

## Argentina & Brazil Sharpen Their Competitive Edge

The U.S. has been the world's leading exporter of corn, soybeans, and wheat for the past 40 years, but Argentina and Brazil have become increasingly strong competitors with the U.S. in field crop production and trade. U.S. market share of global soybean and soybean product exports shrank from 80 percent during the 1960s to only 35 percent in 1998-2000. Over that same period, the combined share for Argentina and Brazil has grown from less than 10 to nearly 50 percent. A less dramatic U.S. trade share decline in the global corn market has also coincided with gains by Argentina. The continued decline of the U.S. share of soybean trade since the mid-1990s is particularly remarkable since the U.S. had record-large soybean plantings in every year since 1998.

Both Argentina and Brazil have yet to fully develop their tremendous agricultural resources, despite great strides to date. With improvement of their transportation systems and with a more stable economic environment (see accompanying article on Argentina's and Brazil's economic situations), the two countries could see further production and market share gains for a number of commodities.

Since the early 1990s, grain and oilseed producers in Argentina and Brazil have made impressive gains in agricultural output. Brazil's soybean production doubled from an average of 18.5 million metric tons during 1989-91 to 37.5 million tons in 2000, while Argentina's production grew from 11.1 million tons to 26 million tons over the same period. Similarly, Argentina's corn and wheat production were up 151 and 58 percent, rebounding from a severe decline in the late 1980s. In contrast, U.S. soybean and corn production expanded by 40 and 39 percent, while wheat production was up only 11 percent.

The resulting trade gains are equally impressive. Since 1990, Argentina's shares of global trade for corn and wheat have nearly doubled to 13 and 8 percent. Brazil, traditionally a net importer of wheat, corn, cotton, and rice, has been expanding its capacity to produce field crops other than soybeans. Brazil has been the world's third-leading corn producer for the past 40 years, and has expanded its production by over 60 percent since 1990. Brazil's corn trade is projected to switch from average net imports of almost 1 million tons per year during the 1990s to projected net exports of nearly 3.3 million tons in 2000/01.

However, it appears that Brazil's recent corn export surge is just a temporary phenomenon. The feasibility of future corn production and trade growth will likely hinge on the development of economically viable tropical corn varieties, and on the pace of development of Brazil's rapidly growing pork and poultry sectors.

In contrast to soybeans, corn, and more recently cotton, Brazil's predominantly tropical setting has prevented the expansion of



Embassy of the Argentine Republic

most small grain production beyond the southern-most states. Brazil's wheat industry has been in steady decline since government production subsidies and import protection were removed in the early 1990s. Continued population and gross domestic product (GDP) growth have bolstered demand for wheat products. As a result, Brazil is projected to be the world's leading importer of wheat in 2000/01 at 7.3 million tons.

### *Resources in Argentina & Brazil*

The combined total land area of 1.1 billion hectares for Argentina and Brazil is 22 percent larger than U.S. area. Yet they are almost identical to the U.S. in area involved in agricultural activities—about 419 million hectares in 1998 (one hectare equals 2.47 acres). A major difference is that only 78 million hectares are involved in field crop production in these two countries compared with 177 million in the U.S. Both Brazil and Argentina instead have huge areas under permanent pasture, supporting large, predominantly grass-fed, cattle sectors.

Pasture is an important component of crop rotations in Argentina and Brazil, and significant portions of the pasture lie within their major field-crop regions. In contrast, cattle in the U.S. are fed primarily concentrated cereal rations once they go to feedlots, and permanent pasture is limited to highly marginal land not easily converted to crops. As a result, Brazil and Argentina may have more scope to convert pasture to field crop production than the U.S. Most significantly, Brazil's vast *Cerrado* savanna, an area of over 200 million hectares in the interior Center-West region, has enormous potential for further agricultural development. Much of the *Cerrado* savanna is still scrubland covered with brush and small trees, but is easily converted to agricultural use.

Argentina is the world's top exporter of soyoil and soymeal, and ranks third as both producer and exporter of soybeans, trailing the U.S. and Brazil. Argentina also produces many of the other field crops grown in the U.S., and ranks among the world's leading exporters of corn, wheat, sorghum, sunflower, and peanuts. With an historic lack of government support, crop and livestock decisions are based principally on relative returns, rotational considerations, and longer run investment plans. As a result, market conditions and weather have strongly influenced the evolution of field cropping patterns in Argentina.

Nearly all field crop production and most livestock production occur in the northeastern third of Argentina. This is a humid, warm temperate zone similar in climate to the U.S. Southeast, but with more fertile soils. A secondary pocket of crop production has also been developing in Argentina's northwestern provinces. This development is being spurred by improvements in transportation and better access to export markets.

