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INTERNATIONAL DEVELOPMENT ASSOCIATION

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Report No. 38-BR

THE ECONOMIC AND SOCIAL DEVELOPMENT OF BRAZIL

(In eight volumes)

VOLUME VI

AGRICULTURE IN THE CENTER-SOUTH

March 12, 1973

Latin America and the Caribbean Department

CURRENCY EQUIVALENT

Currency Unit: Cruzeiro. (Prior to May 15, 1970, the currency unit was called the "Cruzeiro Novo" or "New Cruzeiro", the adjective was dropped in May 1970, without any change involved.)

Exchange Rates Effective December 15, 1972

Selling Rate:	US$1.00	= Cr$6,215
Buying Rate:	US$1.00	= Cr$6,165

Average Exchange Rates

US$1.00	=	Cr$4.594	Cr$5.285
US$1 million	=	Cr$4,594,000	Cr$5,285,000
Cr$1 million	=	US$217,675	US$189,215

This report is based on the findings of a mission to Brazil in May-June, 1972, composed of:

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A. INTRODUCTION AND SUMMARY

1. This volume reviews the recent performance of agriculture in the Center-South of Brazil and analyses prospects for the decade ahead. Agriculture in the North and Northeast of Brazil is covered in Volume IV of this report which deals with the economy of those regions.

2. The greater part of the agricultural output of Brazil originates in the Center-South. In terms of gross value in 1969 the proportions by subsector were:

Table 1: REGIONAL DISTRIBUTION OF AGRICULTURAL OUTPUT

	Crops	Livestock	Total
	-------- Percent ---------		
Center-South	73	80	75
North-Northeast	27	20	25
Total	100	100	100

Source: Ministry of Agriculture.

2. Agricultural production in the Center-South is poised for a breakthrough into the widespread use of modern methods. This has been stimulated by a variety of technical and economic factors of which good markets for wheat and soya, size of holdings, shortages of seasonal labor, and ready availability of mechanical equipment linked to expand credit supplies on generous terms are among the most important. Increased production to date has been largely a function of expanded cropped area. Recent government policies crystallized in the 1972-74 National Development Plan (PND) and the export corridor program seek to change this trend in favor of higher area productivity through the use of modern inputs, such as fertilizers and improved seed.

3. In order to achieve these ends the government has indicated its intention to increase the supply of subsidized credit, intensify research efforts, expand technical assistance services, improve the input supply position, provide the necessary infrastructure for transportation and assist in the provision of additional storage and processing facilities to handle anticipated large surpluses of selected agricultural products, particularly corn, soya, citrus products and beef which it plans to export. These measures are part of the general policy to diversify and expand agricultural exports and thus ease the foreign exchange constraint which appears to be the dominant short-to-medium term impediment to Brazilian growth.

4. Although specific production programs have still to be worked out in detail, overall export targets for major products have been set for achievement by the mid to late 1970's. Exports of coarse grain and oil crops are to increase from 2.3 million tons in 1971 (1.2 million tons of corn, 0.9 million tons of soybean meal and cake, and 0.2 million tons of soybeans) to 9 million tons (5 million tons of corn and sorghum plus 4 million tons of soya). Beff exports are to increase from 150,000 tons (bone-in equivalent) in 1971 to 500,000 tons.

5. Emphasis on non-traditional exports is to be accompanied by a comprehensive program for coffee, begun in 1972, which is designed to increase average Brazilian production capacity from the present level of about 22 million bags to about 28 million bags per year by 1976-77. The coffee diversification program of the mid-1960's together with the subsequent impact on new tree planting of the recently emerged coffee rust disease and the very severe freeze experienced in 1969 explain the reduction of Brazil's coffee production capacity to its present level which is about 8 million bags below the amount needed for Brazil to maintain its share of the world market. Stocks which formerly were large now have been drawn down to about one year's supply so that remedial action is needed urgently. The new program involves the planting of 600 million new trees by 1974, and promotion of increased fertilizer use, pest and disease control on existing coffee areas. Generous price and credit incentives are integral parts of the program which leans heavily on the willingness of producers to invest in a crop subject to potentially heavy losses from pests, diseases and adverse climatic conditions and which, in contrast to its grain and oilseed competitors, is liable to remain comparatively labor intensive at a time of increasing labor shortage in the Center-South.

6. The analyses indicates that there is a fair chance of reaching production targets for non-traditional agricultural exports by the end of the 1970's. In making this judgment account has been taken of past performance and recent trends along with the likely constraints, of which credit, technical assistance and supply of inputs, particularly fertilizer, are among the most important. Suggestions are made for easing these problems by acceleration of government efforts in the fields of production-oriented research, credit-linked technical assistance, improved input supplies, and the production of beef substitutes particularly from pigs, for the internal market.

7. The analyses also indicates that Brazil is likely to increase its coffee production capacity up to levels consistent with maintenance of its present share of the world coffee market by the second half of the decade. Largely because of the incentive constituted by the government's pricing policies, the initial response of produces to the above mentioned new tree planting and treatment programs has been very favorable. Nevertheless, Brazilian coffee stocks promise to be abnormally thin during the next few years even if no unusual losses from freeze or other unfavorable climatic conditions are encountered.

B. RECENT TRENDS

8. Brazil's agriculture accounted for 20.2 percent of GDP (at market prices) in 1970, down from about 23.4 percent in 1960. Agricultural output in real terms is estimated to have grown at an annual rate of 4.1 percent in the 1960-70 period, and 3.4 percent in the 1965-70 period. Comparable figures for the economy in total are 5.5 percent and 7.8 percent (Table 1). In 1970, the national agricultural labor force totalled 13.1 million, an increase of 8 percent over the 1960 level. However, the proportion of the total labor force engaged in agriculture declined from about 54 percent in 1960 to 44 percent in 1970.

Commodity Output Trends

9. Wheat and soybean production has expanded very rapidly in recent years. The southernmost state Rio Grande do Sul, is the main production area. Output of wheat increased at an annual rate of almost 18 percent in the 1960-70 period, and reached 2.1 million tons in 1971. Soybeans showed a still higher growth rate (23.5 percent annual in the same period), and output was just under two million tons in 1971. Annual output growth rates for other important crops ranged between one and 5 percent in the decade.

10. The greater part of the output expansion derives from increases in area cropped. Harvested area increased by one million hectares annually between 1968 and 1970. Yields of most crops have not gone up significantly; some, including rice and cotton, have actually declined. However, vast tracts of land remain to be brought into cultivation. The 1970's population growth rate is estimated at 2.8 percent per year. These two factors alone suggest that agricultural production is likely to continue to rise at a significant rate, regardless of the rate of adoption of modern technology.

11. Coffee production declined from an annual average of about 26 million bags during the 1961-66 period to about 20 million bags since the latter year. The effect of the coffee diversification program is illustrated by the fact that coffee tree population and area planted dropped from 4.0 billion trees and 4.6 million hectares planted in 1962 to 2.3 billion trees and 2.7 million hectares planted in 1967. Although the 1969 freeze was harsh, reducing the 1970 crop to 11 million bags, it was no harsher than the 1963 freeze which reduced the 1964 crop to only 8 million bags. Also, the newly emerged coffee rust, while it does increase the cost of coffee production, is susceptable to treatment so that its impact on productivity can be forestalled. Nevertheless, Brazil's present production capacity clearly is well below the equilibrium level; the internal and external market for Brazilian coffee has totalled 27-28 million bags annually.

Table 2: PRODUCTION AREA AND YIELD OF PRINCIPAL CENTER-SOUTH CASH CROPS[1/]

(Production in 1,000 MT, area in 1,000 ha., yield in Kg/ha unless otherwise stated)

	1967	1969	1971
Coffee			
Production (1,000 60 kg bags)	23,374.0	20,600.0	24.600.0
Area	2,791.7	2,570.9	2,583.5
Yield (60 kg bags)	8.37	8.01	9.52
Corn			
Production	12,824.5	12,693.4	14,306.8
Area	9,274.3	9,653.8	10,708.8
Yield	1,383	1,315	1,336
Rice			
Production	6,792.0	6,394.3	7,111.1
Area	4,291.1	4,620.7	5,042.3
Yield	1,583	1,384	1,410
Wheat			
Production	629.3	1,373.7	2,132.3
Area	830.9	1,407.1	2,260.9
Yield	757	976	943
Peanuts (Unshelled)			
Production	750.7	753.9	894.4
Area	693.9	613.3	672.0
Yield	1,082	1,229	1,331
Soybeans			
Production	715.6	1,056.6	1,977.1
Area	612.1	906.1	1,589.1
Yield	1,169	1,166	1,244
Cotton			
Production	1,692.1	2,110.8	2,152.8
Area	3,719.8	4,194.7	4,459.6
Yield	455	503	483
Sugar Cane			
Production	77,086.5	75,247.1	79,595.2
Area	1,680.8	1,672.1	1,691.7
Yield	45,864	45,002	47,050
Beans			
Production	2,547.6	2,200.0	2,500.0
Area	3,650.6	3,633.3	3,743.1
Yield	698	606	668

1/ Table shows total Brazilian production of these commodities: some -- e.g. sugar cane and cotton -- are produced in Northeast as well as Center-South.

12. Rio Grande do Sul continues to dominate Brazil's production of wheat. However, generous credit terms, favorable pricing and ready markets have stimulated increased planting in other states: Parana, Santa Catarina and, to a lesser extent, Sao Paulo and southeastern Matc Grosso.

13. Brazilian wheat breeders have not yet solved the problems of mildew and stem rust, nor have they developed short-stemmed varieties capable of absorbing heavy fertilizer dressings without lodging. For these reasons, significant productivity increases appear unlikely in the short term. The probable build-up of pests and diseases is an important implication of the concentration on wheat production in recent years. Most producers tend to grow wheat on the same land year after year with the result that, endemic diseases such as mildew and stem rust, and insect pests tend to reach epidemic levels necessitating either expensive control measures or severely reduced yields. This situation occurred in some areas of Rio Grande do Sul in 1971 and can be expected to recur with increasing frequency unless high yielding pest and disease resistant varieties are widely disseminated, or cheap pest control measures are rapidly developed, and farming systems involving the cultivation of wheat over wider time intervals are adopted.

14. Production of soya has been linked to wheat through summer/winter rotation in the southern states. The wheat/soybean tandem now, however, is beginning to be separated, as illustrated by the rapid increases in area and production of soybean in states such as Sao Paulo, Goias and Mato Grosso.

Table 3: DISTRIBUTION OF SOYA PRODUCTION

State	Area ('000 ha)			Production ('000 tons)		
	1969	1970	1971	1969	1970	1971
Sao Paulo	47.1	62.2	65.9	61.0	90.1	74.6
Goias	1.6	7.9	33.1	1.9	9.8	40.3
Mato Grosso	3.1	5.8	9.1	3.4	9.0	10.8

Source: Ministry of Agriculture.

15. Production has increased at an annual rate of 35 percent since 1966, reaching a total of nearly two million tons in 1971. The 1972 production is estimated at about three million tons as a result of further increases in area and substantially higher yields than 1971 due to excellent growing conditions. Export forecasts for 1972 are about 750,000 tons of beans, compared with 200,000 tons in 1971; between 50,000 and 75,000 tons of oil and about one million tons of meal, compared with 911,000 tons in 1971. Prospects for further expansion are examined in Chapter III.

16. Production of peanuts continues to expand as a function of increased plantings in the major producing states of Sao Paulo and Parana. The annual national production growth rate has averaged 5.8 percent over the 1960-71 period, reaching 894,000 tons from about 672,000 ha in 1971. Profitability is apparently greater than for competing crops such as corn and soya in Sao Paulo (Table 7.5, Statistical Appendix), but continued expansion, which is linked to market opportunities for these crops and cotton, will also be governed by availability of input supplies and credit, both of which are likely to be channeled to other production lines.

17. Despite a 9 percent increase in cultivated area, 1971 corn production, at 14.3 million tons, approximately equalled that of the previous year. This was due mainly to poor climatic conditions. These were much improved in the following growing season and a 10 percent increase in production is predicted for the 1972 harvest. Area expansion has taken place at an annual rate of about 4 percent over the period 1960-71, most rapidly in the important corn producing state of Parana which registered an 11 percent annual gain between 1966 and 1971 when just over two million ha were planted. Yields overall have remained more or less static. In the center-south states, Parana and Mato Grosso have registered average yield increases of between 3 and 4 percent yearly; elsewhere the six-year (1966-71) trend has been slightly negative.

18. Average yields are in the range 1,200-1,900 kg per hectare and could be increased substantially by increased use of improved seed and fertilizers. Although it is estimated that about 30 percent of the corn crop in the center-south is based on seed of improved varieties, only a small proportion receives fertilizer which is essential for exploitation of improved seeds. Limited numbers of farmers in northern Sao Paulo regularly obtain yields of four tons per hectare (more than double average state yields) and could increase their yields still further with existing varieties using heavier fertilizer dressings. However, this is unlikely to occur on a large scale at present fertilizer prices. Domestic consumption of corn is said to be increasing as a result of growing demand for stock feed, particularly balanced rations for the expanding poultry industry. A recent estimate is that about 80 percent of production is fed to animals of which 86 percent is fed as grain and 14 percent as prepared rations. Prospects for further expansion are considered in Chapter III.

