

easyBrasil

# BRAZILIAN AGRIBUSINESS

Sustainable, Competitive,  
Food Security Provider

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## easyBrasil

A series of reports covering the Brazilian business environment, **easyBrasil** provides official, transparent, reliable information for those oriented toward investment and trade, and for those simply looking to learn more about the country and its economy. Each report addresses specific topics and opportunities in Brazil's diverse economic spheres, providing macro- and micro-economic information, information on regulation and policy, and forecasts, all affirmed and acknowledged by the Brazilian federal government. The series' individual reports are published as booklets in both digital and print editions.

### **BRAZILIAN AGRIBUSINESS** **Sustainable, Competitive,** **Food Security Provider**

Brazil is one of the world's leading producers and suppliers of food, fibers and agro-energy. Productivity gains obtained through technology and organization of agribusiness production chain, added to steady improvements in political and institutional conditions, and the enterprising, groundbreaking spirit of Brazilian farmers, have been the principal factors in this veritable revolution.

Over recent decades, Brazil has gone from a position as a net importer of food to being a major world supplier. Competitiveness in the global market, aligned with full capacity to provide for the domestic market simultaneously, ensures a huge credit balance for the Brazilian agribusiness sector, while mostly of the other major producers and exporters are also major world importers of food. Today Brazil is the largest net food exporter in the globe, and the agriculture and livestock sector already accounts for more than 20% of its GDP, using less than 10% of the country's area of production, with an area between 20% and 30% dedicated to livestock.

Brazil also has extensive areas of native vegetation, which covers about 66% of its national territory, which are recognized worldwide as important to biodiversity, water cycling, carbon storage and climate regulation. Brazilian agribusiness is ready to commit to preserving this natural resource heritage, while at the same time expanding its production and supply of agricultural products to attend domestic and overseas demand, in order to contribute positively to the two major global challenges of this century: food security and environmental sustainability.

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## 3. Closing remarks

**In recent decades, Brazilian agribusiness has become one of the world's leading producers and exporters of food, agro-energy and other inputs, thus contributing to food security and global development.**

Brazilian agricultural and livestock output will continue to grow in coming years at a rate faster than the world average, for a series of reasons. There is plentiful land available for expansion in the form of underused pastures, as well as scope to increase mean productivity of several crops. A number of sustainable technology options are available for producing in tropical climates, and environmental sciences continue in persistent pursuit of new options. Environmental policies encourage protection and offer incentives for increased farm productivity. Integrated action by the public authorities, private enterprise and civil society is fostering profitable production, the adoption of sustainable technology, and alignment with society's needs and expectations.

Under these conditions, it has been – and will continue to be – possible to solve problems that are being addressed and reduced over time, such as deforestation and suppression of native vegetation, climate change, natural resource and biodiversity loss, and others. The adverse externalities caused by unsustainable production – whether losses to wellbeing, environmental and climate security, or

economic and market losses – are increasingly present to government, society, producers and consumers.

Also increasingly evident are the various socio-environmental benefits generated by sustainable production: the amount of carbon sequestered, the level of biodiversity preserved, the volume of water generated or safeguarded, and so on. Once recognized and valued by consumers, these environmental services can be remunerated by the market by way of stronger demand and more attractive prices.

The agriculture and livestock sector potential – with the compliance of the New Forest Code and the maintenance of native vegetation on private properties – should contribute to Brazil's consolidation of its low-carbon agriculture model. Socio-environmental progress has been constant, bringing greater transparency, environmental and health quality, as well as economic output, all of which are necessary conditions for Brazil to confirm its position as a world reference in sustainable production, and the leading agro-environmental power on the planet. ■

**2.4. PRIVATE AND THIRD SECTOR INITIATIVES**

A number of local, subnational, national and international efforts and initiatives are ongoing in the endeavor to assure sustainability in Brazil’s various different agribusiness production chains. Although a good part of deforestation is not directly related to agricultural and livestock farming, at present the various chains seek to guarantee

that their product is not associated with recently deforested areas.

There are conservation initiatives in Brazil specifically connected with agriculture and livestock farming, in the form of either associations, programs, projects, commitments or certifications.

**EXAMPLES OF PRIVATE AND THIRD SECTOR INITIATIVES ONGOING IN BRAZIL TOWARDS SUSTAINABILITY IN AGRIBUSINESS CHAINS OR SEGMENTS**

INITIATIVE	DESCRIPTION
Soy Moratorium	A private institutional arrangement by the Brazilian Vegetable Oil Industries Association (Associação Brasileira das Indústrias de Óleos Vegetais, ABIOVE) and the Brazilian Cereals Exporters Association (Associação Brasileira dos Exportadores de Cereais, ANEC), under which major soybean purchasers commit to neither selling nor financing soy produced in the Amazon biome on areas deforested after July 2006. Monitoring of the Soy Moratorium has shown that crops planted on areas deforested after the initiative represent a negligible share.
Soy Plus Program	Rural property management program preparing soy producers to meet demand in economically, socially and environmentally more sustainable manners.
Sustainable Livestock Farming Working Group (Grupo de Trabalho da Pecuária Sustentável, GTPS)	Group comprising representatives of all links in the beef livestock chain, which promotes discussion on adoption of new common principles and practices for the purpose of constructing a new kind of sustainable and economically workable livestock farming.
Bonsucro Certification Program	A multi-stakeholder association set up to reduce the environmental and social impacts of sugarcane production.

Although research about the reach and impact of these initiatives are scarce, a recent study published in the journal Science<sup>22</sup> indicates that, since 2006, the Soy Moratorium has been a significant influence in slowing the expansion of soy in areas of native

vegetation in the Amazon. The Soy Moratorium was the first voluntary commitment associated with zero deforestation, and was considered to set an example for similar arrangements with regard to livestock and oil palm.