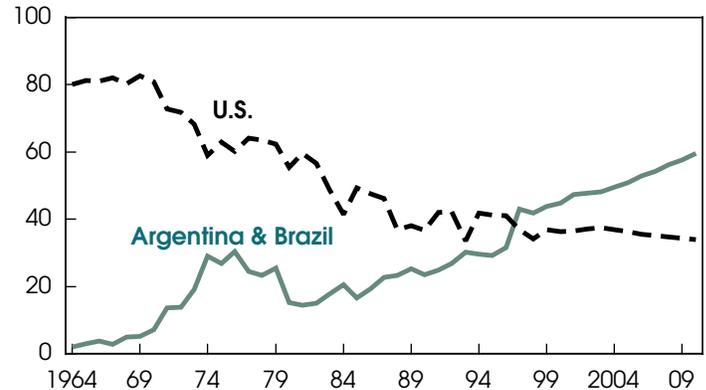
In Brazil, agricultural production is focused in the South and the Center-West. Brazil's South lies principally within the same humid, warm temperate latitudes as the northern portions of Argentina's agricultural region, and these two regions produce many of the same livestock and crops (such as rice, corn, soybeans, and wheat). Field crop production has traditionally been centered in the South's densely populated coastal states. Close proximity to major urban centers, as well as to the country's three major ports, give producers in this region easy access to both domestic and export markets.

Today, the Center-West rivals the South as the principal region of agricultural production within Brazil. The most distinguishing features between Brazil's South and Center-West are the temperate versus tropical setting and the tremendous potential for continued growth of cultivated land area onto the *Cerrado* soils. In 1990, the Brazilian institute for agricultural research, EMBRAPA, estimated that 136 million hectares of the *Cerrado* savanna were suitable for large-scale mechanized agriculture based on a rotation system of improved pasture, grains, and oilseeds. About 47 million hectares were in production agriculture in 1990, leaving nearly 90 million hectares available for development as farmland since. Unfortunately, the pace of conversion has been difficult to judge and ranges from conservative official Brazilian government estimates, to sensational reports from U.S. travelers to the region.

Most newly cleared land is initially converted to rangeland. Cropping alternatives become viable with infrastructure development. As passable roads become available and the decision is made to convert pastureland to crops, one or two years of upland rice cultivation are usually undertaken before soybeans or other crops are planted. Not all *Cerrado* is converted to agriculture. State and Federal regulations require landowners to permanently conserve a portion of their property, ranging from 20 percent in the drier southern *Cerrado*, up to 80 percent toward the Amazon rainforests near the northern *Cerrado*. Much of the *Cerrado* cropland is planted to soybeans, but cotton area has been on the rise the past 5 years. In addition, most farms keep some pasture, and rotate corn every fourth or fifth year. Occasionally coffee,

## Argentina and Brazil Have Surpassed U.S. in Exports of Soybeans and Soy Products

Percent of global exports



Sources: USDA historical data base for 1964-2000; USDA Agricultural Baseline Projections to 2010 (February 2001) for 2001-10.

Economic Research Service, USDA

rubber, and other perennial crops along with sugar cane, rice, and food crops are grown in various parts of the *Cerrado*.

Soybean area in Brazil is nearly evenly divided between the two regions. However, the Center-West's soybean area is expanding, while the South's area has stagnated. Farms in the Center-West are much larger, in part because *Cerrado* land is capable of supporting the full suite of modern production technology. Two-thirds of *Cerrado* land is in farms that are larger than 1,000 hectares. The combination of rapid technology adoption and significant economies of scale in field crop production have pushed crop yields in the Center-West to near parity with the U.S.

### *Argentina & Brazil Have Natural Advantages Over the U.S.*

Several important differences distinguish agriculture in Argentina and Brazil from the U.S. First, the southern hemisphere location means that their crop production cycles are nearly counter-seasonal to the U.S.—the primary field-crop growing period in Argentina and Brazil's South extends from October through March, compared with a May-September growing period in the U.S. Corn Belt. U.S. and international prices generally reach their lows at U.S. harvest time (September-October) when supplies are most plentiful. Prices then gradually rise into the spring with carrying charges and accumulating demand. Argentine and Brazilian producers and exporters benefit from this price recovery during February to April, their traditional harvest period.

Second, the production zones of Argentina and Brazil all lie at lower latitudes and, therefore, these countries have significantly longer frost-free growing seasons and more double-cropping opportunities. Brazil's Center-West lies entirely within the frost-free tropics and can technically produce three crops per year.