19. Rice is grown under irrigation in Rio Grande do Sul; elsewhere production is mainly under rainfed conditions, estimated at about 76 percent of total rice area. Output declined by 6 percent in 1971 primarily because of unfavorable climatic effects. Authorities predict a production increase of about 20 percent in 1972 over 1971 levels. The expansion in rice production in the center-western states, which began in the 1960's, is expected to continue in the future. This is because dry land rice is commonly used as an opening crop in "frontier" regions. In some cases, after two or three years, rice land is used as pasture or alternatively it may continue to be planted with crops such as corn or cotton. In Parana recently, wheat and soya has tended to follow rice on new land.

Rice is exported by Brazil but only in minor quantities (about 150,000 tons in 1971), and with internal prices far higher than world levels, increased exports are unlikely. While increases in rice output roughly proportionate to changes in internal demand may be expected, they are also dependent to some extent on the rate at which new land in "frontier" areas is opened for livestock and crop production.

20. Production of cotton in the center-south has increased at an average annual rate of about 5 percent over the period 1966-71, mainly as a result of increased plantings (cotton area increased by about 3.5 percent annually over the period). Sao Paulo continues to dominate the cotton production picture in the center-south. Emphasis on cotton has declined in Parana from 1970 in favor of soya, but has increased in Minas Gerais, Goias and Mato Grosso since 1969. Future prospects are linked closely to world price movements and competition with other crops. If, as appears likely, world prices decline, area expansion and production could be adversely affected in favor of corn and soya which can be expected to receive special attention as the result of the export corridors program.

21. The past five years have seen a 33 percent increase in production of oranges and a 29 percent increase in area planted. In Sao Paulo, which produces about four times as many oranges as its nearest competitor, Minas Gerais, area planted has increased from about 75,000 ha in 1969 to about 93,000 ha in 1971. Interest in the crop is a reflection of expanding internal demand and excellent export prospects, particularly for processed products, such as juice concentrate. Processing capacity in Sao Paulo doubled between 1970 and 1971 and it is estimated by state authorities that roughly one-third of total production is now processed. About 30 percent of Sao Paulo's plantings are not yet in production and policy is now directed towards improved productivity of existing trees, from the present level of about 60 kg of fresh fruit per tree to 160 kg, and the construction of refrigerated storage capacity for carry-over stocks at Santos and in major producing areas in the center of the state.

22. The recent growth of output of livestock products has been led by the poultry industry, with other branches being less bouyant.

Table 4: LIVESTOCK PRODUCTION

	Annual Average		% Increase
	1964-65	1969-70	1969-70 over 1964-65
	(Thousand tons carcass weight)		
Beef and Veal	1,467	1,650	12
Pork	587	660	12
Sheep and Goat	32	34	6
Goat	21	22	5
Poultry	17	74	335
Total	2,124	2,440	15

Source: Table 7.8 Statistical Appendix.

Foreign Trade

23. Agricultural products continue to make up much of the greater part of total exports despite a decline from 86 percent in 1968 to 78 percent in 1970. Although coffee is by far the major item, beef and oilseed exports have been very dynamic in recent years; the former because of rising world prices and increased value added in Brazilian processing and the latter because of increased domestic supply. Domestic sugar and cocoa production have been stagnant but world prices have been rising.

Table 5: AGRICULTURAL EXPORTS

	Exports (Annual Average)		% Increase
	1964-65	1969-70	1969-70 Over 1964-65
	---------- US$ ---------		
Coffee	733.7	913.8	25
Cotton	158.1	226.3	43
Sugar	44.9	128.2	186
Cocoa	44.0	124.4	183
Beef	37.1	90.3	143
Oilseeds	52.1	143.7	176
Forest Products	67.6	128.9	91
Cereals	29.6	64.9	119

Source: Table 7.11 Statistical Appendix.

24. Wheat makes up over half of the imports of farm products which account for 15 to 20 percent of total imports. Fruit, malt and dried milk are other important components. Despite an increase in apparent domestic wheat consumption from 2.5 million tons in 1965 to 3.9 million tons in 1971, wheat imports have decreased moderately to a current level of about 1.8 million tons annually owing to the sharp rise of domestic wheat production. Argentina supplies about one million tons of wheat annually to Brazil under a long term arrangement.

Technical Change and Modern Inputs

25. Although its use is limited mainly to coffee and wheat and consumption is low in absolute terms, fertilizer usage has increased considerably in the last few years. After the 1960-65 period of virtual stagnation, consumption doubled between 1965 and 1968, and again between 1968 and 1971 to an estimated 1.35 million tons of nutrients of which over 90 percent was applied in the central and southern states.

26. Farmers are using more pesticides. Consumption (in terms of active ingredient) doubled in the 1960-70 period from the very small base of 18,000 to 36,600 tons (Table 7.2 , Statistical Appendix). Herbicides showed a particularly rapid growth, with consumption in 1969 being more than ten times that of 1960. Much of the increase in herbicide use is attributable to the treatment of coffee against rust.

27. State Governments and the private sector have been active in promoting the production and use of improved seed, particularly of wheat, soybeans and cotton and, to a lesser extent, corn. Recent estimates are that about one-third of the corn crop and over two-thirds of the others are produced from improved seed.

28. Mechanization of farm operations in the center-south increased markedly over the last decade and especially towards its end. As compared to one tractor per 30.6 farms and per 142.8 farm workers in 1960, tractor density increased to one per 17.6 farms and 67.6 workers in 1970. Over the same period the number of farm workers per establishment declined from 4.7 to 3.8. Regional variance in the density of tractor use is indicative of variations in labor supply: as compared to one tractor per 17.6 farm establishments in the center-south in 1970 there was one tractor for every 366.8 farm establishments in the Northeast in that same year. Domestic production and imports of tractors increased as follows, since 1968:

Table 6: DOMESTIC PRODUCTION AND IMPORTS OF TRACTORS

Tractor Units	1968	1969	1970	1971
Domestic Production	9,420	9,679	14,212	21,725
Imports	653	260	180	Negligible

Source: Massey Ferguson, Brazil.

The industry concentrates on 40-50 and 50-60 HP models but interest is growing in more powerful wheeled tractors, of 70-80 HP, suitable for large-scale mechanized operations. Tractor imports are now negligible and the domestic industry -- responding to fiscal and other incentives -- has begun to export tractors to neighboring countries.

29. The rapid growth of wheat and soya production has created demand for combine harvesters. About 2,800 combines were produced in Brazil in 1971. Domestic manufacture of less sophisticated equipment such as plows, disc harrows and seeders is widespread and no data are available on total production. Imports of rather highly sophisticated agricultural machinery are being prompted by the shortage of seasonal labor in the Center-South. In Sao Paulo, for example, 40 mechanical cotton pickers were imported during 1971 and additional imports are in prospect for Sao Paulo and elsewhere despite lower producers' prices for machine-picked than for the hand-picked fiber. Experimentation with the adaptation of U.S. berry picking equipment to coffee harvesting also is underway.

Terms of Trade

30. Wholesale prices for farm products have increased relative to prices for industrial products since the middle of the decade as shown in the following breakdown of the wholesale price index.

Table 7: COMPARATIVE TRENDS IN SECTORAL PRICES

(Base Period: 1965-67 = 100)

	General	Farm Products	Industrial Products
1960	6.89	7.09	6.72
1965	73.50	71.90	75.20
1967	126.00	127.00	125.00
1968	156.00	149.00	163.00
1969	188.00	181.00	196.00
1970	229.00	233.00	229.00
1971	276.00	292.00	269.00
June 1972	322.00	346.00	310.00

Source: Getulio Vargas Foundation, Conjuntura Economica, April 1972, Vol. 26.

31. Prices received for individual products between 1967 and 1971 (Table 7.4, Statistical Appendix) illustrate that increases have been greatest for coffee, manioc, beans and peanuts and least for wool, tobacco, potatoes and seed cotton. However, seed cotton prices increased sharply in 1971 from relatively low levels in 1968 and 1969. The effect of increased world prices for beef and expanded exports between 1970 and 1971 are reflected in price movements of fat steers and to a lesser extent pigs and poultry, all of which rose sharply from 1969 levels as shown below.

Table 8: FARMGATE LIVESTOCK PRICE MOVEMENTS

(Index: 1966 = 100)

	1969	1970	1971
Steer for Beef	143	197	274
Fattened Pig	187	232	279
Chicken for Slaughter	143	203	241

Source: Getulio Vargas Foundation; Conjuntura Economica.

32. Although data on land prices generally are lacking, there is little reason to doubt that they are rising. In Sao Paulo, for example, prices of the five classes of agricultural land have more than doubled on a current cruzeiro basis between 1969 and 1972 (Tables 7.13 and 7.14, Statistical Appendix). Prices of first class cropland in January 1972 lay between Cr$1,455 and Cr$3,270 per hectare (US$249 and US$559 per hectare, respectively) for pasture land they varied between Cr$775 and Cr$1,460 per hectare (US$132 and US$250 per hectare, respectively) depending on locality.

33. It is not possible to obtain representative data on the relative profitability of major crops throughout the Center-South because of wide variations in land capability, farming practices and other factors. The Sao Paulo Secretary of Agriculture regularly produces information of this kind for selected major crops (Table 7.5, Statistical Appendix), but its reliability is suspect on the grounds that assumed production practices and yields apply to the most efficient producers in the state. Nevertheless, Sao Paulo data on the per hectare profitability of major crops probably is indicative of (a) trends in overall agricultural profitability and (b) trends in the relative profitability of alternative crops. Thus, it appears that on average there has been a substantial improvement in profitability since the 1965-67 period when the government was giving primary emphasis to reducing the rate of inflation. Moreover, of the six crops shown, by far the largest increase in profitability appear to have been that of coffee production. In 1971-72, gross profits per hectare of coffee production as a percentage of costs were almost three times as large as in the case of the next most profitable product, soybean.

C. AGRICULTURAL CREDITS

34. Since 1966 the stock of agricultural credit in Brazil has grown at an average annual rate of more than 19 percent in real terms. Agricultural credit growth has been much faster than the growth of gross agricultural product (GAP), the stock of agricultural credit having increased from 20.8 percent of GAP in 1966 to an estimated 37.5 percent in 1971. Bank credit is more concentrated in agriculture than in the rest of the economy; the 37.5 percent ratio between agro-credit and GAP in 1971 contrasting with a 24.0 percent ratio between total agro-credit and GDP. Moreover, this concentration has increased in recent years; bank credit was almost 1.6 times more concentrated in agriculture than elsewhere in 1971 as compared to about 1.4 times in 1964 (see line 9 of following table). On the other hand, the rapid growth of agro-credit has not been proportionately greater than that of total credit; the agro-total credit ratio remained roughly constant at about one-third throughout the period. Moreover, the tremendous growth of non-bank credit to the private sector which also has taken place during this period (see section of Volume I) has been channelled almost exclusively to the industrial sector. Thus, the economy has by no means accorded highest priority to agricultural development in its allocation of credit resources.

Table 9: AGRICULTURAL CREDIT - ITS RELATIONSHIPS TO TOTAL CREDIT AND TO GROSS DOMESTIC AGRICULTURAL PRODUCT

(Monetary Values in billions 1971 Cr$)

	1967	1968	1969	1970	1971
1. Agricultural Credit	7.3	7.1	11.1	14.8	17.2
2. Total Credit Private Sector	22.0	21.4	33.4	45.5	54.3
3. Agro/Total Credit	.332	.332	.332	.325	.318
4. Gross Agricultural Product	33.4	34.1	36.6	40.9	45.9
5. Gross Domestic Product	138.2	149.3	169.9	202.4	225.9
6. GAP/GDP	.224	.228	.216	.202	.203
7. Agro-Credit/GAP	.219	.208	.303	.362	.375
8. Total Credit/GDP	.159	.143	.197	.225	.240
9. Agro/Total Credit Concentration Ratio (7/8)	1,377	1,455	1,538	1,609	1,563

Source: Table 7.39, Statistical Appendix.

Institutional Structure of Agricultural Credit

35. The rapid growth of agricultural (and other) credit in the past eight years has been, in large measure, due to the success of the public sector in mobilizing savings. However, profound changes in the institutional framework of agricultural credit made since 1964 have also contributed to absolute and relative increases in the concentration of credit in agriculture. Installation of mechanisms for directing bank credit to agriculture in comprehensive fashion began with the creation of the National Monetary Council (CMN) and Central Bank of Brazil (BACEN) in 1964 (Law 4595). This was followed by the National Rural Credit Law of 1965 (Law 4829) which incorporated the Bank of Brazil (BB), the Northeast and Amazon regional development banks (BNB and BASA), the National Cooperative Credit Bank (BNCC), the National Economic Development Bank (BNDE), the Federal Savings Banks (CEF), the state banks and the commercial banks in a rural credit system subject to norms to be established by the CMN and implemented by BACEN. One of the most important of these norms is that which requires commercial banks to apply at least 10 percent of their deposit resources in the agricultural sector, either directly -- through their own lending operations -- or indirectly -- by depositing equivalent amounts in the Central Bank's National Rural Refinancing Fund (FNRR-Resolution 69 of 9/22/67).

