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# Cornhusker Economics

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## **Trucks, Trains, and Barges: For Brazilian Soybeans, It's Not Your Grandpa's Infrastructure Anymore**

In the popular movie “Planes, Trains & Automobiles”, the tagline said, “Steve Martin had no reason to panic... until John Candy came along”. In the soybean market, we could say, “We had no reason to panic... until Brazil came along”. Brazil has been rapidly growing its soybean production for the last 30 years and has recently become the largest exporter in the world. In 2024/25, USDA estimates that Brazil will account for 58% of soybean exports worldwide, followed by the United States with 28%. These are roughly the numbers for 2023/24 and 2022/23 as well.

Still, despite the massive growth in production and exports since the 1990s, Brazil has often had a notoriously poor transportation infrastructure. This created very large logistic costs, which heavily affected its competitiveness in the world market. But this is starting to change more visibly now.

In the last 5-10 years, thanks to developments in the transportation infrastructure, Brazil started closing the competitive gap with the United States. More than that, it's closing the gap fast. Recent developments in infrastructure have focused on improving efficiency, reducing costs, and enhancing connectivity between production areas and export markets.

### **Overview of transportation infrastructure in Brazil**

Brazil has a vast network of roads and grain transportation has traditionally relied heavily on them. In the past, roads and trucks were the main mode of transportation for soybeans to reach the ports of Santos and Paranagua in the south (red dots in Figure 1), which were the major destinations of soybeans for export. Soybean production used to be concentrated in the south, so these two ports were natural exit routes at the time.