## Special Article

**Argentina and Brazil Have Lower Soybean Production Costs Than U.S.,  
But Transport and Marketing Costs Are Higher than U.S.**

Cost item	U.S. Heartland	Brazil		Argentine average N. Buenos Aires/S. Santa Fe
		Parana	Mato Grosso	
—US\$ per bu —				
<b>Production costs<sup>1</sup></b>				
Variable costs	1.71	2.78	3.17	1.90
Fixed costs	3.40	1.38	0.72	2.02
<b>Total costs</b>	5.11	4.16	3.89	3.93
Internal transport and marketing	0.43	0.85	1.34	0.81
<b>Border price</b>	5.54	5.01	5.23	4.74
Freight costs to Rotterdam	0.38	0.57	0.57	0.49
<b>Price at Rotterdam</b>	5.92	5.58	5.80	5.23

<sup>1</sup> Based on local marketing year costs in 1998/99.

Source: ERS calculations based on data available from various sources. Adjustments were made to the data to enhance comparability.

Economic Research Service, USDA.

Third, while Argentina's growing-season temperature and precipitation levels are similar to U.S. Corn Belt averages, Brazil's agricultural regions are generally milder and wetter.

Fourth, the U.S. Corn Belt is famous for its deep, rich soils, but Argentina's *Pampas* soils are equally as fertile and have produced bountiful grain and oilseed crops for decades with relatively low fertilizer-use rates. However, most of Argentina's cereal yield gains of the 1990s have resulted from increased use of chemical inputs and improved seeds. While highly fertile soils also allow for a wide range of intensive crop and livestock activities in Brazil's South, soils in Brazil's Center-West are not naturally fertile. However, proper soil management techniques have helped them become very productive.

On the other hand, U.S. transportation and marketing systems are vastly more developed. Despite considerably shorter average distances to ports from the Argentine *Pampas* and Brazil's South, transportation and marketing costs for bulk agricultural product exports have historically been much higher than in the U.S. The higher transportation costs for Argentina and Brazil are due to inefficient or underdeveloped barge and railroad transportation systems, and heavy reliance on more expensive truck hauling operations.

### ***Economic Policy Reforms Spur Growth***

A primary catalyst in Brazil and Argentina's surge in agricultural production in the past decade were the economic and political reforms undertaken by Argentina in the early 1990s and by Brazil in the mid-1990s. The reforms in the two countries shared many common elements, including deregulation and privatization of domestic marketing systems, restraining inflation, and easing of trade rules—i.e., decreasing and/or removing export taxes, import tariffs, and restrictive quotas and licenses.

These reforms opened the door to rapidly expanding foreign investment, leading to increased competition and efficiency in the agricultural sectors of both countries. Argentina, where reforms occurred first, has undergone significant modernization following heavy domestic and foreign investment in the agricultural sector and the storage and transportation systems that support it. Similar developments are underway in Brazil, helping to lower production and marketing costs, to raise farm-gate prices, and to help producers respond to international market signals.

With more open trade and strengthened market signals, imports and utilization of agricultural inputs and technology have increased markedly through the 1990s. For example, the combined value of Brazilian and Argentine imports of agricultural machinery rose from less than \$40 million per year in the early 1990s, to \$140 million in Argentina and over \$200 million in Brazil by 1998. Production and marketing processes are now applying cutting-edge technologies as strong international commodity prices in the mid-1990s provided a powerful incentive to invest in agriculture and expand production.

Argentine soybean growers have rapidly adopted herbicide-tolerant soybeans to reduce costs, raise yields, and remain competitive in the face of lower international prices. Expanded plantings of biotech soybeans in Argentina, an estimated 90 percent of plantings in 2000/01, have helped lower costs and increase yields by boosting weed control in rotations. In addition, varietal improvements and gradually increasing fertilizer-usage rates helped raise Argentina's corn yields recently. Brazil has not approved commercial planting of biotech varieties. Development and adoption of improved non-biotech soybean varieties and cultural practices suitable to the Center-West's poor natural soil fertility and tropical conditions were also critical to the expansion of large-scale mechanized agriculture into the vast interior regions.

## ***Soybean Cost Structure Favors Argentina & Brazil***

Combining abundant land and favorable climates, Argentina and Brazil are naturally low-cost producers of soybeans. Lower production costs have provided a competitive edge in international markets for Argentine and Brazilian soybeans. Comparison of 1998 farm-level soybean production costs indicates that total per-bushel costs are about one-quarter lower in Argentina and Brazil's Mato Grosso, and about 20 percent lower in Brazil's Parana than in the U.S. Heartland. Variable input costs per acre are lowest in the U.S., but yearly land costs are as much as \$80 per acre higher in the U.S. Heartland than in Brazil's Mato Grosso and about \$25 per acre higher than for prime land in Argentina. In fact, land costs in Mato Grosso are less than one-tenth of those in the U.S.

