

The Brazilian Market for U.S. Agricultural and Food Products

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The Brazilian Market for U.S. Agricultural and Food Products

Flynn Adcock, Yuri Calil, Luis Ribera, Parr Rosson¹

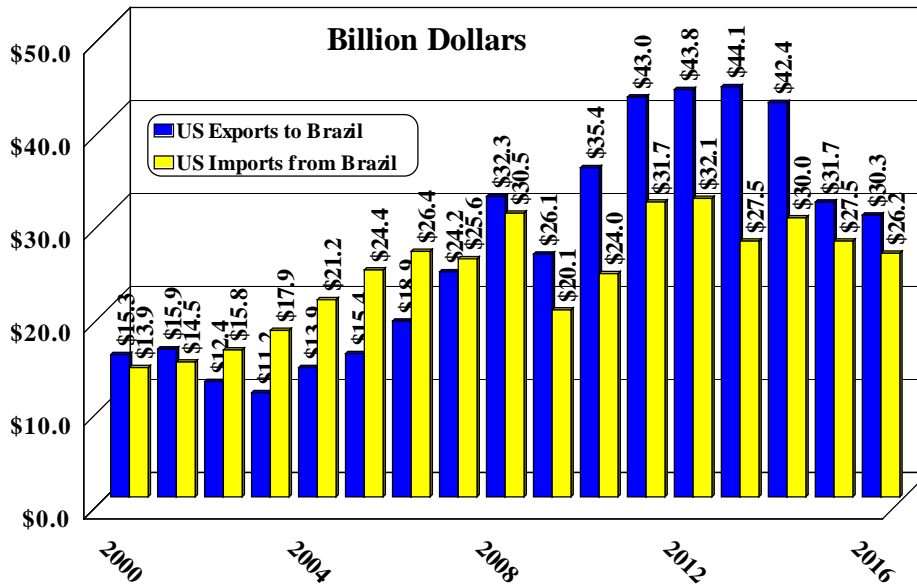
Introduction

While Brazil is viewed as a U.S. competitor in the trade of beef, broilers, soybeans, and cotton, its potential as a market for U.S. foods and other agricultural products is often overlooked. This study examines the prospects of Brazil as a market for processed foods and other value-added products. The study contains the latest information on market size and potential in value and volume, economic and political conditions and stability, supply/demand balance, market trends related to growth, product form, packaging/labeling requirements, trade barriers and other restrictions, competing products, and exchange rates. Also included are sections on Brazil's productive capacity and transportation infrastructure.

Overview of U.S. Trade with Brazil

The United States and Brazil have a robust trade relationship. From 2000 through 2016, total two-way trade grew from about \$29.2 billion to an average of \$74 billion during 2011-14 before falling to \$56.5 billion in 2016. During the early part of the time period, Brazil often held a trade surplus with the United States. U.S. exports to Brazil, however, have exceeded imports since 2008.

Total U.S. Trade with Brazil, 2000 - 2016

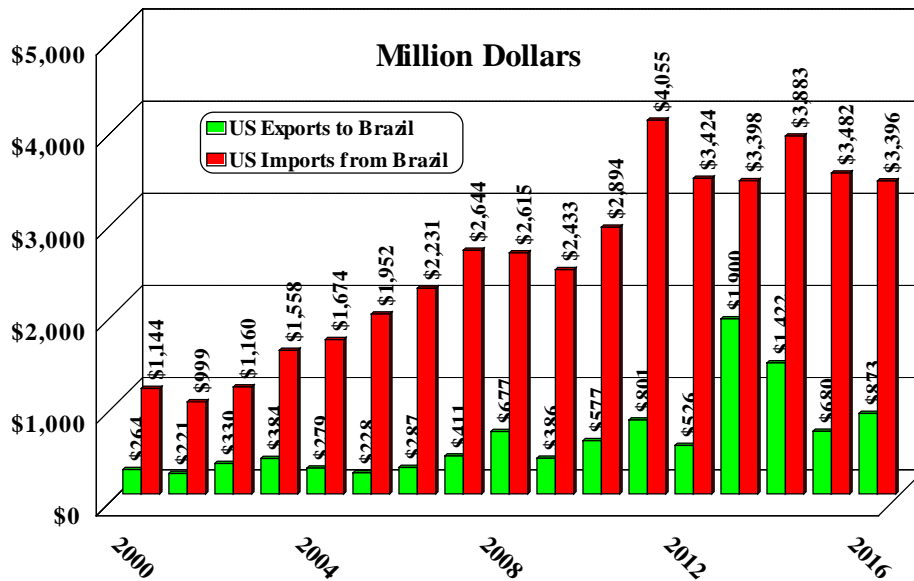


Source: U.S. Census Bureau, Foreign Trade, U.S. Trade in Goods by Country, www.census.gov/foreign-trade/balance.

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When considering only agricultural and food products trade between the United States and Brazil, that relationship has also seen substantial growth. U.S. agricultural exports to Brazil have generally grown since 2000, from \$264 million to \$1.9 billion in 2013 before dropping to \$1.4 billion in 2014 and settling at \$873 million in 2016. U.S. agricultural imports from Brazil have also grown and exceed agricultural exports to Brazil by a substantial margin. Much of the reason for this is that Brazil produces a wide variety of products not produced in the United States but demanded by U.S. consumers. For instance, about 31 percent of the \$3.4 billion in U.S. agricultural imports from Brazil in 2016 consisted of coffee. Nonetheless, Brazil also ships many products to the United States that it also produces, including tobacco, fruit juices, red meats and sugar. The following section looks more closely at the Brazilian market for U.S. agricultural, food, and related products.

U.S. Ag and Food Trade with Brazil, 2000 - 2016



Source: Global Ag Trading System (GATS), FAS/USDA

Current Market for U.S. Agricultural and Food Exports to Brazil

Brazil is a large country with a population of 206 million and imports roughly \$8.5 billion worth of agricultural and food products each year. While Brazil is the largest of the South American markets, it is only the third or fourth largest market for U.S. agricultural and exports to the region, depending on the year. U.S. agricultural exports to Colombia at \$2.4 billion in 2016 and Peru at \$1.1 billion exceed those to Brazil. Chile with \$848 million in during 2016 is sometimes ahead Brazil as a market for U.S. agricultural and food exports. The table below provides an overview of the Brazilian market.

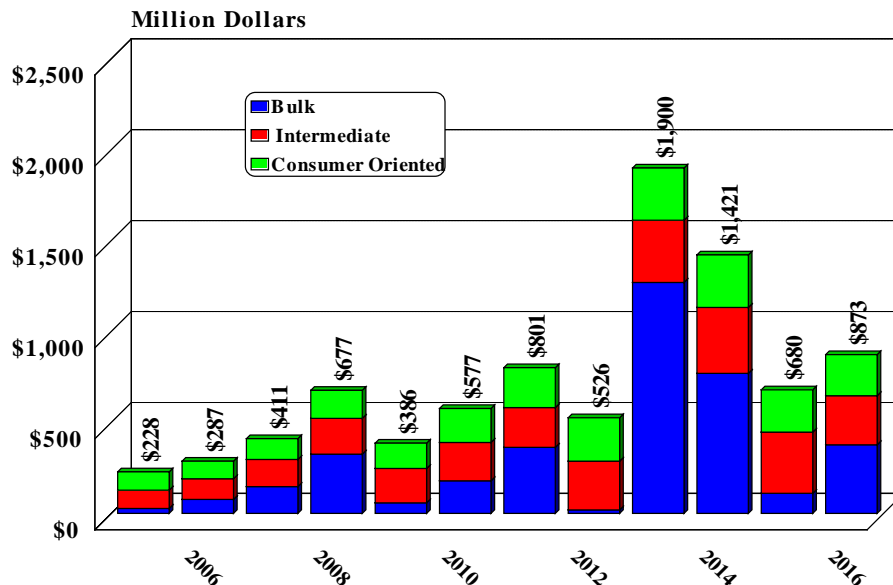
U.S. agricultural and food exports to Brazil have fluctuated in recent years. Following years of cyclical growth, total U.S. agricultural exports to Brazil reached a high of \$1.9 billion in 2013 before falling in 2014 and 2015. These exports rebounded somewhat in 2016 to \$873 million. The high years of 2013 and 2014 and much of the rebound in 2016 were in part a result of low supplies of Argentine wheat and marketing efforts by U.S. Wheat Associates to capture a larger share of the market.

Category	2005	2016	Average Annual Growth from 2005-2016
Population (mil)	188.4	205.8	0.8%
Per Capita Income	\$3,910	\$9,850	15.2%
2016 Ag Imports from the United States (\$ mil)	\$228.3	\$873.1	25.7%
Bulk	\$27.2	\$377.2	117.0%
Intermediate	\$100.6	\$270.0	15.3%
Consumer Oriented	\$100.5	\$226.0	11.4%
Ag-Related	\$8.7	\$505.8	519.4%
Ag Inputs	\$655.0	\$1,541.8	12.3%

Sources: USDA/FAS GATS, World Bank and Instituto Brasileiro de Geografia e Estatística

Note: 2015 data used for 2016 per capita income

U.S. Ag and Food Exports to Brazil, 2005-2016



Source: Global Ag Trading System (GATS), FAS/USDA

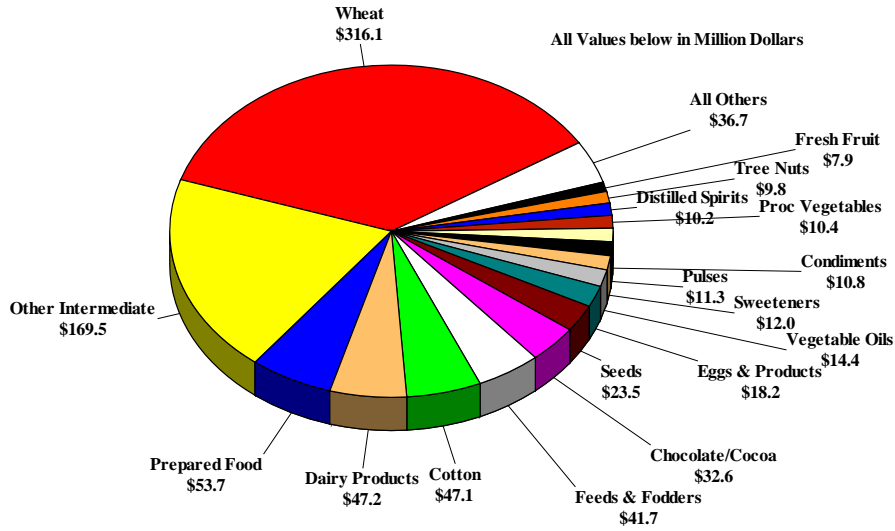
U.S. agricultural exports to Brazil typically consist of intermediate and consumer oriented products, though the actual proportions change year to year; however, bulk exports consisting mainly of wheat and cotton sometimes exceed those of intermediate and consumer-oriented as they did in several recent years. The main intermediate products include protein concentrates, feeds, sweeteners such as beverage preps, glucose, and fructose, seeds for corn, sorghum, and a wide variety of vegetables, and products used in the food production process including enzymes and beverage aromas. The main consumer oriented products include dairy products such as non-fat dry milk and whey proteins, a wide variety of prepared foods, chocolate, eggs, snack foods, especially corn chips, and processed vegetables. Thus, Brazil is a viable market for a wide array of U.S. agricultural and food products.