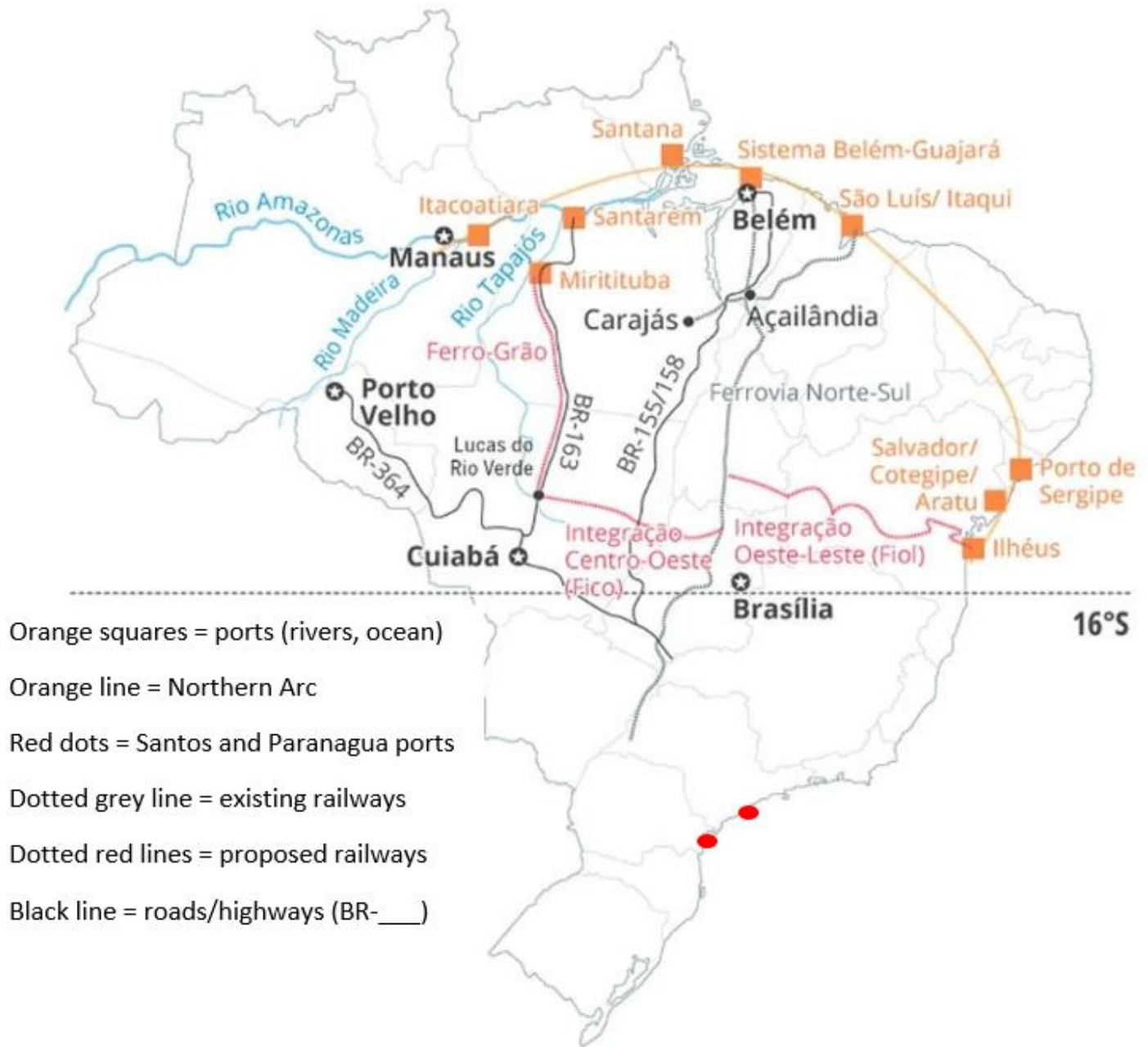
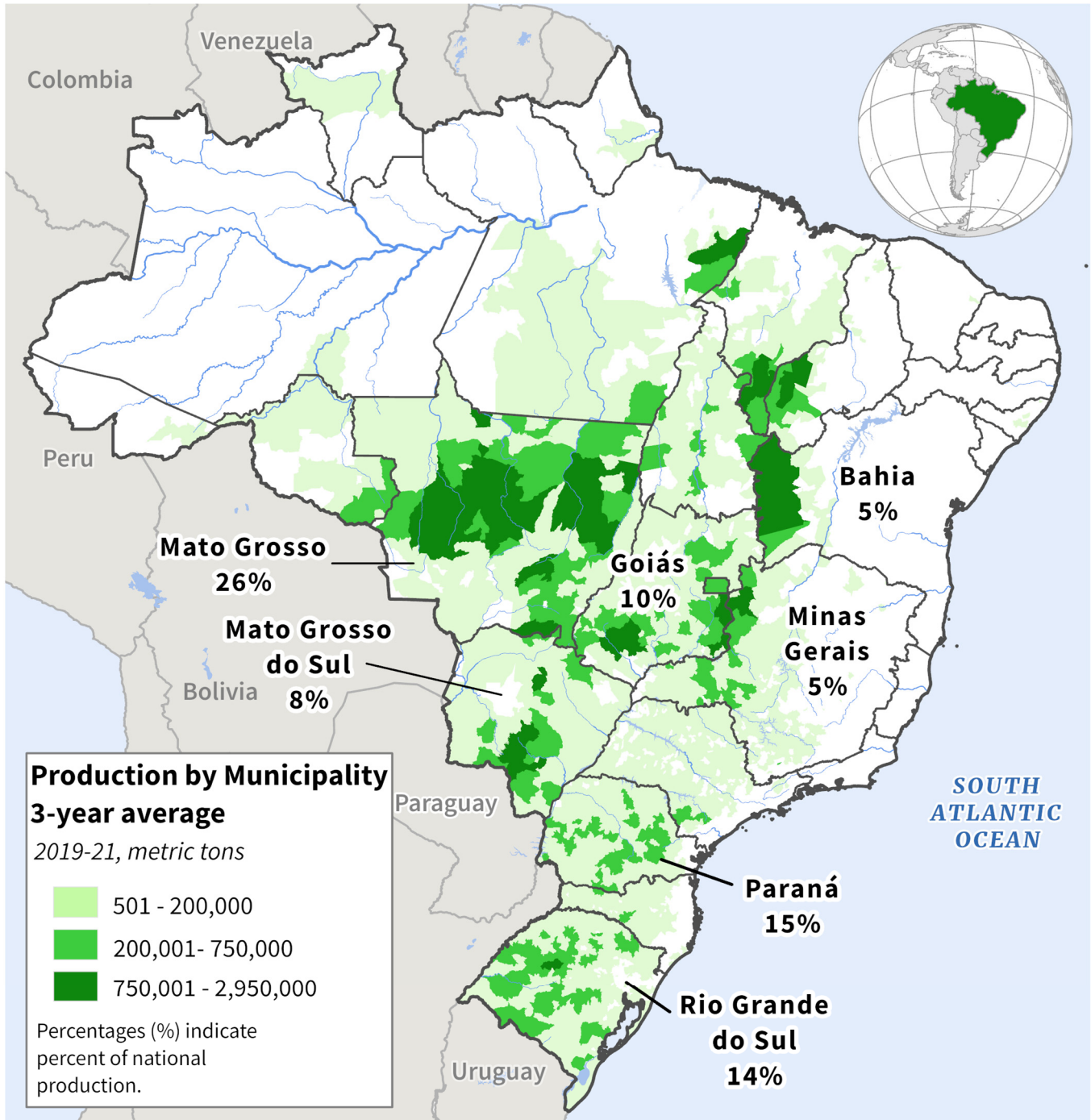


