Chapter 2

The Brazilian Grain System

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Brazil produces the three major grains—corn, wheat, and soybeans—that are the focus of this assessment but is a competitor of the United States in international markets only in soybeans. In corn, domestic consumption on the average is equal to production, so exports vary highly with crop conditions. Corn exports have ranged from O to 12 percent; in some years, domestic requirements can only be met by importing corn.

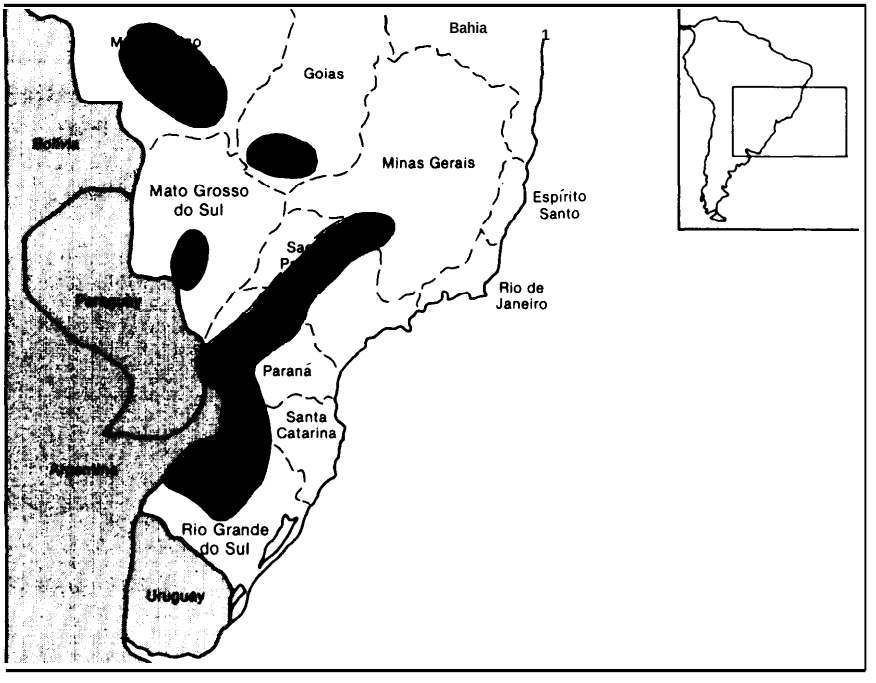
Likewise, wheat production in Brazil has been small, although production has increased from 1.7 million metric tons (MMT) in 1970 to 5.3 MMT in 1986. However, Brazil's wheat consumption far exceeds production, with imports supplying nearly half of total consumer needs. Brazil is a customer for, not a competitor of, U.S. wheat. This chapter focuses, therefore, on the Brazilian soybean industry. *

*This chapter draws on the OTA paper "A Comparison of the Quality Factors of the Brazilian and United States Grain Systems," based on the findings of an OTA study team consisting of Dr. Lowell D. Hill, Mr. Thomas E. Weidner, Mr. Robert A, Zortman, and Ms. Mary J. Schultz (interpreter) that traveled to Brazil in *1987.* Dr. Hill integrated the findings of the team into the OTA paper.

OVERVIEW OF SOYBEAN PRODUCTION AND MARKETS

Soybeans in Brazil are produced in the Southeastern part of the country. They are grown in seven provinces: Mato Grosso, Goias, Mato Grosso do Sol, Sao Paulo, Paraná, Santa Catarina, and Rio Grande do Sul (figure 2-1). The majority of soybeans, however, are produced

Figure 2-1.—Soybean-Growing Regions of Brazil



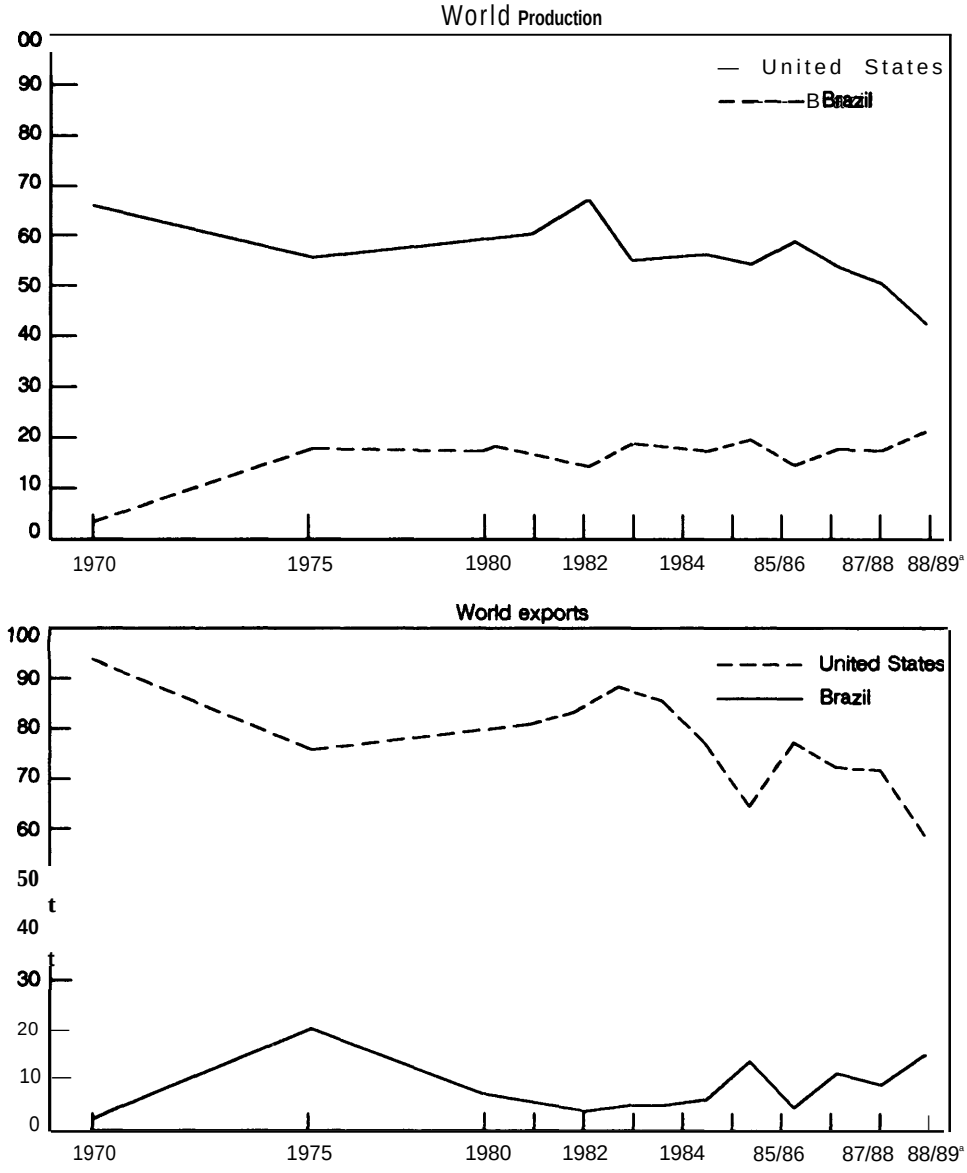
● Each dot represents 500,000 metric tons

SOURCE: Adapted from U.S. Department of Agriculture, *Major World Crop Areas and Climatic Profiles,* **Agriculture Handbook 664, 1987.**

in the two provinces of Rio Grande do Sul and Paraná.

Even though the United States dominates world production of raw soybeans (60 percent of world production), Brazil is the second largest producer (17 percent), followed by China (11 percent) and Argentina (7.5 percent). Both Brazil and the United States have dramatically increased the production of soybeans over the past 20 years (figure 2-2). U.S. production increased from 19 MMT in 1964 to 55 MMT in

Figure 2-2.—U.S. and Brazilian Production and Export of Soybeans as a Share of World Totals



[a] Preliminary

SOURCE: 196544: Food and Agriculture Organization, *Production Yearbook,* various years; *FAO Trade Yearbook,* various years. **1984/85-88/89:** U.S. Department of Agriculture, Foreign Agriculture Service, *World Oilseed Situation* and Market *Highlights*, Circular Series FOP 9-SS, September 1988.

1986, an increase of 287 percent. During the same time period, Brazil's production jumped from 523,000 MT to 16 MMT, an increase of nearly 3,000 percent.

Exports of soybeans from the United States increased steadily through 1981, when the pattern changed. Between 1981 and 1986, U.S. exports ranged from 16.3 to 25.3 MMT. In contrast, Brazilian exports varied dramatically over the entire period, with no discernible trend (table 2-1). The percent of usage exported as raw soybeans between 1965 and 1976 was similar for the two countries, fluctuating around a 12-year average of 26.5 percent for Brazil and 33.3 percent for the United States (table 2-2). However, this pattern changed for Brazil in 1977, when exports as a percent of raw soybean use dropped below 20 percent and fell to 6 percent in 1978, 1979, and 1982. The contrast between the U.S. and Brazilian export patterns is the result of Brazil's emphasis on domestic crushing capacity.