36. FNRR is one component of BACEN's General Fund for Agriculture and Industry (FUNAGRI). Agricultural credit rediscounts from this fund amounted to about 12 percent of total agricultural credit outstanding as of end-1971 and to a substantially larger percentage of that portion of agro-credit falling outside the ambit of such semi-autonomous operations as the system of coffee financing and the system of minimum price support financing and commodity purchase. Besides the above-mentioned commercial bank resources, funds repassed through FUNAGRI include, inter alia:

(i) cruzeiro counterpart resources from various AID program loans and a fertilizer loan;

(ii) IDB credit lines for livestock development in the Northeast and for small to medium agriculture;

(iii) an IBRD loan for livestock development in the Center-South together with counterpart government resources (FUNDEPE);

(iv) cruzeiro counterpart resources from various PL-480 commodity loans;

(v) cruzeiro counterpart resources from a Canadian wheat loan;

(vi) resources generated by the sale from IBC stocks of coffee for internal consumption;

(vii) FUNAGRI's own resources in the form of repayments and interest earnings; and,

(viii) federal budgetary resources as -- for example -- the PROTERRA allocation for modern inputs and land purchase credit in the Northeast.

37. Although the Bank of Brazil continues to be the predominant source of agricultural credit, the 10 percent requirement of Resolution 69 and the option of discharging it by transferring equivalent resources to FNRR has been crucially important to the direction of commercial bank resources into agriculture. The share of commercial bank (including refinanced) in total outstanding agricultural credit rose from about 10 percent as of end-1966 to 22 percent as of end-1970.

Table 10: SOURCE DISTRIBUTION OF AGRO-CREDIT, 1970

	Millions Current Cr$	% Distribution
Bank of Brazil	7,741	62.9
Banks of Northeast and Amazon	494	4.0
Official State Banks	1,348	11.0
Commercial Banks	2,719	22.1
Total	12,302	100.0

Source: Table 7.38, Statistical Appendix.

38. Having had little past experience in agro-credit operations, the commercial banks tended to concentrate the required 10 percent of deposit resources in agro-marketing operations and with larger producers. Resolution 69 had imposed a maximum 18 percent limit on agro-credit interest rates. At first the spread between this rate and the interest earned by commercial banks on amounts transferred to FNRR under Resolution 69 was 12 percentage points. This encouraged the banks to discharge the maximum portion of their rural credit obligation through direct lending. Thus, the CMN has reduced gradually this spread in an effort to attract a greater proportion of Resolution 69 funds into FNRR. As of February 1972, the spread was reduced to 5 points, hardly enough to cover the administrative costs of direct lending. The mechanism -- in effect -- now transfers rural credit resources from those banks with little agro-lending capability to those with relatively developed capability.

39. In addition, CMN, as of September, 1968 (Resolution 99), imposed direct controls on the bank's own allocations under the 10 percent rule; requiring that at least one-third by value of such application be for production rather than marketing credit and that at least 10 percent by value -- and 70 percent by number -- be directed to "small farmers" (defined in terms of the size of the individual operation; i.e., less than or equal

to 50 times the minimum monthly wage). These controls reinforce the effect of the small spread between maximum interest rates and the interest earned by banks on transfers to FNRR in terms of limiting agro-lending to qualified banks.

40. In 1971, about 100 of Brazil's 200 commercial banks were directly applying rural credit, in almost all cases with refinancing from FUNAGRI. For the last two years the operations of these "rural credit agents" have been subject to a comprehensive set of priorities known as the "Rural Credit Program (PASEP)". PASEP-1972 groups financeable operations into three priority categories -- A, B, and C -- for each state and, in some cases, for micro-regions within states. It requires that at least the first 50 percent by value of rural credit go for category A operations, at least the next 30 percent for category B operations and limits category C operations to 20 percent of the total. For all states, financing of modern inputs (fertilizer, improved seeds, etc.) and machinery procurement is included in category A regardless of the end product involved. The other priorities are articulated on a commodity basis. For machinery financing FUNAGRI will refinance up to 90 percent of the total operation. In all other cases, the FUNAGRI input is limited to 70 percent.

Cost of Agricultural Credit

41. Interest rate maxima have been imposed on Brazilian agricultural credit operations for many years. The most recent adjustment of these maxima was made by CMN Resolution 209 of February 1972. The maximum interest rate schedule contained in this resolution and in that previously in force (Resolution 140 of March, 1970) are as follows:

Table 11: MAXIMUM AGRICULTURAL INTEREST RATES

	Res. 140 3/70	Res. 209 2/72
For loans greater than 50 times the largest minimum monthly wage (about US$2,350)	17%	15%
For loans either less than or equal to the above amount or made to producers' cooperatives	13%[1/]	13%
For all credits conceded to finance the acquisition of modern inputs (e.g., fertilizer, lime, improved seed mineral and protein feed supplements, fungicides, herbicides, pesticide, semen, veterinary medicines; agricultural machinery is not classified as a modern input unless the use thereof is provided by a specialized entity or cooperative)	7%	7%

1/ Under Resolution 140, loans to producers cooperatives greater than 50 times the minimum wage bore a maximum interest rate of 15 percent.

Source: Central Bank of Brazil.

Not all agricultural credit operations are subject to these particular maximum interest rates. Loans refinanced by the Central Bank with external resources are subject to special interest arrangements set for each credit line. In the case of the IBRD-financed livestock development program -- for example -- subloans bear ex post monetary correction (proportionate to changes in the exchange rate or, alternatively, to changes in the livestock products price index) plus a 7.25 percent nominal interest rate. Coffee production loans, on the other hand, bear a nominal interest rate of only 4 percent while credits for the planting of coffee trees and for readjustment of spacing, treatment with fungicide and pesticide, and fertilization of coffee trees bear a nominal interest rate of only 3 percent, neither of these coffee credit lines bear monetary correction. Also, under the PROTERRA program for the regional development of the Northeast, "modern inputs" credit bears zero nominal interest while tractor financing is made available at 15 percent nominal interest. Terms for rural credit range up to three years in the case of working capital credit ("custeio" -- which can include the procurement of modern inputs) and up to seven years in the case of investment credit. Much of the working capital credit actually extended falls in the 60-180 days range, however. The extent to which the rural credit system will cover the total cost of the operation involved varies widely. Most Bank of Brazil crop financing covers 60 percent of crop value estimated at the support price when one is applicable or at the market price when no support price applies. Wheat and coffee crop financing are special cases, the former covering 45 percent of crop support price value and the latter 100 percent of crop value at the IBC guarantee price. Investment credits cover from 50 to 100 percent of procurement costs depending upon the type of investment.

42. Although their control of the non-agricultural credit operations of the banking system is not as comprehensive as is that of agricultural credit, the monetary authorities have imposed limits on non-agricultural interest rates as well. These limits were most recently adjusted by Resolution 207 of February 1972:

Table 12: MAXIMUM NON-AGRICULTURAL INTEREST RATES

	Res. 134 2/70	Res. 207 2/72
	----- Percentage ----	
Credit Financing the Production of Goods and Services		
60 day term or less	21	18
More than 60 day term	24	21
Personal Credit	No limit	34.5

Source: Central Bank.

The commercial banks tend to require compensating balances averaging about 30 percent of respective loans for non-agricultural credit. This means that effective interest charges on non-agricultural production loans up to the 60 day-term and above will average about 24 and 30 percent, respectively. The 2 and 3 point downward adjustments of maximum interest rates effected, respectively, by Resolutions 209 and 207 for agricultural and non-agricultural credit form part of the government's program to reduce the rate of inflation from the 20 percent annual rate obtaining during the last few years to 15-16 percent in 1972. The fact that the downward adjustment of agricultural rates was smaller than either the anticipated decline of inflation or the adjustment of non-agricultural rates means that -- save for the highly subsidized lines destined to promote regional development and improved agricultural productivity -- agricultural credit subsidization will decline slightly in 1972. Nevertheless, with the nominal opportunity cost of capital equal to at least 27 percent in 1972 (the rate of price increase, 15 percent, times the arbitrarily estimated real opportunity cost of capital, 10 percent),1/ agricultural credit in Brazil remains heavily subsidized.

Distribution of Agricultural Credit

43. Brazil's elaborate agricultural credit mechanism has distributed credit fairly widely over the range of agricultural commodities as well as by economic category. In 1970 about 45 percent of total new agricultural credits were destined to cover production costs, 28 percent marketing costs and 27 percent investment outlays. Table 11 compares the value of these credits with the value of agricultural production in 1970. The insight given by this table into the relationship between production value and credit is only very general in nature owing, among other things, to lags in the true relationship between credit and output, variations among commodities in harvesting periods and climate-related variations in the level of individual commodity productivity. Nevertheless, the table gives some idea of the commodity emphasis of the credit system and of the extent to which commodity output benefits from credit. Column IV of the table shows that the relationship between the value of production credit and commodity output varies from lows of 2.2 and 5.2 percent in the case of manioc and beans -- important subsistence crops -- to highs of 47 and 36 percent in the case of coffee and soybeans. The production of cotton, wheat, peanuts, corn and rice also benefit relatively intensively from production credit, especially when located in the center-south. Whereas livestock production benefits fairly little from production credit, investment credit is much more highly concentrated in the livestock subsector than in the crop subsector. The absence of a commodity breakdown of credits conceded to production cooperatives biases these statistics to some extent but not severely; credits to cooperatives (for both direct expenditure and repass) constituted only 9 percent of total new agro-credit in 1970.

1/ $(1 + 0.15)(1 + 0.10) - 1 = 0.265$.

Table 13: COMMODITY DISTRIBUTION OF AGRICULTURAL CREDIT OPERATIONS, 1970

(Monetary Values in Millions Current Cruzeiros)

	Value of Credits I	Percent of Total Credits II	Production Value III	Credits Production IV
Production Credits	1,111.2	44.8		
Cotton	400.4	4.4	1,343.5	.298
Peanuts	81.6	0.9	336.8	.242
Rice	433.7	4.7	2,254.8	.192
Cacao	58.1	0.6	376.0	.155
Coffee	695.7	7.6	1,477.2	.471
Sugar Cane	286.5	3.1	1,578.9	.181
Beans	75.7	0.8	1,453.9	.052
Manioc	31.0	0.3	1,397.1	.022
Corn	486.8	5.3	2,198.9	.221
Soybean	155.7	1.7	430.0	.362
Wheat	262.3	2.9	882.3	.297
Other Crops	352.0	3.8	3,750.7 1/	.094
Livestock	452.5	4.9	6,580.0	.069
To Cooperatives	339.5	3.7		
Marketing Credits	3,589.3	28.2		
Crops	1,682.3	18.3	17,480.1	.097
Livestock	486.1	5.3	6,580.0	.074
To Cooperatives	420.8	4.6		
Investment Credits	2,481.9	27.0		
To Crop Producers	1,094.6	11.8	17,480.1	.063
To Livestock Producers	1,309.1	14.3	6,580.0	.199
To Cooperatives	78.3	0.8		
Total Credit	9,182.4	100.0		
Crops	6,096.1	66.3	17,480.1	.349
Livestock	2,247.7	24.5	6,580.0	.342
Cooperatives	838.6	9.1		

Source: Central Bank of Brazil

1/ Calculation on the basis of slaughterhouse production value assuming that livestock producers value equals two-thirds slaughterhouse value.

44. The regional distribution of agricultural credit operations is very skewed. In 1970, the number of agricultural credit contracts per farm ranged from a high concentration of one credit per 1.7 farms in the Southeast region (states of Minas Gerais, Espirito Santo, Sao Paulo, Estado do Rio and Guanabara) to a low concentration of one credit per 16.7 farms in the Northeast; Brazil's poorest region. By value the Northeast received 10.8 percent of total new agricultural credit in 1970 while producing some 21 percent of Brazil's total GAP.

Table 14: REGIONAL DISTRIBUTION OF AGRICULTURAL CREDIT OPERATIONS, 1970

	Value of New Credit 1/	% of Total Credits by Value	Number of New Credits 2/	% of Total Number of Credits	Number of Farms 3/	Number of Farms per Credit
North	91.8	1.0	7.8	0.7	n.a.	n.a. 4/
Northeast	994.4	10.8	132.8	11.2	2,213.1	16.7
Southeast	4,574.3	49.8	550.5	46.3	930.8	1.7
South	2,924.4	31.8	427.2	36.0	1,274.6	3.0
Center-West	597.5	6.5	69.9	5.9	253.3	3.6
Total	9,182.4	100.0	1,188.2	100.0	5,000.0 5/	4.2

1/ Millions cruzeiros.
2/ Thousands of credits.
3/ Thousands of farms.
4/ This portion 1970 agricultural census results not yet available.
5/ Estimated.

Source: Central Bank of Brazil.

45. Table 14 suggests that only about one in every four farm establishments was the recipient of agricultural credit in 1970. This is only a gross order of magnitude indicator, however, since it does not take into consideration:

(i) the fact that some farmers received more than one credit during the year; and,

(ii) the fact that Brazil's rural credit statistics do not cover the recipients of subloans made by agricultural cooperatives.

Agricultural Credit Cooperatives

46. This last is frequently cited as a source of considerable bias in the apparent farm coverage of Brazil's rural credit system. However, credits made available to cooperatives for repass totalled only 5.4 percent of total new agricultural credit by value in 1970. Moreover, 89

percent of these credits by value and 92 percent by number of contracts were destined to the Southeastern and Southern regions of the country so that, in regional terms at least, they did not alleviate the skewness of the overall credit distribution. On the other hand, cooperative relending activities probably do mean that the farm/credit ratio is significantly lower in the Southeast and South than is suggested by Table 14.