21 - Ministry of Agriculture, Livestock, and Supply. Plano Setorial de Mitigação e de Adaptação às Mudanças Climáticas para a Consolidação de uma Economia de Baixa Emissão de Carbono na Agricultura. Available at: <http://www.agricultura.gov.br/assuntos/sustentabilidade/plano-abc/arquivo-publicacoes-plano-abc/download.pdf>. Accessed on 12 Sept 2017.

22 - Gibbs et al. (2015).

Brazil is one of the world’s leading producers and suppliers of food, fibers and agro-energy. Productivity gains obtained through technology and organization of agribusiness production chain, added to steady improvements in political and institutional conditions, and the enterprising, groundbreaking spirit of Brazilian farmers, have been the principal factors in this veritable revolution.

Over recent decades, Brazil has gone from a position as a net importer of food to being a major world supplier. Competitiveness in the global market, aligned with full capacity to provide for the domestic market simultaneously, ensures a huge credit balance for the Brazilian agribusiness sector, while mostly of the other major producers and exporters are also major world importers of food. Today Brazil is the largest net food exporter in the globe, and the agriculture and livestock sector already accounts for more than 20% of its GDP, using less than 10% of the country's area of production, with an area between 20% and 30% dedicated to livestock.

Brazil also has extensive areas of native vegetation, which covers about 66% of its national territory, which are recognized worldwide as important to biodiversity, water cycling, carbon storage and climate regulation. Brazilian agribusiness is ready to commit to preserving this natural resource heritage, while at the same time expanding its production and supply of agricultural products to attend domestic and overseas demand, in order to contribute positively to the two major global challenges of this century: food security and environmental sustainability.

# Introduction

The most recent projections published in **Agricultural Outlook by the United Nations Food and Agriculture Organization (FAO) and the Organization for Economic Cooperation and Development (OECD) estimate that, over the next ten years, Brazil's production of various agricultural and livestock products will grow at rates far above the world average<sup>1</sup>. Maize production in Brazil should rise by approximately 441% more than the world figure, with soy increasing 70%, beef 34%, pork 259%, milk 219%, ethanol 72%, biodiesel 333%, and fish 267%.**

Brazil still possesses extensive areas of native vegetation. Brazilian agribusiness is ready to commit to preserving this natural resource heritage, while at the same time expanding its production and supply of agricultural products to attend domestic and overseas demand. This challenge is being met thanks to integration between government, private agents and the third sector. The results will afford unique opportunities to generate eco-systemic and environmental services capable of further

improving the country's position of leadership in the promotion of sustainable development.

The development of public policies, with improvements of public environmental management, as well as the engagement of Brazilian society, is building a stronger legal and regulatory system of land use and environmental protection that provides a better synergy between food production and the biodiversity and natural resources protection.

## 1. Brazilian Agribusiness

### 1.1. THE IMPORTANCE OF THE COUNTRY'S AGRIBUSINESS CONTRIBUTION FOR THE GLOBAL ECONOMY

**Brazil is one of the world's main producers and exporters of agricultural and livestock products. According to the FAO, the value of Brazil's farm production in 2014 was US\$ 220 billion, ranking it fourth in the world, behind only China, India, and the United States (Figure 1).**

Value of agricultural and livestock production in 2014 (USD billion)

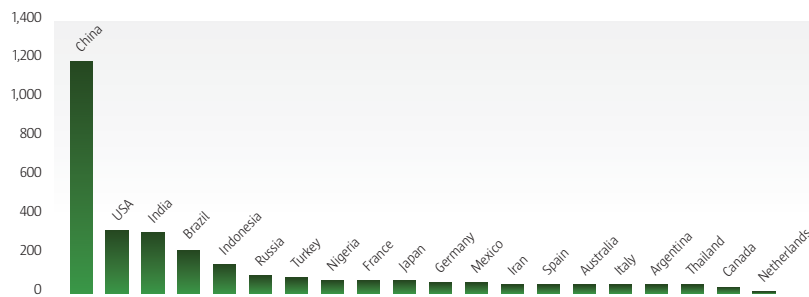


FIGURE 1  
Source: FAO<sup>2</sup>

1 - <http://www.fao.org/3/a-i7465e.pdf>  
2 - <http://www.fao.org/faostat/en/#data>. Includes grains, meats, eggs, milk, fruit, vegetables, legumes, roots and tubers, Brazil and other nuts, honey, and tobacco.

### 2.3.5. Climate change policy

Brazilian emissions originating in changes in land use and deforestation have now been reduced from their 70% level in 2005, to 27.5% in 2010. Brazil is voluntarily committed to the emissions reductions of the 15<sup>th</sup> Conference of the Parties (COP15) of the 2009 United Nations Framework Convention on Climate Change (UNFCCC) approved in Copenhagen. That commitment has led the country to introduce the National Climate Change Policy (Política Nacional sobre Mudança do Clima, PNMC), in the form of Law 12.187, of 29 December 2009, which undertakes to reduce deforestation by 80% in the Amazon and 40% in the Cerrado by 2020.

Other measures introduced by the PNMC included the Sector Climate Change Mitigation and Adaptation Plan to Establish a Low Carbon Emission Economy in Agriculture (Plano Setorial de Mitigação e de Adaptação às Mudanças Climáticas para a Consolidação de uma Economia de Baixa Emissão de Carbono na Agricultura<sup>23</sup>), known as the “ABC Plan”, which encourages the adoption of technologies such as pasture restoration, no-till farming, integrated agro-forestry, and others. In order to finance adoption of these measures, the ABC Program includes a specific public rural credit line at more competitive rates of interest.

In 2015 Brazil committed to the most ambitious greenhouse gas emission reduction targets in the context of the Paris Agreement signed at COP21.

That commitment, termed a “nationally determined contribution” (NDC), imposes emissions reduction targets of 37% of 2005 level emissions by 2025, and can attain 43% reductions by 2030. The NDC is to be implemented starting in 2020.

