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BRAZIL: AGRICULTURAL PRODUCTION AND TRADE PROSPECTS

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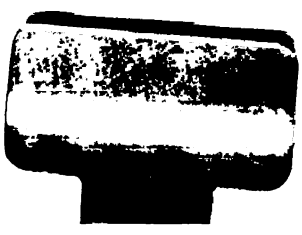

BRAZIL: AGRICULTURAL PRODUCTION AND TRADE PROSPECTS

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This paper is part of a largest hemispheric effort carried out by the Technical Management Unit of IICA, under the direction of P. Lizardo de las Casas. The purpose is to gain a fuller understanding of the nature and prospects of agricultural trade, policies and integration in the Americas to better assist in the debate among member countries.

TABLA DE CONTENIDO

INTRODUCTION

Agriculture in Brazil accounts for 14% of the country's GDP and employs 27% of its labor force. Between 1990 and 1994, agricultural GDP grew 3.75% per year, while the overall economy grew at a slower 2.3% average rate. Brazil is a global trader. However, like most countries with large domestic markets, Brazil is not a great trader (i.e., its exports in 1996 were just 7% of its GDP). The country has diversified its exports over the years, reducing its dependence on agriculture from 60% of total exports in the 1950s to 25% in the 1990s.

Brazil's total agricultural exports of $14.3 billion in 1995, contributed to an agricultural trade surplus of $8.0 billion. Looking at percentage averages of Brazil's total agricultural exports and imports for the three-year periods 1981-83 and 1993-95, it becomes apparent that even though Brazil remains a net exporter of agricultural goods, the growth in agricultural imports (172%) for that period overshadows the growth in exports (27%). This trend is expected to continue as long as the Brazilian currency "the real" remains overvalued and Brazilian exporting companies are unwilling to adopt more aggressive promotion of their exports to penetrate markets where other countries, with less comparative advantage, are already succeeding.

An anti-export bias plagued Brazilian agriculture for decades preventing domestic producers from taking full advantage of trade liberalization. Burdensome taxes on domestic production, protective tariffs for inputs, lack of transparency in prices and market signals, overvaluation of the exchange rates, some of the highest interest rates in the world and export taxation have played roles in deterring producers from pursuing export markets aggressively. This year the government is removing many of these obstacles and the extra costs that result from inefficient state-owned infrastructure (collectively referred to as the "Brazil cost") by privatizing Santos (South America's biggest port), eliminating some value-added taxes on exports and offering cheap loans to exporters (The Economist, May 17,1997).

In the last few years, as part of a larger tariff reform, the average tariffs on agricultural and processed products have been reduced from 62% to 12% (Brandão, Lopes and Lopes, 1997).

Since implementation of the "Real Plan," in mid-1994, the Brazilian economy has experienced its lowest inflation rate in the last 39 years (around 9.5%) and the new currency "the Real" has been remarkably stable. Consumers' purchasing power has increased by 30%, especially for lower income households - a large proportion of the country's 160 million people. This has provided greater opportunities for imports of agricultural and food products.

Brazilian agriculture. About 60% of Brazilian farmers obtain loans through government programs or private banks. Without these loans, farmers are not able to plant. Farmers with huge debts were caught in the middle of this transition phase to low inflation, high interest rates on outstanding loans and reduced government subsidized credit. Loans per farm producing wheat, corn, and rice were reduced first from $268,000 to $156,250 for large producers and $31,250 for small producers, and since 1997 the loans have been reduced further to $30,000 and only small producers qualify for these loans.

In January 1995, Brazil implemented the 1991 Treaty of Asuncion to become a founding member of MERCOSUR (along with Argentina, Paraguay and Uruguay) and started enacting Common External Tariffs (CET). At present MERCOSUR has extended the CET only to approximately 85% of tariff items but intends to establish a true customs union in 2006. With the opening of the Brazilian market under MERCOSUR import demand has increased and is leading to a trade deficit. Total imports in 1996 rose 7.3 percent to $53.2 billion (International Trade Reporter, January 29, 1997).

The paper is organized as follows: Section II presents trade patterns of the most important agricultural commodities for the last 15 years. Section III discusses the impact of changes in agricultural policies, and investment in infrastructure on agricultural production. Section IV discusses production and trade prospects for a number of agricultural commodities. Section V discusses several determinants of rural poverty and how it is linked with agrarian reform and land settlement in Brazil. Section VI summarizes the paper and it gives some policy recommendations.

TRADE PATTERNS OF FOOD AND AGRICULTURAL COMMODITIES

This section discusses the change in trade patterns for the last 15 years between Brazil and its trade partners. The UN bilateral trade data are used for exports and imports (the data are in U.S. dollar value-Economic Research Service, USDA). They consist of: total agricultural commodities (according to the USDA definition), which in turn are divided into the following seven categories: (1) bulk commodities, (2) horticultural commodities, (3) intermediates, (4) consumer-oriented processed, (5) food and beverages (non-alcoholic), (6) agricultural inputs, and (7) other agriculture. These can be further divided into ninety separate commodities.

The fastest growing category of imported agricultural goods was consumer-oriented processed foods (975%), followed by intermediate agricultural goods (225%), food and beverages (40%), horticultural products (26%), bulk commodities (26%) and agricultural inputs (19%). With respect to Brazilian agricultural exports, the fastest growth was recorded by horticultural products (82%), followed by consumer-oriented processed foods (67%), food and beverages (30%), agricultural inputs (23%), bulk commodities (23%) and intermediate agricultural products (7%).

In 1995, Brazil exported $14.3 billion worth of agricultural goods to the world, of which $6.3 billion were shipped to the European Union, $2.9 billion to Asia (with more than 70% of the exports going to East Asian countries, especially Japan) and $2.2 billion to the Western Hemisphere (WH) countries. Within the WH, NAFTA countries accounted for 66% of Brazilian agricultural exports, followed by the other three MERCOSUR countries with 25%, the Andean countries with 3% and the rest of the Latin American countries accounting for 5%.

During 1995, Brazil imported $6.3 billion of agricultural goods, $4.0 billion of which came from the Western Hemisphere, $1.1 billion came from the European Union, and $380 million were received from Asia. With respect to Brazil's agricultural imports from WH countries, MERCOSUR countries accounted for 66% of WH exports to Brazil and NAFTA supplied another 24% and the Andean countries accounted for less than 2%.

RECENT AGRICULTURAL PRODUCTION PERFORMANCE

Crops Sector

Corn

Corn is considered a farm commodity of national importance for Brazil. During the 1995/1997 period, the average annual growth of Brazilian corn production was 4.72%, and yields increased by 5.33% due to the adoption of hybrid varieties developed by the Brazilian seed industry. The simultaneous developments of the mixed feed and poultry industries have driven the modernization and expansion of corn production in Brazil. During the same period consumption of corn grew slightly faster than production. Brazilian corn producers, like those of soybeans, are becoming more dependent on the market and less so on government support.

Rice

Since rice is an important component of the Brazilian diet, the government over the years has utilized several price control mechanisms to avoid increases in the cost of living. Current prices and imports are subject to the market. The MERCOSUR Common External Tariff (CET) for rice is 10%. Half of the rice is produced in irrigated fields mainly in the state of Rio Grande do Sul. Non-irrigated rice is produced throughout Brazil with the heaviest concentration in the Center-Western states. Yields of irrigated rice are between five and six metric tons per hectare, approximately twice those of non-irrigated rice. Transportation and storage systems in the areas where non-irrigated rice is grown are deficient. Area planted to rice, declining steadily since 1979, in 1995 fell to the same level as in 1977. The increase in the yields from 1.6 metric tons per hectare to 2.5 metric tons can be explained by the expansion of irrigated rice in the southern part of Brazil. The government has been carrying stocks of more than 1.5 million metric tons during the 1990s.

Brazil might become the world's biggest rice importer in 1997. The country is projected to produce 9.7 million tons and to consume 11.0 million tons. Normally Brazil imports rice from MERCOSUR countries, mainly Uruguay and Argentina. However, starting this year Brazil is likely to import rice from third countries as well, especially those in Asia (Table 15).

Wheat

Wheat is not ideally fitted to the ecological conditions in Brazil, and production, especially combating pests and diseases, is very demanding. Wheat is an off-season (winter) crop which conflicts to varying degrees depending on the location with the labor, land, machinery and other inputs used to produce soybeans, the main season crop. Although soybean-wheat double cropping provides the pattern of year round production in most wheat areas, the timing of these two crops is not perfectly complementary. It has been observed that soybean yields are reduced about 15%, on average, because of the delay in spring planting while awaiting the wheat harvest. In the states of Parana, São Paulo and Mato Grosso, the overlap period is in the fall when the soybean harvest delays planting of wheat. Research has increased wheat productivity from 1 metric ton per hectare in the 1970s to almost to 2 metric tons in the mid 1990s, but these yields are still low.

Production Policy: In the mid-1990s the marketing board for wheat was eliminated, the government monopoly was ended, and wheat was transferred to the minimum price program (EGF). In October 1996, the Brazilian Government established the "Premium for Discarding Product" (PEP), also called the "Subsidy Auctions," to guarantee a minimum price to producers. If the domestic market price falls below the government set minimum price, the Brazilian government will pay participating wheat producers the price difference between the market price and the R$157/metric ton minimum price through official auctions. The CET for wheat is 10%.

In recent years the land planted to wheat has declined as farmers have chosen to plant soybeans alone and to avoid the risks and the penalties when double-cropping with wheat. (Table 15).

Soybeans

Soybeans constitute a success story for Brazilian agriculture. From 1966 to 1977, the area planted to soybeans grew at an average annual rate of 27%, making soybeans the second largest crop in Brazil in terms of land use. Over the same period, yields per hectare grew at a remarkable annual rate. Soybeans first were planted in the southern states of Parana, São Paulo, Rio Grande do Sul, and Santa Catarina. More recently, soybean planting has been spreading into the Center-West highlands (Campos do Cerrado). Now they are moving toward the North and into new agricultural frontiers. Soybeans are cultivated primarily on medium and large farms with 62% of total output produced on farms of 20 to 500 hectares. Brazil accounts for about one-half of global trade in soybean meal and one-third of global trade in soybean oil.

Production Policy: Soybeans are included in the Brazilian government's guaranteed minimum agricultural price program. Official credit available is maintained at R$30,000 and the interest rate applicable to official loans is 12%. An important means of financing the 1996/97 summer soybean crop was through forward sales. This practice is called "green soya" ("soja verde") and is based on arrangements between growers and input suppliers, crushers, and traders. A source of quasi-official financing for soybean growers is the Rural Product Note ("Cedula do Produto Rural" - CPR). Farmers can use the CPR to obtain financing for planting by issuing a type of promissory note against the delivery of their crop (the official Bank of Brazil acts as a guarantor). Soybean growers can also gain financing via banks which have borrowed money through Resolution 2148 ("63 rural" or "caipira") offering loans with interest rates below those of the domestic market.

Trade Policy: The MERCOSUR CET for the soybean complex varies among the different products: soybeans, 8%; soybean meal, 6%; and soybean oil, 10% if crude and 12% if refined. The value-added tax *Imposto sobre Circulao de Mercadorias e Servicos* (ICMS), which state governments had been assessing on exports of soybeans and soybean products, was eliminated recently (Law 95). In August 1996, the Brazilian federal government, in order to boost exports, reached an agreement with Brazil's state governments to eliminate in 1997 the ICMS tax on exports of semi-manufactured and raw material agricultural products. This means that soybeans, soybean meal, and soyoil are no longer taxed when they are exported. However, the ICMS tax continues to be assessed on interstate purchases. This law is an important step toward eliminating the anti-export bias against agricultural commodities. This change has energized soybean exports, up 60% in the first year, and has increased returns to growers. However, this change in export taxes also eliminated the advantage soybean crushers, who export meal and oil, had previously enjoyed (i.e., exports of soybeans had been assessed an ICMS tax of 13%, while those of soybean meal and oil had been assessed ICMS taxes of 11% and 8.5%, respectively).

Infrastructure: It is expected that recent substantial investments in railways, roads, and waterways in the central-west states -- the cerrados area-- will expand soybean production such that by the year 2010 the central-west states will have replaced the southern states as the major region for producing soybeans. Overall land devoted to produce soybeans will increase (Table 15).