47. Not only the commercial banks but also the official "rural credit agencies" have given relatively little attention to the credit needs of the small farmer. The Rural Credit Department (formerly the Agricultural and Industrial Credit Department) of the Bank of Brazil, which is the main channel for agro-credit in Brazil (about 60 percent of the total outstanding as of end-1970), increased its rural credit applications by more than 100 percent over the 1964-71 period in constant value terms but only by 33 percent in terms of the number of credit contracts. Moreover, about three-fourths of the latter was attributable to increases in agro-investment credit operations indicating that the increase in the number of beneficiaries probably was considerably smaller than the increase in the total number of credits.

48. The Government has established the National Cooperative Credit Bank (BNCC) to attack directly the problem of smallholder credit access. BNCC was created in 1951 but remained dormant until reorganized in 1966. In 1970 it made loans to cooperatives totalling Cr$167.0 million or about 20 percent of total bank loans to cooperatives made in that year. Midway in 1971, BNCC's capital consisted of Cr$55.6 million in paid up Government and cooperative share subscriptions. The BNCC administers a revolving fund which in mid-1971, amounted to about Cr$87 million and consisted of resources made available by the Central Bank and, to a lesser extent, by the Inter-American Development Bank and USAID. BNCC's deposit resources are very small; they amounted to only Cr$21.1 million midway in 1971. Some Cr$9.3 million in Central Bank rediscounts completed the resources available to BNCC at that time. Clearly, one of the principal problems of the BNCC is limited access to funds. By their nature, BNCC's clients do not constitute a significant source of deposit resources. In addition, the BNCC has had a high default rate on its loans which, together with the fact that its nominal borrowers interest rates are limited to 13 percent tends to erode the real value of revolving funds and to lead to decapitalization.

49. In December, 1971 the Government promulgated new cooperative legislation which calls for budgetary resources to be channeled to the BNCC by the Ministry of Agriculture and the National Colonization and Agrarian Reform Institute (INCRA). The BNCC anticipates that these resources will enable it to double the real value of its annual lending by 1974. This legislation also made it possible for cooperative members to transfer commodities to the cooperative without such transfer being subject to state value-added taxation, thereby facilitating greatly the operation of marketing cooperatives.

Agricultural Credit and Extension

50. The government attaches great importance to the linkage of credit and extension services. Not only is this linkage an apt device for promoting technological improvement but it also is important from the point of view of forestalling the misallocation of resources which tends to result from credit subsidization. Especially in this second sense it is significant that the rural credit agencies are obliged statutorily to take into account input standards as well as product volume and production costs and to limit and supervise their individual lending operations accordingly. Thus, while only a small portion of agro-credit presently is accompanied by formal extension work, most of it has some technical orientation. However, the need for more sophisticated loan orientation and supervision has increased markedly with the adoption by the government of its highly subsidized "modern inputs" agricultural credit line. The risk of resource misallocation is greater when inputs include a variety of technical factors than when they are limited largely to labor, seed and transportation.

The Price Support Program

51. Cotton, peanuts, rice, manioc, beans, soya, sisal, corn and castor beans benefit from a price support system. Minimum prices set for these commodities have increased at a weighted average annual rate of about 5 percent in real terms since 1965. The system provides for purchase of these crops at the support price by the Commission of Production Financing (CEP). However, purchase is not the main mechanism employed by the system to implement support prices; the main reliance is on production credit which, as indicated, is extended by the rural credit system in function of the support price. Hence, with the exception of rice which the government has sought to stockpile for price stabilization purposes, CFP purchases have been almost negligible in recent years and actual commodity prices generally have exceeded support prices.

52. A number of commodities -- coffee, cacao, sugar, beef and wheat -- are subject to special price regimes. Market levelling mechanisms have been developed in the cases of coffee, cacao and sugar; export taxes on these commodities generate resources available for financing buffer stocks and respective commodity development programs. Beef and coffee pricing are discussed elsewhere in this volume (see paras. 135 and 154, respectively). The government through its supply superintendency (SUNAB), purchases all wheat produced in and imported into Brazil and sells it to the millers at a price supposedly equal to the weighted average cost of supply. Even though in 1971, the support price for Brazilian wheat was still about two-thirds higher than the FOB wheat import price, the value of the support price has been reduced substantially and steadily in real terms over the last several years as part of the government's effort to improve wheat productivity. In 1971 the wheat support price (in this case, identical with the actual price) stood at 66 percent of the 1965 level in real terms. This progress not withstanding, the government has experienced severe pressure to keep bread prices down. Thus the price at which it sold wheat to the millers in 1971 was around 20 percent below the break-even point.

Table 15: WHEAT PRODUCTION, IMPORTS AND PRICES

(In thousand metric tons and 1971 Cr$/metric tons)

	1965	1966	1967	1968	1969	1970	1971
Production	585	615	629	856	1,374	1,844	2,132
Imports	1,902	2,467	2,433	2,417	2,237	1,957	1,763
Apparent Consumption	2,487	3,082	3,062	3,273	3,611	3,801	3,895
Domestic Producers' Price	804	736	685	667	649	590	531
FOB Import Price	429	342	361	343	333	296	317
Domestic/FOB Import Price	1.87	2.15	1.90	1.94	1.95	1.99	1.68

Source: SUNAB and Ministry of Finance.

D. AGRICULTURAL DEVELOPMENT STRATEGY

53. Brazil's 1972-74 Development Program projects a 7 percent annual average rate of agricultural sector growth. In the center-south the strategy for achieving this growth emphasizes the installation of modern commercial agriculture capable of producing large exportable surpluses in several commodities and of increasing Brazil's self-sufficiency in the case of presently imported commodities, principally wheat. The export corridors program, directed towards the construction of infrastructure to develop the catchment areas of five principal ports, is an integral part of the national strategy to promote increased exports of non-traditional products of which corn, sorghum, soybeans, beef and orange juice are the most important.

54. The section of the development program dealing with agriculture in the center-south proposes six major groups of activity:

(i) Development of technology.

(ii) Expansion of cropped area.

(iii) A national livestock program.

(iv) Forestry development.

(v) Modernization of the supply system.

(vi) Financial and Economic Support Programs.

Development of Technology

55. The program for developing agricultural technology includes measures to expand agronomic research and to promote increased supplies and uptake of improved seeds, fertilizer and lime, pesticides, mechanization and technical assistance.

56. The expanded agronomic research program, totalling about Cr$165 million (including a Cr$46 million USAID loan) covers a wide range of crops and is to be implemented through selected federal and state research institutes and universities throughout the country. USAID participation will be through contracted groups from U.S. universities, over a five-year period. The U.S. groups are to be based at selected Brazilian universities, but will also utilize federal and state facilities as required. In contrast to much of the rest of the national research program the USAID component is primarily commodity based and will employ an inter-disciplinary team approach to research on corn and sorghum, rice, beans, soya and forages.

57. The program for developing production and distribution of improved seed has component projects for the center-south (Cr$122 million) and the northeast (Cr$38 million). IDB financing (US$10 million) has been obtained for the center-south project which is to be implemented over the period 1972-74. The following increases in the use of improved seed for eight major crops are proposed in the center-south by 1974:

Table 15: IMPROVED SEED USE TARGETS

(Improved Seed as Percentage of Total Planted)

Crop	1969	1974
Cotton	79	100
Peanuts	2	42
Soya	67	81
Potatoes	13	35
Beans	0.2	22
Corn	30	62
Rice	6	27
Wheat	69	88

Source: 1972-74 Development Plan.

Project activities will include research on improved varieties and seed technology; production, processing and storage of foundation seed stocks; commercial seed production, inspection and certification; and personnel training. Implementation of the program is proposed through joint action between federal, state and private sector agencies.

58. The PND proposes to stimulate a 55 percent increase in fertilizer consumption by 1974 from the 1971 level of about 1.6 million tons of nutrients. Major program elements include substantial increases in technical assistance to farmers along with improvements in transport and distribution systems and the provision of financial incentives to fertilizer producers to permit the expansion and modernization of the national fertilizer industry. An increase in the consumption of pesticides and fungicides from about 37,000 tons in 1970 to 70,000 tons of active ingredient by 1974, is also targeted.

59. Tractor usage is projected to increase from the present level of about 97,000 to about 130,000 units by 1974. Current fiscal incentives to the manufacturing industry and the special line of tractor purchase credit for farmers will be continued. The plan also proposes increased imports of more sophisticated agricultural machinery, such as combines, to supplement equipment manufactured locally. Cr$1,090 million is earmarked for the mechanization program.

60. A 65 percent increase in staffing and a 42 percent increase in the number of county extension offices of the state affiliates of the National Extension Organization (ABCAR) are the major components of the proposed expansion of technical assistance services. ABCAR had a total professional staff of about 1,900 in 1972. Federal support for the program is set at Cr$179 million but additional funds are also expected from the 21 states affiliated to the ABCAR organization.

Expansion of Cropped Area

61. The woodland savannah or "cerrado" region of the central plateau has about 1.3 million km^2 of acid laterite soils and a natural vegetation of sparse grass and scrub forest. Although it extends into 14 states, about 80 percent is located in Mato Grosso, Goias and Minas Gerais. A certain amount of spontaneous agriculture is taking place in this region. Much more intensive activity could be supported if proper technologies for crop and livestock production from the acid cerrado soils were developed and dissementated. A major need is likely to be for liming. A two-year program of land use capability investigations to supplement ongoing research in the area is proposed prior to formulation of a regional development policy.

National Livestock Program

62. Ongoing projects to improve the productivity of the beef cattle industry financed by IBRD and IDB are the major components of the Cr$272 million beef cattle investment program cited in the Development Plan. These projects are to be accompanied by provision of Cr$366 million (including US$13 million IDB loan component) for another ongoing program to control Foot and Mouth Disease. Development of the dairy industry is proposed along two lines. The existing technical assistance program (PLANAM) directed towards producers has been transferred from the Ministry of Agriculture to the ABCAR organization and an accompanying Cr$30 million

credit line has been established in the Bank of Brazil for the period 1972-74. The second line of attack is the proposed modernization of milk marketing and processing. Pre-investment studies commissioned by the Ministries of Planning and Agriculture, for completion in 1972, are expected to identify dairy industry projects for internal financing later in the plan period.

63. With the exception of a program for importation of breeder stock by the Ministry of Agriculture for the center-south states, the only measure proposed for stimulation of pig production is a scheme for improved carcass classification and price control related to the cost of pig feed. This has still to be worked out in detail. No specific projects are proposed for development of the poultry industry.

64. The Development Program makes no specific provision for development of the fishing industry and, though it notes the need to establish a balance between fish extraction and processing, and the development of specialized fisheries terminals, it gives no indication as to how this will be achieved.

Forestry Development

65. It is estimated that about Cr$1,560 million derived from the fiscal incentive program for forestry will be invested in reforestation projects in 1973-74 under the direction of the Brazilian forestry development institute (IBDF). During the plan period IBDF is to rationalize aforestation projects proposals to take account of ecological and economic considerations; it will also consolidate the legislation relating to processing and export of timber, quantify areas to be retained in forest, define an incentive system for the replacement of charcoal as fuel, and develop a policy for promoting processing and export of forest products. A forestry research center is to be established; substations are to be located in the center-south (the "araucaria" region), the center-west ("cerrados" region) and the Amazon region. Facilities are to be created for training personnel in the processing of forest products. Additional forest inventory work is also planned.

Modernization of the Supply System

66. Proposed activities are concerned mainly with completion of the construction of 15 wholesale markets located at main centers of population. It is estimated that about 30 million people will be served by this network which is to handle about four million tons of perishable foodstuffs annually by 1975. The estimated cost is Cr$585 million, of which approximately 40 percent will be provided by USAID and IDB loans. In addition to civil works, the program includes a computerized wholesale market telex information service based at Brasilia. The prime objectives of the program are reduction of marketing costs, elimination of fluctuations in the flow of food products and consequent dampening of price variations. The program is administered by a group (GEMAB) consisting of representatives of the Ministries of Finance,

Planning, Agriculture (through the federal marketing agency COBAL) and the private sector, with 70 percent of financing provided through the national development bank (BNDE) and the balance from state and municipal sources.

67. Four storage projects are also proposed for the plan period. The first, amounting to Cr$330 million, provides credit to the private sector for intermediate storage and is related to the minimum price program. Approximately one-third of total project costs will be supplied by the private sector, the balance will come from the Federal Government, the Bank of Brazil and from the recent US$30 million IBRD storage loan in the central and southern states. A second project aims to provide special credit lines through the Bank of Brazil for on-farm storage. The third proposes development of storage facilities by the national storage company (CIBRAZEM) in new areas of production, and the improvement of existing CIBRAZEM facilities in selected major production areas. The fourth is the cold storage component of the export corridors program.

Economic and Financial Incentives

68. According to the development plan, credit subsidization will continue to be used to promote agricultural growth; with particular emphasis on non-traditional agricultural exports. Rural credit will be linked to technical assistance to the greatest possible extent. Policy for the minimum price program will continue unchanged.

