	2.47	3 244	4 040	12.56	0.88
Argentina	992	1 316	4.68	2.25	0	0	..	..	610	771	8.32	1.58
Brazil	8 187	10 473	0.34	2.90	705	625	-3.96	2.27	1 039	1 197	51.49	-1.14
Chile	84	87	-0.28	0.49	111	156	0.74	2.23	1	1	38.27	-0.49
Mexico	129	183	-5.09	2.86	923	1 257	3.43	2.55	3	31	13.72	21.06
Uruguay	984	1 174	3.56	1.55	1	0	-6.27	-0.31	859	1 053	4.46	1.65
ASIA and PACIFIC	427 818	479 262	2.46	0.96	16 926	19 169	3.91	1.50	28 632	36 101	3.47	2.20
Bangladesh	33 712	40 191	3.76	1.72	808	1 760	-5.39	8.57	7	10	-3.97	2.40
China[2]	137 990	136 574	2.29	-0.24	1 656	1 494	11.57	-2.55	365	304	-12.93	-0.99
India	101 030	112 916	1.85	1.00	100	140	53.37	2.50	7 179	5 286	4.82	-2.48
Indonesia	42 248	50 845	3.37	1.54	1 800	1 292	1.85	-1.04	2	5	58.85	0.09
Iran, Islamic Republic of	1 468	1 652	-2.42	0.82	1 305	1 919	2.80	3.92	0	0	0.00	3.08
Korea	4 175	4 032	-1.45	0.05	393	444	7.92	0.28	3	3	-40.64	0.00
Pakistan	5 751	7 752	2.44	1.94	60	55	77.09	-0.69	3 088	4 074	2.52	1.85
Philippines	11 300	15 163	2.35	2.18	1 100	1 031	-2.91	-1.18	0	0	0.00	0.08
Thailand	24 084	28 077	2.96	1.13	517	95	91.44	14.31	8 453	12 231	-0.80	1.86
Turkey	528	761	8.97	2.36	258	201	5.40	-1.01	90	111	97.15	1.02
Viet Nam	28 012	31 783	2.50	1.13	583	97	42.41	-15.17	7 444	9 691	7.41	2.90
LDC Asia[3]	30 195	41 362	3.42	3.17	1 000	364	2.89	-9.68	1 951	4 346	24.43	15.72
LEAST DEVELOPED COUNTRIES (LDC)	**73 441**	**99 822**	**4.01**	**3.07**	**6 928**	**7 451**	**1.16**	**0.41**	**2 048**	**4 434**	**21.93**	**15.11**
OECD[4]	**21 606**	**22 450**	**-0.02**	**0.56**	**4 989**	**6 298**	**3.34**	**2.02**	**4 062**	**4 797**	**0.20**	**2.27**
BRICS	**247 916**	**260 758**	**2.05**	**0.39**	**3 610**	**3 737**	**3.66**	**-0.03**	**8 820**	**6 831**	**5.31**	**-2.25**

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. LDC Asia includes Afghanistan, Bhutan, Myanmar, Cambodia, Lao Peoples' Democratic Republic, Nepal, Yemen, Timor Meste, Maldives.
4. Excludes Iceland but includes all EU27 member countries.
5. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

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Table A.9.2. Rice projections: Consumption, per capita

Crop year

	CONSUMPTION (kt)		Growth (%)[1]		PER CAPITA (kg)		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**468 706**	**551 295**	**1.76**	**1.36**	**57.0**	**59.4**	**0.17**	**0.35**
DEVELOPED COUNTRIES	**18 608**	**20 143**	**0.40**	**0.76**	**12.6**	**13.3**	**-0.27**	**0.45**
NORTH AMERICA	4 290	4 795	0.54	1.22	12.4	12.6	-0.37	0.41
Canada	380	413	2.95	0.90	11.0	10.9	1.89	0.05
United States	3 910	4 382	0.32	1.25	12.5	12.8	-0.57	0.44
EUROPE	3 634	4 432	0.83	1.86	4.9	5.9	0.62	1.80
European Union	2 602	3 167	1.53	1.94	5.2	6.2	1.13	1.74
Russian Federation	654	865	-1.43	2.29	4.6	6.2	-1.28	2.47
Ukraine	158	159	-1.10	-0.07	3.3	3.6	-0.80	0.42
OCEANIA DEVELOPED	348	477	-2.12	1.99	12.9	15.5	-3.65	0.84
Australia	306	436	-2.59	2.20	13.5	16.9	-4.19	1.01
New Zealand	41	41	1.62	0.00	9.3	8.4	0.48	-0.94
OTHER DEVELOPED[2]	10 336	10 439	0.28	0.08	34.9	34.1	-0.65	-0.30
Japan	8 514	7 983	-0.31	-0.44	58.8	56.5	-0.89	-0.30
South Africa	962	1 362	3.63	1.68	18.1	24.5	3.03	1.27
DEVELOPING COUNTRIES	**450 099**	**531 151**	**1.82**	**1.39**	**67.9**	**69.7**	**0.04**	**0.22**
AFRICA	27 536	42 490	4.46	4.10	24.2	30.2	1.84	1.99
NORTH AFRICA	4 315	5 493	2.01	1.92	23.2	25.7	0.92	0.84
Algeria	86	102	2.38	1.74	2.4	2.5	0.86	0.58
Egypt	3 911	4 899	1.69	1.75	42.3	44.9	0.33	0.45
SUB-SAHARAN AFRICA	23 222	36 996	4.98	4.47	24.4	31.0	2.04	2.16
LATIN AMERICA and CARIBBEAN	19 296	23 913	0.38	2.51	30.6	34.3	-0.74	1.61
Argentina	383	544	1.22	3.29	9.4	12.2	0.34	2.49
Brazil	7 989	9 824	-1.23	3.32	40.6	46.1	-2.17	2.61
Chile	201	241	0.72	1.58	11.4	12.6	-0.15	0.84
Mexico	1 046	1 398	1.96	2.41	9.1	10.9	0.69	1.43
Uruguay	100	120	6.99	1.11	7.5	8.1	-2.94	0.60
ASIA and PACIFIC	403 267	464 749	1.73	1.12	84.3	86.4	0.14	0.17
Bangladesh	34 031	41 826	3.41	1.93	169.7	184.1	0.91	0.76
China[3]	130 595	140 127	0.69	0.26	77.8	76.6	-0.17	-0.19
India	93 418	108 516	1.61	1.24	71.4	73.6	-0.26	0.15
Indonesia	43 446	51 985	2.90	1.48	160.9	173.2	1.17	0.54
Iran, Islamic Republic of	2 703	3 568	-0.42	2.36	32.1	37.8	-1.14	1.42
Korea	4 603	4 474	-0.35	0.07	66.2	54.1	-2.09	-1.19
Pakistan	2 905	3 717	3.79	2.01	13.7	15.0	3.32	0.58
Philippines	13 023	16 161	2.23	1.99	123.2	130.5	1.50	0.42
Thailand	12 198	15 917	1.50	2.03	126.0	133.5	0.18	0.52
Turkey	702	848	5.81	1.66	9.0	9.7	4.32	0.69
Viet Nam	21 085	22 048	1.38	0.26	188.9	170.7	0.21	-1.03
LDC Asia[4]	29 952	37 230	3.48	2.12	127.9	137.4	0.22	0.72
LEAST DEVELOPED COUNTRIES (LDC)	**78 531**	**102 543**	**3.75**	**2.55**	**68.4**	**73.2**	**0.34**	**0.66**
OECD[5]	**22 544**	**23 671**	**0.31**	**0.60**	**15.7**	**15.4**	**-0.74**	**0.03**
BRICS	**233 618**	**260 695**	**0.98**	**0.77**	**68.1**	**69.3**	**-0.25**	**0.12**

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010-12est: Data for 2012 are estimated.

1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. LDC Asia includes Afghanistan, Bhutan, Myanmar, Cambodia, Lao Peoples' Democratic Republic, Nepal, Yemen, Timor Meste, Maldives.
5. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

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Table A.10. Main policy assumptions for cereal markets

Crop year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ARGENTINA												
Crops export tax	%	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Rice export tax	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
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]												
Cereal reference price[3]	EUR/t	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3
Single farm payment[4]	EUR/ha	187.9	187.9	187.9	187.9	187.9	187.9	187.9	187.9	187.9	187.9	187.9
Rice reference price[5]	EUR/t	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
Direct payment for rice	EUR/ha	180.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wheat tariff-quota[1]	kt	3 346.0	3 346.0	3 346.0	3 346.0	3 346.0	3 346.0	3 346.0	3 346.0	3 346.0	3 346.0	3 346.0
Coarse grain tariff-quota[1]	kt	3 518.3	3 518.3	3 518.3	3 518.3	3 518.3	3 518.3	3 518.3	3 518.3	3 518.3	3 518.3	3 518.3
Subsidised export limits[1]												
Wheat	mt	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4
Coarse grains[6]	mt	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
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	%	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Out-of-quota tariff	%	403.5	403.5	403.5	403.5	403.5	403.5	403.5	403.5	403.5	403.5	403.5
Barley tariff-quota	kt	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6
In-quota tariff	%	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Out-of-quota tariff	%	359.3	359.3	359.3	359.3	359.3	359.3	359.3	359.3	359.3	359.3	359.3
Rice quota[7]	kt	205.2	205.2	205.2	205.2	205.2	205.2	205.2	205.2	205.2	205.2	205.2
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	%	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	%	115.2	100.0	60.0	45.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0
UNITED STATES												
ACRE participation rate												
Wheat	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Coarse grains	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Rice	%	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Wheat loan rate	USD/t	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0
Maize loan rate	USD/t	76.8	76.8	76.8	76.8	76.8	76.8	76.8	76.8	76.8	76.8	76.8
Prod. flex. contract payment												
Wheat	USD/t	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9
Maize	USD/t	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
CRP areas[8]												
Wheat	mha	3.2	3.1	3.2	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Coarse grains	mha	2.9	2.8	2.9	3.0	3.0	3.0	3.0	3.0	3.0	2.6	2.6
Subsidised export limits[1]												
Wheat	mt	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
Coarse grains	mt	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6

Table A.10. Main policy assumptions for cereal markets *(cont.)*

Crop year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
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	%	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Out-of-quota tariff	%	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7
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
INDIA												
Input subsidy coarse grains[9]	INR/ha	7 165	7 194	7 151	7 182	7 183	7 114	7 105	7 014	6 949	6 889	6 831
Input subsidy rice[9]	INR/ha	7 165	7 194	7 151	7 182	7 183	7 114	7 105	7 014	6 949	6 889	6 831
Input subsidy wheat[9]	INR/ha	7 165	7 194	7 151	7 182	7 183	7 114	7 105	7 014	6 949	6 889	6 831
Minimum support price												
Maize	INR/t	9 157	9 899	10 295	10 707	11 135	11 580	12 043	12 525	13 026	13 514	14 011
Rice	INR/t	10 405	11 249	11 699	12 167	12 653	13 159	13 686	14 233	14 802	15 357	15 922
Wheat	INR/t	11 654	12 598	13 102	13 627	14 172	14 738	15 328	15 941	16 579	17 200	17 832
Wheat Export subsidy	INR/t	1 941	1 941	1 941	1 941	1 941	1 941	1 941	1 941	1 941	1 941	1 941
Wheat tariff	%	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Maize tariff	%	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Rice tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Barley tariff	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
RUSSIAN FEDERATION												
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	%	5.0	13.3	11.7	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Coarse grains tariff equivalent of import barriers	%	2.7	2.7	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Coarse grain specific tariff	RUB/t	1.7	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Coarse grain ad valorem import tax	%	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.

The source for tariffs and Tariff Rate Quotas is AMAD (Agricultural market access database). The tariff and TRQ data are based on Most Favoured Nation rates scheduled with the WTO and exclude those under preferential or regional agreements, which may be substantially different. Tariffs are simple averages of several product lines. Specific rates are converted to ad valorem rates using world prices in the Outlook. Import quotas are based on global commitments scheduled in the WTO rather than those allocated to preferential partners under regional or other agreements.

Average 2010-12est: Data for 2012 are estimated.

1. Year beginning 1 July.
2. EU farmers also benefit from the Single Farm Payment (SFP) Scheme, which provides flat-rate payments independent from current production decisions and market developments. For the new member states, payments are phased in with the assumption of maximum top-ups from national budgets up to 2013 through the Single Area Payment Scheme (SAPS). Due to modulation, an increasing share of the total SFP will go to rural development spending rather than directly to farmers.
3. 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, barley and sorghum intervention can take place only via tender.
4. EU average payment per hectare after modulation. Actual payments are made per eligible hectare based on historical reference or regional average and can differ significantly from EU average.
5. Intervention is set at zero tonnes per marketing year. However, the Commission may initiate intervention if market requires.
6. The export volume excludes 0.4 mt of exported potato starch. The original limit on subsidised exports is 10.8 mt.
7. Husked rice basis.
8. Includes wheat, barley, maize, oats and sorghum.
9. Indian input subsidies consist of those for electricty, fertiliser and irrigation.

Source: OECD and FAO Secretariats.

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Table A.11. World oilseed projections

		Average 2010/11-2012/13est	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
OILSEED (crop year)[2]												
World												
Production	mt	390.4	408.2	414.0	427.0	435.7	443.7	452.5	460.7	470.9	480.8	490.5
Area	mha	150.0	188.8	188.6	191.1	192.8	194.3	195.9	197.3	199.6	201.8	203.5
Yield	t/ha	1.9	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.4
Consumption	mt	392.0	406.2	416.2	426.6	436.3	444.5	453.3	461.6	470.7	480.5	489.6
Crush	mt	345.3	357.5	366.5	376.5	385.0	392.4	400.5	408.2	416.7	425.8	434.3
Exports	mt	74.5	118.6	120.1	123.8	125.8	127.6	129.6	131.4	134.4	137.3	140.2
Closing stocks	mt	40.3	38.5	37.2	38.6	39.0	39.2	39.4	39.5	40.7	41.9	43.8
Price[3]	USD/t	605.0	564.1	514.0	511.2	507.0	521.7	523.0	530.0	530.5	538.9	540.0
Developed countries												
Production	mt	165.5	176.3	177.3	182.6	186.2	188.3	191.5	194.0	197.3	200.5	203.2
Consumption	mt	136.6	139.2	142.1	145.2	148.5	151.0	153.7	156.1	158.6	160.9	163.0
Crush	mt	124.4	126.5	128.8	132.2	134.8	137.0	139.6	141.9	144.4	146.6	148.6
Closing stocks	mt	14.4	13.9	14.2	15.6	16.0	16.2	16.2	16.1	16.3	16.4	16.6
Developing countries												
Production	mt	224.9	231.9	236.7	244.3	249.5	255.4	261.0	266.6	273.6	280.3	287.2
Consumption	mt	255.4	267.0	274.1	281.4	287.8	293.5	299.6	305.5	312.2	319.6	326.6
Crush	mt	220.9	231.0	237.7	244.3	250.1	255.4	260.9	266.3	272.4	279.1	285.6
Closing stocks	mt	25.8	24.5	23.0	23.0	23.0	23.0	23.3	23.4	24.4	25.6	27.2
OECD[1]												
Production	mt	140.8	150.7	150.6	155.7	157.8	159.0	161.2	162.7	165.0	167.1	169.0
Consumption	mt	123.4	125.0	127.1	129.7	132.1	133.9	135.8	137.3	139.0	140.5	141.8
Crush	mt	112.5	113.9	115.4	118.2	120.0	121.6	123.3	124.7	126.4	127.8	129.1
Closing stocks	mt	13.2	13.2	13.3	14.7	15.1	15.2	15.1	15.0	15.1	15.1	15.2
PROTEIN MEALS (marketing year)												
World												
Production	mt	271.5	280.9	288.3	295.5	301.7	307.0	313.4	319.3	325.7	332.4	338.8
Consumption	mt	268.9	280.6	287.8	295.2	301.6	307.0	313.3	319.1	325.5	332.1	338.5
Closing stocks	mt	15.4	14.9	15.5	15.9	16.1	16.2	16.4	16.6	16.9	17.3	17.6
Price[4]	USD/t	436.9	464.3	403.9	389.0	387.0	390.2	396.2	401.7	403.6	404.2	406.1
Developed countries												
Production	mt	87.2	88.6	90.4	92.6	94.2	95.3	97.1	98.5	100.1	101.5	102.8
Consumption	mt	107.3	111.5	112.2	113.5	114.8	115.1	116.5	117.3	118.3	119.3	120.0
Closing stocks	mt	1.3	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4
Developing countries												
Production	mt	184.3	192.3	197.9	203.0	207.5	211.7	216.2	220.7	225.6	230.9	236.0
Consumption	mt	161.6	169.1	175.5	181.7	186.9	191.9	196.8	201.8	207.2	212.8	218.5
Closing stocks	mt	14.2	13.7	14.2	14.6	14.7	14.9	15.1	15.3	15.6	15.9	16.3
OECD												
Production	mt	82.6	83.8	85.2	87.0	88.2	89.0	90.3	91.2	92.4	93.4	94.3
Consumption	mt	110.3	114.6	115.5	117.1	118.5	119.0	120.3	121.1	122.2	123.2	124.0
Closing stocks	mt	1.5	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
VEGETABLE OILS (marketing year)												
World												
Production	mt	156.2	163.3	166.9	170.9	174.3	177.5	181.2	184.6	188.3	192.1	195.7
Of which palm oil	mt	52.1	55.7	56.9	58.2	59.4	60.6	61.9	63.1	64.4	65.6	66.9
Consumption	mt	154.9	163.7	167.9	170.6	174.9	178.3	181.8	185.3	189.0	192.6	196.2
Food	mt	108.4	133.6	137.0	138.6	141.2	143.4	145.8	148.1	150.5	153.2	156.0
Biofuel	mt	19.4	21.0	21.5	22.5	24.0	25.1	26.2	27.1	28.4	29.1	29.7
Exports	mt	41.8	65.6	66.0	67.5	68.5	70.1	71.5	73.1	74.7	76.0	77.3
Closing stocks	mt	21.3	22.1	22.0	23.1	23.5	23.6	23.8	24.1	24.3	24.7	25.0
Price[5]	USD/t	1 206.6	1 141.4	1 038.3	1 077.6	1 065.2	1 097.7	1 104.9	1 117.6	1 136.1	1 154.6	1 160.3
Developed countries												
Production	mt	39.8	40.5	41.2	42.3	43.1	43.7	44.6	45.4	46.2	47.0	47.7
Consumption	mt	46.9	47.7	48.3	48.9	49.8	50.6	51.3	52.1	53.3	53.7	54.1
Closing stocks	mt	3.4	3.3	3.3	3.4	3.5	3.5	3.5	3.6	3.6	3.8	3.9
Developing countries												
Production	mt	116.4	122.8	125.7	128.6	131.2	133.8	136.5	139.2	142.1	145.0	147.9
Consumption	mt	108.0	116.0	119.5	121.7	125.1	127.7	130.5	133.2	135.7	139.0	142.2
Closing stocks	mt	17.9	18.8	18.7	19.7	20.0	20.1	20.3	20.5	20.7	20.9	21.1
OECD												
Production	mt	34.3	34.8	35.2	36.0	36.5	36.9	37.5	37.9	38.5	38.9	39.3
Consumption	mt	45.8	46.5	47.0	47.5	48.2	49.0	49.6	50.5	51.6	52.0	52.4
Closing stocks	mt	3.0	2.9	2.9	3.0	3.0	3.1	3.1	3.1	3.2	3.3	3.5

1. Excludes Iceland but includes all EU27 member countries.
2. Beginning crop marketing year - see Glossary of Terms for definitions. Cotton seeds have been extracted from the oilseed total. Based on the cotton outlook, cotton seed production and crush would reach about 50 mt in 2022.
   Average 2010/11-2012/13est: Data for 2012/13 are estimated.
3. Weighted average oilseed price, European port.
4. Weighted average protein meal, European port.
5. Weighted average price of oilseed oils and palm oil, European port.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861358

Table A.12.1. Oilseed projections: Production and trade

Crop year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**390 414**	**490 460**	**3.13**	**2.07**	**110 714**	**141 194**	**6.68**	**1.82**	**110 371**	**140 197**	**6.27**	**1.83**
DEVELOPED COUNTRIES	**165 474**	**203 242**	**3.70**	**1.63**	**25 357**	**27 995**	**-0.47**	**0.86**	**55 540**	**68 070**	**6.67**	**1.22**
NORTH AMERICA	107 682	128 468	2.35	1.13	1 649	1 477	1.95	0.07	49 400	59 152	6.15	1.01
Canada	18 184	23 367	8.05	1.62	519	541	-6.30	0.00	10 594	13 703	10.35	2.00
United States	89 497	105 101	1.44	1.03	1 130	936	8.70	0.10	38 805	45 449	5.23	0.73
EUROPE	52 349	66 678	6.59	2.46	17 592	20 816	0.53	1.27	4 040	5 912	12.51	3.21
European Union	28 073	33 832	4.20	1.97	16 096	18 981	-0.21	1.24	657	662	-0.30	0.34
Russian Federation	9 933	12 095	7.03	2.68	895	1 272	73.42	2.31	283	1 011	0.00	9.84
Ukraine	12 088	17 859	14.45	3.41	24	25	0.86	-0.19	2 705	3 640	25.61	2.20
OCEANIA DEVELOPED	2 861	4 130	9.33	2.53	35	30	1.32	-0.01	1 864	2 876	11.72	2.46
Australia	2 851	4 120	9.32	2.53	25	25	1.53	0.00	1 863	2 876	11.72	2.46
New Zealand	10	10	14.26	0.00	10	5	1.54	-0.08	0	0	-0.11	-1.52
OTHER DEVELOPED[1]	2 582	3 966	5.88	4.01	6 081	5 672	-3.48	-0.31	237	130	16.66	-6.76
Japan	246	239	0.93	0.00	5 222	4 476	-4.23	-1.03	0	0	-10.09	0.00
South Africa	1 523	2 714	6.32	5.21	46	130	-2.67	15.25	127	23	34.46	-20.01
DEVELOPING COUNTRIES	**224 940**	**287 218**	**2.71**	**2.39**	**85 357**	**113 200**	**9.89**	**2.07**	**54 831**	**72 128**	**5.80**	**2.45**
AFRICA	10 043	12 910	1.11	2.65	3 009	3 773	12.34	1.84	281	169	9.41	4.51
NORTH AFRICA	555	656	0.26	1.88	2 902	3 633	13.23	1.76	36	34	0.79	-1.37
Algeria	115	136	1.15	2.17	205	260	10.64	0.68	0	0	0.00	-0.05
Egypt	270	327	-0.48	1.96	1 894	2 288	20.33	1.31	30	30	12.44	-1.30
SUB-SAHARAN AFRICA	9 489	12 254	1.16	2.69	108	140	-0.97	4.18	244	135	11.52	6.83
LATIN AMERICA and CARIBBEAN	139 470	189 415	4.17	2.84	7 409	8 705	-0.21	0.07	52 832	71 075	6.06	2.58
Argentina	52 500	73 607	2.14	3.54	294	1 686	-42.13	0.81	11 372	17 501	1.51	2.24
Brazil	73 635	95 403	5.01	2.31	84	68	-22.83	0.08	34 064	41 569	6.58	2.38
Chile	83	144	1.12	5.25	209	234	-1.29	3.06	5	3	-5.15	-2.85
Mexico	297	209	3.89	-4.29	5 432	5 589	2.08	0.11	10	10	2.67	-0.06
Uruguay	2 623	4 434	21.71	2.99	4	4	-9.13	-0.53	2 242	3 488	21.69	3.06
ASIA and PACIFIC	75 427	84 893	0.62	1.42	74 939	100 721	11.41	2.27	1 719	884	-0.88	-5.15
Bangladesh	365	435	3.47	1.60	252	237	2.91	1.04	0	0	0.00	-0.07
China[2]	44 380	47 951	0.01	1.20	58 898	82 830	14.17	2.57	932	409	-4.71	-7.41
India	23 222	27 165	1.29	1.71	191	2	62.22	-34.98	521	202	7.12	-4.35
Indonesia	1 899	2 425	0.16	2.16	2 184	2 230	7.32	0.75	3	2	-7.15	-0.06
Iran, Islamic Republic of	501	586	3.76	1.38	712	803	0.03	0.47	3	3	-1.41	-0.06
Korea	136	144	0.88	0.00	1 311	1 453	-1.78	1.47	0	0	-4.56	0.00
Malaysia	7	8	4.37	1.28	559	587	-1.35	0.95	17	22	-6.53	-0.14
Pakistan	871	1 070	8.42	2.55	1 311	1 709	7.06	1.68	8	0	68.19	-0.29
Saudi Arabia	4	4	0.00	0.81	5	7	0.00	1.89	0	0	0.00	-1.86
Turkey	1 257	1 620	6.08	0.94	2 150	2 169	5.53	1.10	38	40	33.86	-0.66
LEAST DEVELOPED COUNTRIES (LDC)	**6 617**	**8 640**	**0.98**	**2.60**	**381**	**356**	**1.60**	**1.03**	**106**	**143**	**4.40**	**7.82**
OECD[3]	**140 802**	**168 962**	**2.82**	**1.32**	**33 185**	**35 719**	**-0.25**	**0.73**	**51 994**	**62 761**	**6.16**	**1.06**
BRICS	**152 693**	**185 330**	**2.89**	**1.98**	**60 114**	**84 302**	**13.94**	**2.56**	**35 927**	**43 214**	**6.14**	**2.27**

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

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Table A.12.2. Oilseed projections: Consumption, domestic crush

Crop year

	CONSUMPTION (kt)		Growth (%)[1]		DOMESTIC CRUSH (kt)		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**391 994**	**489 640**	**3.47**	**2.06**	**345 295**	**434 270**	**3.77**	**2.15**
DEVELOPED COUNTRIES	**136 565**	**162 990**	**2.26**	**1.77**	**124 420**	**148 629**	**2.66**	**1.82**
NORTH AMERICA	60 840	70 687	0.49	1.36	55 230	63 790	0.88	1.41
Canada	8 913	10 210	5.93	1.31	8 018	8 970	6.96	1.09
United States	51 928	60 476	-0.23	1.36	47 211	54 820	0.09	1.46
EUROPE	66 277	81 556	4.72	2.17	61 019	75 510	5.20	2.19
European Union	43 878	52 162	2.73	1.86	40 533	48 402	3.07	1.80
Russian Federation	10 569	12 336	9.28	2.07	9 996	11 645	9.77	2.20
Ukraine	9 385	14 234	12.81	3.75	8 459	13 116	14.90	4.01
OCEANIA DEVELOPED	939	1 284	5.84	2.39	912	1 262	6.30	2.44
Australia	920	1 270	5.80	2.42	901	1 250	6.26	2.46
New Zealand	19	14	7.79	0.02	12	12	9.62	0.02
OTHER DEVELOPED[2]	8 508	9 463	-1.41	1.52	7 259	8 068	-1.76	1.63
Japan	5 564	4 708	-3.73	-0.82	4 681	3 828	-4.23	-0.99
South Africa	1 440	2 787	4.67	6.49	1 283	2 599	4.66	6.96
DEVELOPING COUNTRIES	**255 429**	**326 650**	**4.16**	**2.21**	**220 875**	**285 641**	**4.44**	**2.32**
AFRICA	12 794	16 507	2.89	2.45	7 954	9 335	4.22	1.42
NORTH AFRICA	3 427	4 250	10.42	1.85	3 211	3 972	11.20	1.79
Algeria	322	396	6.38	1.26	303	375	6.60	1.20
Egypt	2 126	2 580	15.42	1.49	1 990	2 397	17.35	1.38
SUB-SAHARAN AFRICA	9 367	12 257	0.99	2.67	4 743	5 363	1.05	1.15
LATIN AMERICA and CARIBBEAN	93 868	126 728	3.24	2.79	87 468	119 734	3.02	2.93
Argentina	41 332	57 507	2.12	3.91	40 384	56 487	2.16	3.98
Brazil	39 560	53 885	4.26	2.25	35 117	49 158	3.58	2.44
Chile	289	375	-0.42	3.91	279	363	-0.48	3.98
Mexico	5 718	5 788	2.15	-0.09	5 374	5 444	3.19	-0.09
Uruguay	385	948	21.65	2.87	326	828	21.32	3.00
ASIA and PACIFIC	148 767	183 414	4.90	1.81	125 453	156 572	5.52	1.94
Bangladesh	633	671	3.60	1.40	545	547	3.09	0.99
China[3]	102 415	129 172	6.12	1.94	85 461	109 856	7.02	2.13
India	22 729	26 866	1.47	1.63	20 113	23 502	1.46	1.59
Indonesia	4 103	4 651	3.55	1.47	2 322	2 997	6.73	2.57
Iran, Islamic Republic of	1 209	1 386	1.56	0.85	1 151	1 312	1.46	0.79
Korea	1 499	1 596	-0.90	1.33	1 066	1 079	-0.84	0.95
Malaysia	550	572	-1.06	1.04	543	566	-1.11	1.04
Pakistan	2 244	2 777	8.12	2.01	2 027	2 475	8.38	1.99
Saudi Arabia	9	11	0.00	1.50	6	7	0.00	0.61
Turkey	3 414	3 747	5.78	1.08	3 201	3 491	5.83	0.98
LEAST DEVELOPED COUNTRIES (LDC)	**6 921**	**8 851**	**1.02**	**2.47**	**4 608**	**5 469**	**1.20**	**1.69**
OECD[4]	**123 370**	**141 813**	**1.22**	**1.41**	**112 470**	**129 099**	**1.60**	**1.41**
BRICS	**176 713**	**225 046**	**5.15**	**2.03**	**151 970**	**196 759**	**5.43**	**2.20**

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010-12est: Data for 2012 are estimated.