Sugar

Brazil is the largest sugarcane producer in the world, producing around 230 millions tons annually. One third of this sugarcane production is used to produce sugar. The other two thirds are used to produce ethanol as part of a fuel alcohol program. Brazil produces approximately 12.5 billion liters of alcohol every year. According to some estimates, the cost of sugar produced in Brazil is approximately US$ 215 per ton, making Brazil one of the most efficient producers in the world.

Production Policy: Sugar, one of a few farm commodities left outside the minimum price program, is administered by a special agency, the Brazilian Institute of Sugar and Alcohol, that is responsible for regulating the production and trade of sugar and ethanol. There are concerns regarding the impact of the alcohol program on land use, particularly when sugar displaces food crops. One concern is the large scale of the sugar enterprises. They convert almost all of the land near their mills into sugarcane production. Another concern is the location of the principal sugarcane producing areas. In the state of São Paulo, sugarcane is taking up food producing areas, and in the Northeast there is a concern that small farmers will be displaced by the spread of sugarcane production. Sugarcane growers in the Center-South enjoy substantially higher average yields (almost 40% higher) than those in the Northeast.

Sugar exports have decreased because larger proportions of sugarcane harvests have been directed to alcohol production. However, the system that insulated domestic prices of ethanol and sugar from world prices is near an end (Brandão & Lopes, 1996). The Brazilian government announced that it will stop subsidizing anhydrous and hydrated alcohol production in May 1997 and May 1998, respectively.

As established in a convention at Ouro Preto, Brazil, any kind of sugar marketed among the MERCOSUR countries will be duty free by 2001. Currently the Paraguayan import tariff

is 24% and Argentina and Uruguay also impose high tariffs. The other MERCOSUR countries rejected a Brazilian government proposal to establish in 1997 a common tariff of 10% that would be reduced in graduated annual steps until elimination in 2001.

Livestock and Products

The livestock sector accounts for 40% of agricultural GDP and employs 25% of the agricultural labor force. With the world's fourth largest cattle herd (over 153 million head) more than three-fourths of the country's agricultural land (close to 220 million hectares) is under pasture. About 76% of the sector's output is milk and beef production. According to the last agricultural census in 1985, 54% of all milked cows in Brazil were dairy cows, 33% were beef-type cows, and the rest were of mixed variety.

When the Brazilian government stopped guaranteeing low prices to urban consumers in the late 1980's and early 1990's, milk production regained impetus. Many fiscal incentives that determined the occupation of the Amazon region - an area not well suited for livestock development were removed. The beef and milk sectors responded positively. The recent growth of livestock production, particularly poultry and hogs, can be explained by income growth. Household expenditures for this food item, a product of particular importance to the middle class, accounted for more than one-third of food purchases.

The traditional and still dominant beef production system in Brazil is extensive, low cost and based on natural pastures of low productivity. The stock rates vary nationally between 0.2 and two animal units (AU) per hectare. Feedlots have recently been introduced, with most of them being in the southeast.

Labor and management account for 50% of the variable costs of a typical extensive beef production system, followed by 16% for transportation costs and 7% for technology inputs (e.g., animal health products).

Beef production in the traditional system is 44 kilograms of live cattle per hectare, while a high technology system yields 378 kilograms of live cattle per hectare. Profits per hectare are US$ 8.70 in the traditional system and US$ 115.10 in the modern system. The CET for livestock products other than dairy is 7.9%; 14% for fluid milk; 15% for dairy products and milk (except fluid and powder); and 16% for butter, cheese, and powdered milk.

Hogs

Hog production is labor intensive and about 75% of it is concentrated on small farms in the South and Southeast. The major cost is feed, accounting for 84% of total variable costs. Corn provides the bulk of the feed, making the hog industry very sensitive to corn prices. The major processing companies, such as Sadia, Perdigao, and Seara, provide technical assistance to local producers. Marketing and distribution efforts have been successful in making hog meat among the most preferred foods in Brazil.

Poultry

Poultry is an export-oriented industry with high technology production systems. Like pig production, feed rations for poultry are comprised mainly of corn and account for 60% of total variable costs. While farmers are mostly small-scale and produce a diversity of

products on their farms the whole system from producers to slaughter processing plants to distribution companies works very efficiently. A feed output ratio of 1.9 kg of feed per 1 kg of live poultry rivals the most agriculturally advanced countries.

Skins, Hides and Leather Products

Brazil's production of hides and skins is expected to decline in 1997/98 as a result of lower slaughter rates of cattle. However demand for hides and skins remains firm in the medium and long-run as Brazil's market promotion efforts have bolstered the shoe industry's sales domestically and abroad.

As consumers' preference to buy goods made from natural materials continues, market demand for leather products is expected to grow. Since no synthetic replacement has been developed to imitate leather's properties effectively, particular products like quality shoes will continue to provide a good market for leather manufacturers.

Although Brazil exports hides and skins to more than 60 countries, only six countries (Italy, Spain, Portugal, Netherlands, the United States and Hong Kong - a part of China now) account for 80% of the total shipped. Given that the more processed the product is, the more value added to it, and the higher the revenues are for the exporting country, then, exports of processed hides (i.e., tanned hides) and leather goods -such as shoes, are preferred to exports of non-processed fresh hides (i.e., uncured hides).

Since cured hides must have the salt removed before they can be tanned, processing fresh hides is economically advantageous if tanneries are close to beef processing plants that cure hides directly and is environmentally advantageous if tanneries are close to a source of abundant fresh water. While environmental concerns have forced many hide-processing countries to close their older tanning operations, technology that will allow these plants to operate in an environmentally acceptable manner is available. Brazil has an abundant supply of fresh water.

Brazil has invested in plants capable of processing hides. The capital required for an environmentally acceptable effluent treatment plant that is capable of processing 12,000 hides per week has been estimated at $12 - $15 million US dollars (Investment Opportunities: Hides and Tanning. Alberta Agriculture, Food and Rural Development, March 21, 1996).

Brazil is a leading exporter of leather shoes. These exports have increased more than four times in the last 15 years, the fastest growth of all the agricultural-related categories in table 1b. In 1980 the value of Brazilian leather shoes exports was equivalent to 4% of total Brazilian agricultural exports and by 1995 it had increased to be equivalent to 10% of total agricultural exports (Tables 1a and 1b).

The leading export market for Brazilian leather shoes is NAFTA, with the United States accounting for more than 95% of NAFTA imports and more than 75% of Brazil's total exports (Table 2a). Brazilian exports of leather shoes in the last five years have grown the fastest to South American countries, followed by Asian and Oceania countries. However the value of these imports was still small relative to United States imports (Tables 2a and 2b). Undoubtedly, Brazil has a comparative advantage producing and exporting leather shoes. The value of these exports to the US is almost the same as the value of total Brazilian agricultural exports to the US (Table 2c). Moreover, leather shoes exports to the US grew over the period, whereas total agriculture exports to the North American country declined (Table 2c).

Table 1a: Brazil Agricultural and Leather Shoes Exports to the World (in 1,000 US Dollars

Year	Total Agriculture	Food & Beverages	Bulk Commodities	Intermediates	Consumer Processed	Other Agriculture	Leather Shoes	Horticulture
1980	10,325,544	8,115,516	4,574,361	3,910,174	1,481,127	791,719	369,273	259,882
1985	10,989,235	8,709,481	4,771,217	3,415,849	2,474,732	760,818	1,029,388	327,437
1990	10,739,414	7,561,960	3,782,180	3,597,482	2,987,122	1,162,390	1,351,582	372,630
1995	14,322,223	10,814,803	5,704,872	4,734,026	3,420,637	1,991,267	1,501,734	462,688

Table 1b: Brazil Growth in Agricultural and Leather Shoes to the World (in indices, 1980 value = 100)

Year	Total Agriculture	Food & Beverages	Bulk Commodities	Intermediates	Consumer Oriented Processed	Other Agriculture	Leather Shoes	Horticulture
1980	100	100	100	100	100	100	100	100
1985	104	107	104	87	167	96	279	126
1990	103	93	83	92	202	147	366	143
1995	127	133	125	121	231	252	407	178

Table 2a: Brazil Exports of Leather Shoes to Selected Regions (in 1,000 US Dollars)

Year	To World	To NAFTA	To USA	To European Union	To South America	To Asia & Oceania
1980	369,273	281,906	263,439	70,370	8,581	7,556
1985	1,029,388	961,858	935,105	50,788	1,390	11,986
1990	1,351,582	1,122,161	1,062,924	211,238	1,471	15,074
1995	1,501,734	1,204,112	1,155,878	201,623	57,644	35,253

Table 2b: Brazil Exports of Leather Shoes to Selected Regions (indices, 1980 value = 100)

Year	To World	To NAFTA	To USA	To European Union	To South America	To Asia & Oceania
1980	100	100	100	100	100	100
1985	279	341	355	72	16	159
1990	366	357	403	300	17	199
1995	407	427	439	287	672	467

Table 2c: Brazil Selected Exports to the United States (in 1,000 US$ and for indices 1980 value = 100)

Year	Total Agriculture (Growth)	Leather Shoes (Growth)	Skins and Hides (Growth)
1980	2,145,001 (100)	263,439 (100)	4,362 (100)
1985	2,336,535 (109)	935,105 (355)	3,055 (70)
1990	1,961,091 (91)	1,062,924 (403)	1,284 (29)
1995	1,272,235 (60)	1,155,678 (439)	3,178 (73)

Horticultural Sector

Given Brazil's tropical climate and lack of extensive refrigeration facilities, fresh produce is highly perishable. Losses can be as high as 40% of total volume (USDA/FAS/AGR:BR 7018). High prices for fresh vegetables and fruits when excessive rainfall occurs during November to March encourage consumption of frozen vegetables and fruits. However, recent price stability and increased buying power by lower income families has resulted in a gradual increase in fresh fruit consumption.

Most of the fruits produced in Brazil for the fresh market are produced in northeastern Brazil. Although one out of every four orange trees in the world can be found in the southern states of Brazil (e.g., São Paulo), most of the oranges produced there are for processing.

Especially in the northeastern states of Brazil, a thriving export industry has been developed mainly for the needs of the fresh fruit market. Tropical fruit production is shifting gradually from the south to the northeast where labor is cheap and abundant. Following extensive federal and private irrigation projects in recent years, the supply of export-grade fresh produce has been boosted very rapidly in Brazil's northeastern interior. For example, the state of Rio Grande do Norte alone produces more than 85% of Brazil's exported melons, as well as mangoes, papayas, grapes and cherries.

This section gives emphasizes fruits, since Brazil's exports of vegetables is negligible relative to its other agricultural sectors. The current and expected developments in the fruit sector, distinguishing between temperate and tropical fruits, are discussed.

Tropical Fruits

Mangoes

Mangos are a seasonal fruit in Brazil with production running from September until January. The European Union (EU) is the world's largest import market for mangos on a year-round basis with imports of 82,000 tons in 1995 and an estimated growth rate of 15% per year. The EU starts its year by importing mangoes from Mexico and concludes the year with imports from Brazil. The growing sophistication of the trade and consumer awareness have created opportunities for suppliers to enter one of the most promising growth areas of produce trade (Eurofruit Magazine, March 1997).

Northeast Brazil with its hot, dry climate produces most of the mangoes for export. The very latest irrigation and harvest management techniques have contributed to a five-fold increase in mango production since 1994. Only India and Mexico produce more mangoes than Brazil.

The APHIS of the US Department of Agriculture has certified the absence of the fruit fly from northeast Brazil, which means that producers can use lower levels of pesticides. Big mango producers/exporters such as Frunorte of Brazil practice crop rotation and integrated pest management to keep the mangos free of toxic residues and to reduce costs of production. Investments in research, collaboration with universities and experimental stations, product quality control programs (such as the ISO-9000 by Fruitnorte that monitors floration and nutritional patterns) have all improved the fruit. New pre-cooling and grading equipment has also contributed to more consistent, high quality fruit. (Eurofruit Magazine May 1994, July and October 1996).

Recent technology (mango boosters) developed by Embrapa (the Brazilian Enterprise for Agricultural Research, Agriculture and Supply Ministry) is claimed to have expanded the mango export season in northeast Brazil from three months per year to year-round. The boosters (calcium nitrate) induce blooming, through artificial conditions, which starts the process of fruit appearance. This technology makes it possible to schedule mango harvests when global production is low and world prices are about 50% higher than normal. Embrapa was also responsible for developing a hydrothermal treatment to minimize fruit damage from fruit flies.