As regards agriculture and livestock farming in Brazil, the target signed under the Paris Agreement is to restore another 15 million hectares of degraded pastures and expand integrated agro-forestry systems by 5 million hectares.

Brazil was the only developing country to commit to absolute emission reduction targets in the Paris Agreement signed at COP21

Other goals contained in Brazil's NDC under the Paris Agreement are the elimination of illegal deforestation and restoration of 12 million hectares of areas of native vegetation. Those goals reassert the policies to combat deforestation (PPCDAM and PPCerrado), and the Forest Code. It is estimated that 5 million hectares of permanent protection areas will be

restored, along with at least 7.5 million hectares of legal reserves, which could foster the formation of carbon stocks of the order of 4.5 billion tonnes of CO2 equivalent in the coming 30 years. At 2014 annual rates, that volume of carbon would offset ten years of emissions by the agriculture and livestock farming sector.

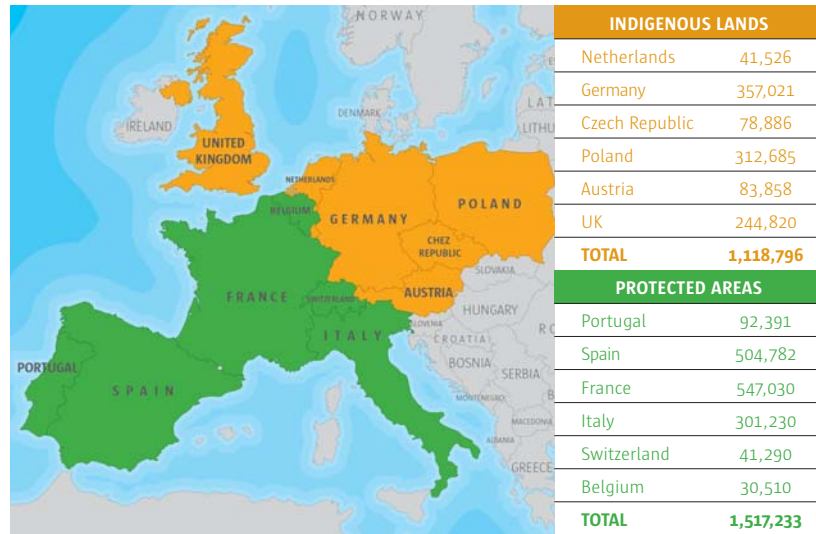
Another of Brazil's commitments under the Paris Agreement is the goal of expanding renewable biofuels to an 18% share in the national energy matrix. Although this item is considered to relate to the energy sector, it is directly associated with agriculture and Brazilian agribusiness.

rules protecting APPs on private lands than do Argentina, Canada, China, France, Germany and the United States, where some degree of intervention and production on APPs is allowed<sup>19</sup>. In addition, in several of these countries, farmers can receive compensation for mandatory restriction of the productive area of their properties.

**2.3.4. Biodiversity protection and agro-ecological zoning policies and measures**

The Forest Code contributes to protecting biodiversity on private properties by requiring that areas of native

vegetation are maintained, and this is included among the biodiversity protection goals that Brazil set itself<sup>20</sup>. The extensive areas protected in the form of conservation units and indigenous lands, which today constitute an area equivalent to much of Europe, are also an important biodiversity protection mechanism. The conservation units total an area equivalent to six European countries (Portugal, Spain, France, Italy, Switzerland and Belgium), while indigenous lands are equivalent in area to another six (Holland, Germany, Czech Republic, Poland, Austria and the United Kingdom) (Figure 9).



**FIGURE 9**  
Source: Brazilian Rural Society

Agro-ecological Zoning specifies environmental potentials and vulnerabilities associated with agricultural crops, by region of Brazil. It is used as a tool in managing and organizing agricultural production spatially, and today contemplates 40 crops. One example is sugarcane agro-ecological zoning, which delimits the expansion and sustainable

production of the crop across Brazilian territory, by identifying land, preferably already occupied by pasture, with potential for expanding the crop. Oil palm zoning guides expansion of Brazilian production in such a way as to ensure economic, social and environmental sustainability in previously deforested areas in 14 states.

Brazil is the leading producer and trader in a variety of products, such as sugar, coffee and orange juice, and one of the four largest producers and exporters of soy, beef, poultry, cellulose, corn, cotton, soy oil and meal, and pork.

the production and commercialization of inputs, machinery and equipment, and the storage, processing and distribution of agricultural goods and items used as raw material. This series of activities, called **agribusiness**, extends far beyond the rural production environment to form a varied group of stakeholders with the common objective of establishing Brazil's position among the world's leading producers.

This set of products originates not only from the agriculture and livestock sector, but from a whole network of adjacent activities involving

**BRAZIL'S SHARE AND RANKING IN WORLD PRODUCTION AND EXPORTATION OF SELECTED AGRIBUSINESS PRODUCTS**

	PRODUCTION			EXPORTS		
	% global total	2006/07	2016/17	% global total	2006/07	2016/17
<b>Orange juice</b>	62%	1	1	79%	1	1
<b>Coffee</b>	36%	1	1	27%	1	1
<b>Soy</b>	32%	2	2	43%	2	1
<b>Sugar</b>	21%	1	1	45%	1	1
<b>Beef</b>	15%	2	2	18%	1	2
<b>Poultry</b>	15%	3	2	36%	1	1
<b>Maize</b>	9%	3	3	22%	3	2
<b>Pork</b>	3%	4	4	10%	4	4

Source: USDA (2016, 2017)

The agribusiness sector's importance is also reflected in Brazil's annual wealth production:

- The overall sector contributed 20% of Gross Domestic Product (GDP) in 2016<sup>3</sup>;

- In 2017 the sector accounted for a predominant (44%) share of exports, and was decisive to guaranteeing the country's positive trade balance, the agribusiness balance equalling 122% of the national balance<sup>4</sup>.