In both countries the percent of supply processed annually followed a similar pattern up through 1971, with total crush ranging from 47 to 73 percent in Brazil, and from 48 to 62 percent in the United States (figure 2-3). After 1977, however, a significant change is evident in Brazil's strategy. While Brazil increased its percentage of supply processed domestically to 84 percent in 1982, U.S. processing stayed around the same level. Between 1978 and 1988, Brazil never processed less than 71 percent of its production. In contrast, the United States never processed more than 51 percent. The increased proportion of the Brazilian crop used by domestic crushers shifted Brazil from an exporter of beans to the dominant force in the world meal market.

Brazil's production of meal and oil increased at a very high rate, especially prior to 1980. U.S. production also increased, enough to exceed Brazil's total output, but the relatively rapid growth of oil and meal production in Brazil reflects policy actions to encourage growth in processing capacity. While Brazil raised its share of the world soybean meal market from 3.7 percent in 1965 to 34.6 percent in 1988-89, the United States dropped from 70.2 percent to 15.9 percent (figure 2-4). Brazilian strategies have resulted in a total crush capacity that exceeds annual production in most years, shifting its comparative advantage to meal exports rather than raw beans.

Table 2-1 .–Production and Utilization of Soybeans in Brazil, 1965-87

Year	Area harvested (1,000 ha)	Yield (MT/ha)	Production	Beginning stocks	Imports (1,000 MT)	Total supply	Exports	Crush	Food	Fd/Sd	Total usage	Ending stocks
1965	432	1.211	523	56	0	579	75	282	0	49	406	173
1966	491	1.212	595	173	0	768	121	395	0	81	577	191
1967	612	1.170	716	191	0	907	305	423	0	72	800	107
1968	722	0.906	654	107	0	761	66	471	0	89	626	135
1969	906	1.167	1,057	135	0	1,193	310	612	0	130	1,052	141
1970	1,319	1.144	1,509	141	0	1,650	290	932	0	169	1,391	259
1971	1,716	1.210	2,076	259		2,336	230	1,700	0	277	2,207	129
1972	2,640	1.291	3,666	129	5	3,600	1,023	2,132	0	362	3,517	263
1973	3,615	1.386	5,010	283	5	5,299	1,788	2,714	0	513	5,015	264
1974	5,143	1.531	7,974	284	6	8,164	2,662	4,302	0	603	7,767	397
1975	5,824	1.698	9,669	397	0	10,286	3,516	5,516	0	677	9,709	577
1976	6,417	1.750	11,230	577	0	11,807	3,328	6,374	0	749	10,450	1,357
1977	7,070	1.770	12,514	1,357	0	13,871	2,581	8,661		825	12,067	1,604
1978	7,782	1.226	9,541	1,604	89	11,433	659	8,882	0	638	10,379	1,054
1979	8,256	1.240	10,237	1,054	253	11,545	638	9,094	0	895	10,627	918
1960	9,774	1.727	15,153	918	474	16,544	1,533	13,009	0	920	15,462	1,082
1981	8,501	1.788	15,200	1,082	934	17,216	1,502	13,796	0	890	16,188	1,028
1982	8,202	1.565	12,836	1,028	1,252	15,116	797	12,728	0	895	14,420	
1963	8,136	1.813	14,751	696	34	15,481	1,316	12,873	0	1,069	15,258	223
1984	9,421	1.650	15,545	223	154	15,922	1,580	12,517	0	1,147	15,244	678
1985	10,153	1.800	18,275	678	428	19,381	3,456	13,774	0	1,156	18,366	995
1986	9,450	1.492	14,099	995	350	15,444	1,200	12,332	0	1,056	14,568	856
1987	9,300	1.666	17,298	856	441	18,595	3,290	13,820	0	1,200	18,310	285

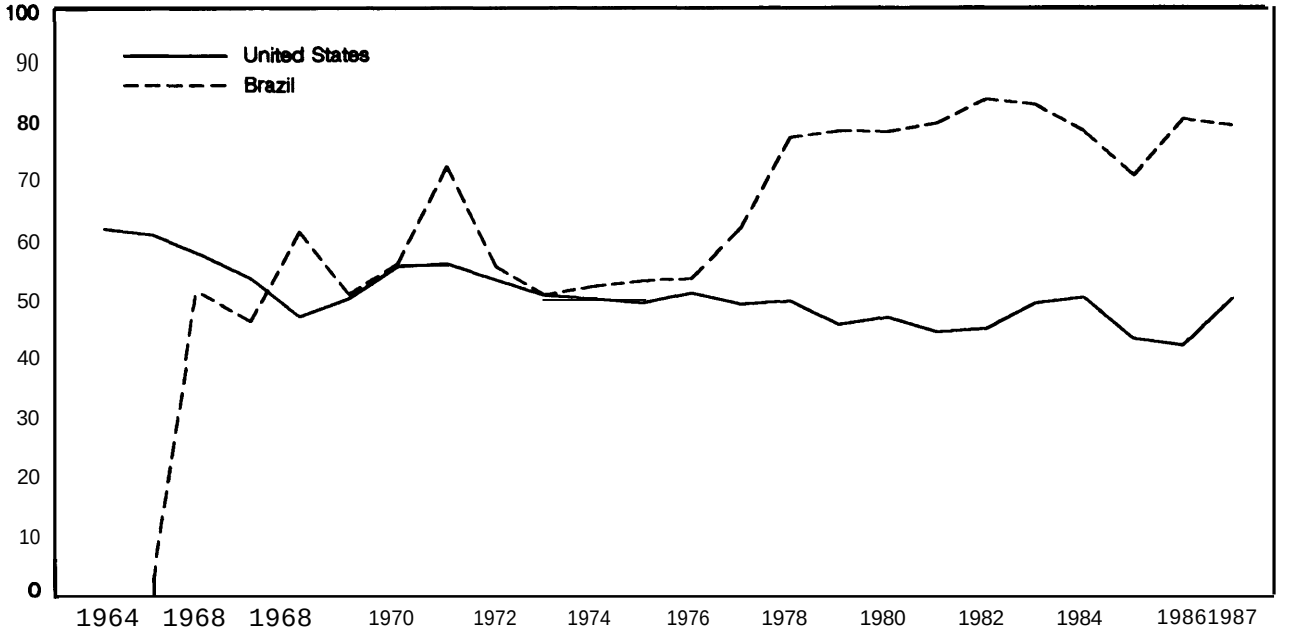
SOURCE: U.S. Department of Agriculture, Foreign Agriculture Service, *Foreign Agriculture Circular—Oilseeds and Products/World Oilseed Situation* and *Market Highlights*, Washington, DC, various issues. Reference tables on the major producers and consumers of soybeans and soybean products.

Table 2-2.–U.S. and Brazilian Exports of Soybeans as a Share of Total Domestic Supplies, 1965-87

	Percent of usage exported as soybeans		Percent of meal usage exported		Percent of oil usage exported	
Marketing year	Brazil	Us.	Brazil	Us.	Brazil	**Us.**
1965 ....., ...	180/0	290/o	620/o	180/0	00/0	250/o
1966 21		**30**	77	20	0	16
1967 38		**30**	46	20	0	18
1968 11		30	71	21	0	16
1969 29		30	75	21	0	13
1970 21		35	85	23	2	18
1971 10		34	84	25	2	22
1972 29		35		22	10	18
1973 36		37	68	28	16	14
1974 37		38	72	29	2	16
1975 36		35	81	26	31	14
1976 32		37	83	25	35	11
1977 21		39	81	24	35	
1978		41	79	27	32	20
1979	6	40	72	27	26	21
1980	10	42	73	29	35	23
1981	9	39		28	45	15
1982	6	45	80	28	37	18
1983	9	43		27	38	17
1984	10	45	80	23	37	16
1985 19		32	80	20	37	14
1986	**8**	**35**	73	24	18	11
1987	19	39	74	26	37	10