Melons

Most melons are produced in northeastern Brazil. MAISA (Mossoró Agro Industrial SA) which produces 44% of Brazil's melon crop expects to become one of the biggest melon exporters in the world. It grows a wide range of melon varieties targeting different customers. For example, White Honeydew and orange-fleshed varieties are popular in the United States, while Brazilians and Spanish consumers favor Piel de Sapo. Successful development of new varieties offers possibilities in new markets. If Brazilian exporters can guarantee constant improvements, they should be able to hold their place in the EU's winter melon market (Eurofruit Magazine, October 1995). While the current Brazilian melon crop is predominately Yellow Honeydew, leading exporters are investing in the Galia and Piel de Sapo varieties favored by Europeans.

Papayas

Papayas are neither a seasonal fruit nor have many varieties. These characteristics can be advantageous in familiarizing consumers with the product and developing markets. However demand for papayas is not as strong as that for mangoes. One reason is that until recently the big chains exported papayas when they were very green and immature and their flavor was poor. But now, a Brazilian company Caliman has developed a papaya variety, known as the Golden papaya, which is full-colored, free from blemishes and ripe when it is 100% yellow.

The market is changing rapidly to better quality papayas and 70% of European demand now is for yellow papayas, favoring Brazilian papaya exports (Eurofruit Magazine, March 1996).

Pineapples

The topography, soil and dry climate in northeast Brazil are conducive to the production of a high quality pineapple with an appealing shell color, extended shelf-life, and sweet taste which is popular with Europeans. When exporting to Europe, distance is no longer a problem. The major challenge facing Brazilian pineapples is exclusion from the Generalized System of Preferences reducing their cost competitiveness (Eurofruit Magazine, October 1994).

Temperate Fruits

Apples

The apple is an important commodity in south Brazil, with the Fraiburgo region in the state of Santa Catarina being one of the largest single fruit-producing regions in the world (International Fruit World, 1996). Only three varieties have adapted well to the tropical climate: Gala, Royal Gala and

Golden Delicious. Fuji is another popular variety growing in that region, but some experts believe it is too delicate to thrive in the South.

Large, high quality Brazilian apples are exported during the traditional Southern Hemisphere shipping period to reach European markets at the beginning of March. Brazilian apples have a very appealing color relative to other Southern Hemisphere apples but need to be larger in order for Brazilians to remain players in the international apple market.

In 1994, apple exporters in Brazil started labeling their season's export crop in an effort to differentiate their fruit from other Southern Hemisphere competitors. Sinclair International ltd., the labeling specialist, installed automatic fruit labeling systems in its packhouses in Brazil's top apple growing areas. Export volumes to the EU increased the following years and are expected to jump to more than 20,000 tons in 1997 from 2,300 tons in 1996. The 1997 apple crop is forecast to be more than half a million tons, a 9% increase from the 1996 crop. More than 90% of these will be Gala and Fuji and the rest will be Golden Delicious (Eurofruit Magazine, March 1997).

Stone fruits and grapes

With the completion of the Sobradinho Dam in northeastern Brazil the São Francisco valley (the area between the western part of Permambuco and the northern state of Bahia) has been expanding its in irrigated crop management and become an important area for grape growing. The vineyards are labor intensive and require considerable investment in production technology.

Grape exporters from northeast Brazil sell to Europe from September through November. Seeded grape varieties still predominate but a new five-year project has been set up to improve the production of seedless grapes which are more suited to the European and US markets. The private sector manages the project with some technical assistance from government research institutions. This cooperation between the private sector and the government has established an excellent foundation for the production/exports of other horticultural crops.

Peaches

Price stability and increased buying power by lower income families, have resulted in a gradual increase in the consumption of fresh fruit, including table peaches. Brazil is a small but promising market for peaches. Peaches for canning traditionally have been an important use for much of the Brazilian crop but competition from imported European canned peaches eroded Brazilian growers. Brazilian commercial peach production is concentrated in the hilly areas of the southern states, with most growers having orchards of less than two hectares. There are small amounts of peaches processed by "cottage" industries in most larger growing regions. Table peach production has been increasing about 10,000 tons yearly with continued expansion expected during the next five years. The 1995/96 peach crop was estimated at 134,000 tons (FAS/USDA/AR, BR6608). According to area estimates compiled from state agencies there were nearly 20,000 hectares of peaches in 1992, see Table 3.

Table 3: Brazil - Area and Production of Peaches 1991/92 - 1993/94

Area	Production			
	1992	1991/92	1992/93	1993/94
State	hectares	----------metric tons----------		
Rio Grande do Sul (RS)	13,226	62,000	68,000	75,000
Sao Paulo (SP)	3,400	12,000	15,800	20,307
Santa Catarina (SC)	2,033	11,000	12,000	12,500
Parana (PR)	700	5,590	4,686	4,803
Minas Gerais (MG)	172	2,000	1,800	1,800
Others	50	200	230	250
TOTAL	19,581	92,790	102,516	14,660

Source: Production data, Brazilian Fruit Society (SBF).

Of the 2,000 fruit growers in Rio Grande do Sul's South Zone growing peaches for processing, the majority (i.e., 80%) have less than 10 hectares each. The other 20% owns more than 30 hectares each and they account for more than 50% of production. Peach production for processing accounts for 50% of Brazil's total area in peaches and 80% of domestic consumption.

Two systems of planting peaches are used in Brazil: dense and traditional. Under the dense system, peach trees are planted 3 meters apart allowing for 500 trees per hectare and the trees can bear fruit for an average of 20 years. Under the traditional system, more space per tree is allowed and it takes longer for them to fill out but the trees can bear fruit for an average of 25 years. It is more profitable for Brazilian peach growers to use the dense system because the soil in many peach orchards becomes depleted and requires orchard renovation about every 15 years.

Three varieties of peaches are grown in Brazil: the Marli, the Coral and the Xiripa. The first two varieties are more resistant to bacterial canker (Xanthomonas pruni) than is the Xiripa variety.

Outlook for Peach Production and Trade in 2000: Brazilian peach growers can make investment decisions based on real rather than "inflationary" expected profits since the Brazilian economy has been stabilized. Unfortunately, many fruit growers are carrying a heavy debt which cannot be offset easily by production loans because the government has reduced funding in the official credit programs. Peach growers will have to do more on their own, since the two largest farm marketing cooperatives which were heavily involved in fruits and vegetables went bankrupt in the early 1990's.

Production Policy: With the exception of research on varieties and diseases, the federal government provides very little assistance to Brazilian fruit growers. When a grower receives a production loan under the farm loan program, he must take out crop insurance (PROAGRO) which

covers up to 100% of his budgeted production costs. In Santa Catarina, stone fruit production was originally supported by the state in the 1970's through the PROFIT (Temperate Fruit Project) program which combined research, technical assistance and subsidized credit. In 1978 the area devoted to peaches reached 1,650 hectares before bad weather, improper plantings, and phytosanitary problems led to the eradication of most orchards. Research and extension services have concentrated on the selection of improved peach varieties which have greater consumer acceptance and are disease resistant. More recently research and extension services started working on improved cultivation practices and more effective use of chemical sprays. Important research activities take place at the state level, particularly in Sao Paulo at the Agronomic Institute in Campinas(IAC) and at the Santa Catarina station (EPAGRI-CTA) at Videira.

With the creation of MERCOSUR and the elimination of import duties on fresh peaches from the member countries, Brazilian peach producers are facing competition from Argentina. The CET on fresh peaches is 10%, and Chile enjoys a preferential tariff of 4%.

Traditionally Brazil has been an exporter of canned peaches with the bulk of the shipments going to Paraguay. Exports reached a peak in 1993 at 3,844 tons valued at $3.6 million, only to fall to 1,678 tons in 1994 and 431 tons in 1995. Imports of canned peaches totaled 21,681 tons in 1994, three times the 1993 level. Greek canned peaches dominated imports in 1993 (98%) and again in 1994 (70%). The Brazilian tariff on canned peaches is 45%, one of Brazil's few exceptions (until April of 1996) to the MERCOSUR CET, 10% for peaches. Brazil imported 2,385 tons of fresh peaches in 1994 (compared to 1,008 tons in 1993). Chile was the major supplier followed by Paraguay and Argentina.

Southern Hemisphere countries generally export peaches between November and March. Countries from the Northern Hemisphere export peaches during the months of May through October.

The state and county authorities in Santa Catarina and Rio Grande do Sul have recently built cold storage facilities and charge the peach growers storage fees. Production costs are still very high compared with those of competing countries and the price the Brazilian consumer pays is approximately four times higher the amount the grower receives.

Marli peaches are available from November through February. Xiripa peaches are available during January and February. Chile is the major source of imported peaches.

Oranges and Orange Juice

Brazil is the world's largest orange producing country. In the state of São Paulo, which accounts for nearly 90% of the country's production, the bulk of oranges is processed. Domestic consumption is increasing as a result of low prices and shifts in consumer spending. With more flexible import rules, some imported oranges, mainly from Uruguay and Argentina, are found in upscale supermarkets. However, the volumes are insignificant.

Brazilian industry has the capacity to hold considerable stocks of frozen concentrated orange juice (FCOJ) domestically and in offshore facilities in Europe, the United States and Japan. Demand in the European Union is expected to remain strong while exports to the United States will always depend on the size of the Florida crop. The Brazilian processing sector has the ability to produce

enough FCOJ to satisfy world demand but intends to export only enough product to maintain stable world prices. Under the Uruguay Round Agreement Brazilian orange juice faces a 55% tariff when it enters the United States.

5a. Fresh Oranges: The two main Brazilian institutions which provide crop estimates are the Institute of Agricultural Economics (IEA) of the São Paulo State Secretariat of Agriculture and the Brazilian Association of Citrus Exporters (ABECITRUS). According to these two institutions the São Paulo commercial orange area accounts for 88% of total Brazilian production, and the total orange crop forecast for marketing year 1997/98 is approximately 450 million boxes, i.e., an 8% increase from the previous crop. IEA forecasts a 3% increase in area planted to oranges, 889,000 hectares for the marketing year 1997/98. The increase is due mainly to investments in new plantings by big producers and processors. The area harvested to oranges is likely to increase to 781,000 hectares, almost a 4% increase from the 1995/96 crop, since more trees are maturing and bearing fruit.

Cost of production: The number of citrus growers has diminished through competition and concentration of the industry. The outbreak of the disease Citrus Chlorosis Variegated (CVC or "amarelinho") has sharply increased the costs of grove management, and many producers cannot afford the costs of pruning the infected branches. Some producers were forced to eradicate their groves in highly infected areas such as São Jose do Rio Preto in northern São Paulo state. Moreover, the end of the master contract in the recent past (FAS/USDA/AR: BR5086) has foisted another burden on producers, who previously did not pick the fruit and haul it to the processing plant. Overall, most producers have lost bargaining power relative to processors, since individually they deliver small volumes of fruits for processing. In an attempt to offset this disadvantage, some growers have formed into groups of 20 to 30, in order to negotiate a larger amount of fruit for processing.

Table 4: Brazil Production and Demand of Fresh Oranges (July/June)
(1,000 hectares, Million trees, Million 40.8 kg boxes)

Item/Marketing Year (Bloom/Harvest)	1995/96 (94/95)	1996/97 (95/96)	1997/98 (96/97)
Area Planted	921	860	889
Area harvested	752	752	781
Bearing trees	197	208	216
Non-bearing trees	46	34	34
Total trees	243	242	250
Total Production	405	416	450
São Paulo	357	366	400
Others	48	50	50
Exports	2	2	2
São Paulo	2	2	2
Domestic Consumption	133	137	145
Processing	270	277	303
São Paulo	263	269	295
Others	7		8

Yields: The IEA's estimate of Brazilian orange yield for the marketing year 1996/97 is two boxes (40.8 kg) of oranges per tree. Crop yields for the marketing year 1997/98 are expected to increase to 2.08 boxes per tree, due to good flowering and fruit formation and the fact that the tree population has reached optimal producing stages.

Input Use: Orange grove care has decreased as a result of increased financial difficulties among orange growers and higher chemical and fertilizer prices, 14% higher in 1996 than in 1995. Table 5 shows the recent evolution of pesticide sales for use in citrus production. According to data provided by the Pesticide Industry Syndicate (SINDAG), total pesticide sales increased 7% in 1996 compared to 1995. However, the increase in the price of mitecide and the decrease in mitecide sales, suggest a reduction in the number of applications.