Conclusions

69. Most of the programs proposed in the PND were still in the planning stage midway in 1972. Thus lags in program formulation are likely to introduce some slippage in the achievement of goals. Other likely constraints include the shortage of trained manpower, and the need to rationalize the organization of public agencies operating in the agricultural sector. The following chapters evaluate prospects for meeting some of the government's goals for agriculture in the center-south.

E. EXPORT CORRIDORS PROGRAM

70. The Brazilian Government's export corridors program is designed to bring about a dramatic upturn in the export of bulk and processed agricultural products through the ports of Vitoria-Tubarao (ES), Santos (SP), Paranagua (PA) and Rio Grande do Sul (RGS). The principal aim is to increase Brazil's exports of course grains and oil crops from about 2.3 million tons in 1971 to about 9 million tons by the late 1970's. The 9 million tons would be made up primarily of corn and of soya in the form of beans, oil and cake. Sharp increases in beef and processed fruit exports also are envisaged. The program is a companion to the massive efforts being made to promote the export of minerals and manufactures and

to maintain Brazil's share of the world coffee market. However, of all the components of Brazil's export drive, that relative to non-traditional agricultural exports is perhaps the most complex, requiring an extraordinary degree of coordination between federal and local entities operating in the agricultural, industrial, transport and financial sectors.

71. The export corridors program began as an attempt to make use of the US$50 million which will have been accumulated by Brazil in the ICO's Coffee Diversification Fund by 1973. At this stage, the export corridors involved were those of: Minas Gerais -- ports of Vitoria, Tubarao; Sao Paulo -- port of Santos; and Parana -- port of Paranagua. All of these states had been subject to coffee diversification activities. The program attained entirely new dimensions and impetus after visits by the Ministers of Finance and Planning to Japan early in 1972. The Japanese apparently informed the Brazilians that, in order to diversify their supply sources, they would buy very large amounts of corn and soya from Brazil, provided Brazil could equal the CIF prices at which U.S. corn and soya are landed in Japan. Japan presently imports 8-9 million tons of coarse grains annually from the USA. One Japanese buyer alone -- Zingkoren, the Japanese agricultural federation -- is said to be prepared to take 2 million tons of corn in 1973. Accordingly, Brazil expanded the program to include a fourth corridor, Rio Grande do Sul -- port of Rio Grande -- as well as very substantial additional investment in port improvement, inland transport, storage and processing facilities.

72. Coordination at the federal level is in charge of a group which includes representatives of the Ministries of Finance, Planning, Transport, and Industry and Commerce, and the Brazilian Coffee Institute and is chaired by the Director in charge of rural credit of the Central Bank. State coordinating groups have been set up in Sao Paulo, Parana, Minas Gerais and Rio Grande do Sul. The Bank of Brazil and the development banks of the states of Sao Paulo, Parana, Rio Grande do Sul, Minas Gerais and Espirito Santo have been designated as the "financial agents" of the program -- i.e., as the intermediaries who will repass program funds to investing entities. These entities -- termed "executing agents" by the program -- include the National Railways Department (DNEF), the Ports and Navigable Waterways Department (DNPVN), the Federal Storage Company (CIBRAZEM), the storage companies of the states cited above, the agencies of the Ministry of Agriculture and state agricultural secretariats who will provide the research and extension services called for by the program and finally, the private corporations and individuals who will invest in the processing enterprises and agricultural production inputs needed to realize the output goals of the program. Although still somewhat loosely defined, the program may be divided into five major components:

(a) Improvement of Agricultural Productivity: This has to do with the agricultural research, demonstration and extension work needed to teach farmers how to achieve increased productivity, as well as with the provision of credit to finance the acquisition of modern inputs and equipment needed

by these farmers. Although no specific research or extension project has yet been put together it is estimated that these aspects of the program will cost US$13.5 million to be disbursed by March 1974. The credit requirements also have yet to be clearly defined, although it has been broadly estimated that in order to produce the exportable surpluses envisaged some US$3.7 billion in production credit, US$1.2 billion in investment credit and US$2.3 billion in marketing credit will have to be made available to center-south farmers over the 1972-74 period.

(b) Expansion of Agro-Industry: The program envisages spending some US$125 million by March 1974 on the installation of food processing and cold storage capacity. The principal elements will be beef, citrus and oil seed processing. An additional US$2 million would be spent by the same date on food technology research.

(c) Intermediate Storage Facilities: In addition to other storage projects underway in Brazil -- including that financed by the IBRD -- the export corridors program will spend an estimated US$18.5 million on intermediate storage facilities by March 1974. These expenditures are destined to install inland collection points for bulk cargo accumulation.

(d) Railways: The program relies primarily on railways rather than highways for inland transport. Improvement primarily of rolling stock and secondarily of trackage linking inland collection points with the ports is needed if transport costs are to be reduced sufficiently to make Brazilian bulk cargoes price competitive on the world market. Brazilian farmgate prices for corn and soya are substantially lower than in the USA but higher inland transport and port costs offset the lower production costs prevailing in Brazil. Some US$475 million is to be spent on the railway elements of the program; US$229 million by March 1974 and the remaining US$246 million by the end of 1976.

(e) Ports: Improvement of port depth, quayside storage and loading facilities is required if bulk carriers are to be able to enter the ports and load Brazilian cargoes expenditiously. Some US$174 million is to be spent on this phase of the program, US$104 million by March 1974 and the remaining US$70 million by the end of 1976.

73. The above description gives some idea of the chronology of the investment involved in the program. By March 1974 infrastructure will have been improved to the point where 9 million tons of bulk agricultural cargo could be drained at competitive transport costs through the four corridors. The infrastructural investment to take place between March 1974 and December

1976, would permit even larger quantities to be moved. In fact, the first chronological phase is subdivided; a crash program of port dredging, loading facilities modernization and warehouse expansion costing some US$87 million is expected to permit Brazil to increase its bulk agricultural exports by 2-3 million tons as of March 1973. The entire export corridors program -- excluding the agricultural credit mentioned in item 72(a) above, is expected to cost US$810 million, or about Cr$4.3 billion (in 1971 cruzeiros).

74. The Government has gotten underway the infrastructural components of the export corridors program; for this purpose external finance already has been obtained from Japan. Additional external finance for infrastructure, as well as for the technological and agro-industries components of the program probably will be available from official external development agencies and from the International Coffee Organization. While the infrastructure certainly will reduce the prices at which Brazilian agricultural products can be exported it is less clear that the cargo magnitudes which these investments are designed to accommodate will be forthcoming. There are a number of potential conflicts involved in the attainment of the exportable surpluses envisaged by the program. One is the possible conflict with the goals of the coffee tree planting and productivity program. The additional area -- about 600,000 hectares -- needed for coffee tree planting is not an issue, that amount of land is minuscule by comparison with Brazil's unused land resources. However, the increasing attractiveness of grain and oilseed cultivation resulting from the program, together with the emerging agricultural labor shortage in the center-south, could discourage the planting of coffee, a crop for which mechanization has not yet been developed. Moreover, unexploited land resources notwithstanding, attainment of targeted exportable corn, soya and sorghum surpluses will require very substantial productivity increases in the more accessible farming areas. This -- along with the needs of the coffee program -- will require a sharp increase in the supply of fertilizer, lime and other agricultural chemicals. Brazil's fertilizer industry is inefficient and scarcity of domestically supplied primary materials -- natural gas and phosphate -- impedes to a certain extent expansion up to more economic scale. Attainment of large exportable surpluses of corn will be especially difficult owing to the need for rations of the domestic meat industry. This is especially true in view of the fact that a large increase in beef exports also included amongst the targets of the export corridors program. Finally, targeted increases in corn and soybean exports would increase Brazil's role in world trade in these commodities from that of a residual to that of a major supplier.

75. The remainder of this chapter is devoted to projection of exportable surpluses of corn, soya and sorghum. Some commentary on Brazil's prospective role in the international market for these commodities also is included. Discussion of topics such as livestock development -- which, while important to the export corridors program, have a much more general significance -- are dealt with in the final chapter of this volume.

Corn and Soya Production in the Center-South

76. Brazil now has a substantial history of corn and soya production in the center-south states. Thus, historical trends in area cultivated and yields as well as observation of the general status of agriculture in the

center-south and the implications of both the 1972-74 national development plan and the export corridors program have been taken into account in projecting developments with regard to the area and productivity of corn and soya production.

Table 16: ACTUAL AND PROJECTED CORN AND SOYA PRODUCTIVITY IN BRAZIL COMPARED TO OTHER SELECTED PRODUCERS

(Values in Kg/ha)

	Canada	France	India	Italy	Mexico	USA	USSR	Brazil
1971-65								
Corn	4,740	3,020	990	3,280	1,050	4,100	2,230	1,290
Soya	1,930	-	-	2,020	1,950	1,630	470	1,050
1970								
Corn	5,290	5,010	1,080	4,350	1,200	4,500	2,830	1,442
Soya	2,080	-	-	1,900	2,000	1,800	690	1,144
1976								
Corn:								
Optimistic								2,558
Possible								2,006
Soya:								
Optimistic								1,691
Possible								1,438

Note: Historical figures in Brazil column are for the entire country. Projections for 1976 are for the center-south states only. Over 1966-71, yields per hectare in these states ranged tightly around average values of 1,591 and 1,165 kg/ha for corn and soya, respectively.

Source: FAO Production Yearbook 1970 and mission estimates.

77. Tables 7.21 and 7.22 of the Statistical Appendix contain state by state projections of corn and soya hectarage, yield and production in the center-south. Two projections -- "highly optimistic" and "possible" -- are made for each commodity. The former shows corn and soya production up from 12.2 and 2.0 million tons, respectively in 1971 to 31.2 and 6.8 million tons in 1976. For corn, this assumes that hectarage increases at an average annual rate of 9 percent and that productivity increases at a 10 percent pace. For soya, the hectarage increase would be 21 percent annually productivity increase about 8 percent annually. Of the 70 million hectares in new planting which this would require about half would take

place in the economic frontier states of Goias and Mato Grosso. As is shown by Table 15 above, corn productivity in 1976 would be almost as high as it was in the USSR in 1970, but only about half as great as in Canada and the USA in that same year. Still highly concentrated in the relatively developed states of Rio Grande do Sul and Parana, soya productivity in 1976 would approach that registered in North America in 1970. Note that the estimated breakdown between the two crops probably is even more tenuous than the hypotheses regarding area and productivity. It might well be that of the same area a greater share would be devoted in 1976 to soya, a higher value crop. In this case while the combined value of the two crops might be almost the same, combined volume would decline because of lower volume/ha productivity in the case of soya. Corn production has been given emphasis because of the heavy internal demand. Most of Brazil's soya production has been and will continue to be exported.

78. This "highly optimistic" projection implies superb performance with respect to all of the policy prescriptions of both the 1972-74 development program and the export corridors program regarding, inter alia: agricultural research and extension, increased supplies -- on economic terms -- of fertilizer agricultural lime, pesticides, agricultural machinery, etc. One very important performance component, for example, would be adequate research and extension work in the "cerrados" region, permitting efficient exploitation of these acid soils; another would be rapid development of an agricultural lime industry and distribution network. Domestic fertilizer production also would have very high levels of protection presently enjoyed by domestic producers reduced to no more than about one-fourth of present values. Finally, it might be difficult to induce the expansion into frontier areas implied by the "highly optimistic" projection without raising prices to levels that would be uncompetitive in the world market and which, moreover, could attract producers out of needed alternative crops such as coffee.

79. Thus the "possible" projection assumes slower growth in cropped area -- 5 percent in the case of corn and 13 percent in the case of soya -- as well as in productivity -- 5 percent in the case of corn and 4 percent in the case of soya. Under these assumptions corn and soya output in the Center-South would amount to 20.0 and 4.1 million tons, respectively, in 1976 as compared to 12.2 and 2.0 million tons in 1971.

Corn Export Projections

80. No detailed data are available on the breakdown of usage of the Brazilian corn crop. Total production and exports over recent years are as follows:

Table 17: BRAZIL - PRODUCTION AND EXPORT OF CORN

Year	Total Production	Exports	Apparent Consumption	Exports as % of Total Production
	million tons			
1966	11,371	627	10,744	5.6
1967	12,825	430	12,395	3.3
1968	12,814	1,238	11,576	9.7
1969	12,693	649	12,044	5.1
1970	14,161	1,471	12,690	10.4
1971	13,500	1,280	12,220	9.5

Source: IBGE, Ministry of Agriculture and CACEX.

