Brazil’s soybean production — production inputs
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(Second in a Series)

Brazilian soybean production has expanded rapidly in recent years. Soybeans were produced on 33.6 million acres in 2000. The estimated yield for Brazilian soybeans is 45 bushels per acre while the U.S. average yield has been around 38 bushels.

A discussion of the production inputs and resources used in Brazilian soybean production is presented below.

Soils and Fertility
Most of the soils in the new areas being developed in Brazil are classified as tropical soils, or what is known as Oxisols. The subsurface horizon contains only hydrated oxides of iron and aluminum along with kaolinite and quartz sand. The soils are subject to the formation of “hardpans.” These are “old” soils. The two largest areas of these soils are the Amazon Basin and the Congo Basin of Africa.

The Oxisols are highly weathered soils with low native fertility and low organic matter. They can be very productive when supplemented with lime and phosphorus. The addition of lime and phosphorus helps minimize the aluminum toxicity. Aluminum toxicity is often the major limiting factor for crop production with very acid soils. As the toxicity increases the root development decreases. Many native plants have high tolerances to aluminum toxicity. The process of how aluminum toxicity occurs in the plant is not very well understood at this time. However, much effort is being spent researching ways to overcome the root development problems in these type of soils. Aluminum toxicity is common throughout the world. It occurs in South America, southern United States, Africa, and Australia. This is a common problem in older soils.

The low pH of the soils also causes problems with availability of phosphorus. The availability of phosphorus decreases significantly as the soil drops below 6 pH. Aluminum and iron increase in availability. That is why some people have said that these soils would never be productive. However, producers with a greater understanding of the soils have

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been able to make these soils very productive by adding lime to increase the pH. It should be possible for these soils to produce even greater yields if producers have a greater selection of adapted varieties and a better understanding of soil chemistry.

Soybeans require large amounts of phosphorus compared to other crops such as corn or wheat. Phosphorus stress on plants usually occurs when the plant is in the seedling stage and the roots have not developed enough to supply all the needed phosphorus. Banding of fertilizer applications would probably give better yield responses because the Oxisols test low in phosphorus. It would improve the availability of the nutrients applied.

Brazil has large supplies of lime. The problem, similar to the U.S, is transportation costs. In the 1970s when the government was trying to stimulate the growth in central Brazil with government loans and grants, one of the key factors in deciding where to target these new growth areas was the availability of low cost lime.

The soils in both the south and the cerrados are very fragile. The soils in the cerrados are thin loess (wind deposited) soils (2 to 3 feet) over sandstone and rock formations. The high rainfall amounts present significant risk of high amounts of soil erosion. Some of the areas have significant slopes, both in rise and in length. Producers are using no-till and terracing to try to minimize erosion.

Weed control

Brazilian farmers tend to have fewer weed control problems. This is partly due to the fact that these lands have not been farmed for very many years. However, they use no-till, which will tend to increase weed pressure over time. They also have several weeds that chemicals do not control very well.

Another challenge is that temperatures stay warm after the soybean leaf canopy has fallen, which encourages weeds to start growing before the crop is harvested. This late season weed growth probably has very little if any yield impact. However, it can be a challenge to harvest crops with young green weeds growing. The growth of new weeds after the crop has matured and dropped leaves would be an unacceptable level of control for most Midwest producers.

Brazilian research is currently focusing on identifying herbicide resistant varieties, studying weed ecology and allelopathic effects, and developing integrated pest management control strategies. Along with Monsanto, they have developed Round-Up Ready soybean varieties that will be released as soon as they become legal. It is speculated that this could happen within two years.

It is illegal to raise Round-Up Ready soybeans in Brazil, but it is occurring. It is most prominent in the southwestern part of Brazil where the seed comes in from Argentina and then continues to be brown bagged. It is estimated that in some parts of the southwestern area more than 60 percent of the soybeans are Round-Up Ready. A lot of these soybeans are exported back out of Brazil through Argentina. Contamination is and will become an even bigger problem for Brazil to deal with. It may provide an opportunity for U.S. producers who can identity-preserve soybeans to sell into certain markets at a premium price.