There is potential to greatly increase U.S. exports to Brazil as U.S. exporters account for only about ten percent of the Brazilian import market for agricultural and food products since U.S. exports capture much larger shares of nearby markets such as Colombia and Peru, and a consistently growing share in Chile. Further, the recent economic downturn has hurt Brazil's ability to purchase consumer oriented products. As Brazil's economy rebounds and their consumers recapture and grow their income, Brazil will be able to import more U.S. consumer oriented and other value added products.

Further highlighting Brazil's market potential for consumer oriented products is the relatively low amount Brazilian consumers spend on food per year. Brazilians on average spent about 15.5 percent of their income in 2015, which ranks as 30th out of 86 countries reported by ERS/USDA and down each of the last 5 years. The only Latin American country which spends a lower percentage on food is Chile at 15.3 percent. By comparison, the lowest in the world is the United States at 6.6 percent. One reason consumers can spend a smaller percentage of income on food is lower food prices while another is higher incomes, which Brazilians had been experiencing until 2015. However, the Brazilian economy and per capita income are expected to rebound over the next couple of years which would increase their ability to purchase consumer oriented food products.

U.S. Agricultural and Food Exports to Brazil, 2016

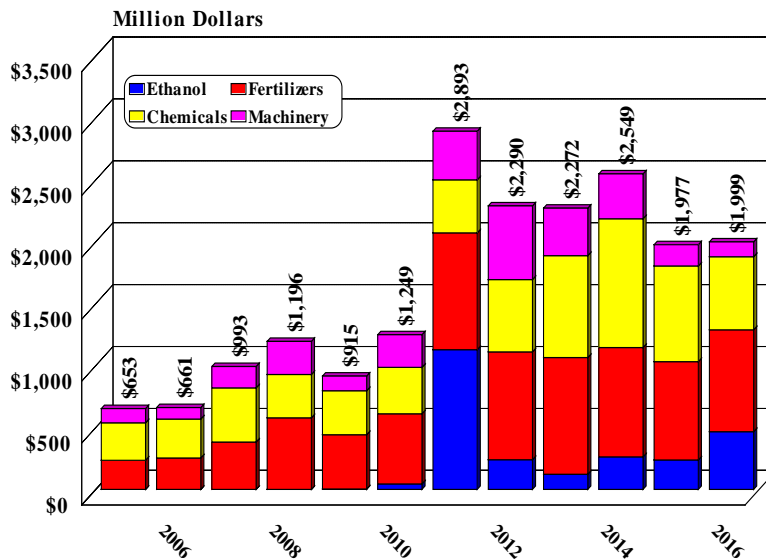
2016 Total: \$873.1 Million



Source: Global Ag Trading System (GATS), FAS/USDA; Note: Other Intermediate includes a wide array of products, 1 by enzymes, protein concentrates, odiferous mixtures for beverage production, and bull semen.

Certain agriculture-related U.S. exports to Brazil mainly consist of ethanol, while agricultural inputs include fertilizers, agricultural chemicals, and agricultural machinery. Brazil is a large consumer of ethanol in their vehicles and U.S. exports of ethanol to Brazil directly help the U.S. corn producer as most U.S. ethanol is produced using corn. At the same time, Brazil's imports of large quantities of U.S. fertilizers, chemicals, and machinery have helped Brazil to greatly expand its productive capacity and to compete with the United States in many products and throughout the globe.

U.S. Ag-Related and Input Exports to Brazil, 2005-2016

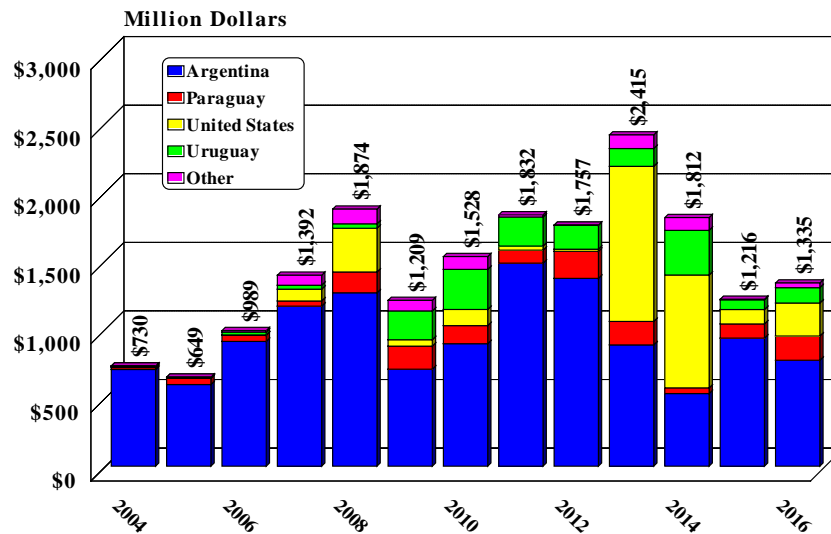


Source: Global Ag Trading System (GATS), FAS/USDA

Competitors in the Brazilian Agricultural and Food Market

The United States actively participates in the Brazilian market for both wheat and cotton. The Brazilian market for imported wheat has exceeded \$1.2 billion per year since 2007, reaching a high of \$2.4 billion in 2013, a year in which U.S. wheat exports to Brazil reached a high of \$1.1 billion. These U.S. wheat exports compete with exports from Argentina, Paraguay, and Uruguay, all with geographic advantages, and all members of MERCOSUR and facing zero tariffs as a result. However, many Brazilian millers prefer U.S. wheat and as more Brazilian millers discover the quality and reliability of U.S. wheat for milling, they may import more U.S. wheat to blend with the lower quality domestic wheat in order to meet baking specifications. To the extent that U.S. wheat can overcome these disadvantages reveals the competitiveness and quality of U.S. exports.

Brazilian Import Market for Wheat



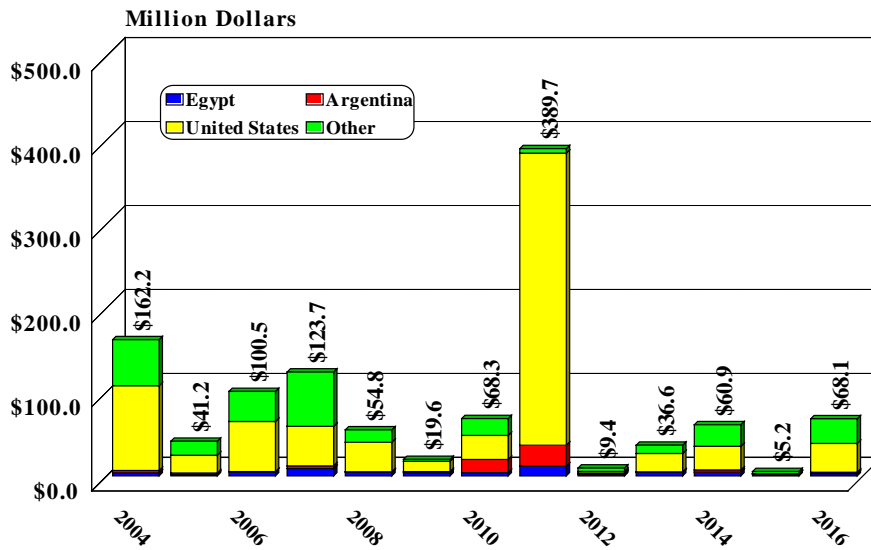
Source: Brazilian Ministry of Development, Industry and Foreign Trade (MDIC) - System Of Analysis of Foreign Trade Information (Alice Web), <http://aliceweb.mdic.gov.br/>

While Brazil is not a major producer of wheat, it is a significant producer of cotton. Still, Brazil imports cotton from time to time and often these imports come from the United States. While Brazil's 2011 cotton imports of \$389.7 million was an anomaly, U.S. cotton was the leading supplier as it is in most years. Some competition for the Brazilian cotton market comes from Argentina and Egypt, however, the market has been under \$70 million per year since 2008 with the exception of 2011. Brazilian cotton imports did reach a recent high in 2016 at \$68.1 million, and U.S. cotton accounted for \$47.1 million of these imports.