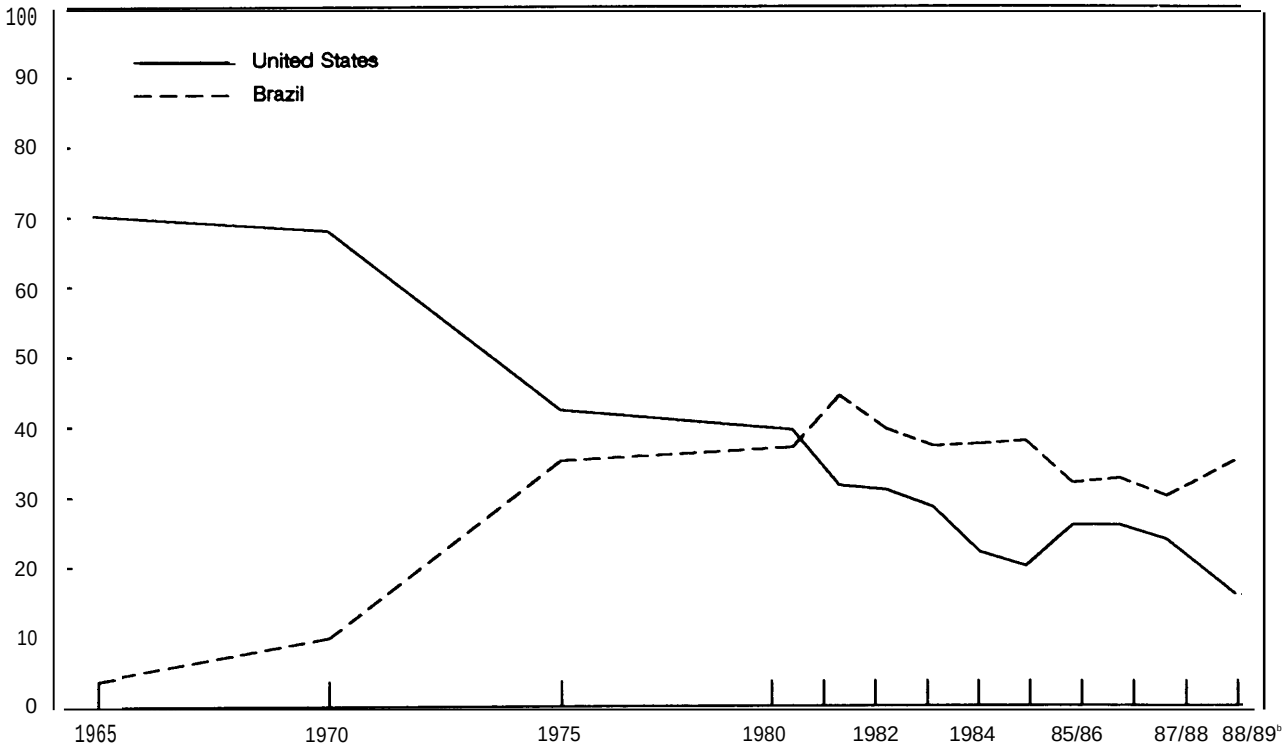
SOURCE:U.S.Department of **Agriculture, Foreign Agriculture** *Service. Foreign Agriculture r-01/seeds and* ***Products/World Oilseed Situation and Market Highlights,*** Washington, DC, various **issues. Reference** tables on **the major producers** and **consumers of** soybeans end soybean products.

Figure 2=3.-Volume of Soybeans Processed as a Percent of Total Domestic Supplies: United States and Brazil (percentage)



SOURCE: Calculated from U.S. Department of Agriculture, Foreign Agriculture Service, *Foreign Agriculture Circular – Oilseeds and Products/World Oilseed Situation and Market Highlights*, various issues. Reference tables on the major producers and consumers of soybeans and soybean products.

Figure 2-4.—Market Shares of World Soybean Meal[a] Exports: United States and Brazil (percentage)



[a] During the period 1965–85 this data includes soybean cake and meal.
[b] Preliminary

SOURCE: 1985-84: Food and Agriculture Organization, *FAO Trade Yearbook,* various years. 198485-88/89: U.S. Department of Agriculture, Foreign Agriculture Service, *World Oil/seed Situation and Market Highlights,* Circular Series FOP 9-88, September 1988.

Western Europe has been a major market for soybeans of both countries, accounting for 45 percent of U.S. exports of raw beans in 1985/86, and 84 percent of Brazil's (table 2-3). Exports to the U.S.S.R. from both countries have varied. Although Japan takes a small and intermittent proportion of Brazil's exports, the country is a large and stable customer for U.S. soybeans. As for soybean meal exports, Western Europe is the largest market for both countries; East European countries are important markets only for Brazil.

THE BRAZILIAN SOYBEAN INDUSTRY

Most of the soybeans in Brazil are produced in the two southern states of Rio Grande do Sul and Paraná. Mato Grosso and Mato Grosso do Sul, in the north, have increased their output to tie for second place. Rio Grande do Sul has been producing soybeans for many years and has more problems of disease and soil fertility than the newer areas.

In the southern states, small farms are becoming even smaller as inheritances are divided. Yields decline due to the increased double-cropping, which requires shorter season varieties and less than optimum timing in planting. Currently, yields in Rio Grande do Sul are about 70 percent of those in Paraná Double-cropping in Rio Grande do Sul is at the margin for sufficient season length to mature both crops.

Farther north, the longer season in Mato Grosso do Sul and Mato Grosso allows more

Table 2-3.—Major Destinations of Brazilian Soybean Exports, 1975176-85186"
(in 1,000 MT/percent of total in parentheses)

Destination year	Western Europe	Japan	China	U.S.S.R	Mexico	Iraq	Others[b]	Total
1975	2,727	44	32	438	(0)	—		3,333
	(81.8)			(131)		(0)	(2\;	
1976	1,966	125		1,162	122	10	229	3,639
	(54.0)	(3.4)	(0.7)	(31.9)	(3.4)	(0.3)	(6.3)	
1977	1,551		309	552		24		2,587
	(60.0)	(2.3)	(11.9)	(21.3)	(2.7)	(0.9)	(0.8)	
1978	565					40		659
	(85.8)	(0.3)	(2.9)	(4.9)	(0)	(6.1)	(6.5)	
1979	506					24		638
	(79.3)	(0.2)	(2.7)	(7.1)	(0)	(3.8)	(7.1)	
1980	1,332		—	118		—		1,549
	(86.0)	(5.6)	(0)	(7.6)	(2.7)	(0)	(l.1)	
1981	697		—		218	—		1,450
	(481)	(0.3)	(0)	(34.3)	(15.0)	(0)	(2.3)	
1982			—	255	178	—		501
	(9.1)	(0)	(0)	(50.9)	(35.5)	(0)	(4.4)	
1983			—	128	116	—		1,295
	(73.5)	(4.2)	(0)	(9.9)	(9.0)	(0)	(3.5)	
1984	1,169		—		347	—		1,561
	(74.9)	(0)	(0)	(0)	(22.2)	(0)	(2.9)	
1985	2,874	212	—			—	383	3,491
	y&y	(61)	(0)	(0)	(0.6)	(0)	(11.0)	
1986	,	114	NA	NA	NA	NA	83	1,198
	(83.6)	(9.5)	–	–	–	–	(6.9)	

[a]Brazilian marketing year for soybeans is April-March.
[b]Includes countries not reporting.

SOURCE: 1975-85: unpublished Brazilian tables (CACEX); 1988: USDA-FAS, *Brazil Annual Oilseeds* Report; unpublished, Feb. 27, 19S7.

double-cropping and produces wheat yields of about 3,000 kilograms per hectare under irrigation. The returns justify installation of irrigation systems for wheat. During the dry season, the land is then readied for soybeans as the rainy season starts. If the rain is delayed, the irrigation system is in place, at minimal cost to give the soybeans a good start as well. For these reasons, the northern expanding areas have a potential for increasing average yields and total production in Brazil.

Erosion is a problem in these recently cleared lands, however, although considerable efforts are being made to control it. Erosion is more serious than in Rio Grande do Sul, where few efforts are being made on the small farms to control erosion. Government policies and educational programs are oriented toward increased terracing and crop rotations as a means of reducing erosion and maintaining longer term productivity.

Yields have also increased as varieties improved. As an example, 20 years ago farmers were fortunate to obtain 65 bags from 2.4 hectares. They are now harvesting 100 bags from the same area. The oil and protein content have declined as yields increased. Average oil content 20 years ago was 20.5 percent; now it is closer to 18.5 percent. No attention is paid to these quality characteristics in the selection of seed. Yield is the primary concern and in many cases the only criterion.

Production and Marketing Technology

The technology of production and cultural practices in Brazil are quite parallel to those of the United States. The same types and brands of combines, tractors, and cultivators are seen in Brazilian soybean fields as in the U.S. Midwest. The transfer of technology by private firms from the United States is rapid and ef-

Photo credit OTA Brazil Study **Team**

Erosion can be a problem in recently cleared lands. Terracing and crop rotations are used to reduce erosion as seen here in the province of Paraná

fective. Farmers appear to know as much about production practices as U.S. farmers do. Farm sizes and production costs and efficiency vary widely. Estimates of production costs for Brazil are difficult to generalize because of the diversity of farm sizes and types. Much of the soybean production is found in specialized cropping areas, and beans do not appear to be grown in any systematic rotation in the state of Paraná.

Brazilian technology of handling, drying, and storage is generally similar to that of the United States, with some exceptions. Little on-farm storage exists, requiring that nearly all soybeans be delivered into the market channel at harvest and that the market channel have sufficient storage capacity. With large crops of corn and soybeans in the same year, pressure on stor-

Photo credit: OTA Brazil Study Team

Cultural practices and production technology are very similar to those of the United States. Here a Brazilian farmer uses a self-propelled combine to harvest his soybeans.

age capacities may force exports of raw grain even though grain may be re-imported later in the season. The lack of on-farm drying and storage have an important influence on marketing and pricing strategies (discussed later in this section). Most of the storage capacity for soybeans at country elevators and processing plants is provided by large, flat buildings of metal, block, or concrete and/or steel bins. The vertical concrete silos with multiple bins so common in the United States are less frequent.