Table 5: Pesticide Sales in Brazil by Type (1,000 US$)

TYPE	1992	1993	1994	1995	1996
Insecticide	11,216	9,107	12,657	12,174	18,089
Mitecide	60,574	68,181	85,585	91,470	87,939
Fungicide	10,146	13,284	13,546	12,800	12,770
Herbicide	11,91	15,196	14,397	19,289	26,541
Other	290	212	563	349	484
Total	94,138	105,980	126,748	136,082	145,823

Source: Pesticide Industry Syndicate (SINDAG).

The monthly terms of trade between oranges for the domestic market and one ton of fertilizer, i.e., 12 kg of Nitrogen, 8 kg of P2O5 Phosphorus, 12 kg of Potassium, used in citrus growing areas for 1995 and 1996 are shown at Table 6. According to the Brazilian Fertilizer Association (ANDA), there was a sharp increase in the terms of trade1 from 1995 (34.6 boxes of 40.8 kg of oranges) to 1996 (61 boxes of oranges), which contributed to a lower fertilizer use in citrus producing areas. If oranges for processing were considered, then the terms of trade would be much higher than those shown on Table 6.

Table 6: Terms of Trade (TOT): Fresh Oranges for Domestic Market per ton of Fertilizer (Center-South Brazil)

	1995			1996		
Month	(Fertilizer Price) (US$)	TOT	(Orange Price) (US$)	(Fertilizer Price) (US$)	TOT	(Orange Price) (US$)
JAN	7.20	173.0	224.0	3.23	200.22	62.0
FEB	6.16	173.4	528.2	3.05	199.80	65.5
MAR	6.60	171.4	826.0	2.99	200.99	67.2
APR	6.56	166.9	825.5	3.44	204.35	59.4

[1] Note that the terms of trade consider oranges for the domestic market whose prices are higher than those delivered to processors.

Continuation...

MAY	6.00	169.5	628.3	3.27	197.98	60.5
JUN	4.96	164.5	533.2	3.24	195.83	60.4
JUL	4.36	164.5	437.7	3.20	196.85	61.5
AUG	3.88	167.8	643.3	3.23	196.76	60.9
SEP	3.80	181.2	147.7	3.48	203.50	58.5
OCT	3.92	189.3	548.3	3.51	205.80	58.6
NOV	3.85	196.1	651.0	3.39	205.18	60.5
DEC	3.46	191.7	955.4	3.37	202.47	60.1
AVG	5.08	175.8	334.6 3	.29	200.81	61.0

Source: Brazilian Fertilizer Association (ANDA).

Problems with Orange Trees Diseases

In 1996, Fundecitrus sampled 8,000 orange trees in the São Paulo commercial area to estimate the percentage of trees infected by 'Xilella fastidiosa', the bacterium that causes the disease Citrus Chlorosis Variegated (CVC). According to the results, 7% of the trees had severe symptoms; 17% of the plants had minor symptoms; the remainder did not show any symptoms. The absence of symptoms does not exclude the possibility of infection, since they may take between 10 and 16 months to appear. Orange groves in warmer producing areas of the central-northern São Paulo region show symptoms more rapidly compared to groves in cooler producing areas of southern São Paulo region. The results also show 53% of the sampled orange groves had CVC symptoms. The disease affects new plants, those of less than seven years of age, more severely. According to the results of the above survey, 23% of orange trees less than seven years of age showed symptoms of CVC, while only 9.3% of older trees showed the same symptoms.

There is no chemical product available to control the bacterium. Thus, the best procedures to control the bacterium include intensive management of nurseries to avoid the presence of sharpshooters ("cigarrinhas"), the insect that transmits the becterium; the use of disease-free budwoods when producing new seedlings; the planting of healthy seedlings; the elimination of plants less than three years of age when there are symptoms of the disease; and the careful management of older trees in the grove with prompt pruning of affected branches as soon as they are detected.

Citrus producers, processors, analysts, and researchers express mixed feelings about the CVC issue. Some allege that most groves are infected with the disease, and that the outbreaks of CVC will have a major negative impact on orange production in the next three to four years. Others state that monitoring and controlling measures already taken will allow trees to live with the disease without affecting production seriously. According to researchers, it may take eight to 14 months for an infected plant to show initial symptoms, and two or three more years for production to drop. Other statistics show that from one infected plant, the whole grove could be infected by CVC in six to seven years. Unofficial estimates suggest that production costs could increase by 15% due to the extra pruning and spraying needed to control the CVC.

According to Fundecitrus, another major disease concern is citrus canker which is concentrated in the commercial citrus area of Sao Paulo. The disease is caused by a bacterium (Xanthomonas axonopodis p.v. citri') and the eradication of all plants within a 30-meter radius is the only effective way to control the disease.

Table 7 shows the recent evolution of the disease. The main factors that have contributed to the spread of citrus canker are: (1) a great number of non-eradicated loci of canker in the noncommercial area of Sao Paulo; (2) vehicle traffic due to the expansion of area planted to citrus in traditional noncommercial areas; and (3) the presence of damage caused by the worm "Citrus Leaf Miner" in the leaves of the plants, making the leaves more susceptible to the bacterium.

Table 7: Evolution of Citrus Canker in the Sao Paulo State

Year	Number of Towns Areas	Number of Plants	Infected Plants 1/	Affected Seedlings	Affected
1992	4	9	934	7,733	--
1993	6	14	342	10,433	--
1994	12	144	746	10,165	8,000
1995	11	25	8,253	38,230	200,512
1996	22	45	3,512	30,394	1,310,000
1997 2/	20	41	15,026	57,379	200,000

Source: FUNDECITRUS

1/ Plants affected in a 30 meter radius from the infected plant.
2/ January to April period, inspection and eradication of plants in progress.

Costs of Production

Table 8 shows production cost data for the major orange producing area in Brazil (i.e., the state of São Paulo) for marketing year 1996/97, as estimated by the Brazilian Institute of Agricultural Economics (IEA). Assumptions: (a) depreciation of orange grove: US$ 2.23 per box of orange as the average price for marketing year 1996/97, and expected tree life of 20 years; (b) interest rate: 16% per year. Costs do not include the picking and hauling expenditures which producers have been incurring since 1995. Picking and hauling costs for the marketing year 1996/97 varies from US$ 0.60 to 0.80 per box of oranges.

Table 8: Estimated Production Costs of Fresh Oranges (US$)Sao Paulo State 1/ Developing Groves 2/

ITEM	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR
Labo	175.82	61.85	60.89	57.23
Seedlings	221.36	--	--	--
Fertilizer & Lime	89.34	52.80	153.6	2111.01
Pesticide	31.46	85.86	106.4	2144.84
Machinery operation	312.59	124.44	136.0	6133.16
Depreciation/	96.35	44.52	48.25	47.21

Continuation...

Social costs 4/	58.02	20.42	26.23	28.81
Financing costs	66.50	26.00	36.56	35.72
Total costs	1,051.44	415.89	568.03	557.98
Yield per hectare (boxes)	--	--	130.00	208.00
Cost per box (US$/box	--	--	4.37	2.68

SOURCE: IEA

1/ Rate of exchange in November 1996, US $ 1 = R$ 1.03. 2/ 260 trees per hectare, 286 seedlings per hectare.
3/ Includes tractor, implements, and grove. 4/ 33% of labor cost, including social security, vacation, etc.

Production Policy: The Frozen Concentrated Orange Juice (FCOJ) processors are no longer responsible for the picking and hauling operations, since the end of the master contract in 1995 (FAS/USDA: BR5086). Table 9 shows the monthly average prices received by producers during 1994 to 1997 (January to April), as reported by IEA.

Table 9 : São Paulo - Prices Received by Producers of Oranges for Processing (R$/40.8 kg Box)

Month	1994	1995	1996	1997
JAN	1.61	3.04	1.23	2.18
FEB	1.72	2.71	1.29	2.28
MAR	1.70	n/a	0.95	2.18
APR	1.43	2.51	1.26	2.35
MAY	1.69	2.39	0.99	-
JUN	1.76	2.34	1.30	-
JUL	2.82	1.72	1.28	-
AUG	3.01	1.56	1.53	-
SEP	3.07	1.45	1.71	-
OCT	3.12	1.36	1.76	-
NOV	3.35	1.37	1.98	-
DEC	2.98	1.34	2.02	-

Source: IEA.

Fresh Orange Consumption and Trade

Domestic consumption of fresh oranges has been increasing since the implementation of the economic stabilization plan in July 1994 which has increased the purchasing power of the lower and lower-middle classes. Orange prices in the domestic market have decreased in the past four years, making them more affordable to Brazilians. The forecast of Brazilian domestic consumption for

1997/98 is 145 million boxes. Domestic consumption estimates by the IEA are taken as the difference between production estimates and the volume of oranges delivered for processing. It has been reported that oranges have an inelastic demand when retail prices range from R$0.90 to R$1.50 per kilogram. Table 10 shows prices received by orange producers for the 1994 to 1997 period (January to April), as reported by the IEA. Note the drop in prices during the period, as well as the fluctuation in prices.

Table 10 : São Paulo - Fresh Orange Market Prices (R$/40.8 kg Box)

MONTH	1994	1995	1996	1997
JAN	4.42	5.43	1.80	3.17
FEB	4.55	4.84	1.71	3.99
MAR	3.95	5.30	1.71	4.21
APR	3.17	5.61	2.35	4.10
MAY	2.55	4.68	1.91	-
JUN	2.45	3.58	2.13	-
JUL	3.47	2.91	2.16	-
AUG	3.80	2.4	2.22	-
SEP	4.17	2.53	2.53	-
OCT	4.96	2.43	2.57	-
NOV	5.59	2.53	2.83	-
DEC	6.13	2.06	2.71	-

Source: IEA

The consumption of not-from-concentrate fresh or pasteurized orange juice has increased, supporting the increase in domestic orange consumption. The number of extractors of fresh juice has increased sharply since 1994, reflecting the upward trend in juice consumption. Also, the shift in the way oranges are marketed from units (price per dozen) to weight (price per kilogram) and the presence of juicers ("laranjinhas"), who process orange juice and sell it in the informal economy, have contributed to a higher consumption of the fruit. Table 11 provides cumulative exports of fresh oranges by destination for marketing year 1995/96 and 1996/97 (July to April).

Production Policy: The São Paulo State Secretariat of Agriculture has proposed the creation of a Citrus Commission ("Camara Setorial") comprised of representatives of different sectors of the citrus industry and Subordinated to the São Paulo State Secretariat of Agriculture, to establish a citrus policy and to respond to citrus related issues. The setting of an orange reference price for producers and the establishment of future measures for monitoring and controlling citrus canker would be the responsibilities of the Citrus Commission.

Table 11 : Brazil Fresh Orange Exports by Destination (1,000 Metric Tons)

DESTINATION	MY 1995/96 1/	MY 1996/97 2/
NAFTA	2	
EUROPEAN UNION	52	35
ASIA	0	0
MERCOSUR	0	0
U.ARAB EMIRATES	9	6
SAUDI ARABIA	1	2
OTHERS	10	7
TOTAL	65	43

Source: ABECITRUS.

1/Revised. 2/July/April.

Note: Numbers may not add due to rounding, "0" means less than 500 tons.

The FCOJ industrial complex is concentrated in the Sao Paulo commercial area. There hes been a trend toward mergers and consolidations of the small companies. There are three major FCOJ companies in northeastern Brazil: Frutos Tropicais and Frutene in the state of Sergipe and Utiara in the state of Bahia. There are other minor processing plants which manufacture pineapple, mango, passion fruit, guava, cashew, grape, and papaya juices in addition to concentrated orange juice. The FCOJ processors in northeastern Brazil face stiff competition from the local fresh fruit market and oranges delivered for processing are usually left over from what is not consumed by the local market. Recently, the four major Brazilian processors have been investing in Florida. According to Brazilian processors, the presence of Brazilians in Florida will permit a greater access to the American FCOJ market and Brazilians will be able to take advantage of having fruits for processing in two different seasons. Brazilian processors argue that they have expertise in juice production and export at reduced costs, resulting in a competitive advantage compared to U.S. producers.