Also favoring soybean farms in Argentina and Brazil's Mato Grosso is their much larger size (averaging over 1,000 hectares) relative to soybean farms in the U.S. Heartland (120-150 hectares) or in Brazil's Parana (about 30 hectares). Large farm size permits economies of scale by spreading overhead costs over more acres, resulting in much lower per-unit costs. As a result, average machinery costs are relatively low in Mato Grosso and Argentina.

On the other hand, internal marketing and transportation costs are sharply higher for producers in Argentina and Brazil than in the U.S. The average U.S. soybean producer-to-f.o.b. port price spread (an indication of internal marketing and transportation costs) has remained relatively constant since the mid-1980s at about \$17 per ton (\$0.46 per bushel), or about one-half to one-third the current costs in Brazil and Argentina. As a result, differences in port prices for soybeans from the U.S., Argentina, and Brazil are substantially smaller than cost-of-production differences. Port price differences narrow even further when compared at Rotterdam (the major destination).

In Argentina, reduced export taxes and the improvement of port facilities has narrowed the margin between the terminal cash price at Rosario and the f.o.b. price of soybeans at Argentine ports from an average of \$68 per metric ton during the 1980-91 period, to just \$11 per ton since 1991. Significant improvements have also been made to Argentina's principal internal waterway, the Parana-Paraguay River system. But average per-kilometer transportation costs still remain high due to continued heavy reliance on trucks to move crops to market.

In Brazil, similar cost reductions have resulted from improvements to the transportation system and elimination of a value-added tax on soybean exports in 1996. For producers in Mato Grosso, whose soybeans must travel roughly 1,500 kilometers to port, the producer-to-f.o.b. price spread averaged \$76 per ton from 1983 to 1997. Since 1997 they have averaged an estimated \$47 per ton. Compared with Brazil's Mato Grosso, Argentina's relatively low average transport costs are due to the fact that most soybean production takes place within 250-300 kilometers of ports. In Brazil's Parana, where soybeans have a much shorter

## **Major Agricultural Areas in Argentina and Brazil**



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distance to port, the producer-f.o.b. price spread has fallen from a \$52-per-ton average during 1983 to 1997, to \$29 since 1997.

Lower transportation costs for the U.S. reflect, in part, its efficient barge system, which can transport grain long distances at low cost. Thus, while Brazil and Argentina have an edge over the U.S. in farm-level costs of production, their advantage is somewhat offset by the higher marketing and transportation costs.

In Brazil, significant potential remains to lower commodity export prices through improvements of road, rail, and waterway. Development of transportation on the Amazon River and its many tributaries is just beginning to open Brazil's Center-West growing areas to this ocean portal, but offers tremendous potential.

### ***What Will Drive Future Growth?***

In the future, the pace of agricultural growth in Brazil and Argentina will likely hinge primarily on improvement in the marketing and transportation systems, livestock sector dynamics, and economic stability.

## Special Article

### Producer Adoption of Biotech Crops Could Have Market Implications

Biotechnology, specifically genetic engineering, has launched speculation about the effects of the new technology on producer and consumer demand for genetically-modified crops. Some biotech crops possess traits (e.g., insect resistance or herbicide tolerance) that can significantly reduce costs and risks for producers. However, consumer acceptance remains uncertain, particularly in some major importing markets—e.g., the European Union (EU), Japan, and Korea—where consumer and political groups have called for greater scrutiny over the use of biotech crops in the food chain.

While Argentine producers are aware of the restrictions on biotech products in some importing markets, such concerns have not deterred them from adopting biotech varieties. Approximately 90 percent of Argentina's soybean production is from biotech varieties, and producers are clearly motivated by the savings generated by herbicide-tolerant soybean varieties as well as environmental benefits from using less-damaging chemicals. Cost savings attributable to biotech soybeans are estimated at about \$40 per metric ton, significantly larger than the \$8-per-ton premium received by producers for non-biotech soybeans in Argentine markets.

In contrast to the U.S., herbicide-tolerant soybeans have not been patented in Argentina. As a result, Argentine producers are not charged technology fees to use the seed, and farmers are allowed to save seeds from one year to the next. Consequently, seed costs for biotech soybeans are significantly lower in Argentina than in the U.S.