1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861396

Table A.13.1. Protein meal projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**271 467**	**338 786**	**3.50**	**2.06**	**73 198**	**96 187**	**3.44**	**2.75**	**74 002**	**96 106**	**3.36**	**2.75**
DEVELOPED COUNTRIES	**87 154**	**102 790**	**1.70**	**1.64**	**38 808**	**39 805**	**1.39**	**0.19**	**17 259**	**22 539**	**7.25**	**3.53**
NORTH AMERICA	45 300	52 053	0.35	1.30	3 820	4 465	3.77	1.30	11 566	12 458	5.69	1.94
Canada	4 831	5 504	5.44	1.21	1 055	863	-1.74	-0.60	3 239	3 566	9.74	1.71
United States	40 469	46 549	-0.13	1.31	2 764	3 603	6.73	1.82	8 327	8 892	4.49	2.04
EUROPE	35 036	42 976	4.39	2.10	28 943	29 012	-0.16	0.11	5 438	9 856	11.25	6.10
European Union	25 377	30 180	2.14	1.74	26 674	26 317	-0.53	-0.06	1 039	3 997	5.47	11.55
Russian Federation	4 906	5 682	12.10	2.34	440	702	-3.95	4.84	1 153	831	7.69	1.02
Ukraine	3 940	6 137	17.15	4.01	70	53	-2.38	-4.03	2 973	4 807	16.36	4.27
OCEANIA DEVELOPED	893	1 147	6.23	1.79	2 046	2 423	20.00	0.48	23	22	5.85	-0.01
Australia	885	1 139	6.21	1.81	620	702	5.99	0.91	23	22	5.85	0.00
New Zealand	8	8	8.22	0.00	1 425	1 721	36.79	0.31	0	0	..	..
OTHER DEVELOPED[1]	5 926	6 615	-1.82	1.52	4 000	3 905	7.28	-0.56	231	203	8.81	-0.65
Japan	3 219	2 697	-4.73	-0.99	2 350	2 585	8.70	0.79	2	0	-25.78	0.00
South Africa	767	1 551	4.19	6.78	1 148	756	4.68	-4.66	64	75	40.43	4.86
DEVELOPING COUNTRIES	**184 313**	**235 996**	**4.45**	**2.24**	**34 390**	**56 381**	**6.25**	**5.04**	**56 744**	**73 567**	**2.36**	**2.53**
AFRICA	6 299	8 713	3.80	2.81	2 947	5 200	4.57	5.52	420	857	-0.11	6.14
NORTH AFRICA	2 530	3 083	9.93	1.78	2 626	4 858	4.45	5.71	6	5	5.03	-0.49
Algeria	197	246	8.49	1.20	943	1 619	8.18	4.75	0	0	0.00	-0.33
Egypt	1 651	1 948	12.86	1.40	675	1 854	-1.82	9.19	2	2	0.00	-0.70
SUB-SAHARAN AFRICA	3 769	5 630	0.93	3.42	321	341	5.61	3.19	413	852	-0.17	6.20
LATIN AMERICA and CARIBBEAN	68 590	93 732	3.04	2.96	6 675	9 132	3.42	3.57	42 562	58 725	1.77	3.18
Argentina	30 867	42 826	2.35	4.04	0	0	0.00	0.00	27 780	38 384	1.22	4.17
Brazil	28 358	39 424	3.54	2.45	24	25	-30.56	4.47	12 289	18 256	2.65	1.96
Chile	202	254	-0.53	3.98	961	1 209	4.44	1.62	10	9	115.95	-1.44
Mexico	3 965	4 180	2.61	0.01	564	1 427	10.65	10.02	15	15	12.44	0.08
Uruguay	201	555	21.58	2.99	253	251	18.48	7.60	6	5	0.03	-4.95
ASIA and PACIFIC	109 423	133 552	5.44	1.73	24 769	42 049	7.36	5.32	13 762	13 985	4.50	0.00
Bangladesh	369	383	2.90	1.18	343	711	11.03	6.94	0	0	0.00	-0.48
China[2]	65 513	80 784	7.08	1.75	1 592	5 847	21.76	17.80	918	128	2.21	-22.04
India	19 270	23 074	3.21	1.76	76	80	1.76	-0.23	5 380	6 118	3.67	1.99
Indonesia	5 428	6 920	7.57	1.97	3 351	6 365	7.51	6.08	3 329	3 986	7.66	1.20
Iran, Islamic Republic of	1 005	1 231	1.86	1.61	2 086	3 051	21.25	4.42	180	104	24.19	-4.24
Korea	881	893	-0.80	0.89	3 211	3 811	2.63	1.65	0	0	..	..
Malaysia	3 084	3 832	1.96	1.86	1 104	1 089	5.72	-0.33	2 354	2 573	2.82	0.33
Pakistan	3 589	4 599	2.31	2.63	626	1 385	19.22	4.79	142	77	20.40	-3.68
Saudi Arabia	29	3	-0.16	0.60	592	857	-1.58	2.29	4	0	7.06	-2.24
Turkey	2 522	2 565	3.26	0.54	1 386	3 171	6.72	6.72	183	60	13.89	-6.24
LEAST DEVELOPED COUNTRIES (LDC)	**3 148**	**4 678**	**0.71**	**3.49**	**527**	**1 035**	**7.95**	**7.05**	**200**	**682**	**-1.28**	**9.66**
OECD[3]	**82 611**	**94 257**	**0.84**	**1.29**	**41 942**	**46 395**	**1.56**	**0.90**	**12 902**	**16 624**	**5.78**	**3.53**
BRICS	**118 813**	**150 514**	**5.61**	**1.99**	**3 281**	**7 411**	**5.97**	**10.57**	**19 804**	**25 408**	**3.16**	**1.35**

Note: Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861415

Table A.13.2. Protein meal projections: Consumption

Marketing year

	CONSUMPTION (kt)		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22
WORLD	**268 898**	**338 524**	**3.60**	**2.06**
DEVELOPED COUNTRIES	**107 329**	**120 048**	**0.96**	**0.84**
NORTH AMERICA	36 117	44 062	-0.58	1.12
Canada	2 665	2 801	-0.89	0.01
United States	33 452	41 261	-0.55	1.20
EUROPE	58 577	62 124	1.55	0.65
European Union	51 013	52 500	0.63	0.36
Russian Federation	4 201	5 551	10.23	2.85
Ukraine	1 056	1 380	16.52	2.79
OCEANIA DEVELOPED	2 912	3 547	14.26	0.89
Australia	1 479	1 818	5.92	1.47
New Zealand	1 433	1 729	36.58	0.31
OTHER DEVELOPED[2]	9 723	10 315	1.03	0.76
Japan	5 600	5 282	-0.59	-0.12
South Africa	1 848	2 231	4.11	1.45
DEVELOPING COUNTRIES	**161 569**	**218 475**	**5.72**	**2.81**
AFRICA	8 841	13 047	4.32	3.62
NORTH AFRICA	5 155	7 929	6.84	4.02
Algeria	1 136	1 862	8.14	4.25
Egypt	2 329	3 797	6.34	4.51
SUB-SAHARAN AFRICA	3 686	5 118	1.49	3.02
LATIN AMERICA and CARIBBEAN	32 186	43 983	5.10	2.80
Argentina	3 044	4 406	20.45	3.03
Brazil	15 600	21 105	4.26	2.87
Chile	1 149	1 452	3.37	2.17
Mexico	4 514	5 592	3.30	1.83
Uruguay	448	801	20.17	4.24
ASIA and PACIFIC	120 542	161 446	6.01	2.74
Bangladesh	713	1 094	6.15	4.56
China[3]	66 212	86 437	7.51	2.52
India	14 152	17 004	3.25	1.73
Indonesia	5 401	9 254	7.39	5.13
Iran, Islamic Republic of	2 909	4 175	11.16	3.83
Korea	4 092	4 704	1.58	1.51
Malaysia	1 826	2 342	3.04	2.63
Pakistan	4 072	5 903	3.44	3.22
Saudi Arabia	617	859	-1.46	2.29
Turkey	3 733	5 669	4.24	3.71
LEAST DEVELOPED COUNTRIES (LDC)	**3 477**	**5 031**	**1.72**	**3.48**
OECD[4]	**110 256**	**124 021**	**0.69**	**0.88**
BRICS	**102 013**	**132 328**	**6.31**	**2.46**

Note: Average 2010-12est: Data for 2012 are estimated.
1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

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Table A.14.1. Vegetable oil projections: Production and trade

Marketing year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WOLRD	**156 234**	**195 658**	**4.62**	**2.01**	**64 207**	**78 226**	**5.66**	**1.93**	**64 072**	**77 321**	**5.24**	**1.95**
DEVELOPED COUNTRIES	**39 787**	**47 722**	**3.82**	**1.85**	**16 455**	**18 208**	**4.41**	**1.24**	**9 688**	**11 736**	**11.90**	**2.64**
NORTH AMERICA	14 922	16 796	1.40	1.17	3 875	3 308	9.57	-2.46	3 997	4 504	10.91	2.12
Canada	3 181	3 590	9.39	1.17	262	232	1.96	-1.21	2 564	2 929	13.10	1.87
United States	11 740	13 206	-0.09	1.17	3 613	3 076	10.38	-2.55	1 433	1 575	7.44	2.61
EUROPE	21 829	27 485	6.37	2.32	10 218	12 483	3.09	2.84	5 442	6 935	12.67	3.02
European Union	14 197	17 164	4.51	1.91	8 209	10 315	2.89	3.42	999	876	2.09	0.19
Russian Federation	3 543	4 160	8.26	2.11	944	1 118	0.96	1.80	1 157	1 408	22.23	2.67
Ukraine	3 645	5 629	14.58	4.01	326	266	6.02	-3.85	3 080	4 420	17.27	4.00
OCEANIA DEVELOPED	461	622	5.33	2.05	488	524	5.50	1.04	138	195	15.90	2.19
Australia	457	617	5.30	2.07	381	416	9.19	1.29	138	194	15.98	2.19
New Zealand	5	5	8.98	0.00	107	108	-2.64	0.12	0	0	-0.60	-0.22
OTHER DEVELOPED[1]	2 574	2 819	-0.27	1.59	1 874	1 894	2.99	-0.78	111	103	5.79	2.15
Japan	1 441	1 166	-2.30	-0.95	730	940	2.60	0.51	1	0	9.08	0.00
South Africa	398	762	3.41	6.57	786	592	3.32	-2.81	86	77	6.30	2.89
DEVELOPING COUNTRIES	**116 447**	**147 936**	**4.90**	**2.07**	**47 752**	**60 018**	**6.13**	**2.15**	**54 384**	**65 585**	**4.34**	**1.83**
AFRICA	5 421	7 213	2.88	2.48	7 322	9 346	6.15	2.83	1 145	645	12.20	-2.66
NORTH AFRICA	763	917	7.42	1.66	2 994	3 423	3.44	1.45	419	292	25.61	-1.57
Algeria	83	102	4.26	1.20	560	691	1.04	1.65	34	20	-6.97	-1.62
Egypt	433	510	10.71	1.40	1 745	2 174	5.70	2.15	319	219	51.50	-2.11
SUB-SAHARAN AFRICA	4 658	6 297	2.28	2.61	4 327	5 924	8.40	3.72	726	353	9.05	-3.48
LATIN AMERICA and CARIBBEAN	21 666	29 507	3.37	2.72	3 913	3 841	4.30	2.00	8 588	11 809	-2.31	4.35
Argentina	8 177	11 516	1.85	3.76	11	13	2.26	-0.11	4 933	7 639	-3.32	5.36
Brazil	7 659	10 524	3.78	2.42	397	486	16.82	1.58	1 849	2 912	-4.90	3.95
Chile	71	95	-0.05	3.98	309	374	2.27	0.90	3	3	-5.24	-0.66
Mexico	1 643	1 772	3.07	0.22	750	927	3.30	4.14	22	0	-15.22	..
Uruguay	83	192	20.32	2.99	80	51	13.04	1.48	2	2	-2.16	-0.62
ASIA and PACIFIC	89 360	111 215	5.43	1.87	36 518	46 831	6.33	2.03	44 651	53 131	5.91	1.41
Bangladesh	218	221	4.14	1.00	1 436	2 120	4.16	2.84	0	0	0.00	-0.20
China[2]	21 320	25 733	5.57	1.68	9 101	11 418	3.52	1.60	119	159	-3.93	-0.98
India	7 258	8 694	1.72	1.76	9 688	14 665	10.26	3.20	69	99	-11.14	-0.52
Indonesia	30 051	38 365	8.80	1.84	74	65	6.93	-0.25	20 969	26 288	8.22	1.64
Iran, Islamic Republic of	302	372	1.76	1.66	1 460	1 470	1.81	1.00	189	93	0.29	-0.99
Korea	250	256	-0.43	0.82	850	953	6.62	0.71	19	5	13.41	0.00
Malaysia	21 080	26 093	3.32	1.97	2 695	2 299	13.01	-1.40	19 510	22 878	4.33	1.42
Pakistan	1 321	1 651	4.57	2.45	2 296	2 943	4.31	2.55	113	0	1.09	-46.34
Saudi Arabia	11	2	-0.15	0.60	386	581	-0.46	3.39	8	1	-16.64	-3.28
Turkey	1 241	1 320	4.12	0.70	1 168	1 391	4.57	1.11	443	399	33.73	-1.09
LEAST DEVELOPED COUNTRIES (LDC)	**2 740**	**3 939**	**1.78**	**3.24**	**4 923**	**6 599**	**5.04**	**2.85**	**256**	**130**	**5.81**	**-2.10**
OECD[3]	**34 342**	**39 311**	**2.61**	**1.37**	**16 832**	**19 263**	**4.73**	**1.58**	**5 695**	**6 058**	**9.27**	**1.55**
BRICS	**40 177**	**49 874**	**4.63**	**1.94**	**20 916**	**28 278**	**6.26**	**2.28**	**3 280**	**4 655**	**-0.02**	**3.21**

Note: Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

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Table A.14.2. Vegetable oil projections: Consumption, per capita food use

Marketing year

	CONSUMPTION (kt)		Growth (%)[1]		PER CAPITA FOOD USE (kg)		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**154 876**	**196 243**	**4.75**	**2.02**	**18.3**	**20.0**	**1.82**	**0.67**
DEVELOPED COUNTRIES	**46 869**	**54 088**	**3.00**	**1.50**	**24.9**	**24.4**	**-0.57**	**-0.05**
NORTH AMERICA	15 163	15 523	1.63	0.08	37.9	32.2	-0.83	-1.01
Canada	903	893	0.77	-1.42	23.9	20.8	-1.73	-0.59
United States	14 260	14 630	1.69	0.18	39.5	33.5	-0.77	-1.03
EUROPE	26 552	33 024	4.16	2.37	21.8	23.3	-0.76	0.46
European Union	21 409	26 597	4.06	2.54	21.9	22.3	-2.74	-0.05
Russian Federation	3 267	3 869	3.43	1.80	22.9	27.6	3.59	1.98
Ukraine	905	1 474	7.52	2.27	19.4	22.8	7.83	0.64
OCEANIA DEVELOPED	809	946	4.10	1.44	26.4	27.0	0.89	0.26
Australia	698	834	5.61	1.63	26.7	27.9	2.00	0.44
New Zealand	111	112	-2.41	0.11	25.1	22.8	-3.51	-0.83
OTHER DEVELOPED[2]	4 345	4 595	1.03	0.59	16.2	16.4	0.26	0.21
Japan	2 180	2 093	-0.67	-0.28	17.2	16.9	-0.69	-0.08
South Africa	1 105	1 275	3.31	1.35	20.3	22.0	1.44	0.82
DEVELOPING COUNTRIES	**108 007**	**142 155**	**5.59**	**2.23**	**16.7**	**19.0**	**2.98**	**0.95**
AFRICA	11 557	15 900	4.10	2.97	11.4	12.2	1.57	0.68
NORTH AFRICA	3 333	4 039	3.06	1.76	19.7	20.7	1.50	0.52
Algeria	611	772	1.97	1.72	16.8	18.7	0.45	0.57
Egypt	1 854	2 458	4.89	2.48	22.2	25.0	3.04	1.02
SUB-SAHARAN AFRICA	8 224	11 861	4.55	3.42	9.7	10.7	1.78	0.93
LATIN AMERICA and CARIBBEAN	16 581	21 592	7.59	1.85	19.2	22.3	1.24	0.76
Argentina	3 071	3 959	18.86	1.72	23.4	23.9	-0.31	0.22
Brazil	6 035	8 089	8.45	1.75	20.1	26.6	1.26	0.99
Chile	375	466	1.62	1.47	21.5	24.6	0.64	0.73
Mexico	2 347	2 699	3.39	1.22	20.4	21.1	2.11	0.26
Uruguay	161	241	16.94	2.64	16.0	17.7	2.21	0.59
ASIA and PACIFIC	79 869	104 663	5.44	2.20	17.7	20.5	3.61	1.15
Bangladesh	1 646	2 337	4.19	2.68	10.8	13.6	2.96	1.56
China[3]	29 828	36 919	4.60	1.64	21.9	26.3	4.06	1.37
India	16 919	23 244	6.25	2.66	13.3	16.0	4.61	1.41
Indonesia	8 801	12 031	9.75	2.40	19.1	22.3	2.67	1.16
Iran, Islamic Republic of	1 544	1 746	1.76	1.27	20.4	21.1	0.58	0.47
Korea	1 079	1 204	4.36	0.73	22.3	24.1	3.87	0.45
Malaysia	3 912	5 483	3.48	2.68	23.6	26.6	3.16	0.81
Pakistan	3 492	4 615	4.58	2.53	19.4	20.3	2.56	0.60
Saudi Arabia	392	582	0.52	3.39	13.8	16.7	-2.19	1.50
Turkey	1 912	2 307	1.92	1.37	25.5	27.6	0.59	0.40
LEAST DEVELOPED COUNTRIES (LDC)	**7 388**	**10 400**	**3.72**	**3.08**	**8.5**	**9.5**	**1.30**	**0.94**
OECD[4]	**45 764**	**52 410**	**2.86**	**1.44**	**26.0**	**25.1**	**-0.97**	**-0.25**
BRICS	**57 154**	**73 396**	**5.34**	**1.97**	**18.3**	**21.8**	**3.80**	**1.27**

Note: Average 2010-12est: Data for 2012 are estimated.
1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861472

Table A.15. Main policy assumptions for oilseed markets

Crop year

		Average 2010/11-2012/13est	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
ARGENTINA												
Oilseed export tax	%	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Protein meal export tax	%	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0
Oilseed oil export tax	%	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0
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												
Single farm payment[1]	EUR/ha	187.9	187.9	187.9	187.9	187.9	187.9	187.9	187.9	187.9	187.9	187.9
Tariffs												
Soybean oil	%	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Rapeseed oil	%	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
JAPAN												
New output payments												
Soybeans	JPY/kg	188.5	188.5	188.5	188.5	188.5	188.5	188.5	188.5	188.5	188.5	188.5
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	156	146	141	138	134	130	127	123	119	115	112
MEXICO												
Tariffs												
Soybeans	%	33	33	33	33	33	33	33	33	33	33	33
Soybeans meal	%	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
Soybeans oil	%	45	45	45	45	45	45	45	45	45	45	45
UNITED STATES												
ACRE participation rate												
Soybeans	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Soybeans loan rate	USD/t	183.7	183.7	183.7	183.7	183.7	183.7	183.7	183.7	183.7	183.7	183.7
CRP area												
Soybeans	mha	1.8	1.7	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Tariffs												
Rapeseed	%	3	3	3	3	3	3	3	3	3	3	3
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
Subsidised export limits												
Oilseed oils	kt	141	141	141	141	141	141	141	141	141	142	142
CHINA												
Tariffs												
Soybeans	%	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												
Input subsidy rate, oilseeds[2]	INR/t	4 888.3	4 888.3	4 888.3	4 888.3	4 888.3	4 888.3	4 888.3	4 888.3	4 888.3	4 888.3	4 888.3
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
Sunflower tariff	%	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Oilseed 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	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Rapeseed meal tariff	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sunflower meal tariff	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Soybean oil tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rapeseed oil tariff	%	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Sunflower oil tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palm oil tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note: Beginning crop marketing year - see Glossary of Terms for definitions.

The source for tariffs and Tariff Rate Quotas is AMAD (Agricultural market access database). The tariff and TRQ data are based on Most Favoured Nation rates scheduled with the WTO and exclude those under preferential or regional agreements, which may be substantially different. Tariffs are simple averages of several product lines. Specific rates are converted to ad valorem rates using world prices in the Outlook. Import quotas are based on global commitments scheduled in the WTO rather than those allocated to preferential partners under regional or other agreements. For Mexico, the NAFTA tariffs on soybeans, oil meals and soybean oil are zero after 2003.

Average 2010/11-2012/13est: Data for 2012/13 are estimated.

1. EU average payment per hectare after modulation. Actual payments are made per eligible hectare based on historical reference or regional average and can differ significantly from EU average.
2. Indian input subsidies consist of those for electricty, fertiliser and irrigation.

Source: OECD and FAO Secretariats.

StatLink *http://dx.doi.org/10.1787/888932861491*

Table A.16. World sugar projections

Crop year

		Average 2010/11-2012/13est	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
WORLD												
SUGARBEET												
Production	mt	251.7	247.7	248.3	251.5	253.2	258.6	261.9	264.8	267.6	270.0	272.5
Area	mha	4.9	4.7	4.6	4.6	4.6	4.6	4.7	4.7	4.7	4.7	4.7
Yield	t/ha	51.3	53.0	53.9	54.4	54.9	55.7	56.3	56.8	57.3	57.7	58.1
Biofuel use	mt	14.3	14.6	15.1	15.1	15.2	15.6	15.9	16.3	16.7	16.9	17.2
SUGARCANE												
Production	mt	1 703.9	1 741.3	1 786.1	1 766.8	1 820.9	1 925.3	1 878.6	1 932.2	1 952.1	1 985.4	1 996.2
Area	mha	24.3	24.9	24.9	24.5	25.2	26.9	26.3	26.7	27.0	27.2	27.3
Yield	t/ha	70.1	70.0	71.7	72.1	72.3	71.6	71.5	72.4	72.4	73.0	73.1
Biofuel use	mt	290.7	334.4	416.2	443.2	470.2	519.7	529.4	545.2	552.0	572.9	568.7
SUGAR												
Production	mt rse	173.7	180.5	182.9	182.4	190.3	195.3	194.7	200.2	203.7	207.9	212.2
Consumption	mt rse	164.8	173.1	176.4	179.0	182.6	186.4	188.9	192.7	196.8	200.5	204.2
Closing stocks	mt rse	64.3	70.7	70.8	67.7	68.9	71.3	70.6	71.5	71.8	72.6	73.9
Price, raw sugar[1]	USD/t	522.7	410.2	408.0	432.4	414.0	413.4	437.8	444.5	441.8	442.8	438.7
Price, white sugar[2]	USD/t	621.0	498.8	503.7	530.7	512.5	507.4	538.7	545.2	541.3	540.6	536.4
Price, HFCS[3]	USD/t	524.4	340.8	388.4	431.2	442.2	405.1	374.0	363.0	369.7	365.9	357.1
DEVELOPED COUNTRIES												
SUGARBEET												
Production	mt	195.8	190.5	189.6	191.6	191.6	195.5	197.1	198.0	199.0	199.4	199.9
SUGARCANE												
Production	mt	72.2	77.6	77.9	78.2	79.7	78.8	80.1	79.5	81.2	80.9	82.2
SUGAR												
Production	mt rse	41.2	41.8	41.6	42.2	42.6	43.2	43.8	44.0	44.5	44.7	45.1
Consumption	mt rse	49.3	49.6	49.9	49.8	50.1	50.2	50.3	50.4	50.6	50.7	50.6
Closing stocks	mt rse	17.2	19.7	19.8	18.2	17.8	18.2	18.2	18.3	18.4	18.2	18.2
HFCS												
Production	mt	11.7	11.6	11.6	12.1	12.3	12.6	12.7	12.8	13.0	13.1	13.3
Consumption	mt	10.2	10.0	9.9	10.1	10.4	10.6	10.6	10.7	10.8	10.7	10.7
DEVELOPING COUNTRIES												
SUGARBEET												
Production	mt	55.9	57.3	58.6	59.9	61.6	63.1	64.7	66.8	68.7	70.6	72.6
SUGARCANE												
Production	mt	1 631.7	1 663.7	1 708.2	1 688.6	1 741.2	1 846.5	1 798.5	1 852.6	1 870.9	1 904.6	1 914.0
SUGAR												
Production	mt rse	132.6	138.7	141.3	140.2	147.7	152.1	150.9	156.2	159.2	163.3	167.1
Consumption	mt rse	115.5	123.6	126.5	129.2	132.5	136.2	138.6	142.3	146.2	149.8	153.6
Closing stocks	mt rse	47.1	51.0	51.0	49.5	51.1	53.1	52.5	53.2	53.4	54.4	55.7
HFCS												
Production	mt	2.5	2.6	2.6	2.7	2.7	2.8	2.9	3.0	3.0	3.0	3.1
Consumption	mt	3.7	3.9	3.9	4.2	4.3	4.5	4.6	4.8	4.9	5.1	5.3
OECD[4]												
SUGARBEET												
Production	mt	163.7	163.3	162.5	165.1	164.8	168.2	168.9	168.7	168.9	168.3	168.0
SUGARCANE												
Production	mt	108.5	118.7	116.8	116.0	118.5	118.8	121.8	121.7	124.0	124.1	125.7
SUGAR												
Production	mt rse	39.1	40.7	40.1	40.6	41.0	41.5	42.0	41.9	42.2	42.1	42.3
Consumption	mt rse	44.5	44.9	45.4	45.2	45.5	45.4	45.5	45.6	45.9	46.1	46.0
Closing stocks	mt rse	14.9	17.0	16.6	15.0	14.5	14.9	15.0	15.2	15.1	14.7	14.6
HFCS												
Production	mt	12.9	12.8	12.7	13.3	13.6	13.9	14.0	14.2	14.4	14.6	14.7
Consumption	mt	12.5	12.3	12.3	12.8	13.1	13.4	13.5	13.7	13.9	13.9	14.0

Note: Crop year: Beginning crop marketing year (Oct/Sept)- see the Glossary of Terms for definitions.
rse : raw sugar equivalent.
HFCS: High fructose corn syrup
Average 2010/11-2012/13est: Data for 2012/13 are estimated.

