

PART I
Chapter 2

Brazilian agriculture: Prospects and challenges

This chapter reviews the prospects and challenges facing Brazil's agriculture, biofuel and fish sectors over the next decade. It reviews sector performance, outlines the current market context, provides detailed quantitative medium term projections for the ten-year period 2015-24, and assesses key risks and uncertainties. Brazil's main challenges lie in sustaining productivity and production growth, while ensuring that such growth is reconciled with the country's poverty and inequality reduction objectives and the need for environmental sustainability. The chapter describes the main domestic and trade policies seeking to address these multiple objectives and suggests some strategic priorities, in the areas of productivity-enhancing investments, as well as targeted measures to ensure broad based sustainable development. Brazil is projected to maintain its role as a leading supplier to international food and agriculture markets over the next decade while also meeting the needs of an expanding and increasingly wealthy population. The key risks to this optimistic outlook pertain to Brazil's macroeconomic performance, the pace of structural reforms, and external factors including China's import demand.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

The position of the United Nations on the question of Jerusalem is contained in General Assembly Resolution 181(II) of 29 November 1947, and subsequent resolutions of the General Assembly and the Security Council concerning this question.

Introduction

Brazil is among the world's ten largest economies, with a GDP of over USD 2 trillion in 2013. It has the fifth highest population (now over 200 million) and the fifth largest surface area. Real GDP per capita has grown at an average of nearly 5% per year since 1995, enabling per capita incomes to reach USD 11 200 in 2013 and consolidating Brazil's position as an "upper middle income" country (World Development Indicators, 2014). In recent years, the country has made outstanding progress in poverty reduction, with the proportion of the population living on less than USD 1.25 per day falling from 7.2% to 3.8% between 2005 and 2012, and the proportion living on less than USD 2 per day falling from 15.5% to 6.8% over the same period. Nevertheless, over one-half of households live with per capita income at or below the minimum wage, and, despite some progress over the past decade, income distribution remains one of the world's most uneven. In 2012 the highest earning 10% of households accounted for 42% of total income, and the lowest earning 10% responded for just 1% (World Development Indicators, 2014).

The agricultural sector plays an important role in underpinning Brazil's economic performance, even though agriculture's share of GDP is no more than one would expect given the country's level of development, at 5.4% in 2010-13. Brazilian agriculture has seen strong growth for over three decades. Total agricultural output has more than doubled in volume compared to its level in 1990 and livestock production has almost trebled, primarily on the basis of productivity improvements. The sector makes an important contribution to the country's trade balance. Exports by agriculture and agro-food industries totalled over USD 86 billion in 2013, accounting for 36% of total exports. These exports more than offset deficits in other sectors and have been rising in importance, strengthening the sector's role as an earner of foreign currency. Brazil's agricultural exports make it a major player on international markets. Brazil is the world's second largest agricultural exporter and the biggest supplier of sugar, orange juice and coffee. In 2013 it surpassed the United States as the largest supplier of soybeans and it is a major exporter of tobacco and poultry. It is also a major producer of maize, rice and beef – the majority of which are absorbed by the large domestic market.

The agricultural sector absorbed about 13% of Brazil's employment in 2012, or almost three times its share in GDP. The implied low labour productivity compared to the rest of the economy reflects in part the dualistic nature of farming in Brazil, where capital-intensive and large-scale production co-exists with traditional farms, including many small and resource-poor farms producing for self-consumption or local markets. Nevertheless, the labour productivity gap in agriculture is declining, with rapid improvements in labour productivity driven mainly by more capital-intensive production. Some of that growth occurred among small-scale farms producing high value products. The country is relatively urbanised, with 15% of the population living in rural areas in 2013 (World Bank, 2015). The majority of the poor live in urban areas and spend a significant share of their income on food. The rural poor are less numerous, but the incidence of

poverty is more than double that in urban areas, at nearly 30%. Agriculture is also a buyer and supplier for a significant part of the rest of the economy – the agricultural input sectors, agro-processing and retailing altogether contribute an additional 17% to GDP and around 18% to employment (OECD, 2014).

One of the most outstanding developments of the Brazilian economy over the past decade has been the pronounced reduction in poverty and hunger. A new approach to tackling these problems was implemented in 2003 with the launching of the Zero Hunger Program. The model adopted in Brazil represented a breakthrough, by making the war on poverty and hunger a central policy priority and by recognising that the multi-sectoral dimensions of the problems required concerted actions across government departments, with widened involvement of civil society. This approach has attracted widespread interest internationally, and efforts to implement the Brazilian approach are being pursued in numerous countries of Latin America and also in certain countries of Africa and Asia. In Brazil, as in many other countries, access to food, rather than availability of supplies, was identified as the most significant factor contributing to hunger and food insecurity. Broad-based social protection and development measures aimed at strengthening the inclusion of vulnerable populations in economic growth and improving their access to food were complemented by targeted measures to raise productivity and production among “family” farms.¹ This inclusive approach continues to represent an over-riding national priority as reflected in the Brazil without Extreme Poverty Plan of 2011. While the measures implemented since the early 2000s have been effective in eradicating hunger as measured by the FAO’s undernourishment indicator (FAO, 2014), the Government considers that still much remains to be done to tackle poverty, including among rural populations that depend on agriculture for their livelihoods.

The rise in agricultural productivity over the past three decades has had an important impact on access to food supplies in the domestic market. Since the mid-1970s, the prices of basic foods have decreased continuously, raising real incomes and lowering inflationary pressures (Tollini, 2007). Agriculture is also expected to make an increasing contribution to enhanced environmental sustainability through the adoption of policies and implementation of targeted programmes, such as those promoting environmentally sound agricultural practices, incentives to low carbon agricultural initiatives and support to biofuel production.

Finally, agriculture in Brazil is an important contributor to the country’s energy supply. Renewable energy from agriculture, comprises of sugarcane biomass (42%), hydraulic energy (28%), firewood (20%) and other sources (10%). These account for almost half of the total energy supply (MME/EPE, 2013b).

For the past twenty years, Brazil’s agricultural sector has grown rapidly on the basis of increased productivity, as well as expansion and consolidation of the agricultural frontier in the Centre-West and Northern regions. Although the internal market absorbs the largest part of Brazilian agricultural output, this growth has been mainly driven by the expansion of the production of export-oriented products, especially soybeans, sugar and poultry. The share of these products exported increased sharply in the 1990s, but has generally stabilised. In 2013, China replaced the European Union as the single most important market for Brazil’s agriculture-based exports, reinforcing the recent trend towards new commercial partners, such as countries in East Asia and the Pacific, the Middle East, and Latin America.

Agriculture was significant in enabling Brazil to withstand the financial crisis, with high prices for agricultural commodities providing incentives to increase production and contributing to an average of 3.5% real GDP growth per year between 2005 and 2013. However, since 2011, the economy has grown at just over 2% per year, compared with over 8% in China and more than 5% in India. Growth remains hampered by structural weaknesses in the economy, which include weak infrastructure, an onerous indirect tax system, burdensome administrative procedures, low engagement in international trade and low levels of education and skills. As this chapter argues, improvements in these areas have the potential to raise medium-term prospects significantly both for sustained agricultural growth, but also for economic development more widely.

Trends and prospects for Brazilian agriculture

The growth and performance of Brazilian agriculture

Trends in production and productivity

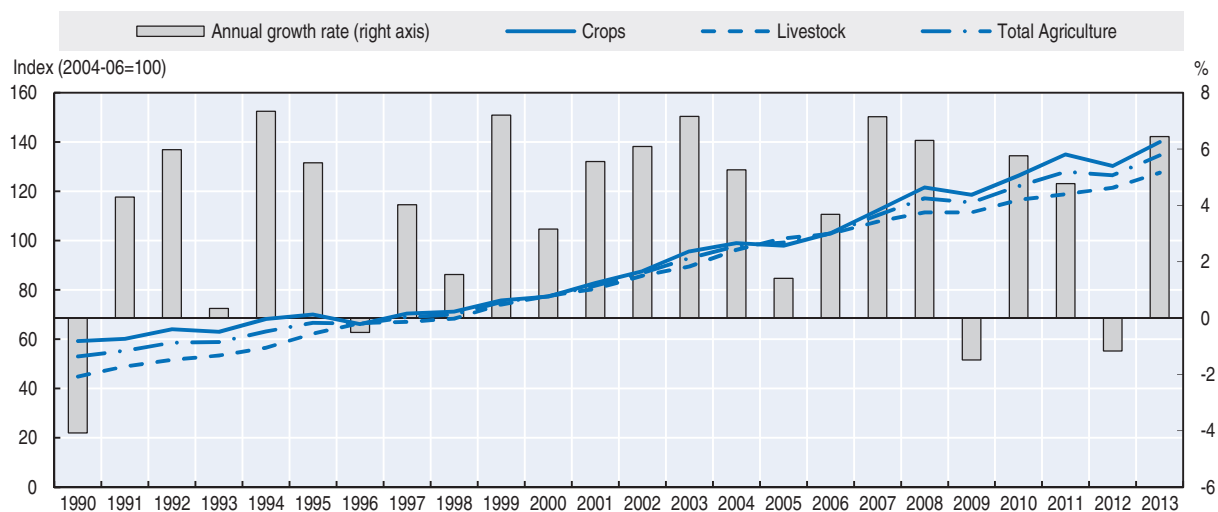
Brazil's varied climate leads to diversified agriculture of both temperate and tropical products. The South and Centre-West regions of the country have higher rainfall, better soils and more developed infrastructure. Farms in these regions use purchased inputs more intensively and are equipped with higher technologies. Central Brazil contains substantial areas of degraded grassland with potential for crop production. Most of Brazil's grains, oilseeds and other export crops are produced in the South and Centre-West regions, although soybean production is increasing in the MaToPiBa region, containing the states of Maranhão, Tocantins, Piauí and Bahia. The North-East and the Amazon basin area lack well-distributed rainfall and good soils, while infrastructure and capital markets remain less developed than in the South and Centre-West regions. Livestock production is an important economic activity in the Centre-West and Amazon regions where production and exports of tropical horticultural products have also increased.

Brazilian agriculture has seen strong growth for over two decades, although not without troughs in certain years as a result of poor harvests. Total agricultural output has more than doubled in volume compared to its level in 1990 and livestock production has almost trebled (Figure 2.1).

Deep economic reforms in the 1990s spurred agricultural growth. The abandonment of the import substitution strategy led to broad trade, exchange rate and domestic market liberalisation. Although the first half of the 1990s proved to be extremely turbulent and destabilising for the agriculture sector, by the end of that decade macroeconomic stabilisation had been achieved. Agricultural policies were liberalised as part of the overall reform: previous production and supply control systems were dismantled and price interventions scaled down and re-instrumented. Trade policy liberalisation removed ICM export taxes, licensing and quantitative restrictions on agro-food. It also abolished state control of wheat, sugar and ethanol trade. Brazil entered key trade agreements, including the Uruguay Round Agreement and the Mercosur Customs Union.

These reforms progressively enabled agricultural resources to be re-allocated to activities where the country has a comparative advantage and to tap the potential of world markets. The farm structure underwent considerable change with the exit of less efficient producers and the development of large farms which have exploited economies of scale and technical progress, particularly in the Centre West. According to the most recent Agricultural Census, from 2006, units of less than 20 hectares constituted two-thirds of the total farm

Figure 2.1. Brazil's agricultural output, 1990-2013

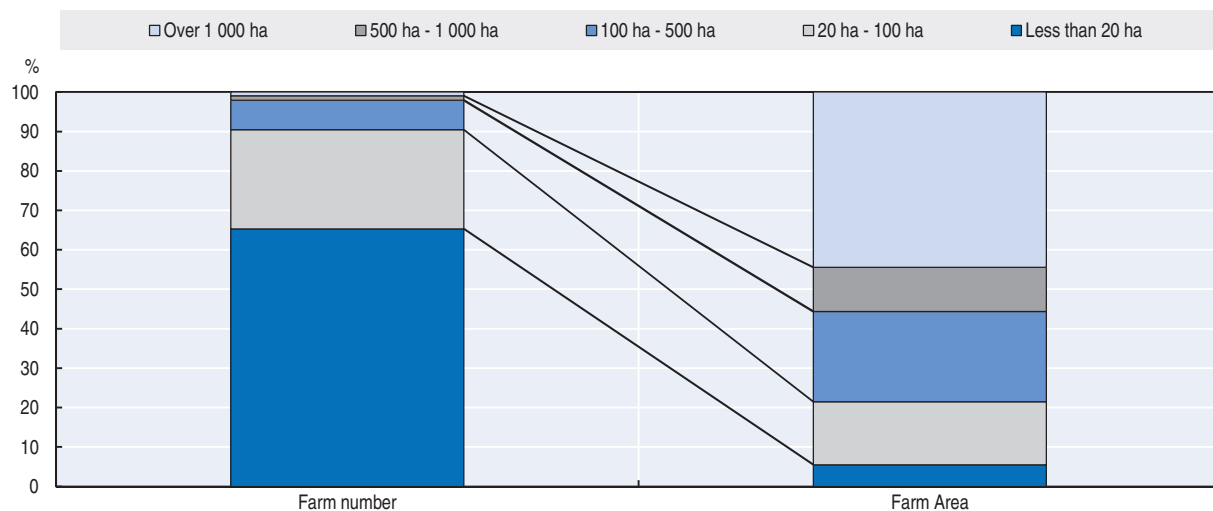


Source: FAOSTAT (2015), On-line database accessed on February 23, 2015. FAO, <http://faostat.fao.org/>.

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number in Brazil, but occupied less than 5% of farmland. On other hand, holdings of over 1 000 hectares accounted for only 1% of the total farm number and accounted for 44% of farmland (Figure 2.2). To some extent these data reflected the existence of unproductive *latifundia*, although improved macroeconomic stability and the development of financial markets have reduced the incentives for speculative landholding. The data also exclude the more recent effects of agrarian reforms. In the period between 2003 and 2009, nearly 600 000 families were settled in about 48 million hectares. These reforms, which accelerated in the late 1990s, provided free of charge settlement for disadvantaged people on lands and facilitation to purchase land to start up agricultural activity. Established and newly settled small-scale producers received substantial credit concessions and benefitted from a range of other rural development and social programmes targeted to the rural poor.

Figure 2.2. Brazil's farm structure, 2006



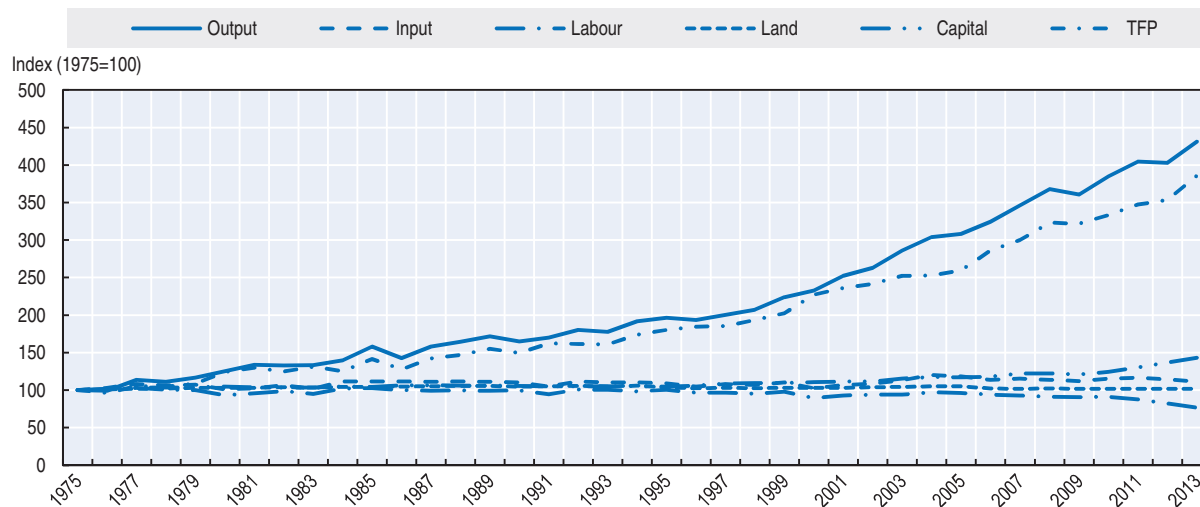
Source: IBGE (2006).

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Brazil's agricultural growth has been underpinned by rapidly increasing efficiency in utilisation of production factors, particularly land and labour (Figure 2.3). Indeed, agriculture was the dominant driver of labour productivity within the overall economy, contributing 85% to the aggregate labour productivity growth in the four sectors (agriculture, manufacturing, mining and services) between 2002 and 2007, and almost one-half between 2007 and 2012 (OECD, 2013b). Productivity improvements were in part an effect of capital replacing labour, with agriculture's share of employment falling from 18% in 2002 to less than 13% in 2012. Policy stimulus has propelled the rapid mechanisation and replacement of obsolete machinery in agriculture between the mid-1970s and mid-1990s; for example, the total tractor fleet more than trebled during this period and the value of the machinery and equipment stock more than doubled in constant prices (FAOSTAT, 2013).

Brazil has emerged as one of the top global performers in agricultural Total Factor Productivity (TFP) growth. Of the 172 countries covered in a study by USDA,² it ranked 12th by the rate of TFP growth between 2001 and 2010. Brazil demonstrated the strongest TFP improvements in agriculture among the BRICS and the OECD countries. According to data from Gasques et al. (2014), TFP growth in Brazilian agriculture increased 3.5% per year between 1975 and 2013 with a higher rate of over 4% from the start of the new century (Figure 2.3). This contrasts with the trends in the rest of the economy, where growth was achieved mostly due to increased employment of productive factors, with the rate of TFP growth slowing (OECD, 2013b).

Figure 2.3. Trends in agricultural output and Total Factor Productivity in Brazil, 1975-2013



Source: Gasques et al. (2014).

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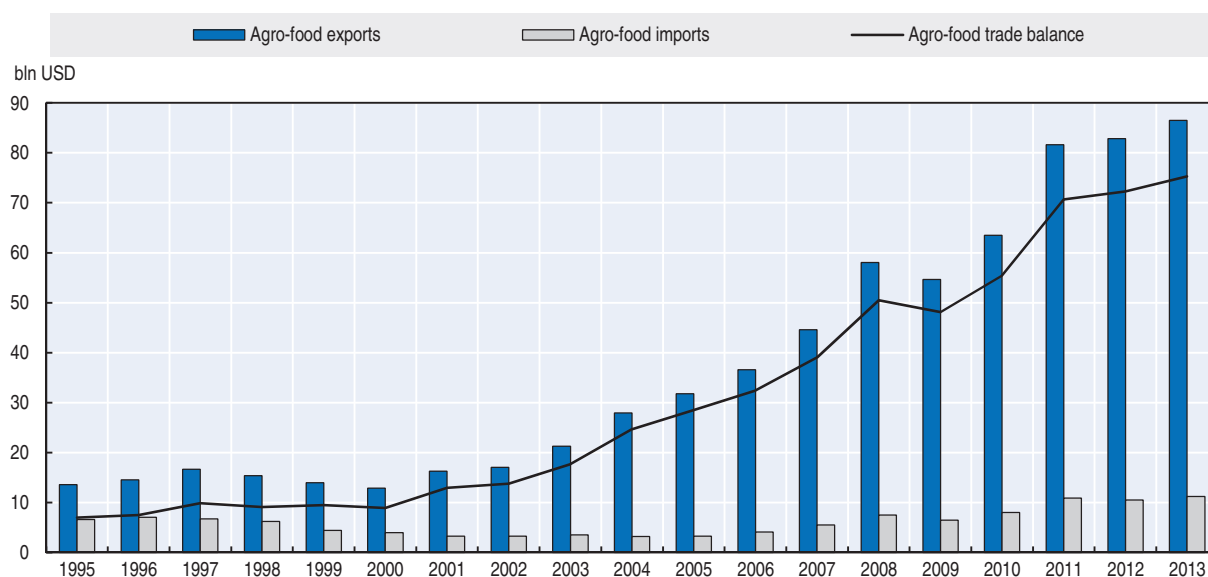
Among the factors underpinning the growth of productivity are the longstanding investments in agricultural research that have enabled Brazil to achieve the most advanced technology for tropical agriculture. That research made better crop and livestock technologies available to producers and the agro-industry, notably tropical technologies making possible the incorporation of Brazilian *cerrados* (savannah areas) into productive use. Most important were the technologies of nitrogen fixation, particularly in soybean varieties, no-tillage systems and the emergence of new grain varieties and livestock breeds adapted to the tropics. Productivity improvements over the past fifteen years were

facilitated by economic reforms, which enabled the re-allocation of resources and the structural changes in agriculture and its associated industries. By establishing a more competitive environment, the economic reforms also strengthened producer incentives to increase productivity and therefore to uptake innovations.