3 - Source: CEPEA (<https://www.cepea.esalq.usp.br/br/pib-do-agronegocio-brasileiro.aspx>)

4 - Source: Ministry of Agriculture, Livestock and Supply (<http://www.agricultura.gov.br/assuntos/relacoes-internacionais/documentos/estatisticas-do-agronegocio/SERIEHISTORICABCARESUMIDA19972017.xls/view>)

**1.2. THE EVOLUTION OF BRAZILIAN AGRIBUSINESS**

Over the last decades, Brazil has gone from a position as a net importer of food to being a major world supplier. A veritable revolution in agribusiness came with a set of far-reaching changes in the country’s economy and society, as it emerged from significant State intervention and planning with strong trade protectionism in the 1960s and 1970s into an environment with more competition and less governmental control. Reforms and changes in the macro-economic environment during the 1990s, characterized by price stabilization, the opening up of the economy, and privatizations, made for a competitive environment with less regulation of agricultural and livestock products markets.

Controls on prices and production volumes were gradually replaced by better agricultural credit instruments, equalized interest rates, and greater private sector participation in production financing. These changes provided farmers with funds for investment, current expenditure, and commercialization. However, production support

via agricultural credit has not translated into privilege or competitive distortion in favor of Brazilian farming since, in proportion to gross farm receipts, the level of support offered to farmers, as estimated by the OECD, is far lower in Brazil than in the world’s leading producer countries (Figure 2).

Producer Support Estimate (PSE) in % of gross farm receipts

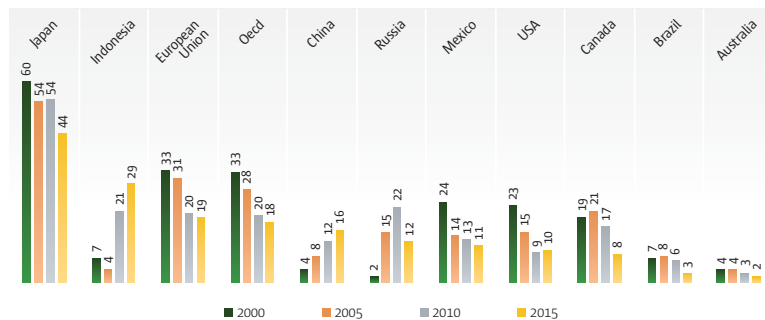


FIGURE 2  
Source: OCDE<sup>5</sup>

Agriculture and livestock financing mechanisms have been refined to reduce dependence on public funding and the risks associated with generous subsidies and guaranteed sales, transferring greater responsibility to the private sector for organizing and distributing production. As competitiveness has developed, so trading companies and suppliers of inputs, machines, and equipment have gradually taken over a significant portion of sector financing.

In parallel with this, Brazil’s population has urbanized in sixty years, from 66% in rural areas in 1950 to 85% living in cities in 2010. This has radically changed the proportion between food producers and consumers in the population, leading to changes in diet and strong growth in demand for certain food products. Indeed, Brazil has not specialized in producing commodities for export, but rather has managed to increase the volume and productivity

5 - <https://data.oecd.org/agrpolicy/agricultural-support.htm>

**2.3.3. Native vegetation protection policy (“Forest Code”)**

The Native Vegetation Protection Law (Law 12.651/2012), known as the “Forest Code”, is the main public policy instrument fostering convergence between interests in expanding Brazilian agribusiness and the necessary environmental protection to assure Brazil’s sustainable development. The Forest Code stipulates that natural vegetation is to be

conserved on agricultural and livestock farming properties, and sets minimum requirements for Permanent Preservation Areas (Áreas de Preservação Permanente, APPs) and Legal Reserves (Reserva Legal, RLs) on such properties. APPs are areas of specific interest for conservation of natural resources (river banks, hillsides, etc.), while RLs are the fraction of the area that must be preserved in the form of native vegetation. The minimum areas for RLs depend on the biome where the property is located.

MINIMUM LEVELS OF NATIVE VEGETATION PROTECTION ON RURAL PROPERTIES, AS SPECIFIED BY THE “FOREST CODE”, BY BIOME AND TYPE OF VEGETATION

REGION	MINIMUM PERCENTAGE	
	Forest	
Legal Amazon	Forest	80%
	Cerrado (wooded savannah)	35%
	Campos (grassland)	20%
Rest of country		20%

The Forest Code also stipulates inclusion in a mandatory Rural Environmental Register (Cadastro Ambiental Rural, CAR), an electronic data base identifying the areas of APP and RL on each rural property, as well as any deficits (liabilities) and surpluses that may exist in relation to required minimum protection levels.

The Forest Code also calls for areas of properties with APP and/or RL deficits to be restored, and an Environmental Compliance Program (Programa de Regularização Ambiental, PRA) requires that farmers establish how and when they will restore their APP or RL.

This means that the CAR will become the chief tool for agro-environmental monitoring and transparency of properties in Brazil, by making it possible not only to identify land use on private properties, but also to set strategies and policies for public management of rural space and environmental protection in Brazil. By 16 February 2018, more than 4.8 million rural properties had been registered, totaling an area of more than 435 million hectares introduced into the system data base<sup>18</sup>.

The areas of native vegetation on private properties are essential to conserving biodiversity, water, soil, carbon stocks, and other environmental services. In this regard, compliance with the Forest Code is one of the national commitments that Brazil entered into under the Paris Agreement to combat climate change.