The types of chemicals used on soybeans are similar to ours. This includes Treflan, Classic, Cobra, Reflex, Basagran, Pursuit, Poast, and Select, along with others that can be found in the U.S. Chemical weed control costs about $15 to $20 an acre. This gives reasonable broadleaf and grass control.

Perennial weed pressure seems to be light. However, the pressure from perennial weeds will increase over time. The fact that it rarely freezes also will increase perennial weed pressure. In the south where labor is very cheap, hand hoeing may be a reasonably good option. In the new cerrados, where labor is higher priced, it may be less of an option.

A major concern is the growing number of herbicide resistant weeds. Many of the chemicals that producers use are of the same chemistry and have the same mode of action. Continued and repeated use of the same chemistry will put tremendous selection pressure on the weeds to develop resistance.

In general, there are more weeds in the southern part that has been under cultivation longer. The chemical resistance to weeds also is showing up in the south.

Weed control in the new cerrados is based on chemical control. Chemical carryover is less of a problem due to the warm soil temperatures and higher rainfall. However, they will need to rotate crops and chemical modes of action if they want to minimize the probability of developing additional resistant weeds.

Diseases and insects

The disadvantage of being in a climate that has warm winters is that you have more disease and insect problems. Disease problems include stem canker and frogeye leaf spot. Brazilian scientists

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estimate that 90 percent of the soybean seeds are treated with some type of systemic or contact fungicide. Powdery Mildew and White Mold are also problems. Planting in narrow rows enhances White Mold and some of the producers are considering going to wider rows to help manage the disease. Sudden Death Syndrome is also a major disease problem due to no-till and high rainfall.

Soybean Cyst Nematodes (SCN) were discovered in Brazil in 1992. It is estimated that five million acres are currently infested with SCN. The Mato Grosso Foundation is working to try and develop varieties that are resistant to SCN and stem canker.

Insects also are more of a problem due to the warm weather. Insects include velvetbean caterpillars, southern stinkbug, and the ceratoma beetle. Some producers are using a biological control for velvetbean caterpillars. Many of the producers are spraying several times during the growing season to try to control insects. This adds substantially to the cost of production.

**Machinery**

The machinery costs of production in Brazil vary significantly by areas and crops. Smaller and older equipment is found in the southern region of Brazil. Farther north are farms that are larger in size and appear to be more profitable. They tend to have larger and newer equipment. We saw pictures of several large combines operating in one field but we did not have the opportunity to observe this. It appears that no-till is the major tillage system. This has resulted in less horsepower requirements and less fuel usage. This also has reduced the use of heavy tillage equipment. The exception would be the planting of sugar cane. Cane production currently requires large tractors due to the tillage and planting methods used.

Almost all of the farm tractors, harvesting equipment, and trucks use diesel fuel. The current price for diesel is approximately $1.50 a gallon. Diesel is considered to be the “working fuel” so it is free from fuel taxes. Gasoline costs approximately $3.00 per gallon. Cars cannot use diesel, only gasoline or alcohol.

In the southern region we observed the use of smaller equipment. Typically this is a mechanical front wheel assist tractor with less than 120 horsepower. Massey Ferguson tractors were common. Many tractors were in the 50 to 100 horsepower size. Combines tended to be older and most did not have cabs. New Holland combines with twelve to fifteen foot platforms were quite common.

John Deere started in Brazil with an arrangement with SLC, a German company, in 1945. SLC produces combines, tractors, planters, cotton harvesters, and sugar cane harvesters. Recently John Deere bought the remaining shares and is now 100 percent owner. John Deere equipment is manufactured in Brazil under the brand name SLC and is painted John Deere green.