Trends in agricultural and agri-food trade

Brazil is a large exporter of agricultural products with a trade surplus of USD 78.6 billion in 2013.³ With economic liberalisation and rapid growth of demand from emerging economies, particularly China, agro-food exports have grown rapidly (Figure 2.4). The export growth was influenced also in some years, by large depreciation of the domestic currency. Brazil's largest trading partners are the European Union, China, the United States, Japan, the Russian Federation and Saudi Arabia. Despite exporting large volumes of agricultural products, most of the production is consumed domestically.

Figure 2.4. **Brazil's agro-food trade, 1995-2013**



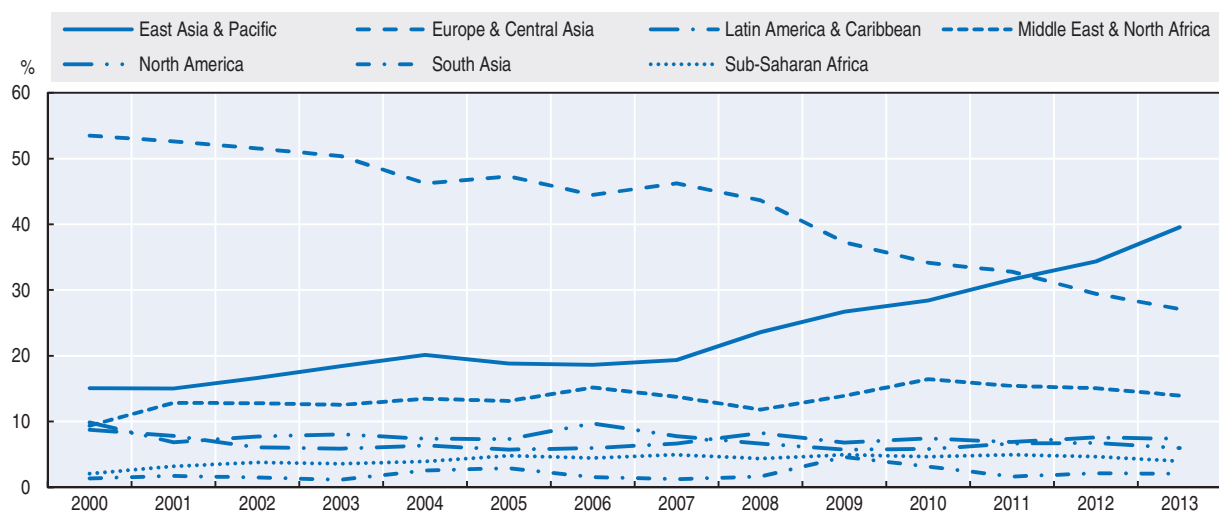
Source: UN Comtrade Database (2013).

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Brazil's exposure to international trade is less than the other BRIICS or other comparable size economies, partly due to the size of the domestic market. Trade (imports plus exports) as a share of GDP in 2013 in Brazil accounted for about 28% of GDP compared with an average of over 50% in the other BRIICS economies, 60% among the group of upper middle income countries to which Brazil belongs, 47% for Brazil's developing Latin American neighbours and a world average of 60%. Among major economies, only the United States, an economy that is almost eight times bigger has comparably small share. Brazil has become the second largest exporter of agricultural and agro-food products in the world behind the United States rising from fourth place in 2000. In 2013, Brazil agricultural exports (as defined at the WTO) totalled USD 89.5 billion (about 9% of world total), compared with USD 14.3 billion in 2000 (4.5% of world total). The share of agricultural exports in total export earnings increased from 25% to 36% over the same period.

The destination of Brazilian agricultural exports has evolved considerably over the past fifteen years. In 2000, countries located in Europe and Central Asia were the dominant partners taking more than 53% of Brazil's agricultural exports. East Asia and the Pacific was a distant second destination, accounting for about 15% of Brazil's agricultural exports. By 2013, countries in East Asia and Pacific bought almost 40% of Brazil's agricultural goods, while countries in Europe and Central Asia took 27% (Figure 2.5).

Figure 2.5. **Destination of Brazilian agricultural exports, 2000-2013**



Source: UN Comtrade Database (2013).

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The rising importance of the East Asia and Pacific region derives from China's demand for Brazilian agricultural products. In 2000, China was the 11th most important import market demanding less than USD 0.5 billion or 3% of the total. By 2013, China was the largest demander of Brazilian agricultural produce, buying almost USD 20.5 billion, or 23% of the total. The second biggest market for Brazilian agricultural goods in 2013 was the European Union, importing almost USD 18.3 billion (almost 20% of total), followed by the United States importing roughly USD 4.6 billion.

Although Brazil exports to more than 180 countries, a relatively small number of countries take up most of the produce. In 2000, the top ten markets (includes individual EU members) bought 57% of Brazil's total agricultural exports and the top 20 accounted for 75%; by 2012 these shares were 56% and 72% respectively.

The type of agricultural products that Brazil exports has also changed since the start of the century. Segregating the agricultural products into four broad categories based on their degree of processing, in 2000 the largest export category was processed products such as juices, fresh or frozen meat valued at USD 5 billion or 35% of exports followed closely by exports of bulk products such as soybeans and coffee valued at USD 4.8 billion or 33% of the total. Horticultural products such as fresh fruits and vegetables were a relatively minor part of exports valued at USD 567 million (4% of total). By 2013, Brazil's exports had become more specialised, with exports of bulk products totalling USD 39.5 billion or 44% of total agricultural exports, and exports of processed products, although also expanding to USD 26.7 billion accounting for 30% of the total. Exports of horticultural products accounted less than 2% of total exports, despite almost trebling since 2000 to USD 1.4 billion.

Brazil is relatively heavily dependent upon a few products to generate most of its export earnings from the sector. In 2013, soybean exports totalled USD 23 billion, representing 26% of agricultural export earnings. The top ten products generated almost 82% of export earnings from agricultural goods – compared to 79% in 2000 (MAPA, Intercambio Comercial do Agronegócio: principais mercados de destino, 2013). The composition of the top products and relative rankings changed somewhat between the two years however with maize and ethyl alcohol surpassing soybean oil and prepared meats. The rise in ethyl alcohol exports, which was driven by US biofuel policy, is not projected to be sustained in the current *Outlook*.

In addition, Brazil is relatively unintegrated with global value chains, with a modest 10% of intermediate inputs originating overseas, while a relatively small share of Brazilian exports are used by other economies to generate their own exports. One explanation is Brazil's relatively high protection of its manufacturing sector.

While Brazil has increased its export share of the international agricultural and food market, its imports of food and its products have also risen. An increase from USD 4.1 billion in 2000 to USD 11.1 billion in 2013 covered domestic shortfalls in certain commodities, and provided consumers with additional choices. Imports of wheat account for about 20% of the imported value, while other major imports include dairy products, olive oil and various food preparations.

Development of the Brazilian ethanol industry

The blending of sugarcane based ethanol with gasoline in Brazil dates back to 1931. Cheap crude oil prices after the Second World War meant that the blending of ethanol into regular gasoline was not commercially viable. However, in November 1975 in response to the first crude oil crisis, the Brazilian government created the National Alcohol Program, "Proálcool". This programme enacted the obligatory blending of anhydrous ethanol with gasoline (hereafter referred as gasohol) for fuels used by ordinary cars, which enabled the sugarcane based ethanol industry to increase its producing capacities. Proálcool successfully reduced the impact of the oil crisis on the Brazilian trade balance and increased the country's energy self-sufficiency. Nevertheless, when the second oil crisis occurred in 1979, Brazil was still importing the majority of its oil which renewed the government's focus on Proálcool and led to increased subsidies for both producers and consumers and credit for investment into the sector. The first car running on hydrous ethanol was launched in 1979.

A succession of factors in the second half of the 1980s, including the downward oil price shock, increased international sugar prices, the debt crisis and deregulation of the Brazilian economy, reduced the profitability of the ethanol sector until the early 2000s when it became the target of massive investments. Growing concerns about global warming, greenhouse gas emission and energy security led a certain number of developed and developing countries to implement ambitious biofuel targets or mandates as well as other support measures to the biofuel sector. Under the Renewable Fuel Standard (RFS2), set in 2007 in the United States, Brazilian sugarcane based ethanol qualified as an advanced fuel, which increased demand for Brazilian ethanol on the international market.

In addition, the introduction of flex-fuel vehicles in March 2003 contributed to the rebound of the ethanol industry. This new technology was widely accepted by automobile manufacturers and consumers (MME/EPE, 2013a): In 2004, flex-fuel vehicles represented 22% of light vehicles sales in Brazil. In 2014, their share reached more than 88%. Domestic Brazilian

ethanol demand jumped from about four billion litres in 2003 to 16.5 billion in 2009, with an annual growth rate exceeding 15% (MME/EPE, 2014) boosted by the increase in fuel use and by the competitive price of hydrous ethanol with respect to gasohol. During the same period, total ethanol production increased from 14.5 to 26.1 billion litres, in order to meet not only domestic demand, but also international contracts and other uses. This boost in production was made possible by extensive debt financing from the sugar and ethanol industries.

The global economic crisis at the end of the last decade interrupted the upward trend of the Brazilian ethanol industry, reducing the construction of new plants and capital investment in the existing units. As a consequence, the expansion of sugarcane production fell. This was felt strongly from 2010, as the sector was highly indebted and investments were cut, which resulted in higher production costs. This, along with several climatic problems that resulted in low sugarcane yields, contributed to the rise in the international sugar price amplified the negative impacts on the ethanol industry.

From 2006, Brazil's fossil fuel pricing policy, adopted in order to contain inflation and applied by Petrobras,⁴ kept the Brazilian gasoline price insulated from the crude oil price fluctuations in the international market. This affected ethanol prices and profits of the ethanol industry. Uncertainty concerning the future of biofuel policies in the United States and to a lesser extent in the European Union added to the ethanol crisis. Given the strong decrease of international crude oil prices in 2014, Brazilian petrol retail prices are at present slightly above international prices. This coupled with differentiated taxation between ethanol and gasohol as well as the increased blending requirement for anhydrous ethanol that entered in place in 2015 should help the Brazilian ethanol industry in the short term.

Sustainability performance of agriculture

Although driven mainly by strongly increasing productivity, agricultural growth was also associated with an expansion of agricultural land, which increased by 34 million hectares between 1990 and 2012. On a global scale, this was one of the largest expansions during that time period. In the first half of the 1990s, this occurred mostly due to the outstretching of pastureland – a process driven by the introduction of new land management technologies and policy stimulus, but which virtually stopped by the end of that decade. Since then, agricultural land has increased mainly due to expansion of arable areas, which in over only four crop years, 2000/01 to 2003/04, soared by 9 million hectares, with soybean plantings increasing by 50%. The expansion of soybean area, particularly in the Centre West, has in turn boosted plantings of crops that are rotated with soybeans, notably second crop maize and cotton.

Recent decades have also seen a shrinking of native forest land, the share of which in total land fell from 68% to 61% between 1990 and 2011. There is continued debate on how and to what degree agriculture contributed directly or indirectly to this process.⁵ A significant share of deforestation was due to illegal logging activities, with cleared land subsequently used for pasture. This led to concerns regarding the expansion of agriculture in the Amazon region in particular, which together with surrounding *cerrado* savannah contains the largest portion of the world's terrestrial biodiversity. The accumulated area of deforestation in the legal Amazon⁶ increased from 43 million hectares in 1990 to 75 million hectares in 2010 (IBGE, 2013). Since the mid-2000s, Amazon deforestation rates have been consistently decelerating, reflecting progressive tightening of land use monitoring. This trend was temporarily reversed with a rise in deforestation in 2013 of 5 891 km², but the latest estimates for 2014 indicate a reduction of 18% to 4 848 km² (National Institute for

Spatial Research). Some analyses tend to link recent deforestation rates with infrastructure projects carried out in the Amazon region, rather than with the expansion of agriculture (FGV, 2013). The environmental impact of agricultural expansion in the Amazon region and *cerrado* has received much public attention, both nationally and internationally.

The available data suggest that fertiliser and agricultural chemical use in Brazil has intensified. However, according to the 2006 Agricultural Census, almost 70% of farms reported they did not use any fertiliser during the census year, and the same share reported no use of agricultural chemicals. This implies that the impacts of fertiliser and chemical use are strongly differentiated by the type of agricultural system and by region (Helfand et al., 2013). Given the abundance of rainfall and water resources, the importance of irrigation in Brazil is small, with only around 2% of agricultural land equipped with irrigation. This share, nevertheless, has tended to increase since 1990, with agriculture currently making almost 60% of annual freshwater withdrawals. Brazil ranks fifth worldwide in terms of overall greenhouse gas (GHG) emissions, although total emissions have fallen sharply as a result of reduced deforestation. Agriculture is a significant source of GHG emissions, as a result of both land-use change and considerable growth in livestock inventories, which rose by almost 40% between 1990 and 2010 in cattle equivalents, among the most important increases globally (USDA, 2013). The expansion of inventory doubled livestock density, from 3 heads per hectare of agricultural land in 1990 to 6 heads in 2011. These levels are comparable with those in New Zealand where a pastoral system prevails, but are low compared to world regions with more intensive livestock production (e.g. the European Union with an average total cattle number per hectare of 9.6 heads).

Average figures for Brazil disguise substantial differentiation in the nature and scale of environmental pressures across Brazil resulting from different farming systems. For example, commercial farming in the southern states of Rio Grande do Sul, São Paulo and Paraná is input intensive, with high fertiliser use. Farming systems in these areas are associated with concerns on the impact of agricultural water use on resource levels, and pesticide use on water quality. In the Centre West farming systems are more extensive. Farmers in these regions increasingly use direct planting which also reduces the risks of erosion; however, a loss of natural forest cover and biodiversity is a significant concern in these parts of the country (OECD, 2005). The use of no tillage or minimum tillage practices (direct planting) mitigates some of the pressures on the soil and requires less fuel. At the same time it facilitates the use of double or even triple cropping. Direct planting is also associated with the use of GMOs, which leads to less use of pesticides.

Brazil's agricultural outlook

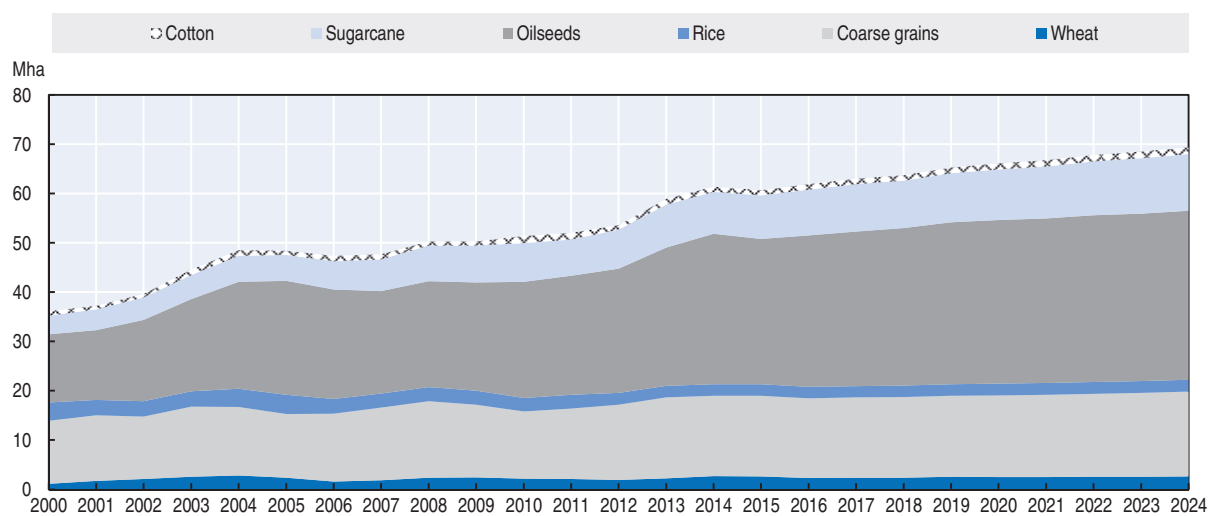
The outlook for Brazilian agriculture remains positive, despite the prospect of slower growth in both domestic and international demand, and declining real prices for most agricultural commodities. On the supply side, producers are expected to benefit from continued productivity growth, complemented by a depreciating Brazilian real (BRL). The current projections assume that there are no significant changes to agricultural policy settings over the next ten years, and that “normal” weather with no severe events prevails from one year to the next. Projections for macroeconomic changes in Brazil and the rest of the world are based on the *OECD Economic Outlook* (November 2014) and the International Monetary Fund's, *World Economic Outlook* (October 2014), while international oil prices are projected to grow at the same rate as projected by the IEA's *World Economic Outlook* (see Chapter 1). Changes in any of these assumptions can significantly alter the projections.

Brazil exhibited relatively strong growth in real income averaging 3.5% per annum from 2000 to 2007. With the onset of the global financial crisis, growth diminished somewhat from 2008 to 2013 averaging 3.1% per annum. Until 2016, growth is not expected to exceed 2% per year. From 2017 to the end of the projection period, real GDP growth is expected to average 2.6% per annum. The exchange rate of the Brazilian real (BRL) relative to the USD is expected to depreciate throughout the outlook period making Brazil's export sectors more competitive in world markets but also increasing the cost of imports. This is not expected to put undue pressure on consumer prices, with inflation remaining low.

Crops

During the next ten years, Brazil's crop sector is expected to continue growing on the basis of yield growth and increase in agricultural area. Producer prices are expected to rise briskly during the next ten years, but when adjusted for inflation, crop prices are relatively flat. Land use for the major crops in 2024, (oilseeds, coarse grains, rice, wheat, sugarcane and cotton), is expected to reach 69.4 million hectares (Mha), 20% greater than the average area used during the three years 2012-14, representing a growth rate of some 1.5% per annum (Figure 2.6).⁷ In relative terms, this area expansion is primarily driven by the 37% (relative to the base period)⁸ expected increase in land allocated to sugarcane production, followed by the 35% and 23% increase in area allocated to coarse grains, domestic feed demand for an expanding livestock sector accounts for most of the additional expected to take up on and oilseed production respectively. In absolute terms however, oilseeds, predominantly soybeans, will continue to dominate land use in Brazil over the next ten years taking up almost half of the additional crop area in 2024.

Figure 2.6. **Trend in land used for crop production in Brazil**



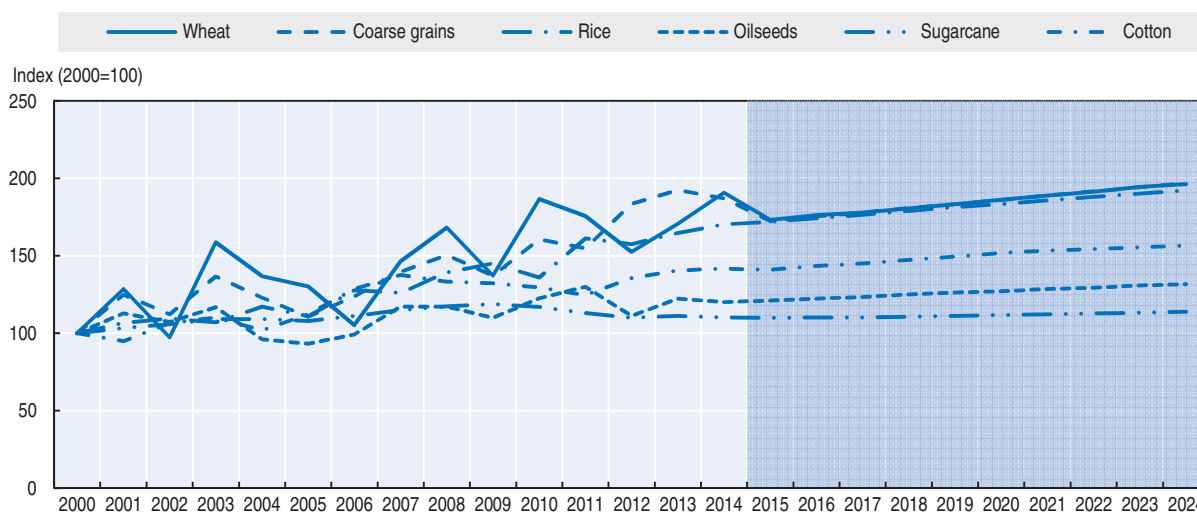
Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.
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A growing domestic market is expected to take up most of the additional coarse grains and sugarcane production. In the case of coarse grains, domestic feed demand for an expanding livestock sector accounts for most of the additional production whereas in the case of sugarcane it is the expanding ethanol market. Consequently, for these crops, the share of production going to international markets is relatively flat during the next ten

years. This is not the case for cotton or oilseeds, where the projections indicate that the world markets draw a larger share of production.