The United States is also a large exporter of both rice and corn but has been unable to gain a large market share in Brazil. The Brazilian market for imported rice has been at least \$175 million every year since 2006 with the exception of 2015. While some U.S. rice is shipped

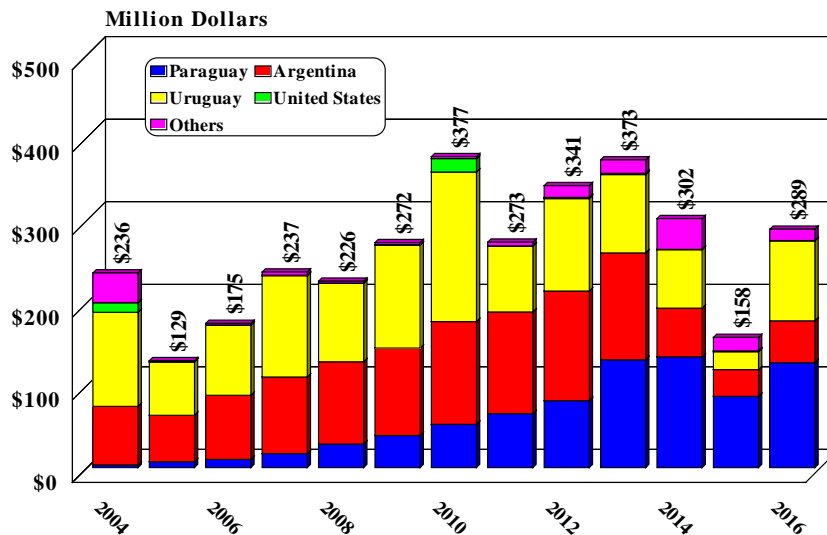
to Brazil, MERCOSUR countries dominate the rice market, in part due to previously mentioned advantages. A similar trend persists for Brazilian corn imports with Paraguay and Argentina dominating the market. Further, the prevalence of genetically-modified corn in the United States has also kept U.S. corn out of Brazil in the past though approval for feed was granted to some GM corn varieties in 2016. These approvals were the result of an effort to ease pressures on the Brazilian pork and poultry industries in a situation of tight corn supplies. Also, the USDA Foreign Agricultural Service is ways to streamline approval of additional U.S. corn varieties for feed purposes.

Brazilian Import Market for Cotton



Source: Brazilian Ministry of Development, Industry and Foreign Trade (MDIC) - System Of Analysis of Foreign Trade Information (Alice Web), <http://aliceweb.mdic.gov.br/>

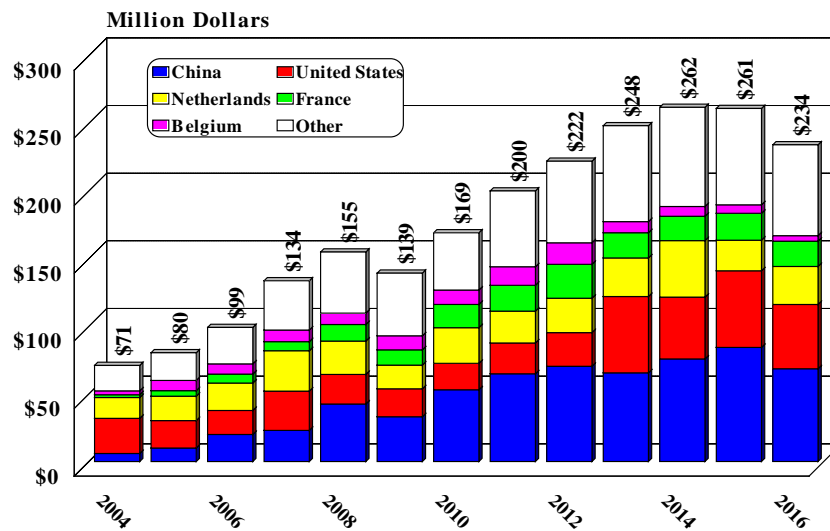
Brazilian Import Market for Rice



Source: Brazilian Ministry of Development, Industry and Foreign Trade (MDIC) - System Of Analysis of Foreign Trade Information (Alice Web), <http://aliceweb.mdic.gov.br/>

Moving from bulk to intermediate products, U.S. exports of animal feed preparations for livestock and poultry have captured an average of 20 percent of the Brazilian import market each year since 2012. Major competitors include China and the European countries of the Netherlands, France, and Belgium. With trade talks between MERCOSUR and the European Union which began in 2010 and set to resume in March 2017, U.S. feeds may be presented with another competitive disadvantage to overcome with respect to feed exports to Brazil. As for other intermediate products, the United States also captures a large percentage of a small Brazilian import market for soybean meal – \$783,900 out of \$1.2 million in 2016 – while accounting for only a small part of the \$44.5 million Brazilian soybean oil market that is dominated by Argentina and Paraguay.

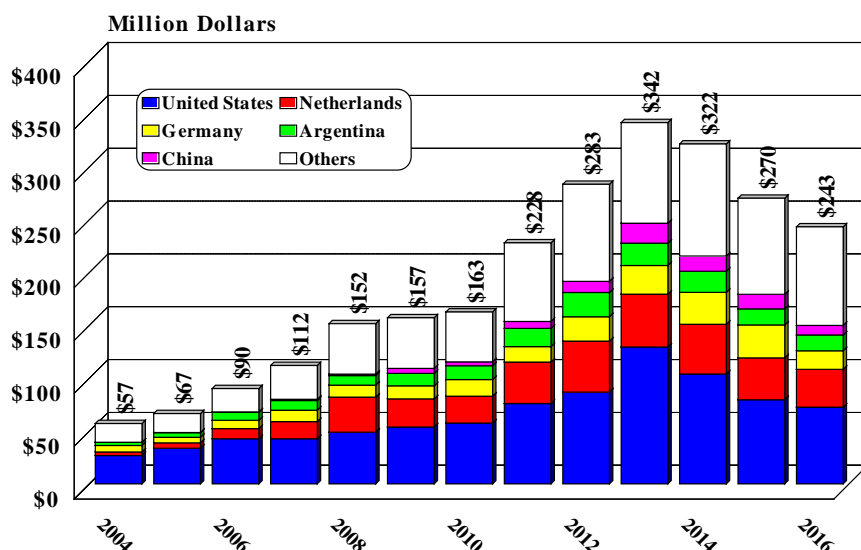
Brazilian Import Market for Animal Feed Preps



Source: Brazilian Ministry of Development, Industry and Foreign Trade (MDIC) - System Of Analysis of Foreign Trade Information (Alice Web), <http://aliceweb.mdic.gov.br/>

The United States has a significant presence in the Brazilian import market for many consumer-oriented products, but the competition for these markets is intense and global. U.S. exports of all processed food products to Brazil have had the largest market share, followed by the Netherlands, Germany and Argentina. While the market was down in 2016 for the third consecutive year, U.S. exports managed to maintain a 30 percent market share, which is actually the market share floor for the past 13 years. While the U.S. market share has been higher in the past, it has averaged 32 percent since 2011, the first year Brazil imported more than \$200 million in processed food products.

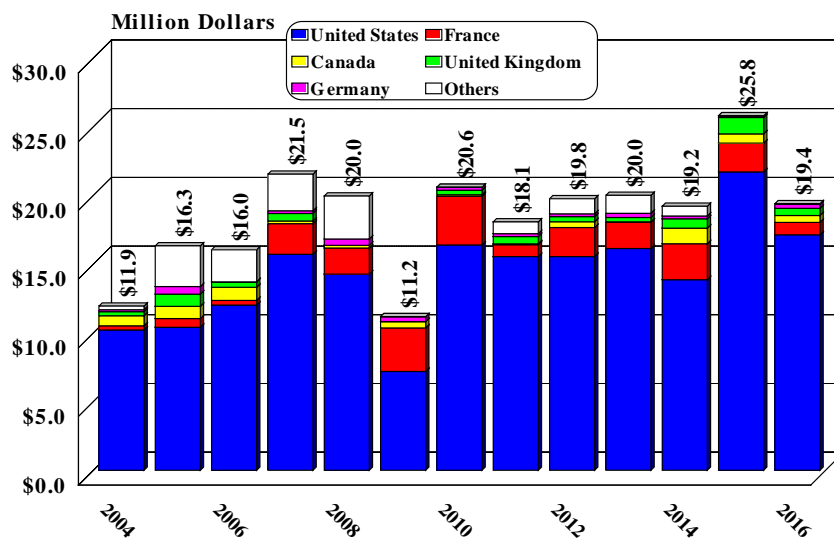
Brazilian Import Market for Processed Foods



Source: Brazilian Ministry of Development, Industry and Foreign Trade (MDIC) - System Of Analysis of Foreign Trade Information (Alice Web), <http://aliceweb.mdic.gov.br/>

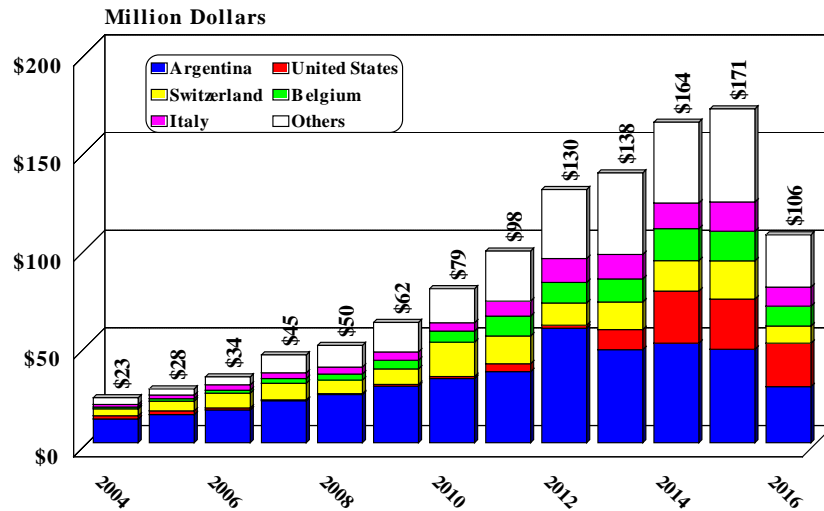
U.S. eggs and egg products dominate the Brazilian import market that is around the \$20 million level. Some competition comes from France, Canada, the United Kingdom, and Germany. In chocolates and cocoa-related products, the United States has been second to Argentina in recent years. The 2016 Brazilian market size of \$106 million was the lowest since 2011, and U.S. exports dropped along with exports from all of its major competitors including not only Argentina but also Switzerland, Belgium and Italy.