Case-IH has been manufacturing in Brazil since 1975, although they have been selling equipment in Brazil since 1920. Massey Ferguson has a manufacturing plant in Brazil and appears to be the largest selling tractor, at least in southern Brazil.

Case-IH and John Deere appear to be increasing market share. Of interest to watch will be whether these companies can expand domestic production in Brazil and minimize the import taxes they now face. Taxes can be as much as 35 percent.

Most of the planters in the south are made by a company called Jumil. They are a no-till planter set up as a five row planter for corn on approximately 36-inch rows. They can add units to plant soybeans in 18-inch rows. The new planters are larger with more units and use air-metering systems. Jumil has been in businesses since 1936, is ISO 9001 certified since 1995, and uses the latest computer design software for engineering and production.

Brazil has imported about 175 cotton pickers into the cerrados area. These are John Deere five row pickers. Due to the rapidly expanding acreage of cotton and shortage of labor in the new frontier, producers are purchasing these larger, more expensive units. The largest domestically manufactured cotton picker is a two-row picker.

Brazilian producers also are importing other brands of cotton pickers. A major factor in the importing and selling of equipment is the amount of seller financing available. Difficulties in accessing capital and unfavorable currency exchange rates are continuing problems.

They use traditional sprayers, foggers, and aerial application for spraying. Producers don’t need a license to buy or apply chemicals. Most of the application is done by the farmers themselves and is not custom applied by the cooperatives. This is partly due to cheap labor and the large number of farm laborers.

Brazilian made machinery is less expensive than comparable equipment from the US. Hired laborers operate most of the equipment so there are very few
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tractors with cabs and only a few combines with cabs. So equipment manufacturing costs are less. It is estimated that a new 100 horse power tractor costs $50,000 and a new SLC combine with cab and a fifteen foot platform costs $90,000.

Brazilian researchers estimate machinery costs for soybean production is about 20 percent of the total cost of production. This would be approximately $32 per acre. However, this would not include trucking to a port. If you compare this number with the 2,500 acre farm in the southern area it is pretty reasonable.

Assuming a 2,500 acre farm has $250,000 invested in equipment with a repair cost of $10 per acre and two gallons of fuel used per acre, the machinery costs, excluding labor, is about $23 per acre. This is less than what a typical Iowa farmer would have. This is due to the use of older equipment, lower initial investment costs, more hours of use per year, and lower costs of repair. By using no-till, the amount of tillage equipment and fuel needed is also decreased. Labor costs are low enough that producers substitute labor for machinery.

Up until 1995, Brazil had a uniform national fuel pricing system. The price of fuel is controlled by the government at the wholesale level. Through the use of a tax the government keeps the price of diesel fuel constant no matter how far you are from the refinery. This is an important and significant subsidy for the development of agriculture in the cerrados.

**Producer alliances in the new agriculture**

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Traditionally, agriculture was an industry of farmers producing standardized commodities for a common market. But today's new agriculture has changed. The focus is increasingly on end products rather than raw commodities. Product markets have opened up huge new opportunities for producers—and huge new challenges.

To meet today's new challenges and take advantage of new market opportunities, an increasing number of producers are turning to alliances. Alliances are not a new concept in agriculture. In the early 1900s, alliances were formalized to create market access for commodity producers and to provide affordable services and inputs. Most of these alliances took the form of cooperatives and received special policy attention. But the new agriculture of the twenty-first century has put many commodity producers in a profit squeeze. And many producers wonder if alliances can help them return to profitability.

**New alliances for a new agriculture**

Producers of agricultural commodities across rural America have been put to the test over the last decade. Crop and livestock producers alike have watched profit margins vanish as real commodity prices have fallen. U.S. producers saw their share of the consumer food dollar shrink from nearly 40 percent in the 1950s to half that in 1999. At first it seemed the only way to manage the risks of commodity production was to get bigger, and thus lower costs, or else exit the industry. Now it appears there is another viable option—product agriculture.