Productivity is also expected to improve over the coming ten years but at different rates across crops (Figure 2.7). Lack of investment in the sugarcane sector in the recent past, coupled with adverse weather conditions led to below average yields. Investment in the highly mechanised sugarcane plantations is expected to increase during the outlook period, leading to marginal yield improvements which nonetheless, do not reach previous peaks. Similarly, oilseed yields are not expected to improve substantially in the course of the next ten years. In contrast, productivity gains in cereals – coarse grains, wheat and rice – increase substantially, while cotton yields increase more moderately (Figure 2.7).

Figure 2.7. **Growth in yields for cereals, sugarcane and cotton in Brazil**

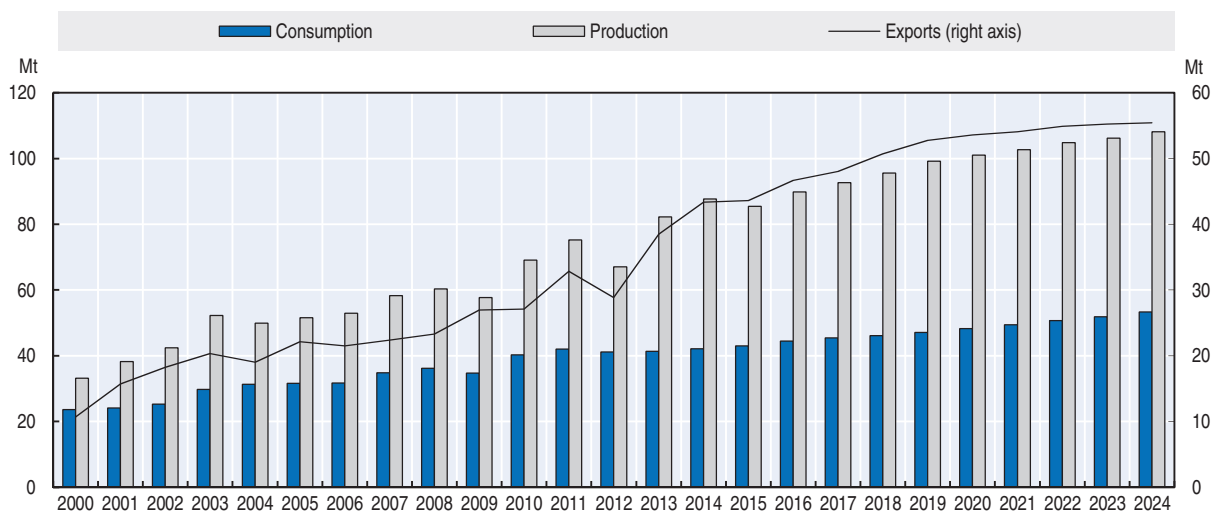


Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.
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Oilseeds

Soybeans are expected to continue to be Brazil's most important agricultural product. Currently, Brazil is the second largest producer behind the United States but during the outlook period, the difference is expected to narrow as soybean production in Brazil will continue to expand. Among the large oilseed producing and exporting countries, Brazil has the greatest potential to expand production. It is as productive as the United States (average yields are about the same) but has a large available land base to produce soybeans, whereas the United States is more competitive in producing maize, which limits its potential to shift large swaths of area into soybeans to meet future oilseed demand.

Producer prices are expected to remain relatively strong during the projection period rising by 6.9% per annum. This gives support to oilseed production, which is expected to increase by 2.5% per annum during the projection period, to 108 million tonnes (Mt) (Figure 2.8).⁹ Most of the expected production increase comes from a 23% increase in area harvested to 34.3 million hectares (Mha) in 2024, as average yield is expected to increase modestly to 3.15 t/ha in 2024. The additional land to produce soybeans is expected to come mostly from the MaToPiBa region, which includes Maranhão, Tocantins, Piauí and Bahia States, and is not expected to compete with other cropland or reduce land allocated to other crops.

Figure 2.8. **Production, consumption and exports of oilseeds in Brazil**

Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.
StatLink  <http://dx.doi.org/10.1787/888933229018>

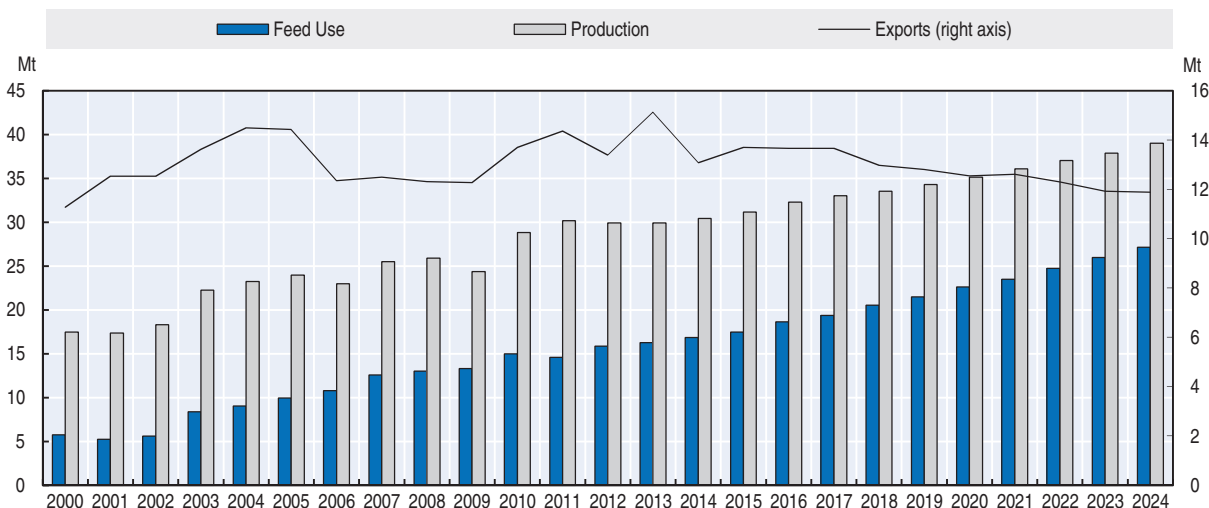
Consumption of oilseeds is also expected to increase over the projection period but at a slower rate than production (2.3% per annum) to 53.3 Mt. The growing domestic surplus (the gap between production and domestic consumption) will be exported.

Soybeans are expected to continue being the most lucrative export product with more than half of Brazilian production destined for world markets. Valued at domestic producer prices, these exports generate BRL 87.5 billion (USD 22.8 billion) in 2024. China has been the world's largest import market for soybeans and Brazil's largest customer. Brazil also became China's largest supplier in 2013 surpassing the United States. This *Outlook* is conditional on China's strong demand for imported soybeans continuing, and most of this additional demand coming mostly from Brazil, the country with the most potential to expand production in the coming years. Should this demand falter, or should China's food security concerns push for increased diversification in import sources, Brazil may have to quickly adjust production given the size of alternative import markets. As illustrated in Box 2.1, should China's demand weaken not only will Brazil's oilseeds exports to China fall, oilseeds export to other countries will also decline. Without alternative international markets, Brazil's oilseed production and exports fall below the baseline.

Brazil not only produces a large quantity of soybeans, it also has a considerable crushing sector producing soybean meal and soybean oil. Although most of Brazil's soybean production is for export markets, domestic demand for crush is expected to continue increasing. Demand for crush is expected to grow by around 2.3% per annum during the period so that by the end of the projection period, demand for crush is expected to reach almost 47.1 Mt, some 27% above the base period (Figure 2.9). Higher crush results in higher protein meal production which grows to 39 Mt in 2024. Most of the additional production stays at home to feed the pork and poultry sectors with feed use increasing by 4.9% per annum to more than 27 Mt, some 66% higher than the base. However, crushing capacity is not expected to expand sufficiently quickly to keep pace with rising domestic demand for soybean meal from the poultry and pork sectors. Additional domestic demand is expected to reduce exportable surplus resulting in declining exports of soybean meal.

Protein meal exports decline to about 11.9 Mt from almost 14 Mt in the base period. Nonetheless, Brazil will continue to edge the United States as the second largest exporter of soybean meal.

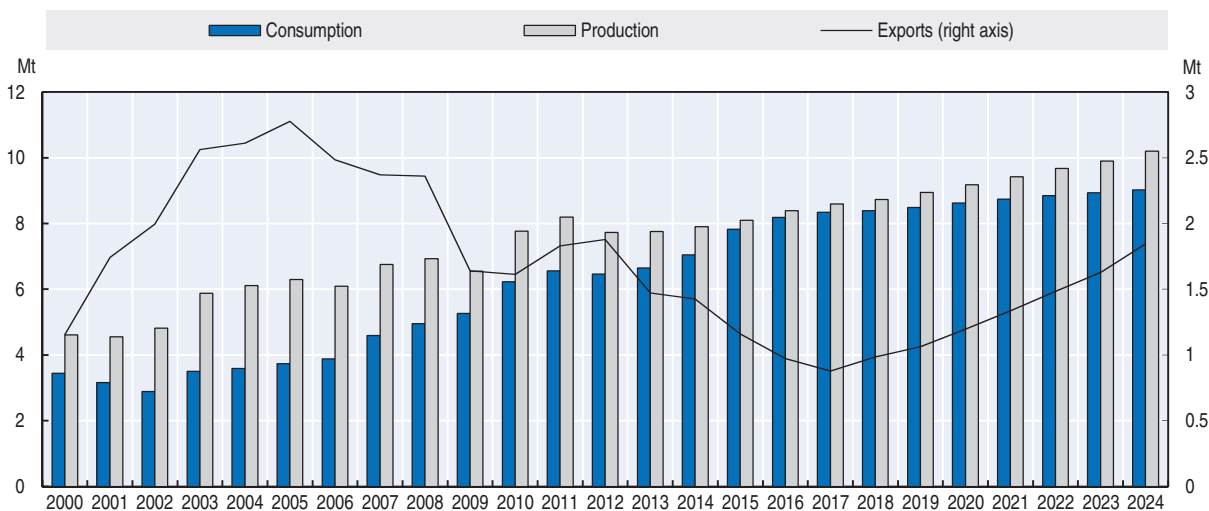
Figure 2.9. **Protein meal production, feed use and exports in Brazil**



Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.
StatLink <http://dx.doi.org/10.1787/888933229026>

The additional crush demand for soybean meal will result in increasing supply of soybean oil. Production of vegetable oil grows at an average annual rate of 2.5% rising to 10.2 Mt by 2024 some 31% above the base period. However, domestic demand for vegetable oil for human consumption will grow at a slower rate. Demand of vegetable oil for human consumption grows at only 2.2% per annum to about 5.2 Mt (Figure 2.10). Per capita consumption of vegetable oil is expected to increase by around 1.5% per year to reach 24.2 kg per person.

Figure 2.10. **Production, consumption and exports of vegetable oils in Brazil**



Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.
StatLink <http://dx.doi.org/10.1787/888933229035>

An additional source of domestic demand for vegetable oil is for the production of biodiesel. Total consumption of vegetable oil grows at 1.4% per annum to 9 Mt some 34% higher than the base period. During the first half of the projection period, biodiesel demand is expected to increase strongly due to the domestic blending mandate. Slower food demand and biodiesel production in the second half of the outlook period will lead to increasing exportable surplus. Vegetable oil exports are expected at 1.8 Mt in 2024 almost unchanged from 1.6 Mt in the base period.

Box 2.1. Impact of China's economic growth on Brazil's agricultural exports

As a major agricultural exporter, Brazil's agricultural commodity markets are affected by developments in major importing countries, especially China. Brazil's agricultural exports to China have surged since 2000, especially in the last five years and the main exports are oilseeds, vegetable oil, cotton, sugar and poultry. In 2014, about 71% of total oilseeds exports (31 Mt), or 35% of Brazil's total production, were exported to China, which also accounted for about 40% of China's total oilseeds imports. The export shares of vegetable oil and cotton to China in Brazil's total export were also high in 2014, at 28% and 24% respectively. The export shares of sugar and poultry to China in Brazil's total export were smaller at 9.5% and 6.4% respectively.

After more than three decades of rapid growth, China's economy is entering a "new normal" with a lower growth path. The Chinese government lowered its target growth rate to around 7% for 2015 seeking more sustainable development. For the Outlook, economic growth is expected to continue moderating, falling to 4.2% in 2024. As a consequence, Brazil's agricultural exports to China will slow down in the outlook period. While oilseeds exports from Brazil to China will increase to 47 Mt in 2024, during the outlook period, the exports will grow by only 3.9% p.a, compared with 18.9% p.a. in the previous decade. Also exports of sugar, cotton and poultry are projected to expand more slowly than before. Brazil's exports of vegetable oil to China reached a high of 0.95 Mt in 2012, but decreased sharply to 0.36 Mt in 2014. Considering China imports more oilseeds for domestic crushing, which will substitute for the import of vegetable oil, vegetable oil imports are expected to continue the downward trend to 0.2 Mt in 2024.

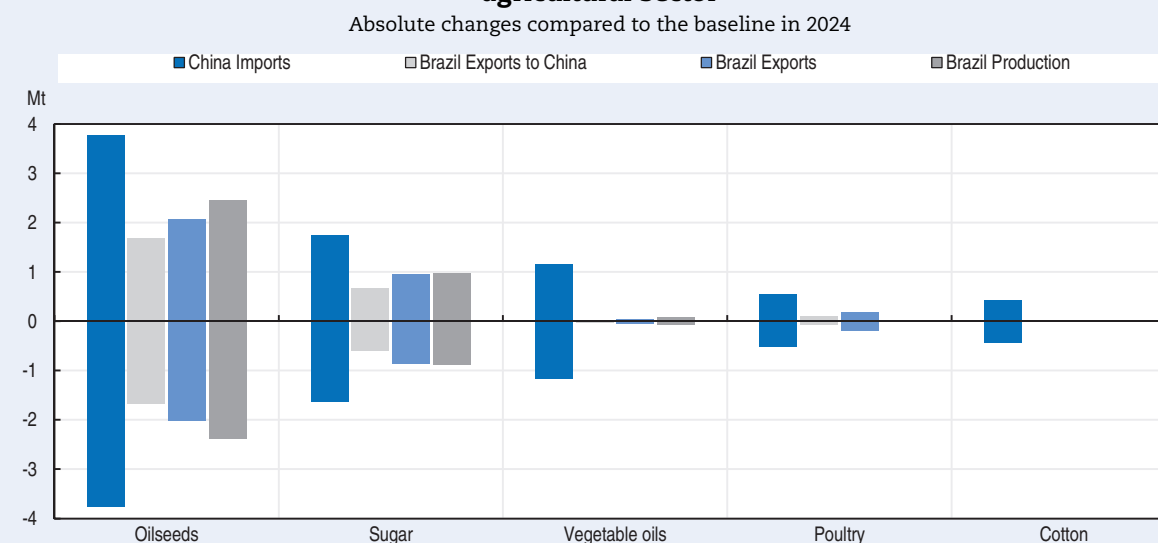
However, China faces many uncertainties in the future as its economy transitions, and its economic performance and consequent import demand will affect Brazil. To assess the quantitative impacts, two different scenarios altering China's economic growth rate were implemented: an optimistic one in which economic growth each year is 25% higher than in the baseline, and a pessimistic one in which annual growth is 25% lower than in the baseline.

As expected, Brazil's agricultural exports are affected by China's economic performance. The impacts occur not only directly through bilateral trade, but also indirectly through changing world prices, which are to varying degrees transmitted to domestic markets of all countries, including Brazil. Figure 2.11 shows the extent to which China will import more (less) agricultural products from all suppliers, including from Brazil if the economy grows faster (slower) than in the baseline. Under the higher growth scenario, the increase in Chinese imports will raise world prices, which will lead producers to increase their production and consumers to reduce their consumption. The results show that the overall impacts on Brazil's production and total exports are positive, and oilseeds and sugar account for a sizeable share of the overall increase. In general, Brazilian production will increase relative to other suppliers, as the supply of land is more elastic and there is greater scope to increase the intensity of production. However, the impacts are almost opposite and symmetrical if China's economic growth is lower than in the baseline.

Box 2.1. Impact of China's economic growth on Brazil's agricultural exports (cont.)

The impacts on Brazil's oilseeds market are the largest, followed by vegetable oil and sugar; the impacts on cotton and poultry seem modest. For example, in high growth scenario, China's total oilseeds import demand increases by 2.9 Mt, or 2.9% compared to the baseline in 2024, and about half of the increased import demand (1.5 Mt) is met by Brazil. The producer price of oilseeds in Brazil increases by 2.6% due to the expanded market, which stimulates a total production increase of 2.4 Mt. The results show that Brazil's oilseed exports to other countries will increase slightly due to the country's comparative advantage in producing this product. Brazil's total oilseeds export increases by 1.9 Mt from the baseline in 2024. The annual average growth rates of Brazil's total oilseeds exports and production during the next decade are 2.9% and 2.4% higher, respectively. However, if Chinese economic growth is worse than in the baseline, not only will Brazil's oilseeds exports to China be 1.4 Mt lower in 2024, the country's oilseeds export to the other countries will decline by a further 0.4 Mt, which leads to decreases in both total exports and production of 3.2% p.a. and 2.1% p.a. from the baseline, respectively. The results also show the same trends for other commodities, with a strong pass-through from Chinese imports to Brazilian exports in the cases of sugar and poultry, but much weaker transmission for vegetable oil and cotton.

Figure 2.11. Impact of higher or lower economic growth in China's on Brazil's agricultural sector



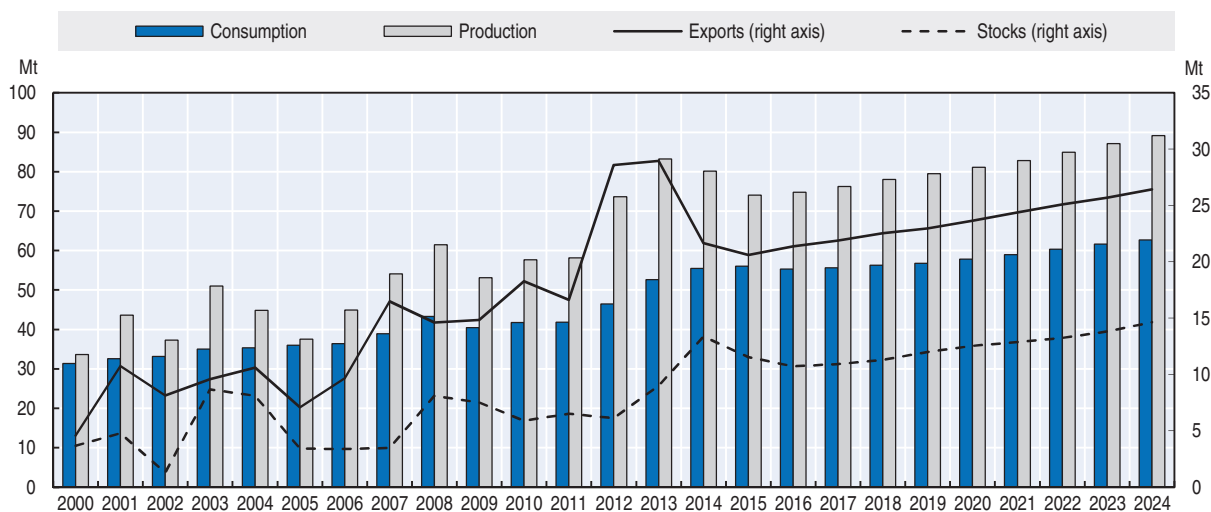
Source: OECD and FAO Secretariats.


StatLink <http://dx.doi.org/10.1787/888933229043>

Coarse grains

Maize is by far the dominant coarse grain grown and consumed in Brazil. Coarse grain demand is dominated by feed use. Feed use is expected to increase following a small decline in 2016, growing at 1.5% per year during the projection period to about 49.9 Mt by 2024, 23% above base period volume, more than keeping pace with the assumed increase in the production of non-ruminant meat (Figure 2.12). Total use increases at an average rate of 1.4% per year to reach 62.7 Mt in 2024, 22% above the base period level.

The producer price is expected to increase at a rate of 5.5% per annum, thus bolstering coarse grain production which is expected to total more than 89 Mt by the end of the outlook period. This will be underpinned by a moderate expansion in area harvested and

Figure 2.12. **Coarse grains production, consumption, exports and stocks in Brazil**

Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>. StatLink  <http://dx.doi.org/10.1787/888933229052>

by yield improvements, which continue at recent trends and reach a new high of 5.2 t/ha in 2024. Production is expected to rise faster than domestic consumption, resulting in rising net exports that are back up to the base period level of 26.4 Mt by 2024. Brazil has build-up stocks that have reached relatively high levels compared to use. Expectations are for stock-to-use ratios to fall modestly during the early projection years, with a gradually rebuilding in the second half of the decade, such that the stocks-to-use ratio reaches 23% in 2024.