The Forest Code can be said to place Brazilian farmers at a higher level of accountability than their counterparts in most of the world’s leading food-producing countries. Brazil has more restrictive

18 - [www.florestal.gov.br/numeros-do-car](http://www.florestal.gov.br/numeros-do-car)

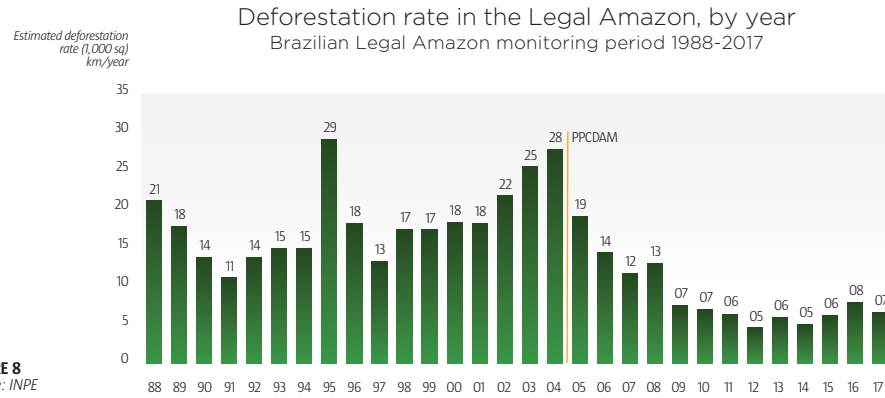
19 - Chiavari & Lopes (2017) explain that Brazil allows only sustainable forest management in permanent preservation areas, while economic exploitation of forest resources is prohibited. France, meanwhile, allows both sustainable forest management and grazing of buffer strips, while Germany permits sustainable forest management and good-practice farming, as well as providing financial compensation for voluntary total preservation. Argentina, Canada and the USA permit sustainable forest management in permanent preservation areas, while China does not delimit such areas.



**2.3.2. Policies to combat illegal deforestation (PPCDAM and PPCerrado)**

The Action Plan to Prevent and Control Deforestation in the Legal Amazon (Plano de Ação para Prevenção e Controle do Desmatamento na Amazônia Legal, PPCDAM)<sup>13</sup> was introduced in 2004. By the end of 2017, the Amazon deforestation rate had fallen

by 76%<sup>14</sup>. Today, deforestation is concentrated in smaller areas, which are difficult for monitoring systems to detect. In 2016 most deforestation (67%) occurred in areas under public management, while only 32% was in private areas<sup>15</sup>. Figure 8 shows that deforestation in the Legal Amazon reached one of its highest levels in 2004, and has remained at far lower levels ever since.



**FIGURE 8**  
Source: INPE

In 2016, a new phase of the PPCDAM was launched, which includes new economic and normative instruments, points to a scenario of regeneration of native vegetation and elimination of net emissions from deforestation in the coming decade.

Deforestation in the Cerrado biome accumulated 43.5% before 2002, when the Action Plan for Prevention and Control of Deforestation and Intentional Fires in the Cerrado<sup>16</sup> was put in place. The figures amount to 47.8% in 2008 – an increase of 8,0% in six years – and

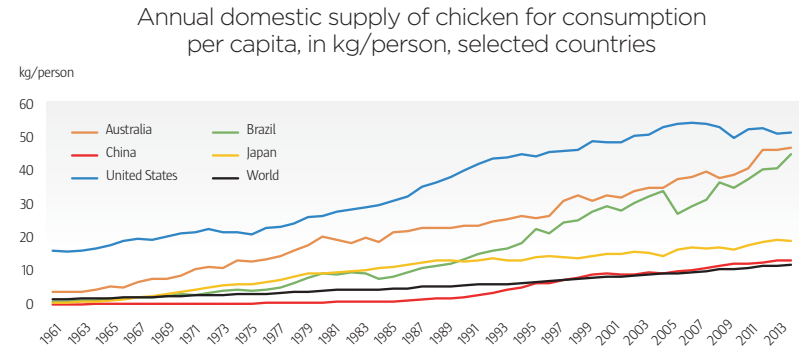
to 48.89 in 2011, that is, 2,0% accumulated between 2008 and 2011<sup>17</sup>. The current phase of the PPCerrado, which began in 2016, comprises a new core strategy based on economic, fiscal and tax instruments.

It can thus be seen that there is a modern public policy apparatus in place to curb conversion of natural areas in the two biomes, so as to guarantee that agribusiness expands over areas already occupied or at least takes account of the legal constraints requiring conservation of natural vegetation.

13 - The Legal Amazon covers 59% of the area of Brazil and comprises the whole of eight states (Acre, Amapá, Amazonas, Mato Grosso, Pará, Rondônia, Roraima and Tocantins) and part of the State of Maranhão (west of the 44°W meridian), totaling 5.0 million sq. km.  
 14 - Assunção, Gandour, Rocha & Rocha (2013a) and Assunção & Rocha (2014).  
 15 - 30% in agrarian reform settlements, 24% in unpurposed public lands, 1% in indigenous lands, and 12% in Conservation Units.  
 16 - Plano de Ação para Prevenção e Controle do Desmatamento e das Queimadas no Cerrado, PPCerrado.  
 17 - Ministry of the Environment: (<http://www.mma.gov.br/images/arquivo/80120/PPCDAM%20e%20PPCerrado%20-%20Encarte%20Principa%20-%20GPTI%20-%20p%20site.pdf>)

of foods important for domestic consumption, such as rice, beans, cassava, vegetables, fruits, and meats. This has meant profound economic and social change in the country. Growth and diversification in exports has been accompanied by improved domestic supply, consequently bringing down the price of the standard basic food basket by about 79% between 1976 and 2014.