Product agriculture has emerged largely in response to the increasing sophistication of consumer preferences. Consumers demand high-quality, safe, nutritious foods that are easy to prepare. This demand has created niche markets that large processors and retailers have been quick to exploit. But individual producers have found it difficult to tap these new markets, because reaching the consumer often requires more resources than one farmer can supply.

Processors and retailers typically lead the supply chain, but leadership can actually come from any stage in the chain—input provider, producer, processor, or retailer.

One way to get specialized products from farms to consumers is supply chains. Supply chains are effective mainly because they offer a good way to coordinate activities from production to marketing. Coordination creates cost efficiencies and allows the quality and safety of products to be monitored along each stage in the supply chain. Processors and retailers typically lead the supply chain, but leadership can actually come from any stage in the chain—input provider, producer, processor, or retailer.

To help producers reap more of the benefits of supply chains, producer alliances have evolved. Many of these alliances have been labeled “new generation cooperatives.” New generation coops typically limit

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Producer alliances generally engage in one of three types of activities. Some alliances identify special products for specific processor or retailer needs—sometimes for direct sale to consumers. Other alliances have shifted to product agriculture in one fell swoop by building or acquiring processing facilities. Still other alliances have taken a more conservative approach by partnering with businesses or other alliances already involved in producing food products.

Some success stories

Many producer groups that focus on products have been operational only a short while, and many are still in the formation stages, so the jury is still out on just how well producer alliances can help farmers tap opportunities in product agriculture. But some groups are well established and show the different relationships producers are forming and the activities they are pursuing.

Direct marketing cooperatives

A great deal of attention has focused on new generation cooperatives. But many cooperatives have formed with value-added agriculture in mind and do not require huge investments. Across the country producers are identifying products that are more valuable even before they are processed. These groups have formed marketing cooperatives and are selling their specialty products to food processors and retailers—and in some cases are marketing directly to consumers.

Numerous markets exist for producers of specialty products. Organic products such as fruits, vegetables, meat, and eggs are a growing market. These products are often difficult for processors and retailers to find, so a premium is generally paid for the products. Products produced both with and without biotechnology also have found special market outlets because they are difficult to segregate in traditional commodity markets. Many consumers also are keen to buy farm fresh produce. For example, HyVee grocery stores sell farm fresh hormone-free eggs at more than double the price of the store brand, a premium even some price-conscious consumers are willing to pay. It is difficult to pinpoint exactly how many alliances are engaged in this approach. But it is safe to say that direct marketing is becoming a much more widely used tool for producers to capture more of America’s food dollar without investing in costly food processing facilities.

Dakota Growers Pasta Company

The 1980s brought turmoil to durum wheat producers in North Dakota. But the decade also sparked a new momentum toward product agriculture. One alliance that emerged from those troubled times was the Dakota Growers Pasta Company, an initiative of North Dakota wheat producers.

North Dakota produces roughly 65 percent of the nation’s durum wheat, which is used almost exclusively in the production of pasta. Yet prior to the 1990s much of the state’s durum wheat crop was sold and milled elsewhere. Rural leaders liked the idea of building a pasta plant in the heart of durum wheat country. In 1990, they launched plans for Dakota Growers Pasta Company. In November 1993, the cooperative’s first pasta products began appearing on grocery shelves.

Dakota Growers is owned solely by 1,157 durum wheat producers in North Dakota, Minnesota, and Montana. The North Dakota and Minnesota facilities process durum into semolina, which is then used to make more than 80 varieties of pasta. The cooperative’s pasta products are sold to customers in the retail, food service, and ingredient markets, making Dakota Growers a completely integrated pasta manufacturer.

By integrating production and processing, the company has been able to trim costs and achieve efficiencies associated with scheduling, inventory management, and product quality. An early feasibility study projected that farmers involved in the entire production process could potentially receive as much as a dollar extra in returns on a bushel of wheat. While investing in bricks and mortar required a substantial initial investment, rural leaders found it hard to ignore the potential gains for farmers and the local economy.

