IS BRAZILIAN SOYBEAN PRODUCTION A THREAT TO U.S. EXPORTS?

Marty J. McVey¹, C. Phillip Baume², and Robert Wisner³ provided this assessment of Brazil’s soybean industry following completion of a trip to the country in May.

INTRODUCTION

Soybeans have been produced in Brazil since 1882.⁴ Early production was used mainly for hay and as a cover crop. By 1960, soybean production reached 7.3 million bushels, all of it processed domestically. The oil was used in domestic foods and the meal was used to support a growing poultry industry. At this point, Brazil was by no means a major U.S. competitor in world soybean markets.

That began to change in the early 1970s when the following chain of events propelled Brazil into the world soybean market. In 1971, the U.S. devalued the dollar causing the export price of U.S. corn, wheat and soybeans to fall sharply relative to the rest of the world. Also during that time, the USSR was generating large supplies of foreign currency by increasing its petroleum production. Using this foreign currency, the USSR financed importing large quantities of wheat and then later, large quantities of U.S. corn and soybeans. Simultaneously, adverse world wide weather conditions had reduced world grain production. Later, in 1972-73, an exceptionally harsh El Nino greatly reduced the supply of Peruvian fish meal - a major source of protein in animal feed rations. As a result, foreign demand for U.S. soybeans increased dramatically, causing soybean supplies to dwindle and soybean prices to skyrocket to $12.00 per bushel. This drew loud complaints from U.S. consumers who raised the possibility that the U.S. would run out of soybeans.

In June of 1973, President Nixon, responding to political pressures, imposed an embargo on soybean and soybean meal exports. Combined, the soy embargoes and the Peruvian fish meal shortage created the worldwide impression that the U.S. and Peru were unreliable suppliers of animal feed protein. Consequently, major soy importers -- Japan and Europe -- began seeking alternative sources of animal feed protein. Attempting to encourage the growth of soybeans in Brazil, Japanese investors bought land in Brazil for soybean production. Since then, soybean production in Brazil has increased from 5-million metric tons in 1973 to about 32.5-million metric tons in 2000. Today, Brazil is the second largest soybean exporting country.

SOURCES OF GROWTH

The growth in soybean production has come from increases in both yields and acres planted. Brazilian soybean yields increased from about 16.5 bushels in 1970 to about 45 bushels per acre in Mato Grosso in 2000. During the same time, harvested acres increased from about 3.2 million acres in 1970 to 32.4 million acres in 2000. Soybean production in 1970 was predominantly in the southern states of Sao Paulo, Parana, Santa Catarina and Rio Grande de Sul. Increases in soybean acreages in these states has come at the expense of rice, peanuts, potatoes, corn, cotton, coffee, corn and pastures. The most spectacular growth in Brazilian soybean acres has occurred in the state of Mato Grosso and the cerrado area of central Brazil. Figure 1 highlights the state of Mato Grosso and the cerrado region of central Brazil.

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⁴ Warken, Philip F. "The Development and Growth of the Soybean Industry in Brazil," Iowa State University Press, Ames, IA, 1999. This paper relies heavily on Warken for its description of the historical growth in soybean production in Brazil. The assessment of future growth potential and transportation constraints are based on a one-week trip to Brazil by the authors in May, 2000.
Figure 1. The state of Mato Grosso and the cerrado region.
THE CERRADOS

The cerrado area is defined as "a wasteland with stunted, twisted trees." The cerrados are not rainforests. Figure 2 illustrates the ground cover typically found on the cerrados. Warken describes the soils of the cerrado as highly acidic, saturated with aluminum, deficient in phosphorous with low water-holding capacity. Early on, many felt that the land in the cerrado could not be cultivated. Contrary to popular belief, the soils in the cerrados proved to be deep and well drained with excellent physical characteristics suitable for mechanized production. Warken reports that approximately 234 million acres or 46 percent of the cerrados are suitable for large-scale crop production. Thus, it is clear that there is potential for large increases in crop production in the cerrados.

Figure 2. Farm access road through the small scrub brush of the Cerrados.