These figures indicate that in recent years internal consumption has been relatively stagnant at around 12 million tons. The great bulk of internal use is for stockfeed; human consumption, industrial use and seed production account for the remainder. Some authorities claim that up to 80 percent of total production is fed as grain to pigs. However, it is difficult to reconcile this high figure with other uses, particularly since export volumes have amounted to about 10 percent of total production in 1970 and 1971, and in view of the rapid increase in amounts processed as stock feed for the expanding poultry industry. For the purposes of this analysis, therefore, the following arbitrary breakdown has been assumed:

Fed to stock as grain:	70%
Fed to stock as rations:	11%
Human consumption, industrial use and seed:	9%
Exports:	10%

Corn Used as Pig Feed

81. For 1970 this breakdown implies a grain to pig meat conversion factor of 14.6 percent:

Total corn production (million tons)	14.2
70 percent corn production fed as grain to pigs (million tons)	9.9
Pig meat production (thousand tons)	.680
Tons of corn per ton of pig meat produced	14.6

82. Assuming no substitution of pig for other meat in the Brazilian diet, an average rate of economic growth of 8 to 9 percent, a 2.8 percent demographic growth rate, a 0.5 income elasticity of demand for pig meat and no change in income distribution, domestic demand for pig meat can be

expected to increase at a 5 percent annual pace. However, in view of the government's emphasis on beef exports as well as of the possibility that the income elasticity of demand for meat in general will exceed 0.5, a good alternative pig meat growth assumption would be 10 percent. 1/ With no change in the above mentioned conversion factor the demand for corn for use as pig feed in 1976 would be likely to range between about 14.1 and 17.6 million tons. However, government imports of breeding stock plus various private initiatives for improving the efficiency of pig meat production indicate that the conversion factor is likely to improve. Assuming alternative improvements of 5 and 10 percent over the entire period, therefore, the demand for corn to be used as pig feed is likely to be in the following range by 1976:

Table 18: ALTERNATIVE PROJECTIONS OF CORN CONSUMPTION BY PIGS IN 1976

(In millions of tons)

Increase in Meat Production	1970 Conversion Level	5% Conversion Improvement	10% Conversion Improvement
Increase at 5% per year	13.3	12.6	11.9
Increase at 10% per year	17.5	16.6	15.8

Use of Corn in Compound Rations

83. The Brazilian poultry industry is expanding rapidly (birds slaughtered increased from 45 million to 62 million between 1969 and 1970). As indicated, apparently about 11 percent of total corn production in 1970 -- or about 1.6 million tons -- was used in compound rations fed mostly to poultry. Brazil's poultry industry has been very dynamic in recent years and is likely to continue to develop rapidly. Using the same alternative assumptions -- 5 and 10 percent -- that were used in projecting the growth of pigmeat production, the demand for corn to be used in compound rations is likely to range between 2.1 and 2.8 million tons by 1976.

Corn for Human Consumption, Industrial Use and Seed

84. If it is assumed that the 9 percent of total corn production consumed by humans, processed by industry and used for seed increases at an annual average rate of 5 percent, then requirements for these purposes would be 1.7 million tons by 1976.

1/ As is shown by Table 26 internal demand for meat of all types remained stagnant during the last decade. Thus the overall income demand elasticity of food in Brazil which has been estimated at 0.5 is employed in these estimates.

Possible Range of Internal Demand for Corn and Export Surplus

85. The sum of the projections of the three categories of internal demand for corn in 1976 range from a low of 15.7 million tons to a high of 22.1 million tons. As indicated above (para. 79) the possible forecast of production during that year in the center-south states is about 20 million tons. To this may be added production elsewhere in Brazil. This amounted to 1.3 million tons in 1970. Assuming 7 percent average annual growth -- in contrast to 10 percent growth in the center-south -- it would rise to about 1.9 million tons by 1976. At the mid-point of the range of demand forecasts, therefore, Brazil would produce an exportable corn surplus of about 3 million tons in 1976.

Table 19: PROJECTION OF 1976 EXPORTABLE CORN SURPLUS

(Millions of metric tons)

	Low	High	Selected
Domestic Demand Forecast			
Pig Feed	11.9	17.5	
Combined Rations	2.1	2.8	
Other Uses	1.7	1.8	
Total	15.7	22.1	18.9
Supply Forecast			
Center-South			20.0
Elsewhere			1.9
Total			21.9
Exportable Surplus			3.0

Soya Export Projections

86. The volume of soya exports has increased rapidly in recent years. This is attributable primarily to the utilization of excess of soya processing capacity installed in the mid-1960's. Internal demand for refined soybean oil has expanded sharply owing in part to a fall off in domestic peanut production. Moreover, export incentives given to soybean processers has permitted them to be more competitive in the domestic market. In other words, the profits made from exporting soybean meal and cake for which there is little internal demand probably have been partially passed on to domestic consumers of soybean oil making this product increasing competitive with peanut and other edible oils.

Table 20: PRODUCTION, PROCESSING, EXPORT AND APPARENT DOMESTIC CONSUMPTION OF SOYBEANS 1/

(Values in '000 metric tons)

		1968	1969	1970	1971 2/
Domestic Bean Production		653.7	1,056.7	1,508.5	1,977.2
Of Which:	Oil	75.7	99.2	165.7	270.3
	Cake	347.4	455.0	760.3	1,240.4
	Waste	22.3	29.2	48.7	79.5
	Non-Processed	208.3	473.4	533.7	386.9
Exports		300.4	605.5	815.0	1,124.8
	Oil	-	-	-	-
	Cake	234.5	295.4	525.4	911.4
	Non-Processed	65.9	310.1	289.6	213.4
Apparent Domestic Consumption		331.0	422.5	644.8	772.9
	Oil	75.7	99.2	165.7	270.3
	Cake	112.9	160.0	235.0	329.0
	Non-Processed	142.4	163.3	244.1	173.5

1/ All data on a calendar rather than crop year basis.
2/ Processing breakdown estimated on basis export data.

Source: IBGE: "Anuario Estatistico do Brasil"; Ministry of Agriculture and CACEX.

87. For the future it would be better for the government if the exportable soybean surplus it is promoting could be exported as beans. Brazil is unlikely to find a ready world market for refined soybean oil and the rather small amount of value-added involved in processing up to the unrefined oil, meal and cake stage is more than offset by the value of the export incentives presently being given by the government to meal and cake exporters. However, very large expansion of facilities for processing unrefined oil presently taking place in the State of Rio Grande do Sul, means that approximately the first of the several million additional tons of exportable soybean surplus being promoted by the government will have to be exported as meal, cake and unrefined oil if these facilities are to operate at a reasonable percentage of capacity. Fortunately this expansion does not include facilities for refining crude soybean oil; thus the recent rapid expansion of domestic soybean oil consumption can be expected to slowdown. On the other hand, domestic use of meal and cake as pig and poultry feed probably can be expected to continue to increase fairly

rapidly. All in all domestic consumption probably can be expected to increase by about 5 percent annually in the case of soybean oil and by about 10 percent annually in the case of meal and cake.

Table 21: PROJECTION OF SOYBEAN PRODUCTION AND USE IN 1976

(Values in '000 metric tons)

	Production	Export	Domestic Consumption
Beans	4,100	2,921	1,071
Oil	486	141	345
Meal and Cake	2,106	1,580	526
Waste	108 1/	-	-
Non-Processed	1,400	1,200	200

1/ Assumes reduction of loss in processing owing to the fact that about 30 percent of the oil will not be refined.

Source: Mission estimates.

88. The "possible" forecast of soybean production in 1976 cited above is 4.1 million tons. Assuming that internal demand for oil increases at a 5 percent annual pace, that demand for meal and cake increases at a 10 percent pace and that domestic enterprise processes about 1.1 million tons of beans more in 1976 than it did in 1971 Brazil's exportable surplus will look as it does above in Table 20. About 2.9 million tons of crude and processed soybean would be exported in that year as compared to 1.1 million tons in 1971. Of the additional 1.8 million tons about 0.8 million tons would be in the form of unrefined soybean oil and soybean cake and meal.

89. Subsequent to the data gathering and analysis which went into the calculations of this chapter, the government produced projections of corn and soya production for the country as a whole. As compared to the "possible" projections for 1976 of 21.9 million tons in the case of corn and 4.1 million tons in the case of soya cited above, the government produced estimates termed "optimistic", reasonable and "pessimistic" of 19.4, 18.5 and 16.8 million tons in the case of corn and 10.5, 8.5 and 7.5 million tons in the case of soya. The differences between the two sets of estimates are attributable in part to the greater relative emphasis given by the government to soya, vis-a-vis corn, an emphasis which may be misplaced in view of the far greater present use of corn than of soya as animal feed. There are also differences in area and productivity assumptions; the government assuming a slightly smaller increase in area and a far greater increase in productivity than does the "possible" projection of this report. By 1976 the government's "reasonable" projection would have corn yields at 2,400 kg/ha as compared to the 2,006 kg/ha shown above and soya yields at 2,000 kg/ha as compared to 1,438 kg/ha.

The government projected soya yield would be high even by U.S. standards (1,800 kg/ha in 1970 -- see Table 15). Nevertheless, owing to the emphasis being placed by the government on soya, the "optimistic" export projection made by this report (see Table 3.11, Statistical Appendix) does assume total domestic production and exports of about 5.1 and 4.0 million tons in 1976, respectively; i.e., about 1.0 million tons more in both cases than is shown by Table 20.

Sorghum Production and Export

90. The government's "reasonable" projection of sorghum production as of 1976 is 1.35 million tons of which all would be exported. Per hectare yields of 4,500 kg are assumed on 300,000 hectares. In recent years average yields of around 3,200 kg/ha have been achieved by some European countries.

91. There are no official data on sorghum production in Brazil. However, the firm responsible for importation and distribution of sorghum seed provided the following data for the 1970-71 and 1971-72 crop year:

Table 22: SORGHUM PRODUCTION

	1970-71	1971-72
Production ('000 tons)	100	315
Hectarage ('000 ha)	22.3	67.2
Yield (kg/ha)	4,484	4,688

92. The excellent yields obtained in Brazil are attributable not only to the restricted nature of sorghum cultivation thus far but also to the varieties of seed which have been used. These are based on U.S. type germ plasm imported from the U.S. and Argentina. They appear to be well suited to conditions in the center-south, particularly Sao Paulo, Parana and Rio Grande do Sul. They should also perform well in Goias and Minas Gerais, particularly where rainfall becomes a constraint on corn production. It is conceivable that sorghum production could quatruple by 1976, as is projected by the government. However, this report includes no specific projection for sorghum in its export forecasts.

World Market Prospects

93. World corn exports presently total about 25 million tons. About 60 percent of these exports are supplied by the United States. In 1971 Brazil supplied approximately 5 percent. World coarse grain exports have been projected by IBRD staff to grow at an annual rate of 4 percent through 1980. If Brazil does produce a 3.0 million tons exportable surplus of corn by 1976, therefore, this surplus would equal no more than about 10 percent of total world exports in that year. Even if Brazil continues to expand its

exportable surplus up to 5 million tons by 1980, such surplus would equal about 14 percent of world exports in that year. Thus, assuming price competitivity with the principal exporter -- the United States -- Brazil should have no difficulty with the marketing of the exportable corn surpluses projected by this report.

94. The U.S. Department of Agriculture projects world trade in oil seeds, vegetable oils and oil cake to increase at an annual rate of about 5 percent through 1980. This exceeds the 3.4 percent projected annual rate in total world consumption largely because consumption in Japan -- which imports the bulk of its requirements -- is expected to increase at an annual rate of about 6 percent while consumption in the U.S. -- which presently exports about one-third of its total production -- is expected to increase at an annual rate of only about 2 percent. Soya presently accounts for about 60 percent of total world trade in oilseeds, meal and cake and for about 20 percent of trade in vegetable oils, the seed to oil conversion rate being lower for soya than for any other oilseed save cotton. Participation of soya in the total oilseed trade is expected to increase in line with the overall increase in world oilseed production. In 1971, Brazil probably supplied about 11 percent of world soya exports expressed in terms of bean equivalent. Assuming that by 1976, soya accounts for about 70 percent of total oil cake exports and retains its 20 percent share of total vegetable oil exports, Brazil -- exporting at the projected rate of 5.1 million tons of bean equivalent in that year -- would account for about 27 percent of total world soya exports:

Table 24: PROJECTION TOTAL WORLD SOYA EXPORTS AND BRAZILIAN PARTICIPATION

(Values in '000 metric tons)

	1963-65	1971	1976	1980
1. Total Exports (Bean Equivalent) 1/	6,610	10,185	15,149	18,546
Oil	673 2/	982 3/	1,181 4/	1,366 4/
Cake and Bean	5,673 2/	8,796 3/	13,362 4/	16,438 4/
2. Brazil Exports (Bean Equivalent)		1,124	4,050	6,175
3. Brazil Participation (2/3 x 100)		11.0	26.7	33.3

1/ Assumes that the total of soya exports in oil and cake = 96 percent of bean equivalent.

2/ Assumes that 17 percent by volume of total world vegetable oil exports is soybean oil and that 53 percent of total world oil cake exports is soya cake. Total world trade and soya participation data are taken from "World Supply and Demand Prospects for Oilseeds and Oilseed Products in 1970", Foreign Agricultural Economic Report No. 71, USDA, March, 1971.

3/ Based on USDA trade forecast; assumes that soya accounted for 20 and 60 percent, respectively, of trade in oil and cake.

4/ Based on USDA trade forecast; assumes soya participation in cake exports up to 70 percent.

95. Although quite large, the increase in Brazil's soybean market share implied by this projection would still permit other soybean suppliers to increase their exports in absolute terms at an average annual rate of about 4 percent through 1976. This is, however, dependent upon the above mentioned increase in the share of soybean in the world oilseeds trade. Should this share remain constant, the soybean exports of other exporting countries would have to remain stagnant in absolute terms if Brazil were to export at the rate shown above. Of course, a reduction of the relative prices of soybean oil and cake could increase world demand and exports but with an offsetting effect on exchange earnings. The USDA projection assumes that real oil cake prices remain constant at the 1963-65 level and that vegetable oil prices decline by 20 percent below that level by 1980.