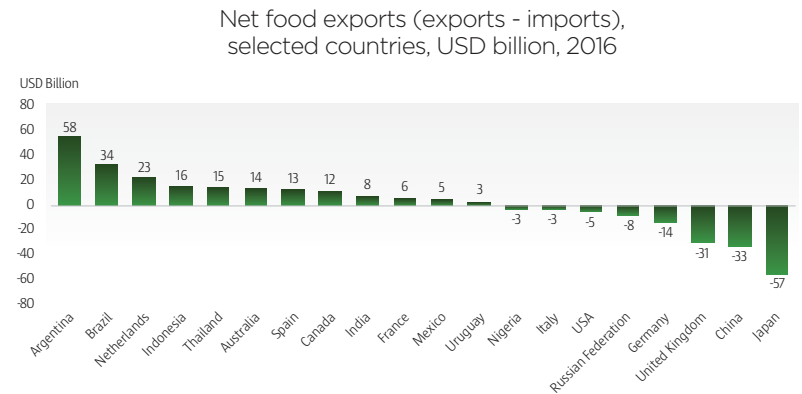
In that context, increased consumption of chicken is a prime example. Figure 3 shows growth in domestic supply<sup>6</sup> for consumption per person in selected countries. At present, the level of consumption in Brazil is close to that in the largest world consumers, such as the United States and Australia. Per capita consumption rose 6.4% per year in Brazil between 1961 and 2013.



**FIGURE 3**  
Source: FAO

High productivity, competitiveness in the global market, and versatility in also serving the domestic market, have all helped the agribusiness trade balance to take on a profile of enormous surplus, while the other major producers and exporters are also leading world importers of food products. This resulted from the development of

technologies adapted to tropical climates and soils, the entrepreneurial efforts of Brazilian producers, and sector production chain arrangements, which raised Brazil from a position as a net food importer in the 1970s to being currently the country with the largest net balance of food exports in foreign trade (Figure 4).



**FIGURE 4**  
Source: WTO

6 - Domestic supply is the result of the sum of the total of imports minus exports.

### 1.3. TECHNOLOGY, PRODUCTIVITY AND ENTREPRENEURSHIP

A number of factors explain the rising growth trajectory of Brazilian agribusiness over recent decades. The success of Brazilian agriculture is often attributed to the stock of national resources, given the country’s continental dimensions and its predominantly tropical climate. Nonetheless, until 30 years ago, the leading food-producing countries were those with temperate climates, and grain and livestock production had been developed more to suit those climates. As a result, natural conditions in Brazil were not suitable for the various technological packages

available until then. Moreover, a considerable portion of Brazilian soil, including the Cerrado savannah biome, is poor in fertility, and poses problems of acidity that limit agricultural production. Also, and most importantly, the majority – about 66% – of Brazil’s total area is still covered by native vegetation. Therefore, current output levels were attained by developing production techniques and systems suited to tropical climate conditions, and by overcoming the constraints imposed by the Cerrado savanna.

*Discoveries and innovations in agricultural sciences, including soil chemistry, physics and fertility, plant physiology, crop management, pest, disease and weed control, animal nutrition and health, genetics, agricultural meteorology, irrigation, and mechanization were all decisive in this achievement by Brazil’s agriculture and livestock sector.*

As a result of this development, grain production has grown by about 407% since the 1976/1977 harvest, equivalent to 4.1% per year, while the planted area grew only 63% or 1.2% a year (Figure 5), representing productivity gains of 2.9% per year. Meanwhile, overall meat production has increased 205% since

1990, but chicken meat output, especially, has gone up 438% in this period (Figure 6). Also, double-cropping and winter crops deserve special mention: these entail re-using planted areas for a new crop in the same harvest-year, and are increasingly common when soy production is followed by maize.

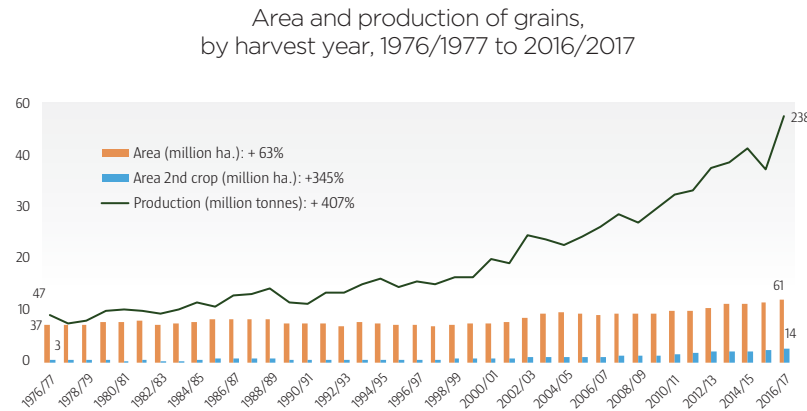


FIGURE 5  
Source: Conab

### 2.2. AGRO-ENVIRONMENTAL TECHNOLOGIES

Techniques and practices developed or adapted for a tropical climate, among them no-till farming, are now in widespread use in Brazil, while others, including integrated agro-forestry systems, show great potential for expansion.

No-till farming allows crops to be grown with less turning and exposure of the soil, which reduces the need for mechanization, and consequently fossil fuel use, and expenditure on inputs. Restoration of degraded pastures increases land use efficiency in livestock farming. Integrated agro-forestry enables different agricultural, livestock and forest products to be generated in the same space, concomitantly or sequentially, which increases land use efficiency and

is also a more economic manner of fostering recovery of degraded pastures. Meanwhile crop rotation and winter crop systems, such as second- or interim-crop maize production, which is possible in latitudes with a tropical climate, enable land resources to be utilized for a longer period of the year, making it possible to diversify and expand production.

With a view to promoting sustainability in Brazilian agriculture and livestock farming, an agricultural credit policy is in place designed to encourage the adoption of technologies that permit economic efficiency gains and modernization of farming. These efficiency gains also help lessen the need to expand agricultural areas in the country.