Much of the harvest arrives at 14 to 18 percent moisture levels, requiring drying, usually to 13 percent. Grain dryers are very common at every country elevator and processing plant. Nearly all are fired with wood, and some larger firms have integrated the production and processing of wood and fuel for their dryers. The cost of handling and the labor involved in fueling grain dryers with logs seems large but, given the relative cost of wood and fossil fuels, wood is obviously an economically viable alternative.

Grain handling equipment, dump pits, legs, and belts are all similar to those in U.S. elevators and processors. Truck hoists are seen less frequently and are limited to larger facilities. At smaller elevators, the large straight trucks are often unloaded by hand without benefit of hoists.

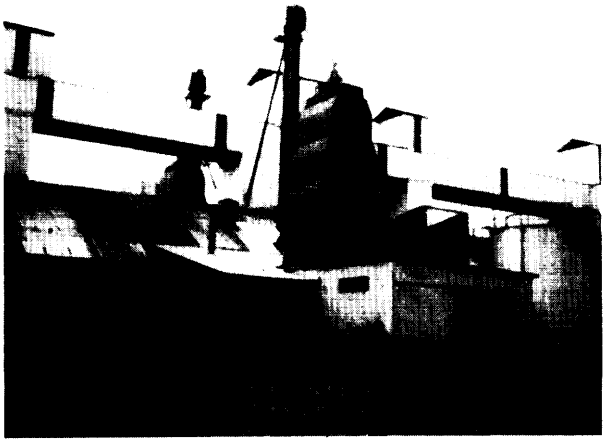


Photo credit: OTA Brazil Study Team

Grain dryers are used at every country elevator and soybean processing plant. Brazil uses wood in fueling the dryers instead of fossil fuel.

Flat storage facilities vary in design, but several seen by the study team had belt or chain conveyors below the floor and tractors were used to move grain to the conveyor after bin levels dropped below the gravity feed. Metal bins and some of the small concrete block silos are equipped with augers. Portable augers are also in evidence. Cleaners are nearly always available for inbound grain, but seldom needed on outbound. Cleaning outbound grain even from flat storage is reportedly seldom needed to meet the l-percent limit on foreign material.

Transportation in Brazil from farm to market to export point is primarily by truck. Although rail is available, it appears to be relatively inefficient and does not account for much of the long haul from Mato Grosso do Sul and Mato Grosso, where railroads have not been built or do not connect the important production and consumption points. For example, beans from Mato Grosso maybe transported over 1,500 miles to the port at Paranagua. As rail facilities are not available for this, the highways are heavily stressed with large trucks making long hauls to the port and the processing plants in the major processing regions of the country. The location of the ports and the export-directed flow of the raw and processed products require large quantities of transportation services. Congestion in truck deliveries is evident, with waiting lines at country elevators, processing plants, and port elevators.

Photo credit: OTA Brazil Study Team

Transportation from farm to export facilities is primarily by truck. Soybeans maybe transported over 1,500 miles from farm to port. Heavy congestion at port facilities is common.

Technology at port facilities is also modern in most instances, with high-speed belts and legs. In general, relatively few bins are available for separate storage, even at the port. Flat storage and large silos are common, providing less opportunity for blending diverse lots segregated into separate bins according to quality.

Marketing Channels and Practices

Nearly all beans are delivered direct from the farm to the first handler at harvest time. Most go through a country elevator, but many go directly to a processing plant. A high proportion of these beans must be artificially dried, and farmers have neither drying nor storage facilities on farms. All the conditioning is therefore conducted at the first handler, i.e., the country elevator or the processing plant. Soybeans are also delivered direct to processors, where they are put into storage in the condition desired for processing.

Since up to 95 percent of annual production goes into Brazilian soybean processing plants, the market channel is directed toward supplying these plants with their monthly crush requirements. Many of the older and smaller plants are unable to maintain this flow through the market channel and operate only during a relatively short season as a result. Those with adequate storage or access to country elevator storage are able to generate 80 to 85 percent of their rated capacity. The strategy is to fill storage space as rapidly as possible at harvest time and then to feed this into the crushing plant at a uniform rate.

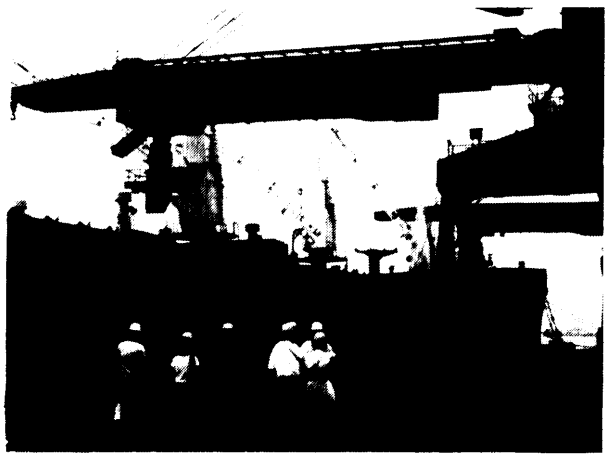


Photo credit: OTA Brazil Study Team

Modern technology at port facilities with high-speed belts and legs for shiploading is common. Here a ship is being readied for loading at Paranagua, Brazil.

Soybean exports are more seasonal in Brazil than in the United States, and the harvest time surplus moves into the export channel. Bean exports are therefore concentrated in a relatively short season, with over 75 percent moving into world markets between April and August and over 90 percent by the September following spring harvest. In contrast, cumulative exports from the United States follow a uniform monthly pattern, with an almost constant percentage exported each month (figure 2-5).

Most deliveries from Brazilian producing areas to the port are transported by trucks. The highway system is severely taxed during the harvest period, with long hauls to ports as well as processors. Most of the newly developing production areas in the north do not have crushing facilities, and even domestic destinations may require truck transport of over 1,000 miles.

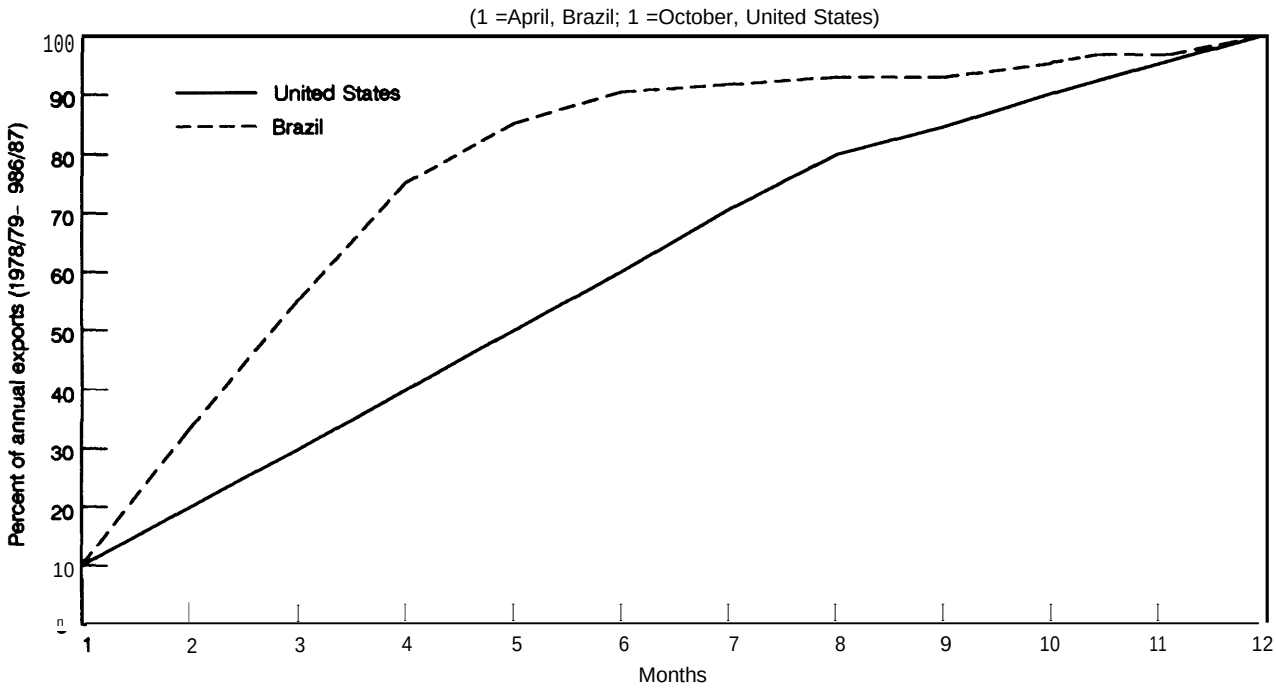
The meal market is oriented toward export, with 73 percent of 1986 production of meal going out of the country. This emphasis controls not only crushing rates and margins but transportation and facilities as well.