Table 12 : Supply and Demand of Orange Juice (Metric Tons) (XX Degree Brix)

BRAZIL	1994	1995	1996
Beg.		Month/Year	
Marketing Year:	7 / 95	7 / 96	7 / 97
Deliv. To Processors	11020	11302	2362
Beginning Stocks	155000	172000	152000
Production	1085000	1140000	1250000
TOTAL SUPPLY	1240000	1312000	1402000
Exports	1050000	1140000	1160000
Domestic Consumption	18000	20000	20000
Ending Stocks	172000	152000	222000
TOTAL DISTRIBUTION	1240000	1312000	1402000

Frozen Concentrated Orange Juice (FCOJ) Policy: Importers of Brazilian FCOJ have benefited from the elimination of the value-added tax ("Imposto sobre Circulacao de Mercadorias e Servicos"-ICMS) on exports of raw materials and semi-manufactured products. A coincidental drop in international prices by about US$ 450 per ton of FCOJ during marketing year 1996/97 prevented Brazilian processors and producers from realizing any competitiveness gains as a result of the approximately US$ 100 per ton price reduction due to the ICMS elimination.

Table 13: Brazil Frozen Concentrated Orange Juice (FCOJ) (July/June) (Million 40,8 kg boxes, 65 degree brix, thousand metric tons)

Item/ Marketing Year (Bloom/Harvest)	1995/96 (94/95)	1996/97 (95/96)	1997/98 (96/97)
Delivered to processors	270	277	303
São Paulo	263	269	295
Others	7	8	8
Beginning stocks 1/	155	172	152
Total production	1,085	1,140	1,250
São Paulo	1,062	1,110	1,220
Others	23	30	30
Total supply	1,240	1,312	1,402
Exports	1,050	1,140	1,160
São Paulo	1,027	1,110	1,130
Others	23	30	30
Domestic consumption	18	20	20
Ending stocks	172	152	222
Total distribution	1,240	1,312	1,402
FCOJ yields (kg/box)	402	412	413

1/ São Paulo stocks.

Source: UN Comtrade

According to IEA the total Brazilian FCOJ production forecast for Marketing Year 1997/98 is 1.250 million tons. Sao Paulo processing plants should contribute 1.220 million tons of FCOJ, almost a 10% increase from the former season, due to the greater volume of oranges for processing (295 M boxes for MY 1997/98 compared to 269 M boxes for MY 1996/97), industry sources reported.

Fresh juice production in Brazil has been increasing, too. Currently there are more then 7,000 fresh juice extractors in Brazil, mainly in the states of Sao Paulo (50% of the total), Rio de Janeiro (11%) and Rio Grande do Sul (8%). The fresh juice extractors are located in supermarkets, bakeries, convenience stores and bars.

There also has been an increase in pasteurized and fresh juice consumption in the recent past, related to effects of the economic stabilization plan (Real Plan) in 1994, and the drop in orange prices in the domestic market. FCOJ exports by destination shipped from the port of Santos for MY 1995/96 and 1996/97 (July to April) as reported by ABECITRUS follow in Table 14.

Table 14 : Brazil exports of Frozen Concentrated Orange Juice (FCOJ) (In 1,000 Metric Tons)

DESTINATION	MY 1995/96	1/ MY 1996/97 2/
UNITED STATES	191	188
CANADA	2	0
NAFTA	193	189
EUROPEAN UNION	720	661
EASTERN EUROPE	0	1
JAPAN	68	62
SOUTH KOREA	27	35
REST OF ASIA	5	7
ASIA	100	105
MERCOSUL	3	2
CHILE	2	2
AUSTRALIA	18	11
NEW ZEALAND	5	3
PUERTO RICO	4	5
HONDURAS	1	0
ISRAEL	--	1
OTHERS	31	24
TOTAL	1,046	981

Source: ABECITRUS

1/ Revised. 2/ July/April.

NOTE: Numbers may not add due to rounding, "--" means no exports, "0" means less than 500 tons.

Tomatoes

Tomatoes are produced throughout Brazil, primarily for fresh consumption, but there are three regions within Brazil that are commercially important for processing tomatoes. These are: 1) Bahia (BA) and Permambuco (PE) (in the northeast), 2) Goias (GO) and Minas Gerais (MG) (in the center), and 3) Sao Paulo (SP) (in the center-south). In 1996, these three regions accounted for 71% of all tomato production in Brazil and virtually all of the tomatoes used for processing.

COMMODITY PROJECTIONS AND TRADE ANALYSIS TO 2005

Modeling framework used: CPPA is the Country Projections and Policy Analysis modeling framework (Hjort, 1994, and Wainio, 1995), that was used to analyze economic and policy changes in the Brazilian commodity markets.

CPPA is a tool for generating theoretically consistent projections of the supply, demand, and trade of major agricultural commodities; and for conducting policy analysis or analyzing alternative scenarios (see Appendix A, for more information).

Crops Sector

Wheat

Wheat planted area is expected not to recover back to the level of the 1980s (i.e., when area was 40% larger than in 1996/97), but to decrease further by 1.5% annually through 2005 (Table 15). However, domestic supply is expected to increase, mainly through annual increases in yields, since producing wheat is still profitable (for example, high market prices prevailing since late 1995 influenced wheat farmers in the South to increase the use of acreage by 79%, as well as increase their use of inputs which will be reflected in higher yields). Per capita consumption is expected to increase slightly by 0.6% through 2005 when it will reach 52 kilograms per person.

Brazil will increase its wheat imports annually through 2005 (Table 15). Since Brazilian importers would have to pay a 10% tariff if they bought wheat from non-MERCOSUR countries, Brazil's wheat

Domestic corn production is expected to increase through 2005, please see Table 15. This increase will come mainly from increases in yields rather than in area. Feed demand is expected to increase considerably through 2005, mainly for the poultry and pork industries. The expanding poultry industry, which is concentrated in south Brazil, has announced significant new investment plans for several central Brazilian states (Bahia, Goias and Mato Grosso do Sul) which have excess corn supplies. Brazil was a major exporter of corn before the reduction in government subsidized loans. Now, it is not expected to be self-sufficient and imports are expected to increase by as much as 8.2% per year through 2005.

Soybeans

Soybean farmers relative to other crop farmers who relied on some kind of government support, have benefited from soybean prices being determined by world markets. Area planted to soybeans is expected to increase by 1.5% annually through 2005, please see Table 15. The new area is expected to be in the state of Mato Grosso (the cerrados) where investments in infrastructure will reduce transportation costs considerably. The Mato Grosso is a flat area where the use of tractors is efficient, the climate will permit two soybean crops per year and rotation of soybeans with other crops has not been practiced.

Production is expected to increase annually by 3% through 2005. Soybean yields are expected to increase by 1.25% per year. Domestic demand for crush is expected to increase annually by 3% while demand other than for crush is expected to increase as well. The elimination of the 13% ICMS state tax on exports, together with the elimination of the Brazilian government's option to purchase commodities, will have a significant effect on soybean net exports. Exports are expected to increase annually through 2010.

Brazilians have advanced soybean production "know how" and they are taking full advantage of it through MERCOSUR integration. The land surrounding the common borders of MERCOSUR countries (i.e., the southern states of Mato Grosso, Mato Grosso do Sul, Rio Grande do Sul and Sao Paulo together with the eastern parts of Paraguay and Bolivia) is the best land for soybean production. Brazilian processors will continue to buy or rent land in Bolivia and Paraguay to produce soybeans, then import these soybeans back to Brazil to process and export them as soy meal.

Soybean Meal

Domestic production is expected to increase by 3% annually through 2005. Annual crush capacity is about 30 million tons. Many older crushing plants in traditional soybean areas of the central-south have closed while new ones continue to open in the central-west (i.e., Mato Grosso) in response to increased demand, favorable state government financial incentives and investments in infrastructure. Feed demand for soymeal is expected to increase on average by 4% annually, reaching 7.67 million metric tons in 2005, mainly due to strong demand for animal feed in the growing livestock sector, please see Table 15. The elimination of the soymeal export tax will have a strong influence on exports which are expected to increase by 2.7% per year, reaching 14 million metric tons by 2005.

Soybean Oil

Brazil likely will continue to export more soybeans and soymeal while consuming huge volumes of oil. Domestic production is expected to increase by 3% per year reaching 5.25 million metric tons in 2005, please see Table 15. Food demand is expected to increase on average by 2.73% annually reaching 18.02 kg per person by 2005. And, demand for other-than-food purposes is expected to grow annually by 2.11%. The result is 7.5% annual import growth to 213 thousand metric tons in the year 2005. The elimination of the soyoil export tax will impact soyoil exports which are expected to increase annually by 4%, reaching 2.24 million metric tons in 2005.

Cotton

Brazil once planted 4.2 million hectares of cotton. In recent years, since trade liberalization, cotton acreage has dropped 60% and was around 1.1 million hectares in 1996. The same trend is expected to continue as cotton farmers in Parana, most of which farm small acreages, have not overcome production costs successfully. Thus, they have been switching to other summer crops that do not require such high levels of inputs. The majority (80%) of Brazilian cotton is produced in the center-south region, where it competes for land with soybeans and corn. Each year, depending on expected returns, farmers in this area shift acreage between these three crops. Cotton yields are expected to increase annually through 2005 offsetting the decline in area and providing increasing production.

Consumption demand for cotton is expected to grow through 2005, please see Table 15, which means that the demand for imports will increase. Paraguay and Argentina traditionally have been Brazil's largest cotton suppliers due to proximity, favorable payment terms and the possibility of spot shipments of small quantities. The elimination of import duties between MERCOSUR partners over the last two years has reinforced this relationship.

Brazil is now the second largest cotton importer. Up to now, the zero import tariff policy combined with a 13% export tax has biased textile mills' purchases away from domestic cotton toward imported cotton. As a result, domestic producers supply only 40% of the consumption of the textile industry.

Rice

Rice farmers in Rio Grande do Sul where 50% of the crop is grown and which specializes in irrigated rice, are heavily in debt and continue to face increased import competition from neighboring areas in Uruguay and Argentina. Area planted to rice in Brazil is expected to decrease slightly (i.e., by 0.2% annually) through 2005. A bigger decrease is expected in the upland (non-irrigated) rice area. Upland rice is produced by farmers who typically operate fewer hectares and use more traditional inputs and methods. Upland rice competes directly with soybeans for land and soybean production is much more efficient.

Annual average growth of 1.4% in yield and 1.2% in production are expected through 2005 (Table 15). Food demand for rice -- a staple of the Brazilian diet-- is projected to increase by 1.1%

annually through 2005. Imports also are expected to increase by 1.4% per year through the same period. Brazil's costs of rice production are higher than Argentina's and Uruguay's, and with MERCOSUR in effect, it is much more efficient to import from these two partner countries than to produce rice itself.

Sorghum

Area planted to sorghum is expected to decrease by 1.4% per year reaching 187 thousand hectares by 2005 (see Table 15), while sorghum yield will increase by 0.34% annually reaching 1.82 metric tons per hectare by 2005. Domestic production is expected to decrease on average by 1.06% per year, reaching 340 thousand metric tons by 2005. Feed demand for sorghum also is expected to decrease annually by the same amount as yield.

Barley

Area planted to barley is expected to decrease by 1.57% annually, whereas yield will increase by 2.56% per year. As a result there will be a slight annual increase in domestic production of 0.95% per year, reaching 160.4 thousand metric tons by 2005 (see Table 15). Consumption demand which is mostly for beer is expected to increase by 3.34% annually, reaching 392.3 thousand metric tons by 2005. Imports will increase annually by 4.04%, reaching 232 thousand metric tons by 2005. The CET for barley is 5.5%.

Poultry Meat

Brazil has a sophisticated poultry sector and produces most feed rations domestically. The poultry industry, which has been concentrated in southern states, is moving northward to areas where ample feed supplies already exist. The cost of feed is expected to decrease, because the real prices of corn and soybean meal are expected to decrease annually by 1.93% and 3.53% respectively, whereas the price of poultry meat is expected to decrease by only 1.03% per year through 2005, please see Table 15. Thus, the outlook for poultry producers appears very favorable and several companies have announced their intentions to make large investments in the industry over the next decade. Poultry production is expected to increase on average by 2.97%, reaching 6.3 million metric tons by 2005.

Income growth and the sector's competitiveness are expected to boost per capita poultry consumption by 2.1% per year, reaching 30.81 kilograms/person by 2005. While Brazil is expected to remain an important exporter of poultry (i.e., Brazil is the world's third largest exporter of broiler meat), a steady rise in domestic consumption over the forecast period reduces exportable surpluses. Exports are expected to grow by 3.02% per year, reaching 831.2 thousand metric tons by 2005.