### 2.3. LEGAL AND REGULATORY ENVIRONMENTAL PROTECTION SYSTEM

Over recent decades, as an integral part of its environmental conservation policy, Brazil has developed an ample legal and regulatory framework for environmental preservation. Its purpose is to guarantee that agricultural and livestock farm production will develop with an appropriate level of environmental protection that will allow Brazil to attain a leading position in the sustainable supply of food and environmental services.

categories of protected public area: Comprehensive Protection Conservation Units (Unidades de Conservação de Proteção Integral)<sup>10</sup>, which are public domain and allow no human occupation, and Sustainable Use Conservation Units (Unidades de Conservação de Uso Sustentável)<sup>11</sup>, which allow direct, sustainable use of natural resources under a management plan for the unit. It also defines private areas that are considered as Private Reserve of Natural Heritage (Reserva Particular do Patrimônio Natural, RPPN).

#### 2.3.1. Conservation units and preservation areas

Environmental Protection Areas have been set up in Brazil for the purpose of protecting and conserving biotic (fauna and flora), esthetic or cultural features considered essential to quality of life and ecosystem protection. The National Conservation Units System (Sistema Nacional de Unidades de Conservação, SNUC) set up in 2000 provides for two major

Between 2000 and 2017, conservation units grew in number 90%, from 500 (90 million hectares) to 950 (159 million hectares), equivalent to 19% of Brazil’s total area, and distributed across all biomes in the country<sup>12</sup>. At present, the law protects native vegetation and biodiversity in these areas, helping reduce the risk of deforestation and degradation.

10 - Classified into Ecological Station, Biological Reserve, National Park, Natural Monument, and Wildlife Refuge.  
 11 - Classified into Environmental Protection Area, Area of Outstanding Ecological Interest, National Forest, Extractive Reserve, Fauna Reserve, Sustainable Development Reserve, and Particular Natural Heritage Reserve.  
 12 - Source: CNUC/MMA - www.mma.gov.br/cadastro\_uc

Although different research groups differ in their definitions of use categories and interpretations of satellite images, and despite the difficulty of data collection in remote areas, advances in image technology and processing methods have diminished the divergences. A recent study by the United States Geological Survey (USGS) in partnership with NASA revealed that plant crop areas cover 64 million hectares, or about 7.6%, of Brazil's territory.

The following estimates, which take account of the variations noted above, distribute the areas of Brazil into:

- croplands and planted forests: 77 million hectares;
- native and planted pastures: between 180 and 243 million hectares;
- native or remnant vegetation: between 507 and 564 million hectares, i.e., 60 to 66% of the territory.

Note that areas of remnant native vegetation within rural properties occupy between 24% and 32% of Brazil's total area, and represent nearly half of all native vegetation countrywide.

Accordingly, Brazil is accredited by its land use and occupation as both an agricultural and livestock farming power and an environmental power. With a view to consolidating and improving its role as an agro-environmental power, government and society have striven to address the challenges still existing, such as illegal deforestation and disparities in production efficiency.

Areas of pasture are abundant in Brazil, and offer much higher production potential than the current

average. Although average productivity in livestock farming is still relatively low, it has been rising in recent years, from 0.44 animals per hectare in 1950 to 1.08 in 2006 (a 145% gain). In the same period, carcass equivalent weight<sup>8</sup> produced per hectare increased from 10.1 kg to 43.4 kg (i.e. by 331%)<sup>9</sup>. Brazil's most efficient production systems yield as many as three or more animals per hectare, evidencing a wide margin for growth. A number of technological options and inputs are available to increase pasture productivity or convert it to cropland, with no need to expand the agricultural frontier.

Considerable differences in technology and productivity also exist within regions and biomes, and in the same agricultural crop or livestock product. There is thus considerable potential for increasing Brazil's grain output, particularly of maize and rice, by boosting productivity of areas that are underused or where productivity is still below full capacity.

Already today, most maize and beans crops, and all wheat, are grown on areas previously under soy or other crops, and planted in succession in the same harvest-year, as a second crop, making for greater productivity in use of resources and inputs. The most significant example is maize, which in 2016/2017 occupied 12 million hectares as a second crop produced on the same area and in succession with the soy crop, reutilizing 20% of the total area of grains cultivated that year.

The productivity gains in Brazilian agriculture and livestock farming, and reductions in deforestation, have been encouraged by private initiatives directed to boosting competitiveness and securing sustainable production, and by pressure from the national legal and regulatory system in place to assure environmental preservation.

Meat production - Brazil

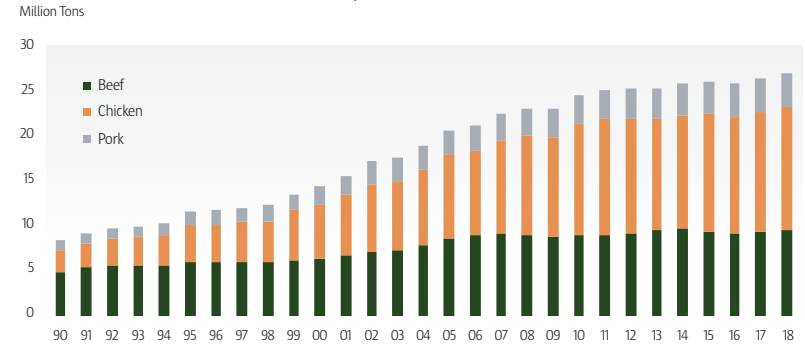


FIGURE 6  
Source: USDA

This scientific development has been made possible by agricultural research focused on Brazilian conditions and led by agricultural science universities, institutes and state research entities, and as of 1972 by the Brazilian Agricultural-Livestock Research Company (EMBRAPA). A network of state and federal agencies that promote science, technology and innovation fostered an environment that facilitated research and development in the private sector.