Since its inception, Dakota Growers has benefited both growers and their local communities. Farmers have received patronage refunds ranging from 20 cents to one dollar per bushel every year after the startup year. In addition, members have received a price for their durum wheat that exceeds the average price in North Dakota. And the communities that are home to Dakota Growers have expanded their tax base and created nearly 300 jobs for residents—a welcome change for communities accustomed to bleak economic outlooks.

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U.S. Premium Beef

The U.S. cattle industry has changed so drastically in recent years that just four processors now control roughly 80 percent of the nation's beef production. At the same time, consumer tastes and preferences have evolved to include more than just hamburger and steaks—people want quality meals that are nutritious and easy to prepare. As consumer demand has become more sophisticated, producers have seen profits from selling live cattle diminish. In the mid-1990s a group of cattle producers became convinced that to survive they had to add more value to their products. Soon, U.S. Premium Beef was born. Membership required cattle producers to purchase stock at $55 per share with each share entitling them to deliver one animal per year. The first U.S. Premium Beef cattle were delivered to processing plants in December 1997.

In the early planning stages, producers were reluctant to invest in actual processing facilities, even though market research showed that the coop needed to own a piece of the processing pie to reap maximum benefits. Since U.S. Premium Beef was a group of producers—not processors or food marketers—they could either jump into a highly concentrated market by building processing facilities from the ground up, or they could partner with someone already in the processing business. They chose to partner with Farmland Industries and purchased a 29 percent ownership stake in Farmland National Beef, an industry leader in value-added beef products.

This business strategy has proven successful for U.S. Premium Beef and its producer members. Bigger profits and access to product markets have helped cattle producers both large and small. Success appears to have been driven by several factors. Like many new generation cooperatives, a substantial initial investment of $38 million at the outset ensured that members were committed to success. Producers had the incentive to continuously produce high quality cattle since premiums are paid based on the quality of each animal. Producers receive the final carcass data from every steer sold to help them improve their product.

As a result of this commitment to adding value, premiums paid to U.S. Premium Beef producers continue to climb. During the life of the cooperative, producers have received an average premium of $12.76 per head over the market price, with premiums in 2000 averaging $14.35 per head. More striking are the premiums received by producers producing the highest quality cattle. In 2000, the top 25 percent of cattle in terms of quality averaged a premium over market price of a staggering $41.13 per head.

The premiums paid to members have kept cattle producers knocking on the doors of U.S. Premium Beef. The cooperative's membership has grown from 200 producers at startup less than four years ago to more than 1,500 across 33 states today. Unlike Dakota Growers Pasta Company, U.S. Premium Beef did not put community development high on its list of priorities largely because their producers span many states. Still, roughly 1,000 jobs have been created in Farmland National Beef's meat packing operation since U.S. Premium Beef jumped on board.

Conclusions

Agriculture's shift from commodities to products is well under way. To take advantage of the opportunities offered by product agriculture, many producers must form alliances with other producers. Alliances have evolved as agriculture has changed over the years. The success stories described in this article show how two producer alliances discovered firsthand the benefits of producing products, despite the significant investment sometimes required.

The benefits of producer alliances extend beyond the members of the alliances themselves. In some cases, processing activities generate employment opportunities for hundreds of workers. A large business such as a processing plant can also boost the tax base for a local community, helping to fund sorely needed schools and other public projects. For many rural places, a shift to product agriculture may be a key ingredient for survival and prosperity.

Product agriculture poses new challenges for policy as well. Many of the laws that helped foster traditional alliances have been on the books more than 70 years now. These aging policies were aimed at commodity agriculture and are ill equipped to handle many of the unique issues facing producers in today's product-oriented agriculture. New policies could help encourage new alliances, with new structures, and new goals—and at the same time help traditional cooperatives redefine themselves so that they too can seize the opportunities offered by new agriculture.