Beef and Veal

Beef production is expected to grow by 2.23% per year, reaching 6.25 million metric tons in 2005 (Table 15). One factor underlying this forecast is the large increase in cattle placed in

feedlots. With one of the world's largest beef cattle herds, Brazilian ranchers have started adapting better cross breeding practices and are moving to confinement feeding/finishing to reduce average

slaughter age and improve meat quality. Per capita consumption will grow annually by 1.42%, reaching 34 kilograms/person by 2005. In mid-August, a federal directive became effective on the marketing of fresh beef in two of the biggest metropolitan areas in Sao Paulo and Porto Alegre. It requires that only packaged, chilled and labeled beef be sold to retailers (i.e., safer meat). Its success will influence its adaptation in other metropolitan areas. Imports are expected to grow on average by 2.24% per year, reaching 120 thousand metric tons in 2005. Argentina and Uruguay have become the largest suppliers of beef to Brazil because of the MERCOSUR free trade agreement and proximity. Again non-MERCOSUR countries that export meat and meat products to Brazil are burdened with tariffs such as 10% on meat products, 12.4% on processed meat, 14% on fluid milk, 15% on milk (other than fluid or powder), and 16% on butter, cheese, and powdered milk. Exports are expected to increase annually by 1%, reaching 368 thousand metric tons by 2005. Thus, Brazil will remain a net exporter of beef but by a smaller margin.

Table 15. CPPA Projections for 1997 (i.e base year value) & Annual Average % Growth for 1997-2005.

Commodity	Area Planted (in 1,000s)	Yield	Production (in 1,000s)	Consumption (in 1,000s when total)	Exports (in 1000)	Imports (in 1,000)
Wheat (in 1997) %annual growth (1997-2005)	1,600 hectares (-1.49)	1.53 mt/ha (2.08)	2,448 mt (0.56)	8,200 metr ton 49.1 kg/capita (1.48 total) (0.6 per capita)		5,900 mt (1.56)
Corn (in 1997) %annual growth	14,400 hectares (0.51)	2.5 (2.05)	36,000 mt (2.68)	32,225 mt (3.48) feed use		1,500 mt (8.15)
Rice (in 1997) %annual growth	4,170 hectares (-0.22)	1.68 (1.41)	7,006 (1.19)	8,350 (1.13)		1,290 mt (1.37)
Cotton (in1997) %annual growth	1,130 hectares (-0.05)	0.38 (1.15)	429.4 (1.09)	909 (2.35)		465 mt (3.95)
Soybeans (in 1997) %annual growth	12,200 hectares (1.53)	2.15 (1.25)	26,230 (2.79)	21,600 crush (3.12)	3,550 (1.16)	700 mt (1.18)
Soymeal (in 1997) %annual growth			17,064 (3.12)	5,600 feed (4.01)	11,400 (2.71)	
Soybean Oil (in 1997) %annual growth			4,104 (3.12)	2,984 food (2.73)	1,625 (4.09)	120 mt (7.46)
Poultry meat (in 1997) % Growth			5,000 (2.97)	4,350 (2.96)	655.0 (3.02)	
Beef&Veal (in 1997) % Growth	26.197 metric tons slaughter (2.12)	0.200 (0.10)	5,239.4 (2.23)	4,997. (2.31)	0.34 (1.0)	0.10 (2.24)
Pork meat % Growth	19.00 M.T. (1.45)	0.0842 (0.10)	1,600 (1.55)	1,525 (1.59)	80.0 (1.06)	5.00 M.T. (4.59)

Pork

About 33% of production is located in the south, the northeast accounts for 29% and the southeast accounts for 18%. According to a 1995 Brazilian study, pig meat is about 40% more expensive than chicken meat. The contrast between the efficiency of animal protein production

from pigs and chickens is clear from the technical measures of feed conversion. The feed conversion ratio is around 2.8:1 for pigs compared to 1.9:1 for chickens. Recently, however, pork and poultry producers have started to show similarities in their production techniques, starting with the provision of feeder pigs, feed, and technical assistance by highly integrated companies which have their own processing plants and wholesale distribution system. These factors will contribute to the expected growth in pork production of 1.55% per year, with production reaching 1.81 million metric tons in 2005 (please see Table 15).

Per capita consumption is expected to grow annually by 0.7% on average, reaching 9.7 kilograms/person by 2005. Imports are expected to grow by 4.6% per year (reaching 7.16 thousand metric tons in 2005) while exports are expected to increase annually by 1.06% (reaching 87 thousand metric tons in 2005).

Comparison of the Results Generated by CPPA and the Results from Another Recent Study on Brazil

A study by Brandão and de Resende Lopes (1996) both from IBRE (Brazilian Economic Institute, Getulio Vargas Foundation) forecasts the agricultural market situation for cereal, oilseed, and sugar, as well as for the livestock and meat sectors in Brazil for the year 2001. The paper also discusses the factors which are likely to shape sectoral developments through the year 2001. The authors see a smaller role for government in agricultural markets in the future because of the elimination of price support policies and of government stocks and the reduction of credit policies. However, the authors anticipate an increased role for government in other areas such as (1) disease control and animal health services, (2) product grading and quality control, (3) rural poverty programs, and (4) infrastructure.

IBRE's forecasts on production, consumption, and trade prospects for five crops and for four livestock/meat sectors for the next five years are presented in tables 16 and 17. The first column contains the Brazil CPPA model (Country Projections and Policy Analysis) projections while the second column contains IBRE's projections. Note that IBRE does not specify the GDP growth rate upon which their results for corn and livestock sectors are based. Also note that the Brazil CPPA assumes a much higher GDP growth rate than does IBRE.

With the exception of wheat and soybeans (see table 16), Brazil CPPA's and IBRE's trade projections differ in magnitude, and in the case of rice, even in sign (i.e., imports versus exports). Specifically, Brazil CPPA projects that in the year 2001 Brazil will remain an importer of rice. On page 21 (Brandão and de Resende Lopes, 1996), the authors write that "the domestic consumption of rice has been growing at an average rate of 2.8% per year since 1978, while production increased at 2.6% per year leading to a steady increase of imports." Furthermore, the MERCOSUR agreement is expected to lead to an increase in Brazil's imports of rice because Brazilian rice farmers are heavily indebted and face increased competition from rice producers in Uruguay and Argentina,

who have duty free access to the Brazilian market. Thus, it is not clear how the authors arrive at rice exports by 2001 and 2002.

The IBRE projection for corn imports of 5.4 million tons by 2001 is significantly higher than the Brazil CPPA projection and is driven in part by their higher domestic consumption. Still it is too high and contradicts the authors expectations that "there is potential for continued growth of (maize) production and for Brazil to become in the long term an important exporter," (Brandão and de Resende Lopes, page 23, 1996).

Table 17 summarizes IBRE's projections for the year 2001 for three of the most important meat products in Brazil. The first column contains Brazil CPPA projections while the second column contains IBRE's projections. IBRE projects much higher exports and lower domestic consumption (with the exception of poultry meat) than does the Brazil CPPA. The assumption of higher annual GDP growth, which we use in CPPA, may explain part of the higher domestic demand for beef and pork. However, the models are not comparable since Brazil CPPA uses income elasticities, substitution demand elasticities, etc., while IBRE uses time trends only to specify their model.

Table 16. A Comparison of CPPA's and IBRE's Projections for Brazil's Crops in 2001

	CPPA Model	IBRE Model A	IBRE Model B
A.MACROECONOMIC ASSUMPTIONS			
GDP annual growth (1996-2001)	4.25 percent	3.00 percent	1.43 percent
B. MODEL SPECIFICATION	Partial Equilibrium Dynamic model. Demand Elasticity Matrix allowing for theoretical consistency and explicit consideration of structural changes and price policies.	Use of Time Trends	Use of Time Trends
C. COMMODITY PROJECTIONS			
SOYBEANS			
Area	12,482,000 hectares	11,552,000 ha	11,552,000 ha
Yield	2.32 (tons/hectare)	2.27 (tons/ha)	2.27 (tons/ha)
Production	28,907,000 tons	26,239,000 tons	26,239,000 tons
Domestic Consumption	23,296,000 tons	23,944,000 tons	21,012,000 tons
Net Exports	5,591,000 tons	2,294,000 tons	5,227,000 tons
RICE (Rough)			
Area	3,993,000 hectares	4,912,000 hectares	4,912,000 hectares
Yield	2.91 (tons/hectare)	2.86 (tons/ha)	2.86 (tons/ha)
Production	11,633,397 tons	14,041,000 tons	14,041,000 tons
Domestic Consumption	12,962,756 tons	14,201,000 tons	13,718,000 tons
Net Exports	-1,363,946.6 tons	420,000 tons	903,000 tons
CORN			
Area	14,587,000 hectares		14,547,000 ha
Yield	2.73 (tons/hectare)		2.55 (tons/ha)
Production	39,814,000 tons		37,113,000 tons
Domestic Consumption	41,664,000 tons		42,321,000 tons
Net Exports	-1,912,000 tons		-5,392,000 tons
WHEAT			
Area	1,192,000 hectares	1,652,000 hectares	1,652,000 hectares
Yield	1.75 (tons/hectare)	1.84 (tons/ha)	1.84 (tons/hectare)
Production	2,086,000 tons	3,032,000 tons	3,032,000 tons
Domestic Consumption	8,822,000 tons	9,166,000 tons	9,038,000 tons
Net Exports	-6,752,000 tons	-6,134,000 tons	-6,006,000 tons

Table 17. A Comparison of CPPA's and IBRE's Projections for Brazil's Meat Sectors in 2001

	CPPA Model	IBRE Model
A. MACROECONOMIC ASSUMPTIONS GDP annual growth (1996-2001)	4.25 percent	Not clear
B. MODEL SPECIFICATION	Partial Equilibrium Dynamic model. Demand Elasticity Matrix allowing for theoretical consistency and explicit consideration of structural changes and price policies.	Use of Time Trends
C. LIVESTOCK PROJECTIONS		
BEEF		
Production	5,228,000 (1,000 kg)	
Domestic Consumption	4,969,000 (1,000 kg)	4,046,000 (1,000 kg)
Net Exports	258,000 (1,000 kg)	3,377,000 (1,000 kg)
PORK MEAT	1,673,000 (1,000 kg)	669,000 (1,000 kg)
Production	1,598,000 (1,000 kg)	
Domestic Consumption		1,586,000 (1,000 kg)
Net Exports	75,000 (1,000 kg)	1,421,000 (1,000 kg)
POULTRY MEAT		66,000 (1,000 kg)
Production	5,397,000 (1,000 kg)	
Domestic Consumption	4,646,000 (1,000 kg)	
Net Exports	750,000 (1,000 kg)	6,552,000 (1,000 kg) 5,572,000 (1,000 kg) 980,000 (1,000 kg)

The Impacts of MERCOSUR on Brazil

A study by Brandão, Lopes, and Valls-Pereira (BLV, 1995) has found that if all tariffs between Brazil and the rest of the MERCOSUR countries were eliminated, the following changes would occur in Brazil's trade. Brazilian exports to Argentina would increase significantly, particularly those of (1) natural resources such as forestry, lumber, fisheries, coal, oil and gas; (2) processed agricultural products such as processed coffee, sugar, cocoa, tobacco and other processed food; and (3) dairy products.

Increases in agricultural exports for regions other than Argentina were small. For the purpose of their study, BLV used a computable general equilibrium (CGE) model called Global Trade Analysis Project (GTAP). They found that the overall increase in exports of agricultural goods would be less than 10%. The only exception was dairy products.

With respect to Brazilian imports, their results showed large increases from Argentina by 2006. Specifically, Brazilian imports of processed foods would increase by 60%, the bulk of which would come from Argentina. According to their study, trade would be diverted from all other regions except the European Union and toward Mercosur. The EU and the Pacific countries were found to increase their shares of Brazilian imports. The only exception was horticultural imports from North America which showed a substantial increase. Fruits and vegetables and soybeans from North America would more than double, whereas horticultural imports from Argentina and the Pacific countries would increase very little. There would be a little increase in grain imports. Additionally, wheat imports from Canada and the U.S. would decrease and substantial import increases of rice from Asia and of grains from the EU would take place. Additional grain imports from Argentina would not be large.