96. These projections suggest that in terms both of internal supply and world demand Brazil's coarse grain and soybean exports may well rise to about 7 million tons by 1976 and that they are perhaps even more likely to reach the 9 million ton "medium term" goal cited by the government by the end of the decade. Clearly, these projections should not be taken too seriously, especially on the supply side. Even a detailed, state by state, survey in the field -- which has not been made -- could not predict, however, the reaction of the farmer to the marketing opportunities which the export corridors program will provide.

F. PROBLEMS AND PROSPECTS

97. The natural resource endowment, existing levels of technology, and government policies towards agriculture in the center and south of the country combine to create good prospects for future development. Past performance has been encouraging and there are excellent possibilities for further improvement. The following paragraphs examine the major problems involved in the development of agricultural production in the center-south and prospects for their solution in the light of the existing institutional structure and of government policies and programs. Particular reference is made to: the organization of policy making and executing agencies; agricultural research, extension and training; agricultural credit; and modern inputs such as fertilizers, lime and agricultural machinery. This chapter examines in detail the outlook for two very important subsectors, livestock and coffee, and closes with an overall projection of agricultural growth.

Organization

98. One of the serious impediments to Brazil's agricultural development is the lack of coordination and executive responsibility which results from the fact that six central government ministries[1] and more than 30

1/ Agriculture, Industry and Commerce, Finance, Planning, Interior and Education.

decentralized federal entities exercise authority over this sector of the economy. These entities are identified in Appendix I of this volume. In addition to these federal entities state entities also exercise governmental authority in the agricultural sector. Some improvements have been made: clear definition of authority to control coffee producers' prices and other incentives achieved in the mid-1960 was crucial to reconciling activity within this subsector; recently established and effectively administered priorities for agricultural credit allocation have improved the credit mechanism as a tool for promoting exports and improving the balance of domestic supply. The efforts of the export corridors program to improve the link between infrastructural investment and agricultural exports represents another step in the right direction.

99. Many of the ongoing problems testifying to the need for additional reform have risen in the context of the regional development programs for the Northeast and North and are examined in Volume IV of this report. These include the reconciliation of agrarian reform efforts with the reorganization of the Northeast sugar industry, the need for reorganizing and expanding agricultural research and extension services in order to support agrarian resettlement efforts, etc.

100. In the center-south needs for organizational reform center on the lack of sufficient linkages between agricultural research, extension and credit facilities. Improved coordination of protectionist policies, incentives for industrial investment and agricultural development programs also is required if the farmers are to have access to modern inputs at prices which will permit them to increase their output while maintaining their competitiveness in the world market. Finally better linkage between agricultural development and improvement in the distribution of agricultural incomes will require reorientation of a number of institutions, particularly those engaged in the allocation of credit.

101. Interrelationships between the large number of institutions involved with agriculture are extremely complex: nevertheless, reference to one basic dechotomy gives considerable insight into the overall problem. Whereas agricultural research and planning and the execution of much of the rural development effort is the responsibility primarily of the Ministry of Agriculture, the funding of these efforts -- both directly and through the banking system -- is largely responsibility of the Ministry of Finance. Thus the reconciliation of agricultural development policy and fiscal responsibility has been a particularly difficult problem.

Agricultural Research

102. In Brazil, the primary responsibility for agricultural research rests with the Federal Department of Agricultural Research (DNPEA), an organ of the Ministry of Agriculture. The budget of this agency is inadequate. Its staff has stagnated over the last decade, amounting to about 850 professionals in 1972, of which about 10 percent have advanced degrees. Budgetary constraints have limited staff salaries to levels inadequate to

attract and/or retain qualified individuals. Salaries paid by DNPEA to senior staff range between Cr$1,900 and Cr$3,000 (about US$317 to US$500/ month). Universities pay comparable staff at twice their rates. Also funds allocated for the operation and maintenance of federal research facilities have declined by about 12 percent in real terms since 1965 so that these facilities now are in poor repair. With these budgetary constraints increasing amounts of research have been undertaken by other entities independently and through a multitude of protocol arrangements, which have complicated research administration and tended to blur national priorities. Even with these additional facilities the total number of researchers in Brazil per 100,000 agricultural population is very low by international standards; i.e., 0.7 researchers in Brazil compared to 4.5 in Pakistan, 79 in Taiwan and 133 in the Netherlands. Finally, in addition to its inadequate size the Brazilian agricultural research effort has been disciplined rather than commodity oriented with the result that practical solutions -- ones taking into account markets, prices and profits as well as technical relationships -- have not been forthcoming in most cases. There are exceptions to this general situation -- commodity research undertaken by the coffee and cacao institutes being good examples thereof -- which can serve as guides for other commodity -- oriented research programs.

103. Moving to remedy this situation, the Minister of Agriculture appointed a commission in April 1972 charged with responsibility for recommending measures to amplify and reorganize the federal research structure on more efficient lines. Its report, dated June 1972, identified the major problems outlined above, and proposed sweeping reforms. These centered on fundamental institutional restructuring whereby DNPEA would become an autonomous national research organization financed from both Government and private sources and freed from present restrictions on personnel and funds. The commission also recommends revision of research strategy in order to reconcile technological and economic considerations and to produce comprehensive packages of production function alternatives -- prescriptions as to appropirate mixes of land, labor and technical inputs -- on a commodity by commodity basis. Account is also taken of the need to integrate research and extension activities more closely than hitherto. Finally, staff training at all levels is emphasized. The report stresses the importance of external assistance to Brazilian research both in the detailed planning of the proposed reorganization and in subsequent implementation. Part of these proposals has already been implemented. Late in 1972 the Federal Department of Agricultural Research was, in fact, transformed into an independent, mixed enterprise.

104. This institutional reform may be welcomed as a first step towards improving the research contribution to agricultural development. Every encouragement should now be given to the formulation of comprehensive technical assistance proposals from both bilateral and international agencies. Even before this comes about, however, the opportunity should be taken to make an inventory and assessment of the existing stock of research findings. The various commodity institutes and state research entities should be called upon to assist with this inventory. It should be possible thereafter to

pinpoint additional requirements with a fair degree of accuracy. Special case should be taken to identify variance in recommended production functions introduced by farm size as well as by variables such as climate and soils. Attention should also be concentrated on the trade-offs between labor and capital intensive systems. The role of credit subsidization in determining factor mix should be examined. Finally required additional research efforts should be broken down, perhaps on a commodity and/or regional basis and costs identified in order to facilitate mobilization of external technical and financial assistance.

Agricultural Extension

105. Efforts to improve agricultural research will be vitiated unless concurrent improvements take place in the field of extension. The Brazilian Association of Credit and Rural Assistance (ABCAR) provides an official extension service through 21 affiliated state organizations. The State of São Paulo has its own extension service -- the Coordination of Integrated Technical Assistance (CATI) with about 450 professionals -- which provides more intensive coverage than in any other Brazilian state. In addition to these organizations, technical assistance is provided to farmers by commercial seed and fertilizer companies as part of their sales service and, in the center-south states particularly, by a number of private agricultural consultants who sell their services to large farmers and ranchers. Details of ABCAR staffing and operations are provided below.

106. The increasing emphasis now being placed in rural credit policy on promotion of modern inputs intensifies the need for expanded, credit linked technical assistance services as do the export corridors program and other policies emphasizing improved productivity. Legislation creating the national rural credit system provides that two percentage points of the total interest charged for agricultural production credits be repassed to ABCAR when that credit has been accompanied by ABCAR advice as to proper production practices. That this step has so far proved inadequate to enable ABCAR to keep pace with the outflow of credit is illustrated by the fact that no more than 5.7 percent of individual agricultural credit operations were accompanied by ABCAR in 1970.

107. The problem is exacerbated by the weak linkage between research activities and extension staff. In 1971 ABCAR had only 23 technicians with post-graduate qualifications. Most were posted to research institutes of the DNPEA and charged with responsibility for translating research findings into meaningful extension recommendations. However, their limited numbers, the wide range and fragmentary nature of research activities and the multitude of agro-ecological conditions encountered in Brazil suggest that the research input into ABCAR extension activities is significant.

108. The 65 percent increase in ABCAR staff targeted by the PND certainly would tend to improve the situation even if it does not completely meet Brazil's extension needs. The abovementioned recommendations of the commission on agricultural research manifest Brazil's awareness of the great need to improve the linkage between research and extension. Training of

Table 25: AGRICULTURAL EXTENSION, SELECTED DATA[1/]

A. Operating Centers, 1972	
Number	1,284
Area of coverage	3,743.3 thousand km^2
Population served	46.4 million
B. Staff, May 1972	Number
Agronomists and Veterinarians	1,455
Sub-professional	588
Social Welfare Workers	802
Other Technical	51
TOTAL	2,896[2/]
C. Average Monthly Salary 1972	
Field Agronomists (University Training)	Cr$1,600 (US$265)
Agricultural Technicians (Secondary Level Training)	Cr$ 885 (US$147)
State Specialists (Advanced Degrees)	Cr$2,360 (US$393)
D. Number of Farmers Receiving Accompanied by ABCAR-Provided Technical Assistance	
Year 1970	35,706
Year 1971	55,685
E. Percentage of Total Agricultural Credit Operations Accompanied by Extension Assistance	
Year 1970	5.7%

1/ Excludes Sao Paulo and Guanabara.
2/ Of which 23 have advanced degrees.

Source: Brazilian Association for Credit and Rural Assistance (ABCAR).

extensionists as well as researchers also will have to be increased and improved if the targeted increase in the number of extensionists is to have its full impact. A corollary of this need for improved qualifications may well be the need to increase the salaries of ABCAR professionals.

109. All of these prescriptions imply an absorptive capacity on ABCAR's part which should not be taken for granted. ABCAR's leadership should be included in the agricultural strategy-making councils of the government with a view towards testing its capacity to make needed changes as well as to taking advantage of its experience.

Agricultural Credit

110. Chapter II of this volume contains an analyses of Brazil's agricultural credit system. It suffices to iterate here the changes in agricultural credit orientation which appear to be called for.

111. Variations in maximum agricultural credit interest rates would seem to be counter productive on the supply side. Relatively low maximum rates may discourage the lender and thereby prevent credit from flowing according to the priorities represented by these variations. Thus the provision for reimbursement by the Central Bank to the financial intermediary involved of the difference between interest at the very low nominal rates incident on the "modern inputs" and Northeast credit lines and interest at the standard, 15 percent rate for agro-credit is to be welcomed. The narrowing from 4 to 2 points of the spread between the interest rate for "small" agricultural credits (less than 50 minimum wages) and the general agricultural rate effected by the government early this year also constitutes a step in the right direction but one which probably does not go far enough. The government should either extend the reimbursement mechanism to these credits as well or increase the rate on these credits to party with the general 15 percent agricultural interest rate.

112. However, these changes are not likely to be sufficient of themselves to improve very significantly the distribution of agro-credit. The principal components of the agro-credit system -- i.e., the Bank of Brazil, regional banks such as the Bank of the Northeast, and the commercial banks -- do not appear to be prepared to undertake the effort of an almost missionary nature which would be required to make meaningful inroads into this problem. This statement should be qualified by noting that the Bank of Brazil is providing good credit services to some producer cooperatives in the center-south. However, not only is this a very small percentage of Bank of Brazil agricultural operations but it involves farmers who in any case probably are not in the lower 50 percent of the size distribution of farm-owner income.

113. A specialized small holder credit institution may be required, one that would probably have to operate through producers' cooperatives if administrative costs are not to be prohibitive. The National Cooperative Credit Bank might be enabled to make meaningful progress in improving agro-credit distribution if some of its problems were resolved. The problem of

maintenance of value of BNCC funds could be handled by a government commitment to reimburse the BNCC for: (a) the difference between its borrower's interest rates and maintenance of real capital value plus administrative costs; and (b) for a measure of default. This would have to be accompanied by a thoroughgoing review of BNCC management and by a sizeable investment in human resources for promoting cooperative organization in the countryside. In addition -- in view of the continued difficulty which the BNCC can be expected to have in capturing deposit resources from its clientele -- the government should consider increasing very substantially its contribution to the capital of this agency.

114. With the general agricultural credit rate and the rate of inflation both at about 15 percent and a variety of special agricultural credit lines priced negatively, agricultural credit remains highly subsidized. The high cost of technical inputs -- especially fertilizer -- and the lack of adequate infrastructure may continue to justify some subsidization for a time. This, in turn, may not seriously misallocate resources so long as the government is careful in controlling the application of credit resources and can afford to bear the cost of this subsidy as it presently does through a variety of devices, but principally by foregoing interest on public sector deposits in official banks.

115. However, it would seem adviseable to make the value of the credit subsidy more explicit, at least in the case of investment as opposed to production credit. This could be done by wider application of ex post correction of loan principal in accordance with an index of relevant prices, preferably agricultural prices. Under these circumstances, a degree of subsidization could be fixed by setting the nominal interest rate below the real opportunity cost of capital, which can be estimated at 10 percent. Fixing the degree of subsidization in this manner has the advantage of avoiding windfall gains resulting from the price fluctuations to which Brazilian agriculture still is susceptable and, therefore, of forestalling unnecessary credit demand.