Wheat

Demand for wheat in Brazil is dominated by food use which represents 95% of total consumption. Demand for human consumption is expected to continue to increase but below the trend in the last decade. Food demand for wheat is expected to total 11 Mt in 2024, 4% higher than the base. With rising population the result is a slight decrease in per capita consumption. Feed and other uses for wheat are expected to remain relatively flat so that total consumption in 2024 is about 11.5 Mt.

The producer price is expected to increase during the outlook period rising about 6.4% per annum incentivising production. Area harvested is expected to decline somewhat at the beginning of the outlook and then increase slowly during the remainder of the projection period, totalling 2.6 Mha in 2024. Production is expected to increase primarily through increasing yield. Average yield is expected to grow about 1% per annum to almost 3 t/ha in 2024. Production increases from about 6 Mt in the base to 7.8 Mt in 2024. Rising domestic supply is sufficient to keep pace with demand and imports remaining relatively flat. With the import price increasing an average of 6.4% per year, imports of 6.6 Mt in 2024 are slightly below the base period value of 6.7 Mt. Wheat stocks in 2012 fell to very low levels which were replenished in the subsequent two years. There may have been overshooting and in 2014 stocks are estimated at 1.8 Mt yielding a relatively high stocks-to-use ratio of 16%. During the course of the outlook stocks are expected to grow with demand so that a relatively more stable stock to use ratio of 11% is expected.

Rice

Rice, along with wheat and pulses, is an important part of the Brazilian diet. During the course of the next ten years, rice production is expected to increase at an average annual rate of 1.6% to 9.5 Mt, mostly as a result of improvements in average yield as harvested area is not expected to change materially. Harvested area remains relatively flat at around 2.4 Mha while yield is expected to increase by almost 1.3% per annum to almost 4 t/ha. Consumption on the other hand is expected to be relatively flat growing only to 8.7 Mt by 2024. Consequently, Brazil's exportable surplus grows somewhat during the outlook confirming Brazil's switch from a rice importer to a rice exporter. Even with a rising population however, consumption keeps pace and per capita consumption remains at about 40 kg during the period.

Sugar

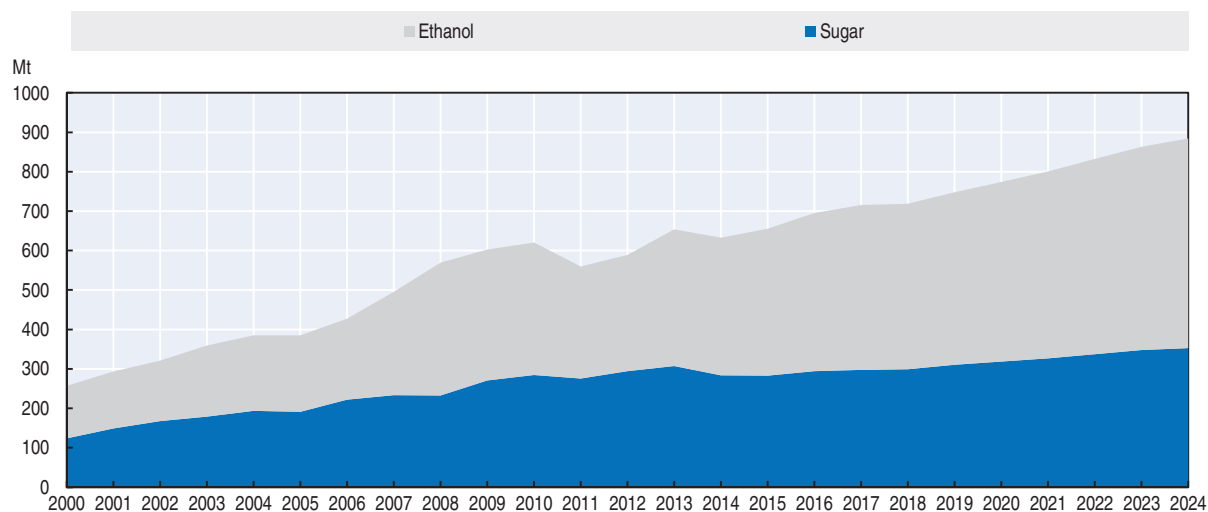
Brazil continues and will continue to be the world's largest sugar producer and exporter. In recent years, however, lack of investment in the sugarcane sector, coupled with adverse climatic conditions, has resulted in below average yields. Brazil's cost advantage in sugarcane production has also been eroded as increased mechanisation in other countries has slightly reduced Brazil's competitiveness in world markets. These factors, along with recent low sugar prices, have caused several mills to go bankrupt or be mothballed. Some of these negative factors are expected to reverse during the outlook period. The expected Brazilian real depreciation relative to the US dollar and lower oil price should help spur investment in the highly mechanised sugarcane plantations.

In contrast to the producer price for refined sugar, which declined after 2010 until just before the beginning of the outlook, the producer price for sugarcane increased during this time as a result of continuing demand for sugarcane for ethanol. For the outlook period, the producer prices for both refined and cane sugar are expected to rise, at a more modest 2.6% per annum for cane sugar and relatively more robust 4.8% per annum for white sugar. Consequently, sugarcane production is expected to grow at an annual rate of 3.3% to 884 Mt (42% higher than the base period level) driven mostly by increases in area harvested (Figure 2.13). Harvested area increases at an annual rate of 2.9% and is expected to rise to 11.5 million hectares by 2024. Average yield on the other hand has fallen from its 2010 high and is expected to increase moderately over the course of the outlook and not reach the previous high as sugar margins, which are highly dependent on the level of the Brazilian real, will not be high enough for big companies to invest heavily in the sector.

With a rising producer price, sugar production, after a very slow growth period, is expected to reach 48.4 Mt from 38.9 Mt during the base period. This is primarily driven by measures to encourage ethanol production which will divert more sugarcane to ethanol rather than sugar production. Sugarcane used for ethanol production grows to about 532 Mt by 2024 61% above the level in the base period. As a result the share of sugarcane going into sugar production drops from 47% in the base period to 40% at the end.

Sugar consumption is expected to rise to 15.8 Mt (average annual growth rate of 1.4%) during the course of the outlook to 17% above the base period level. Even with more and more of the sugarcane destined for the ethanol market, sugar production expands faster than consumption resulting in larger exportable surplus. Total exports rise from 25.7 Mt in the base period to 31.9 Mt at the end, growing 4.1% per year. Brazil's exporters seem to focus on exporting raw rather than refined sugar. Most of Brazil's sugar exports are in raw form, and although Brazil is exporting increasing quantities of refined sugar over the

Figure 2.13. Allocation of sugarcane between ethanol and sugar production in Brazil



Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.
StatLink  <http://dx.doi.org/10.1787/888933229069>

coming ten years, they do not return to the levels in the base period. Whereas exports of raw sugar grow to almost 27 Mt, averaging a growth rate of 4.7% per annum, exports of refined sugar grow much slower averaging 1.8% per annum to 5.2 Mt, some 15% below the base period level. Brazil's overall share of the world sugar market, although below the highs of the recent past gradually increase over the outlook period to almost 44% in 2024.

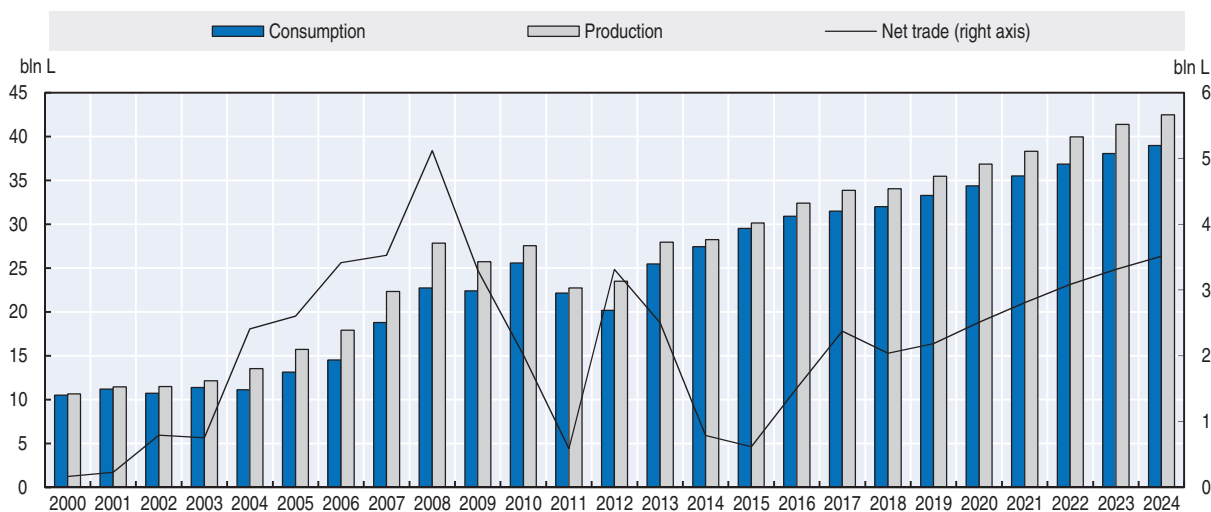
Biofuels

This Outlook assumes that over the first part of the projection period domestic gasoline prices in Brazil will be kept slightly above international prices and that they will reconnect with world crude oil prices in the later part of the projection period. Recent policy changes that include the hike in gasoline taxes while maintaining low taxes on ethanol as well as the new 27% blending requirement in gasohol (up from 25%) are expected to provide some relief in the short term to the domestic Brazilian ethanol industry by keeping the ethanol to gasoline price ratio favourable for ethanol use at least in some states. This should imply that in the first years of the projection period the Brazilian ethanol market should remain relatively isolated from the world market with producer prices above international ones. Sugarcane based ethanol production is thus expected to increase by about 60% to almost 42.5 billion litres (bln L) during the outlook period, most of which will be consumed domestically (Figure 2.14).

Total demand for ethanol is expected to rise to almost 39 bln L by the end of the projection period, pushed by the blending requirement and by the competition between hydrous ethanol and gasohol at the pump. Fuel ethanol use in 2024 is expected to comprise of 17 bln L of anhydrous ethanol and 21 bln L of hydrous ethanol for fuel use.

Net exports are projected to remain limited at the beginning of the projections period as the Brazilian ethanol industry will mostly fill sustained domestic demand, before rebounding to a little more than 3.5 bln L by 2024. The export recovery should take place in the second half of the projection period when Brazilian ethanol and gasoline prices are

Figure 2.14. Ethanol use, production and net trade in Brazil



Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>. StatLink  <http://dx.doi.org/10.1787/888933229078>

expected to move in line with international ones. Export expansion should occur at a relatively moderate rate as opportunities are expected to be limited because of uncertainties around the US bioenergy policy and the 10% blend wall limit.

Biodiesel use will also increase because of the higher blending requirement that was introduced in late 2014 (7%). Domestic use and supply is expected to rise from 3.4 bln L in 2014 to 5.1 bln L by 2024. Export opportunities will be limited.

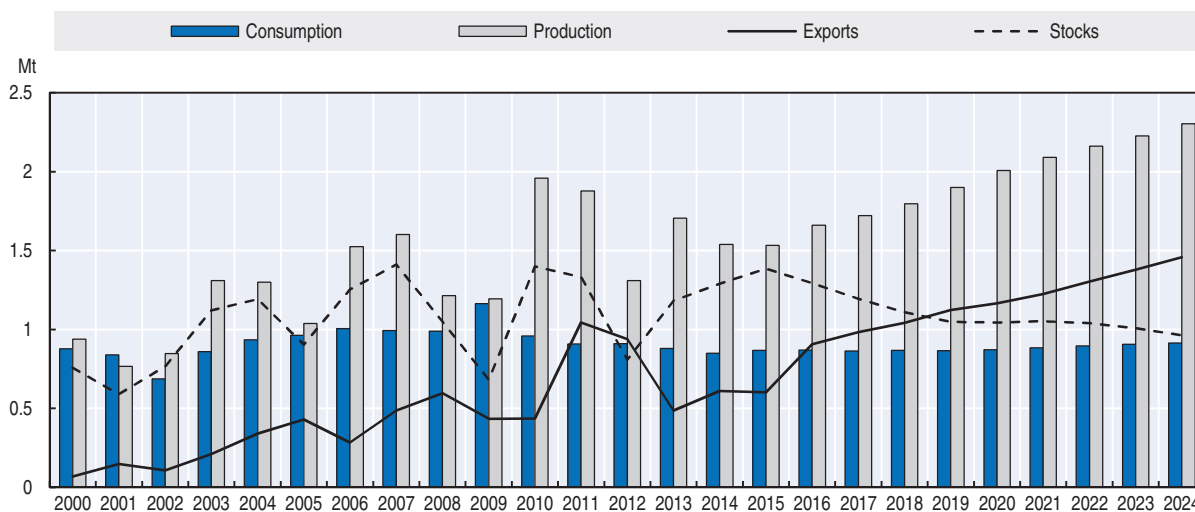
Cotton

Cotton is another important commodity for Brazil. Advances in soil technology and the development of new crop varieties have enabled cotton yields to rise rapidly since the late 1990s to more than double world average. This has enabled Brazil to become the world's fifth largest cotton producer. Government policies may also have contributed to Brazil's expanding cotton production with a minimum producer price policy to support farmer's income when prices are low.

During the course of the projection period, Brazil's continued technological progress and abundant land base and other natural endowments are expected to enable cotton production to grow at a faster rate than production by other major cotton producing countries such as China, the United States and Pakistan. During the next ten years, production is expected to grow at an annual average rate of 4.6% to attain 2.3 Mt in 2024, 52% more than the base period (Figure 2.15). This is driven mostly by an expansion in land use with harvested area growing 3.3% per annum to 1.36 Mha which is some 35% above base period level. Yield growth is expected to temper down during the next ten years with a growth rate expected to average around 1.2% per annum. Brazil's cotton production is expected to grow even faster than the world's largest cotton producer, India, which has a greater potential for higher yield growth as it starts from a low base. During the course of the next ten years, Brazil is expected to draw-down cotton stocks.

With domestic demand relatively flat and an expected robust growth in world price, the world market is important for Brazil's cotton sector. During the projection period, the

Figure 2.15. Cotton production, consumption, stocks and exports in Brazil



Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.
StatLink  <http://dx.doi.org/10.1787/888933229088>

share of cotton exported grows from less than half of production to 63% by the end of the period making Brazil among the world leaders capturing about 14% of the world market.

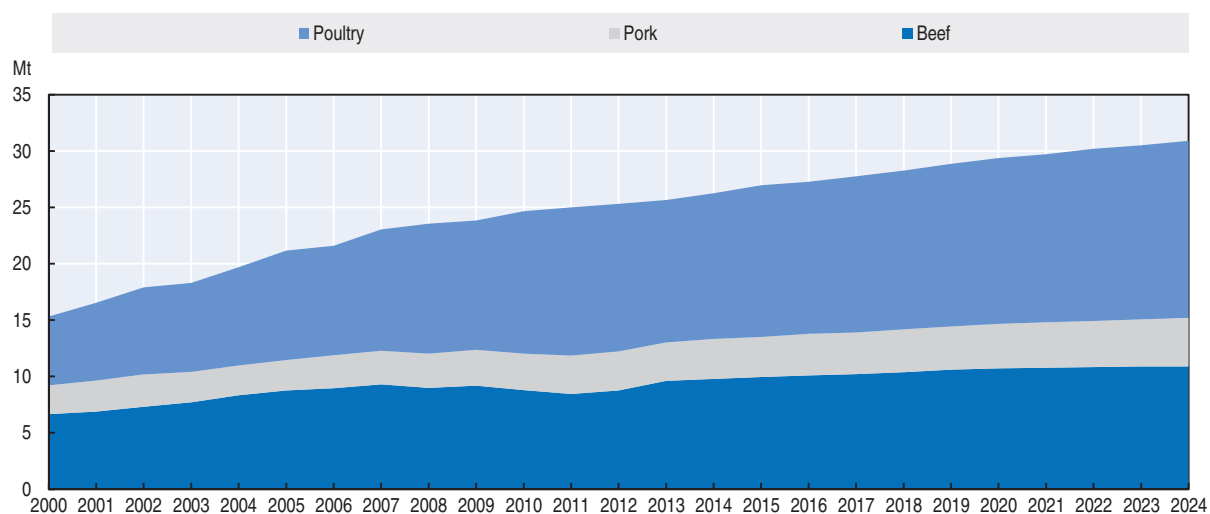
The projections outlined above are conditional on the recovery in cotton mill consumption in world markets and the reduction in China's cotton stocks. Changing competition for resources to produce other commodities is also expected to influence the outlook for cotton markets.

Brazil is also able to utilise its position as a large cotton producer to move up the value chain into processing cotton. Brazil is the fifth largest cotton processing country with a 3% share of the world's market. This is used mostly to satisfy domestic demand which is expected to increase slowly over the medium term but is not expected to surpass the levels recorded in late 2000s, when global per capita consumption of cotton reached historical highs.

Meat

Brazil is among the world's largest producers and exporters of poultry, beef and veal, and pigmeat. Brazilian meat production is expected to continue its fast growth in the coming decade. The depreciation of the Brazilian real relative to the US dollar, lower projected feed costs, improved animal genetics along with better health and nutrition, combined with an increasing domestic and international demand should sustain the projected expansion of Brazilian meat production. Production of poultry meat will be responsible for more than half of the projected increase in meat production fuelled by both domestic and international demand. The remaining expansion of the meat sector will be shared between beef and pigmeat (Figure 2.16).

Producer prices are expected to increase strongly during the next ten years especially for pork (5.9%) and beef and veal (4.4%) per annum, whereas poultry prices grow at a more modest rate of 3.9% per annum. When adjusted for inflation however, prices mostly rise at a modest rate.

Figure 2.16. **Beef, pigmeat and poultry production in Brazil**

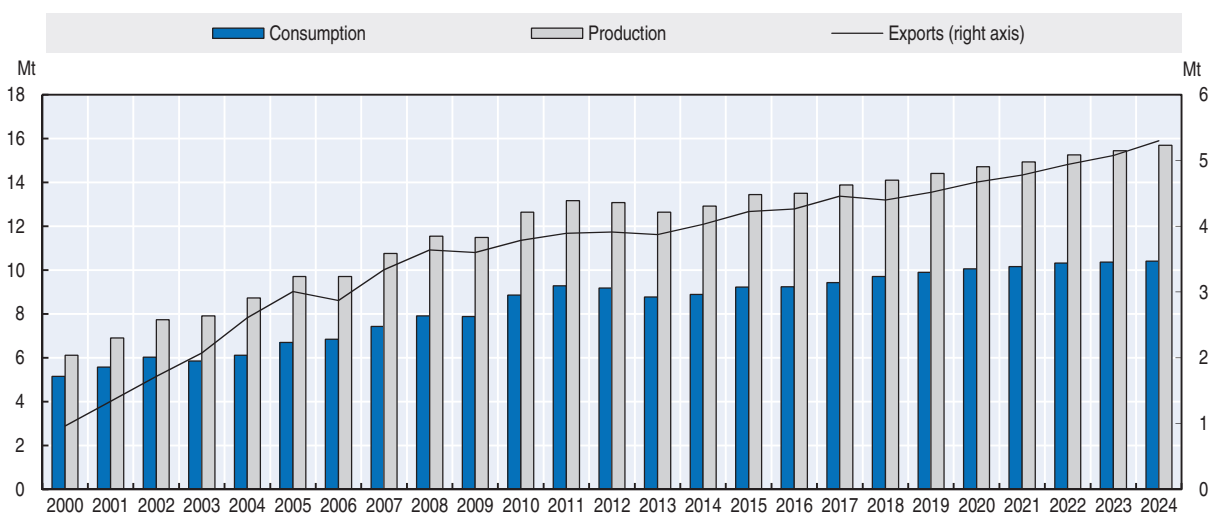
Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>
 StatLink  <http://dx.doi.org/10.1787/888933229099>

With the expectation that the price for poultry meat will rise at a slower rate than the price for beef and pigmeat, domestic consumption grows faster than population with per capita consumption rising to 42.3 kg per person per year (kg/p) from 39.3 kg/p in the base period. In general, per capita consumption of the three primary meat types is poised to increase reflecting Brazil's continuous economic development. Per capita consumption reaches 83 kg/p in 2024, adding 5.8 kg/p to each person's diet relative to the base period driven primarily by additional consumption of poultry meat.

Even with rising domestic consumption, Brazil's competitiveness in the beef and veal, and poultry international markets is projected to increase and with a depreciating currency bolstering price competitiveness. An increasing share of production is projected to go to consumers overseas enabling Brazil to capture international market share in beef and veal, and poultry.