Brazilian Import Market for Eggs



Source: Brazilian Ministry of Development, Industry and Foreign Trade (MDIC) - System Of Analysis of Foreign Trade Information (Alice Web), <http://aliceweb.mdic.gov.br/>

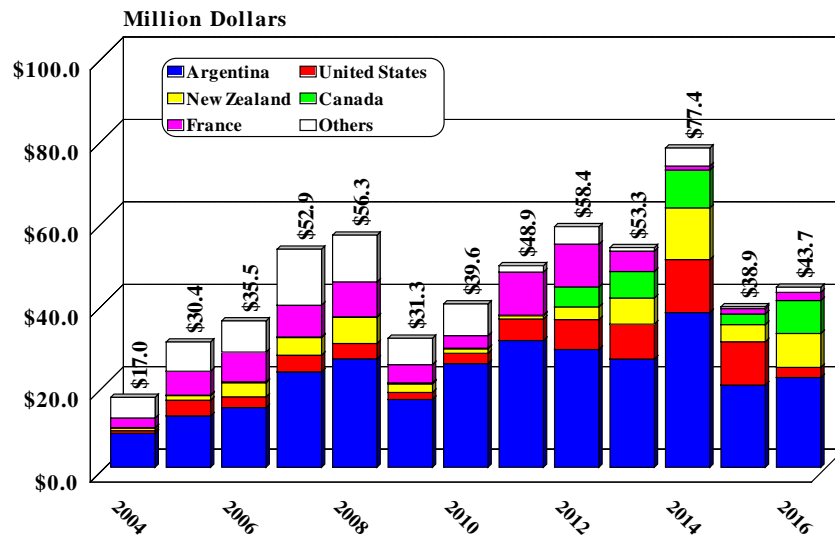
Brazilian Import Market for Chocolate/Cocoa Products



Source: Brazilian Ministry of Development, Industry and Foreign Trade (MDIC) - System Of Analysis of Foreign Trade Information (Alice Web), <http://aliceweb.mdic.gov.br/>

The one consumer-oriented import market highlighted here which did not decrease during 2016 in Brazil is the market for whey products. At nearly \$44 million, however, the market was the second lowest since 2011. The market is dominated by Argentina in most years though the United States has participated to varying extents in each year. New Zealand, Canada, and France are other major competitors.

Brazilian Import Market for Whey Products



Source: Brazilian Ministry of Development, Industry and Foreign Trade (MDIC) - System Of Analysis of Foreign Trade Information (Alice Web), <http://aliceweb.mdic.gov.br/>

Finally, even though Brazil is a major participant in global beef markets, it is also an import market for beef. Brazil has imported an average of about \$281 million in fresh and frozen beef since 2011, with a high of \$389 million in 2014 before falling in 2015 and 2016. It is not odd for a major beef producer as the United States is a major beef exporter but also imports significant amounts of beef. The Brazilian beef import market is dominated by neighbors Paraguay, Uruguay and Argentina while the U.S. share is negligible.

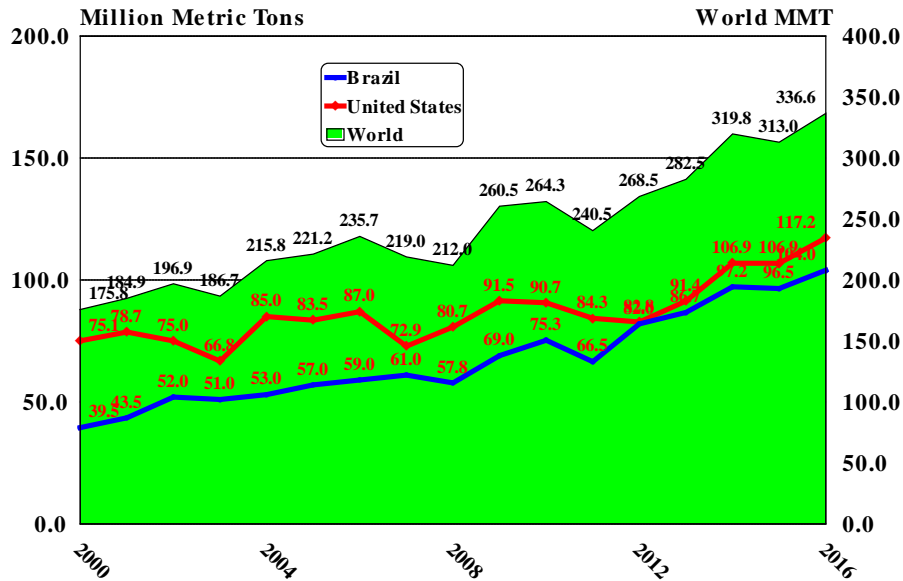
It is important to point out that Brazilian imports of most of the consumer-oriented products discussed above have decreased over the last several years. This is in large part due to the economic recession experienced in the country in which per capita income has decreased. A stronger US dollar likely contributed as well. The situation has been exacerbated by the accompanying depreciation of the Brazilian real, which has made imported products generally more expensive in a situation where incomes are lower.

Brazilian Agricultural Productive Capacity

Brazil has significant productive capacity in many commodities traded around the world. This includes corn, soybeans, cotton, beef, poultry meat, and orange juice. The following discussion centers on several aspects of Brazilian agricultural production.

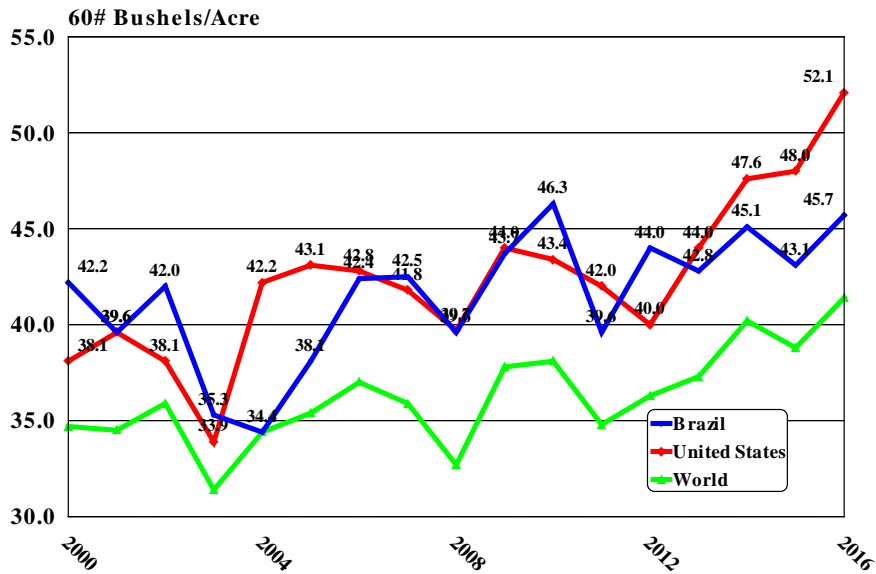
Brazil has been a major soybean producer for decades, with 2016 production of 104 million metric tons (MMT), nearly tripling production from the beginning of the 21st century. While Brazilian average soybean yields were 45.7 bushels/acre in 2016, yields have fluctuated slightly with a slight upward trend much of Brazil's growth has come from a dramatic increase in harvested acres. Brazilian harvested acres grew nearly 150 percent from 34.4 million acres in 2000 to 83.7 million acres in 2016. For comparison purposes, U.S. production of soybeans totaled 117.2 MMT in 2016 with an average yield of 52.1 bushels/acre on slightly less than 83 million acres (14 percent above 2000 harvested acres).

Soybean Production in the U.S., Brazil and the World



Source: PS&D View, FAS/USDA

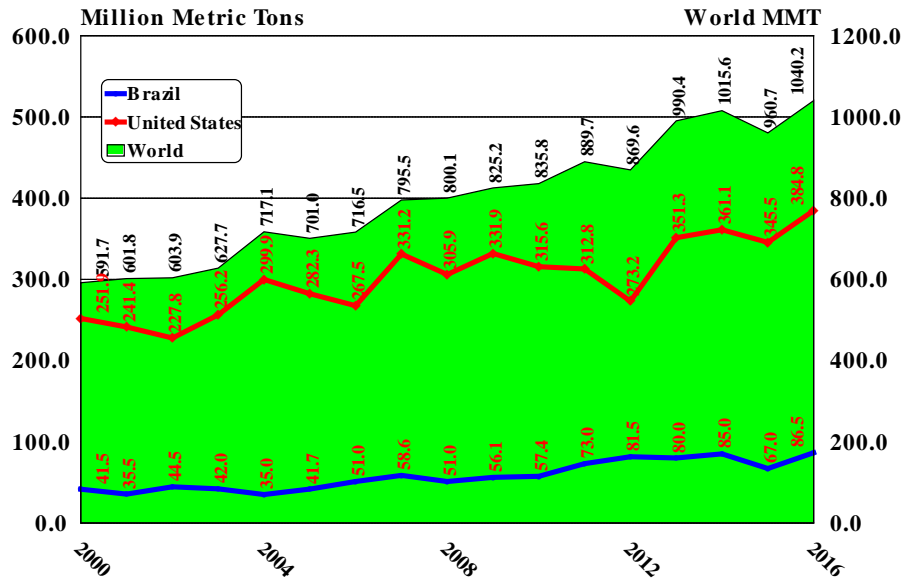
Soybean Yields in the U.S., Brazil and the World



Source: PS&D View, FAS/USDA

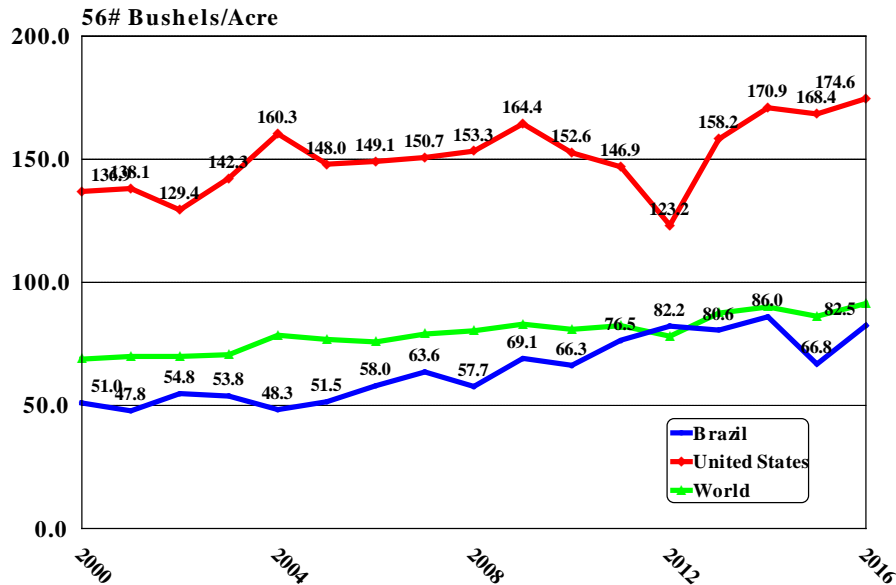
Brazil has also become a major corn producer with 2016 production of 86.5 MMT, more than doubling production at the beginning of the 21st century. Much of this production growth is due to an increase in average yield from 51.0 bushels/acre to 82.5 bushels/acre. For comparison purposes, U.S. production of corn totaled 384.8 MMT in 2016 with an average yield of 174.6 bushels/acre.