In general, local cooperatives think of themselves as brokers for the farmers. Although they may technically take title to the grain, they do not consider themselves merchandisers. This is a technical issue. When they sell back to back (i.e., a sale offsets a purchase), they consider it as a brokerage activity. Income is derived primarily from discounts and drying charges, commissions, storage income, and charges for related services. Limited blending was reported by several country elevators, but blending was clearly not a major source of income for grain handlers.

Organization of the Industry

The processing and exporting firms are a mixture of cooperatives, independent private firms, and multinationals. All the major multinational

FIgure 2-5. Cumulative Raw Soybean Export Shares



SOURCE: Office of Technology Assessment, 1989

grain companies are involved in some phase of assembly, processing, and marketing grain. A large share of the processing and local assembly is done by cooperatives, several of which are organized into regional and national entities providing coordination from input supplies to final products in many agriculturally related products.

ABIOVE, the Trade Association of Oil Processors, reported just over 80 active soybean processors in 1987. The Trade Association is relatively young, having been in operation only about 5 years. However, it appears to be quite active in lobbying and influencing political decisions as well as in servicing trade-related problems.

Brazil's crushing industry was characterized by many small-scale plants in the late 1960s and early 1970s. But expansion of crush capacity in the late 1970s and early 1980s created an industry dominated by large (1,200 to 2,000 MT per day) modern plants. The facilities are concentrated in the states of Paraná and Rio Grande do Sul. New soybean acreage in Mato Grosso do Sul and Mato Grosso thus places additional stress on the transportation system for moving soybeans to processors or to ports. Processing technology in the newer plants is identical to that in the United States, relying on the solvent extraction process, Many plants are integrated into production of final products packaged for retail at the same plant location as the receiving truck dump for raw soybeans.

Marketing Practices and Pricing Strategies of Producers

As noted, the lack of farm storage results in virtually all soybeans being delivered directly from the field to elevators or processing plants. In some cases, they may be delivered direct from farm to the port, but the majority of the soybeans delivered to ports are sold through a local cooperative or private elevator and delivered in the elevator's name. Some beans are sold direct in the farmer's name, but this would be true only for larger farms.

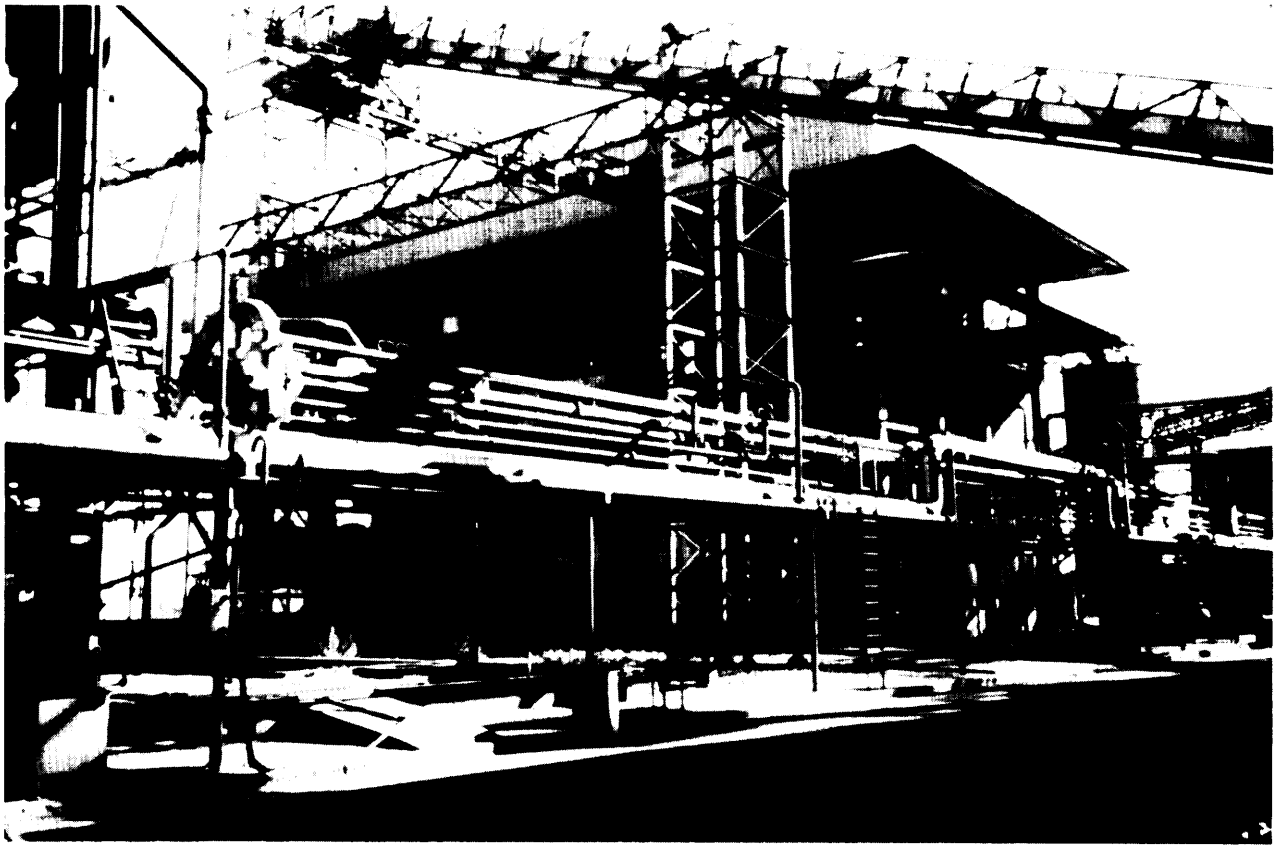


Photo credit: OTA Brazil Study Team

Soybean processing is dominated by large modern plants. Processing technology using the solvent extraction process is identical to that in the United States.

Several merchandising opportunities are open to the farmer, although not as many as in the United States. Cooperatives provide management advice and pricing information. In general, producers have five marketing options available:

1. They may sell at the spot or current bid price and receive payment immediately (usually within 48 hours).
2. "A-Fix-A" and similar programs with different names are a form of the "delayed price" concept used in the United States. Under this, the farmer receives an advance (the amount varied from 40 to 70 percent of the value among those seen by the study team) on which interest is paid until, at a day of the farmer's choosing, the soybeans are priced at the elevator. The farmer has from 6 to 12 months in which to price. Different buyers set different time limits, and most agree that the limit is negotiable. Some buyers indicate that they would negotiate across crop years, although sellers seldom want to delay pricing that long. This A-Fix-A grain is sometimes bid lower than the posted bid at the time of pricing, to compensate for storage costs. Most elevators do not have a specific charge for "price later" or "delayed price" contracts.
3. Farmers may sell on a deferred price agreed upon at the time of delivery, with payment to be made at the deferred date. For example, the soybeans might be delivered in April with price set according to a July price, with payment made in July.

4. Farmers may store the grain at an agreed-upon storage cost at the country elevator and sell at their option at a later time.
5. Farmers may sell to the Government at the established minimum price, with delivery to a country elevator or a public warehouse. Payment is made at time of delivery.

Of the five alternatives, the A-Fix-A concept is most extensively used. Some elevators and processors report as much as 80 to 85 percent of their receipts are purchased on A-Fix-A. The Government minimum price was not effective in most of the state of Paraná when the study team visited because the market price in general was above the minimum, or at least the realized market price was above the realized minimum price offered by the Government. In areas more remote from the processing plants and export ports, the Government minimum price—identical throughout Brazil—is much more attractive because of transportation costs.

Marketing strategies are heavily influenced by the economic situation in Brazil and by the personal financial picture of the individual farmer. In most cases an immediate sale is necessary, or at least an advance against the A-Fix-A, in order to pay off operating loans. Inflation and high interest rates have put farmers in a financial squeeze; with low prices, they have no choice but to obtain early payment for the soybeans in order to repay loans and credit extended by the marketing firms or banks.

At the country elevator, hedging is virtually nonexistent. Several people interviewed by the study team reported that the practice was illegal; others said that Government regulations made it extremely difficult; still others stated that hedging was illegal except for that portion of the grain that would eventually be exported. Regardless of the degree of Government control over hedging or the legality, almost no merchandisers or processors hedge their purchases of beans. They almost universally agree that no long position would be allowed on the Chicago Board of Trade, primarily because of the Government's need to control currency movement between the United States and Brazil. Hedging is not important to most elevators because they either sell immediately after purchase, back to back, or they act as brokers. Thus, their risk is minimized in terms of future price changes. The rapid inflation rate also minimizes the danger of losses through purchases of grain, since prices rise almost continuously over time.