1. Raw sugar world price, ICE contract No11 nearby, October/September.
2. Refined sugar price, White Sugar Futures Contract No. 407, Euronext market, Liffe, London, Europe, October/September.
3. United States wholesale list price HFCS-55 , October/September.
4. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861510

Table A.17.1. Sugar projections: Production and trade

Crop year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**173 721**	**212 197**	**2.32**	**1.87**	**49 741**	**56 710**	**1.81**	**1.40**	**54 696**	**63 091**	**1.69**	**1.25**
DEVELOPED COUNTRIES	**41 158**	**45 056**	**-0.76**	**0.93**	**16 035**	**12 909**	**-1.05**	**-1.64**	**6 537**	**7 354**	**-9.43**	**1.20**
NORTH AMERICA	7 826	8 129	0.62	0.31	4 634	4 163	5.31	-0.05	266	230	2.72	0.00
Canada	108	104	0.59	-0.23	1 310	1 361	0.00	0.09	57	70	11.48	0.00
United States	7 718	8 025	0.63	0.32	3 324	2 802	8.27	-0.11	209	160	0.70	0.00
EUROPE	26 472	28 376	-0.44	1.04	6 522	3 309	-4.57	-6.01	2 861	2 994	-12.57	1.62
European Union	17 826	17 893	-2.61	0.16	3 929	1 613	3.51	-6.40	1 859	1 260	-15.86	-2.98
Russian Federation	4 717	5 313	8.86	2.21	1 478	818	-14.94	-8.45	121	150	-6.85	0.00
Ukraine	2 223	2 901	1.22	3.60	110	10	-18.75	-14.68	143	639	-3.47	17.58
OCEANIA DEVELOPED	4 004	5 007	-3.61	1.11	294	261	1.09	0.75	2 916	3 841	-4.33	1.38
Australia	4 004	5 007	-3.61	1.11	51	10	14.27	0.00	2 899	3 836	-4.33	1.38
New Zealand	0	0	..	..	243	251	-0.70	0.78	17	5	-7.57	0.00
OTHER DEVELOPED[1]	2 856	3 544	-2.35	1.39	4 585	5 175	-0.66	0.89	495	290	-15.68	-2.68
Japan	784	952	-2.28	1.40	1 386	1 206	-0.59	-2.99	4	5	4.81	0.00
South Africa	1 949	2 448	-2.33	1.36	343	306	2.21	2.64	293	212	-16.38	-2.57
DEVELOPING COUNTRIES	**132 563**	**167 140**	**3.47**	**2.14**	**33 706**	**43 801**	**3.33**	**2.52**	**48 158**	**55 737**	**4.64**	**1.26**
AFRICA	8 271	11 797	2.03	3.09	9 418	13 453	2.55	3.38	2 708	3 343	0.62	1.41
NORTH AFRICA	2 295	2 781	1.27	2.17	4 196	5 218	1.91	1.87	320	251	15.75	-0.74
Algeria	0	0	..	..	1 513	2 011	2.14	2.14	247	242	112.17	-0.30
Egypt	2 008	2 499	3.62	2.23	1 135	1 341	0.50	1.81	73	8	-4.07	-8.42
SUB-SAHARAN AFRICA	5 976	9 016	2.31	3.39	5 222	8 235	3.12	4.46	2 388	3 092	-0.40	1.61
LATIN AMERICA and CARIBBEAN	58 290	71 350	2.88	1.27	2 590	2 721	3.99	1.92	31 880	38 256	4.40	0.87
Argentina	2 044	2 459	0.21	1.00	22	5	17.53	0.00	199	377	-5.22	-2.37
Brazil	37 874	48 207	4.50	1.63	0	0	..	..	24 927	31 968	5.30	1.69
Chile	340	411	-2.40	3.01	496	641	9.43	3.42	0	0	0.00	-0.24
Mexico	5 607	6 643	-0.09	0.81	273	50	6.54	-0.03	1 452	1 624	28.02	-0.40
Uruguay	20	32	16.77	4.79	112	137	-1.83	0.86	3	9	-33.46	-0.85
ASIA and PACIFIC	66 003	83 993	4.27	2.80	21 699	27 627	3.61	2.20	13 570	14 137	6.21	2.40
Bangladesh	137	160	-1.89	0.71	1 498	2 518	6.91	3.50	83	227	31.21	-4.20
China[2]	12 828	16 467	2.88	2.75	2 963	2 570	11.77	-0.51	60	33	-12.10	-3.03
India	27 249	31 848	6.15	2.28	505	1 436	68.56	44.93	2 571	211	27.09	3.82
Indonesia	2 525	3 570	1.56	3.23	2 950	4 009	5.98	2.47	0	0	-6.90	-0.18
Iran, Islamic Republic of	1 050	1 433	-3.49	2.08	1 407	1 876	5.99	3.09	48	0	-11.64	-0.01
Korea	0	0	..	..	1 664	2 064	0.65	2.17	344	468	0.23	4.10
Malaysia	28	54	-13.62	2.80	1 624	2 057	1.27	2.69	165	78	-5.69	-2.62
Pakistan	4 943	7 063	3.59	2.86	192	24	-3.29	-6.17	126	308	12.28	3.78
Saudi Arabia	0	0	..	..	1 301	1 936	5.06	3.22	250	335	9.58	2.01
Thaïland	10 077	13 768	6.86	4.00	10	5	34.62	-0.44	6 971	10 094	8.98	4.59
Turkey	2 449	2 944	3.06	2.35	67	258	32.23	-1.90	45	12	-9.74	1.28
LEAST DEVELOPED COUNTRIES (LDC)	**4 177**	**7 016**	**4.23**	**4.22**	**5 586**	**7 995**	**5.45**	**3.00**	**1 213**	**2 057**	**4.91**	**1.31**
OECD[3]	**39 097**	**42 255**	**-1.44**	**0.59**	**13 504**	**10 975**	**2.83**	**-1.18**	**6 896**	**7 445**	**-6.82**	**0.10**
BRICS	**84 617**	**104 284**	**4.68**	**2.01**	**5 289**	**5 131**	**-0.83**	**-0.95**	**27 972**	**32 576**	**5.05**	**1.38**

Note: Crop year: Beginning crop marketing year (Oct/Sept) - see Glossary of Terms for definitions. Sugar data are expressed in raw sugar equivalent.

Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

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Table A.17.2. Sugar projections: Consumption, per capita

Crop year

	CONSUMPTION (kt)		Growth (%)[1]		PER CAPITA (kg)		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**164 796**	**204 189**	**1.84**	**1.85**	**23.6**	**26.2**	**0.66**	**0.84**
DEVELOPED COUNTRIES	**49 287**	**50 596**	**0.40**	**0.23**	**35.8**	**35.3**	**-0.06**	**-0.10**
NORTH AMERICA	11 714	12 110	1.65	0.08	33.7	31.9	0.73	-0.72
Canada	1 385	1 396	0.86	0.07	40.3	37.0	-0.18	-0.77
United States	10 329	10 715	1.76	0.08	33.0	31.3	0.85	-0.71
EUROPE	29 189	28 726	-0.26	-0.07	39.4	38.4	-0.46	-0.13
European Union	19 290	18 334	0.45	-0.29	38.3	35.6	0.06	-0.48
Russian Federation	5 906	5 975	-1.76	-0.11	41.3	42.6	-1.61	0.06
Ukraine	2 022	2 243	-2.01	1.02	44.7	52.7	-1.38	1.57
OCEANIA DEVELOPED	1 285	1 385	-0.06	0.95	47.6	45.1	-1.62	-0.19
Australia	1 060	1 138	-0.02	0.94	46.9	44.1	-1.66	-0.24
New Zealand	225	246	-0.25	1.03	51.0	50.2	-1.38	0.08
OTHER DEVELOPED[2]	7 098	8 374	1.37	1.47	27.0	30.7	0.83	1.13
Japan	2 228	2 156	-0.79	-0.24	17.6	17.4	-0.82	-0.04
South Africa	2 045	2 485	3.89	1.51	40.5	46.8	2.91	1.07
DEVELOPING COUNTRIES	**115 510**	**153 593**	**2.49**	**2.45**	**20.6**	**24.1**	**1.13**	**1.28**
AFRICA	14 855	21 424	2.76	3.25	14.9	16.7	0.35	0.94
NORTH AFRICA	6 244	7 667	1.67	1.74	37.2	39.8	0.13	0.49
Algeria	1 345	1 751	2.07	2.38	37.4	42.7	0.55	1.22
Egypt	3 075	3 811	2.18	1.88	37.3	39.2	0.37	0.41
SUB-SAHARAN AFRICA	8 611	13 757	3.62	4.20	10.4	12.7	1.00	1.67
LATIN AMERICA and CARIBBEAN	29 090	35 706	1.13	1.60	48.8	53.8	-0.04	0.66
Argentina	1 784	2 108	1.00	1.50	43.8	47.4	0.12	0.71
Brazil	13 414	16 254	2.05	1.51	68.2	76.3	1.07	0.81
Chile	807	1 021	2.40	2.18	46.7	54.4	1.41	1.43
Mexico	4 380	5 118	-2.12	0.92	38.2	40.0	-3.33	-0.04
Uruguay	130	159	1.59	1.59	38.4	45.3	1.34	1.21
ASIA and PACIFIC	71 564	96 464	3.04	2.61	17.9	21.8	1.89	1.71
Bangladesh	1 477	2 420	8.16	4.43	9.8	14.2	6.89	3.28
China[3]	15 058	19 053	3.61	2.22	11.2	13.7	3.09	1.96
India	23 695	32 771	2.84	2.74	19.1	23.1	1.38	1.54
Indonesia	5 523	7 569	4.48	2.82	22.8	28.4	3.35	1.97
Iran, Islamic Republic of	2 475	3 265	2.42	2.48	33.1	39.8	1.22	1.68
Korea	1 318	1 604	0.77	1.76	27.2	32.1	0.30	1.48
Malaysia	1 487	2 000	2.86	2.68	51.5	59.0	1.10	1.22
Pakistan	4 910	6 740	2.76	2.66	27.8	31.9	0.93	1.03
Saudi Arabia	1 035	1 541	4.49	3.55	36.9	44.5	1.67	1.64
Thailand	2 833	3 643	2.74	2.29	40.8	50.3	1.99	1.95
Turkey	2 492	3 183	3.84	1.96	33.8	38.8	2.50	1.00
LEAST DEVELOPED COUNTRIES (LDC)	**8 296**	**12 653**	**5.55**	**3.74**	**9.7**	**11.7**	**3.22**	**1.55**
OECD[4]	**44 534**	**45 953**	**0.55**	**0.25**	**34.8**	**34.0**	**-0.12**	**-0.24**
BRICS	**60 117**	**76 538**	**2.34**	**2.06**	**20.2**	**23.8**	**1.44**	**1.38**

Note: Crop year: Beginning crop marketing year (Oct/Sept) - see Glossary of Terms for definitions. Sugar data are expressed in raw sugar equivalent.

Average 2010-12est: Data for 2012 are estimated.

1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861548

Table A.18. Main policy assumptions for sugar markets

Crop year

		Average 2010/11-2012/13est	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
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
BANGLADESH												
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
BRAZIL												
Tariff, raw sugar	%	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Tariff, white sugar	%	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
CANADA												
Tariff, raw sugar	CAD/t	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7
Tariff, white sugar	CAD/t	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9
CHINA[1]												
TRQ sugar	kt	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0	1 954.0
In-quota tariff, raw sugar	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
In-quota tariff, white sugar	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Tariff, over-quota	%	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
EUROPEAN UNION												
Reference price, white sugar	EUR/t	404.4	404.4	404.4	404.4	404.4	404.4	404.4	404.4	404.4	404.4	404.4
Production quota[2]	mt wse	13.3	13.3	13.3	..	..	..	..	..	..	..	..
WTO export limit	kt wse	1 374.4	1 374.4	1 374.4	1 374.4	1 374.4	1 374.4	1 374.4	1 374.4	1 374.4	1 374.4	1 374.4
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												
Intervention price, sugarcane	INR/t	1 516.7	2 100.0	2 100.0	2 100.0	2 100.0	2 100.0	2 100.0	2 100.0	2 100.0	2 100.0	2 100.0
Applied tariff, raw sugar	%	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
INDONESIA												
Tariff, white sugar	%	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
JAPAN												
Minimum stabilisation price, raw sugar	JPY/kg	153.0	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2
Tariff, raw sugar	JPY/kg	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8	71.8
Tariff, white sugar	JPY/kg	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1
KOREA												
Tariff, raw sugar	%	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
MEXICO												
Mexico common external tariff, raw sugar	MXN/t	4 318.1	4 478.4	4 478.4	4 540.0	4 587.1	4 625.7	4 659.7	4 691.8	4 723.6	4 743.6	4 761.9
Mexico common external tariff, white sugar	MXN/t	4 557.0	4 726.2	4 726.2	4 791.2	4 841.0	4 881.7	4 917.5	4 951.5	4 985.0	5 006.1	5 025.4
RUSSIAN FEDERATION												
Minimum tariff, raw sugar	USD/t	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0
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	411.5	413.4	413.4	413.4	413.4	413.4	413.4	413.4	413.4	413.4	413.4
Loan rate, white sugar	USD/t	528.8	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	1 560	1 413	1 416	1 419	1 424	1 427	1 431	1 434	1 435	1 436	1 437
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
SOUTH AFRICA												
Tariff, raw sugar	%	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0
TANZANIA												
Applied tariff, white sugar	%	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
VIETNAM												
Applied tariff, white sugar	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0

Note: Crop year: Beginning crop marketing year - see the Glossary of Terms for definitions.

The source for tariffs (except United States and Russia) is AMAD. The source for Russia and United States tariffs is ERS, USDA.

Average 2010/11-2012/13est: Data for 2012/13 are estimated.

1. Refers to mainland only.
2. Production that receives official support.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861567

Table A.19. World meat projections

Calendar year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
WORLD												
BEEF AND VEAL												
Production	kt cwe	66 891	67 212	67 955	68 934	70 066	71 180	72 438	73 485	74 440	75 422	76 531
Consumption	kt cwe	66 404	67 071	67 744	68 726	69 830	70 947	72 220	73 273	74 218	75 196	76 310
PIGMEAT												
Production	kt cwe	109 793	111 853	113 963	115 944	118 146	119 458	121 172	122 537	123 965	125 322	126 731
Consumption	kt cwe	109 456	111 717	113 830	115 800	117 997	119 319	121 038	122 404	123 821	125 168	126 576
POULTRY MEAT												
Production	kt rtc	103 257	108 354	110 519	113 144	115 388	117 763	120 001	121 975	124 289	126 502	128 669
Consumption	kt rtc	103 132	108 084	110 225	112 848	115 088	117 471	119 709	121 685	123 999	126 212	128 377
SHEEP MEAT												
Production	kt cwe	13 854	14 102	14 331	14 332	14 620	14 683	14 952	15 125	15 351	15 569	15 782
Consumption	kt cwe	13 804	14 084	14 316	14 315	14 607	14 670	14 939	15 112	15 341	15 559	15 774
TOTAL MEAT												
Per capita consumption[1]	kg rwt	33.7	33.9	34.1	34.4	34.6	34.8	35.1	35.2	35.4	35.6	35.8
DEVELOPED COUNTRIES												
BEEF AND VEAL												
Production	kt cwe	29 482	28 720	28 743	28 888	29 424	29 687	30 112	30 362	30 609	30 695	30 876
Consumption	kt cwe	29 528	28 974	29 001	29 192	29 615	29 833	30 255	30 447	30 637	30 666	30 792
PIGMEAT												
Production	kt cwe	41 903	41 584	42 085	42 651	43 383	43 358	43 585	43 769	44 009	44 258	44 499
Consumption	kt cwe	39 647	39 059	39 684	40 196	40 862	40 826	41 041	41 205	41 396	41 530	41 721
POULTRY MEAT												
Production	kt rtc	42 330	43 278	43 743	44 558	45 309	46 060	46 694	47 178	47 875	48 453	49 078
Consumption	kt rtc	40 502	41 186	41 642	42 412	42 976	43 658	44 177	44 502	45 110	45 555	46 009
SHEEP MEAT												
Production	kt cwe	3 179	3 226	3 241	3 249	3 278	3 294	3 318	3 346	3 364	3 400	3 418
Consumption	kt cwe	2 713	2 733	2 732	2 723	2 741	2 748	2 755	2 765	2 774	2 797	2 800
TOTAL MEAT												
Per capita consumption[1]	kg rwt	65.0	64.3	64.8	65.4	66.1	66.4	66.8	67.0	67.4	67.5	67.8
DEVELOPING COUNTRIES												
BEEF AND VEAL												
Production	kt cwe	37 219	38 492	39 211	40 046	40 642	41 493	42 326	43 123	43 832	44 728	45 655
Consumption	kt cwe	36 876	38 097	38 742	39 534	40 215	41 115	41 966	42 825	43 581	44 531	45 518
PIGMEAT												
Production	kt cwe	67 890	70 270	71 878	73 293	74 763	76 101	77 587	78 768	79 956	81 064	82 232
Consumption	kt cwe	69 808	72 658	74 146	75 605	77 135	78 493	79 997	81 199	82 425	83 638	84 856
POULTRY MEAT												
Production	kt rtc	60 927	65 077	66 776	68 586	70 079	71 702	73 307	74 797	76 414	78 048	79 592
Consumption	kt rtc	62 630	66 898	68 583	70 435	72 111	73 813	75 531	77 183	78 889	80 657	82 368
SHEEP MEAT												
Production	kt cwe	10 675	10 876	11 089	11 082	11 342	11 389	11 634	11 779	11 987	12 169	12 364
Consumption	kt cwe	11 091	11 350	11 584	11 592	11 866	11 922	12 185	12 347	12 567	12 762	12 974
TOTAL MEAT												
Per capita consumption[1]	kg rwt	25.9	26.5	26.7	27.0	27.2	27.4	27.7	27.9	28.1	28.3	28.6
OECD[2]												
BEEF AND VEAL												
Production	kt cwe	27 117	25 983	25 961	26 047	26 513	26 689	27 046	27 228	27 402	27 434	27 542
Consumption	kt cwe	26 335	25 767	25 786	25 959	26 376	26 568	26 942	27 102	27 264	27 281	27 384
PIGMEAT												
Production	kt cwe	40 057	39 621	40 071	40 554	41 243	41 191	41 404	41 552	41 773	42 035	42 265
Consumption	kt cwe	37 207	36 536	36 925	37 371	38 000	37 943	38 148	38 268	38 414	38 531	38 688
POULTRY MEAT												
Production	kt rtc	41 785	42 459	42 839	43 573	44 201	44 885	45 537	45 956	46 573	47 086	47 650
Consumption	kt rtc	38 967	39 489	39 816	40 448	40 866	41 455	41 975	42 253	42 780	43 134	43 496
SHEEP MEAT												
Production	kt cwe	2 507	2 522	2 529	2 537	2 546	2 550	2 558	2 571	2 581	2 599	2 608
Consumption	kt cwe	2 055	2 039	2 017	2 007	2 004	2 001	1 990	1 982	1 983	1 987	1 981
TOTAL MEAT												
Per capita consumption[1]	kg rwt	65.4	64.2	64.3	64.8	65.3	65.5	65.8	65.8	66.0	66.1	66.2

Note: Calendar Year: Year ending 30 September for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Per capita consumption expressed in retail weight. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pigmeat and 0.88 for both sheep meat and poultry meat.
2. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

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Table A.20.1. 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 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**66 891**	**76 531**	**1.23**	**1.49**	**7 429**	**9 333**	**2.83**	**2.02**	**7 934**	**9 369**	**1.44**	**1.87**
DEVELOPED COUNTRIES	**29 482**	**30 876**	**-0.01**	**0.92**	**3 452**	**4 042**	**-1.33**	**0.86**	**3 737**	**4 350**	**1.30**	**1.49**
NORTH AMERICA	12 775	13 012	0.02	1.12	1 278	1 821	-3.93	1.50	1 547	2 043	5.03	2.53
Canada	1 398	1 486	-3.63	0.25	233	260	4.83	0.96	405	476	-3.56	0.59
United States	11 377	11 527	0.55	1.24	1 044	1 561	-5.10	1.59	1 142	1 567	12.98	3.26
EUROPE	10 891	11 238	-0.85	0.57	1 251	1 112	0.52	-0.99	458	396	-2.68	2.30
European Union	8 092	7 958	-0.42	0.20	291	371	-8.74	2.78	259	171	-4.69	2.83
Russian Federation	1 655	2 089	-2.04	1.96	855	637	6.25	-2.87	0	0	..	..
Ukraine	407	369	-6.28	-0.32	8	20	-4.19	3.99	13	3	-23.95	-6.65
OCEANIA DEVELOPED	2 771	3 024	0.12	0.60	11	9	-3.69	0.00	1 717	1 895	0.04	0.34
Australia	2 135	2 405	0.40	1.00	5	3	-1.14	0.00	1 200	1 405	0.48	0.95
New Zealand	636	619	-0.78	-0.81	6	6	-3.30	0.00	517	490	-0.94	-1.24
OTHER DEVELOPED[1]	3 045	3 602	3.29	1.62	912	1 100	0.77	1.91	15	15	2.77	0.58
Japan	512	505	0.35	0.00	734	797	0.73	0.61	1	1	39.47	0.00
South Africa	915	1 105	4.60	1.69	10	9	-8.87	-0.82	10	11	0.63	0.83
DEVELOPING COUNTRIES	**37 219**	**45 655**	**2.30**	**1.90**	**3 977**	**5 291**	**8.03**	**3.01**	**4 007**	**5 019**	**1.89**	**2.22**
AFRICA	4 818	6 552	2.57	3.31	542	853	4.24	5.70	70	13	4.57	-13.07
NORTH AFRICA	1 096	1 271	3.19	1.95	359	504	4.82	4.04	1	1	4.45	-0.35
Algeria	127	159	2.16	1.93	75	109	0.50	2.73	0	0	-20.83	-0.19
Egypt	719	783	3.63	1.88	251	378	5.93	4.40	1	1	1.74	-0.34
SUB-SAHARAN AFRICA	3 722	5 282	2.39	3.67	183	349	3.23	8.73	69	11	4.55	-13.97
LATIN AMERICA and CARIBBEAN	17 829	21 025	1.73	1.61	902	988	4.03	1.23	2 405	3 047	-2.28	3.06
Argentina	2 571	3 215	-1.33	1.97	5	10	-5.05	3.55	249	527	-10.05	7.62
Brazil	9 740	11 027	2.37	1.16	38	95	-1.90	0.53	1 307	1 577	-4.27	2.65
Chile	197	214	-0.74	1.20	171	188	0.39	1.00	10	6	-5.31	-0.91
Mexico	1 769	1 959	2.18	1.03	291	301	-2.08	0.10	110	74	22.27	-6.34
Uruguay	548	661	0.95	2.72	0	0	-18.03	-0.26	312	459	-0.05	3.40
ASIA and PACIFIC	14 572	18 078	2.94	1.77	2 533	3 450	11.07	2.98	1 532	1 959	13.50	1.27
Bangladesh	197	220	0.85	0.95	0	0	9.49	7.72	0	0	-16.61	-6.96
China[2]	6 483	7 546	2.18	1.67	79	176	49.33	8.19	88	85	1.47	1.16
India	2 934	4 163	3.55	2.13	1	1	29.09	-0.92	1 174	1 635	13.24	1.88
Indonesia	481	684	3.24	1.99	89	123	22.57	7.81	1	1	-9.18	-0.62
Iran, Islamic Republic of	410	468	2.53	1.22	176	83	16.46	2.02	1	2	40.14	-0.19
Korea	292	378	6.82	2.59	385	425	4.59	-0.06	3	3	9.07	0.00
Malaysia	12	17	-1.11	2.83	160	203	0.91	1.91	8	7	16.15	-1.88
Pakistan	1 476	1 774	5.57	1.67	3	3	36.83	2.56	26	17	45.38	-8.92
Saudi Arabia	38	29	10.83	-2.86	163	217	10.53	2.08	14	8	3.34	-2.04
Turkey	236	221	-4.64	0.48	2	1	86.01	6.12	13	1	42.23	-36.49
LEAST DEVELOPED COUNTRIES (LDC)	**3 593**	**5 104**	**2.17**	**3.62**	**167**	**325**	**6.94**	**7.22**	**4**	**2**	**4.59**	**-2.05**
OECD[3]	**27 117**	**27 542**	**0.05**	**0.76**	**3 292**	**4 081**	**-2.27**	**1.15**	**3 853**	**4 196**	**1.81**	**1.19**
BRICS	**21 727**	**25 930**	**2.15**	**1.54**	**984**	**919**	**6.58**	**-1.09**	**2 580**	**3 308**	**1.28**	**2.21**

Note: Calendar year: Year ending 30 September for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Gross indigenous production.
5. Least-squares growth rate (see glossary).
6. Excludes trade of live animals.

Source: OECD and FAO Secretariats.