Corn Production in the U.S., Brazil and the World



Source: PS&D View, FAS/USDA

Corn Yields in the U.S., Brazil and the World

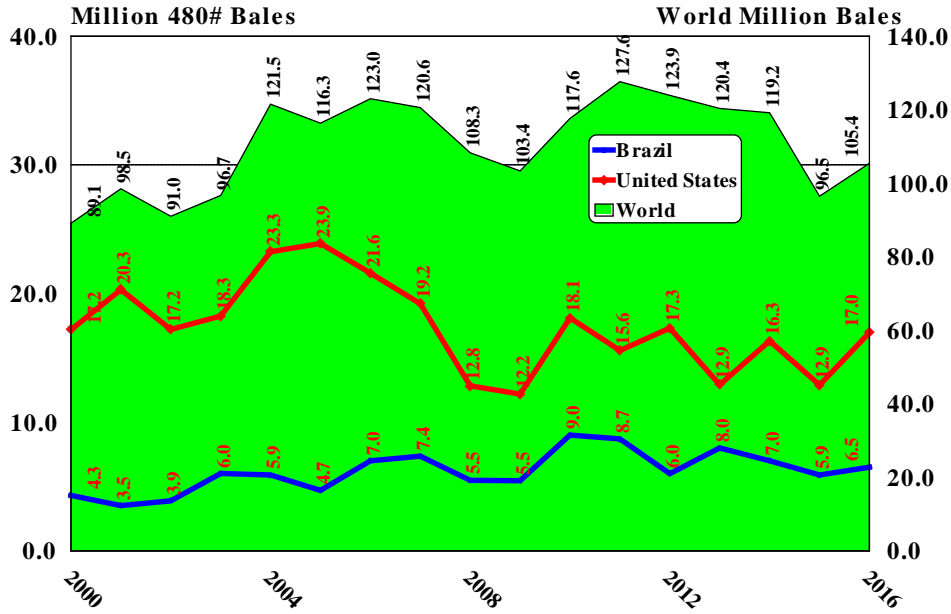


Source: PS&D View, FAS/USDA

Brazil is also an important producer of cotton, producing 6.5 million 480 pound bales in 2016. While Brazilian cotton production has been down in recent years, their 2016 production was slightly higher than their 2000-2016 average. By comparison, U.S. cotton production averaged 17.4 million bales over the same time period. While U.S. cotton production is much greater than Brazilian production, Brazil's yields are typically 50 to 60 percent higher than yields

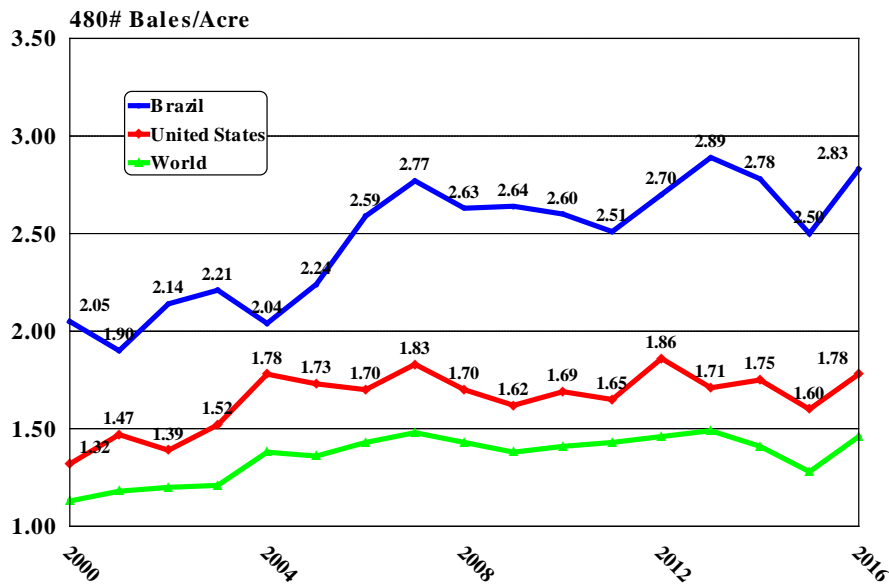
in the United States. In 2016, Brazil yielded 2.47 bales/acre, while the U.S. cotton yields were 1.65 bales/acre. Finally, while there is an upward trend in both Brazilian and U.S. cotton yields, Brazil's increases in yield seem to be greater than that of the United States. As a result, Brazil will likely be a competitor in the global cotton market for the foreseeable future.

Cotton Production in the U.S., Brazil and the World



Source: PS&D View, FAS/USDA

Cotton Yields in the U.S., Brazil and the World

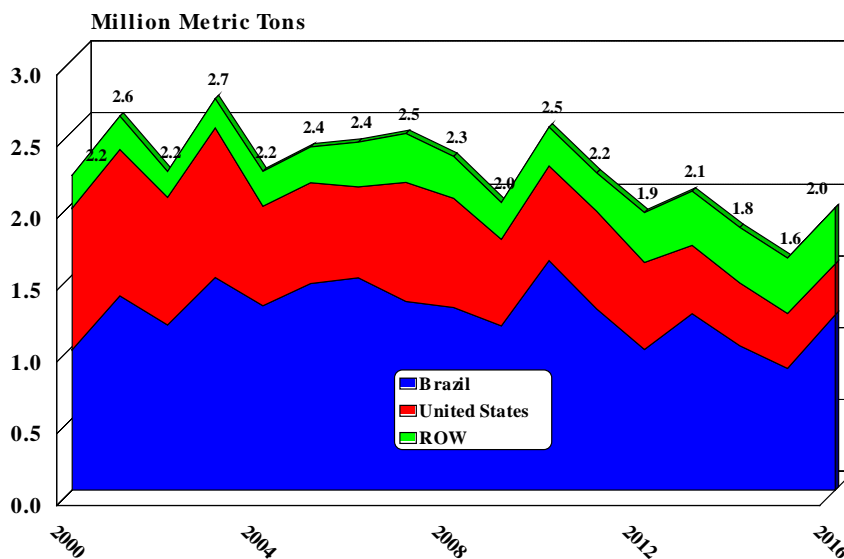


Source: PS&D View, FAS/USDA

Before discussing Brazil’s productive capacity in other commodities, it is important to note that investors and exporters in the United States have played a role in at least in part of Brazil’s growth in corn, soybeans, cotton, and other commodities. As noted, U.S. exports of inputs such as fertilizers, chemicals and machinery to Brazil have grown over the years, allowing Brazilian agriculture to grow and compete with the United States. U.S. companies have also invested millions in Brazilian crop production, processing and technology. These investments occur not only because Brazil has significant and growing productive capacity, but because the investment amount required is relatively low when compared to similar opportunities in the United States.

Brazil is easily the world’s leading producer of orange juice, accounting for an average of 56 percent of production since 2000 and for 62 percent in 2016. The United States accounts for most of the remaining, 31 percent over the entire seventeen-year period but only a quarter since 2010.

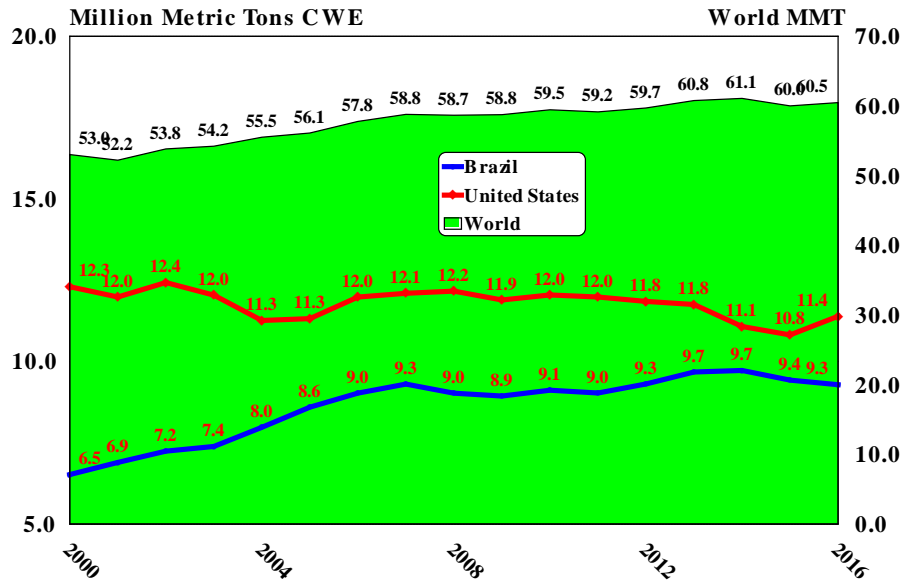
FCOJ Production in the U.S., Brazil and the Rest-of-World