AGRICULTURAL SECTOR CHARACTERISTICS: LAND USE, SUSTAINABILITY, AND RURAL POVERTY

The triple challenges of achieving food security, alleviating poverty, and conserving the environment, still remain at the center of the development debate. Transforming agriculture, the biggest user of land and natural resources and one of the largest providers of employment in Brazil, will be essential if we are to bring aid to millions of people who live in rural areas. New partnerships between the public, private, international, national, regional, local, and community based hold the key to success or failure.

This section discusses changes in the land use and distribution for the last ten years. For example, the low level of land utilization in large farms creates an uncertainty with respect to property rights and reduces the incentives for investment in the agricultural sector and becomes a source of social tension and rural poverty. Also, this section discusses the share of agriculture in GDP, trade, labor force, growth rate of agricultural GDP of livestock and crops, value of production of crops and livestock, and changes in the crop mix.

Land Use

Total area devoted to agriculture and livestock was 330 million hectares in 1985 (last Brazilian Agricultural Census) with pasture occupying 65% of this area. Livestock production occurred on approximately 200 million hectares and crops accounted for 49 million hectares. The average Brazilian farm-size was reported to be 64 hectares. However, three million farms, 53% of the rural households, had less than 10 hectares each and accounted for only 4% of the total agricultural area. The 50 thousand farms, 0.86% of the rural households in the country, with more than 1,000 hectares each accounted for 44% of the total area. Recent studies show that 70% of the area on properties with greater than 1,000 hectares is not in production (Quadros, p.54). Aggravating this distribution of agricultural land is uncertainty with respect to property rights in many areas. Without proof of ownership, farmers have less incentive to invest in the land and generally would be denied the loans even if they wanted them. This situation creates a very serious problem for potential investors in new crops. Agrarian reform should reduce obstacles that discourage farmers from investing in their land, reconstruct rural institutions and recognize producers' organizations such as cooperatives. There is pressure for agrarian reform, sustainable agriculture, land settlement policy and rural development. The new role of the state should be to facilitate rather than to direct rural development.

CONCLUSIONS AND RECOMMENDATIONS BY COMMODITY

Sector

In addition to intended and overdue changes, the recent stabilization program in Brazil has produced some negative repercussions such as high interest rates, extreme restrictions on government spending, and an overvalued currency2. These undesirable side effects have placed new limitations on agriculture and decreased profit margins for exporters and import-competing sectors. Consequently, the agricultural sector is undergoing dramatic changes in crop patterns and rural demographics.

As agricultural producers, traders, and processors have found themselves at the mercy of adverse swings in commodity prices, interest rates and exchange rates, they have come to realize that they lack the information, appropriate tools, skills or domestic institutions that would allow them to cope with these changing circumstances. The government must facilitate the adjustment process toward this new era by developing policies that will increase the productivity of producers that will survive the transition and remain in the sector, address some migration of the population from the agricultural sector and reduce the negative impacts on lower income groups.

The livestock sector is expected to continue expanding. Beef and dairy production has not modernized quickly enough and faces strong competition from other MERCOSUR countries. The development and modernization of the livestock sector will hinge on the policies implemented by tha Brazilian government in the near future. For example, the Brazilian government must provide the infrastructure necessary for the private sector to assume a number of veterinary, animal health, disease control and animal production services. To make the livestock sector more efficient, the government must encourage foreign investment which will introduce new technology. Also, the Brazilian government must encourage more research on beef and dairy production and improve product grading, quality control, and inspection systems.

Changes in crop patterns and land use: Total area planted to wheat will decline due to competition from Argentine imports. However yields should increase because only the more productive land will remain in production. Land devoted to rice will either be stable or decrease

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[2] In August 1996 *Conjuntura Economica*, estimated that the appreciation of the exchange ratevis a vis the wholesale price index is of the order of 21% relative to the average of the period 1988/1996. Another indicator is the evolution of the price indices of tradables/nontradables in the consumer price index has dropped from 1 to 0.68. These indicators show clearly that there is an overvaluation of the currency.

slightly, but yields will increase because rain-fed rice paddies will be replaced by irrigated production. Brazil is a low-cost producer of soybeans, corn, and sugarcane. Under appropriate macroeconomic conditions, more investment is likely to be made in these three crops, resulting in an increase in their planted areas and yields. Following the same logic, it would be very profitable for the government to encourage investment in tropical fruit production in Northeastern Brazil.

Investment in transportation and storage facilities is critical for the further development of the agricultural sector. Inefficient port services, high labor costs in the ports and poor or nonexistent waterway and railway services are inhibiting growth. Preferential regulations could be used to favor segments of the transportation industry that need the most improvement. A frequently successful strategy for generating and maintaining an efficient and competitive transportation system is to use public funds to construct and maintain the right-of-way and to regulate traffic flows while allowing private firms to compete for carrying the freight. The fixed costs incurred by the government can be converted into variable costs recovered through user fees.

Attention to regional issues: The government needs to give greater attention to issues which affect entire regions and involve natural or public resources. For example, irrigation (and the attendant water management problem) is central to the development of the Northeast region and resource availability in the Center-West region is necessary to promote its integration with the existing ports in the state of Maranhao.

Creation of a reliable crop-insurance system: A system should be created through public or private insurance programs to alleviate unpredictable income losses associated with fluctuations in crop yields. There are four categories of agricultural risk ranging from those that are ideally suited to insurance to those that cannot be covered by an actuarially sound insurance program.

The first category is ideally suited to insurance because the risks are random over time, are spread over a limited geographic area, cannot be affected by management choices and have a clearly identifiable loss (e.g., hail insurance).

The second category includes natural weather hazards which affect crop production. These risks are less insurable by the private industry primarily because they affect a larger number of farmers in a given year.

The third category affects crops in areas where the probability of crop failure is high. This risk is unappealing to private industry and must be accepted by the government.

The final category of risks is one that neither the insurance industry nor the government wants to insure. Known as "moral hazard," it revolves around losses resulting from management or decision-making by the insured.

Creation of Futures Contracts: Reliance on market mechanisms such as futures contracts to cope with farmers' risk cannot readily be imposed on a newly developing economy without government oversight. A futures market can provide a useful tool for minimizing the impact of price variability. Access to such risk shifting mechanisms requires the development of a market where forward contracts can be bought and sold. These exchanges must be regulated with rules enforced by government bodies to protect the participants. A futures market is a preferable alternative to government intervention to reduce price fluctuations through price fixing or trade restrictions (Hill

and Bender, 1995). Income stability is enhanced by allowing farmers and agricultural marketing firms to shift risk to other individuals or firms who are more willing or able to assume short term risks in hopes of long term gains.

Authorizing legislation: Marketing institutions that can be developed and operated by private firms to carry out transactions such as marketing orders or commodity exchanges usually require legislation and regulation by the government before they can become operational. The government needs to enact legislation to minimize the costs of risk shifting such as those currently being incurred by grain buyers in Brazil due to impediments to their use of the Chicago Board of Trade.

Use of Contracts: Specialized crops, such as horticultural products, with low volumes but high values per acre often are grown under contracts with processors or marketing firms in developed countries. Quality control, scheduling of harvesting and uncertainties of seasonal supply and demand have made contract production the primary strategy for these goods. Government's role in these contracts generally is limited to enforcing them through the legal system. However, in a country like Brazil with newly developing markets, the government may need to assume the role of the contractor to encourage production of small volume crops that will later develop into full scale markets. At that point, these marketing functions should be transferred to the private industry.

For example, most production of processing tomatoes in Brazil can be done only on a contract basis since the growers have difficulties obtaining production loans if they do not have a contract. In the north-eastern states of Bahia and Permambuco and the southern state of Sao Paulo, an "Agroindustry Committee" and the growers negotiate the price based on costs of production estimated by the São Paulo Institute of Agricultural Economics (IEA) plus a profit margin.

An Agroindustry Committee does not exist in the central states of Goias and Minas Gerais, so prices are negotiated on a company by company basis. Contracts generally are negotiated in December and January. Under the typical contract, companies provide seeds, other inputs and technical assistance to the growers. This is an extremely useful approach which encourages farmers to enter promising new horticultural markets that have good prospects for high returns.

Agricultural Credit System Reform: High interest rates combined with a lack of available credit have ushered serious problems into the farm sector. The government, which funneled cheap credit to the agricultural sector through Banco do Brazil until the early 1980s, no longer plays a role in the system even though no viable market alternatives have developed. The present market interest rate is on the order of 15% per year and farm debt has increased from US$ 2.4 billion in 1994 to US$ 7.0 billion in 1996. The credit system, which has been treated with ad hoc measures, needs to be replaced with a forward-looking program that will allow the agricultural sector to make the necessary investments to increase its competitiveness worldwide.

Aggressive Export Promotion instead of Import Finance Restrictions: In March 1997 the Brazilian government published a Provisional Measure that restricts financing of less than 360 days for most goods imported to Brazil. (Official Gazette, March 1997). That measure is expected to decrease Brazilian imports by 30% to 40% (USDA/FAS/ AGR: BR9724V).

In order to improve the trade balance in the long run, Brazil should make greater efforts to employ pro-active policies that will encourage growth in agricultural production and exports rather than reactionary policies which attempt to deter imports. Its export performance has been unsatisfactory even for a country with a large domestic market. With exports equivalent to 7% of

GDP, it is exporting at a level below that of India and only a quarter that of Mexico (The Economist, May 17, 1997). To boost its sluggish exports Brazil will require concerted efforts by business and government. The few Brazilian firms that export tend to fill orders from abroad passively, rather than actively to promote their goods in new markets. Businessmen blame this on the "Brazil cost," which refers to the extra cost that results from inefficient state-owned infrastructure. Government needs to remove these obstacles in order to unleash Brazilian export growth potential.

Reduction of Agricultural Sector Taxes: Even though the Brazilian government has eliminated the 13% ICMS Tax (Value Added Tax) on exports, more must be done to reduce the tax burden, direct or indirect, on the agricultural sector. Any delay in reforming the tax system in Brazil will cause further losses to agriculture.

APPENDIX A

Modeling framework used: CPPA is the Country Projections and Policy analysis model-builder (Hjort, 1994, and Wainio, 1995), that is being used as a tool to analyze economic and policy changes in the Brazilian commodity markets. It was developed by the Economic Research Service (ERS), an agency of the U.S. Department of Agriculture. This framework provides a means for developing and maintaining an agricultural sector projection and simulation model, using elasticities and other parameters available in the literature. The CPPA system operates on IBM or compatible computers using the spreadsheet program EXCEL.

CPPA is a tool for (1) generating rigorous, theoretically consistent annual, long-term projections of the supply, demand, and trade of major agricultural commodities; (2) for conducting policy analysis or analyzing alternative scenarios; and (3) it enables the linking of individual country models to create price endogenous global models.

It is assumed that Brazil is a "small country" and therefore takes world (reference) prices as given3. Domestic prices are determined by policies and world prices. Domestic prices, in conjunction with land endowment, technology, and inputs, determine market supply. Market demand is determined by prices and income. Supply and demand are balanced in each market.

For each commodity, prices are projected on up to five levels: reference (world), border, export, wholesale and producer price. All prices are relative prices and they are expressed in real terms in local currency (Real is the Brazilian currency). The exogeneity of technology means that yield-enhancing technologies, and changes in feed conversion coefficients must be determined outside of the model. Similarly, with the intermediate input availability and prices. Therefore, the model implicitly imposes a perfectly elastic supply curve on inputs such as fertilizers, chemicals, and labor. There is also an implicit assumption that relative input prices remain constant in relation to one another.

There are six quantity variables for each commodity: production (for crops, the product of area and yield), consumption, beginning and ending stocks, imports and exports. Typically, five of the six

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[3] World prices are assumed to be determined by aggregate supply and demand for agricultural commodities and by worldmacroeconomic conditions.

quantity variables for each commodity are functions of prices, etc., while the sixth is calculated as a residual in order to satisfy the market clearing condition:
Production + Imports + Beginning Stocks = Consumption + Exports + Ending Stocks.

The model accounts for policy effects on domestic price determination. It does this by accommodating up to seven domestic price levels in each commodity market, with varying degrees of linkage between the world and domestic price levels. To account for resource constraints and substitution possibilities between different sectors of the economy, the mode reflects linkages within the agricultural sector, and when possible between agriculture and other sectors. Thus, it includes land use, links crop and livestock production, enables cross-commodity linkages, and has a macroeconomic component.