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Table A.20.2. Beef and veal projections: Consumption, per capita

Calendar year

	CONSUMPTION (kt cwe)		Growth (%)[1]		PER CAPITA (kg rwt)[5]		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**66 404**	**76 310**	**1.35**	**1.49**	**6.7**	**6.8**	**0.18**	**0.48**
DEVELOPED COUNTRIES	**29 528**	**30 792**	**-0.25**	**0.78**	**15.0**	**15.1**	**-0.72**	**0.44**
NORTH AMERICA	12 857	13 068	-0.80	0.91	25.9	24.1	-1.70	0.10
Canada	992	981	-0.57	-0.01	20.2	18.2	-1.60	-0.85
United States	11 865	12 087	-0.82	0.99	26.5	24.7	-1.70	0.19
EUROPE	11 833	12 030	-0.49	0.29	11.2	11.3	-0.68	0.23
European Union	7 978	8 100	-0.82	0.37	11.1	11.0	-1.20	0.17
Russian Federation	2 783	2 842	1.39	0.02	13.6	14.2	1.55	0.20
Ukraine	403	386	-4.68	-0.07	6.2	6.3	-4.06	0.47
OCEANIA DEVELOPED	861	931	-0.60	0.83	22.3	21.2	-2.15	-0.32
Australia	740	813	-0.73	0.94	22.9	22.1	-2.37	-0.24
New Zealand	121	118	0.43	0.10	19.1	16.8	-0.70	-0.84
OTHER DEVELOPED[2]	3 978	4 764	2.61	1.70	10.6	12.2	2.06	1.36
Japan	1 236	1 300	0.29	0.38	6.8	7.3	0.27	0.58
South Africa	906	1 093	4.20	1.70	12.6	14.4	3.22	1.25
DEVELOPING COUNTRIES	**36 876**	**45 518**	**2.79**	**2.00**	**4.6**	**5.0**	**1.42**	**0.83**
AFRICA	5 322	7 415	2.69	3.62	3.7	4.1	0.28	1.29
NORTH AFRICA	1 508	1 821	3.72	2.42	6.3	6.6	2.15	1.16
Algeria	210	276	0.93	2.17	4.1	4.7	-0.57	1.02
Egypt	1 004	1 191	4.43	2.55	8.5	8.6	2.58	1.07
SUB-SAHARAN AFRICA	3 814	5 595	2.31	4.04	3.2	3.6	-0.27	1.51
LATIN AMERICA and CARIBBEAN	15 769	18 408	2.48	1.41	18.5	19.4	1.30	0.47
Argentina	2 327	2 699	0.15	1.22	40.0	42.5	-0.72	0.43
Brazil	8 219	9 242	3.49	0.89	29.3	30.4	2.50	0.20
Chile	358	395	-0.07	1.14	14.5	14.7	-1.04	0.40
Mexico	1 630	1 942	0.54	1.67	9.9	10.6	-0.71	0.70
Uruguay	181	178	-0.72	1.51	37.6	35.4	-0.97	1.13
ASIA and PACIFIC	15 785	19 695	3.14	2.01	2.8	3.1	2.00	1.12
Bangladesh	197	220	0.85	0.96	0.9	0.9	-0.33	-0.15
China[3]	6 480	7 644	2.38	1.78	3.4	3.8	1.86	1.52
India	1 761	2 529	-0.23	2.30	1.0	1.2	-1.65	1.11
Indonesia	639	810	4.88	2.67	1.8	2.1	3.75	1.81
Iran, Islamic Republic of	590	554	5.29	1.26	5.5	4.7	4.06	0.47
Korea	646	800	4.28	1.13	9.3	11.2	3.80	0.85
Malaysia	181	230	0.73	1.96	4.4	4.8	-1.00	0.51
Pakistan	1 446	1 755	5.34	1.82	5.7	5.8	3.46	0.20
Saudi Arabia	191	241	10.12	1.46	4.7	4.9	7.15	-0.41
Turkey	306	326	-1.27	1.04	2.9	2.8	-2.54	0.08
LEAST DEVELOPED COUNTRIES (LDC)	**3 721**	**5 377**	**2.47**	**3.83**	**3.1**	**3.5**	**0.21**	**1.64**
OECD[4]	**26 335**	**27 384**	**-0.52**	**0.78**	**14.4**	**14.2**	**-1.18**	**0.29**
BRICS	**20 149**	**23 349**	**2.49**	**1.24**	**4.7**	**5.1**	**1.58**	**0.57**

Note: Calendar year: Year ending 30 September New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.
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 and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861624

Table A.21.1. 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 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**109 793**	**126 731**	**1.83**	**1.37**	**6 566**	**7 643**	**6.43**	**0.82**	**6 839**	**7 765**	**5.41**	**0.85**
DEVELOPED COUNTRIES	**41 903**	**44 499**	**1.15**	**0.70**	**3 457**	**3 699**	**3.42**	**0.45**	**5 706**	**6 532**	**7.17**	**0.82**
NORTH AMERICA	12 315	13 649	1.50	1.09	587	609	-0.59	1.94	3 453	4 165	8.30	1.17
Canada	2 141	2 382	-0.65	0.88	202	233	9.72	2.63	1 224	1 403	2.67	1.60
United States	10 175	11 266	2.00	1.13	385	376	-3.81	1.53	2 229	2 762	12.85	0.97
EUROPE	27 311	28 430	1.01	0.52	1 330	1 412	8.56	0.05	2 199	2 323	6.09	0.27
European Union	22 950	23 189	0.69	0.32	17	14	-8.06	0.41	2 062	2 222	6.07	0.34
Russian Federation	2 452	3 181	5.55	1.64	916	889	8.24	0.17	0	0	..	..
Ukraine	659	708	1.91	1.70	156	167	26.14	-4.44	16	35	-9.54	2.11
OCEANIA DEVELOPED	393	417	-2.08	0.53	325	431	10.94	1.95	50	39	-5.98	-2.27
Australia	344	369	-2.33	0.72	285	380	11.85	1.88	50	39	-6.01	-2.28
New Zealand	48	48	-0.14	-0.85	40	51	5.82	2.47	0	0	9.49	0.00
OTHER DEVELOPED[1]	1 884	2 004	1.65	0.71	1 216	1 247	0.03	-0.21	5	5	3.48	-0.21
Japan	1 286	1 290	0.41	-0.06	1 123	1 141	-0.39	-0.34	1	0	56.73	-9.98
South Africa	311	370	12.27	2.21	40	25	5.02	-5.96	3	4	6.21	1.11
DEVELOPING COUNTRIES	**67 890**	**82 232**	**2.27**	**1.75**	**3 109**	**3 944**	**10.82**	**1.18**	**1 133**	**1 233**	**-0.99**	**1.01**
AFRICA	1 017	1 315	4.38	3.63	184	334	14.88	4.86	5	2	-2.83	-2.68
NORTH AFRICA	95	2	15.52	2.19	1	2	17.90	2.08	0	0	29.99	-0.51
Algeria	93	0	38.58	2.46	0	0	-15.09	0.00	0	0	0.00	0.00
Egypt	0	0	-17.39	1.60	1	1	29.68	2.52	0	0	33.04	-2.46
SUB-SAHARAN AFRICA	922	1 314	3.25	3.63	183	333	14.86	4.87	5	2	-3.44	-2.89
LATIN AMERICA and CARIBBEAN	6 789	8 293	3.19	1.85	909	1 052	9.91	0.38	773	923	2.61	1.36
Argentina	300	420	6.97	3.11	37	34	0.22	-0.04	8	33	28.68	11.64
Brazil	3 330	3 988	3.05	1.60	10	11	36.43	0.01	529	640	0.64	1.82
Chile	521	602	4.44	1.38	19	23	46.63	0.43	142	150	5.64	-0.49
Mexico	1 193	1 400	2.18	1.61	587	655	9.54	-0.29	72	91	14.39	-0.23
Uruguay	19	27	0.98	3.26	22	25	11.78	-0.65	0	0	-48.13	0.05
ASIA and PACIFIC	60 085	72 623	2.13	1.71	2 016	2 558	10.91	1.12	355	308	-6.51	0.05
Bangladesh	0	0	0.00	7.94	0	0	26.43	0.00	0	0	0.00	0.00
China[2]	50 431	60 435	2.01	1.61	480	695	29.13	1.16	255	230	-9.41	0.42
India	321	384	-4.59	2.64	1	1	42.77	-0.01	1	1	7.79	0.01
Indonesia	700	842	4.18	1.78	1	1	-21.04	2.34	0	0	-35.08	-2.14
Iran, Islamic Republic of	0	0	0.00	4.53	1	2	40.98	0.00	1	1	63.93	0.00
Korea	1 004	1 306	-0.24	2.16	528	470	12.45	-2.00	1	2	-34.55	0.00
Malaysia	241	287	2.36	1.72	16	48	17.83	6.26	5	4	23.75	-1.95
Pakistan	0	0	0.00	2.65	0	0	-34.56	0.00	0	0	-16.13	0.00
Saudi Arabia	0	1	0.00	28.30	5	5	-4.01	0.00	0	0	-42.99	0.00
Turkey	0	0	-26.99	31.20	1	2	25.34	0.00	1	1	15.16	0.00
LEAST DEVELOPED COUNTRIES (LDC)	**1 233**	**1 669**	**4.13**	**3.14**	**157**	**276**	**17.45**	**4.30**	**1**	**1**	**30.88**	**-0.64**
OECD[3]	**40 057**	**42 265**	**0.96**	**0.66**	**3 204**	**3 371**	**3.39**	**0.10**	**5 787**	**6 675**	**7.13**	**0.80**
BRICS	**56 846**	**68 359**	**2.19**	**1.62**	**1 448**	**1 621**	**12.03**	**0.46**	**789**	**875**	**-3.45**	**1.42**

Note: Calendar year: Year ending 30 September New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Gross indigenous production.
5. Least-squares growth rate (see glossary).
6. Excludes trade of live animals.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861643

Table A.21.2. Pigmeat projections: Consumption, per capita

Calendar year

	CONSUMPTION (kt cwe)		Growth (%)[1]		PER CAPITA (kg rwe)[5]		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**109 456**	**126 576**	**1.88**	**1.37**	**12.2**	**12.7**	**0.70**	**0.37**
DEVELOPED COUNTRIES	**39 647**	**41 721**	**0.72**	**0.66**	**22.4**	**22.7**	**0.26**	**0.33**
NORTH AMERICA	9 215	9 874	-0.47	1.11	20.7	20.3	-1.37	0.30
Canada	735	763	-1.15	0.10	16.7	15.8	-2.17	-0.74
United States	8 480	9 110	-0.41	1.20	21.1	20.8	-1.30	0.39
EUROPE	26 664	27 792	1.06	0.52	28.0	29.0	0.86	0.45
European Union	20 839	20 916	0.21	0.32	32.3	31.7	-0.18	0.13
Russian Federation	3 602	4 350	7.19	1.26	19.7	24.2	7.35	1.44
Ukraine	812	859	4.20	0.13	14.0	15.7	4.88	0.67
OCEANIA DEVELOPED	668	809	3.22	1.44	19.3	20.6	1.61	0.29
Australia	580	710	3.38	1.54	20.0	21.5	1.68	0.35
New Zealand	88	99	2.21	0.74	15.5	15.7	1.06	-0.21
OTHER DEVELOPED[2]	3 100	3 246	1.13	0.37	9.2	9.3	0.58	0.04
Japan	2 414	2 431	0.18	-0.15	14.9	15.3	0.16	0.05
South Africa	348	392	11.60	1.50	5.4	5.8	10.55	1.05
DEVELOPING COUNTRIES	**69 808**	**84 856**	**2.59**	**1.74**	**9.7**	**10.4**	**1.23**	**0.57**
AFRICA	1 191	1 648	5.56	3.87	0.9	1.0	3.08	1.54
NORTH AFRICA	96	3	19.46	2.35	0.4	0.0	17.65	1.09
Algeria	93	0	32.02	2.17	2.0	0.0	30.05	1.02
Egypt	1	2	-4.54	2.42	0.0	0.0	-6.23	0.94
SUB-SAHARAN AFRICA	1 095	1 644	4.57	3.87	1.0	1.2	1.93	1.35
LATIN AMERICA and CARIBBEAN	6 928	8 433	3.89	1.71	9.1	9.9	2.70	0.76
Argentina	329	421	5.64	2.38	6.3	7.4	4.72	1.58
Brazil	2 811	3 360	3.63	1.55	11.1	12.3	2.64	0.85
Chile	398	476	4.69	2.02	18.0	19.8	3.67	1.27
Mexico	1 711	1 974	3.51	1.02	11.6	12.0	2.23	0.06
Uruguay	42	52	5.86	1.23	9.6	11.5	5.60	0.85
ASIA and PACIFIC	61 690	74 775	2.40	1.70	12.0	13.2	1.26	0.81
Bangladesh	0	0	17.48	0.96	0.0	0.0	16.10	-0.15
China[3]	50 526	60 782	2.22	1.61	29.2	34.1	1.70	1.34
India	321	384	-4.57	2.63	0.2	0.2	-5.93	1.44
Indonesia	681	822	4.23	1.83	2.2	2.4	3.11	0.99
Iran, Islamic Republic of	0	0	31.34	1.26	0.0	0.0	29.81	0.47
Korea	1 556	1 774	3.27	0.88	25.1	27.7	2.79	0.60
Malaysia	253	331	2.72	2.29	6.8	7.6	0.96	0.84
Pakistan	0	0	-26.74	1.82	0.0	0.0	-28.04	0.20
Saudi Arabia	5	6	-2.71	1.46	0.2	0.1	-5.33	-0.41
Turkey	0	1	4.37	1.04	0.0	0.0	3.02	0.08
LEAST DEVELOPED COUNTRIES (LDC)	**1 388**	**1 949**	**5.07**	**3.29**	**1.3**	**1.4**	**2.75**	**1.11**
OECD[4]	**37 207**	**38 688**	**0.38**	**0.59**	**22.7**	**22.3**	**-0.29**	**0.11**
BRICS	**57 607**	**69 268**	**2.54**	**1.59**	**15.1**	**16.8**	**1.63**	**0.92**

Note: Calendar year: Year ending 30 September for New Zealand.
Average 2010-12est: Data for 2012 are estimated.
1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.
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 and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861662

Table A.22.1. Poultry meat projections: Production and trade

Calendar year

	PRODUCTION (kt rtc)		Growth (%)[4]		IMPORTS (kt rtc)		Growth (%)[4]		EXPORTS (kt rtc)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**103 257**	**128 669**	**3.68**	**1.93**	**11 997**	**14 523**	**6.74**	**2.13**	**12 029**	**14 813**	**6.69**	**2.09**
DEVELOPED COUNTRIES	**42 330**	**49 078**	**2.34**	**1.43**	**3 338**	**3 374**	**-0.14**	**0.42**	**5 167**	**6 441**	**4.86**	**2.17**
NORTH AMERICA	20 400	23 440	0.95	1.68	297	323	6.57	0.71	3 628	4 566	4.76	2.68
Canada	1 205	1 378	1.01	1.33	238	264	4.42	0.93	177	195	6.06	1.08
United States	19 195	22 062	0.94	1.71	59	59	24.04	-0.20	3 451	4 372	4.70	2.76
EUROPE	17 003	19 691	3.66	1.06	1 829	1 416	-3.39	-1.68	1 457	1 780	4.94	0.99
European Union	12 375	12 976	1.34	0.20	809	798	2.11	-0.15	1 271	1 397	3.59	-0.12
Russian Federation	3 167	4 555	14.77	2.55	519	259	-11.61	-3.59	30	160	77.31	13.53
Ukraine	863	1 297	12.62	3.99	241	164	4.54	-4.41	48	84	20.97	4.38
OCEANIA DEVELOPED	1 199	1 405	3.85	1.31	0	0	..	..	44	63	7.62	2.24
Australia	1 041	1 224	4.40	1.34	0	0	..	..	44	63	7.62	2.24
New Zealand	158	181	0.71	1.07	0	0	..	..	0	0	..	..
OTHER DEVELOPED[1]	3 728	4 541	4.33	1.82	1 212	1 635	5.16	2.62	38	31	7.80	0.40
Japan	1 415	1 401	1.70	-0.20	446	391	0.90	-1.37	8	8	23.79	0.00
South Africa	1 523	2 101	7.49	3.03	336	632	8.12	5.20	15	10	9.26	-0.86
DEVELOPING COUNTRIES	**60 927**	**79 592**	**4.71**	**2.24**	**8 659**	**11 149**	**10.87**	**2.72**	**6 861**	**8 372**	**8.31**	**2.02**
AFRICA	3 215	4 435	3.85	2.98	1 199	1 896	13.44	4.04	41	16	3.52	-0.25
NORTH AFRICA	1 979	2 706	3.96	3.02	136	193	26.61	1.98	7	7	-6.99	4.35
Algeria	272	326	0.69	1.70	12	17	8.29	2.04	1	0	105.47	-0.21
Egypt	794	1 049	2.15	2.84	111	172	60.36	2.17	5	4	-11.12	-0.26
SUB-SAHARAN AFRICA	1 236	1 730	3.67	2.93	1 063	1 703	12.37	4.30	34	10	9.52	-3.72
LATIN AMERICA and CARIBBEAN	23 588	30 295	5.71	2.01	1 758	2 066	8.98	1.33	4 309	5 706	7.29	2.60
Argentina	1 778	2 613	11.18	2.54	19	16	1.07	0.00	231	613	24.58	8.01
Brazil	13 121	16 261	6.00	1.59	2	2	21.34	-0.04	3 849	4 894	6.49	2.20
Chile	638	816	3.24	2.00	79	81	40.59	-0.36	114	125	10.42	0.36
Mexico	2 797	3 575	2.76	2.34	623	615	5.76	-0.63	19	19	79.84	0.86
Uruguay	65	66	7.06	1.35	3	5	24.23	2.67	12	10	154.79	-3.18
ASIA and PACIFIC	34 123	44 862	4.15	2.33	5 702	7 186	11.05	2.81	2 511	2 650	10.76	0.90
Bangladesh	186	238	3.81	3.19	2	3	-3.92	1.64	0	0	-6.43	-0.71
China[2]	17 094	21 475	3.12	1.89	473	555	3.06	1.42	584	532	2.24	-1.05
India	2 875	4 124	7.20	2.98	0	0	17.47	1.76	9	10	5.89	-2.29
Indonesia	1 722	2 365	5.39	3.00	1	1	-17.03	2.85	0	0	-40.56	-2.68
Iran, Islamic Republic of	1 725	2 391	5.51	2.99	49	22	27.17	0.79	32	21	4.07	-0.47
Korea	686	884	5.70	2.06	137	107	10.22	-2.29	23	15	34.14	0.00
Malaysia	1 540	1 951	6.23	2.21	50	97	6.42	6.14	143	64	6.45	-8.05
Pakistan	732	1 019	9.17	2.94	3	3	9.90	6.01	2	3	-5.19	-5.47
Saudi Arabia	547	795	1.53	2.07	743	984	8.26	3.50	38	37	7.78	-3.34
Turkey	1 589	2 310	8.26	3.19	101	82	-0.55	-2.44	239	395	30.35	2.54
LEAST DEVELOPED COUNTRIES (LDC)	**1 996**	**2 744**	**5.56**	**2.94**	**927**	**1 425**	**11.21**	**3.92**	**23**	**2**	**17.14**	**-3.13**
OECD[3]	**41 785**	**47 650**	**1.63**	**1.32**	**2 541**	**2 448**	**3.68**	**-0.55**	**5 361**	**6 600**	**5.22**	**1.95**
BRICS	**37 780**	**48 517**	**5.23**	**1.98**	**1 331**	**1 449**	**-4.26**	**1.62**	**4 487**	**5 606**	**5.88**	**2.02**

Note: Calendar year: Year ending 30 September for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861681

Table A.22.2. Poultry meat projections: Consumption, per capita

Calendar year

	CONSUMPTION (kt rtc)		Growth (%)[1]		PER CAPITA (kg rwt)[5]		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**103 132**	**128 377**	**3.67**	**1.93**	**13.0**	**14.5**	**2.47**	**0.92**
DEVELOPED COUNTRIES	**40 502**	**46 009**	**1.82**	**1.25**	**25.9**	**28.3**	**1.35**	**0.92**
NORTH AMERICA	17 081	19 196	0.34	1.44	43.3	44.5	-0.57	0.63
Canada	1 271	1 447	1.04	1.29	32.6	33.7	0.00	0.44
United States	15 810	17 749	0.29	1.45	44.4	45.6	-0.61	0.64
EUROPE	17 373	19 327	2.58	0.83	20.6	22.7	2.38	0.77
European Union	11 914	12 377	1.18	0.22	20.8	21.2	0.79	0.02
Russian Federation	3 655	4 654	6.00	1.87	22.5	29.2	6.16	2.04
Ukraine	1 056	1 377	9.79	2.51	20.6	28.5	10.50	3.06
OCEANIA DEVELOPED	1 156	1 343	3.72	1.27	37.6	38.5	2.10	0.12
Australia	997	1 162	4.27	1.30	38.8	39.6	2.56	0.12
New Zealand	158	181	0.71	1.07	31.6	32.5	-0.43	0.12
OTHER DEVELOPED[2]	4 892	6 144	4.48	2.03	16.4	19.8	3.92	1.69
Japan	1 843	1 784	1.40	-0.47	12.8	12.7	1.37	-0.27
South Africa	1 844	2 723	7.58	3.51	32.2	45.2	6.57	3.05
DEVELOPING COUNTRIES	**62 630**	**82 368**	**5.03**	**2.33**	**9.8**	**11.4**	**3.63**	**1.16**
AFRICA	4 373	6 317	5.85	3.31	3.9	4.3	3.37	0.99
NORTH AFRICA	2 108	2 894	4.78	2.96	11.1	13.2	3.19	1.70
Algeria	283	343	0.88	1.72	6.9	7.4	-0.62	0.57
Egypt	900	1 217	4.12	2.76	9.6	11.0	2.28	1.27
SUB-SAHARAN AFRICA	2 265	3 423	6.93	3.61	2.4	2.8	4.23	1.09
LATIN AMERICA and CARIBBEAN	20 943	26 653	5.62	1.84	30.9	35.4	4.40	0.89
Argentina	1 472	2 016	9.04	1.30	31.7	39.9	8.09	0.51
Brazil	9 274	11 369	5.82	1.35	41.5	47.0	4.81	0.65
Chile	603	772	3.82	2.01	30.7	36.2	2.81	1.26
Mexico	3 401	4 172	3.18	1.85	26.1	28.7	1.90	0.88
Uruguay	55	60	4.25	2.51	14.3	15.1	4.00	2.12
ASIA and PACIFIC	37 314	49 398	4.62	2.49	8.2	9.8	3.46	1.59
Bangladesh	188	241	3.70	3.17	1.1	1.2	2.48	2.03
China[3]	16 984	21 499	3.11	1.96	11.1	13.6	2.59	1.69
India	2 866	4 114	7.21	3.00	2.0	2.6	5.69	1.80
Indonesia	1 723	2 366	5.38	3.00	6.3	7.8	4.24	2.15
Iran, Islamic Republic of	1 742	2 392	5.76	3.01	20.5	25.7	4.53	2.20
Korea	800	976	5.87	1.52	14.5	17.2	5.38	1.24
Malaysia	1 447	1 983	6.19	3.00	44.1	51.5	4.38	1.54
Pakistan	732	1 019	9.23	3.00	3.6	4.2	7.28	1.37
Saudi Arabia	1 251	1 742	4.96	3.01	39.2	44.2	2.13	1.10
Turkey	1 451	1 998	5.74	3.01	17.3	21.4	4.37	2.03
LEAST DEVELOPED COUNTRIES (LDC)	**2 900**	**4 168**	**7.01**	**3.27**	**3.0**	**3.4**	**4.65**	**1.09**
OECD[4]	**38 967**	**43 496**	**1.32**	**1.11**	**26.8**	**28.3**	**0.64**	**0.62**
BRICS	**34 623**	**44 360**	**4.60**	**1.97**	**10.2**	**12.1**	**3.67**	**1.29**

Note: Calendar year: Year ending 30 September for New Zealand.
Average 2010-12est: Data for 2012 are estimated.
1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.
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 and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861700

Table A.23.1. 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 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**13 854**	**15 782**	**2.15**	**1.25**	**812**	**978**	**0.65**	**1.62**	**867**	**971**	**0.41**	**1.62**
DEVELOPED COUNTRIES	**3 179**	**3 418**	**-0.12**	**0.67**	**372**	**394**	**-2.33**	**0.53**	**768**	**933**	**0.09**	**1.95**
NORTH AMERICA	91	77	-3.07	-0.78	94	95	-0.49	0.14	5	12	0.67	0.73
Canada	15	17	-1.72	0.71	20	16	1.15	-0.17	0	0	0.90	0.00
United States	75	60	-3.33	-1.15	74	79	-0.91	0.20	5	12	0.72	0.74
EUROPE	1 290	1 186	-0.82	-0.75	235	235	-2.18	0.23	24	24	12.29	-0.73
European Union	982	832	-1.73	-1.48	216	208	-2.60	0.39	17	20	21.27	-0.94
Russian Federation	191	238	4.24	1.80	9	14	8.89	-2.73	0	0	..	..
Ukraine	21	22	3.66	0.12	0	0	26.38	0.39	0	0	-48.27	-0.38
OCEANIA DEVELOPED	1 043	1 246	-1.73	1.46	3	3	-2.90	0.00	738	896	-0.18	2.06
Australia	582	753	-1.52	2.19	0	0	..	..	316	452	0.70	2.96
New Zealand	461	494	-1.99	0.44	3	3	-2.90	0.00	422	445	-0.80	1.21
OTHER DEVELOPED[1]	755	908	4.72	1.80	40	61	-6.31	2.56	1	0	16.14	-1.14
Japan	0	0	..	..	30	30	-5.16	-0.22	0	0	..	..
South Africa	175	178	3.03	0.53	7	28	-12.21	6.82	0	0	3.84	-0.70
DEVELOPING COUNTRIES	**10 675**	**12 364**	**2.91**	**1.42**	**440**	**584**	**3.83**	**2.44**	**99**	**38**	**2.97**	**-4.40**
AFRICA	2 727	3 352	3.68	2.09	26	68	1.74	10.67	25	1	2.90	-20.74
NORTH AFRICA	586	728	2.82	1.89	5	8	-12.65	1.55	0	0	4.96	-0.63
Algeria	196	236	0.80	1.82	1	3	-46.13	0.51	0	0	-3.87	-0.35
Egypt	119	143	8.04	2.77	2	3	12.48	1.74	0	0	4.09	-0.62
SUB-SAHARAN AFRICA	2 141	2 623	3.93	2.14	21	60	11.79	12.60	24	1	2.88	-20.97
LATIN AMERICA and CARIBBEAN	363	382	0.39	0.65	26	33	-11.82	3.03	25	8	2.94	-7.65
Argentina	56	52	-1.31	-0.90	0	0	-8.68	0.00	6	5	-0.66	0.28
Brazil	81	84	1.53	0.68	4	3	..	..	0	0	..	..
Chile	16	14	1.28	-0.75	0	0	-19.11	1.16	6	1	1.24	-14.73
Mexico	56	73	3.60	2.30	11	3	-17.94	-10.50	0	0	..	..
Uruguay	31	25	-1.38	-1.37	0	0	57.00	1.13	13	2	6.33	-13.10
ASIA and PACIFIC	7 585	8 630	2.77	1.21	388	483	6.20	1.61	49	29	2.69	-0.91
Bangladesh	203	274	3.54	2.07	0	1	-12.02	3.34	0	0	-18.74	-2.84
China[2]	4 075	4 281	3.04	0.52	85	63	13.52	0.94	8	16	-15.92	9.60
India	897	1 120	3.33	2.14	0	0	13.58	2.47	11	3	4.06	-6.76
Indonesia	135	158	0.22	1.39	1	3	8.15	6.27	0	0	-12.88	-3.27
Iran, Islamic Republic of	536	547	2.01	0.40	9	23	218.36	7.06	0	0	-6.10	-1.62
Korea	1	1	-9.89	0.00	5	5	7.92	0.00	0	0	-12.08	0.36
Malaysia	1	0	1.25	-6.35	20	26	5.13	2.84	0	0	41.70	-0.40
Pakistan	541	725	1.00	1.91	0	0	-28.79	1.04	15	5	17.13	-7.62
Saudi Arabia	33	51	26.33	1.66	55	87	-0.72	1.01	4	3	3.45	-1.00
Turkey	280	324	-1.80	1.56	1	1	85.36	2.22	0	0	-12.40	-1.73
LEAST DEVELOPED COUNTRIES (LDC)	**2 008**	**2 607**	**4.70**	**2.64**	**10**	**15**	**9.42**	**1.46**	**13**	**0**	**2.86**	**-25.35**
OECD[3]	**2 507**	**2 608**	**-1.66**	**0.37**	**370**	**356**	**-3.04**	**0.10**	**766**	**929**	**0.07**	**1.92**
BRICS	**5 419**	**5 901**	**3.10**	**0.86**	**105**	**109**	**7.85**	**1.49**	**19**	**19**	**-6.81**	**4.14**

Note: Calendar year: Year ending 30 September for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Gross indigenous production.
5. Least-squares growth rate (see glossary).
6. Excludes trade of live animals.