Source: PS&D View, FAS/USDA

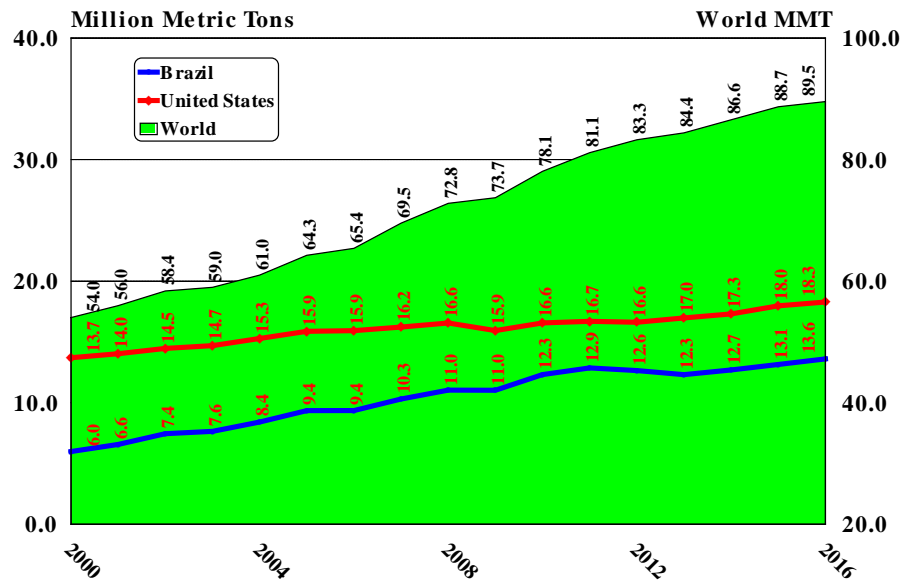
Brazil is also one of largest producers of beef and chicken broilers in the world. On a carcass weight equivalent, Brazilian beef production grew from 6.5 MMT in 2000 to a high of 9.7 MMT in 2014 before dropping to 9.3 MMT in 2016. Meanwhile, U.S. beef production has dropped slightly over the same time period though it did increase a bit in 2016 to 11.4 MMT. Both Brazilian and U.S. broiler meat production have increased over the same time period – Brazil from 6.0 MMT to a high of 13.6 MMT in 2016 and the United States from 13.7 MMT to a high of 18.3 MMT in 2016. As a result, U.S. beef and poultry exporters are facing ever growing competition from Brazilian exporters.

Beef Production in the U.S., Brazil and the World



Source: PS&D View, FAS/USDA

Broiler Production in the U.S., Brazil and the World



Source: PS&D View, FAS/USDA

Competition from Brazil in International Markets

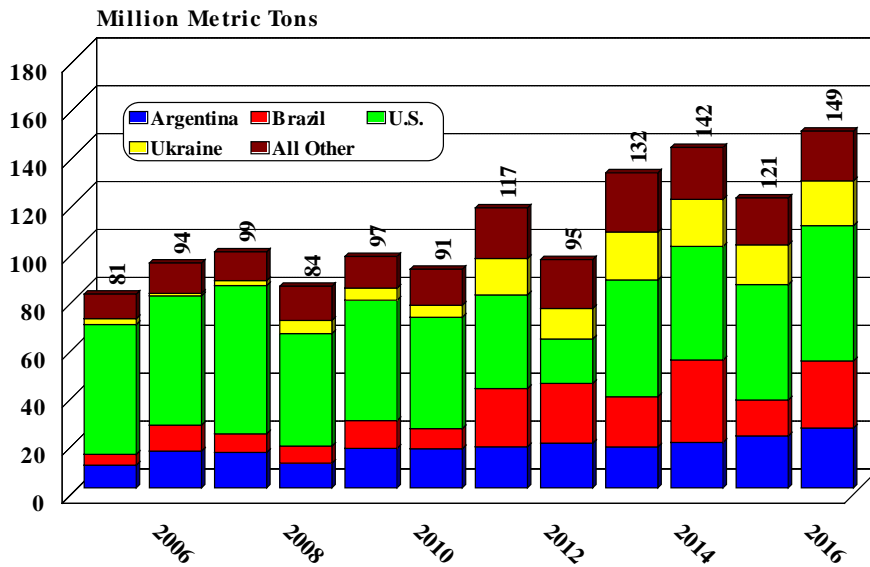
Brazil is considered a major competitor to U.S. agriculture and has a stronger impact on the development of U.S. agricultural programs and policies than almost any other country. As already discussed, Brazil is among the world's leaders in the production of soybeans, poultry, beef, cotton, corn, and orange juice, thus, Brazil exports many of these same products.

Brazil has been among the world’s leading corn, soybean and cotton exports for numerous years. Brazilian corn exports in recent years have alternated between number two and number three with Argentina and behind the United States. For instance, world exports of corn totaled 149 MMT, with U.S. exports totaling 56.5 MMT followed by Brazil (28.0 MMT) and Argentina (25.0 MMT). By contrast, Brazilian corn exports were 4.5 MMT in 2005 while U.S. exports were 54.2 MMT. This illustrates significant growth in Brazilian corn exports.

Brazil has been the leading soybean exporter each year since 2012 ahead of the United States. Prior to 2012, Brazil was second behind the United States but Brazilian exports grew consistently each year faster than U.S. exports grew. In 2016, Brazil exported 59.5 MMT of soybeans compared to U.S. exports of 55.8 MMT. Brazil and U.S. soybean exports compete for the Chinese market and have done so for fifteen years or more.

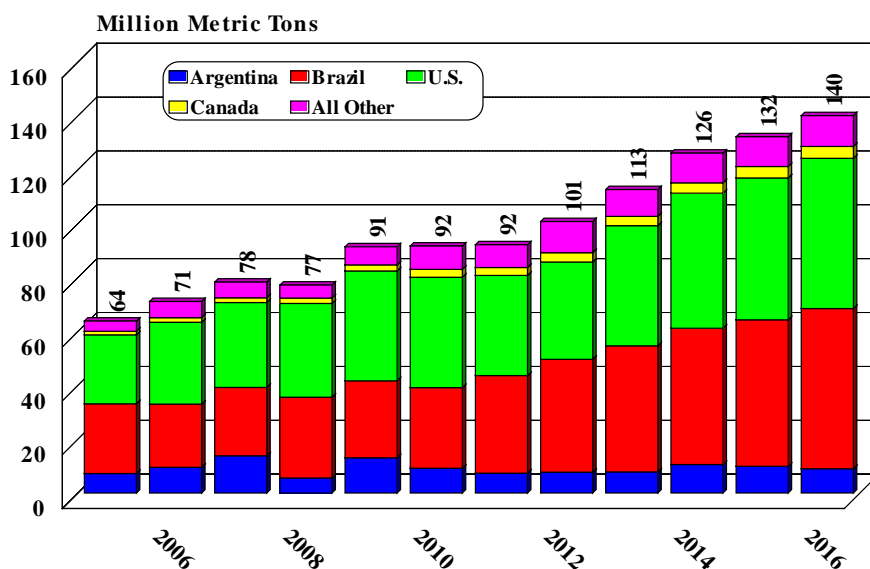
In cotton, Brazil is often the third or fourth leading world exporter behind the United States, India, and sometimes behind and sometimes ahead of Australia. To compare, during 2016, U.S. cotton growers exported 12.7 million bales of cotton while producing 17.0 million bales, or 75 percent, while Brazilian cotton exports were 2.9 million bales with production of 6.5 million bales, or 45 percent of production. Both countries hold large amounts of cotton though Brazil holds more. This could be a greater competitive challenge to U.S. cotton exporters in the future.