The Brazil CPPA (Country Projections and Policy Analysis) model produces medium-run and long-run projections of the production, consumption, and trade of 14 major Brazilian agricultural commodities (grains, oilseeds, and livestock) in a partial equilibrium framework. The model can be used to analyze outcomes of alternative scenarios concerning agricultural policy and key economic relationships. It is a dynamic (i.e., it includes lagged variables) with exogenous world price projection. Specifically, there are market clearing conditions for soybeans, soymeal, soyoil, cotton, cottonmeal, cotton oil, wheat, rice, corn, sorghum, barley, beef, pork, poultry.

There is substitution in production and demand for a commodity. The Brazil CPPA model computes annual projections of price and quantity variables for 14 commodities, based on a set of exogenous macroeconomic and policy variables. The model is structured to produce ten year forecasts, but users may specify other time frames. Historic price, macro and policy data is derived from various sources, with quantity data coming from ERS's Production, Supply and Distribution (PSD) data base. Parameter values are taken from several sources, including estimation and assumption when necessary.

Price Determination

Producer prices for soybeans, soybean meal, soybean oil, and poultry are determined exogenously. These are commodities in which Brazil has a sizable trade. The rational is that the domestic prices of the commodities cannot differ considerably from the world prices in order for trade to take place. Whereas for rice, corn, beef and veal, and pork, producer prices are determined endogenously in the Brazil model. These are commodities in which Brazil does not trade a lot. Supply (S) is defined as the sum of: beginning stocks (BS), production (PR) and imports (IM). And, demand (D) as the sum of: ending stocks (ES), domestic consumption demand (DM), and exports (EX).

(Supply): $S = BS + PR + IM$,
(Demand): $D = ES + DM + EX$,
(Excess Demand): $ED = D\text{-}S$,
(Producer Price): $PPt = PPt\text{-}1\ (1 + ED)$

Transmission of international price signals into domestic markets may be distorted, due to policy intervention. If there is full price transmission, the domestic value of the good is determined by the external value and the distortions introduced by domestic policies. If there is no transmission of external price signals, the domestic value of a good is determined by internal market conditions and policies. There are three primary means by which international price signals may be distorted. The first arises at the border, due to exchange rates, which are frequently used as policy variables. The second source of distortion arises through trade policy. If trade (i.e., import/export) taxes or subsidies are added to border prices, international price signals become further distorted. The final source of distortion enters through domestic government pricing policies. Exchange rate, trade, and agricultural pricing policy therefore contribute to the determination of domestic producer and consumer market prices, which in turn determine supply and demand for agricultural goods. Border price equals the real exchange rate times the world price plus the transportation cost: BP = RER(RP + TC)
Import price equals border price plus a unit tax: MP = BP + UT
Export price equals border price minus a unit tax: XP = BP - UT
Consumer price equals producer price plus a marketing margin: CP = PP + MMPC
Producer price equals consumer price minus a marketing margin: PP = CP - MMPC
World price: Price of a commodity at its major world market, e.g., U.S. Gulf prices for major grains.
Border price: FOB price of a commodity at the port of São Paulo. This price represents the difference of quality and transportation cost between U.S. and Brazilian commodities. Prices are calculated through regression over reference prices.
Export price: Border price plus export rebate or minus export tax. This represents the price received by the Brazilian exporter.
Producer price: Prices received by Brazilian farmers (provided by the Center for Agricultural Studies (CEA), Brazilian Economic Institute (IBRE), Getulio Vargas Foundation (FGV), Rio de Janeiro, Brazil).
There are other basic identities such as total arable crop acreage, cross-commodity linkages and technical restrictions. These relationships ensure maintenance of basic economic principles and internal consistency of the model.

Area: Area responses are based on the following assumptions:

a) Farmers make planting decisions based on profit expectations.

b) Profit expectations depend on productivity growth expectations.

c) Profitability of a crop relative to all other crops (and livestock) determine area.

Area responses are based on expected gross returns (price times yield) for own crop and competing crops. Own price elasticities are obtained from FAO. Cross-price elasticities are obtained by calculation based on bilateral relationships of crops (-1 for perfect substitutes to +1 for perfect complements), the relative importance of crops based on their acreage, and the homogeneity constraint. Adjustments are made to keep individual crop areas consistent with total cropped arable land.

Yield: Yields vary overtime in response to a variety of factors including short term input and output price fluctuations, longer term investment in research and capital, and environmental (weather, disease) factors. Yields in the Brazil model are obtained through a set of output price

response elasticities taken from FAO. In addition trend variables are included for each crop to capture long term technical and environmental changes.

Consumption: Consumption for each commodity is calculated as the summation of food, feed, crush and/ or other demand forecasts.

Food Demand: Food demand is the product of per capita food demand and population. Each per capita food demand equation has its own price and income (or GDP for proxy) as variables, and a trend. Equations are written in Cobb-Douglas form so model parameters can be interpreted as elasticities.

Feed Demand: total feed demand is first determined by calculating grain requirements for animal production for beef, milk, pork, poultry and eggs. Technical feed-livestock ratios are taken from FAO data. To this is added herd maintenance requirements for cattle and hogs, and one number for draft animals and other.

Land Constraint: The aggregate land is fixed. For example we assume that Brazil is not going to extend its frontiers. However, the distribution of land to agricultural and nonagricultural uses, as well as the distribution of agricultural land between crops and animals, varies, depending on market and other conditions. Aggregate land area is composed of three broad aggregates: agricultural, forestry and woodlands, and other land. Agricultural land can also be broken down into three aggregates: permanent crops, permanent pasture, and arable land. The land use block is structured to be compatible with the United Nations Food and Agriculture Organization's (FAO) land use database. The FAO defines permanent pasture as land that has been used five years or more for herbaceous forage crops. The permanent crops category contains land used to produce crops such as coffee, cocoa, and rubber. The various uses of arable land depend primarily on technical factors and on agricultural market conditions. For example, the use of land for crops or temporary pasture may depend on the expected profitability or return to producers from the two activities. The use of land for fallow or other non-cropped uses may be a function of soil types or other technical factors.

Structure of the Equations

The Functional Form is either linear or Cobb-Douglas constant elasticity. The generic functional form is: $Yt = a1.X1t + a2.X1t + a3.X1t + c.Yt\text{-}1(1 + e1Z1 + e2Z2 + e3Z3 + e4Z4 + e5Z5)$

where: Yt is the dependent variable in year t,
a1, c, and ej are parameters ($I = 1,2,3$ and $j = 1,...,5$),
Xit are linear independent variables in year t ($I = 1,2,3$) and
Zj is the percent change in a Cobb-Douglas independent variable,
which is defined as: $(Zjt - Zjt\text{-}1)/ Zjt\text{-}1$ $(j = 1,....,5)$

The multiple linear regression with a lagged dependent variable can be specified all $ej = 0$, such that: $Yt = a1.X1t + a2.X1t + a3.X1t + c.Yt\text{-}1$. The Cobb-Douglas function is accessed by setting $ai = 0$ and setting $c = 1$ to yield: $Yt = Yt\text{-}1(1 + e1Z1 + e2Z2 + e3Z3 + e4Z4 + e5Z5)$.

Note that the c parameter acts as a switch to activate the Cobb-Douglas specification-that is, c must equal 1 when the Cobb-Douglas function is being used.

Note that the Cobb-Douglas form is specified as a dynamic relationship; the current period value of the dependent variable is equal to the lagged dependent value adjusted for changes in the independent variables. In this form, the ei are elasticities.

Note that a key figure of the Cobb-Douglas function form is that it allows one to express the growth rate of the dependent variable (Y) as the weighted sum of the growth rates of the independent variables (the Zj). Also note that the parameters (ej) are elasticities because each equals the percent change in Y divided by the percent change in the Zj. Therefore, all parameters in the Cobb-Douglas part of the generic function should be regarded as elasticities.

At times, it may be desirable for a parameter or elasticity in a function to vary over time. A varying parameter can be used to capture the effects of a declining income elasticity for food as incomes rise, a declining rate of growth in yield-enhancing technologies, or an increasing degree of price transmission as a country liberalizes trade policy over the years.

The parameter then takes the form of $ft = f0*(1+r)t$, where f0 is the initial value of the parameter, r is the annual compound growth rate, and t is an index beginning with 0 in the first forecast year and incremented by 1 for each subsequent year.

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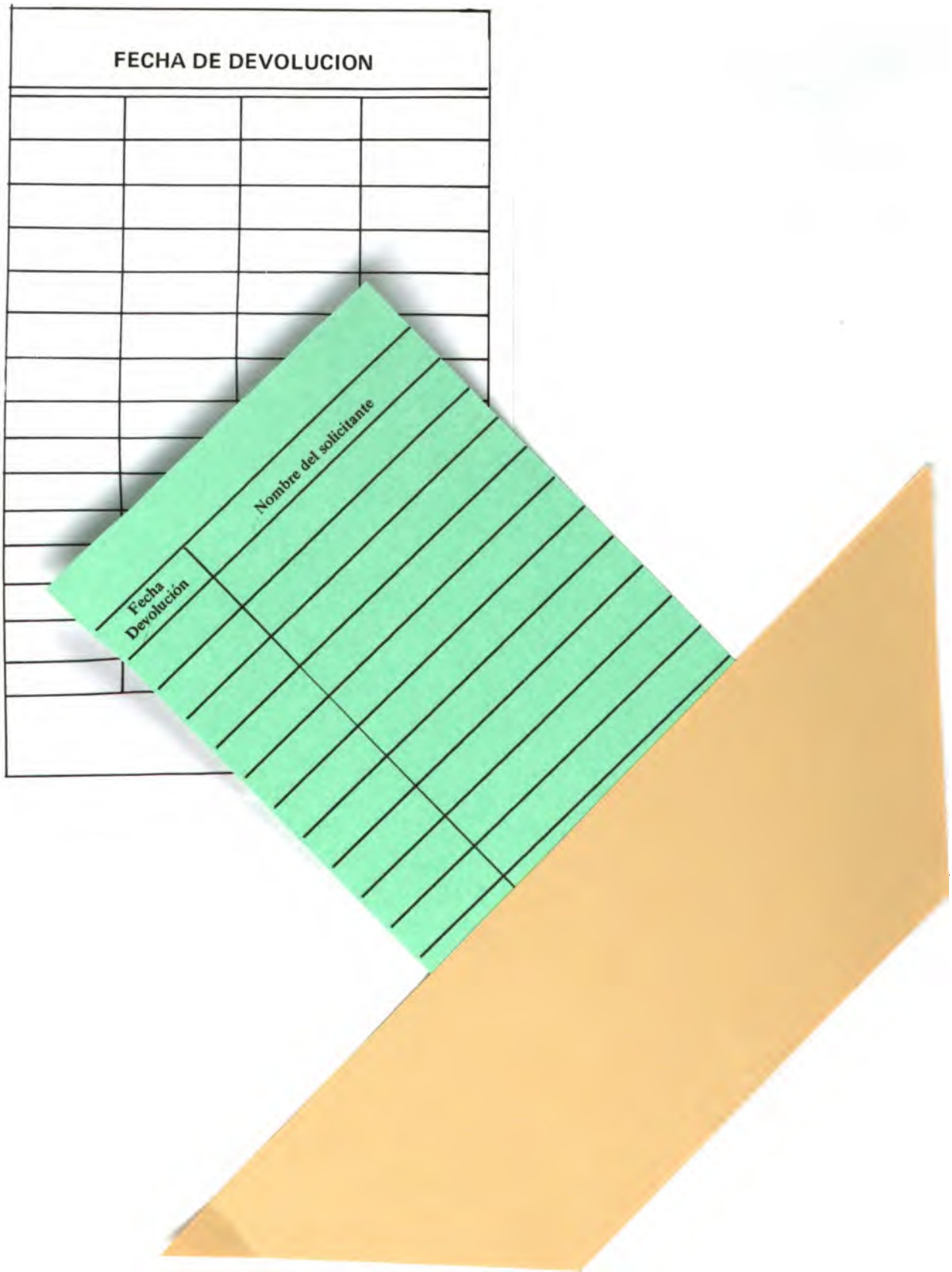
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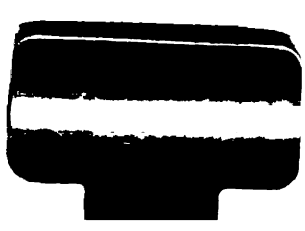

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