Rainfall over most of the cerrados ranges from 39- to 75-inches per year. About 80 percent of this precipitation falls during Brazil’s rainy season, which runs from September through April. Brazil's soybean growing season coincides with its rainy season. Consequently, the good drainage of the cerrado's soil is a must for soybean production. Brazil's dry season runs from May through August.

The rapid growth in soybean production in the cerrados has been made possible by modern mechanical, chemical and biological technologies. The mechanical technologies allow for relatively inexpensive clearing of virgin cerrado land for crop production and for low cost soybean planting, cultivation, harvesting and drying. On average, cerrado land can be cleared for production for about $US 250 per acre.

Chemical technologies have corrected the low fertility, high acid soils through the application of limestone, phosphate fertilizers and trace minerals. Before adopting these agronomic technologies, Brazilian producers grew rice for two years on newly cleared land to reduce the soil's acidity. Nevertheless, correcting these soil deficiencies with current technologies is relatively expensive.
Biological technologies have resulted in the development of high yielding soybean varieties with a high tolerance to high aluminum soils, drought and to low latitude, tropical climates. Today, yields of soybean varieties grown in Mato Grosso are comparable to those of varieties in Iowa.

COST OF PRODUCTION

Table 1 shows preliminary estimates of the per acre and per bushel cost of soybean production in Mato Grosso and in Iowa. Soybean production in Iowa costs $2.91 more per bushel than in Mato Grosso -- 49 percent of Iowa's total cost. Iowa producers are at a cost disadvantage to Brazil on all inputs except fertilizer, but as Brazil improves its infrastructure, even fertilizer costs will fall. Brazil's greatest competitive advantage is its land costs. The land cost per bushel for Iowa soybeans is $2.22 per bushel more than in Mato Grosso.

Labor costs in Mato Grosso range from $80 to $200 per month plus free housing. Laborers sometimes work seven days per week during planting and harvest season with no additional pay for the extra days. Thus, labor costs per bushel in Brazil are only 26 percent of those in Iowa.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Iowa</th>
<th>Mato Grosso (preliminary)</th>
<th>Iowa</th>
<th>Mato Grosso (preliminary)</th>
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<td>$149.00</td>
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</tr>
</tbody>
</table>

Yield per acre 50 50

The state of Mato Grosso, however, is not the only region of potential soybean expansion in Brazil. Figure 3 highlights the areas in Brazil with the greatest potential for soybean expansion. The top red number is the region’s current soybean production in mmt, and the bottom blue number is the potential for the region. While Mato Grosso shows the most potential, the states of Bahia, Piauí, Rondonia and Roraima also show potential for growth. In total, Brazil has the potential to increase soybean production another 13.1 to 15.1 million metric tons, or 481 to 555 million bushels in the next 5 – 10 years.
Figure 3. Current and potential production in expansion areas (mmt).
CONCLUSIONS

In conclusion, Brazil clearly has a large competitive advantage over the U.S. in producing soybeans. The greatest advantage stems from Brazil's numerous acres of cheap, undeveloped land waiting to come into soybean production. Given the relatively low cost of clearing land in Brazil, it is likely that land clearing and increased soybean production will continue. However, this growth will not take place overnight. Production is only one half of the story in marketing soybeans. This paper did not address the distribution system in place in Brazil today, but transportation in Brazil will come under great stress as more acres are brought into soybean production. Hence, Brazil's soybean production will continue to grow, but only at its long-term rate of growth.

Given the tremendous advantage Brazil has in soybean production, the best long term solution for U.S. producers is to reduce their cost of producing soybeans. U.S. producers must realize that this competitive advantage will not be reversed by simply investing in U.S. transportation infrastructure. The most optimistic estimates of the benefits to producers generated from infrastructure investments total only 6 cents per bushel. The most likely estimates are in the range of 0.5 to 1.5 cents per bushel. Compared to Brazil's competitive advantage, this only a small dent in the armor. U.S. producers need to take a hard look at their agriculture system and find new and cost-effective ways to remain competitive. The most likely method to reduce cost from the system is to remove unnecessary layers and duplication from the system. This reality may be hard for some U.S. producers to face.