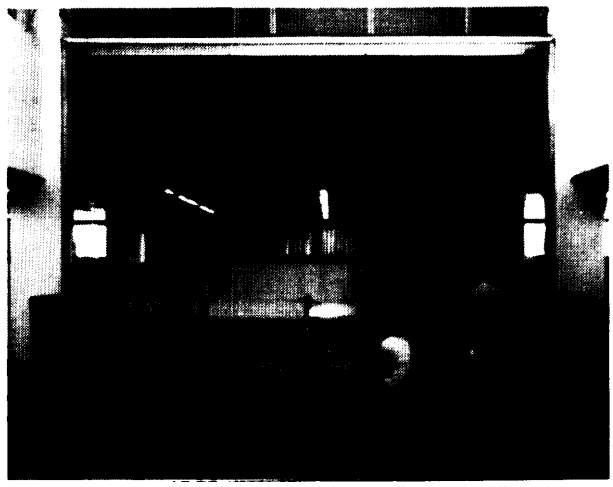


Photo ***credIt: OTA Brazil Study Team***

Cooperatives provide management advice and pricing information. COAMO, one of Brazil's largest cooperatives, uses sophisticated marketing procedures and provides individual booths where farmers can confer with their merchandisers.

Prices for soybeans at the port or in the central merchandising offices in Sao Paulo are generally expressed in U.S. dollars, and are quoted in terms of cents over or under the Chicago Board of Trade. In the country, the price is derived by backing off costs of f.o.b., freight, estimated shrinkage, brokerage, and taxes, and is quoted to the local farmer in Brazilian cruzados. The value of soybeans in Brazil is determined by export values, processor needs, marketing costs, and the influence of Government minimum prices for raw beans as well as for oil at the retail level.

Government Policies

Several Government policies have a director indirect effect upon the quality of soybeans in the domestic and export market. The Government minimum price is administered by the

Commissao de Financiamento da Producao (CFP) and announced prior to planting in order to encourage production of the major crops. It is adjusted during the year to account for inflation and in response to political pressures. This is in contrast to U.S. policy administered by the Agricultural Stabilization and Conservation Service, where price is fixed prior to harvest and remains unchanged. Officials in Brasilia indicated some problems with their adjustment policy, primarily political pressure to change prices beyond the automatic inflation adjustment. The Government is also involved in setting maximum prices for vegetable oil in order to maintain internal supplies at reasonable prices for consumers.

If the farmer chooses to sell to this buyer, the Government takes title, pays the farmer through the elevator, and in 4 to 6 months auctions off the inventory by closed bid at the various locations where grain is stored. Storage must be in Government-approved warehouses, with payment to the elevator according to the inventory it holds. The Government disposes of all of the grain it owns through the public auction route, so that it does not carry inventory across crop years.

Corn and soybeans eligible for price support and storage require guarantees of quality as they go into storage as well as periodically during storage. There is no Federal agency with inspection capability. The Brazilian Warehouse Act (Law 1102, Nov. 11, 1903) transferred the authority for inspecting storage warehouses to the individual state governments. Only CFP and its financial agents inspect warehoused grain. The Bank of Brazil is conscientious in this inspection since the grain is pledged to them as collateral for loans to CFP.

Imposto Sobre Circulacao de Mercadoria (ICM) is the major tax influence on Brazilian soybean exports. The literal translation is “tax on circulation of merchandise. ” This is a value--added tax and is organized so that it is a percentage of the increase in value between the purchase of a product and its sale. Most inputs such as fertilizers and herbicides do not have a tax.

Grain and grain products are almost always taxed, but these taxes differ between locations. For example, crushers who buy soybeans in Sao Paulo pay the ICM tax immediately. If they sell inside the state, they must pay a 15-percent tax; if they buy in one state and receive in another, they only pay 12 percent. If the soybeans are moved to the second state for crushing and the meal is sold there, crushers pay the difference between 15 and 12. If the meal is exported, then the tax rate changes again. Cooperatives do not pay the tax when they receive and sell soybeans because they are considered to be the farmer’s agents and not actually merchandising.

The tax is organized and regulated at the national level, but funds go to the individual states. Sometimes this is reallocated down to the county, but never into the national coffers. States must all adhere to the national percentage although there is still some flexibility in administration. For example, some states allow payment of the tax to be delayed as much as 30 to 90 days, thus providing benefits to firms that wait for devaluation of currency as well as receiving interest on the unpaid tax. This is consistent with circulations demonstrated by the large cooperative, COAMO, where the manager included interest on the ICM tax as part of his income in determining margins and payments to producers.

Soybean export restrictions were first imposed in 1973, giving domestic crushers first access to the soybean crop while improving crush margins by lowering the domestic soybean price. The ICM tax was levied on exports of soybeans and products as well. Export restrictions have now been lifted and the Government currently requires only that sales be licensed.

Taxes on raw beans, meal, and oil have been adjusted in recent years to equalize the relative profitability among raw beans and the two major products. The ICM tax is 11.1 percent on meal, 8.0 percent on oil, and 13.0 percent on raw beans. The tax on raw beans is assessed against the f.o.b. price minus freight costs. Meal and oil are taxed at wholesale values, including assembly and processing costs of raw beans

used by the processor. Processors and exporters are convinced that under present price relationships, taxes provide equal penalty for all forms of soybean exports.

A Government agency known as CACEX has responsibility for export licenses, quotas, and credit. CACEX is an independent, political agency within the Bank of Brazil, with a director appointed by the Minister of Finance or, in some cases, by the President. It is therefore a very high-level Government agency with power to control imports and exports within the import and export bank of Brazil, Grain is one of many products it handles.

Another organization with a broad range of influence in Brazilian exports and grading standards is Conselho Nacional do Comercio Exterior (CONCEX). This is not a Government agency but an association of private traders and Government agencies. It is a board of exporters acting in an advisory capacity. The resolutions it passes establishing grades for corn and soybeans are a resolution of that board, not official Government policy. It has considerable power as an advisory group to CACEX, but does not carry governmental authority within its own organization.

In addition, the Ministry of Agriculture has established a separate set of standards for corn and soybeans for domestic trade. The direct translation of the opening sentence is "By the powers I have under law — I approve the following specifications for the marketing of soybeans and grains. " These then carry the weight of Government as official grades for domestic transactions, but apparently are not enforced within commercial channels.

The Federal Government has no direct role in inspecting or analyzing grain quality. State agencies evidently have responsibility for inspection of products crossing state lines, but implementation on grain is sporadic at best. CLASPAR, from the State of Paraná, is an example of these agencies. The CLASPAR inspection brochure states that grades have been developed in cooperation with the Minister of Agriculture. These are official documents but they do not follow the national or CONCEX grades, and enforcement in commercial channels seems to be optional.

QUALITY CONTROL IN BRAZIL

No objective data are available to verify quality differences in soybeans from the United States and Brazil. Limited data from foreign processors have indicated that Brazilian beans have a higher oil and protein content, less foreign material, and lower moisture; but they also have lower test weight and problems with oil quality due to the presence of red dust. Data of the Japan soybean processing association provide the only known historical series. The 14-year average oil content for beans from Brazil was 20.13 compared with the U.S. average of 19.17 percent. The quality of Brazilian beans also exceeds that of the United States on the factors of splits and foreign material. U.S. quality exceeded that of Brazil on the factors of test weight, protein content, free fatty acid, and damaged kernels.

However, these averages conceal considerable year-to-year variability and provide no information on the differences among vessels within any given year. These data do not provide conclusive evidence of quality. For example, no information is given with which to judge the reliability of sampling methods. It is not clear whether analysis was made on an "as-received" basis or on clean beans at zero moisture. Without data from individual samples, statistical tests cannot be conducted for the significance of the differences.

A recent study conducted by the U.S. Department of Agriculture (USDA) and the American Soybean Association provides a more controlled experiment. The results of analysis of samples collected during a 1-year period from

European ports were mixed on the relative value of U.S. and Brazilian soybeans. The abstract concluded:

> In general, soybeans from Latin American countries showed higher oil and lower protein content than U.S. soybeans. Argentine soybeans showed high levels of split beans. Soybeans received from Brazil were uniformly graded as Sample Grade due to the presence of 4.0 percent red dust in the samples.

The number of samples per vessel was small and the study did not report statistical reliability of the estimates. The problem of nonuniformity and segregation in the vessel was not addressed in either set of data. If segregation problems and variability during loading are less in Brazilian shipments than in U.S. ones (quite likely, given inbound quality controls), sampling at destination is especially important to obtain statistically sound comparisons.

These surveys indicate that Brazil soybeans contain less foreign material and moisture than U.S. beans. It would appear that oil content is higher in Brazil beans, but it must be recognized that oil and protein values vary widely in Brazil (as well as in the United States) depending on region of the country and crop year. Estimates of average oil content in Brazil ranged from 18.5 to 19.5 percent, with the state of Rio Grande do Sul having 18.5 and with oil levels increasing in northern regions.

Two weeks of interviews with Brazilian farmers, grain handlers, and Government agencies plus personal observations throughout the market channel demonstrated that differences in practices and policies undoubtedly result in fewer quality problems related to foreign material and storage molds in Brazilian beans than in U.S. beans. A review of quality-related handling practices and incentives provides a basis for evaluation.