Poultry

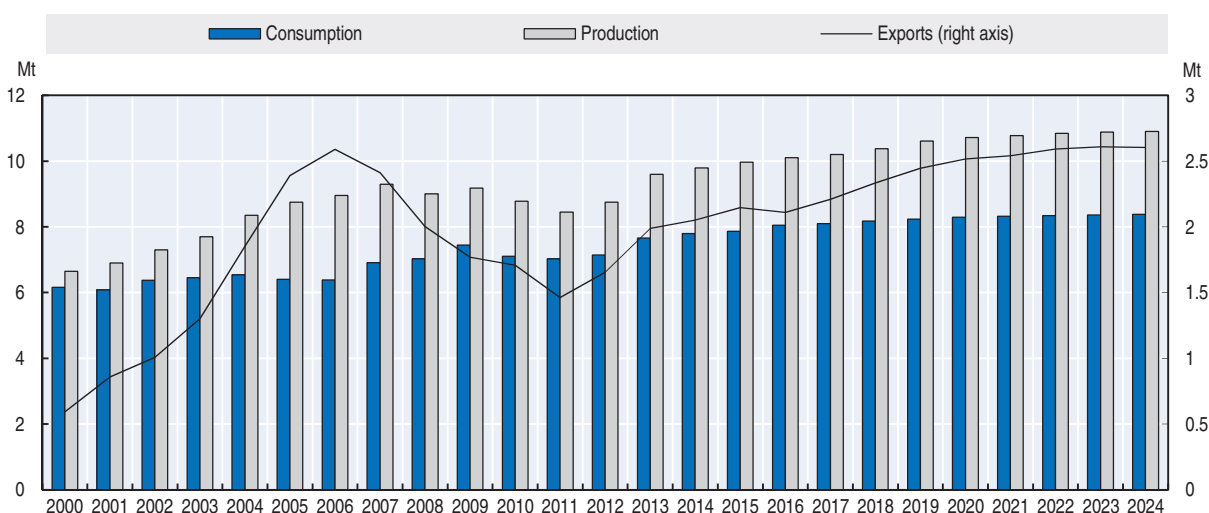
Reflecting the increasing diversification of the developing world diet towards animal protein, demand for poultry meat is expected to continue increasing including in Brazil where poultry maintains its position as the dominant meat in consumers' diet. Production rises by 22% relative to the base period rising to 15.7 Mt (ready-to-cook weight r.t.c.) (Figure 2.17). Domestic consumption is also poised to increase, but at a slower rate raising the exportable surplus. Brazilian poultry sector is geared to supply to the expected increased world demand leading to sustained export supply. Exports continue to expand throughout the projection period reaching 5.3 Mt in 2024 increasing Brazil's share of the poultry world market to a little above 31%.

Figure 2.17. **Production, consumption and exports of poultry meat in Brazil**

Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.
StatLink <http://dx.doi.org/10.1787/888933229103>

Beef and veal

Brazilian beef production is expected to increase, driven by improved animal genetics, better management of forage plants enabling greater stocking density, greater availability of cattle for slaughter, stable domestic cattle prices, and improved feed efficiency resulting in increasing carcass weight due to higher use of feed during the dry season. Production is expected to increase at an average rate of 1.1% to almost 11 Mt (carcass weight equivalent) in 2024, some 16% above the base period (Figure 2.18). Rising consumer price in an environment of relatively low income growth dampens domestic consumption which rises to 8.4 Mt in 2024, some 11% above the base period.

Figure 2.18. **Production, consumption and exports of beef and veal in Brazil**

Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.
StatLink <http://dx.doi.org/10.1787/888933229115>

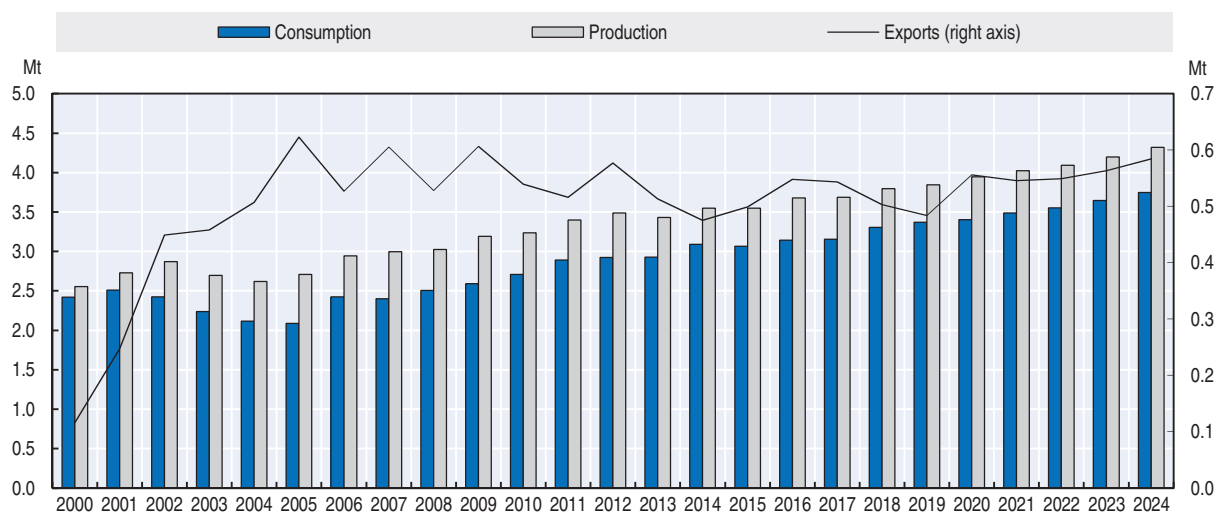
The expansion of the Brazilian cattle herd, coupled with strong international demand and the depreciation of the Brazilian real, is likely to maintain Brazilian beef highly competitive in the world market. Beef and veal exports are expected to grow by an average annual rate of 2.7% rising to 2.6 Mt some 37% above the base period. The additional exports increase Brazil's share in the world market to 20% in 2024 compared to the 18% share in the base period.

Pigmeat

Sparked by relatively low feed cost and rising prices, pigmeat production is expected to grow to 4.3 Mt (carcass weight equivalent) in 2024, 24% higher than the base period (Figure 2.19). The growing Brazilian pigmeat production mainly supplies the increasing domestic demand which increases to 3.7 Mt in 2024, 26% higher than the base period even with domestic consumer prices rising 5% per annum. Pigmeat continues as the least favoured meat for Brazilian consumers, but even with rising population, per capita consumption grows by 2 kg/p to 13.5 kg/p in 2024.

The take-up by domestic consumers absorbs most of the additional supply, nonetheless, pigmeat exports rebound during the projection period from their recent lows. Brazilian meat exports will benefit from a stronger international demand, the ongoing depreciation of the Brazilian currency and the lower projected feed costs (with the expected abundant soybean and corn crops) improving Brazil's competitiveness in the numerous destinations it currently supplies. In the short term, Brazil is expected to increase its pigmeat exports to the Russian Federation, due to the one-year import ban Russia imposed on the United States, Australia, Norway, Canada and the European Union to counter their economic sanctions. Part of Brazil increased share of pigmeat exports to the Russian market is expected to remain for the medium term.

Figure 2.19. **Production, consumption and exports of pigmeat in Brazil**



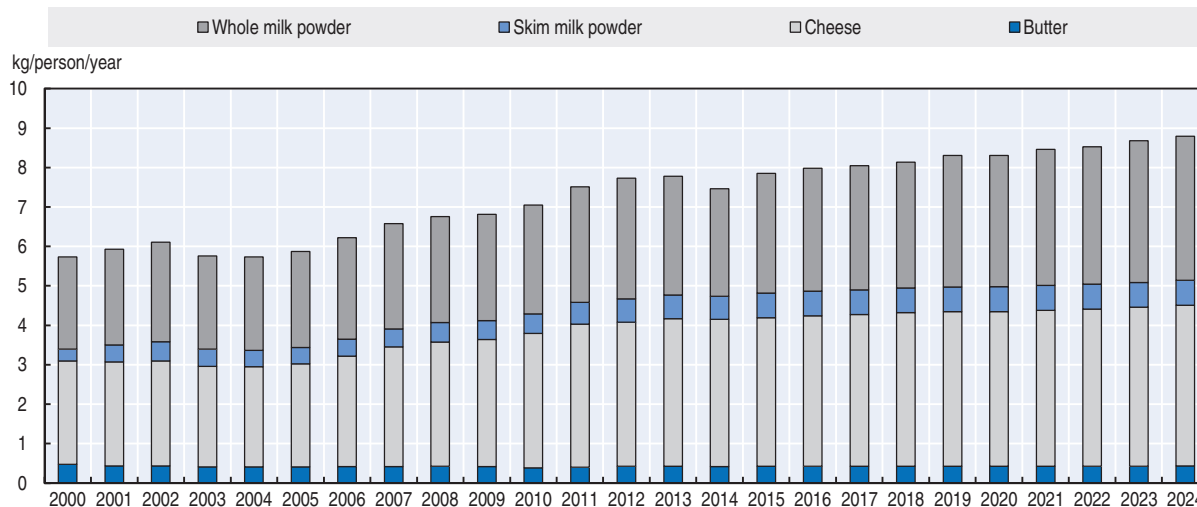
Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.
StatLink  <http://dx.doi.org/10.1787/888933229125>

Dairy


Brazil is basically self-sufficient in dairy and dairy products and no major structural changes are anticipated during the projection period. The cow herd is expected to increase slowly and milk production is expected to continue trending with domestic demand increasing slowly and keeping pace with population and income growth. Milk yields are also expected to increase slowly during the projection period and remain at low levels reflecting the pasture-based production system.

With domestic prices expected to rise from 6% to 8% during the projection period, domestic demand for dairy products (butter, cheese, skim milk and whole milk powder) is expected to increase slowly with population and income. Production will basically track demand minimising the role of international markets for this sector. Among the four products, Brazilian's appear to prefer cheese consuming 4 kg/p, a moderate increase during the projection period (Figure 2.20). But, demand for whole milk powder expands faster during the projection period, with per capita consumption rising to 3.7 kg/p. Per capita consumption of butter and skim milk powder is expected to remain relatively flat at 0.4 kg per person and 0.6 kg/p respectively. With domestic production more or less tracking domestic consumption, imports of butter and skim milk powder remain stable at low levels while imports of cheese and whole milk powder decline slightly. Dairy is mostly consumed in fresh or lightly processed form and during the next ten years, will account for a stable share of 53% of Brazilian milk production. At 84 kg/p in 2024 Brazil's per capita consumption of fresh dairy products is projected to be comparable to values in North America.

Figure 2.20. **Per capita consumption of dairy products in Brazil**



Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Pulses

Pulses, in particular beans, are part of the basic diet in Brazil, and therefore this crop along with rice is very important for food security and nutrition. Over the past decade, production of beans has ranged between 2.8 Mt and a record 3.6 Mt achieved in 2011. The crop is vulnerable to adverse weather, resulting in large annual fluctuations in output. In recent years production has been curtailed by drought in the northeast and by pests and

disease in the centre-south. The domestic market absorbs about 3.5 Mt of beans annually. Imports are needed to bridge the gap. In recent years they have fluctuated between 120 kt and as much as 400 kt. In the period to 2023/24, production is expected to remain stable at about 3.2 Mt, although short-term crop shortfalls may occur. The upward trend in yields would be maintained thanks to the further application of existing technologies and the ongoing improvements to infrastructure, such as irrigation, particularly in larger scale production units. Over the next decade, domestic consumption is expected to increase to about 3.6 Mt, suggesting that imports will persist at current levels

Coffee

Brazil is the world's largest coffee producer and exporter, accounting for about one third of global production and exports. Production has been growing steadily over the years, driven by gains in yields. The area harvested actually declined since the early 2000s due to climate shocks (e.g frost and drought) as well as damage caused by pests and diseases. Total coffee production and consumption in Brazil has increased over the last decade by 3.7% and 2.7% respectively. Although output in 2014/15 is expected to decline due to the severe drought that hit the main producing areas, domestic consumption is foreseen to remain stable at the levels of the previous year.

Total coffee exports for 2014/15 also contracted, as a result of the production setback. About 90% of Brazilian coffee exports are in the form of green beans, with shipments of instant coffee accounting for most of the remainder. Brazil's Integrated Processed Coffee Export Program (PSI) aims to position Brazilian coffee further up the value chain by boosting the share of processed coffee products.

Brazilian exports are mainly shipped to the United States market followed by Germany, Japan and Italy. As a result of steady growth in domestic consumption, Brazil is now the world's second largest market after the United States. Demand for quality coffee has expanded driven by shifts in consumer preferences as well as development in the retail market, in particular increased presence of international coffee shops.

In the next decade, coffee production is expected to reach 61 million 60 kg bags in 2023/24, up 25% from 2013/14. This growth reflects continued increases in yields sustained by further investment and better crop management. Moreover, there is considerable scope for production expansion among smallholders.

Coffee exports are foreseen to rise by 25% to 40 million 60 kg bags thereby consolidating Brazil as the main producer and exporter world-wide. Although the projected growth is slower than in the past decade, several factors could have an impact on export levels. In particular, rapid growth in domestic consumption could curtail export supplies. The expanding domestic market has dampened exports somewhat with projected export levels as a share of production falling to 65% compared to 68% currently. Another factor is that the increasing emphasis on export of processed coffee products could encounter less favourable prospects due to existing tariff escalation in several markets. However, the fact that Brazil offers a wide range of coffees (instant, roasted beans, roasted ground, special, organic, etc.) gives it a competitive edge over many other producing and exporting countries.

Oranges and orange juice

Brazil is the world's largest exporter of processed citrus, in particular frozen concentrated orange juice (FCOJ). Production of oranges is destined mostly to processing for export. The domestic market for processed fruit is relatively small, with domestic consumption being mostly in fresh form. Production of oranges in Brazil has remained stable during the past decade following rapid growth in previous periods. More recently, farmers in some regions have abandoned their orchards due to continuing losses in the fresh fruit market.

Production of oranges is expected to increase in the coming decade, although at a slower pace. By 2023/24 total output could reach 17.5 Mt, about 7% above the 2013/14 level. Continued increases in productivity would more than offset further reductions in areas that would drop by about 13% during the decade. The domestic market is expected to continue to absorb only relatively small volumes of fresh fruit. The share of production destined to processing increases in the period to 2023/24, and exports of orange juice rise to 2.6 Mt.

Fruits

Brazil is one of the world's largest producers of fruit. Its output is largely absorbed by the domestic market. Among the major fruits produced are bananas, apples, grapes, melons and tropical fruits, particularly mango, avocado, pineapple and papaya. The exact areas of cultivation and volumes of production are difficult to ascertain because a large share of output takes place on small farms for self-consumption or sale at local markets. Over the past decade, increasing emphasis has been given to the production of organics and targeted technical assistance and support measures are being extended to family farm units engaged in this type of cultivation.

For all major fruit varieties, both expansion of areas and improvements in yields have contributed to higher output levels. In terms of total volumes, the most important fruit is *pineapple*. Over the past decade, production ranged between 2.2 Mt and 2.7 Mt, with the average output of recent years amounting to about 2.5 Mt. Production may expand to 2.9 Mt over the next decade, largely in line with rising domestic demand. The domestic market absorbs the near totality of production, and exports have dwindled to virtually nil. *Apples* also represent a very large volume crop, with production ranging around 1.25Mt. Production of apples has experienced a strong upward trend over the past decade, reflecting mainly rapidly increasing yields. Export volumes have fluctuated from year-to-year, but on average amounted to less than 10% of production. The domestic market has been growing rapidly and absorbs the bulk of output. By 2023/24, apple production is projected to reach more than 1.6 Mt as a result of greater planted areas and further increases in yields.

Continued strong growth to 2023/24 is also projected for *grape* production. The crop is largely irrigated and makes use of advanced cultivation and harvesting technologies. Since 2005 production has increased steadily to more than 1.4 Mt. Over the next decade, with expanded areas and higher yields the crop could reach 1.65 Mt. Production is mostly destined to the domestic market.

Over the past decade, *melon and cantaloupe* production has also expanded because of both greater plantings and higher yields. Among fruits varieties, melons are more dependent on world markets with around a third of production exported. However, this share has fallen over the past decade owing to rising domestic demand.

Bananas are the most widely cultivated fruit, grown throughout the country. Production is expected to continue to increase as a result of productivity gains. While exports have been low over the past decade owing to the importance of the domestic market, an increase in sales to foreign markets could occur as a result of industry reorganisation and the opening of new marketing channels.

In addition to pineapple, a vast range of *tropical fruits* are produced in Brazil. Mangos, avocados and papaya are the most important in volume terms. These fruit varieties are mainly absorbed by the domestic market, and they contribute significantly to nutritional needs of rural and urban populations. Production of these fruits appears to have remained fairly stable over the past decade. Little change is expected in avocado production in the period to 2023/24, while papaya and mango will keep their upward trend in the next decade reaching respectively 1.8 Mt and 1.4 Mt. About 10% of mango production is exported, while only very small amounts of the other fruits find their way to foreign markets.

Table 2.1. **Summary of production levels of other products in Brazil**

	Unit	2005/06	2010/11	2011/12	2012/13	2013/14	2014/15	2023/24
Beans	Mt	3.5	3.7	2.9	2.8	3.4	3.2	3.2
Coffee	Million bags ¹	32.9	48.1	43.5	50.8	49.2	45.3	61.0
Oranges (fresh)	Mt	17.9	18.5	19.8	18.0	17.5	16.5	17.5
Avocado	Mt	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Pineapple	Mt	2.3	2.2	2.4	2.5	2.5	2.5	2.9
Papaya	Mt	1.6	1.9	1.9	1.5	1.6	1.6	1.8
Mango	Mt	1.0	1.2	1.2	1.2	1.2	1.2	1.4
Banana	Mt	7.0	7.3	6.9	6.9	7.1	7.2	7.8

Note: Calendar year first years shown.

1. One bag of coffee equals to 60 kg.

Source: FAO/CONAB/ICO and Ministry of Agriculture, Livestock and Food Supply.

StatLink  <http://dx.doi.org/10.1787/888933229742>

Fisheries and aquaculture

The fisheries and aquaculture sector plays an important role in Brazil's food security, providing an important source of proteins and a livelihood for millions of households. It is estimated that about 4 million people¹⁰ are directly or indirectly involved in this sector.

In Brazil fisheries and aquaculture can be undertaken along 8 400 km of the marine coastline and in its abundant freshwater resources, one of the largest hydrographic basins in the world. During the last few years, major increases in total fishery production have been driven by aquaculture. Production from aquaculture has been significant, with an average growth rate of about 9% per year in the last decade.¹¹

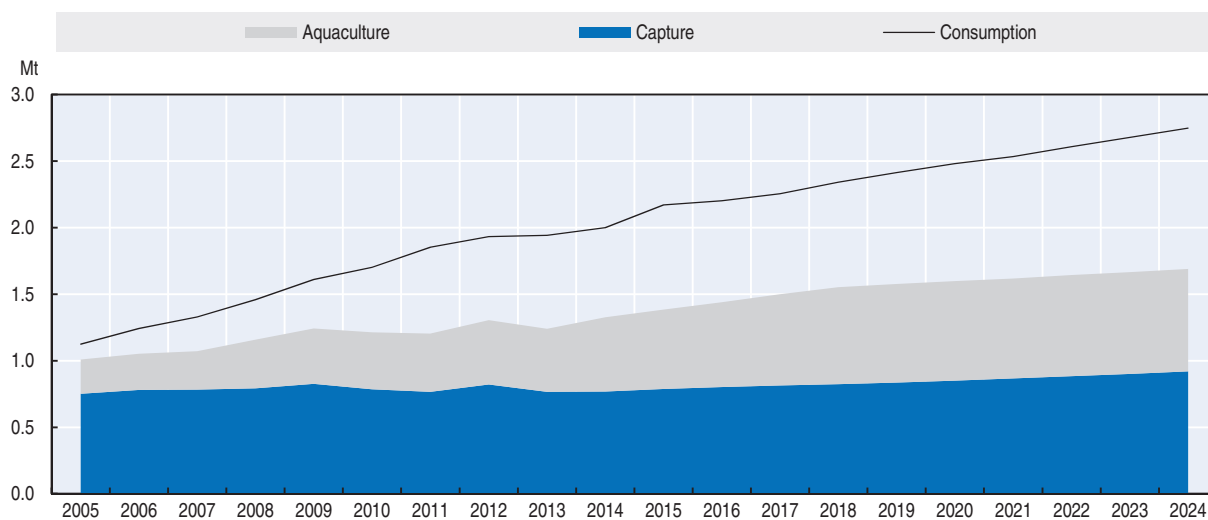
At present, Brazil is the second major aquaculture producer in the American continent after Chile. Major increases are occurring in freshwater species, which dominate production, with mariculture¹² representing about 15% of the total. Prospects for aquaculture are good with production expected to grow to 52% above the average level for 2012-14 by 2024, driven by increasing domestic demand and by national policies which support the sustainable growth of the sector. Main challenges for further expansion are linked to environmental issues and potential impacts of aquaculture on biodiversity and ecosystem services. Efforts to enhance the collaboration between the Ministry of Fisheries and Aquaculture and the Ministry of Environment to address the sustainability of the sector are underway.