The farmers who moved from the traditional regions of the South and Southeast and settled at the agricultural frontier on the Cerrado savannah, and in the states of Mato Grosso and Mato Grosso do Sul, were bold enough to test their own seeds and adapt their techniques to the new climate and soil conditions. Part of the increased production and technological development to be seen today is thus due to the enterprising spirit of those pioneer farmers. More recently, productivity gains in Brazil have attracted multinational companies and overseas investors, who have also begun to

develop modern agricultural technologies adapted to tropical conditions. Examples of this participation are common in the genetic improvement of seeds and cultivars, and in development of machines and equipment. Also in the South and Southeast, the introduction of integrated pig and poultry production systems guaranteed product supply for processing in small family agro-industrial units – which ultimately gave rise to traditional firms in the sector.

This set of factors fostered larger-scale production of grains and livestock, and in the Cerrado savannah regions, a cultivation in extensive areas. It also enabled those who invested in processing to bring added value to production.

Evidence of the technological development of Brazilian agribusiness can be seen in its use of modern chemical inputs, such as fertilizers and pesticides. Today, in kilograms per hectare of arable land, Brazil is on a par with developed countries of equal importance in world production, while Asian countries use these inputs more intensively.

8 - Measurement used to standardize beef weights in order to facilitate transformation of the various different types of meat produced by an animal into a single unit of measurement that can be compared with the animal's carcass weight.  
9 - Martha Jr. et al. (2011).

**PESTICIDE USE IN SELECTED COUNTRIES, IN KILOGRAMS PER HECTARE OF ARABLE LAND**

COUNTRY	2014
France	3.9 ha
<b>Brazil</b>	<b>4.17 ha</b>
Argentina	5.17 ha
Belgium	7.73 ha
Uruguay	9.37 ha
Netherlands	9.86 ha
Japan	11.85 ha
Mainland China	14.85 ha

**TOTAL FERTILIZERS IN SELECTED COUNTRIES, IN KILOGRAMS PER HECTARE OF ARABLE LAND**

COUNTRY	2014
Argentina	34.60
France	163.75
<b>Brazil</b>	<b>176.52</b>
Uruguay	186.67
Japan	229.57
Netherlands	246.98
Belgium	279.53
Mainland China	492.60

Source: FAO, 03/27-04/12 2018. Data are not available for all countries beyond 2014.<sup>7</sup>

Above all, Brazil is a tropical country where the incidence of pests, diseases and weeds is greater than in countries with temperate climates. Also, two or more harvests are produced per year in much of the country, so the use of these advanced input materials is balanced, and in accordance

with developed-country standards. If compared by chemical inputs used per unit produced, these materials are used proportionately even less intensely in Brazil than in European countries, since Brazil's production volume per hectare is far greater than in those countries.

## 2. Sustainability of Brazilian Agribusiness

The environmental policy framework developed and introduced in recent years reflects a balance of interests in Brazilian society that contributes for the full convergence between production and environmental protection. Policies to combat deforestation in the Amazon and Cerrado, to discipline land use under Forest Code requirements for preserving areas on private properties, introducing zonings of production (ecological, ecological-economic and the sugarcane agro ecologic zoning), and to combat climate change, all converge to encourage the development of sustainable agribusiness.

Brazil is one of the world's leading food producers and, at the same time, is among the countries with most areas of preserved vegetation. The growth

trajectory of Brazilian agriculture has been guided over the recent decades by the endeavor to maintain and expand output and environmental protection.

7 - <http://www.fao.org/faostat/en/#data/EF> and <http://www.fao.org/faostat/en/#data/EP>

Government policies, with contributions from private organizations and civil society, are proving able to establish and improve Brazil's position as a major source of healthy foods and sustainable production.

Illegal deforestation of protected and public lands or in excess of limits set for conservation of native areas on private properties, and to boost production efficiency, is being successfully addressed.

### 2.1 LAND USE IN BRAZIL

Agribusiness accounts for around 20% of wealth in Brazil's economy, while using less than 10% of the country's area in plant production, and between 20% and 30% for livestock. It is extremely complex

to detail land use precisely and rigorously in a country of continental dimensions such as Brazil, where some 2/3 of area is under native forests and 85% of the population lives in urban environments. (Figure 7).

Percentage land use and occupation in Brazil, 2017

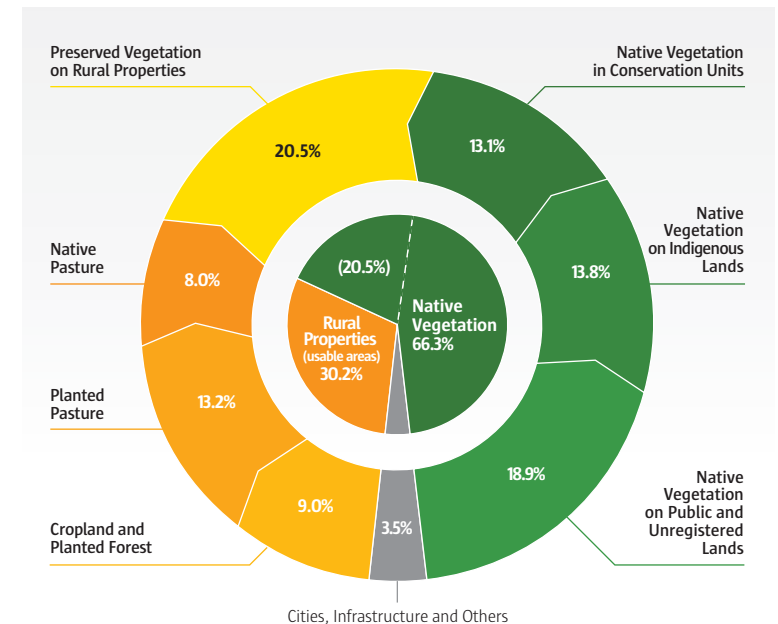


FIGURE 7  
Source: GITE - Embrapa (2017)