Grades and Grading

The Ministry of Agriculture has the legal authority to establish grades. CONCEX, the industry/government trade association, provides a system of grades and standards for soybeans that is identified as Resolution No. 82. This resolution identifies four grades, but these are not the basis for the export contract. The CONCEX export grades are shown in table 2-4. Regarding split or damaged seed coat beans being specified for grade 1 only, it was explained that grade 1 is primarily for seed beans, and that damaged seed coat is not important for beans for processing but only for use as seed, In addition, green-colored beans are limited to 1, 2, 5, and 10 percent, respectively, for grades 1 through 4.

CONCEX standards define each of the grade factors as follows:

> ***Foreign material and impurities*** are defined as all material passing through a 3 millimeter sieve (7.5/64 inches). All material other than soybeans remaining on top of the sieve, including all seed coats that have separated from the bean, are also considered foreign material and impurities.
>
> ***Brokens/splits*** are defined as all splits and pieces of kernels handpicked from the sample remaining on the 3-millimeter sieve.
>
> ***Damaged kernels*** are kernels and pieces of kernels that are not almost perfect in color and shape.

Table 2-4.—Brazil Grades for Soybeans (percent)

Grade	Moisture	Splits	Damage	Foreign material and impurities	Pericarp damage[b]
No. 1	14	10.0	2.0	1.0	15
No. 2	14	20.0	4.0	1.5	—
No. 3	14	30.0	6.0	3.0	—
No. 4	14	40.0	8.00/0 with 5°/0 H D	5.0	—

[a] Includes seed coat broken loose frOm the kernel.
[b] Included only for No, 1 beans as a measure of quality for beans to be sold for seed.

SOURCE: CONCEX Resolucao No. 82 (export grades) June 5, 1973, Rio de Janeiro, P.VI, Article XV.

Nearly all soybeans are exported under the Association Nacional Dos Exportadores de Cereais (ANEC) Contract No. 41, which is a combination of the four grades established by CONCEX. The quality specifications of ANEC are referred to as Brazilian Export Quality Soybeans. This contract specifies maximum moisture of 14 percent; foreign material at 1 percent, with discounts allowable up to 2; damaged beans maximum of 8 percent, of which 5 percent maximum may be heat-damaged. Broken beans have a maximum allowance of 30 percent. A blank is left on the contract for entering oil content, but it is not part of the language automatically.

It is interesting to note that ANEC quality specifications used in export trade do not match those of any one CONCEX grade. For example, allowable foreign material is the same as CONCEX No. 1 grade, but broken beans is equivalent to the No. 3 limit, while damage uses the limit established by CONCEX for grade No. 4. Despite the fact that most Brazilian beans move into the domestic processing market (in 1986 only 8 percent of total usage was exported as raw beans), the quality factors used throughout the domestic market are those identified in the ANEC export contract. The limits on which country elevators based discounts for foreign material, damaged beans, and broken beans were often those limits established in the ANEC contract, not those of the Ministry of Agriculture or CONCEX. The primary deviation from the contract was by processors and/or elevators that specified 13-percent moisture (instead of 14 percent) as the maximum, based on their experience with storability.

The domestic standards, established by the Ministry of Agriculture for the domestic market, contain only one grade. This grade follows the ANEC contract with the exception of the factor Esverdeados (green-colored beans), in which case it is equivalent to the CONCEX No. 4 limit.

Sampling and Inspection Procedures

Grading and inspection at port elevators are conducted entirely by private inspection agencies. No Federal inspection agency has responsibility for grading or inspection equipment. It was reported that 12 private inspection agencies were operating in Paraná including SGS, Thionville, Intertek, and PKB. The majority (some estimate as much as 95 percent) of inspections are done by the SGS International Agency for Product Inspections. The private inspection agencies led by SGS influence soybean quality throughout the market channel. Their control of outbound beans and meal generates the opportunity and requirement for them to control inbound products under their contracts with buyers and sellers.

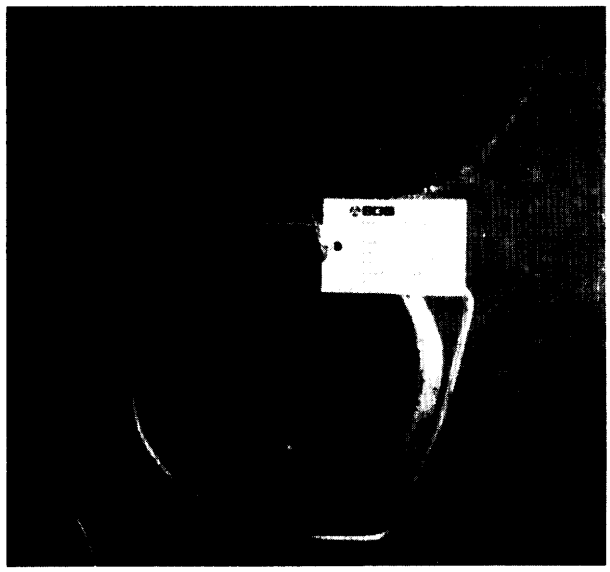


Photo credit: OTA Brazil Study Team

No Government inspection agency exists for grading and inspection of Brazilian grain. Private inspection agencies, such as SGS, provide this service.

Most of the soybean exports from the port of Paranagua moved through a pool arrangement serving as a public elevator for storage and handling. Thus the majority of soybeans coming into the port are inspected by SGS on the basis of grade factors in the ANEC contract. This is rigorously enforced. The study team was told repeatedly and emphatically that any trucks not meeting contract specifications on moisture and foreign material would not be allowed to dump. This statement was reinforced

by records from SGS identifying by name, number, and quality characteristics 15 trucks that exceeded allowable limits and were refused permission to unload. These trucks were forced to return to a nearby firm that could bring the soybeans back into grade requirements through drying or cleaning. SGS has complete authority over inbound and outbound quality at the port.

Each state has an inspection department that inspects processed and raw products. All products crossing state lines must be inspected by the originating state agency, which may also be called on to inspect public warehoused grain. CLASPAR (the agency in the State of Paraná) is apparently not highly regarded by the industry, and its reliability and accuracy were frequently disparaged by firms interviewed by the study team. The CLASPAR inspection is not used for transaction purposes, but the agency does inspect Government-warehoused grain under contract with CFP.

The purpose of the inspection requirement is not clear. Apparently grain moving across state lines is supposed to be accompanied by a weight and quality certificate, There are weight limits on the highways for trucks. For soybeans moving to the port of Paranagua, destination quality determined by SGS is the basis for payment. Origin inspection and analyses are often conducted by shippers for their quality control information, but payment is based on destination quality. This differs from the United States, where some contracts specify origin weights and grades, while others require destination weights and grades. Soybeans moving to destinations other than Paranagua do sometimes move on origin grades, depending on the firms involved and on contract specifications—not unlike U.S. processors and country elevators.

The restrictions on inbound quality at the port that are carried throughout the market channel result in the majority of the crop meeting those conditions or better when moving in the market channel at any point past the first handler. The storage is primarily at the local elevator and the beans are conditioned for safe storage at that point. Little deterioration in quality and few losses occur during the months that follow.

The question of blending at country elevators has been an important issue in discussions of U.S. quality. While some elevators in Brazil do engage in blending, it is on a very limited scale. One large cooperative with flat storage indicated to the study team that one-half of the storage was filled with 14-percent beans and the other with 12-percent beans to permit blending. The same firm cleaned the beans before and after the dryer, and screenings were disposed of or sold back to local feeders. Given the large size and small number of storage facilities and the separate bins both at the country elevator and at the export house, blending is extremely difficult. At the same time, current standards and discounts provide little incentive to blend or create physical facilities necessary for blending.

The system of pooling inbound soybeans at the port elevator without identification of owner eliminates the opportunity for the individual exporter to blend to the contract maximum. Blending (i.e., pulling from several bins simultaneously) is controlled by the operations manager of the public elevator under direct supervision and control of SGS. Any soybeans delivered will lose their identity within the pool, and the quality loaded at export depends on the quality of beans available to the public elevator operator. Since nearly all beans in storage are equal to or better than export quality, opportunity for blending is extremely limited. Export contracts are largely based on factors equivalent to a one-grade system.

Inspection procedures in the country vary widely, depending on the care and accuracy of the person doing the sampling and analysis. The study team noted frequent instances of nonrepresentative sampling methods, carelessness in handling the sample, failure to properly subdivide the sample, and a lack of clear definition of individual grade factors in the training program. Similar conditions can be found at country elevators in the United States.

Grading Equiptment

Equipment is not standardized and apparently no regular checks are made of equipment by a central authority in Brazil. The accuracy of sampling for movement between elevators is probably not a serious problem in that the low levels of foreign material and moisture and lack of large-scale blending makes grain much more uniform within trucks or sublets. Consequently, even carelessly taken samples are probably representative of the total lot, or at least sufficiently representative that it would not exceed the grade limit if reinspected.

Even sampling methods by SGS at the port elevator are less sophisticated and systematic than required in the United States. Samples of inbound trucks consist of one or two probes taken in one corner of the truck, accompanied by observation during dumping at the dump pit. Samples are taken at the port on outbound soybeans by grabbing handfuls off the belt or running a pan through a falling grain stream. These would not be considered representative samples by most statistical standards, but appear to be adequate to meet the needs and preferences of the foreign buyer.