Notwithstanding output of catches that has slightly increased during the past decade, several coastal and inland fishery resources are fully exploited or overexploited, as a result of excessive fishing. Most fisheries are carried out by obsolete fleets very often directed at fish stocks that are already heavily exploited, resulting in low efficiency. Excessive fishing effort has caused productivity to fall, and conflicts over access to resources. These occur between artisanal and industrial fishers and among fishing communities.

The artisanal fisheries dominate capture production, with more than 60% of total landings. This share is higher in inland fisheries. Prospects are for slightly growing catches, mainly due to further increases in inland waters obtained through improved management of resources. During the past decade, about 30% of capture fisheries originated from inland waterways.

During the past decade, domestic consumption of fish and fishery products has increased steadily thanks to growing fishery production and imports. Apparent per capita fish consumption grew from 6.0 kg/p in 2005 to 9.9 kg/p in 2014. This growth is also a result of massive campaigns within the country to promote fish consumption. Significant regional variations exist, with higher consumption in the Amazonia state. Apparent per capita fish consumption is expected to further expand over the next decade, reaching 12.7 kg/p in 2024, a growth of 30% from the average level 2012-14 (Figure 2.21).

Figure 2.21. **Fishery production and consumption in Brazil**



Source: OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture Statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.
StatLink  <http://dx.doi.org/10.1787/888933229141>

For several years, Brazil has been a net importer of fish and fishery products and the largest importer of fish in Latin America and Caribbean. The sharp increase in demand with the strengthening of the Brazilian real against the US dollar led to an impressive increase in imports of fish for human consumption (from USD 297 million in 2005 to USD 1.5 billion in 2014) and a decrease in exports (from USD 405 million to USD 207 million in the same period). Even with the projected depreciation of the Brazilian real against the US dollar, prospects are for imports to increase by 46% (in volume terms) during next decade.

The fishery and aquaculture sector is in a restructuring phase. Major efforts have concentrated on institutional strengthening aimed to obtain a more effective planning and

management of fisheries. Current government policies towards the sector are based, among other things, on the following criteria: sustainability, social inclusion, adequate structuring of production chains, strengthening the domestic market, territorial approaches for management and development programmes, increased competitiveness, and consolidation of state policies.

Government policies are also looking to improve post-harvest activities, with the aim of reducing losses due to improper handling and storage of fish. These wastes occur in particular in artisanal fisheries, but also in industrial fisheries. The Ministry of Fisheries and Aquaculture estimates that adoption of measures to reduce these losses could increase income from fishing by 40%. Furthermore, the legal framework is also seeking to stimulate private sector involvement in all aspects of fish production, processing and marketing. It encourages the establishment and operation of fish processing industries and of industries that provide basic inputs for the fisheries sector.

The effects of government policies on Brazilian agricultural markets

The government of Brazil pursues three broad kinds of policies towards the agricultural sector: an economic one of supporting continued growth of the sector, and the associated generation of income; a social one related to the livelihoods of poorer households and their costs of food purchases; and an environmental one related to the conservation of natural resources and biodiversity. This section looks at specific policies in these three areas, with a view to identifying some strategic priorities for the coming decade.

Macroeconomic and structural policies

Since the elimination of import substitution policies in the late 1980s, an important determinant of the performance of Brazil's agriculture has been the broader context in which the sector operates. Determining factors include the macroeconomic context, governance and the quality of public institutions, the regulatory environment, finance and tax policy, investment policy, labour market policies, the development of hard and soft infrastructure, and education and human capital.

In terms of the overall macroeconomic context, Brazil has achieved much improved stability since the mid-1990s, but real interest rates remain high (reflecting the so-called "Brazil cost"), with financing at market interest rates accounting for more than 30% of crop costs for those crop farmers obliged to borrow at commercial rates. By international standards, Brazil provides relatively high rates of protection, with an average applied tariff of around 10%. This raises the cost of imports including inputs used for agriculture. As a result, Brazil has a low participation in global value chains, while the import content for all Brazilian exports is estimated to reach only 10%, and 7% for exports of primary agricultural commodities and food products. In addition to protection at the border, Brazil uses local content provisions in publicly-financed projects; this condition is also imposed by the National Bank for Economic and Social Development (BNDES) on loans for capital goods, including by the agro-food and agro-processing sectors. Imported capital goods are not financed under the National Rural Credit System, except if there is no similar product made domestically, while those products are subject to a minimum of 60% local content provision.

On the other hand, Brazil has a relatively open FDI regime, and in mid-2012 was the world's sixth largest recipient of FDI. However, FDI is restricted in several sectors, including acquisition of rural land by foreign legal or physical persons reflecting concerns regarding

potential “land grabbing” following the global food price hikes of 2007 and 2008. The agro-processing sector faces much fewer restrictions. Foreign investment, for example, has contributed to the development of fertiliser production in Brazil; FDI has also been very important in the sugar and ethanol sectors, driving their technological development.

Financial markets in Brazil are largely bank based. Free market borrowing costs are high, for a variety of reasons including a high Central Bank refinancing rate, compulsory bank reserves that are high by international standards, and a high level of taxation of the banking sector. This increases the cost of capital and creates a bias toward short-term high-risk investment instead of long-term investment. Some farmers and agribusinesses benefit from the existence of directed credit BNDES at rates higher than the ones under the National Rural Credit System, mainly the long-term interest rate fixed by the government (TJLP) plus administrative fees.

Over the last two decades, Brazil’s tax and contribution systems increased public revenues from 24% to 34% of GDP, a share which is comparable to that of many developed economies but is high relative to most Latin American and other BRIICS economies (e.g. 17% in China, 18% in India, 12% in Indonesia and 27% in South Africa). Brazil’s taxes are also difficult to comply with, in particular the indirect taxes, including the state VAT (*Imposto sobre Circulação de Mercadorias e Serviços*, ICMS), for which each of Brazil’s states has its own tax code, tax base and tax rates.

Agriculture and agro-processing sectors are exempt from the ICMS tax on raw material and semi-processed products destined for export, which effectively applies to the bulk of Brazilian agricultural exports. This preference, since its introduction in mid-1990s, has been one of the factors contributing to the expansion of agricultural exports. ICMS preferences are also granted on sales of agricultural inputs. Thus, various reductions in the ICMS taxable base apply to inter-state trade in agricultural inputs. Federal legislation also empowers states to adopt similar preferences for transactions within states. Other preferences concern social security contributions. Exports, including agro-food exports, are free from PIS/COFINS taxes; PIS/COFINS rates are also set at zero on imported agricultural inputs, and the payment of these taxes is suspended on some domestically produced primary agricultural products supplied for processing. Agricultural producers also have the right to write off losses incurred in the previous year from taxable income, and companies engaged in agricultural activity may depreciate the integrity of the value of acquired capital goods in the same fiscal year (OECD, 2005; World Bank and PwC, 2013a).

Numerous studies cite weaknesses in transport and other physical infrastructures as a critical structural impediment to the Brazil’s economic and social development. Road and railway density in Brazil is less than half of the average for the rest of BRIICS, and far below that of the key OECD economies (although such a comparison is limited given the differences in the countries’ geographic conditions and development levels). During the 2013 soybean harvest, lorries queued for 25 kilometres to get to the port in Santos. The weakness of Brazilian infrastructure is recognised by the government, which since the mid-1990s has undertaken important institutional and regulatory reforms in the infrastructure sectors, and from the mid-2000s introduced various federal and state programmes. Governments at the federal and state levels have also introduced various tax and credit incentives to increase private investment in infrastructure.

The overall national policy on infrastructure development has important implications for the agro-food system. Several projects implemented by the Ministry of Transport and the Secretariat of Sea Ports are not specific to agriculture but have high potential to

improve the capacity and the time involved in the handling and transport of agricultural commodities. Other activities include the development of electronic systems to facilitate the control of shipments in ports and other border points, and financial support for private and public storage. The agro-system should gain significantly from these policies and investments, which will increase capacity and reduce the time involved in the handling and transport of agricultural commodities, and significantly improve cost competitiveness.

The nation's education improvement became a national policy in the 1980s, although Brazil continues to lag in education both in terms of education attainment levels and student performance. Brazil's performance was close to the average for Latin American countries in the OECD's PISA tests for 2012 but 2.5 years of schooling below the average for OECD countries. Agricultural education has seen a strong rise in university enrolments and in the disciplines offered driven by the agricultural boom in Brazil, but the performance of rural schoolchildren still lags that of their urban counterparts. In 2014, the 2014-24 national education plan (*Plano Nacional de Educação, PNE*) was approved, stipulating that no less than 7% of GDP will be allocated to education in 2019 and no less than 10% in 2024. It also prioritises reducing inequality and promotes education access.

Agricultural support policies

The main agricultural policy instruments are price support, concessional credit and insurance support, although specifically targeted policies are also in place to raise incomes and food security in vulnerable family farms. The specifics of these programmes are described in Box 2.2. They are complemented by regulations on land use, the specification of which agricultural zones are suitable for given crops (and therefore more likely to receive official credit), as well as regulations on biofuel use and organic production. Brazil also directs substantial public funds into land reform to empower the poor to generate better incomes. These funds provide disadvantaged groups with access to agricultural land, financial resources, and the knowledge and skills necessary to undertake farming and other economic activities.

The OECD's annual measurement of support to agriculture attaches a monetary value to the different forms in which support can be provided to the agricultural sector. Support is classified according to its tendency to distort production of trade, but it also gives an indication of how policies priorities vary across the sector. One element is support to farmers, which can be provided by supporting prices above world market levels or by making direct budgetary payments. This support is captured by the Producer Support Estimate (PSE). A second element is budgetary support to agriculture in the form of "general services", for example for research and development, advisory systems, and food inspection. These are captured by the General Services Support Estimate (GSSE). Moreover, in some countries governments also transfer taxpayers' money to (often poorer) consumers through food subsidies. Together, the producer support, general services support and taxpayer transfers to poorer consumers represent the OECD's Total Support Estimate (TSE).

Brazil provides a much lower rate of support to farmers than the OECD average, or than most of the emerging economies covered by the OECD's annual Monitoring and Evaluation (Figure 2.22). In 2012-14, the share of farmers' gross receipts coming from support (%PSE) averaged 4% in Brazil. This compares with rates of and 3% in Chile and 12% in Mexico, two Latin America OECD countries. It is considerably lower than the average of 19% in the European Union and 19% in China, its two major markets. It is also lower than the 8% average in the United States, its main competitor for several products. The OECD average is 18%. Although Brazil's PSE is relatively low, most support is provided through distorting instruments,

Box 2.2. Agricultural price, credit and insurance programmes in Brazil

Market price support aims to reduce price volatility, protect farmers' incomes, improve the availability of food supplies and offset the additional costs of producers in regions that are distant from the main markets and ports. There are also specific programmes that target small-scale agriculture, with some purchases being distributed via food programmes.

Minimum guaranteed prices are reviewed annually, covering thirty-three crops. They are announced regionally through the PGPM (*Política de Garantia de Preços Mínimos*) by the Secretary of Agricultural Policy (SPA) operated by the National Food Supply Agency (*Companhia Nacional de Abastecimento*, CONAB). This mechanism covers a great variety of crops from rice, wheat, maize, cotton, soybeans, to regional crops like cassava, beans, açai, guaraná, sisal, and a few livestock products like cow and goat milk, and honey. Other price support mechanisms for commercial agriculture are the direct government purchases (*Aquisição do Governo Federal*, AGF) and the provision financing of storage by the FEPM (*Financiamento para Estocagem de Produtos Agropecuários integrantes da Política de Garantia de Preços Mínimos*) former *Empréstimo do Governo Federal*-EGF. The Ministry of Agrarian Development (MDA) supports the development of family farming, and makes use of the minimum prices policy. Instruments that support prices and target small-scale agriculture are government purchases similar to AGF (*Programa de Aquisição de Alimentos*, PAA) and the minimum prices programme for family farms, (*Programa de Garantia de Preços para a Agricultura Familiar*, PGPAF). Under PAA, CONAB makes direct acquisitions from family farms at market prices, with the product either going into stock or distributed as part of a food programme. The PGPAF ensures that small-scale farmers receive a guaranteed price based on the average regional production cost of family farms.

In 2014, under the minimum prices policy, for the commercial sector BRL 5.6 billion (USD 2.5 billion) were spent on price support, government purchases of agricultural products and maintenance of public stocks. For family agriculture the PAA programme (government purchases) allocated BRL 1.2 million (USD 516 million) in 2014. In 2013, deficiency payments through the *Premio Equalizador Pago ao Produtor* (PEPRO) programme were given to mostly maize farmers (USD 211 million). For 2014, PEPRO was available for wheat (USD 35 million), cotton (USD 105 million) and maize (USD 110 million).

Agricultural credit is the main producer support instrument for the sector and it is provided to both commercial and small-scale family farms. The National Rural Credit System (*Sistema Nacional do Crédito Rural*, SNCR) directs credit to farmers at preferential interest rates. For commercial agriculture the SNCR system provides credit for marketing, working capital and investment. Some investment credit allocations under SNCR are funded by BNDES and managed by MAPA like *Programa ABC*, *Moderagro*, *Moderinfra*, *Moderfrota*, *PSI rural*, *Prodecoop*, *Pronamp*, *Procap-Agro*, *Inovagro* and *PCA*. Credit for family farms falls under the auspices of PRONAF-Credit of MDA and provides only working capital and investment loans. Support is also provided to producers through debt rescheduling. Major debt rescheduling occurred during the late 1990s and early 2000s for both commercial and family producers. Debt rescheduling contributed 10% of the PSE in Brazil in 2012-14.

Sources of funding for concessional credit come from “compulsory” resources (*Exigibilidade dos Recursos Obrigatórios*) where banks are obliged to either hold 34% of their sight deposits as obligatory reserves at the Central Bank at zero interest rate or to allocate the same proportion in loans to agricultural activities at below market interest rates. It is also mandatory that banks allocate 72% of their savings deposits to rural credit at market interest rates, although for part of these the interest rate may be preferential if the government covers the difference. In addition, “constitutional” funds are available for the North, Northeast and Midwest regions.

Concessional credit provided to farmers continued to increase in 2014, growing by 13% compared to 2013. Credit allocated to agriculture reached BRL 177 billion (USD 76 billion) in 2014, of which 13% (BRL 24 billion or USD 10 billion) was allocated to family agriculture. The remaining 87% was allocated to commercial agriculture. In recent years, rural credit investment programmes have been strengthened with the aim of expanding grain storage capacity, promoting technological innovation in rural properties and extending the use of agricultural machineries.

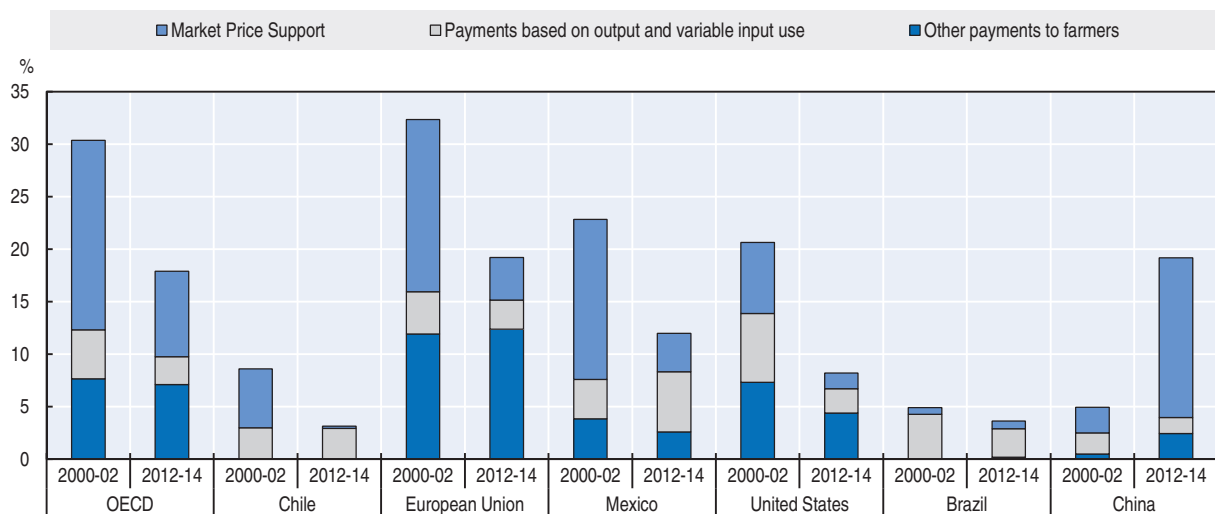
Box 2.2. Agricultural price, credit and insurance programmes in Brazil (cont.)

Agricultural insurance is another important area for the government. There are four main programmes: the rural insurance premium programme (*Programa de Subvenção ao Prêmio do Seguro Rural*, PSR), the general agriculture insurance programme (*Programa de Garantia da Atividade Agropecuária*, PROAGRO) these two targeting commercial farmers and administered by MAPA. PROAGRO-Mais or family agriculture insurance (*Seguro da Agricultura Familiar*, SEAF) and crop guarantee programme (*Programa Garantia-Safra*, GS) that deal with family small-scale agriculture. These four programmes support farmers either by paying part of the insurance premium costs or by compensating farmers for production losses due to natural disasters. Agricultural insurance, which has been increasing rapidly, accounted for 17% of the support to farmers during 2012-14.

In 2014, the rural insurance (*seguro rural*) programme provided BRL 700 million (USD 300 million) in insurance subsidies to commercial producers and covered 10 million hectares of major crops; resources allocated to the other insurance programme called PROAGRO were much higher at BRL 1.5 billion (USD 645 million). These two programmes serve large-scale agriculture only. Insurance support for family farms is under the programme PROAGRO-MAIS-SEAF. This programme spent in 2014 more than BRL 3.2 billion (USD 1.3 billion) to support small-scale agriculture. Subsidy rates go from 40% to 100% of the premium.

Figure 2.22. **The level and composition of producer support in Brazil and selected countries**

Producer support estimate as a percentage of gross farm receipts



Source: OECD (2015), "Producer and Consumer Support Estimates", *OECD Agriculture Statistics* (database), doi: <http://dx.doi.org/10.1787/agr-pcse-data-en> (forthcoming).

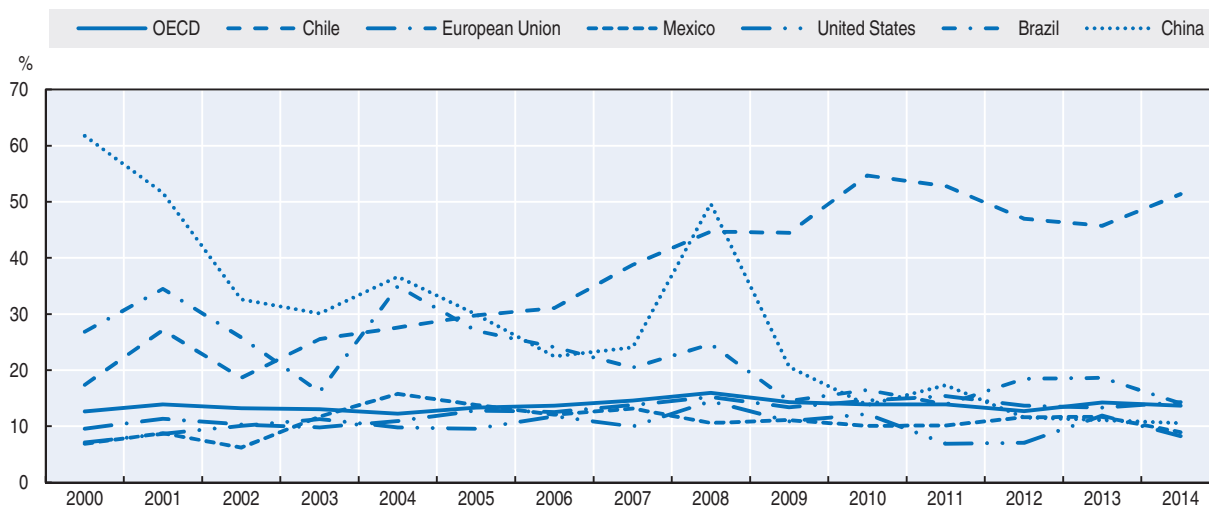
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including extensive support to stabilise prices (minimum guaranteed prices) and intervention in the credit system to provide credit to farmers at preferential rates.