Figure 1: Map of Brazil showing key transportation infrastructure

However, soybean production expanded to the Brazilian center-west, which became the major producer of soybeans in the country (dark-green areas in Figure 2). During the expansion to the center-west, three issues emerged more clearly. One was that many roads faced challenges with poor conditions, congestion, and delays during the year (especially during harvest time). Another was that the new production areas were far from the ports in the south, hence trucks had to travel much longer distances. Finally, the ports of Santos and Paranaguá in the south handle a significant portion of agricultural exports, along with other products. The growing volume of production and hence exports led to congestion and operational inefficiencies, particularly during peak export periods.

# Brazil: Soybean Production



**USDA** Foreign Agricultural Service  
U.S. DEPARTMENT OF AGRICULTURE

Source: IBGE - Produção Agrícola Municipal

Figure 2: Soybean production in Brazil

Could railways and waterways help with grain transportation as alternatives to roads? Railways are underutilized in Brazil's agricultural logistics. While they can carry large volumes over long distances, the network is not comprehensive enough to serve all production areas effectively. As for waterways, there is a vast network of navigable rivers, particularly the Amazon and Parana River systems, which can be cost-effective for transporting bulk commodities. However, waterway transport is often limited by seasonal fluctuations in water levels and inadequate port facilities.

## How has infrastructure improved recently?

In the last 5-10 years, Brazil has invested in expanding its transportation networks to accommodate the growing agricultural production. In particular, efforts have been made to shift grain transportation from predominantly road-based to a more balanced system incorporating rail and barge transport. The objective is to make transportation more efficient and less costly, therefore, making Brazilian exports more competitive.

Investment projects in transportation infrastructure include (i) modernization and expansion of ports, (ii) construction of new port terminals along river routes, (iii) improvements in navigability of rivers close to production areas, (iv) plans to expand the railway system, (v) upgrades to roads, railways, and ports, (vi) broader connectivity between railways, roads and waterways, and (vi) improvements in rural road conditions to facilitate easier access for farmers. Funding has come from the government and the increasing collaboration between the government and private sector.

Figure 1 illustrates some of these investments. Many projects have targeted shipping routes towards the north of the country, taking advantage of waterways close to the main production areas. There have been investments to improve existing roads and create railways connecting the big production areas in the center-west to waterways in the north. Easier access to waterways could make it faster and cheaper to ship soybeans using ports in the north, which have also been the target of recent investments. The orange squares in Figure 1 show new and improved ports in what is called the Northern Arc (orange line on the map), which is a system of ports located on the north side of the country. The red and black lines on the map show roads and railways that can be used to access waterways (blue lines).

Some of these projects are not finished yet, and a few have not even started. However, there is a clear trajectory towards improvement in transportation infrastructure, which can enhance farmers' profitability and the competitiveness of Brazilian soybeans in the world market through a faster, cheaper, and more reliable transportation system.