Foreign buyers have the option on the ANEC contract of requesting their own inspector to be present. However, sampling methods are similar for all inspection agencies. The contract specifies that weights and grades are final as per seller's inspection agency.

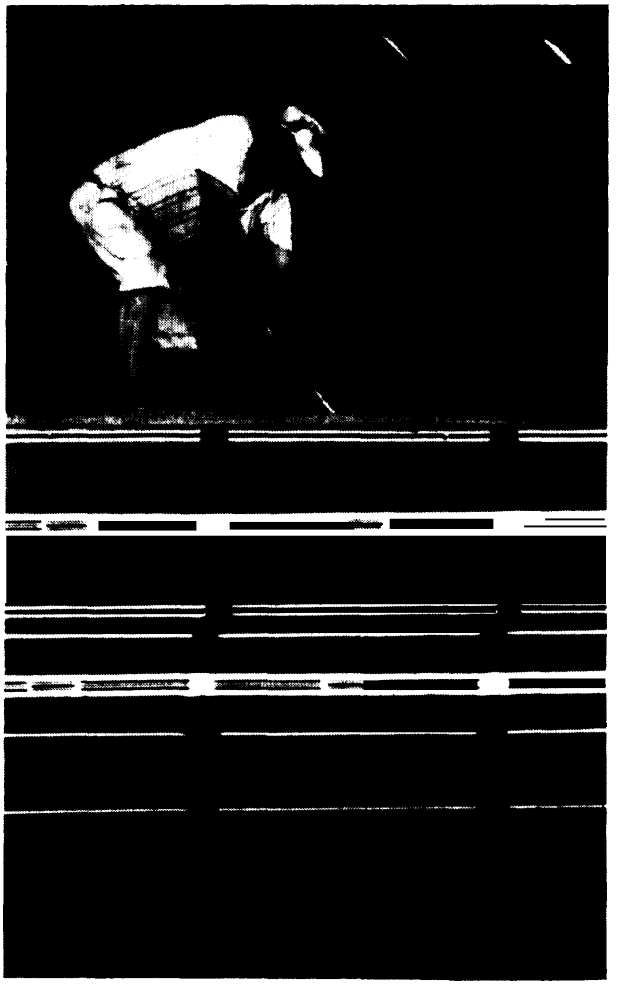


Photo credit: OTA Brazil Study Team

Sampling methods by SGS are less sophisticated and systematic than in the United States. Samples of inbound trucks, for example, consist of one or two probes in one corner of a truck.

Quality Control Through Genetics

New soybean varieties in Brazil must be approved by a commission appointed by the Minister of Agriculture. There are in fact two commissions: one for the southern part of Brazil and another for the remainder of the country. They test and approve varieties for release in each region. The commissions are composed of one representative each of the Ministry of Agriculture, EMBRAPA (the National Soybean Research Institute), the State Research Organization, the State Extension Service, and Brazilian seed producers.

The procedure for testing includes 2 years of preliminary testing inside the organization that is developing the variety, followed by 1 year of intermediate testing at five locations in Brazil. The best lines from these 5 locations are sent for final testing at ***10*** locations over a 2-year period. The commission then meets to discuss the characteristics of each variety and decide which will be released. The decision is then published in the official newspaper. The Commission reviews criteria of yield, stability, disease resistance, and agronomic characteristics. A variety will not be released unless it is equal to or better than the two varieties selected as the standard.

The two varieties for the standard are selected to represent four maturity groups. The best two

varieties in each group become the standards. One variety is selected for its highest yield, the second because it is the most popular currently being planted in the region. Oil and protein content are identified, but release of new varieties has not been restricted for lack of higher oil and protein. Brazil has the potential for controlling varieties to meet a gradually rising standard of quality with respect to oil and protein, but, in practice, this criterion is not being applied.

Evaluation of Quality in Brazil

Quality, past the farmer's deliveries, is quite uniform throughout the market channel. The ANEC contract is equivalent to a numerical grade with only one set of quality limits. Meeting these limits assures soybeans at 14-percent moisture, and less than l-percent foreign material. Blending opportunities are, therefore, limited.

A few samples of soybeans and corn collected at random from country elevators indicate the generally high quality of Brazil grain with respect to cleanliness and moisture when graded on USDA standards. Moisture was below 14 percent with one exception, test weight was above 57.6 pounds per bushel, and broken corn and foreign material below 1.0 percent with one exception. Stress cracks were high on corn dried with heat, and breakage susceptibility on the Wisconsin Breakage Tester varied from 6.3 percent (considered very good by U.S. standards) to 35.5 percent (still good for high-temperature-dried corn). These samples exhibited a high proportion of hard vitreous endosperm, indicating a harder corn with flint ancestry.

Incentives for Quality in the Brazilian System

premiums and discounts for quality differentials are controlled by the market. There are no Government-decreed price differentials, which vary among grain handlers and processing firms. Shrink factors for moisture are generally uniform, but drying charges vary among firms. In many instances, processing plants use shrink-plus-drying charges that are less than actual weight reduction due to water removal. (Shrink is the loss of weight due to removal of water. The quantity of wet grain is adjusted to that quantity remaining after drying to base moisture by subtracting "shrink." A charge is assessed to cover the cost of drying.) Managers who recognized this explained to the study team that moisture was controlled by weather so their "premium" for wet grain did not function as an incentive but only as a better price to the farmer.

The premium for delivering soybeans at higher moisture levels is offset by the necessity of safe storage and long-distance transport. The elevators do not make a concerted effort to deliver soybeans at moisture levels above the 13- to 14-percent base.

Blending to achieve contractor grade limits is not common in Brazil. Country elevators, and to some extent processors, describe themselves as handlers or merchandisers for producers. Their responsibility is to condition producers' soybeans to meet the ANEC contract conditions. Unlike U.S. firms, their income is derived from payment for services rather than from blending to generate a high-priced shipment from lower-priced receipts. Since nearly all soybeans move on the ANEC contract factor limits, the quality in the market is sufficiently uniform to provide little opportunity for blending. With a fixed base for moisture there is little incentive to blend for that factor. Foreign material from the farm is generally removed by the first handlers. In contrast, foreign material and broken beans from U.S. farms are generally stored with the beans and used for blending to grade limits. The small number of large-volume storage bins in Brazil, and the small number of grade factors relative to the United States, encourage storing and marketing all soybeans at a very uniform quality.

Strict control of inbound and outbound quality at the port by SGS eliminates the opportunity, if not the incentive, for blending inbound and outbound at the port elevator. Qualities are extremely uniform. Since identity of individual lots of grain is not maintained, there are no benefits from efforts to blend during vessel

loading. SGS refusal to allow off-grade grain to be unloaded from inbound trucks provides a strong economic incentive for country shippers to deliver soybeans with grade factors below maximum to provide a margin of safety.

The emphasis on quality was illustrated for the study team by a processor with a published schedule of premiums for soybeans below 14-percent moisture and below l-percent foreign material. His philosophy was that producers generating beans of greater value should be rewarded and this incentive would serve to encourage the better farmers to deliver higher quality beans to his plant.

FINDINGS AND CONCLUSIONS

Soybean quality in Brazil is influenced by several regulations, agencies, and marketing practices, beginning with a government/industry committee approving new soybean varieties for distribution. Quality in the context of intrinsic value is not an explicit criterion in approval of new varieties, but oil and protein content are noted in the evaluation.

The majority of soybeans are processed in Brazil by crushers whose capacity exceeds total production of beans. There is thus strong competition for available supply, delivered to processors or elevator storage at harvest. Seasonal surpluses of soybeans move into the export market. Export taxes have been adjusted to equalize the profitability of exporting soybean meal v. raw beans, but the excess crushing capacity and local demand for oil make it unlikely that Brazil will become a major exporter of raw beans.

Grading, inspection, and issuance of export certificates are conducted by private inspection agencies, following specifications in export contracts. Quality factors used throughout the industry generally follow the export contract established by the trade organization ANEC.

Almost all soybeans leave the farm at harvest, and drying and cleaning are done at the first point of receipt, at the farmer's expense. Thus most soybeans enter the market channel and storage in good condition. Strict enforcement of the export contract quality specifications inbound to the port is an additional incentive for shipping to meet or exceed quality requirements. Trucks not meeting the contract quality specifications—especially on moisture and foreign material–are not allowed to dump.

The technologies of production, harvesting, and marketing in Brazil are similar to those in the United States. A higher proportion of soybeans move to market at harvest time and are stored in larger commercial facilities than in the United States. The large flat storage facilities and simple grade standard reduces the incentive for blending.

The end result of the Brazilian system is uniform, clean, dry shipments of soybeans to market. Differences in practices and policies result in fewer quality problems (foreign material and storage molds) than in U.S. soybeans. And based on information from other studies, the oil content in Brazilian soybeans is higher.