As well as supporting farm prices and providing direct payments to farmers, governments provide budgetary support to agriculture more generally. In Brazil, the share of the GSSE in total transfers generated by agricultural policy (as measured by the TSE) was similar to the OECD average in 2012-14, at 17%, and higher than in most markets or competitor countries. However, it is much lower than the 50% share in Chile over the same

period (Figure 2.23). A relatively small part of total support is therefore directed to sector-wide investments that would ensure long-term productivity gains, such as knowledge systems, infrastructure and supporting institutions. Overall, support to the agricultural sector imposes a relatively low burden on the Brazilian economy. In 2012-14 the ratio of the TSE to GDP was 0.4% in Brazil. Altogether, these data suggest that there is a scope for policy to become better targeted to productivity and sustainability outcomes, and for increased spending on the provision of important public goods.

Figure 2.23. **Share of general services (GSSE) in total support (TSE)**



Source: OECD (2015), "Producer and Consumer Support Estimates", *OECD Agriculture Statistics* (database), doi: <http://dx.doi.org/10.1787/agr-pcse-data-en> (forthcoming).

StatLink  <http://dx.doi.org/10.1787/888933229163>

Brazil's Agricultural Innovation System

Science and technology played an important role in the remarkable development of the Brazilian agricultural sector. Investment in R&D has resulted in high growth in Brazilian scientific knowledge, particularly within tropical agriculture. Embrapa has provided comprehensive recommendations ranging from how to correct acid soils and low fertility, the development of varieties that are adapted to the low latitudes and higher temperatures of tropical environments, and to pest and disease control and production systems. Universities also produce high level research in areas complementing Embrapa's activities, such as in nutrition, health and the environment.

Foreign co-operation, which focused traditionally on tropical areas in Latin America, is developing with a wider range of countries in the OECD area, Africa and South-East Asia. The collaboration of Embrapa with other developed countries benefited from a pioneer mechanism, the LABEX (Virtual Laboratories Program), active in the United States, Europe and Asia. This mechanism facilitates participation in global or regional agricultural research networks. Embrapa is also actively collaborating on technology transfer and adaptive research with developing economies, with an emphasis on tropical areas in Latin America, the Caribbean and Africa. With this strategy, the Brazilian government is stimulating public R&D organisations and the private sector to expand their international actions. Brazil's role in promoting South-South co-operation is described in Box 2.3.

Box 2.3. **Brazil's role in promoting South-South co-operation**

Brazil is a strong promoter of South-South co-operation. Over the past decade, there has been a substantial increase in the Brazilian resources allocated to technical co-operation. As a result, the country has gradually switched from a position of recipient to a position of provider of development assistance. The technical co-operation provided by Brazil is characterised as being demand-driven, non-conditional and observant of equality among development partners.

Agriculture tops the list of priority fields of Brazilian technical co-operation. Embrapa, considered a source of cutting-edge expertise on tropical agriculture, research, technology and training, has seen a surge in demand for Brazilian technical co-operation support. Between 2003 and 2012, agriculture accounted for nearly 20 per cent of total initiatives, followed by projects in the sectors of health (15%), education (11%), public security (11%) and environment (6%). Other areas accounting for individual shares of less than 5% included social development, energy, science and technology, communications, and many more.

The Ministry of External Relations (MRE) has shaped the focus and geographical location of technical co-operation initiatives which are coordinated by its Brazilian Co-operation Agency (ABC). Africa continues to be the top destination, accounting for about 55 per cent of total allocations, with the bulk of these for Portuguese-speaking countries. During 2013-15 technical co-operation projects, at design or implementation stage, amounted to USD 36 million and benefitted 42 countries of Africa, with agriculture accounting for 19% of the regional total.

More recently technical co-operation has become increasingly diversified in terms of country coverage, co-operation modalities and thematic focus. During 2013-15, projects also benefitted 31 countries of Latin America and the Caribbean and 21 of Asia, Oceania and the Near East.

The broadening of Brazil's technical co-operation in agriculture is illustrated by its participation in the Africa-Brazil-Latin America and Caribbean Agricultural Innovation Market Place that aims to link experts and institutions to develop co-operative research projects for development. Its primary focus is on smallholder farmers, increasing food production and contributing to reducing hunger and poverty (www.mktplace.org).

With accumulating expertise and increasing size of operations, Brazilian co-operation is gradually moving from small-scale ad hoc projects to larger projects with longer time horizons, addressing also sustainability and capacity building needs. Cotton Four was the first structural project of this kind, launched in 2009, with Embrapa as the implementing agency, in partnership with Benin, Burkina Faso, Chad and Mali. Its aim was to promote sustainable development of the region's cotton value chain through the transfer of Brazilian tropical farming technology, in particular improvement of the genetic base of cotton plants, integrated pest management and introduction of the no-till farming system. ABC's budget for the first phase of the project was USD 5.2 million. A second phase of this horizontal partnership, Cotton 4 + 1, between Brazil and the four countries of West Africa plus Togo began in 2014. Other longer term projects involving Embrapa technical support include the development of rice farming in Senegal and several inter-related initiatives to strengthen the agricultural sector of Mozambique.

The rise in Brazil's technical co-operation has been accompanied by increased trilateral co-operation arrangements with other donor countries and UN agencies. In Mozambique, Embrapa is engaged in three large projects i) Platform with the United States aimed at training for technological innovation and development of agriculture; ii) Food Security with the United States to strengthen family and/or subsistence horticulture; and iii) ProSavannah with Japan to adapt Brazil's successful experience in the Cerrado for agricultural development of the Mozambican Savannahs in the Nacala Corridor. Both public and private contributions are supporting parts of this very large and long term project.

Box 2.3. Brazil's role in promoting South-South co-operation (cont.)

Aside from technology and training, another area of technical co-operation draws on the transfer of Brazil's experience in the field of policies for agricultural and rural development. Beginning in 2010 with the Brazil-Africa Dialogue, the idea of providing support to partner countries to adapt Brazil's policies to promote agricultural development has attracted interest. Thus, the Brazilian Programme to Strengthen Family Farming provided inspiration for the More Food International Programme which offers exchange in public policies expertise and credit facilities to improve productivity through the purchase of farm machinery and equipment. Participating countries include Ghana, Kenya, Mozambique, Senegal and Zimbabwe.

A food acquisition programme, similar to that implemented in Brazil, called Purchase from Africans for Africa (PAA Africa) aims to address food security through public procurement from small farmers and donations to vulnerable families, school feeding programmes, and building of stocks. The Brazilian government has committed USD 2.4 million to support the project in Ethiopia, Malawi, Mozambique, Niger and Senegal. FAO and WFP are assisting in the implementation of this trilateral co-operation programme. With the support of FAO, the Brazilian experience in developing innovative policies and programmes like the "Fome Zero" is being shared with a great number of countries in Latin America and the Caribbean, and, progressively, in Africa.

The role of the private sector in the Brazilian Agricultural Innovation System (AIS) has grown significantly over the last two decades due to the boom in agribusiness, especially in the Cerrado region of central Brazil. Its role is primarily oriented to the supply of inputs and technical assistance to farmers, but agricultural research is growing (seeds, equipment, machines, feed, agrochemicals, etc.).

It is important to foster and support private investment in agricultural R&D by adapting regulatory and policy impediments for investment in innovation and simplifying programmes that finance private innovation. The capacity of businesses to participate in local innovation projects could be strengthened, for example by supporting networking and actions to raise awareness and facilitate exchanges of staff and trainees with public research organisations. Different agencies such as BNDES (Brazilian Development Bank) and FINEP (Funding Agency for Projects and Programs) have specific programmes to boost private-public partnerships. A new programme launched in March 2015 invites external agents to open R&D laboratories in Brazil (www.innovateinbrasil.com.br/).

The Ministry of Agriculture, Livestock and Food Supply (MAPA) is responsible for the coordination of agricultural research at the federal level through Embrapa. The Ministry of Agrarian Development (MDA) leads rural technical assistance and extension services which focus on family agriculture. At the national level, the priorities for R&D are established by the national government through the different ministries involved in innovation, led by the Ministry of Science, Technology and Innovation (MCTI) which also has a strong role in providing resources for agricultural research, especially at the university R&D level. Agricultural research is thus integrated into the national innovation system, as reflected in the National Strategy for the Development of Science, Technology and Innovation 2012-15, and follows clear mechanisms at both the federal and state levels. Stakeholders are represented in councils and boards that discuss sectoral demands and priorities. Embrapa applies regular performance and impact evaluations, internally or with outside experts, and the results are made available to the public. Estimates of the social benefits of research have been published yearly for over ten years.

In order to overcome the constraints to poorer farmers not linked to a supply chain or credit market, the Política Nacional de Assistência Técnica e Extensão Rural (PNATER) called for targeted technical assistance services for family farms. During 2003-09 some BRL 1.5 billion were allocated to assist 2.5 million farm families. The National Agency for Technical Assistance and Rural Extension (ANATER) was created in 2013 by the Federal government to expand the resources and scope of public extension services to poorer farmers and to address sustainability issues. While ANATER is being structured, the Brazilian Government is supporting family farming with the National Program for the Strengthening of Family Farming (PRONAF), the Plano Safra 2014-15 and the National Policy for Organic Farming and Agroecology launched in 2013 with the support of the MDA.

Policies to improve the environmental sustainability of agriculture

Agricultural policy has increasingly focused on sustainable agricultural development. Agricultural zoning represents an important instrument linking agricultural support to environmental sustainability of farming activity. Respect of zoning rules is used as a condition of producers' eligibility for concessional credit and subsidised insurance programmes. Brazil has voluntarily committed to reduce its greenhouse gas emissions by between 36.1% and 38.9% in the period to 2020. To this end, the government launched in 2010 a key credit programme named Plano ABC, Low Carbon Agriculture, which promotes the recovery of pasture areas that have suffered soil degradation and puts into place a system of integrated production of crop, livestock and forestry. Since its inception until early 2015, some 32 000 contracts have been approved with the release of credit amounting to about USD 10 billion.

A range of specific programmes promote sustainable agricultural practices. Such programmes are designed for both the commercial and family farm segments. Several credit programmes for the family farm segment have an environmental focus. These include credit for plantings on unproductive and degraded soils, credit for forest planting including palm oil for biofuel, and credit to modernise production systems and preserve natural resources. PRONAF's Agroecology programme provides investment credit for the introduction of environmentally sustainable agricultural systems and organic production. However, possibly the most far-reaching longer run impacts may derive from environmental rules applicable to the use of agricultural land, including the requirement that farms set aside areas as preservation land. The implementation of the new forest code of 2012 calls for the registration of farm units with the Rural Environmental Register (Cadastro Ambiental Rural – CAR). After May 2017, rural properties not included in the CAR will not have access to agricultural credit. However, farmers may commit to complying with environmental requirements according to the relative Environmental Compliance Plan (PRA), including forest restoration, soil conservation and the above-mentioned maintenance of a share of the property under natural cover. In addition to having 20 years to comply with the PRA, they will receive financial support (particularly small farmers) to assist rehabilitation. Implementing this Plan, which aims to better regulate land use, preserving river bank areas, reducing deforestation in the Amazon and strengthening reforestation efforts, is a major challenge for the government and the sector.

Biofuel policies

In addition to promoting sustainable agricultural practices, the government is implementing a range of agro-energy policies, Brazil's main sources of agricultural renewable energy are sugarcane (ethanol and biogases), planted forests (firewood and charcoal) and biodiesel. The Brazilian government has provided strong support for biofuel via measures, which include: lending to construct ethanol plants and storages; tax incentives on flex-fuel cars which can run on any combination of ethanol and gasoline; and mandatory blending ratios for both gasoline and diesel. The mandatory blending of ethanol with gasoline in fuel mixtures continues to take place, as well as the mandatory blending of biodiesel with fossil diesel. The current blending ratios are 27% and 7% respectively. Most of the biodiesel comes from soybean oil, although the use of palm oil is increasing. Other programmes like animal and plant health continue to be important in the agricultural policy framework. More than BRL 240 million (USD 123 million) have been spent annually in this area over the last five years.

Given the current context, measures to provide relief in the short term to the Brazilian sugar and ethanol industry are more or less restricted to a differentiated taxation between hydrous ethanol and gasohol and an expansion in the mandatory anhydrous ethanol blend in gasoline.

Differentiated taxation has existed for a long time. ICMS, whose rate is set independently by each state of the federation, is the main tax levied on hydrous ethanol and gasohol sales. The lowest tax rate for hydrous ethanol (12%) is charged in São Paulo State, the largest producer and consumer state, whereas the average country tax rate is 16%. For gasoline, the average country tax rate is about 25%.

Relief measures were introduced at the beginning of 2015: the anhydrous ethanol blend in gasoline increased to 27%, the CIDE tax was reintroduced for gasoline and PIS/COFINS tax levels were increased for gasoline only. However, the scope of these measures remains relatively limited, providing relief only for the most efficient and least indebted groups in this sector.

The National Programme for Biodiesel Production and Use (PNPB) was launched by the Brazilian Government in 2005. It brings together both large-scale agribusinesses and smallholder farmers (MDA, 2011). The programme introduced a mandatory content of 2% (B2) biofuel added to fossil diesel in 2008 and set a 5% (B5) goal for 2013, though in reality this was reached in 2010. Brazil became the world's third largest producer and consumer of biodiesel in 2014, and towards the end of the year a new mandatory content of 7% (B7) was established (Presidência da República, 2014). The consumption in that year reached 3.4 billion litres (bln L) (ANP, 2014).

An important initiative implemented under the PNPB was the Social Fuel Seal scheme that is awarded to biodiesel producers that make from 10-30% (a share that varies by region) of their feedstock purchases from smallholders. Incentives to purchase from smallholders include tax reductions, favourable credit terms and, importantly, the possibility to participate in the 80% volume share stage of biodiesel auctions.¹³ In addition to the Social Fuel Seal Scheme, the Ministry of Agrarian Development (MDA) established a biodiesel production centre project that aimed to increase small-scale farmer participation. By 2014, 85 000 farms were participating in the PNPB and 42 companies, accounting for 99% of national biodiesel production, had the Social Fuel Seal (MDA, 2014).

The programme has had positive impacts on job creation in rural areas and has also enabled the introduction of up-to-date technology and training to small farmers, leading to increased productivity on degraded land (FAO, 2013).

Domestic social policies impacting on agriculture

Since the early 2000s, improved macroeconomic conditions along with targeted social safety-net policies have been reflected in significant reductions in national poverty. Between 2001 and 2012 overall poverty declined from 24.3% to 8.4% of the population,¹⁴ while extreme poverty fell from 14% to 3.5%.¹⁵ Over this period, the income of the poorest 20% of the population grew by three times as much as that of the wealthiest 20%,¹⁶ with a resultant narrowing the inequality gap which nevertheless remains large.

In parallel with poverty reduction, Brazil has made rapid progress in reducing hunger. In fact, it has already achieved both the Millennium Development Goals (MDG) target of halving by the end of 2015 the proportion of its people who suffer from hunger as well as the more stringent 1996 World Food Summit (WFS) target of reducing the absolute number of hungry people.¹⁷ Since the early 2000s, the undernourishment rate in Brazil has fallen by half from 10.7% to below 5%. According to recent analysis by the Ministry of Social Development and Fight against Hunger the undernourishment rate fell to less than 2% in 2013.

Although policies already existed in the late 1990s to redress regional economic and social inequality, the greatest acceleration in poverty reduction occurred when ending hunger was put in the centre of Brazil's political agenda by former President Luis Ignacio Lula da Silva. The launching of the *Zero Hunger* programme in 2003 introduced a new approach that gave utmost priority to food security as well as social and economic inclusion for vulnerable population groups, through coordinated macroeconomic, social and agricultural policies.

The *Zero Hunger* programme became the core of the Food and Nutrition Security Policy adopted by the government in 2006; and this inclusive food security model was gradually incorporated into national laws aimed at promoting the progressive realisation of the human right to adequate food, as enshrined in Brazil's Constitution in 2010. The Brazil without Extreme Poverty strategy adopted in 2011 builds on the success of *Zero Hunger* and targets the extremely poor. The current National Food and Nutrition Security Plan incorporates more than 40 programmes and actions with total expenditures amounting to some USD 35 billion in 2013.

The main thrusts of the Food and Nutrition Security Policy involve economic policies and social protection measures, in particular the *Bolsa Família* cash transfer mechanism (described in Box 2.4), combined with innovative measures to strengthen family farming. These two major components aimed at promoting, in an integrated manner, income generation, job creation, growth of agricultural production and improved access to food. Policy actions to enhance food security and nutrition were subsequently extended to cover other areas having implications for the agricultural sector, including sustainable agricultural practices and education in nutrition and food habits.

Box 2.4. **Bolsa Família**

Bolsa Família, launched in 2003, represents the largest programme of this sort worldwide. Since 2011 *Bolsa Família* has been a part of the Brazil without Extreme Poverty Plan that targets the extreme poor. This programme currently provides direct income transfers to more than 13.8 million low-income families. These transfers have had an immediate impact in increasing access to food which in turn has stimulated production and local farm income growth.

Over the longer run, the transfers represent an investment in human capital and productivity as a result of the conditions that must be met to qualify for the allowances. Aside from health monitoring and immunisation of children, the requirement of school attendance has contributed to improving opportunities for social and economic inclusion of future generations. Analysis of evidence from the 2010 census indicates that *Bolsa Família* was associated with a pronounced increase in continued studying, or at least studying and working, as contrasted to working only, in both urban and rural areas. The probability of working only declined most in rural areas, especially for boys.

Investment in this programme tripled in ten years, reaching nearly USD 11 billion in 2013, and currently accounting for about one-third of Federal expenditure on food security and nutrition programmes (CAISAN, 2014).

Family farming

The strengthening of family farming under the Zero Hunger programme was the other key element in the programme for improving income, employment and access to food among vulnerable populations. In 2013, expenditures to support family farmers totalled USD 5.6 billion.¹⁸ The numbers of such family farms are impressive, representing more than 80% of production units. Overall, more than 12 million persons, or about 75% of total rural employment, work in family establishments.¹⁹ Additionally, family farming accounted for 38% of the gross value of agricultural production in 2006 (FAO/INCRA 2006). At the inception of the Zero Hunger programme more than 25% of Brazil's poor population was living in rural areas where the poverty rates exceeded 45%. Between 2003 and 2009, more than 5 million people in rural areas were removed from poverty and the incidence of poverty dropped from 45% to 28%. In these regions, family farming remains the dominant economic activity.

The National Program for the Strengthening of Family Farming (PRONAF) aimed at redressing market failures that had led to depressed prices and condemned smallholders to shrinking production, falling incomes and precarious access to food. Among the main measures in favour of family farming, PRONAF provides low interest credit, the bulk of which has been destined to agriculture. Over the past decade, family farm categories were gradually increased to include units with higher gross annual income, thereby broadening access to targeted rural credit. Between 2003 and 2014, PRONAF credit resources increased from BRL 2.4 billion to about BRL 25 billion. Of the total credit provided in 2014, nearly 60% was for investment.

PRONAF operations are supported by the Family Farming Price Guarantee Program (PGPAF), an insurance programme that provides discounts on credit contracts to offset drops in farm revenue owing to reductions in market prices or climate-induced crop losses. In addition, a harvest insurance fund specifically targets farmers in Brazil's semi-arid region when drought causes severe crop losses for family farmers.

The Family Farming Food Acquisition Program (PAA) implemented in 2003 was initially intended to provide incentives to family farms to increase food production both for self-consumption and for sale at guaranteed prices to public sector procurement agencies. Procurement is made from family farm enterprises registered with PRONAF in order to sustain prices, enhance marketing opportunities and through donations improve food availability of vulnerable populations. Since the middle of the last decade, by far the largest share of procurement has been for simultaneous donation. In 2014, 85% of procurement funds were used in this manner (CONAB-PAA, 2014). A significant share of PAA procured supplies (34% in 2014) is used for the school meal programme. In 2009 the National School Meal Program (PNAE) required public schools to allocate at least 30% of food expenditures to direct purchases from family farmers. Under the PNAE an estimated 47 million free-of-charge meals are served in schools every day.²⁰

Between 2003 and 2014 about BRL 3.3 billion was spent under the PAA, and the total number of suppliers was more than 51 000. Since 2011 under the Brazil without Extreme Poverty Plan, PAA procurement is specifically targeted to the 16 million persons living in extreme poverty with monthly income below BRL 70. In 2014, nearly 24 000 PAA suppliers, or 47%, fell within this category.

The prioritisation of family farming was also reflected by measures to transfer suitably adapted technologies by Embrapa and state research organisations as well as the implementation of projects to promote development in a number of sectors such as animal husbandry, fruits and vegetables and staple food crops. The National Program for Biodiesel Production and Use (PNPB), which contains special provisions for family farmers, was launched by the Brazilian Government in 2005.

Agricultural trade policies

Brazil undertook radical trade reforms in the late 1980s and early 1990s. Tariff reductions, and the liberalisation of domestic markets, coupled with important technological and structural shifts in the agro-food sector, created a new incentive structure in Brazilian agriculture. Currently, agricultural and food commodities imported to Brazil are subject to *ad valorem* tariffs, and no specific tariffs or special safeguards are imposed. Only a very small percentage (0.2%) of agricultural tariff lines has a tariff quota.