Source: OECD and FAO Secretariats.

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Table A.23.2. Sheep meat projections: Consumption, per capita

Calendar year

	CONSUMPTION (kt cwe)		Growth (%)[4]		PER CAPITA (kg rwt)[5]		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**13 804**	**15 774**	**2.15**	**1.26**	**1.7**	**1.8**	**0.97**	**0.26**
DEVELOPED COUNTRIES	**2 713**	**2 800**	**-0.44**	**0.31**	**1.7**	**1.7**	**-0.90**	**-0.03**
NORTH AMERICA	176	160	-1.61	-0.34	0.4	0.4	-2.51	-1.14
Canada	36	33	0.35	0.28	0.9	0.8	-0.68	-0.56
United States	140	127	-2.07	-0.49	0.4	0.3	-2.95	-1.29
EUROPE	1 482	1 362	-1.25	-0.62	1.8	1.6	-1.44	-0.68
European Union	1 162	1 000	-2.25	-1.17	2.0	1.7	-2.63	-1.36
Russian Federation	200	237	5.64	1.58	1.2	1.5	5.80	1.75
Ukraine	21	22	3.87	0.12	0.4	0.5	4.55	0.67
OCEANIA DEVELOPED	260	308	-4.50	0.41	8.5	8.8	-5.99	-0.72
Australia	216	251	-3.24	1.35	8.4	8.6	-4.83	0.17
New Zealand	44	57	-9.91	-2.91	8.8	10.2	-10.93	-3.82
OTHER DEVELOPED[1]	794	970	3.58	1.85	2.7	3.1	3.02	1.50
Japan	30	30	-5.16	-0.22	0.2	0.2	-5.18	-0.02
South Africa	182	206	0.94	1.18	3.2	3.4	-0.01	0.74
DEVELOPING COUNTRIES	**11 091**	**12 974**	**2.87**	**1.48**	**1.7**	**1.8**	**1.50**	**0.32**
AFRICA	2 685	3 375	3.69	2.28	2.4	2.3	1.26	-0.02
NORTH AFRICA	591	735	2.47	1.89	3.1	3.4	0.92	0.64
Algeria	197	238	0.21	1.80	4.8	5.1	-1.28	0.65
Egypt	121	146	7.87	2.75	1.3	1.3	5.97	1.27
SUB-SAHARAN AFRICA	2 094	2 639	4.06	2.39	2.2	2.1	1.44	-0.11
LATIN AMERICA and CARIBBEAN	368	410	-1.25	1.04	0.5	0.5	-2.39	0.10
Argentina	50	48	-1.38	-1.00	1.1	0.9	-2.24	-1.77
Brazil	88	89	1.91	0.71	0.4	0.4	0.94	0.01
Chile	10	14	1.14	1.59	0.5	0.6	0.16	0.85
Mexico	69	76	-5.38	1.11	0.5	0.5	-6.55	0.14
Uruguay	18	23	-2.19	0.97	4.7	5.8	-2.43	0.59
ASIA and PACIFIC	8 039	9 190	2.83	1.23	1.8	1.8	1.68	0.34
Bangladesh	203	274	3.46	2.08	1.2	1.4	2.25	0.96
China[2]	4 151	4 329	3.27	0.51	2.7	2.7	2.75	0.25
India	883	1 116	3.24	2.18	0.6	0.7	1.77	0.99
Indonesia	135	160	0.25	1.46	0.5	0.5	-0.84	0.62
Iran, Islamic Republic of	509	532	1.64	0.63	6.0	5.7	0.45	-0.16
Korea	6	7	1.12	0.00	0.1	0.1	0.65	-0.28
Malaysia	22	27	5.27	2.52	0.7	0.7	3.47	1.07
Pakistan	525	721	0.72	2.03	2.6	3.0	-1.07	0.41
Saudi Arabia	142	181	-0.68	0.96	4.4	4.6	-3.36	-0.90
Turkey	291	332	-1.27	1.52	3.5	3.6	-2.54	0.56
LEAST DEVELOPED COUNTRIES (LDC)	**1 961**	**2 580**	**4.68**	**2.69**	**2.0**	**2.1**	**2.38**	**0.53**
OECD[3]	**2 055**	**1 981**	**-2.47**	**-0.28**	**1.4**	**1.3**	**-3.12**	**-0.76**
BRICS	**5 504**	**5 975**	**3.24**	**0.87**	**1.6**	**1.6**	**2.32**	**0.20**

Note: Calendar year: Year ending 30 September for New Zealand.
Average 2010-12est: Data for 2012 are estimated.
1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 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 and FAO Secretariats.

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Table A.24. Main policy assumptions for meat markets

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ARGENTINA												
Beef export tax	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
CANADA												
Beef tariff-quota	kt pw	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4
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	45.4	45.4	45.4	45.4	45.4	45.4	45.4	45.4	45.4	45.4	45.4
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[1]												
Beef budget ceiling[2]	'000 EUR	1 308 667	1 135 000	1 135 000	1 135 000	1 135 000	1 135 000	1 135 000	1 135 000	1 135 000	1 135 000	1 135 000
Beef basic price[3,4]	EUR/kg dw	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[4,5]	EUR/kg dw	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Pigmeat basic price	EUR/kg dw	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Sheep basic rate[6]	EUR/head	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
Beef tariff-quota	kt cwe	276.7	313.4	313.4	313.4	313.4	313.4	313.4	313.4	313.4	313.4	313.4
Pig tariff-quota	kt cwe	113.8	116.2	116.2	116.2	116.2	116.2	116.2	116.2	116.2	116.2	116.2
Poultry tariff-quota	kt rtc	856.3	959.4	959.4	959.4	959.4	959.4	959.4	959.4	959.4	959.4	959.4
Sheep meat tariff-quota	kt cwe	285.2	285.2	285.2	285.2	285.2	285.2	285.2	285.2	285.2	285.2	285.2
Subsidised export limits												
Beef[7]	kt cwe	989.6	989.6	989.6	989.6	989.6	989.6	989.6	989.6	989.6	989.6	989.6
Pigmeat[7]	kt cwe	588.4	588.4	588.4	588.4	588.4	588.4	588.4	588.4	588.4	588.4	588.4
Poultry meat	kt cwe	430.8	430.8	430.8	430.8	430.8	430.8	430.8	430.8	430.8	430.8	430.8
JAPAN[8]												
Beef stabilisation prices												
Upper price	JPY/kg dw	1 060.0	1 060.0	1 060.0	1 060.0	1 060.0	1 060.0	1 060.0	1 060.0	1 060.0	1 060.0	1 060.0
Lower price	JPY/kg dw	815.0	815.0	815.0	815.0	815.0	815.0	815.0	815.0	815.0	815.0	815.0
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 stabilisation prices												
Upper price	JPY/kg dw	545.0	545.0	545.0	545.0	545.0	545.0	545.0	545.0	545.0	545.0	545.0
Lower price	JPY/kg dw	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
Pigmeat import system[9]												
Tariff	%	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Standard import price	JPY/kg dw	409.9	409.9	409.9	409.9	409.9	409.9	409.9	409.9	409.9	409.9	409.9
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	%	39.1	34.7	32.0	29.3	26.7	18.0	16.0	14.0	12.0	10.0	8.0
Beef mark-up	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pigmeat tariff	%	22.5	22.5	22.5	22.5	22.5	15.8	14.6	13.5	12.4	11.3	11.3
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												
Pigmeat tariff	%	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Pigmeat NAFTA tariff	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Poultry meat tariff-quota	kt pw	40.5	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
In-quota tariff	%	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	%	234.0	175.0	150.0	125.0	100.0	75.0	75.0	75.0	75.0	75.0	75.0
RUSSIAN FEDERATION												
Beef tariff-quota	kt pw	563.3	570.0	570.0	570.0	570.0	570.0	570.0	570.0	0.0	0.0	0.0
In-quota tariff	%	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	0.0	0.0	0.0
Out-of-quota tariff	%	50.0	50.0	55.0	55.0	55.0	55.0	55.0	55.0	27.5	27.5	9.2
Pigmeat tariff-quota	kt pw	476.7	430.0	430.0	430.0	430.0	430.0	430.0	430.0	0.0	0.0	0.0
In-quota tariff	%	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Out-of-quota tariff	%	71.7	65.0	65.0	65.0	65.0	65.0	65.0	65.0	25.0	25.0	25.0
Poultry tariff-quota	kt pw	502.7	378.0	378.0	378.0	378.0	378.0	378.0	378.0	0.0	0.0	0.0
In-quota tariff	%	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	0.0	0.0	0.0
Out-of-quota tariff	%	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	37.5	37.5	37.5
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 A.24. Main policy assumptions for meat markets *(cont.)*

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
CHINA												
Beef tariff	%	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	16.5	16.5
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	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pigmeat tariff	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sheep meat tariff	%	91.9	91.9	91.9	91.9	91.9	91.9	91.9	91.9	91.9	91.9	91.9
Poultry meat tariff	%	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0
Eggs tariff	%	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
SOUTH AFRICA												
Sheep meat tariff-quota	kt pw	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
In-quota tariff	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Out-of-quota tariff	%	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0

Note: Average 2010-12est: Data for 2012 are estimated.

1. EU farmers also benefit from the Single Farm Payment (SFP) Scheme, which provides flat-rate payments independent from current production decisions and market developments. For the new member states, payments are phased in with the assumption of maximum top-ups from national budgets up to 2013 through the Single Area Payment (SAP), and through the (SFP) from 2014. Due to modulation, an increasing share of the total SFP will go to rural development spending rather than directly to farmers.
2. EU budget ceiling for coupled suckler cow premium, applicable to Belgium, Spain, France, Austria and Portugal.
3. Payments for private storage can be made when the average price on the Community market falls below 103% of this basic price.
4. Price for R3 grade male cattle.
5. Safety-net trigger.
6. 80% of this basic rate is granted to milk ewes and goats; an additional premium of EUR 3.5/head is granted in Less Favoured Areas. This payment scheme applies only in Portugal and Finland.
7. Includes live trade.
8. Year beginning 1 April.
9. Pig carcass imports. Emergency import procedures triggered from November 1995 to March 1996, from July 1996 to June 1997, from August 2001 to March 2002, from August 2002 to March 2003, from August 2003 to March 2004 and from August 2004 to March 2005.

Source: OECD and FAO Secretariats.

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Table A.25. World fish and seafood projections

Calendar year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
FISH												
World												
Production	kt	153 940	161 876	164 904	165 171	169 363	171 941	173 853	175 684	175 582	179 234	181 070
of which aquaculture	kt	62 924	68 262	70 682	72 529	74 705	76 584	78 380	80 144	81 593	83 515	85 124
Consumption	kt	154 193	161 830	164 979	165 245	169 438	172 016	173 928	175 758	175 656	179 309	181 145
of which for food	kt	131 741	138 923	142 506	144 594	147 676	150 510	152 715	154 734	156 103	158 644	160 514
of which for reduction	kt	15 941	16 798	16 583	14 992	16 231	16 106	15 943	15 834	14 433	15 605	15 573
Price												
Aquaculture[1]	USD/t	2 034.8	2 047.6	2 092.0	2 225.1	2 224.9	2 221.5	2 273.0	2 422.4	2 568.2	2 658.3	2 700.9
Capture[2]	USD/t	1 324.5	1 386.3	1 431.8	1 501.8	1 513.7	1 555.2	1 601.5	1 681.3	1 750.2	1 798.1	1 842.8
Product traded[3]	USD/t	2 671.3	2 698.1	2 769.9	2 933.0	2 870.8	2 923.0	2 990.8	3 187.4	3 335.4	3 408.1	3 462.7
Developed countries												
Production	kt	28 452	29 139	29 431	29 232	29 313	29 352	29 391	29 462	29 448	29 493	29 478
of which aquaculture	kt	4 133	4 249	4 351	4 213	4 334	4 406	4 491	4 601	4 608	4 665	4 666
Consumption	kt	36 741	37 498	37 833	37 914	38 135	38 242	38 395	38 385	38 434	38 532	38 817
of which for food	kt	32 120	32 671	33 101	33 260	33 578	33 765	33 985	34 035	34 122	34 300	34 587
of which for reduction	kt	3 685	4 058	4 013	3 945	3 858	3 788	3 731	3 681	3 653	3 583	3 539
Developing countries												
Production	kt	125 488	132 737	135 473	135 939	140 050	142 589	144 462	146 222	146 134	149 741	151 592
of which aquaculture	kt	58 791	64 014	66 332	68 316	70 370	72 177	73 889	75 543	76 985	78 850	80 457
Consumption	kt	117 452	124 332	127 146	127 331	131 303	133 773	135 533	137 374	137 222	140 777	142 328
of which for food	kt	99 621	106 252	109 405	111 334	114 098	116 745	118 730	120 699	121 980	124 344	125 927
of which for reduction	kt	12 256	12 740	12 570	11 047	12 374	12 318	12 212	12 153	10 780	12 022	12 033
OECD												
Production	kt	31 613	32 689	32 881	32 236	32 715	32 913	32 948	33 061	32 545	33 008	33 113
of which aquaculture	kt	5 629	5 975	6 059	6 020	6 177	6 282	6 429	6 611	6 730	6 857	6 953
Consumption	kt	39 451	40 339	40 601	40 332	40 855	41 043	41 118	41 137	40 859	41 306	41 689
of which for food	kt	32 286	32 713	33 191	33 443	33 776	34 041	34 278	34 367	34 484	34 712	35 059
of which for reduction	kt	5 978	6 417	6 350	5 941	6 190	6 173	6 071	6 011	5 626	5 856	5 850
FISHMEAL												
World												
Production	kt	6 103.4	6 468.5	6 530.4	6 198.7	6 605.3	6 678.8	6 727.3	6 771.9	6 527.8	6 929.7	7 021.0
from whole fish	kt	3 572.3	3 826.1	3 787.2	3 426.9	3 718.6	3 697.2	3 671.1	3 652.8	3 335.0	3 613.7	3 613.8
Consumption	kt	6 212.3	6 656.4	6 666.0	6 600.1	6 582.4	6 783.6	6 821.7	6 855.4	6 901.9	6 888.1	7 062.8
Variation in stocks	kt	-42.5	1.1	43.6	-232.2	182.0	44.3	44.7	45.5	-255.0	140.7	27.3
Price[4]	USD/t	1 594.2	1 824.8	1 648.4	1 691.6	1 534.7	1 496.5	1 514.8	1 620.7	1 727.6	1 655.2	1 700.0
Developed countries												
Production	kt	1 335.4	1 400.0	1 412.2	1 402.0	1 397.8	1 391.7	1 394.6	1 394.1	1 398.5	1 397.4	1 400.5
from whole fish	kt	828.8	941.5	937.4	923.6	905.2	890.9	883.1	872.9	868.1	853.2	844.4
Consumption	kt	1 923.5	1 971.5	1 934.4	1 828.9	1 818.2	1 833.5	1 814.2	1 792.3	1 755.9	1 743.2	1 743.5
Variation in stocks	kt	-9.5	6.1	7.6	-43.2	39.0	1.3	1.7	0.5	-42.0	37.7	2.3
Developing countries												
Production	kt	4 768.0	5 068.5	5 118.2	4 796.7	5 207.5	5 287.1	5 332.7	5 377.7	5 129.3	5 532.3	5 620.5
from whole fish	kt	2 743.6	2 884.7	2 849.8	2 503.3	2 813.5	2 806.3	2 788.0	2 780.0	2 466.9	2 760.6	2 769.4
Consumption	kt	4 288.8	4 685.0	4 731.5	4 771.1	4 764.2	4 950.1	5 007.5	5 063.2	5 146.0	5 144.8	5 319.3
Variation in stocks	kt	-33.0	-5.0	36.0	-189.0	143.0	43.0	43.0	45.0	-213.0	103.0	25.0
OECD												
Production	kt	1 798.4	1 871.0	1 873.9	1 784.8	1 850.6	1 854.1	1 843.8	1 837.9	1 760.1	1 820.4	1 828.8
from whole fish	kt	1 327.7	1 418.9	1 407.7	1 315.9	1 369.1	1 365.8	1 346.2	1 332.0	1 246.1	1 293.6	1 291.3
Consumption	kt	2 084.9	2 184.5	2 148.6	2 028.1	2 008.6	2 038.3	2 023.9	1 988.7	1 942.8	1 942.6	1 946.1
Variation in stocks	kt	50.5	-24.9	-45.4	-78.2	45.0	-2.7	-2.3	-0.5	-58.0	43.7	15.3

Table A.25. World fish and seafood projections *(cont.)*

Calendar year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
FISH OIL												
World												
Production	kt	979.5	1 086.8	1 088.4	988.6	1 084.5	1 085.1	1 081.3	1 080.1	987.4	1 077.5	1 079.2
from whole fish	kt	682.5	750.6	741.5	656.6	727.1	722.7	716.0	711.9	634.7	703.0	701.9
Consumption	kt	1 008.8	1 023.0	1 042.2	1 008.0	1 035.3	1 060.0	1 079.1	1 075.3	1 047.3	1 050.3	1 052.1
Variation in stocks	kt	-45.6	18.8	6.2	-49.4	29.2	15.2	2.2	4.7	-59.9	27.2	27.1
Price[5]	USD/t	1 514.7	2 004.9	1 772.8	1 844.5	1 725.2	1 730.0	1 767.4	1 782.3	1 978.3	1 840.4	1 864.1
Developed countries												
Production	kt	368.5	398.8	400.8	397.4	395.3	392.2	390.2	388.2	387.3	384.7	383.2
from whole fish	kt	159.3	174.6	172.2	169.0	164.9	161.7	159.2	156.8	155.4	151.9	149.8
Consumption	kt	631.0	639.8	621.4	590.6	590.5	591.9	590.8	582.6	568.5	559.8	552.7
Variation in stocks	kt	-12.3	3.3	0.7	-4.9	9.7	-0.3	-0.3	-0.3	-9.9	7.2	12.1
Developing countries												
Production	kt	611.0	688.0	687.6	591.2	689.2	693.0	691.2	691.9	600.1	692.7	696.0
from whole fish	kt	523.2	576.1	569.4	487.6	562.2	561.0	556.8	555.1	479.3	551.1	552.1
Consumption	kt	377.8	383.2	420.8	417.4	444.8	468.1	488.4	492.8	478.7	490.5	499.4
Variation in stocks	kt	-33.3	15.5	5.5	-44.5	19.5	15.5	2.5	5.0	-50.0	20.0	15.0
OECD												
Production	kt	539.4	612.7	619.4	579.3	619.8	622.5	618.5	616.7	577.0	612.4	613.5
from whole fish	kt	292.8	334.4	331.7	307.8	324.4	323.5	318.0	314.8	292.1	307.2	307.0
Consumption	kt	816.2	816.9	809.6	771.6	765.5	768.0	770.0	763.0	747.5	731.9	726.4
Variation in stocks	kt	-1.6	10.3	-1.3	-26.9	21.7	7.7	-0.3	-0.3	-29.9	17.2	17.1

Note: The term “fish” indicates fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, crocodiles, caimans, alligators and aquatic plants.

Average 2010-12est: Data for 2012 are estimated.

1. World unit value of aquaculture fisheries production (live weight basis).
2. FAO estimated value of world ex vessel value of capture fisheries production excluding for reduction.
3. World unit value of trade (sum of exports and imports).
4. Fishmeal, 64-65% protein, Hamburg, Germany.
5. Fish oil, any origin, N.W. Europe.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861776

Table A.26.1. Fish and seafood projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[3]		IMPORTS (kt)		Growth (%)[3]		EXPORTS (kt)		Growth (%)[3]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**153 940**	**181 070**	**2.17**	**1.23**	**37 012**	**45 082**	**3.16**	**1.83**	**36 994**	**45 082**	**3.14**	**1.83**
DEVELOPED COUNTRIES	**28 452**	**29 478**	**-0.89**	**0.10**	**20 519**	**23 936**	**1.34**	**1.61**	**12 368**	**14 598**	**1.52**	**1.97**
NORTH AMERICA	6 369	6 475	-0.99	-0.02	5 456	6 434	1.58	1.65	2 862	3 413	0.79	2.18
Canada	1 048	1 098	-2.92	0.74	653	722	1.77	1.55	843	919	-2.00	2.41
United States	5 321	5 377	-0.58	-0.17	4 803	5 712	1.56	1.66	2 019	2 494	2.14	2.10
EUROPE	16 069	16 682	-0.29	0.35	10 260	12 568	2.19	2.05	8 264	9 712	2.10	1.96
European Union	6 456	6 487	-1.55	0.06	7 710	9 568	2.10	2.28	2 231	2 783	-0.78	1.94
Norway	3 457	3 742	1.44	0.77	250	241	2.04	-1.11	2 873	3 337	4.72	1.40
Russian Federation	4 265	4 456	3.78	0.39	1 205	1 483	3.11	2.31	1 760	2 267	2.85	4.14
OCEANIA DEVELOPED	788	787	-1.92	-0.01	534	677	3.33	2.47	459	389	-2.47	-1.01
Australia	241	270	-1.40	1.05	476	629	3.00	2.68	59	29	-4.12	-5.49
New Zealand	547	516	-2.14	-0.52	58	48	6.58	0.00	400	360	-2.22	-0.54
OTHER DEVELOPED[1]	5 226	5 535	-2.35	-0.44	4 270	4 258	-0.93	0.21	783	1 085	0.97	2.54
Japan	4 512	4 748	-2.11	-0.55	3 801	3 688	-1.71	0.07	560	844	1.44	2.76
South Africa	576	608	-5.28	-0.34	160	260	12.94	3.56	175	189	-0.32	2.26
DEVELOPING COUNTRIES	**125 488**	**151 592**	**2.98**	**1.47**	**16 494**	**21 146**	**5.87**	**2.10**	**24 626**	**30 484**	**4.03**	**1.76**
AFRICA	8 461	9 819	2.41	1.24	3 716	4 429	6.12	1.75	1 698	1 744	0.79	0.83
NORTH AFRICA	2 651	3 325	3.42	2.04	589	691	7.26	-0.18	433	400	3.09	1.00
Egypt	1 358	1 814	6.10	2.47	356	390	5.14	-1.13	16	3	14.97	-18.78
SUB-SAHARAN AFRICA	5 810	6 494	1.98	0.84	3 127	3 738	5.88	2.14	1 265	1 344	0.08	0.77
Ghana	362	372	-1.26	0.10	281	376	4.35	4.05	14	12	-19.56	-2.00
Nigeria	845	1 060	6.78	2.09	1 318	1 387	5.55	1.29	32	50	27.84	5.07
LATIN AMERICA and CARIBBEAN	15 906	17 321	-1.86	0.39	2 202	2 924	9.92	2.51	3 736	4 884	0.63	2.54
Argentina	786	803	-2.74	0.54	61	78	8.80	2.00	644	716	-1.71	1.54
Brazil	1 372	1 707	4.58	1.99	654	1 070	12.57	4.02	47	100	-12.03	7.78
Chile	3 868	4 404	-2.86	0.47	157	115	18.07	0.00	1 118	1 690	-1.58	3.36
Mexico	1 660	1 776	2.33	-0.05	278	418	7.72	3.05	228	305	5.43	2.83
Peru	5 846	6 156	-4.12	0.02	114	41	11.90	-7.56	577	752	9.80	2.73
ASIA and PACIFIC	101 121	124 452	4.01	1.64	10 576	13 793	5.09	2.13	19 192	23 857	5.19	1.68
China[2]	54 631	68 640	4.15	1.75	3 246	4 436	6.15	2.15	7 801	9 951	6.07	1.99
India	9 108	11 338	5.22	2.03	24	363	15.64	40.34	1 104	1 352	10.79	0.49
Indonesia	8 197	9 969	5.14	1.40	244	464	26.47	5.26	1 239	1 195	3.26	-3.17
Korea	2 250	2 338	1.37	0.67	1 599	1 579	0.16	-0.52	776	681	7.35	-0.71
Philippines	3 260	3 862	2.63	1.27	228	325	11.07	0.22	305	282	6.13	0.41
Thailand	2 928	3 438	-4.53	2.13	1 703	2 063	4.59	1.19	2 520	3 580	2.58	3.92
Viet Nam	5 335	6 459	8.09	1.36	200	325	23.07	3.67	2 155	2 768	13.88	2.13
LEAST DEVELOPED COUNTRIES (LDC)	**11 979**	**14 930**	**5.86**	**1.70**	**717**	**698**	**10.64**	**-0.17**	**1 441**	**1 795**	**1.91**	**2.36**
OECD	**31 613**	**33 113**	**-1.28**	**0.14**	**20 249**	**23 229**	**1.17**	**1.45**	**12 398**	**14 652**	**1.34**	**1.71**
BRICS	**69 952**	**86 748**	**4.15**	**1.70**	**5 290**	**7 613**	**6.21**	**3.05**	**10 887**	**13 859**	**5.59**	**2.19**

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.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861795