World Corn Exports



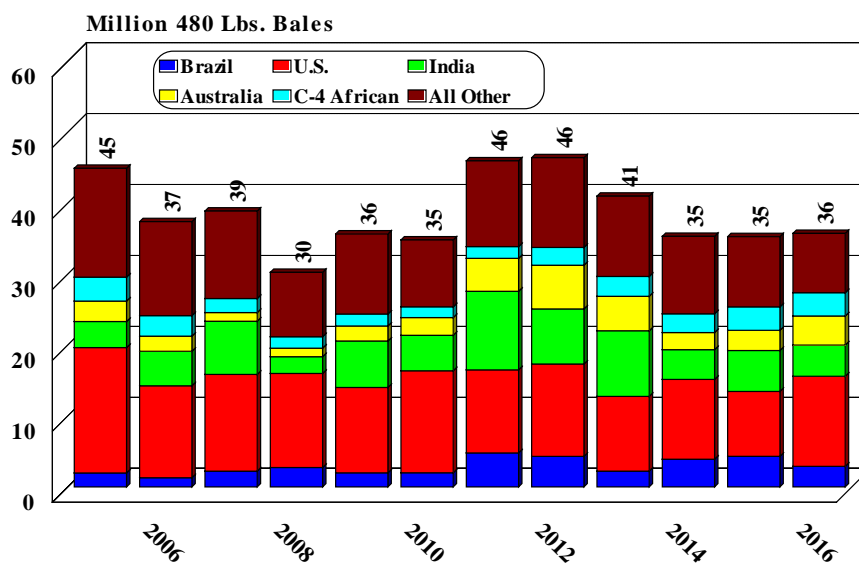
Source: PS&D View, FAS/USDA

World Soybean Exports



Source: PS&D View, FAS/USDA

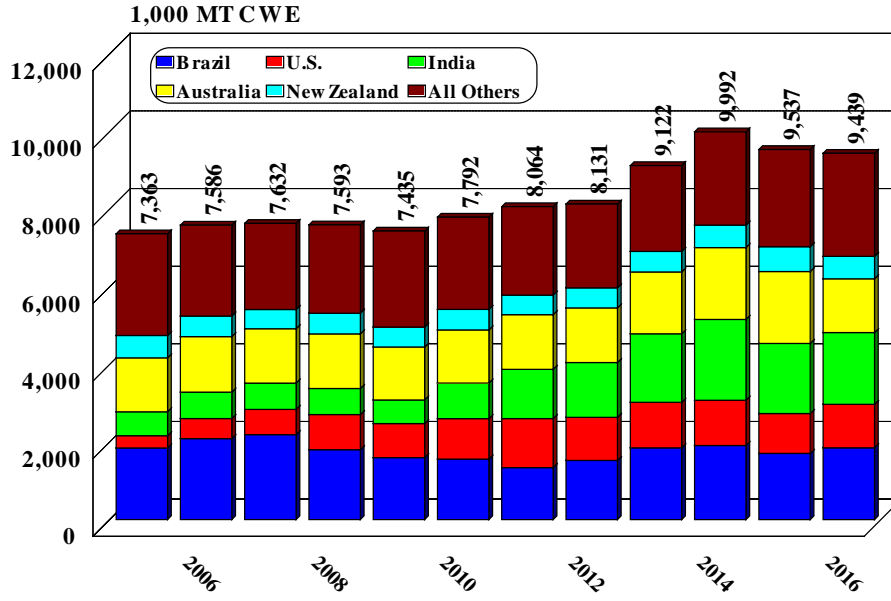
World Cotton Exports



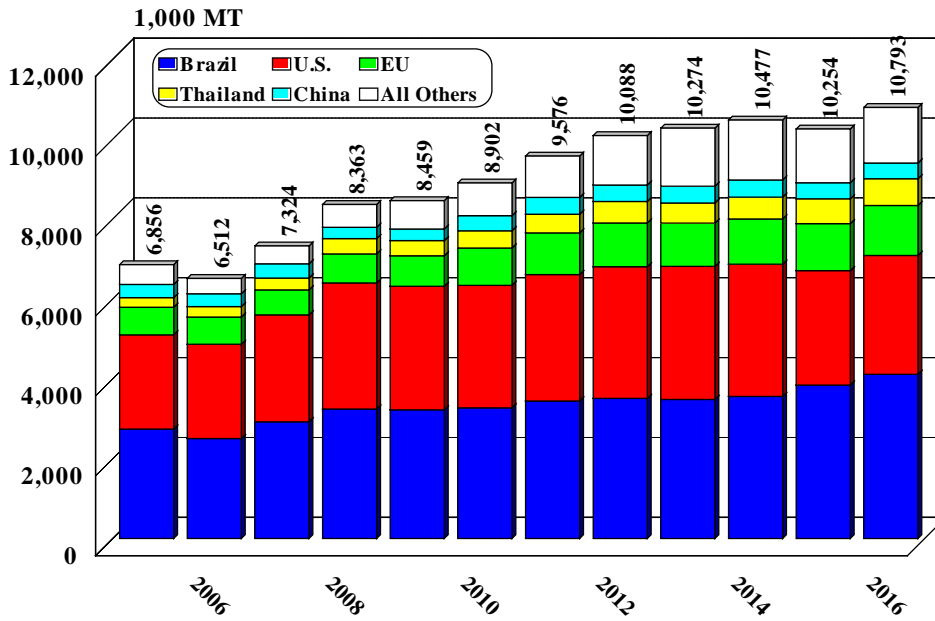
Source: PS&D View, FAS/USDA

As noted, Brazil and the United States are also highly competitive in both beef and poultry meat exports, and both are among the world's leading meat exporters. In 2016, Brazil beef exports were 1.85 MMT as the second leading exporter of beef behind India. The United States is typically the fourth leading beef exporter. In the global broiler meat market, Brazil is typically the leading supplier with U.S. exports coming in second. Hence, Brazil and U.S. beef and broiler exports face immense competition from each other.

World Beef Exports

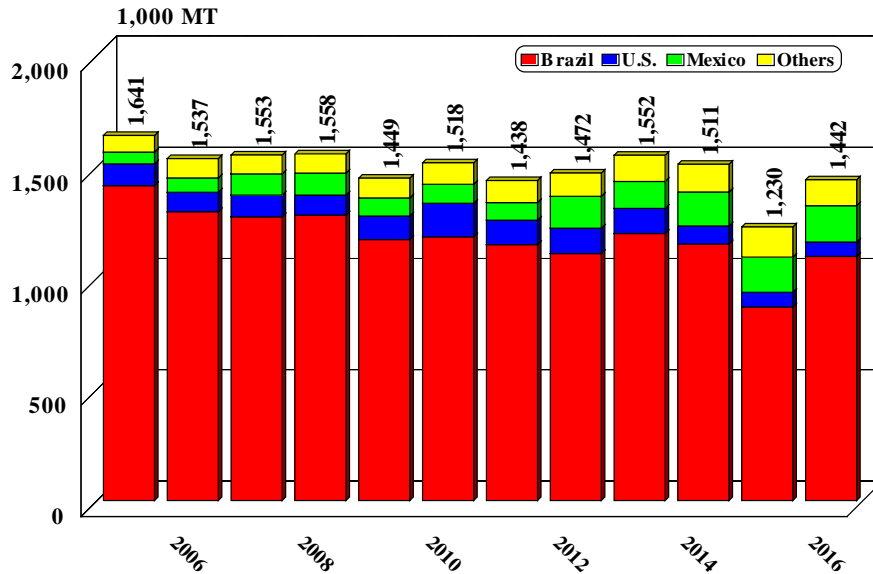


World Broiler Exports



The final product to be discussed here is orange juice. Brazil is clearly the world’s leading orange juice exporter, and while the United States produces and exports orange juice, it is also a well-established market for Brazilian orange juice.

World Orange Juice Exports



Source: PS&D View, FAS/USDA

Brazilian Packaging, Labeling, and Other Import Requirements

In a sense, the process for importing into Brazil is somewhat similar to importing into the United States in that there are numerous federal agencies which could be involved depending on the product being shipped. Also, as members of the World Trade Organization, Brazil food laws, including sanitary and phytosanitary (SPS) measures, are science based as required by the SPS agreement and CODEX.

The two most important agencies involved for food and agricultural exports into Brazil are the Ministry of Agriculture, Livestock, and Food Supply (MAPA) and the National Agency of Sanitary Surveillance (ANVISA). MAPA covers most products including meats, most beverages, fruits and vegetables, wheat flour, seeds, feeds, live animals, and most other intermediate products, and bulk products such as wheat, corn, cotton, and rice and soybeans. ANVISA covers selected consumer oriented products not covered by MAPA, including processed foods, energy drinks and selected other beverages, and certain intermediate products such as sugar, sweeteners, additives, and ingredients.

Brazil is also a member of MERCOSUR, the common market formed by Brazil with the countries of Argentina, Paraguay, Uruguay, and Venezuela, though Venezuela is currently

suspended for failing to meet membership requirements. MERCOSUR members have no tariffs between its members and a common external tariff applied to all other countries and typically approach other trade policies as a group. As a result, MERCOSUR places U.S. exporters at a disadvantage when exporting to Brazil as shippers of competitive products from Argentina, Paraguay, and Uruguay face fewer restrictions than U.S. shippers.

Finally, there are many intricacies and details for exporting to Brazil which have not been noted. This includes specific food laws, labeling requirements, packaging regulations, and laws addressing additives, pesticide tolerances, and other issues. The USDA Foreign Agricultural Service (FAS) GAIN report BR16024 dated January 4, 2017, authored by FAS staff in Sao Paulo, contains much detailed information in these and other areas, as well as contact information for Brazilian agencies and USDA FAS personnel. This report can be found online at the <https://gain.fas.usda.gov/Lists/Advanced%20Search/AllItems.aspx> website, and the exact url is noted in the references.

Transportation Infrastructure in Brazil

Brazil, a country with 3.2 million square miles (mi²) of land area, has as transportation infrastructure consisting of 982,365 miles of roadways, 31,069 miles of waterways, and 17,733 miles of rail. While Brazil appears to have an adequate infrastructure based on absolute numbers, they fall behind other large countries like China, India or Argentina when considering density of infrastructure. For example, Brazil has only 5.5 miles of railroad per 1,000 mi² of land area, while India, China, and Argentina has, respectively, 37.1, 33.0, and 21.7 miles of railroad per 1,000 mi². Brazil also lags behind India, the United States, and China when considering roadway density. Brazil is most similar to Russia when considering roadway, rail, and waterway density. The following table compares the infrastructure for selected countries, including the United States, Argentina, and the BRIC group of countries.

<u>Infrastructure Extension and Density for Selected Countries</u>						
	Brazil	U.S.	Argentina	Russia	China	India
<i>Distance</i>						
Railroad*	17,733	182,412	22,939	54,157	118,850	42,579
Roadways*	982,365	4,092,730	143,769	797,460	2,551,591	2,919,838
Waterways*	31,069	25,482	6,835	63,380	68,351	9,010
<i>Density</i>						
Railroad**	5.5	51.6	21.7	8.6	33.0	37.1
Roadways**	304.4	1,158.8	136.1	126.1	708.6	2,543.5
Waterways**	9.6	7.2	6.5	10.0	19.0	7.8
Land area***	3,227,096	3,531,905	1,056,642	6,323,482	3,600,947	1,147,956

Source: CIA World Fact Book

* in miles; ** density infrastructure, miles of infrastructure per 1,000 miles² of land area; *** miles²

Not only Brazil has low level of infrastructure density relative to other large countries, but also the quality of existing infrastructure is poor. According to Global Competitiveness Report (WEF, 2017) the Brazilian infrastructure quality is ranked 116 out of 138 countries.

Infrastructure Quality Rank for Selected Countries

	Brazil	U.S.	Argentina	Russia	China	India
Roads	111	13	103	123	39	51
Railroads	93	13	87	25	14	23
Ports	114	10	79	72	43	48
Overall Infrastructure	116	12	109	74	43	51

Source: Global Competitiveness Report, World Economic Forum (2017)

Brazilian Transportation Infrastructure



A - Paved Roads



B - Railways



C - Inner Roads



D - Ports

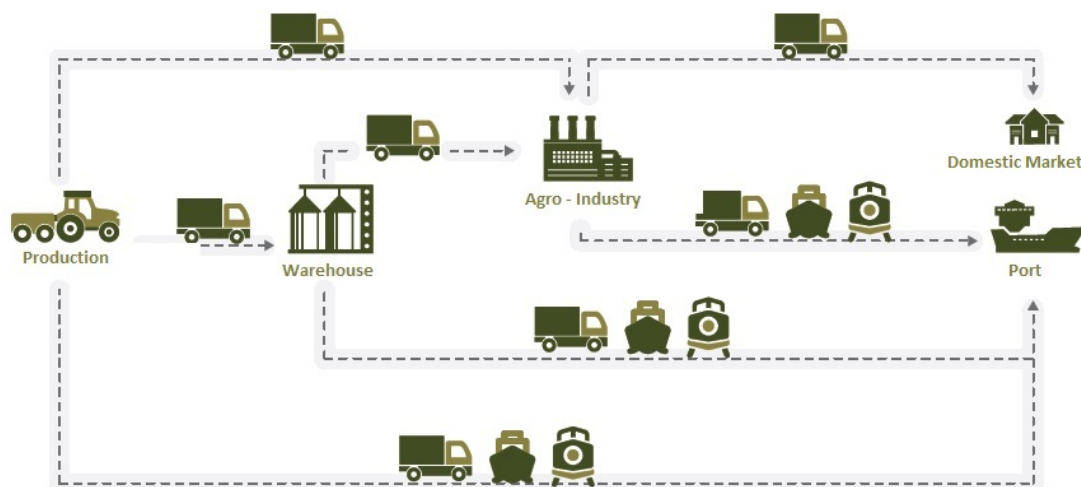
Source: Adapted from CNT (2015)

According to research conducted by the National Conference for Transport in 2015, most types of infrastructure suffer from lack of maintenance, lack of investment and labor issues whether it be lack of skilled labor or difficulty in hiring crews. Highways also suffer from lack

of paving, an aging fleet, and low density while rails suffer from physical and operational bottlenecks, and a lack of integrated expansion. Inland navigation and ports have high taxes and tariffs, difficulty in obtaining credit, lack of terminals and flagged vessels.