Brazil, along with Argentina, Uruguay, Paraguay and Venezuela is a member of MERCOSUR. Bolivia started a process of accession in December 2012 which has not yet concluded. The Mercosur Common External Tariff (CET) constitutes the core of Brazil's import tariff structure. The CET incorporates 1 030 agricultural tariff lines with tariff rates ranging from 0% to 20%. However, each Mercosur member country has a list of exceptions to the CET.

Using the WTO definition of agriculture, the simple average most-favoured nation (MFN) tariff in 2014 was 10.2%. About 8% of agricultural MFN applied tariff rates were duty free in 2013 and most (57%) were between 5-10%. About 1.6% of tariff lines exceed 25% (WTO, ITC and UNCTAD, World Tariff Profiles 2014). Groups of products facing above average tariffs include: dairy products (18.3%), sugar and confectionary (16.5%), beverages, spirits and tobacco (17.0%), and coffee and tea (13.3%), while imports of cotton (6.9%), oilseeds, fats and oils and their products (7.9%), and animals and animal products (8.2%), are subject to tariffs lower than the average.

Brazil's simple average WTO bound tariff rate for 2004 (final year of the implementation period for developing countries) was 35.3%. Brazil's average bound tariff rate for agricultural goods is more than three times the average applied MFN rate. The minimum and maximum bound tariff rates coincide with the minimum and maximum applied MFN rates. However, while over 250 tariff lines were bound at the maximum of 55%, only two are actually fixed at this level. This "tariff overhang" is largely due to the existence of the Mercosur CET which sets the effective border protection at levels much below the country's bindings.

MERCOSUR has signed different agreements with almost all countries in Latin America. In 2009, MERCOSUR signed a Free Trade Agreement (FTA) with Israel, with Egypt in 2010 and with Palestine in 2011. Preferential agreements between MERCOSUR and India and with the South African Customs Union (SACU) were signed in 2009. No trade agreements have been signed since then. The trade agreements with Israel and India are in force, but the agreements with Egypt, Palestine and SACU still need to be ratified by the National Congress.

The majority of agricultural imports from MERCOSUR enter the member countries duty free, while the average tariff on agricultural imports from non-MERCOSUR countries is close to 12%. Brazilian exporters face relatively low duties when exporting to most of their major partners. Exports of all goods to the European Union in 2012 faced a trade-weighted average MFN rate of 6.2% while exports to the United States and China faced tariffs averaging respectively 3.4% and 7%. However, Brazilian goods entering the Russian Federation faced duties averaging 21.4% while to enter Japan they had to overcome an 83% average tariff.

There has been a rapid growth in Brazil's agricultural exports, although those exports remain centred around bulk and lightly processed commodities and there is relatively little integration with global value chains. One reason for this is high tariffs on manufacture relative to other countries, which raises the cost of imported inputs. Although Brazil has liberalised its trade over time, the average applied tariff rate on manufactured products fell from 16% in 1996 to 10% in 2012. That rate is higher than the applied rate by the other BRIICS and about three times higher than the world average.

Box 2.5. Sanitary and phyto-sanitary regulations in Brazil

Importation of products subject to SPS controls requires a non-automatic license. The Ministry of Agriculture, Livestock and Food Supply (MAPA), through its Secretariat of Agricultural Protections (SDA), is responsible for the protection of animal and plant health. The SDA is vested with authority to control the SPS aspects of production and international trade of all livestock, fruits, vegetables, grains, plants, veterinary drugs, pesticides and the components; it also registers and inspects products and activities that use genetically modified organisms, on behalf of the National Technical Commission on Biotechnology (CTNBio), which issues the relevant authorisation. The Ministry of Fisheries and Aquaculture (MPA) is responsible for aquatic, animal health; its General Coordination Office for Aquatic Animal Health (CGSAP) carries out sanitary controls to protect the natural and reproduction environments in Brazil, including on imports of fish and aquatic animals and their reproductive materials. The Brazilian Health Surveillance Agency (ANVISA), an autonomous entity linked to the Ministry of Health under a management contract, is in charge of controlling the production and marketing of products and services subject to sanitary surveillance for the protection of human health. ANVISA is responsible for, *among other things*, approving the importation of food products and performing sanitary inspections at the points of entry into Brazil.

Imports of agricultural products are subject to Brazil's sanitary and phyto-sanitary (SPS) standards. Brazil's system is based on risk analysis that generally takes into account an import's origin and product characteristics (see Box 2.5). Brazil accepts phytosanitary and zoosanitary certificates issued by official sanitary services in countries that follow the guidelines of the Codex Alimentarius Commission, the World Organisation for Animal Health, the International Plant Protection Convention and other international scientific organisations. A total of 3 275 product lines at the HS-8 digit level are subject to SDA controls with 2 675 of these lines requiring SDA authorisation prior to shipment or arrival at Brazil's borders.

Strategic challenges

The prospects for Brazilian agriculture over the next ten years are favourable, notwithstanding the prospects of slower growth in both domestic and international demand, and real prices declining from recent peaks for most agricultural commodities. Both domestic and international markets are expected to grow, with a shift in the composition of demand towards products in which Brazil is a competitive producer; in particular meat and associated feed requirements (maize and oilseeds), sugar, and higher value products such as tropical fruits. That growth will provide further opportunities for Brazil's commercial agriculture, but will add new opportunities for family farms in products where economies of scale are less evident, notably coffee, tropical fruits and horticulture. As a result of this growth, agriculture will continue to play an important role in terms of employment, income generation and export earnings. Increased incomes for family farms and abundant supplies of a diverse range of foods will also contribute to further improvements in food security and nutrition.

The dynamism of Brazilian agriculture was founded on the availability of new technologies adapted to tropical agriculture, the adoption of modern management methods, including financial instruments, and changes in policies. The key to future growth is sustaining improvements in agricultural productivity, which will come from a combination of improvements in crop yields, some conversion of pasture (including degraded and abandoned pasture lands) to cropland, and more intensive livestock production. Brazil's agricultural research and innovation system has been hugely successful, bringing new technologies to farming in tropical areas, and making available innovative new production and management practices. That success can be leveraged through greater private sector engagement. The full potential of the private sector to contribute to agricultural innovation can be realised by strengthening the enabling regulatory framework, improving infrastructure, promoting qualified human capital and developing investment partnerships for research and development between the public and private sectors. At the same time, continued commitment by the government to agricultural research and development, including in new areas such as biotechnology and responses to climate change, are needed to address problems confronting the agricultural sector generally.

The participation of farmers in Brazil's economic growth can be enhanced by further investment in education, training and extension services which provide wider dissemination of existing technologies. However for many traditional farmers, the key to their development will be balanced rural development that creates jobs outside as well as within agriculture. Broad based support, including education and public health support, can help consolidate Brazil's successes in reducing poverty and eliminating hunger, ensuring incomes rise to sustainable levels well beyond the poverty threshold.

Among the factors influencing the competitive position of Brazil's agricultural sector, improvement in logistics and transport infrastructure is a key priority. This would reduce the costs of Brazil's export oriented producers, while benefiting farmers of all types through improved access to domestic markets. The strengthening of animal and plant health and inspection systems is another area that can also underpin the longer term development of domestic and international markets for the Brazilian agricultural sector.

In general, Brazil allocates a relatively low share of its agricultural support to sector-wide investments, such as infrastructure, extension services, and institutional support and knowledge systems. While short term benefits accrue to farmers from price support and credit programmes, in the longer run sector-wide investments can have a higher pay-off to farmers. Although Brazil provides comparatively low support to farmers, there may be opportunities to gradually transfer additional resources to public investment in the light of the expected improvements in agricultural productivity and the associated profitability of the sector. Moreover, the expansion of credit facilities from private sector sources could release further public resources for longer term investment

The lack of a Doha Round WTO agreement has impeded market access for Brazilian producers to many parts of the world. Without a comprehensive WTO agreement, Brazil would gain from a deepening of trade reforms within Mercosur and the broader pursuit of trade agreements with existing and potential partners. Over the past decade a large share of Brazil's exports has gone to China. As China's growth slows, other Asian markets will be progressively more important. At the same time, cross-sectoral liberalisation would eliminate biases in incentives across sectors and reduce the costs of imported inputs. This would help promote value addition in agriculture and greater insertion into global value chains – both of which remain underdeveloped by international standards. Those gains could be reinforced by reforms to the country's complex and costly tax system, and by the removal of administrative obstacles that producers face in establishing and conducting businesses.

One of the overriding challenges for Brazilian agriculture in the long run is the strengthening of productivity growth and the maintenance of international cost competitiveness while making further progress in reducing poverty and inequality. Under the Zero Hunger programme and subsequent National Food Security and Nutrition Program, significant reductions in hunger and poverty rates have taken place in the country over the past decade. Since 2011 the focus given under the Brazil without Extreme Poverty Plan to assisting particularly needy families, most of whom are located in rural areas, can contribute to lessening the economic and social exclusion of these vulnerable groups. Aside from conditional cash transfer payments, longer term benefits can accrue from targeted rural technical assistance.

The improvements in agricultural production can be achieved sustainably. Most of the anticipated increases in production will come from productivity gains, and the stress on natural resources - especially land, but in some regions water too – can be alleviated. There is also scope for further development of more sustainable production practices, including the conversion of existing and degraded cropland to pasture and the integration of crop and livestock systems. Brazil has a large amount of land that can be exploited for agricultural production without further encroaching on the Amazon rainforest. This will imply tighter regulations on illegal activity, and technical and financing support to the Forest Code. It could be further strengthened by assigning property rights on land that has

already been cleared. Clearer property rights would also improve the sustainability of land use in other regions.

The benefits of sustainable growth in Brazil's agriculture are vast. Simultaneously it improves food availability for both domestic and international consumers, while generating income opportunities for a diverse constituency of farmers. Those gains are fully compatible with the government's emphasis on reducing poverty and income inequality, and simultaneously improving the environmental sustainability of the agricultural sector.

Notes

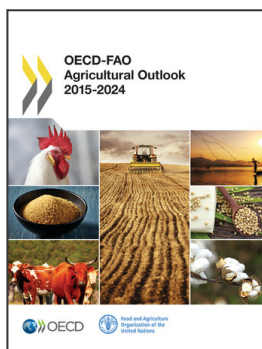
1. Brazil has an official definition of a "family farm" that is adopted in this chapter (Law 11.326/2006 of 24 July 2006, Administrative order Ministry of Agrarian Development No. 111 of 20 November 2003 and Resolution No. 3.467 of 2 July 2007). A family farm must be managed by the owner, use principally family labour, and have a size of less than 4 fiscal modules. A fiscal module is a tax-related measure based on the potential income generation from the land, ranging between 5 and 110 hectares, depending on the geographical area. Using this definition, 84% of Brazil's farms are family farms, averaging 18.4 hectares. By contrast non-family farms average 309 hectares.
2. USDA use data published by FAOSTAT to calculate TFP growth as the difference between output growth and input growth (www.ers.usda.gov/data-products/international-agricultural-productivity.aspx). The aggregate index of output volume is based on Agricultural Gross Production in constant 2004-06 USD, smoothed over time using a Hodrick-Prescott filter. The aggregate index of input use is calculated as the average of land, livestock, machinery, fertiliser and feed use indexes, weighted by the shares of these inputs in agricultural production available in the literature.
3. This value is based on the WTO definition of agricultural products which does not include fish and fish products.
4. Petrobras is a semi-public Brazilian multinational energy corporation. Petrobras's activities include the exploration and production of oil and natural gas, oil refining, transportation and distribution of natural gas and oil products, electricity generation and petrochemical production.
5. The different perspectives are summarised, for example, in Box 1.1, "The impact of agriculture on the Brazilian Amazon" in OECD (2005), and in FGV (2013), pp. 26-29.
6. "Legal Amazon" encompasses nine Brazilian states and covers five million square kilometres – more than 50% of Brazil's total area.
7. Because of double or even triple cropping along with area substitution among the various crops, the figures may overstate the extent that new land is brought into production.
8. Unless indicated otherwise, all references to relative change in the value in 2024 are with respect to the average value during the three years 2012 to 2014. The term base period is also used to refer to the average value for 2012 to 2014.
9. The Brazilian Ministry of Agriculture, Livestock and Food Supply (MAPA) projects soybean production for 2024 at 118.0 million tons. Methodological differences help to explain the different results for this crop as well as for wheat and rice, as MAPA uses forecasting models based on time series while the FAO-OECD projections are based on a structural model.
10. www.mpa.gov.br/files/Docs/Planos_e_Politicas/Plano%20Safra%28Cartilha%29.pdf.
11. Aquaculture data have been recently revised by the Ministry of Fisheries and Aquaculture (MPA).
12. Mariculture: Cultivation, management and harvesting of marine organisms in their natural habitat or in specially constructed rearing units, e.g. ponds, cages, pens, enclosures or tanks.
13. Auctions are run by the Brazilian National Agency of Petroleum, Natural Gas and Biofuels. Eighty percent of the total biodiesel volume supplied in fulfilment of the mandatory blend is reserved for Social Fuel Seal holders, while the remaining 20% is open to competition for producers with or without the Social Fuel Seal.
14. CAISAN. 2014. *Balanco das Acoes do Plano Nacional de Seguraca Alimentar e Nutricional – Plansan 2012/2015*. Brasilia.

15. IPEA. 2014. *Objetivos de Desenvolvimento do Milênio. Relatório nacional de acompanhamento*. Brasília, Institute of Applied Economic Research IPEA.
16. Government of Brazil. 2014. *Indicadores de Desenvolvimento Brasileiro 2001-2012*. Brasília.
17. FAO, IFAD, WFP: *The State of Food Insecurity in the World 2014*, pp. 23-26.
18. CONSEA. 2014. *Análise dos indicadores de segurança alimentar e nutricional*. 4^o Conferência Nacional de Segurança Alimentar e Nutricional +2. Brasília.
19. Del Grossi, M.E. 2011. "Poverty Reduction: From 44 million to 29.6million people" in J. Graziano da Silva, M.E. Del Grossi and C. Galvao de Franca (eds), *The Fome Zero (Zero Hunger Programme: The Brazilian Experience*. Rome, Food and Agriculture Organization of the United Nations.
20. A. Veiga Aranha. 2011. "Zero Hunger: A Project turned into a Government Strategy" in J. Graziano da Silva, M.E. Del Grossi and C. Galvao de Franca (eds), *The Fome Zero (Zero Hunger Programme: The Brazilian Experience*. Rome, Food and Agriculture Organization of the United Nations.

References

- Brandão, A., de Rezende, G.C. and R. da Costa Marques (2005), "Agricultural Growth in the Period 1999-2004, Outburst in Soybean Area and Environmental Impacts in Brazil", *Texto Para Discussão* No. 1062, Rio de Janeiro, <http://dx.doi.org/10.2139/ssrn.660442>.
- CONAB (2014), Programa de Aquisição de Alimentos (PAA), *Resultado das Ações da CONAB em 2014*, Brasília, DF, www.conab.gov.br/conteudos.php?a=1592&t=2.
- Empresa Brasileira de Pesquisa Agropecuária (Embrapa) – Ministry of Agriculture, Livestock and Food Supply MAPA (2014), *Technological solutions and innovation: Embrapa in the International Year of Family Farming*, Brasília, DF, <http://ainfo.cnptia.embrapa.br/digital/bitstream/item/113140/1/Anuario-Separata-Embrapa-2014-INGLES.pdf>.
- FAO (2014), "The State of Food and Agriculture 2014: Innovation in family farming", FAO, Rome, www.fao.org/3/a-i4040e.pdf.
- FAO, IFAD and WFP (2014), "The State of Food Insecurity in the World 2014: Strengthening the enabling environment for food security and nutrition", FAO, Rome, www.fao.org/3/a-i4030e.pdf.
- FAOSTAT (2013), On-line database, FAO, Rome, <http://faostat.fao.org/>.
- FAO and OECD (2014), "Opportunities for Economic Growth and Job Creation in Relation to Food Security and Nutrition, Report to the G20 Development Working Group", https://g20.org/wp-content/uploads/2014/12/opportunities_economic_growth_job_creation_FSN.pdf.
- FGV (2013), *Agroanalysis*, The Agribusiness Magazine from FGV, Special edition, Fundação Getúlio Vargas, Rio De Janeiro, <http://fgvprojetos.fgv.br/en/publicacao/agroanalysis-special-edition-0>.
- Gasques, J.G., E.T. Bastos, C. Valdez, and M.R.P. Bacchi (2014), "Produtividade da agricultura Resultados para o Brasil e estados selecionados", Embrapa, Brasília, DF, www.agricultura.gov.br/arq_editor/RPA%203%202014.pdf#page=88.
- Graziano da Silva, J., Del Grossi, M.E. & de Franca, C.G., eds. (2010), *The Fome Zero (Zero Hunger programme): The Brazilian experience*, FAO and the Ministry of Agrarian Development, Brasília, www.fao.org/docrep/016/i3023e/i3023e.pdf.
- Helfand, S., M. Pereira and W. Soares (2014), "Pequenos e Médios Produtores na Agricultura Brasileira: Situação Atual e Perspectivas". In: Buainain, A., E. Alves, J.M. Silveira and Z. Navarro (Editores Técnicos). "O mundo rural no Brasil do século 21: a formação de um novo padrão agrário e agrícola", Embrapa, Brasília, DF: p. 533-557, <http://www.alice.cnptia.embrapa.br/handle/doc/994073>.
- IBGE: The Brazilian Institute of Geography and Statistics (2006), *Censo Agropecuario 2006*, Rio De Janeiro, www.ibge.gov.br/home/estatistica/economia/agropecuaria/censoagro/2006/.
- Ministerio do Desenvolvimento Agrario (MDA) & Ministerio do Desenvolvimento Social e Combate a Fome (MDS), *Plano Brasil sem Miséria, Resultados no meio rural 2011/2014*, www.mda.gov.br/sitemda/sites/sitemda/files/user_arquivos_25/Caderno%20de%20Graficos%20BSM%20-%203%20C5%20anos%20-%20Rural.pdf
- Ministério de Minas e Energia, Empresa de Pesquisa Energética (MME/EPE) (2013a), *Avaliação Do Comportamento Dos Usuários De Veículos Flex Fuel No Consumo De Combustíveis No Brasil*, www.epe.gov.br/Petroleo/Documents/DPG_Docs/EPE-DPG-SDB-001-2013-r0.pdf.

- Ministério de Minas e Energia, Empresa de Pesquisa Energética (MME/EPE) (2013b), “Balanço Energético Nacional”, <https://ben.epe.gov.br/default2013.aspx>.
- Ministério de Minas e Energia, Empresa de Pesquisa Energética (MME/EPE) (2014), “Análise de Conjuntura dos Biocombustíveis”, www.epe.gov.br/Petroleo/Documents/An%C3%A1lise%20de%20Conjuntura%20dos%20Biocombust%C3%ADveis%20-%20boletins%20peri%C3%B3dicos/An%C3%A1lise%20de%20Conjuntura%20-%20Ano%202014r.pdf.
- Ministry of Agriculture, Livestock and Food Supply (MAPA/ACS) (2014), *Projections of agribusiness: Brazil 2013/14 to 2023/24 Long-term Projections*, Brasília.
- OECD (2005), *OECD Review of Agricultural Policies: Brazil 2005*, OECD Publishing, Paris. doi: <http://dx.doi.org/10.1787/9789264012554-en>.
- OECD (2013), *OECD Economic Surveys: Brazil 2013*, OECD Publishing, Paris, doi: http://dx.doi.org/10.1787/eco_surveys-bra-2013-en.
- OECD (2014), “Innovation for Agriculture Productivity and Sustainability: Review of Brazilian Policies”, OECD, Paris, [www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=TAD/CA/APM/WP\(2014\)23/FINAL&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=TAD/CA/APM/WP(2014)23/FINAL&docLanguage=En).
- OECD (2014), “Analysing Policies to improve agricultural productivity growth, sustainably: Revised framework”, OECD, Paris, www.oecd.org/tad/agricultural-policies/Analysing-policies-improve-agricultural-productivity-growth-sustainably-december-2014.pdf.
- OECD (2014), *OECD Economic Outlook*, Vol. 2014/2, OECD Publishing, Paris, doi: http://dx.doi.org/10.1787/eco_outlook-v2014-2-en.
- OECD/CAF/ECLAC (2014), *Latin American Economic Outlook 2015: Education, Skills and Innovation for Development*, OECD Publishing, Paris, doi: <http://dx.doi.org/10.1787/leo-2015-en>.
- World Bank (2014), *World Development Indicators 2014*, World Bank, Washington, DC, doi: <http://dx.doi.org/10.1596/978-1-4648-0163-1>.



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