Table A.26.2. Fish and seafood projections: Reduction, food use, per capita

Calendar year

	REDUCTION (kt)		Growth (%)[3]		FOOD USE (kt)		Growth (%)[3]		PER CAPITA (kg)		Growth (%)[3]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**15 941**	**15 573**	**-3.85**	**-0.83**	**131 741**	**160 514**	**3.00**	**1.58**	**18.9**	**20.6**	**1.81**	**0.57**
DEVELOPED COUNTRIES	**3 685**	**3 539**	**-5.86**	**-1.54**	**32 120**	**34 587**	**0.24**	**0.57**	**23.3**	**24.2**	**-0.22**	**0.24**
NORTH AMERICA	778	850	0.84	-0.49	7 938	8 416	-0.14	0.42	22.8	22.1	-1.04	-0.39
Canada	52	73	-6.45	1.10	789	797	0.47	-0.28	23.0	21.1	-0.57	-1.12
United States	726	777	1.57	-0.63	7 149	7 618	-0.20	0.49	22.8	22.3	-1.09	-0.31
EUROPE	1 986	1 668	-8.01	-1.32	15 913	17 609	1.55	0.89	21.5	23.6	1.35	0.82
European Union	665	541	-5.76	-1.92	11 120	12 581	0.92	1.37	22.1	24.4	0.53	1.18
Norway	471	326	-10.46	-2.33	265	279	2.36	-0.09	53.9	52.6	1.34	-0.76
Russian Federation	333	301	3.47	-1.08	3 321	3 310	4.03	-0.75	23.3	23.6	4.19	-0.57
OCEANIA DEVELOPED	116	105	-3.68	-2.15	739	970	2.37	2.48	27.4	31.6	0.77	1.33
Australia	37	34	-4.57	-1.58	620	837	2.51	2.76	27.5	32.4	0.82	1.56
New Zealand	79	71	-3.08	-2.41	119	134	1.66	0.92	26.9	27.2	0.52	-0.03
OTHER DEVELOPED[1]	804	917	-6.81	-2.72	7 530	7 592	-1.95	-0.19	28.7	27.8	-2.47	-0.52
Japan	545	527	-8.72	-4.60	6 830	6 865	-2.21	-0.24	54.0	55.3	-2.23	-0.04
South Africa	259	390	-3.52	0.62	302	289	-3.85	-0.12	6.0	5.4	-4.75	-0.56
DEVELOPING COUNTRIES	**12 256**	**12 033**	**-3.19**	**-0.61**	**99 621**	**125 927**	**4.03**	**1.88**	**17.8**	**19.8**	**2.65**	**0.71**
AFRICA	573	666	-1.00	0.87	9 640	11 672	4.16	1.70	9.7	9.1	1.72	-0.58
NORTH AFRICA	359	437	2.91	1.08	2 244	3 075	3.34	2.49	13.4	15.9	1.78	1.23
Egypt	0	0	..	..	1 495	2 100	4.10	2.85	18.1	21.6	2.26	1.37
SUB-SAHARAN AFRICA	214	229	-5.61	0.49	7 396	8 597	4.42	1.43	8.9	7.9	1.79	-1.04
Ghana	0	0	..	..	628	735	1.78	1.99	25.2	23.3	-0.63	-0.13
Nigeria	0	0	..	..	2 132	2 397	5.83	1.57	13.1	11.2	3.21	-0.94
LATIN AMERICA and CARIBBEAN	7 847	7 895	-4.15	-0.59	6 009	7 167	2.87	1.46	10.1	10.8	1.69	0.52
Argentina	0	0	..	..	203	165	-4.36	-2.46	5.0	3.7	-5.20	-3.22
Brazil	63	47	3.91	-2.70	1 916	2 631	7.90	2.69	9.7	12.4	6.86	1.98
Chile	2 258	2 331	-4.28	-0.28	400	449	0.92	1.43	23.1	23.9	-0.06	0.69
Mexico	441	448	6.14	-1.10	1 269	1 441	1.56	0.59	11.1	11.2	0.30	-0.36
Peru	4 685	4 665	-5.68	-0.79	681	779	3.22	1.96	23.2	23.5	2.10	0.88
ASIA and PACIFIC	3 836	3 472	-1.21	-0.90	83 972	107 089	4.10	1.92	21.0	24.2	2.94	1.03
China[2]	1 025	1 019	-8.39	-1.37	46 052	59 106	4.28	1.90	34.2	42.5	3.75	1.63
India	573	541	9.13	1.00	7 305	9 708	4.29	2.85	5.9	6.9	2.81	1.66
Indonesia	71	65	14.24	0.00	6 924	9 173	5.52	2.36	28.6	34.4	4.38	1.51
Korea	77	60	-9.29	-0.35	2 786	3 076	1.06	0.66	57.6	61.5	0.59	0.38
Philippines	0	0	..	..	3 183	3 905	2.83	1.24	33.6	34.5	1.04	-0.34
Thailand	625	543	-6.00	-2.61	1 486	1 377	-4.67	-0.78	21.4	19.0	-5.37	-1.12
Viet Nam	381	344	11.47	-1.93	2 999	3 673	5.40	1.35	33.8	37.6	4.25	0.51
LEAST DEVELOPED COUNTRIES (LDC)	**293**	**302**	**16.28**	**0.00**	**9 974**	**13 123**	**5.99**	**2.10**	**11.7**	**12.2**	**3.66**	**-0.05**
OECD	**5 978**	**5 850**	**-5.12**	**-1.07**	**32 286**	**35 059**	**0.04**	**0.70**	**25.3**	**26.0**	**-0.63**	**0.21**
BRICS	**2 253**	**2 298**	**-3.31**	**-0.52**	**58 895**	**75 043**	**4.31**	**1.90**	**19.8**	**23.3**	**3.38**	**1.23**

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.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861814

Table A.27.1. World dairy projections: Butter and cheese

Calendar year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
BUTTER												
World												
Production	kt pw	9 899	11 025	11 276	11 569	11 845	12 046	12 287	12 536	12 797	13 059	13 348
Consumption	kt pw	9 908	11 009	11 281	11 580	11 871	12 073	12 303	12 552	12 802	13 064	13 352
Stock changes	kt pw	-24	20	0	-6	-21	-22	-12	-12	-2	-2	-1
Price[1]	USD/t	3 943	3 500	3 577	3 548	3 544	3 632	3 659	3 709	3 722	3 718	3 688
Developed countries												
Production	kt pw	4 395	4 576	4 583	4 659	4 761	4 788	4 839	4 885	4 945	4 988	5 055
Consumption	kt pw	3 942	4 084	4 098	4 157	4 255	4 275	4 298	4 332	4 365	4 392	4 439
Developing countries												
Production	kt pw	5 504	6 449	6 693	6 910	7 085	7 257	7 448	7 651	7 852	8 071	8 293
Consumption	kt pw	5 966	6 924	7 183	7 423	7 615	7 798	8 006	8 220	8 437	8 673	8 913
OECD[2]												
Production	kt pw	4 013	4 132	4 140	4 207	4 296	4 308	4 348	4 382	4 431	4 474	4 523
Consumption	kt pw	3 485	3 566	3 569	3 619	3 708	3 720	3 743	3 761	3 784	3 811	3 839
Stock changes	kt pw	-18	20	0	-6	-21	-22	-12	-12	-2	-2	-1
CHEESE												
World												
Production	kt pw	20 357	21 011	21 283	21 548	21 801	22 050	22 327	22 588	22 860	23 094	23 357
Consumption	kt pw	20 425	21 034	21 298	21 571	21 829	22 080	22 357	22 618	22 890	23 123	23 387
Stock changes	kt pw	53	8	18	9	5	2	2	2	3	3	3
Price[3]	USD/t	4 047	3 866	3 946	4 005	4 061	4 168	4 286	4 335	4 394	4 438	4 445
Developed countries												
Production	kt pw	16 389	16 872	17 050	17 266	17 463	17 642	17 822	17 997	18 188	18 354	18 555
Consumption	kt pw	15 887	16 235	16 393	16 571	16 711	16 856	17 015	17 184	17 358	17 495	17 653
Developing countries												
Production	kt pw	3 968	4 139	4 233	4 282	4 339	4 408	4 505	4 590	4 672	4 740	4 802
Consumption	kt pw	4 538	4 799	4 905	5 000	5 118	5 224	5 342	5 434	5 532	5 628	5 734
OECD[2]												
Production	kt pw	15 729	16 185	16 331	16 544	16 712	16 852	17 033	17 203	17 390	17 550	17 739
Consumption	kt pw	15 091	15 437	15 583	15 740	15 866	15 996	16 153	16 301	16 458	16 592	16 735
Stock changes	kt pw	3	13	18	9	5	2	2	2	3	3	3

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand in OECD aggregate.
Average 2010-12est: Data for 2012 are estimated.

1. F.o.b. export price, butter, 82% butterfat, Oceania.
2. Excludes Iceland but includes all EU27 member countries.
3. F.o.b. export price, cheddar cheese, 39% moisture, Oceania.

Source: OECD and FAO Secretariats

StatLink http://dx.doi.org/10.1787/888932861833

Table A.27.2. World dairy projections: Powders and casein

Calendar year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SKIM MILK POWDER												
World												
Production	kt pw	3 617	3 948	4 011	4 073	4 159	4 233	4 300	4 381	4 487	4 556	4 668
Consumption	kt pw	3 648	3 923	4 000	4 058	4 147	4 215	4 282	4 366	4 473	4 543	4 655
Stock changes	kt pw	-41	13	-6	-2	-4	2	3	0	-1	-1	-3
Price[1]	USD/t	3 317	3 472	3 498	3 502	3 503	3 600	3 673	3 704	3 728	3 755	3 733
Developed countries												
Production	kt pw	3 076	3 371	3 413	3 459	3 541	3 608	3 665	3 724	3 792	3 855	3 966
Consumption	kt pw	1 726	1 823	1 828	1 838	1 873	1 897	1 913	1 941	1 973	1 993	2 048
Developing countries												
Production	kt pw	542	577	598	613	619	625	635	656	696	702	702
Consumption	kt pw	1 922	2 100	2 172	2 220	2 274	2 318	2 369	2 425	2 499	2 550	2 607
OECD[2]												
Production	kt pw	2 967	3 214	3 252	3 297	3 372	3 431	3 486	3 543	3 610	3 672	3 780
Consumption	kt pw	1 846	1 924	1 932	1 943	1 980	2 007	2 025	2 055	2 088	2 112	2 165
Stock changes	kt pw	-74	12	0	-3	-4	1	2	0	-1	-1	-3
WHOLE MILK POWDER												
World												
Production	kt pw	4 576	4 973	4 998	5 062	5 146	5 218	5 302	5 386	5 470	5 547	5 639
Consumption	kt pw	4 709	4 972	4 998	5 062	5 146	5 218	5 302	5 386	5 470	5 547	5 639
Stock changes	kt pw	69	1	0	0	0	0	0	0	0	0	0
Price[3]	USD/t	3 600	3 670	3 727	3 717	3 737	3 863	3 930	3 992	4 020	4 056	4 054
Developed countries												
Production	kt pw	2 084	2 280	2 300	2 317	2 349	2 344	2 367	2 387	2 429	2 472	2 529
Consumption	kt pw	557	600	605	606	611	614	619	625	631	634	640
Developing countries												
Production	kt pw	2 492	2 693	2 698	2 745	2 796	2 874	2 935	2 998	3 041	3 075	3 109
Consumption	kt pw	4 152	4 373	4 393	4 456	4 535	4 604	4 683	4 761	4 840	4 913	4 998
OECD[2]												
Production	kt pw	2 359	2 534	2 558	2 582	2 617	2 617	2 647	2 675	2 724	2 772	2 838
Consumption	kt pw	864	862	874	881	893	906	917	929	940	949	960
Stock changes	kt pw	2	0	0	0	0	0	0	0	0	0	0
WHEY POWDER												
Wholesale price, United States[4]	USD/t	1 042	1 139	1 169	1 173	1 176	1 200	1 209	1 231	1 244	1 265	1 273
CASEIN												
Price[5]	USD/t	8 464	8 707	8 820	8 823	8 935	9 127	9 331	9 436	9 508	9 570	9 674

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand in OECD aggregate.
Average 2010-12est: Data for 2012 are estimated.

1. F.o.b. export price, non-fat dry milk, 1.25% butterfat,Oceania.
2. Excludes Iceland but includes all EU27 member countries.
3. F.o.b. export price, WMP 26% butterfat, Oceania.
4. Dry whey, West Region, United States.
5. Export price, New Zealand.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861852

Table A.28.1. Butter projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**9 899**	**13 348**	**2.46**	**2.11**	**822**	**1 008**	**-2.67**	**1.65**	**842**	**1 004**	**-1.20**	**1.66**
DEVELOPED COUNTRIES	**4 395**	**5 055**	**0.75**	**1.14**	**269**	**275**	**-8.70**	**-0.78**	**749**	**891**	**-2.06**	**1.65**
NORTH AMERICA	872	1 076	3.99	1.90	22	18	-5.74	-3.56	56	85	26.38	8.80
Canada	86	86	0.70	0.01	8	8	-5.53	0.00	0	0	-6.86	0.00
United States	786	990	4.41	2.08	14	10	-5.90	-5.67	55	85	27.55	8.82
EUROPE	2 764	3 116	-0.05	1.01	185	183	-10.98	-1.03	212	247	-8.58	2.43
European Union	2 195	2 352	-0.06	0.66	34	44	-12.47	1.52	135	164	-11.93	3.14
Russian Federation	293	433	-0.26	2.78	137	125	-11.56	-1.24	4	3	-7.27	0.00
Ukraine	80	96	-6.17	2.11	6	6	115.96	-9.55	2	1	-33.43	3.13
OCEANIA DEVELOPED	612	685	0.40	0.62	21	24	13.35	0.46	479	557	0.83	0.53
Australia	124	132	-2.89	0.99	20	24	12.74	0.47	59	63	-6.33	1.84
New Zealand	489	553	1.46	0.53	1	1	..	..	419	493	2.23	0.37
OTHER DEVELOPED[1]	147	178	1.15	1.23	42	49	-2.48	0.89	2	2	-1.93	0.71
Japan	68	71	-2.26	0.02	10	12	-4.25	-2.35	0	0	..	..
South Africa	12	13	0.42	0.83	4	3	2.38	-1.99	1	1	3.05	1.86
DEVELOPING COUNTRIES	**5 504**	**8 293**	**4.00**	**2.74**	**553**	**733**	**1.97**	**2.73**	**94**	**113**	**10.26**	**1.73**
AFRICA	267	364	3.18	2.94	159	256	4.16	3.46	7	4	36.72	-1.44
NORTH AFRICA	171	245	2.53	3.22	126	216	3.24	2.92	5	3	71.08	-1.74
Algeria	3	4	3.33	2.39	16	24	1.25	1.92	0	0	0.00	-0.27
Egypt	134	194	2.14	3.29	82	143	8.03	2.51	5	3	107.33	-1.78
SUB-SAHARAN AFRICA	96	119	4.39	2.39	33	40	5.95	6.97	2	1	15.60	-0.69
LATIN AMERICA and CARIBBEAN	247	310	2.61	2.07	48	46	-4.55	-0.74	47	68	12.53	3.39
Argentina	54	64	5.32	1.63	1	0	..	..	20	34	40.16	3.35
Brazil	79	92	0.85	1.31	2	5	15.85	0.80	2	1	19.90	-5.08
Chile	22	32	7.42	3.37	1	1	-14.02	-5.92	3	8	38.55	9.32
Mexico	14	15	-2.64	0.57	23	24	-8.73	1.23	1	1	-2.98	15.16
Uruguay	20	26	2.07	1.72	0	0	44.97	-0.26	17	22	4.91	1.82
ASIA and PACIFIC	4 990	7 618	4.12	2.76	347	431	2.25	2.74	40	41	6.74	-0.23
Bangladesh	1	2	3.77	4.37	1	1	-11.15	-0.47	0	0	-8.33	0.47
China[2]	110	133	1.93	1.38	36	56	17.01	1.12	3	4	112.28	0.00
India	3 755	5 988	4.83	2.84	7	0	-9.78	0.18	9	9	17.34	-0.19
Indonesia	0	0	-11.75	-55.63	15	19	1.22	2.16	1	0	42.52	-0.31
Iran, Islamic Republic of	183	253	0.09	2.06	49	51	-10.28	9.25	2	2	59.24	0.04
Korea	5	7	-3.30	2.57	7	8	26.16	1.27	0	0	..	..
Malaysia	0	0	-11.75	-16.24	14	20	4.60	1.74	4	2	19.57	-0.25
Pakistan	653	840	2.24	2.60	0	0	-5.40	0.32	0	0	54.85	-0.33
Saudi Arabia	5	0	-0.58	-31.24	51	85	0.93	4.53	4	3	-24.17	-0.63
Turkey	156	215	2.98	2.71	13	1	13.16	-18.08	1	1	28.68	1.93
LEAST DEVELOPED COUNTRIES (LDC)	**148**	**197**	**2.24**	**2.79**	**11**	**10**	**-0.65**	**1.75**	**6**	**7**	**42.39**	**0.35**
OECD[3]	**4 013**	**4 523**	**0.90**	**1.03**	**134**	**137**	**-5.24**	**-0.36**	**680**	**822**	**-2.19**	**1.75**
BRICS	**4 249**	**6 660**	**4.24**	**2.78**	**186**	**190**	**-8.18**	**-0.56**	**19**	**18**	**7.27**	**-0.34**

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861871

Table A.28.2. Butter projections: Consumption, per capita

Calendar year

	CONSUMPTION (kt)		Growth (%)[1]		PER CAPITA (kg)		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**9 908**	**13 352**	**2.39**	**2.11**	**1.4**	**1.7**	**1.20**	**1.10**
DEVELOPED COUNTRIES	**3 942**	**4 439**	**0.55**	**0.94**	**2.9**	**3.1**	**0.09**	**0.60**
NORTH AMERICA	839	1 009	2.65	1.32	2.4	2.7	1.72	0.51
Canada	93	92	0.21	-0.19	2.7	2.4	-0.82	-1.03
United States	746	916	2.99	1.48	2.4	2.7	2.07	0.67
EUROPE	2 760	3 053	-0.34	0.80	3.7	4.1	-0.53	0.73
European Union	2 109	2 232	0.71	0.56	4.2	4.3	0.32	0.36
Russian Federation	433	555	-4.64	1.75	3.0	4.0	-4.49	1.93
Ukraine	84	101	-1.73	0.79	1.9	2.4	-1.09	1.34
OCEANIA DEVELOPED	151	153	7.31	0.93	5.6	5.0	5.64	-0.22
Australia	82	93	3.28	0.31	3.6	3.6	1.58	-0.86
New Zealand	70	60	13.65	2.06	15.8	12.2	12.37	1.10
OTHER DEVELOPED[2]	191	225	0.52	1.16	0.7	0.8	-0.02	0.82
Japan	83	83	-1.35	-0.37	0.7	0.7	-1.37	-0.16
South Africa	15	15	0.77	0.01	0.3	0.3	-0.18	-0.43
DEVELOPING COUNTRIES	**5 966**	**8 913**	**3.75**	**2.76**	**1.1**	**1.4**	**2.36**	**1.58**
AFRICA	418	616	3.33	3.19	0.4	0.5	0.90	0.87
NORTH AFRICA	291	457	2.60	3.12	1.7	2.4	1.05	1.85
Algeria	18	28	1.57	1.98	0.5	0.7	0.06	0.82
Egypt	211	334	3.70	3.00	2.5	3.4	1.87	1.52
SUB-SAHARAN AFRICA	127	159	4.81	3.41	0.2	0.1	2.17	0.89
LATIN AMERICA and CARIBBEAN	251	289	0.11	1.29	0.4	0.4	-1.04	0.35
Argentina	36	30	1.16	0.00	0.9	0.7	0.28	-0.78
Brazil	80	97	0.95	1.38	0.4	0.5	-0.02	0.68
Chile	19	25	3.24	1.77	1.1	1.3	2.24	1.02
Mexico	36	38	-6.82	0.78	0.3	0.3	-7.98	-0.18
Uruguay	5	4	2.24	1.13	1.6	1.2	1.99	0.75
ASIA and PACIFIC	5 297	8 008	3.98	2.78	1.3	1.8	2.82	1.88
Bangladesh	2	2	-3.78	3.05	0.0	0.0	-4.91	1.91
China[3]	142	185	4.10	1.33	0.1	0.1	3.58	1.06
India	3 753	5 979	4.82	2.85	3.0	4.2	3.33	1.65
Indonesia	14	19	0.41	2.19	0.1	0.1	-0.68	1.34
Iran, Islamic Republic of	230	301	0.34	3.00	3.1	3.7	-0.83	2.19
Korea	12	16	6.88	1.85	0.3	0.3	6.39	1.57
Malaysia	11	18	2.03	1.98	0.4	0.5	0.28	0.53
Pakistan	652	840	2.23	2.60	3.7	4.0	0.41	0.97
Saudi Arabia	53	82	4.49	3.96	1.9	2.4	1.67	2.04
Turkey	168	215	3.57	2.30	2.3	2.6	2.24	1.33
LEAST DEVELOPED COUNTRIES (LDC)	**153**	**200**	**1.54**	**2.83**	**0.2**	**0.2**	**-0.70**	**0.66**
OECD[4]	**3 485**	**3 839**	**1.42**	**0.85**	**2.7**	**2.8**	**0.73**	**0.36**
BRICS	**4 423**	**6 831**	**3.41**	**2.68**	**1.5**	**2.1**	**2.49**	**2.00**

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand.
Average 2010-12est: Data for 2012 are estimated.
1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861890

Table A.29.1. Cheese projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**20 357**	**23 357**	**1.98**	**1.18**	**2 356**	**2 869**	**5.08**	**2.11**	**2 332**	**2 836**	**5.70**	**2.13**
DEVELOPED COUNTRIES	**16 389**	**18 555**	**1.68**	**1.06**	**1 102**	**1 121**	**2.15**	**0.92**	**1 600**	**2 021**	**2.24**	**2.17**
NORTH AMERICA	5 204	6 296	2.51	1.66	158	155	-5.42	0.23	160	213	12.63	3.19
Canada	381	407	1.33	0.67	22	21	0.83	0.00	9	8	-2.63	-0.47
United States	4 823	5 890	2.61	1.74	136	134	-6.18	0.27	151	205	14.52	3.36
EUROPE	10 189	10 970	1.37	0.62	592	625	4.20	1.38	1 001	1 248	3.36	1.95
European Union	8 998	9 594	1.23	0.52	78	78	-5.12	0.56	705	932	2.73	2.00
Russian Federation	447	554	2.82	1.61	385	435	5.47	2.23	16	25	13.55	0.00
Ukraine	215	220	-0.65	0.90	13	16	20.93	-2.39	73	56	-0.99	2.46
OCEANIA DEVELOPED	658	851	-0.19	2.08	79	84	5.96	1.33	431	552	-2.03	2.28
Australia	343	392	-1.68	0.95	74	80	5.15	1.41	164	181	-3.95	0.77
New Zealand	316	459	1.54	3.17	5	5	..	0.00	267	370	-0.72	3.12
OTHER DEVELOPED[1]	338	438	2.77	1.98	273	257	3.28	0.19	7	9	-1.46	2.83
Japan	46	85	3.66	4.36	212	182	0.24	-0.67	0	0	..	..
South Africa	46	70	2.63	3.87	9	6	9.05	-8.28	2	5	2.42	7.31
DEVELOPING COUNTRIES	**3 968**	**4 802**	**3.31**	**1.68**	**1 255**	**1 748**	**8.41**	**2.96**	**732**	**815**	**20.30**	**2.05**
AFRICA	873	1 002	0.03	1.38	196	330	1.73	6.18	180	210	27.26	4.94
NORTH AFRICA	657	778	-0.19	1.72	128	248	-1.50	5.90	180	210	27.43	4.95
Algeria	2	2	0.00	1.46	22	29	-16.87	1.74	0	0	-19.10	-0.25
Egypt	611	726	-0.43	1.79	51	165	27.12	7.91	157	208	46.22	5.04
SUB-SAHARAN AFRICA	217	223	0.75	0.26	68	82	25.15	7.09	0	0	-4.76	-2.75
LATIN AMERICA and CARIBBEAN	1 937	2 295	5.28	1.35	302	424	9.91	2.61	151	163	5.83	-0.66
Argentina	537	583	5.25	0.27	3	0	..	..	53	46	5.79	-3.74
Brazil	674	838	5.07	1.98	30	17	29.47	-4.80	3	2	-7.17	-0.76
Chile	84	115	3.42	2.60	12	15	10.55	-0.87	10	10	-0.02	0.87
Mexico	174	189	3.68	0.90	92	128	2.33	2.44	0	1	-5.05	0.56
Uruguay	82	103	13.99	1.70	1	1	16.82	-0.49	43	56	9.28	1.74
ASIA and PACIFIC	1 158	1 504	3.15	2.44	757	993	18.44	2.22	401	442	30.08	2.00
Bangladesh	1	1	0.00	3.40	0	0	41.35	1.36	0	0	2.94	-1.35
China[2]	304	391	2.68	2.29	30	102	24.56	9.54	0	0	-12.76	1.27
India	1	1	7.45	-1.73	2	3	57.21	1.08	2	2	26.12	-1.06
Indonesia	0	0	0.00	-3.53	17	25	9.18	3.37	1	1	15.68	-0.47
Iran, Islamic Republic of	251	259	-0.53	0.53	0	0	50.54	0.25	23	19	40.26	-2.98
Korea	26	30	0.73	1.27	71	99	8.25	2.37	0	0	..	..
Malaysia	0	0	0.00	-3.59	13	20	10.59	3.11	0	0	32.93	-0.44
Pakistan	0	0	0.00	8.32	2	3	50.36	1.57	0	0	-20.28	-1.55
Saudi Arabia	75	243	140.73	11.73	194	140	43.01	-3.71	287	350	37.76	3.60
Turkey	169	206	3.07	1.87	11	10	46.90	-2.25	31	41	15.78	2.34
LEAST DEVELOPED COUNTRIES (LDC)	**317**	**354**	**2.07**	**0.87**	**60**	**123**	**33.22**	**6.92**	**0**	**0**	**9.30**	**-1.96**
OECD[3]	**15 729**	**17 739**	**1.62**	**1.02**	**776**	**822**	**-0.01**	**0.67**	**1 413**	**1 823**	**1.83**	**2.11**
BRICS	**1 472**	**1 854**	**3.76**	**1.99**	**456**	**562**	**7.12**	**2.71**	**25**	**35**	**6.61**	**0.67**

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861909

Table A.29.2. Cheese projections: Consumption, per capita

Calendar year

	CONSUMPTION (kt)		Growth (%)[1]		PER CAPITA (kg)		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**20 425**	**23 387**	**1.85**	**1.19**	**2.9**	**3.0**	**0.67**	**0.18**
DEVELOPED COUNTRIES	**15 887**	**17 653**	**1.53**	**0.93**	**11.5**	**12.3**	**1.06**	**0.60**
NORTH AMERICA	5 204	6 235	1.99	1.60	15.0	16.4	1.06	0.79
Canada	395	419	1.63	0.67	11.5	11.1	0.58	-0.17
United States	4 809	5 816	2.02	1.67	15.4	17.0	1.11	0.86
EUROPE	9 777	10 348	1.18	0.51	13.2	13.8	0.98	0.44
European Union	8 371	8 739	0.87	0.37	16.6	17.0	0.48	0.18
Russian Federation	813	963	3.81	1.89	5.7	6.9	3.97	2.07
Ukraine	155	181	0.49	0.13	3.4	4.3	1.14	0.68
OCEANIA DEVELOPED	301	384	2.54	1.64	11.2	12.5	0.94	0.49
Australia	248	290	0.81	1.19	11.0	11.3	-0.85	0.01
New Zealand	54	94	11.80	3.19	12.1	19.1	10.54	2.21
OTHER DEVELOPED[2]	604	686	3.08	1.23	2.3	2.5	2.52	0.89
Japan	258	267	0.84	0.50	2.0	2.2	0.82	0.71
South Africa	53	71	3.63	2.02	1.0	1.3	2.66	1.57
DEVELOPING COUNTRIES	**4 538**	**5 734**	**3.01**	**2.00**	**0.8**	**0.9**	**1.64**	**0.84**
AFRICA	890	1 122	-2.63	1.95	0.9	0.9	-4.92	-0.33
NORTH AFRICA	605	817	-4.50	2.05	3.6	4.2	-5.95	0.79
Algeria	23	31	-16.47	1.72	0.7	0.8	-17.71	0.57
Egypt	504	683	-3.01	2.05	6.1	7.0	-4.72	0.58
SUB-SAHARAN AFRICA	284	305	3.28	1.71	0.3	0.3	0.68	-0.77
LATIN AMERICA and CARIBBEAN	2 087	2 556	5.83	1.69	3.5	3.9	4.61	0.75
Argentina	487	537	5.25	0.72	11.9	12.1	4.33	-0.06
Brazil	701	853	5.67	1.82	3.6	4.0	4.66	1.12
Chile	85	120	4.85	2.24	4.9	6.4	3.84	1.49
Mexico	265	317	3.20	1.49	2.3	2.5	1.92	0.52
Uruguay	40	47	21.45	1.62	11.8	13.5	21.15	1.24
ASIA and PACIFIC	1 562	2 056	4.26	2.43	0.4	0.5	3.10	1.53
Bangladesh	1	2	1.73	3.12	0.0	0.0	0.53	1.99
China[3]	334	493	3.72	3.41	0.2	0.4	3.19	3.14
India	1	1	3.73	3.51	0.0	0.0	2.26	2.31
Indonesia	17	25	8.95	3.52	0.1	0.1	7.77	2.66
Iran, Islamic Republic of	228	240	-1.63	0.87	3.0	2.9	-2.78	0.08
Korea	97	129	5.90	2.10	2.0	2.6	5.41	1.82
Malaysia	13	20	10.32	3.18	0.4	0.6	8.44	1.72
Pakistan	2	3	50.42	1.61	0.0	0.0	47.74	0.00
Saudi Arabia	29	33	-20.68	1.46	1.0	1.0	-22.82	-0.41
Turkey	149	175	2.09	1.47	2.0	2.1	0.77	0.51
LEAST DEVELOPED COUNTRIES (LDC)	**377**	**476**	**3.81**	**2.14**	**0.4**	**0.4**	**1.53**	**-0.01**
OECD[4]	**15 091**	**16 735**	**1.38**	**0.90**	**11.8**	**12.4**	**0.71**	**0.41**
BRICS	**1 901**	**2 382**	**4.44**	**2.16**	**0.6**	**0.7**	**3.51**	**1.49**