## Is Brazil becoming more competitive already?

Two studies from the USDA show evidence that Brazilian soybeans are already becoming more competitive in the world market. These two studies (see citations at the end) investigate different topics related to grain markets and have a lot of good information and analysis, but we will focus only on transportation costs for soybeans here. They compared how much it costs for Brazil and the United States to ship soybeans to China, which is the largest consumer and importer of soybeans in the world. They calculated "inland transport cost", which is essentially how much it costs to ship soybeans from the production area to the export port, and "ocean transport cost", which is the cost from the export port in each country to the same destination in China. The first study calculated these numbers based on average costs in 2008-2012, while the second study used average costs from 2018-2022.

We can see these calculations in Table 1. For Brazil, costs refer to soybeans produced in the state of Mato Grosso (center-west), but they use different export ports. In 2008-2012 they are based on shipping costs through the export ports in the south, while in 2018-2022 they are based on costs to ship grain through the new infrastructure in the northern area of the country. Hence, the difference in shipping costs for Brazil largely reflects the impact of new investments in infrastructure. As we can see in Table 1, inland transport costs dropped 50%, while ocean transport costs decreased 38%.

	From Brazil (Mato Grosso)		From U.S. (Heartland/Midwest)	
	2008-2012	2018-2022	2008-2012	2018-2022
Inland transport cost	98	49	57	58
Ocean transport cost	57	35	51	49

Table 1: Soybean shipping costs from U.S. Heartland and Brazil to China (US\$/metric ton)

In 2008-2012, the U.S. had a competitive advantage in that they could ship soybeans to China at a lower cost than Brazil (both inland and ocean costs). Ten years later, in 2018-2022, the picture has changed. Using the northern ports, Brazil can now ship soybeans from the center-west region to China at a lower cost compared to the U.S. Therefore, preliminary evidence suggests that investments in infrastructure in Brazil have already started making a difference in the competitiveness ranking in the soybean market.

### **What happens next?**

Improvements in transportation infrastructure in Brazil have started to reduce transportation costs, but challenges remain. Many more efforts are still needed to expand rail access to key agricultural regions, but progress is slow. Connectivity between production areas and major ports, especially in the north, has much room for improvement yet. Port capacity is another challenge. The new ports in the north are not able to take large amounts of grain yet. For instance, those ports wouldn't be able to take the entire soybean production of the country. Regardless of costs, the southern ports of Paranagua and Santos are still needed to ship soybeans exported by Brazil. Expansion of railways, ports, and roads may also raise environmental questions in some areas in the north of Brazil (Amazon region), which could delay or prevent further investments.

Despite all the existing challenges, Brazil has shown in the last 5-10 years that it can improve its transportation infrastructure and become more competitive. If they keep this trajectory, as they plan to do, Brazilian soybeans (and other commodities too) can become even more competitive in the world market in the future. Now, it is true that progress in Brazil has historically been very erratic (the motto on the Brazilian flag says, "order and progress", and it's an ongoing joke in the country that Brazil can't do either). Still, we know that they can do it. It is no longer a question of whether they can make improvements, but when they will realize their potential.

Back to the first sentence of this article, if the United States and other countries still don't think it is time to panic, maybe they need to rethink it and start making investments to face the increasing competition of Brazilian soybeans (as well as other commodities). As Brazilian producers have learned, producing large crops at low cost is important, but being able to ship their crops efficiently and at low cost is just as important.

### **Citations**

Meade, B., Puricelli, E., McBride, W., Valdes, C., Hoffman, L., Foreman, L. and Dohlman, E. (2016). *Corn and Soybean Production Costs and Export Competitiveness in Argentina, Brazil, and the United States* (Report No. EIB-154). U.S. Department of Agriculture, Economic Research Service, June 2016.

Valdes, C., Gillespie, J., & Dohlman, E. (2023). *Soybean production, marketing costs, and export competitiveness in Brazil and the United States* (Report No. EIB-262). U.S. Department of Agriculture, Economic Research Service.

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