Although Brazilian agricultural producers and exporters have benefited from the 50-percent depreciation of the Brazilian *real* since January 1999, the low international soybean prices of the past 3 years have likely slowed the pace of land conversion in the Center-West. Nevertheless, several factors suggest that investment in land expansion for soybean production in the Center-West will continue.

- First, the costs associated with bringing new land under production are very low.
- Second, the promise of an improved marketing and transportation system in the Center-West suggests higher land prices in the future, making land investment appear profitable.
- Third, investment in land remains a useful hedge against the threat of inflation which, although greatly reduced from past levels, has not entirely disappeared.
- Finally, strong internal demand for soymeal and feed grains looms as Brazil's large poultry and pork industries respond to surging domestic and international demand.

Marketing and transportation system development will remain a critical determinant of the pace at which Brazil's land resources

Argentine farmers have been slower to adopt biotech corn hybrids. An estimated 20 percent of the 2001 corn crop is planted to insect resistant (Bt) corn hybrids, all of which are approved by the EU. Since 1998, Argentina has approved only new corn hybrids that are accepted in major export markets.

Given Argentina's present adoption rates of both corn and soybean biotech varieties, and a lack of sufficient storage capacity under the identity preservation (IP) system, the additional costs incurred in implementing an IP system would limit the potential for Argentina to capture a market niche for non-biotech corn or soybeans. However, the situation is quite different in Brazil, with respect to soybeans, where the isolated Center-West region can make a much stronger claim to biotech-free status.

In Brazil, the government currently prohibits commercial planting of genetically modified crops. However, the strong incentive to benefit from the cost savings available to biotech soybeans likely contributes to a significant "illicit" flow of biotech seeds from Argentina into Brazil's South, where climatic conditions are fairly similar. The share of biotech soybean plantings in the South has been estimated by various trade sources at between 20 to 40 percent. Although Brazil's corn crop appears to be predominantly non-biotech, other non-biotech producers such as South Africa and Eastern Europe would likely provide stiff competition for any future market niche.

move into productive use. Most agricultural land in the interior states is far removed from markets, and compared with the U.S., transportation costs still represent a very large portion of the export price. Several major development projects are currently underway or planned that are designed to connect Brazil's Center-West with major ports on the Amazon and the east coast. Their completion will likely continue to lower transportation and input costs and raise farm-gate prices for Brazilian farmers. However, completion hinges on continued strong inflow of foreign and domestic investment and a stable economy.

Continued cropland expansion in Brazil's Center-West is also expected to raise national average yields. Large farm sizes, large-scale mechanization, and innovative management practices have helped generate rapid adoption of new technologies in the region, and have helped produce acceptable returns even in the face of low international commodity prices. Crop yields for soybeans and cotton in the Center-West are already at or above average U.S. yields, and research is underway to improve corn and rice yields. In Argentina, crop area growth is less likely, but yield-growth potential for several field crops, particularly corn, appears to be significant. Although Argentina's corn yields rose 46 percent between 1990/91 and 2000/01 they are still only two-thirds of average U.S. yields. Future corn yield growth depends strongly on further increases in fertilizer usage rates.

The tradeoff between livestock and field crops is likely to drive developments in Argentina's agricultural sector. Nearly 90 percent of Argentina's beef production is entirely grass fed. While Argentina leads the world in per capita consumption of beef, the rate has been declining over the past 15 years. This may shift the focus to international markets which, in turn, may eventually encourage greater investment in feedlots and grain feeding in Argentina to produce high-valued beef demanded by international markets. Greater use of feedlots would free some pasture for increased field crop production. Feeding of concentrates could also increase domestic use of grains and high-protein meals. However, the April 2001 confirmation of a widespread outbreak of foot-and-mouth disease in Argentina will limit most unprocessed meat exports in the immediate future.

Many growth bottlenecks in Argentina and Brazil remain. Lack of domestic credit institutions limits the farm sector's ability to acquire new capital directly. Both countries are vulnerable to energy price fluctuations as they continue to rely heavily on diesel-powered vehicles for both crop production and transportation to

market. In Brazil, interstate value-added taxes continue to distort prices throughout the production and marketing systems. In Argentina, high usage tolls on privately owned highways keep domestic transportation costs high. Large government debt in both countries could quickly undermine economic progress. Currency valuation and government deficit levels remain critical to economic stability and foreign investment in both countries, and will likely play a major role in future agricultural export competitiveness.

Clearly, the potential for further growth of South American field crop output, if realized, could have profound implications for global trade and U.S. farm exports, prices, and incomes. The effect on future U.S. payments under current farm programs and on policy could also be profound. **AO**

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