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861928

Table A.30.1. Skim milk powder projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**3 617**	**4 668**	**1.43**	**1.87**	**1 624**	**2 156**	**3.98**	**2.13**	**1 704**	**2 171**	**4.72**	**2.11**
DEVELOPED COUNTRIES	**3 076**	**3 966**	**0.98**	**1.80**	**124**	**120**	**-4.04**	**0.16**	**1 566**	**2 039**	**5.09**	**2.25**
NORTH AMERICA	974	1 372	3.51	3.57	3	3	-2.37	0.00	438	707	9.69	5.23
Canada	75	74	-1.15	0.84	3	3	1.80	0.00	10	9	-7.48	-2.51
United States	899	1 298	4.01	3.75	0	0	..	..	428	699	11.12	5.37
EUROPE	1 219	1 571	-0.99	1.05	56	64	-7.74	1.39	579	765	6.35	1.68
European Union	1 036	1 302	0.04	0.89	2	1	-38.20	0.96	485	664	9.68	1.54
Russian Federation	50	111	-8.39	1.55	44	54	-4.16	2.41	1	1	-12.40	0.00
Ukraine	48	50	-10.68	1.77	3	5	70.49	-2.64	19	20	-14.34	2.75
OCEANIA DEVELOPED	712	808	2.59	0.69	9	7	11.03	-0.16	542	560	1.63	0.01
Australia	214	251	1.71	0.85	5	4	3.98	-0.34	141	163	-1.21	1.33
New Zealand	497	557	3.01	0.62	4	3	..	0.08	401	397	2.86	-0.50
OTHER DEVELOPED[1]	172	215	-2.49	1.27	56	46	-1.74	-1.16	7	6	-2.72	-1.26
Japan	144	182	-3.41	1.32	30	9	-3.99	-6.80	0	0	..	..
South Africa	15	20	4.69	2.78	6	8	4.22	-0.67	3	3	17.71	0.68
DEVELOPING COUNTRIES	**542**	**702**	**4.43**	**2.28**	**1 501**	**2 036**	**4.89**	**2.27**	**138**	**132**	**1.68**	**0.22**
AFRICA	3	0	0.00	-32.09	253	318	4.30	2.71	5	4	4.34	-0.52
NORTH AFRICA	0	0	0.00	-4.46	180	222	5.34	2.44	1	1	7.60	-0.44
Algeria	0	0	0.00	1.27	112	120	4.35	2.22	0	0	0.30	-0.31
Egypt	0	0	0.00	-21.01	54	89	11.72	3.14	1	1	8.44	-0.44
SUB-SAHARAN AFRICA	3	0	0.00	-33.36	73	96	3.26	3.37	3	3	3.06	-0.56
LATIN AMERICA and CARIBBEAN	261	325	3.32	1.86	276	376	3.58	1.15	45	46	4.75	0.67
Argentina	35	38	0.94	0.16	0	0	..	..	18	18	1.23	0.33
Brazil	135	169	2.91	1.97	0	26	..	3.14	0	1	-62.06	-0.77
Chile	19	29	8.59	3.66	6	7	-0.08	1.52	3	4	44.83	-1.50
Mexico	33	36	0.62	1.46	209	278	5.01	1.39	1	0	26.97	-21.21
Uruguay	20	24	4.71	1.88	0	0	57.03	-0.27	21	22	7.31	1.90
ASIA and PACIFIC	278	377	5.68	2.81	972	1 342	5.50	2.50	88	81	0.37	0.01
Bangladesh	0	0	0.00	0.35	19	28	8.20	3.66	0	0	-13.97	-0.51
China[2]	56	58	130.56	0.25	129	256	14.40	4.28	0	0	-23.36	0.00
India	210	289	5.18	2.57	26	10	64.24	-10.61	7	0	-39.00	-4.34
Indonesia	0	2	0.00	18.09	134	185	7.63	2.76	1	1	-11.43	-0.39
Iran, Islamic Republic of	0	0	0.00	8.10	9	9	5.76	0.48	6	4	55.42	-0.48
Korea	6	6	-18.97	2.91	20	23	13.18	2.10	1	1	91.71	0.00
Malaysia	0	0	0.00	-0.82	96	129	9.29	2.04	9	11	0.00	-0.29
Pakistan	0	0	0.00	4.44	24	39	23.02	2.09	0	0	-9.54	-0.29
Saudi Arabia	0	18	0.00	75.77	46	47	-1.70	-2.65	35	41	27.51	0.38
Turkey	0	0	0.00	7.73	5	2	-9.36	1.26	3	0	44.37	-1.25
LEAST DEVELOPED COUNTRIES (LDC)	**0**	**0**	**0.00**	**-26.99**	**94**	**132**	**3.41**	**3.45**	**3**	**3**	**8.26**	**-0.47**
OECD[3]	**2 967**	**3 780**	**1.46**	**1.79**	**289**	**338**	**1.78**	**0.90**	**1 491**	**1 953**	**5.90**	**2.20**
BRICS	**466**	**646**	**2.92**	**2.01**	**206**	**353**	**9.61**	**3.33**	**11**	**5**	**-14.29**	**0.26**

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

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Table A.30.2. Skim milk powder projections: Consumption, per capita

Calendar year

	CONSUMPTION (kt)		Growth (%)[1]		PER CAPITA (kg)		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**3 648**	**4 655**	**1.10**	**1.89**	**0.5**	**0.5**	**1.53**	**0.97**
DEVELOPED COUNTRIES	**1 726**	**2 048**	**-2.10**	**1.30**	**1.0**	**1.2**	**-0.34**	**1.09**
NORTH AMERICA	541	671	-1.46	2.05	1.5	1.7	0.44	1.36
Canada	69	69	2.52	1.43	1.1	1.2	-1.29	1.96
United States	471	602	-1.66	2.13	1.5	1.8	0.78	1.32
EUROPE	792	870	-4.11	0.57	0.8	0.8	-2.16	0.41
European Union	635	640	-4.03	0.29	0.8	0.8	-1.33	-0.23
Russian Federation	93	164	-6.09	1.83	0.7	1.2	-5.95	2.01
Ukraine	32	36	-4.44	0.49	0.7	0.8	-3.83	1.04
OCEANIA DEVELOPED	167	252	13.26	2.26	6.1	8.2	11.50	1.11
Australia	67	92	9.38	0.01	2.9	3.6	7.58	-1.16
New Zealand	100	160	16.61	3.80	22.6	32.7	15.29	2.82
OTHER DEVELOPED[2]	227	255	-2.06	0.99	0.8	0.8	-2.22	0.80
Japan	180	191	-3.28	0.68	1.2	1.3	-3.06	1.04
South Africa	18	24	2.39	1.86	0.4	0.5	1.43	1.41
DEVELOPING COUNTRIES	**1 922**	**2 607**	**5.02**	**2.38**	**0.3**	**0.4**	**3.86**	**1.21**
AFRICA	252	314	4.28	2.56	0.3	0.2	1.83	0.26
NORTH AFRICA	179	221	5.33	2.46	1.1	1.1	3.74	1.20
Algeria	112	120	4.35	2.22	3.1	2.9	2.80	1.06
Egypt	52	88	11.85	3.20	0.6	0.9	9.88	1.72
SUB-SAHARAN AFRICA	73	94	3.21	2.81	0.1	0.1	0.61	0.31
LATIN AMERICA and CARIBBEAN	493	655	3.02	1.49	0.8	0.9	1.86	0.50
Argentina	14	20	-1.42	-1.37	0.4	0.4	-2.28	-2.13
Brazil	136	194	3.04	2.11	0.5	0.6	2.18	1.45
Chile	22	32	3.95	3.99	1.3	1.7	2.94	3.23
Mexico	240	313	4.33	1.43	2.1	2.4	3.04	0.47
Uruguay	4	2	4.32	1.60	1.3	0.7	4.06	1.21
ASIA and PACIFIC	1 177	1 638	6.18	2.71	0.3	0.4	5.36	1.82
Bangladesh	19	28	8.34	3.66	0.1	0.2	7.07	2.52
China[3]	184	314	16.62	3.39	0.1	0.2	16.03	3.12
India	229	298	8.96	2.20	0.2	0.2	7.40	1.02
Indonesia	133	186	8.02	2.85	0.5	0.7	6.85	2.00
Iran, Islamic Republic of	3	5	-7.81	1.49	0.0	0.1	-8.89	0.69
Korea	25	28	-4.51	2.36	0.0	0.0	..	..
Malaysia	87	118	10.84	2.28	3.0	3.5	8.95	0.83
Pakistan	24	39	24.50	2.09	0.1	0.2	22.29	0.48
Saudi Arabia	24	24	-12.02	2.77	0.8	0.7	-14.40	0.87
Turkey	5	2	-8.09	1.86	0.1	0.0	-9.28	0.90
LEAST DEVELOPED COUNTRIES (LDC)	**91**	**129**	**3.37**	**3.37**	**0.1**	**0.1**	**1.09**	**1.18**
OECD[4]	**1 846**	**2 165**	**-1.23**	**1.32**	**1.2**	**1.4**	**0.60**	**0.94**
BRICS	**661**	**994**	**5.31**	**2.47**	**0.2**	**0.3**	**4.56**	**1.82**

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861966

Table A.31.1. Whole milk powder projections: Production and trade

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**4 576**	**5 639**	**2.85**	**1.47**	**2 225**	**2 559**	**2.75**	**1.14**	**2 164**	**2 559**	**3.49**	**1.14**
DEVELOPED COUNTRIES	**2 084**	**2 529**	**1.49**	**1.06**	**49**	**82**	**-8.62**	**3.35**	**1 591**	**1 971**	**3.31**	**1.25**
NORTH AMERICA	40	37	2.54	0.67	10	12	-14.01	0.00	10	13	10.81	3.40
Canada	11	9	-5.72	-1.90	4	4	-22.91	0.00	0	1	-5.45	0.00
United States	29	28	8.07	1.62	6	8	3.72	0.00	10	13	..	3.57
EUROPE	829	857	-3.04	0.28	17	42	-11.37	5.10	446	413	-3.00	0.13
European Union	713	695	-2.65	-0.05	2	2	-13.17	-0.12	399	366	-3.43	-0.29
Russian Federation	57	86	-6.56	0.99	9	36	-15.08	7.50	1	3	-12.63	0.00
Ukraine	12	14	-9.78	6.39	1	0	41.13	-17.87	3	3	-21.77	29.38
OCEANIA DEVELOPED	1 172	1 592	6.08	1.55	11	14	6.89	2.46	1 131	1 542	6.96	1.57
Australia	139	150	-4.03	0.99	10	14	6.95	2.60	101	104	-2.48	1.07
New Zealand	1 032	1 442	8.42	1.61	1	1	..	..	1 030	1 439	8.48	1.61
OTHER DEVELOPED[1]	44	44	0.06	-0.04	11	12	-6.92	3.04	3	2	-2.73	-2.46
Japan	13	12	-1.59	-0.36	0	0	..	..	0	0	..	..
South Africa	15	16	-0.11	0.72	2	3	5.91	2.52	3	2	-3.32	-2.46
DEVELOPING COUNTRIES	**2 492**	**3 109**	**4.14**	**1.80**	**2 176**	**2 477**	**3.17**	**1.07**	**573**	**588**	**4.29**	**0.78**
AFRICA	9	1	3.83	-24.71	575	586	3.26	1.19	15	14	7.88	-0.34
NORTH AFRICA	0	0	-9.26	0.21	228	212	4.16	-0.25	1	1	32.08	-0.42
Algeria	0	0	-11.75	2.17	183	163	3.02	-0.98	0	0	3.26	0.14
Egypt	0	0	-11.75	-13.51	29	30	19.14	3.09	1	1	71.18	-0.43
SUB-SAHARAN AFRICA	9	1	3.86	-24.84	347	374	2.95	2.11	14	12	6.68	-0.33
LATIN AMERICA and CARIBBEAN	1 316	1 570	3.82	1.44	345	416	-0.27	1.08	293	336	4.03	1.45
Argentina	264	313	1.96	1.33	1	0	..	..	189	253	3.62	1.67
Brazil	520	629	3.22	1.59	75	55	13.12	-2.76	2	8	-31.23	7.79
Chile	121	151	9.03	2.26	3	7	-14.67	4.51	12	6	7.26	-9.27
Mexico	280	329	7.23	1.87	32	21	-13.91	0.97	8	11	52.44	4.79
Uruguay	38	52	3.35	1.49	0	0	-0.10	-0.21	56	52	11.46	1.49
ASIA and PACIFIC	1 167	1 539	4.53	2.25	1 256	1 475	4.54	1.03	264	238	4.43	-0.06
Bangladesh	0	0	0.00	-3.81	27	30	-1.75	1.91	0	0	0.91	-0.27
China[2]	1 095	1 451	3.85	2.32	349	465	22.17	0.94	6	7	-6.63	2.20
India	3	2	-0.58	1.52	6	6	23.63	2.85	2	1	-6.73	-2.77
Indonesia	66	79	208.22	1.00	59	70	1.37	0.73	12	9	-6.96	-0.73
Iran, Islamic Republic of	0	2	-5.93	3.34	3	2	-11.01	-0.54	2	2	62.47	0.54
Korea	2	5	-9.93	5.30	3	2	3.39	4.21	0	0	-41.82	0.00
Malaysia	0	0	0.00	-3.64	26	30	-12.65	1.40	12	13	-3.56	-0.20
Pakistan	0	0	0.00	2.50	3	2	3.61	0.14	2	2	31.90	-0.14
Saudi Arabia	0	0	0.00	-0.06	113	135	2.98	1.79	19	15	3.75	-0.25
Turkey	0	0	0.00	-0.14	1	1	-37.34	1.65	1	0	18.40	-1.63
LEAST DEVELOPED COUNTRIES (LDC)	**0**	**0**	**-2.38**	**-3.25**	**227**	**255**	**1.08**	**1.88**	**7**	**7**	**6.22**	**-0.20**
OECD[3]	**2 359**	**2 838**	**2.77**	**1.17**	**66**	**63**	**-10.87**	**1.49**	**1 565**	**1 940**	**3.47**	**1.16**
BRICS	**1 689**	**2 185**	**3.05**	**2.04**	**442**	**566**	**16.81**	**0.78**	**14**	**22**	**-11.83**	**2.33**

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932861985

Table A.31.2. Whole milk powder projections: Consumption, per capita

Calendar year

	CONSUMPTION (kt)		Growth (%)[1]		PER CAPITA (kg)		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**4 709**	**5 639**	**2.69**	**1.47**	**0.7**	**0.7**	**1.51**	**0.46**
DEVELOPED COUNTRIES	**557**	**640**	**-3.30**	**0.73**	**0.4**	**0.4**	**-3.75**	**0.40**
NORTH AMERICA	40	36	-5.63	-0.41	0.1	0.1	-6.48	-1.21
Canada	14	13	-13.27	-1.36	0.4	0.3	-14.17	-2.19
United States	25	23	4.39	0.13	0.1	0.1	3.46	-0.66
EUROPE	412	486	-3.04	0.75	0.6	0.7	-3.23	0.69
European Union	315	331	-1.69	0.23	0.6	0.6	-2.08	0.03
Russian Federation	65	119	-7.96	2.58	0.5	0.8	-7.82	2.76
Ukraine	10	12	-0.77	1.39	0.2	0.3	-0.13	1.94
OCEANIA DEVELOPED	53	64	-4.76	1.28	2.0	2.1	-6.24	0.13
Australia	50	60	-4.88	1.19	2.2	2.3	-6.45	0.01
New Zealand	3	4	-2.54	2.60	0.7	0.8	-3.64	1.63
OTHER DEVELOPED[2]	52	54	-1.59	0.73	0.2	0.2	-2.12	0.39
Japan	13	12	-1.63	-0.36	0.1	0.1	-1.65	-0.16
South Africa	14	17	1.69	1.63	0.3	0.3	0.73	1.18
DEVELOPING COUNTRIES	**4 152**	**4 998**	**3.75**	**1.56**	**0.7**	**0.8**	**2.39**	**0.40**
AFRICA	569	573	3.16	1.08	0.6	0.4	0.74	-1.18
NORTH AFRICA	227	211	4.09	-0.25	1.4	1.1	2.52	-1.47
Algeria	183	162	3.02	-0.98	5.1	4.0	1.49	-2.10
Egypt	28	28	18.28	3.31	0.3	0.3	16.18	1.82
SUB-SAHARAN AFRICA	342	362	2.85	1.95	0.4	0.3	0.26	-0.53
LATIN AMERICA and CARIBBEAN	1 386	1 650	2.69	1.34	2.3	2.5	1.50	0.40
Argentina	76	60	-0.73	0.00	1.9	1.3	-1.59	-0.78
Brazil	593	677	4.23	1.10	3.0	3.2	3.23	0.40
Chile	112	152	7.41	3.16	6.5	8.1	6.37	2.41
Mexico	303	339	2.42	1.73	2.6	2.6	1.15	0.76
Uruguay	0	0	-58.92	1.51	0.0	0.0	-59.02	1.13
ASIA and PACIFIC	2 197	2 775	4.73	1.80	0.5	0.6	3.59	0.90
Bangladesh	27	30	-1.75	1.91	0.2	0.2	-2.90	0.79
China[3]	1 438	1 908	6.54	1.97	1.1	1.4	6.00	1.71
India	7	8	6.87	3.06	0.0	0.0	5.35	1.86
Indonesia	113	141	18.57	0.98	0.5	0.5	17.29	0.14
Iran, Islamic Republic of	3	2	-6.81	1.70	0.0	0.0	-7.90	0.91
Korea	5	7	-4.21	4.92	0.0	0.0	..	..
Malaysia	14	17	-17.81	2.79	0.5	0.5	-19.21	1.33
Pakistan	4	0	-1.94	2.24	0.0	0.0	-3.69	0.62
Saudi Arabia	94	120	3.61	2.07	3.4	3.5	0.81	0.19
Turkey	2	1	-8.01	1.68	0.0	0.0	-9.20	0.72
LEAST DEVELOPED COUNTRIES (LDC)	**221**	**250**	**0.93**	**1.95**	**0.3**	**0.2**	**-1.30**	**-0.21**
OECD[4]	**864**	**960**	**0.01**	**1.23**	**0.7**	**0.7**	**-0.63**	**0.72**
BRICS	**2 118**	**2 729**	**5.08**	**1.77**	**0.7**	**0.8**	**4.15**	**1.10**

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932862004

Table A.32. Milk projections: Production, inventories, yield

Calendar year

	PRODUCTION (kt)		Growth (%)[4]		INVENTORIES ('000 hd)		Growth (%)[4]		YIELD (t/hd)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**737 135**	**905 166**	**2.34**	**1.78**	**650 352**	**748 610**	**1.95**	**1.21**	**1.1**	**1.2**	**0.38**	**0.57**
DEVELOPED COUNTRIES	**368 043**	**412 228**	**0.77**	**0.98**	**77 179**	**77 022**	**-0.52**	**0.02**	**4.8**	**5.4**	**1.30**	**0.96**
NORTH AMERICA	97 394	112 629	1.65	1.49	10 121	9 793	0.07	-0.33	9.6	11.5	1.58	1.82
Canada	8 596	9 247	0.57	0.56	968	898	-0.98	-0.85	8.9	10.3	1.57	1.42
United States	88 798	103 382	1.76	1.57	9 154	8 894	0.19	-0.27	9.7	11.6	1.57	1.85
EUROPE	211 646	227 312	0.07	0.58	43 424	39 454	-2.08	-0.66	4.9	5.8	2.19	1.25
European Union	151 304	158 974	0.21	0.34	22 877	22 206	-1.37	-0.12	6.6	7.2	1.61	0.47
Russian Federation	31 649	36 217	-0.19	0.96	8 944	7 383	-1.97	-2.24	3.5	4.9	1.82	3.28
Ukraine	11 178	12 465	-2.82	1.79	3 891	3 254	-4.19	-0.79	2.9	3.8	1.43	2.60
OCEANIA DEVELOPED	27 811	34 425	1.80	1.32	6 306	7 143	0.78	0.63	4.4	4.8	1.02	0.68
Australia	9 486	10 844	-1.39	1.03	1 605	1 649	-3.12	-0.09	5.9	6.6	1.78	1.12
New Zealand	18 324	23 581	3.83	1.46	4 701	5 494	2.46	0.86	3.9	4.3	1.34	0.59
OTHER DEVELOPED[1]	31 192	37 862	2.18	1.69	17 327	20 632	3.42	1.41	1.8	1.8	-1.20	0.28
Japan	7 619	7 523	-1.22	-0.27	939	874	-1.70	-0.70	8.1	8.6	0.48	0.44
South Africa	3 245	3 783	2.41	1.47	1 036	1 145	4.14	0.71	3.1	3.3	-1.66	0.76
DEVELOPING COUNTRIES	**369 093**	**492 938**	**4.14**	**2.50**	**583 926**	**684 790**	**2.36**	**1.36**	**0.6**	**0.7**	**1.74**	**1.12**
AFRICA	39 092	50 818	3.59	2.37	220 520	263 131	2.73	1.47	0.2	0.2	0.83	0.88
NORTH AFRICA	12 085	16 496	4.26	2.56	42 105	51 512	4.25	1.19	0.3	0.3	0.01	1.35
Algeria	2 839	4 310	7.65	2.34	16 593	22 709	7.85	1.08	0.2	0.2	-0.18	1.25
Egypt	5 825	7 520	2.99	2.65	6 375	6 314	-0.03	0.52	0.9	1.2	3.02	2.11
SUB-SAHARAN AFRICA	27 007	34 322	3.30	2.28	178 415	211 620	2.40	1.54	0.2	0.2	0.88	0.73
LATIN AMERICA and CARIBBEAN	84 178	106 646	3.35	1.96	47 852	52 841	1.27	0.87	1.8	2.0	2.05	1.08
Argentina	11 014	15 378	3.19	2.69	2 375	2 651	2.02	0.95	4.6	5.8	1.14	1.72
Brazil	32 235	38 838	3.68	1.67	23 212	27 622	2.19	1.49	1.4	1.4	1.45	0.17
Chile	2 628	3 601	2.24	2.81	1 311	1 103	-4.63	-1.05	2.0	3.3	7.20	3.90
Mexico	11 183	12 166	1.41	0.58	2 375	2 457	1.09	0.37	4.7	5.0	0.31	0.21
Uruguay	2 134	2 886	4.84	1.65	797	880	0.96	0.60	2.7	3.3	3.85	1.05
ASIA and PACIFIC	245 822	335 473	4.51	2.69	315 554	368 818	2.27	1.36	0.8	0.9	2.20	1.32
Bangladesh	3 588	6 003	5.35	4.30	38 208	57 815	6.38	3.33	0.1	0.1	-0.96	0.94
China[2]	42 832	57 968	7.10	2.38	13 037	15 988	5.87	1.62	3.3	3.6	1.16	0.75
India	127 182	176 404	4.90	2.85	112 348	130 344	1.98	1.18	1.1	1.4	2.86	1.65
Indonesia	1 315	1 723	6.48	1.87	12 236	13 555	4.88	0.46	0.1	0.1	1.53	1.40
Iran, Islamic Republic of	7 451	9 549	1.73	1.74	38 253	40 167	1.70	0.50	0.2	0.2	0.03	1.23
Korea	1 959	2 092	-2.17	0.78	229	244	-3.09	0.67	8.6	8.6	0.94	0.11
Malaysia	60	69	3.95	2.10	150	137	6.52	0.28	0.4	0.5	-2.41	1.82
Pakistan	33 264	41 539	2.08	2.60	27 014	27 769	1.81	1.02	1.2	1.5	0.26	1.56
Saudi Arabia	2 007	3 594	8.31	5.24	4 302	3 593	-2.52	-0.87	0.5	1.0	11.10	6.16
Turkey	15 035	22 349	4.65	2.60	18 171	20 834	-0.11	0.61	0.8	1.1	4.77	1.97
LEAST DEVELOPED COUNTRIES (LDC)	**30 085**	**40 932**	**3.32**	**2.83**	**227 366**	**285 726**	**3.43**	**1.95**	**0.1**	**0.1**	**-0.10**	**0.86**
OECD[3]	**321 966**	**360 961**	**0.96**	**0.93**	**63 564**	**65 822**	**-0.61**	**0.14**	**5.1**	**5.5**	**1.58**	**0.78**
BRICS	**237 144**	**313 211**	**4.21**	**2.36**	**158 577**	**182 482**	**2.02**	**1.10**	**1.5**	**1.7**	**2.15**	**1.25**

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932862023

Table A.33. Whey powder and casein projections

Calendar year

		Average 2010-12est.	2022	Growth (%)[2] 2003-12	Growth (%)[2] 2013-22
AUSTRALIA					
Net trade, whey	kt pw	84.5	84.0	1.28	-0.42
Exports, casein	kt pw	6.2	5.1	-14.40	1.03
CANADA					
Net trade, whey	kt pw	17.2	20.7	29.22	0.03
EUROPEAN UNION					
Net trade, whey	kt pw	301.9	362.0	1.06	1.26
Casein					
Production	kt pw	141.0	175.3	-3.25	2.39
Consumption	kt pw	94.3	109.3	-6.18	2.68
Net trade	kt pw	46.7	66.0	4.27	1.92
JAPAN					
Net trade, whey	kt pw	-53.9	-78.0	0.32	3.53
Casein imports	kt pw	13.8	12.7	-3.55	0.00
KOREA					
Net trade, whey	kt pw	-31.5	-30.7	-2.99	0.87
MEXICO					
Net trade, whey	kt pw	-32.0	-25.9	-3.77	-1.36
NEW ZEALAND					
Net trade, whey	kt pw	6.9	11.4	6.32	4.04
Exports, casein	kt pw	146.0	168.2	-0.17	0.16
UNITED STATES					
Whey					
Production	kt pw	483.0	500.1	-0.02	0.31
Consumption	kt pw	291.6	208.8	-0.98	-2.94
Exports	kt pw	192.3	291.3	1.97	3.46
Imports, casein	kt pw	98.0	148.5	-1.64	2.36
ARGENTINA					
Net trade, whey	kt pw	52.1	124.9	34.09	6.18
BRAZIL					
Net trade, whey	kt pw	-25.6	-31.2	-0.08	2.41
CHINA[1]					
Net trade, whey	kt pw	-329.0	-585.4	9.93	4.43
RUSSIAN FEDERATION					
Net trade, whey	kt pw	-54.3	-70.7	6.18	2.39

Note: Calendar year: Year ending 30 June for Australia and 31 May for New Zealand.
Average 2010-12est: Data for 2012 are estimated.

1. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
2. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932862042

Table A.34. Main policy assumptions for dairy markets

Calendar year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
CANADA												
Milk target price[1]	CADc/litre	73.9	76.2	77.6	78.5	79.7	81.1	82.4	83.8	85.1	86.1	87.2
Butter support price	CAD/t	7 194.6	7 398.8	7 509.7	7 622.4	7 736.7	7 852.8	7 970.6	8 090.1	8 211.5	8 334.7	8 459.7
SMP support price	CAD/t	6 311.3	6 461.6	6 442.1	6 414.5	6 607.5	6 851.3	6 984.4	7 139.6	7 256.5	7 363.8	7 487.4
Cheese tariff-quota	kt pw	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4
In-quota tariff	%	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
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
Subsidised export limits[2]												
Cheese	kt pw	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
SMP	kt pw	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
EUROPEAN UNION[3]												
Milk quota	kt pw	147 912	150 446	150 446	0	0	0	0	0	0	0	0
Butter reference price[4]	EUR/t	2 463.9	2 463.9	2 463.9	2 463.9	2 463.9	2 463.9	2 463.9	2 463.9	2 463.9	2 463.9	2 463.9
SMP intervention price	EUR/t	1 698.0	1 698.0	1 698.0	1 698.0	1 698.0	1 698.0	1 698.0	1 698.0	1 698.0	1 698.0	1 698.0
Butter tariff-quotas	kt pw	86.4	86.4	86.4	86.4	86.4	86.4	86.4	86.4	86.4	86.4	86.4
Cheese tariff-quotas	kt pw	107.0	107.0	107.0	107.0	107.0	107.0	107.0	107.0	107.0	107.0	107.0
SMP tariff-quota	kt pw	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5
Subsidised export limits[2]												
Butter	kt pw	411.6	411.6	411.6	411.6	411.6	411.6	411.6	411.6	411.6	411.6	411.6
Cheese	kt pw	331.7	331.7	331.7	331.7	331.7	331.7	331.7	331.7	331.7	331.7	331.7
SMP	kt pw	323.4	323.4	323.4	323.4	323.4	323.4	323.4	323.4	323.4	323.4	323.4
JAPAN												
Direct payments	JPY/kg	12.0	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2
Cheese tariff[5]	%	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2
Tariff-quotas												
Butter	kt pw	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
In-quota tariff	%	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Out-of-quota tariff	%	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6	732.6
SMP	kt pw	115.7	115.7	115.7	115.7	115.7	115.7	115.7	115.7	115.7	115.7	115.7
In-quota tariff	%	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Out-of-quota tariff	%	210.4	210.4	210.4	210.4	210.4	210.4	210.4	210.4	210.4	210.4	210.4
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

Table A.34. Main policy assumptions for dairy markets *(cont.)*

Calendar year

		Average 2010-12est	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
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	%	125.1	100.0	75.0	60.0	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	%	104.4	63.0	60.0	60.0	50.0	45.0	45.0	45.0	45.0	45.0	45.0
Liconsa social program	MXN mn	1 176.8	1 180.0	1 180.0	1 180.0	1 180.0	1 180.0	1 180.0	1 180.0	1 180.0	1 180.0	1 180.0
RUSSIAN FEDERATION												
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												
Milk support price[1]	USDc/litre	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Target price[6]	USDc/litre	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3	37.3
Butter support price	USD/t	2 315.0	2 315.0	2 315.0	2 315.0	2 315.0	2 315.0	2 315.0	2 315.0	2 315.0	2 315.0	2 315.0
SMP support price	USD/t	1 763.7	1 763.7	1 763.7	1 763.7	1 763.7	1 763.7	1 763.7	1 763.7	1 763.7	1 763.7	1 763.7
Butter tariff-quota	kt pw	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1
In-quota tariff	%	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
Out-of-quota tariff	%	112.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0
Cheese tariff-quota	kt pw	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
In-quota tariff	%	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
Out-of-quota tariff	%	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0
Subsidised export limits[2]												
Butter	kt pw	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
SMP	kt pw	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0
INDIA												
Milk tariff	%	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
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	%	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Whole milk powder tariff	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
SOUTH AFRICA												
Milk powder tariff-quota	kt pw	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
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	%	80.8	80.8	80.8	80.8	80.8	80.8	80.8	80.8	80.8	80.8	80.8

Note: The source for tariffs and Tariff Rate Quotas (except Russia) is AMAD (Agricultural market access database). The tariff and TRQ data are based on Most Favoured Nation rates scheduled with the WTO and exclude those under preferential or regional agreements, which may be substantially different. Tariffs are simple averages of several product lines. Specific rates are converted to ad valorem rates using world prices in the Outlook. Import quotas are based on global commitments scheduled in the WTO rather than those allocated to preferential partners under regional or other agreements.

Average 2010-12est: Data for 2012 are estimated.

1. For manufacturing milk.
2. It is assumed that no export subsidies will be granted for dairy products over the projection period.
3. EU farmers also benefit from the Single Farm Payment (SFP) Scheme, which provides flat-rate payments independent from current production decisions and market developments. For the new member states, payments are phased in with the assumption of maximum top-ups from national budgets up to 2013 through the Single Area Payment Scheme (SAPS). Due to modulation, an increasing share of the total SFP will go to rural development spending rather than directly to farmers.
4. Intervention can take place when the butter price is below 90% of the reference price.
5. Excludes processed cheese.
6. The counter-cyclical payment for milk is determined as a percentage difference between the target price and the Boston class I price. The difference is set at 34% in 2007 and 2008, at 45% in 2009-2012 and 34% thereafter. The target price is adjusted by 45% of the percentage difference between the National Average Dairy Feed Rations Cost and the target cost of feed rations of 16.20 USD/100kg between 2009 and 2012 and 20.94 USD/100kg thereafter.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932862061

Table A.35. World cotton projections

Crop year

		Average 2010/11-2012/13est	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
WORLD												
Production	mt	26.2	23.5	24.4	24.6	24.8	25.0	25.7	26.3	26.6	26.9	27.2
Area	mha	33.1	31.6	32.6	32.8	32.9	33.2	34.0	34.6	34.8	35.1	35.4
Yield	t/ha	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Consumption	mt	23.5	23.9	24.4	24.8	25.2	25.6	26.1	26.6	27.1	27.4	27.7
Closing stocks	mt	13.4	16.6	16.9	17.1	17.0	16.6	16.5	16.5	16.3	16.2	16.0
Price[1]	USD/t	2 344.2	1 788.4	1 795.5	1 914.8	1 954.0	1 947.9	1 923.7	1 892.3	1 890.7	1 885.3	1 935.2
DEVELOPED COUNTRIES												
Production	mt	6.5	5.6	6.1	6.1	6.0	5.9	6.1	6.2	6.2	6.3	6.3
Consumption	mt	1.7	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0
Closing stocks	mt	2.2	2.5	2.6	2.6	2.7	2.5	2.6	2.6	2.6	2.6	2.6
DEVELOPING COUNTRIES												
Production	mt	19.6	17.8	18.4	18.5	18.7	19.1	19.6	20.1	20.3	20.6	20.9
Consumption	mt	21.9	22.2	22.7	23.0	23.4	23.8	24.3	24.7	25.2	25.5	25.8
Closing stocks	mt	11.2	14.2	14.4	14.4	14.3	14.1	14.0	13.9	13.7	13.5	13.4
OECD[2]												
Production	mt	5.9	4.9	5.3	5.3	5.2	5.1	5.3	5.4	5.4	5.4	5.4
Consumption	mt	3.0	3.1	3.2	3.2	3.2	3.3	3.3	3.4	3.4	3.4	3.5
Closing stocks	mt	2.0	2.2	2.3	2.4	2.4	2.3	2.3	2.4	2.4	2.4	2.3

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010/11-2012/13est: Data for 2012/13 are estimated.

1. Cotlook A index, Middling 1 3/32", c.f.r. far Eastern ports (August/July)
2. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932862080

Table A.36.1. Cotton projections: Production and trade

Crop year

	PRODUCTION (kt)		Growth (%)[4]		IMPORTS (kt)		Growth (%)[4]		EXPORTS (kt)		Growth (%)[4]	
	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22	Average 2010-12est	2022	2003-12	2013-22
WORLD	**26 160**	**27 220**	**0.70**	**1.59**	**8 490**	**8 482**	**0.71**	**1.02**	**8 436**	**8 164**	**0.54**	**1.02**
DEVELOPED COUNTRIES	**6 528**	**6 270**	**-2.33**	**0.86**	**418**	**406**	**-14.41**	**-0.16**	**4 816**	**4 742**	**-1.70**	**0.28**
NORTH AMERICA	3 710	3 663	-3.98	1.21	4	2	-34.95	-2.07	2 735	2 821	-2.56	0.95
Canada	0	0	..	..	1	1	-41.61	-5.37	0	0	..	..
United States	3 710	3 663	-3.98	1.21	2	1	..	0.29	2 735	2 821	-2.56	0.95
EUROPE	305	293	-6.58	-0.43	316	309	-14.69	-0.10	276	270	-4.98	-0.37
European Union	304	292	-6.61	-0.43	206	202	-15.63	-0.39	274	269	-4.98	-0.37
Russian Federation	1	1	0.16	0.30	105	101	-13.00	0.51	0	0	..	0.00
Ukraine	1	1	0.00	-0.20	1	1	0.00	0.19	1	1	0.00	-0.19
OCEANIA DEVELOPED	1 013	891	10.84	0.86	0	0	21.27	0.24	870	883	9.06	0.22
Australia	1 013	891	10.84	0.86	0	0	21.27	0.24	870	883	9.06	0.22
New Zealand	0	0	..	..	0	0	..	..	0	0	..	..
OTHER DEVELOPED[1]	1 500	1 422	-2.24	0.34	98	96	-10.70	-0.31	935	769	-4.69	-1.55
Japan	0	0	..	..	68	61	-12.01	-0.10	0	0	..	..
South Africa	13	10	-8.23	2.33	22	28	-6.58	-0.95	16	20	107.24	0.14
DEVELOPING COUNTRIES	**19 632**	**20 950**	**1.84**	**1.82**	**8 072**	**8 075**	**2.45**	**1.08**	**3 619**	**3 422**	**4.22**	**2.16**
AFRICA	1 347	2 242	-4.27	5.29	91	76	-4.58	-3.35	1 055	2 116	-4.96	5.90
NORTH AFRICA	145	132	-7.70	2.01	71	60	-4.59	-3.72	90	116	-3.16	4.06
Algeria	0	0	-13.20	-0.48	4	4	-17.83	-0.76	0	0	0.00	0.76
Egypt	145	132	-7.70	2.01	67	57	-2.98	-3.90	90	116	-3.16	4.06
SUB-SAHARAN AFRICA	1 203	2 110	-3.83	5.53	20	15	-5.35	-1.70	965	2 000	-5.11	6.02
LATIN AMERICA and CARIBBEAN	2 320	2 337	3.04	2.22	457	499	-6.55	1.45	840	798	9.05	2.91
Argentina	223	208	6.47	2.46	8	13	-18.78	-0.70	50	15	22.29	-5.77
Brazil	1 778	1 810	3.66	2.38	59	5	-17.53	0.16	715	696	12.76	3.39
Chile	0	0	0.00	-0.21	1	1	-32.69	0.17	0	0	0.00	-0.17
Mexico	211	208	8.69	1.03	244	328	-6.16	2.25	61	61	5.53	-0.36
Uruguay	1	1	0.00	-0.22	1	1	0.00	0.20	1	1	0.00	-0.19
ASIA and PACIFIC	15 964	16 371	2.33	1.36	7 524	7 500	3.33	1.11	1 724	508	14.27	-7.07
Bangladesh	14	17	0.18	2.56	771	1 275	7.43	5.56	0	0	0.00	-0.40
China[2]	6 933	5 780	1.38	-0.88	3 617	1 947	6.43	-1.51	13	4	-9.99	-1.38
India	5 810	7 267	6.27	3.30	124	261	-2.48	10.85	1 363	123	25.46	-17.16
Indonesia	6	7	0.79	0.58	462	502	0.48	0.33	4	4	116.98	-0.05
Iran, Islamic Republic of	59	71	-9.23	1.42	69	63	20.81	-0.70	0	0	-59.93	0.05
Korea	0	0	..	..	245	303	-1.15	0.82	0	0	..	..
Malaysia	0	0	0.00	-0.09	154	191	16.56	-0.61	119	171	153.16	0.09
Pakistan	2 116	2 500	0.57	2.73	304	564	-4.13	-0.23	173	86	15.76	0.22
Saudi Arabia	1	1	0.00	-0.33	1	1	0.00	0.24	1	1	0.00	-0.24
Turkey	610	331	-5.80	-2.52	675	1 190	0.77	2.64	7	6	-20.82	-0.52
LEAST DEVELOPED COUNTRIES (LDC)	**1 071**	**1 716**	**-2.32**	**4.94**	**784**	**1 289**	**7.37**	**5.46**	**655**	**1 413**	**-6.54**	**6.35**
OECD[3]	**5 861**	**5 400**	**-2.54**	**0.76**	**1 447**	**2 091**	**-5.80**	**1.87**	**3 962**	**4 052**	**-0.92**	**0.65**
BRICS	**14 535**	**14 867**	**3.37**	**1.38**	**3 927**	**2 341**	**4.07**	**-0.54**	**2 107**	**844**	**17.98**	**-3.29**

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010-12est: Data for 2012 are estimated.

1. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
3. Excludes Iceland but includes all EU27 member countries.
4. Least-squares growth rate (see glossary).

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932862099

Table A.36.2. Cotton projections: Consumption

Crop year

	CONSUMPTION (kt)		Growth (%)[1]	
	Average 2010-12est	2022	2003-12	2013-22
WORLD	**23 528**	**27 710**	**-0.02**	**1.70**
DEVELOPED COUNTRIES	**1 675**	**1 960**	**-8.51**	**1.54**
NORTH AMERICA	771	869	-8.50	1.53
Canada	2	1	-40.88	-5.40
United States	769	868	-7.99	1.54
EUROPE	339	332	-15.48	-0.49
European Union	222	225	-16.85	-1.01
Russian Federation	112	102	-12.51	0.74
Ukraine	1	1	0.00	0.17
OCEANIA DEVELOPED	8	9	-7.35	0.61
Australia	8	9	-7.35	0.61
New Zealand	0	0	..	..
OTHER DEVELOPED[2]	557	749	-0.50	2.60
Japan	69	61	-11.98	-0.41
South Africa	20	17	-14.00	-0.50
DEVELOPING COUNTRIES	**21 853**	**25 750**	**0.97**	**1.71**
AFRICA	240	190	-7.88	-2.28
NORTH AFRICA	118	76	-7.87	-4.21
Algeria	4	4	-17.55	-0.76
Egypt	113	72	-7.31	-4.36
SUB-SAHARAN AFRICA	123	114	-7.95	-0.69
LATIN AMERICA and CARIBBEAN	1 713	1 964	-0.80	1.32
Argentina	172	204	2.36	1.44
Brazil	914	1 047	0.27	1.30
Chile	2	1	-28.47	0.17
Mexico	388	474	-1.97	1.78
Uruguay	1	1	0.00	0.16
ASIA and PACIFIC	19 899	23 596	1.30	1.78
Bangladesh	764	1 292	7.44	5.52
China[3]	8 843	7 954	0.81	-0.44
India	4 516	7 404	4.51	4.59
Indonesia	464	505	0.09	0.33
Iran, Islamic Republic of	132	134	1.69	0.38
Korea	241	303	-1.62	0.92
Malaysia	37	20	-3.90	-4.87
Pakistan	2 200	2 978	-0.30	2.19
Saudi Arabia	1	1	0.00	0.15
Turkey	1 278	1 514	-2.19	1.25
LEAST DEVELOPED COUNTRIES (LDC)	**1 052**	**1 581**	**7.76**	**4.23**
OECD[4]	**2 983**	**3 463**	**-6.13**	**1.17**
BRICS	**14 404**	**16 524**	**1.57**	**1.67**

Note: Crop year: Beginning crop marketing year - see Glossary of Terms for definitions.
Average 2010-12est: Data for 2012 are estimated.

1. Least-squares growth rate (see glossary).
2. Includes Israel and also transition economies: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan and Georgia.
3. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Other Asia Pacific aggregate.
4. Excludes Iceland but includes all EU27 member countries.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932862118

Table A.37. Main policy assumptions for cotton markets

Crop year

		Average 2010/11-2012/13est	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
ARGENTINA												
Export tax equivalent of export barriers	%	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
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	2 973.3	2 973.3	2 973.3	2 973.3	2 973.3	2 973.3	2 973.3	2 973.3	2 973.3	2 973.3	2 973.3
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	900.0	900.0	900.0	900.0	900.0	900.0	900.0	900.0	900.0	900.0	900.0
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
INDIA												
Minimum support price	INR/t	32 833.3	38 500.0	38 500.0	38 500.0	40 271.1	41 452.8	43 061.4	44 677.5	46 327.2	48 169.3	51 031.4
Tariff equivalent of import barriers	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAPAN												
Tariff equivalent of import barriers	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KOREA												
Tariff equivalent of import barriers	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MEXICO												
Tariff equivalent of import barriers	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RUSSIAN FEDERATION												
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
UNITED STATES												
ACRE participation rate	%	0.8	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Loan rate, upland cotton	USD/t	1 146.4	1 146.4	1 146.4	1 146.4	1 146.4	1 146.4	1 146.4	1 146.4	1 146.4	1 146.4	1 146.4
Production flexibility contract payments	USD/t	147.0	147.0	147.0	147.0	147.0	147.0	147.0	147.0	147.0	147.0	147.0
CRP area	Mn ha	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Economic Adjustment Assistance payment level	USD/t	80.8	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
TURKEY												
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

Note: Average 2010/11-2012/13est: Data for 2012/13 are estimated.

1. If the area is higher than the ceiling, the amount is proportionally reduced.

Source: OECD and FAO Secretariats.

StatLink http://dx.doi.org/10.1787/888932862137

Table B.1. Information on food price changes

	Total inflation % change (year-on-year)		Food inflation % change (year-on-year)[2]		Expenditure share of food		Food contribution to total change in inflation[3]	
	2012	2013	2012	2013	2012	2013	2012	2013
OECD								
Australia[1]	1.6	..	-4.9	..	12.8	12.8	-0.6	..
Austria	2.8	2.6	3.6	3.9	12.0	12.0	0.4	0.5
Belgium	3.6	1.5	2.7	3.7	17.4	17.4	0.5	0.6
Canada	2.5	0.5	4.9	0.6	11.5	11.5	0.6	0.1
Chile	4.2	1.6	8.9	5.3	18.9	18.9	1.7	1.0
Czech Republic	3.5	1.9	7.0	5.7	17.0	17.0	1.2	1.0
Denmark	2.8	1.3	5.7	2.3	11.5	11.5	0.7	0.3
Estonia	4.5	3.4	4.0	5.5	21.7	21.7	0.9	1.2
Finland	3.2	1.6	5.0	5.3	13.4	13.4	0.7	0.7
France	2.3	1.2	3.6	2.0	14.7	14.7	0.5	0.3
Germany	2.1	1.7	3.2	4.0	10.4	10.4	0.3	0.4
Greece	2.3	0.2	3.0	0.2	17.1	17.1	0.5	0.0
Hungary	5.4	3.8	5.5	6.1	19.6	19.6	1.1	1.2
Iceland	6.5	4.2	6.2	5.3	14.9	14.9	0.9	0.8
Ireland	2.2	1.2	0.3	2.4	11.7	11.7	0.0	0.3
Israel	2.0	1.5	0.7	3.0	14.3	14.3	0.1	0.4
Italy	3.2	2.2	2.4	3.1	16.3	16.3	0.4	0.5
Japan	0.1	-0.3	1.4	-0.8	19.0	19.0	0.3	-0.2
Korea	3.4	1.5	5.9	2.0	14.4	14.4	0.8	0.3
Luxembourg	2.9	2.1	1.7	4.1	11.1	11.1	0.2	0.5
Mexico	4.0	3.3	7.7	5.4	18.9	18.9	1.5	1.0
Netherlands	2.5	3.0	2.3	3.8	11.3	11.3	0.3	0.4
New Zealand[1]	1.6	..	0.3	..	17.4	17.4	0.1	..
Norway	0.5	1.3	2.2	0.0	13.3	13.3	0.3	0.0
Poland	4.0	1.6	4.5	3.5	24.1	24.1	1.1	0.8
Portugal	3.5	0.2	3.3	2.3	18.1	18.1	0.6	0.4
Slovak Republic	3.9	2.4	3.5	5.9	18.4	18.4	0.6	1.1
Slovenia	2.3	2.4	3.9	5.2	17.0	17.0	0.7	0.9
Spain	2.0	2.7	2.3	3.2	18.2	18.2	0.4	0.6
Sweden	1.9	0.0	1.1	2.3	13.9	13.9	0.2	0.3
Switzerland	-0.8	-0.3	-2.3	1.0	10.8	10.8	-0.2	0.1
Turkey	10.6	7.3	11.7	6.8	26.8	26.8	3.1	1.8
United Kingdom	3.6	2.7	3.5	4.2	11.8	11.8	0.4	0.5
United States	2.9	1.6	5.3	1.1	7.8	7.8	0.4	0.1
OECD Total	2.8	1.7	4.2	2.1	..	..	..	..
Enhanced Engagement								
Brazil	6.2	6.2	6.9	11.1	22.5	22.5	8.9	6.5
China	4.5	2.0	10.5	2.9	33.6	33.6	3.5	1.0
India[1]	..	10.7	..	13.2	35.4	35.4	..	1.8
Indonesia	3.7	4.6	3.3	7.3	19.6	19.6	0.6	1.4
Russian Federation	4.1	7.1	2.1	8.6	32.8	32.8	0.7	2.8
South Africa	6.4	5.5	10.4	5.9	18.3	18.3	1.9	1.1

Table B.1. Information on food price changes *(cont.)*

	Total inflation % change (year-on-year)		Food inflation % change (year-on-year)[2]		Expenditure share of food		Food contribution to total change in inflation[3]	
	2012	2013	2012	2013	2012	2013	2012	2013
Non OECD								
Algeria	12.3	8.1	12.3	9.3	43.8	43.8	5.4	4.1
Argentina	8.1	11.1	8.1	9.5	20.3	20.3	1.6	1.9
Bangladesh	10.9	7.4	10.9	1.2	28.6	28.6	3.1	0.3
Bolivia	5.9	4.9	4.8	6.0	39.3	39.3	1.9	2.4
Botswana	8.9	7.5	8.9	7.0	23.7	23.7	2.1	1.7
Bulgaria	4.6	4.4	4.6	6.5	37.2	37.2	1.7	2.4
Columbia	4.9	2.0	4.9	1.7	34.7	34.7	1.7	0.6
Costa Rica	2.0	5.7	2.0	4.6	25.7	25.7	0.5	1.2
Ivory Coast	1.2	3.4	1.2	4.6	24.8	24.8	0.3	1.1
Dominican Republic	8.8	4.8	8.8	6.9	29.2	29.2	2.6	2.0
Ecuador	6.1	4.1	6.1	5.4	31.7	31.7	1.9	1.7
Egypt	11.4	6.3	11.4	7.2	26.3	26.3	3.0	1.9
El Salvador	1.2	0.8	1.2	1.9	38.1	38.1	0.5	0.7
Ethiopia	41.4	12.5	32.0	11.3	57.0	57.0	18.2	6.4
Ghana	4.5	8.8	4.5	3.8	37.0	37.0	1.7	1.4
Guatelama	11.3	3.9	11.3	6.6	28.6	28.6	3.2	1.9
Haiti	7.7	7.2	7.7	7.4	50.4	50.4	3.9	3.7
Honduras	3.4	5.7	3.4	4.1	31.8	31.8	1.1	1.3
Hong Kong, China	10.9	3.0	10.9	3.6	16.1	16.1	1.8	0.6
Iraq	3.9	2.8	3.9	-0.4	35.0	35.0	1.4	-0.1
Jordan	3.9	6.7	3.9	3.8	35.2	35.2	1.4	1.3
Kenya	24.6	3.7	24.6	2.4	36.0	36.0	8.9	0.9
Laos	6.7	5.7	8.8	7.5	41.0	41.0	3.6	3.1
Madagascar	6.0	5.8	6.6	3.0	60.0	60.0	4.0	1.8
Malawi	5.2	31.4	5.2	27.3	25.0	25.0	1.3	6.8
Malaysia	4.8	1.3	4.8	2.2	56.3	56.3	2.7	1.2
Mali	3.7	0.1	7.3	-1.7	60.0	60.0	4.4	-1.0
Moldavia	6.9	4.6	5.1	6.4	60.0	60.0	3.1	3.8
Morocco	1.7	2.6	1.7	4.0	40.4	40.4	0.7	1.6
New Caledonia	2.5	1.9	2.5	2.5	21.0	21.0	0.5	0.5
Nicaragua	8.7	7.6	9.6	10.3	26.1	26.1	2.5	2.7
Niger	-1.8	1.0	-1.8	3.5	29.0	29.0	-0.5	1.0
Nigeria	13.1	9.0	13.1	9.1	51.8	51.8	6.8	4.7
Pakistan	9.2	8.1	9.2	7.1	45.5	45.5	4.2	3.2
Panama	6.1	4.7	7.0	7.1	33.6	33.6	2.4	2.4
Paraguay	2.0	4.1	2.0	2.8	39.1	39.1	0.8	1.1
Peru	7.5	2.9	7.5	4.1	29.0	29.0	2.2	1.2
Philipinnes	3.2	3.0	3.2	2.3	39.0	39.0	1.2	0.9
Romania	0.1	3.2	0.1	6.6	37.4	37.4	0.0	2.5
Rwanda	7.9	5.7	12.8	8.3	48.4	48.4	6.2	4.0
Senegal	2.0	1.1	2.0	1.1	53.4	53.4	1.1	0.6
Singapore	3.8	3.4	3.8	1.0	8.5	8.5	0.3	0.1
Sri Lanka	-0.2	9.8	-0.2	9.7	41.0	41.0	-0.1	4.0
Chinese Taipei	4.5	1.1	4.5	2.4	16.6	16.6	0.8	0.4
Tanzania	19.7	10.9	26.2	11.9	33.6	33.6	8.8	4.0
Thailand	7.7	3.4	7.7	4.1	33.0	33.0	2.5	1.4
Tunisia	6.5	6.0	6.5	8.0	33.8	33.8	2.2	2.7
Uganda	27.3	4.9	27.3	0.0	27.2	27.2	7.4	0.0
Uruguay	8.0	8.7	7.7	10.8	19.2	19.2	1.5	2.1
Venezuela	26.3	21.6	30.1	22.0	29.5	29.5	8.9	6.5
Zambia	6.4	7.0	6.1	7.6	52.5	52.5	3.2	4.0

1. No data available for January 2013 in Australia and New Zealand and for 2012 in India.
2. CPI food: definition based on national sources
3. Contribution is food inflation multiplied by expenditure share, expressed in %

Source: OECD and national sources (for details, see the online version of tables).

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The projections and past trends are presented in the statistical annex and can be viewed in more detail at ***http://dx.doi.org/10.1787/agr-outl-data-en.***

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