Even though there may be problems associated with Brazilian transportation infrastructure, agricultural and food products continue to flow into and out of Brazil, and throughout the country. To illustrate the agricultural transportation process in Brazil, the case of shipping soybeans is highlighted. The Brazilian National Conference for Transport (CNT, 2015) describes the soybean and grain distribution logistics in two major steps illustrated in below. The first step consists in the road transport of harvested grain from the farm directly to either farm warehouse or outside warehouse (government, cooperatives, or other companies). Due to the absence of paved rural roads, this first step, in general, has high costs.

Brazilian Grain and Soybean Distribution Logistics



Source: Adapted from CNT (2015)

The second step concerns to the road transportation from the warehouse to the processing industry. The product is then transported by truck on roads that are mostly paved with asphalt, to the domestic market or to the external market over highways, waterways, railways or a combination of these. Sometimes it could happen that grain is shipped directly from the farm to the port of export.

The comparative perspective between the three largest soybean producer and exporters point out that the United States has a large share of soybeans, 45 percent, moving through inland waterways, while Brazil ships only 9 percent on inland waterways. Brazil uses truck to transport a majority of soybeans, 65 percent while United States ships only 20 percent of their soybeans via highway. The remainder of the soybeans in each country travel on rail – 26 percent in Brazil and 35 percent in the United States.

Brazilian and American soybean travel, on average, approximately 620 miles from production to the ports, but 80 percent of America shipment goes by water and rail while only 35 percent of Brazilian production goes by water and rail. The following table summarizes this results presented by Brazilian Vegetable Oil Industry Association (ABIOVE).

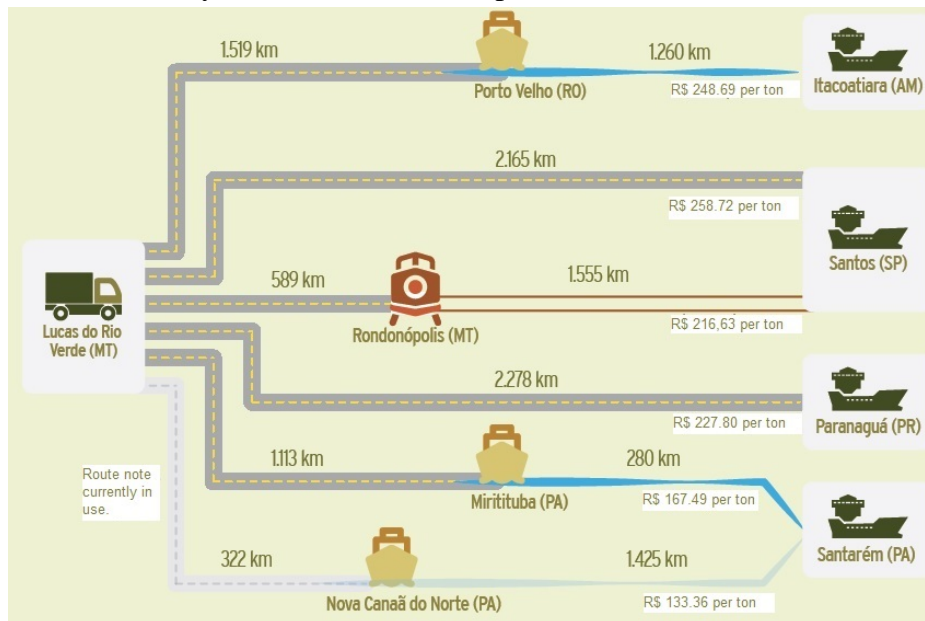
Soybean Transportation in Brazil and the United States

Approximate Shares of Transportation by Mode	Brazil	U.S.
Inland Water	9%	45%
Rail	26%	35%
Truck	65%	20%
Average distance to the port	621 miles	621 miles

Source: Adapted from Abiove and CNT (2015), and USDA Agricultural Marketing Service Data cited are from 2013.

CNT (2015) simulated the transportation cost of Brazilian soybean from the city Lucas do Rio Verde (MT) to four different ports: Itacoatiara (AM), Santos (SP), Paranagua (PR) and Santarem (PA). The results are summarized in the following figure. The least expensive route has the grain traveling truck for 322 km (200 miles) to Nova Canaa do Norte, at which point it uses inland water transport to reach the Port of Santerem 1,425 km (885 miles) further. That cost was estimated at BRL133.36, or about \$61.83 per ton or \$1.68 per bushel based on 2013 exchange rates. The next lowest route involves trucking the soybeans a 2½ times further to Miritituba before using inland waterway to get to Santerem. The most expensive route involves trucking the soybeans 2,165 km (1,345 miles) to Santos at nearly twice the cost of the least expensive option.

Brazilian Soybean Simulated Transportation Cost



Source: Adapted from CNT (2015)

Again, while Brazil, like most other countries, can surely improve their transportation infrastructure, they continue to ship large volumes of agricultural products throughout their country and are competitive enough to maintain large market shares in global markets.

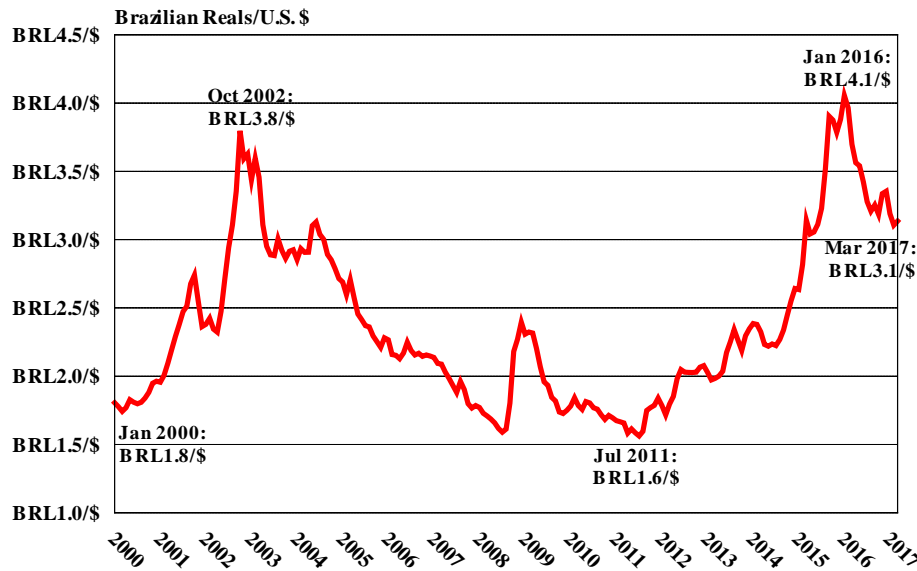
Another area of infrastructure in which Brazil can improve upon is the availability of cold storage. As recently as 2014, Brazil had 16.05 million cubic meters (mcm), or 566.7 million cubic feet (mcf), of cold storage capacity for the entire country. This amounts to 0.094 cm (3.32 cf) per person. To put this in perspective, the United States, with roughly 53 percent more population, has 114.85 mcm (4,055.4 mcf) of capacity or 0.438 cm (15.5 cf) per person. Brazil's capacity per person, however, is much greater than countries such as Mexico, Panama, and Peru, but only one-third the capacity in Uruguay, Canada, and India while being about half that of Greece, Tunisia, and Sweden. The good news for Brazil is that they are expanding their cold storage capacity, growing from 5.71 mcm (201.656 mcf) of capacity in 2010 which represents growth of 181 percent by 2014. As Brazilian cold storage capacity continues to grow, more consumer oriented products which require an efficient cold chain can be imported by Brazil.

Recent Market Environment in Brazil

Two overriding situations are currently impacting the Brazilian market. One is the recent political turmoil complete with a change in regime due to impeachment of a sitting president and corruption charges involving past-presidents and other political leaders. The other is the accompanying economic turmoil that may have in part led to the political turmoil, but has also led to a worsening of the economic situation within Brazil including the falling real. Still, many see Brazil as an exciting place in which to do business whether that be exporting to the largest market in South America for food and agricultural products or investing in the expansion of Brazil's economic engines.

The fact remains that Brazil does indeed have the largest population in the Western Hemisphere outside of the United States. Further, many Brazilians have significant purchasing power. That is, while their per capita GDP has dropped to \$9,850 per person, their purchasing power parity (PPP) is \$15,200 person. PPP goes beyond an exchange rate calculated GDP by accounted for differences in prices for an assortment of products. Thus, 206 million consumers with an average purchasing power of \$15,200, even if that is down in recent years, continue to make Brazil an attractive market. However, the combination of falling incomes, whichever the measure, and a real that has fallen from about 1.6 real/dollar in 2011 to about 4.1 real/dollar in January 2016 and sits at about 3.2 real/dollar in March 2017 has put a damper on Brazil's ability to purchase U.S. and other agricultural and food products, particularly consumer-oriented products.

U.S.-Brazil Monthly Exchange Rate



Source: Federal Reserve Bank of St. Louis, <https://fred.stlouisfed.org>

The question that remains is how long will it take before Brazil is able to fully return to the market size and growth it experienced from 2010-2014? It has been noted that Brazil along with the rest of MERCOSUR is returning to the negotiating table with the European Union in an effort to reignite the prospects for preferential trading agreement between the two groups. If successful, that will surely provide new exporting opportunities for Brazil in Europe and for the Europeans in Brazil. If Brazil is also able to lower their unemployment rate from about 12.5 percent, their inflation rate from about 8.5 percent, and stabilize the real, they could return to their prior path as a growing market sooner rather than later.

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