116. Moreover, as domestic fertilizer production is expanded and its price reduced and as programs like the export corridors lead to a more equal distribution of the benefits of externalities between the agricultural and industrial sectors, agricultural interest rates gradually should be brought into line with industrial and commercial rates, at least in the more affluent regions of the country. This would probably stimulate improvement in the overall supply of credit to the agricultural sector. It would also free resources presently tied up in the subsidization of credit going primarily to large farmers which could be invested in extending credit and extension facilities to smallholders.

Machinery and Technical Inputs

117. The Brazilian tractor industry should be capable of keeping pace with the 34 percent increase in tractor demand projected for the 1972-74 period by the PND. This projection is somewhat below recent trends (40 percent over the 1969-71 period) and may well be underestimated, especially in

view of the fact that the pace of agricultural product growth is expected to increase. However, this may be offset, at least to some extent, by the use of the more powerful units now being produced. In the event that a temporary gap does emerge with lags in expansion of domestic tractor production capacity, the government probably can be counted upon to liberalize tractor imports.

118. Adequacy of the supply of improved seed is more problematic. Implementation of the seed program outlined by the PND (para. 58) began midway in 1972 but delays are being experienced, largely with the recruitment of the 300 professional staff which the program requires. The commodity content of the program appears to be broadly consistent with other policy goals -- those of the export corridors program, for example -- with one major exception. This is the omission from the program of grass and legume seeds for improved pastures. Pasture improvement would appear to be essential for the growth in the beef industry which substantial increases in Brazil's exportable beef surplus would imply.

119. The major problem with respect to technical inputs has to do with the availability at reasonable prices of fertilizer. The PND projects fertilizer use to grow at an annual rate of about 16 percent over the 1972-74 period. Especially in view of the goals of the export corridors and coffee development programs this may be underestimated. Fertilizer producers[1/] are expecting consumption to increase at an 18.5 percent pace. As indicated in para. 25, fertilizer consumption increased at an annual rate of about 26 percent since 1965. Moreover, the PND does not take into account the problem of high domestic fertilizer prices. In 1971 domestic producers supplied about 27 percent of all of the nitrogen nutrient and about 53 percent of all of the phosphate nutrient. As a result of a quota system applicable to fertilizer imports these producers received a level of effective protection which varies by region but in central Brazil -- where 60 percent of fertilizer consumption is concentrated -- amounted to 94 and 50 percent for nitrogen and phosphate, respectively.

120. An analyses of the fertilizer industry is included in Volume VII of this report. Briefly, smallness of scale and other inefficiencies explain in large part the levels of protection mentioned above. The fertilizer import quota system which imparts this protection was introduced in 1971. In central Brazil it permits two units of nitrogen (N) nutrient and 0.6 units of phosphate (P_2O_5) nutrient unit to be imported free of duty and of the ICM tax -- a total burden of 31 percent -- for each unit of N and P_2O_5 produced and sold in the region. All potassium fertilizer imports are duty free since -- until now -- no potassium is produced domestically. As indicated the N and P_2O_5 quotas vary regionally: in the South where about 30 percent of total fertilizer consumption is located they amount to two units of N and five of P_2O_5 for each unit of these nutrients produced in Brazil and sold in that region. In the Northeast, where about 10 percent

1/ Ultrafertil, S.A.

of total fertilizer consumption is located, only P_2O_5 has a quota -- 7.5/1.

121. In order to understand the implications of this system for protection, it must be remembered: (a) that the importer generally will mix the imported with the domestic nitrogen in a second or third generation fertilizer, and (b) that the price charged for this product must not exceed that of the imported similar including tariff and ICM if reverse import substitution is to be avoided. Thus, the difference between the CIF import and domestic price of nitrogen permitted by this system in central Brazil equals, roughly, 94 percent as follows:

$$P_D = \frac{PM\ (1 + t) - PM\ (x)}{(1 - x)}$$

$$P_D = \frac{100\ (1.31) - 67}{-33} = 194$$

Where:

P_D = Price of domestic product.
P_M = Price of imported product = 100.
t = Combined rate of tariff and ICM.
x = Share of imported product in final fertilizer mix.

122. Although the central Brazil import quota is less liberal in the case of P_2O_5 -- reflecting the larger share of the regional market covered by regional production -- the margin of protection is lower; i.e., approximately 50 percent:

$$P_D = \frac{100\ (1.31) - 37.5}{62.5} = 149.6$$

123. These calculations of the level of protection focus on the inefficiency of domestic fertilizer producers. For the farmer located near the Sao Paulo fertilizer production center, fertilizer prices tend to exceed CIF import prices by an amount equal to the combined import and ICM tax rates plus the cost of transport from the Port of Santos; i.e., by about 40 percent. However, for farmers located in the interior fertilizer prices tend to be much higher. This is not only the result of transportation and other distribution costs. Brazil's relatively few fertilizer producers have developed an oligopolistic marketing organization which unnecessarily inflates farmer's fertilizer prices in the interior.

124. As is explained in Volume VII domestic production of both nitrogenous and phosphate fertilizers will expand rapidly over the next several years as existing investment plans are implemented. This expansion will improve the scale of operations and should reduce production costs. However, due to the anticipated rapid increase of demand, the country will remain heavily dependent on fertilizer imports. In the interest of making Brazil's agricultural exports as price competitive as possible and of

achieving better balance in intersectoral price relationships within Brazil, the Government can be expected to take advantage of the opportunity which increased domestic scale will provide to reduce the level of protection presently enjoyed by domestic industry. To accomplish this by changing the above mentioned import quotas probably would be counter-productive; as is shown above, the level of protection is inversely related to the liberality of the quota. Rather, what is needed is reduction of the rate of the import duty and, perhaps, of the ICM as they incides on fertilizer imports. In addition to reducing the protection presently afforded to domestic fertilizer producers the government probably also will take steps to improve the efficiency of the fertilizer distribution network.

125. Another major problem impeding effective use of fertilizer is the need to improve the supply and distribution of agricultural lime and to educate farmers as to its appropriate application. Brazilian soils tend to be very acid; in large areas of Rio Grande do Sul, Minas Gerais, Goias and eastern Mato Grosso, application of three to five tons of lime per hectare every three years or so may be required to support effective fertilizer use. It has been estimated that, in Minas Gerais alone, annual lime requirements for crop land approximate 2.4 million tons against total state production of 0.4 million tons, and total national production in 1970 of 1.4 million tons. Perhaps more significant is that these estimated lime requirements take no account of some 26 million hectares of pasture land in Minas Gerais much of which could be made more productive by liming.

126. Although limestone deposits are relatively plentiful and favorably located, the inefficiency of extraction and distribution is such that prices to farmers are very high (farmers in Rio Grande do Sul pay about US$13 per ton for ground limestone). State government projects to improve supplies are in operation or planned in several states and a federal program to this end should be formulated by the end of 1972. This may well provide opportunities for participation by external agencies which, in view of the size of the problem and its importance to increasing agricultural production, should be actively pursued.

The Outlook for Livestock

127. In the livestock sector the major policy goal is to increase Brazil's exportable beef surplus from about 150,000 tons in 1971 (calculated on the basis of bone-in weight equivalents for boned and cooked beef and special cuts) to about 500,000 tons by the middle of this decade.

128. Brazil's cattle population was estimated at 76 million head by the 1970 Agriculture Census, a figure sharply below the 97.9 million head which the Ministry of Agriculture earlier had estimated for the same year. A large part of the cow herd is milked to produce dairy products; specialized dairy enterprises are not common, however. The pig population approximates 66 million; sheep and goats, 39 million; and chickens, 290 million. Aside from the rapidly growing poultry industry serving the large centers of population, most livestock enterprises are based on traditional practices.

Most beef is produced on extensively grazed natural pasture, which in winter and dry periods, in many areas, are insufficient to maintain body weights at the typical stocking rates. This contributes to notable seasonalities in beef supply and price.

129. Cattle slaughter reached 1.66 million tons carcass weight in 1970, up from 1.51 million in 1967. The comparable figures for pigs are 679,000 and 668,000 tons; for sheep and goats, 56,000 and 52,000 tons; and for chickens, 86,000 and 31,000 tons. Per capita consumption of animal products appears to have decline slightly over the last decade and presently is low as compared to many countries. The estimated consumption data are:

Table 26: MEAT CONSUMPTION PER CAPITA (kg)

	1960-62	1965-67	1968-70
Beef and Veal	18.6	17.3	17.1
Pork	7.4	7.6	7.4
Mutton and Goat	0.6	0.7	0.6
Poultry	0.1	0.3	0.7
Offals	0.7	0.7	0.8
TOTAL	27.4	26.6	26.6

Source: Table 7.8, Statistical Appendix.

130. In view of the fact that Brazil's economic growth averaged 9.0 percent during the 1968-70 period as compared to 4.5 percent during the 1965-67 period it is surprising that per capita meat consumption was not higher in 1968-70. Presumably this is attributable to the sharp increases in meat prices which took place in 1969 and 1970 as the result of the combination of increased world prices and the relaxation of internal price controls on meat. Although internal demand for meat probably can be expected to become more income elastic, beef need not be affected to a proportionate extent if the poultry industry continues to develop rapidly, steps are taken to stimulate the pig industry and appropriate internal pricing policies are followed. If beef output in the 1971-76 period were to increase at 6 percent/year, a rate about 50 percent higher than in the 1960-70 period, and 500,000 tons were exported in 1976, the supply available for domestic use would increase at a rate about one percentage point in excess of the expected rate of population growth. If beef output were to grow at 5 percent yearly, however, per capita consumption would have to fall slightly in the 1971-76 period in order to make available 500,000 tons for export in the latter years.

131. Carcass (dead) weight averages about 200 kg per animal in Brazil and the annual slaughter is about 9 million head, or about 12 percent of the 1970 Agriculture Census estimate of the cattle population.[1/] This low take-off rate is a function of: (a) low fertility (about 50 percent nationwide); (b) high calf mortality (about 10 percent); (c) extended maturation period (4.5 to 5 years on average); and (d) inefficiencies in milk production tying up an excessive share of the herd in that industry. The government is implementing programs designed to stimulate herd build-up, to improve the take-off rate and to increase carcass weight. Credit lines funded by the IBRD and IDB are financing investment in herd management facilities and improved pastures. Companion working capital credit facilities recently provided are designed to facilitate a reduction of the maturation period to 3.5 to 4 years along with a 30 kg improvement in slaughter weight. They make available:

(a) Cr$150/head at 12 percent annual interest to finance retention over the first 18 months of animal life. This credit line is related to brucellosis eradication: 80 percent of the financing is conceded at birth and the remainder when the animal has been inoculated against brucellosis;

(b) Cr$500/head at 12 percent annual interest to finance retention from 18th to 30th month; and

(c) Cr$500/head at 18 percent annual interest to finance retention from 30th month until slaughter.

132. In addition to these credit programs, the Government has undertaken to redefine major milk sheds so as to discourage dairy farming in inappropriate areas. If achieved by 1976, a two percentage point increase in the take-off rate (resulting from improved fertility, reduced mortality, and reduced maturation period) together with a 30 kilo improvement in average carcass weight, would be consistent with the 6 percent beef output growth path mentioned above. More efficient methods of dairy production could increase this growth rate.

133. There are some indications that large scale improvement in the efficiency of the livestock industry already is underway, stimulated not only by the credit programs cited above but also by the upturn in producers prices since 1970. In any case, however, substantial increases above present levels of technical assistance in herd management and of application of phosphate fertilizer in order to improve pasture probably will be required if carcass weight is to be improved and maturation periods reduced on a large scale. Also, and perhaps paradoxically, the confidence of ranchers in future beef prospects, reflected by their willingness to make long-term investments through ongoing IBRD and IDB projects is likely to have an important

1/ In Argentina the take-off rate is about 20 percent.

short-run negative effect on beef supplies. The fact that ranchers will now tend to retain more females for breeding rather than slaughter means that fewer animals will come forward for slaughter in the near term than would be the case if ranchers chose to take a more pessimistic view of market prospects.

134. Another question which complicates prospects for the export surplus concerns the extent to which existing exports are dependent on cattle smuggled into Brazil from Uruguay and Paraguay owing to more favorable producer prices. One estimate is that about 300,000 head moved into Rio Grande do Sul in 1971 from Uruguay. In 1972 the government of Uruguay adopted beef pricing policies which are said to have reduced such smuggling to a fraction of its former level.

135. Perhaps the most important issue involved in the outlook for been exports, however, is Brazil's consumer pricing policy. The government presently is striving to bring the rate of inflation down from the 20 percent plateau it has occupied in recent years. As indicated, world beef price increases beginning in 1969 exerted considerable upward pressure on beef prices and the general price index in Brazil. Ranchgate beef prices are reported to have increased by 45 percent in 1970 and by 27 percent in 1971. Wholesale, carcass beef prices rose by 53 percent in 1970 but only by 14 percent in 1971. Early in 1971 the government reached a "gentleman's agreement" with the frigorificos whereby their prices for the internal market for front and hindquarter beef were fixed at Cr$2.7 and Cr$3.7 per kilo, respectively. In January, 1972 another agreement increased these prices by about 15 percent to Cr$3.20 and Cr$4.20, respectively.

136. The excess of beef producers price increases over increases in the general price level which have taken place in the recent past indicate that price incentives for cattle production are adequate. The consumer price policy now being followed by the government will not operate to reduce this producers' price incentive since the government's policy is to adjust consumers' prices proportionately with changes in the general price level; the government apparently having succeeded in reducing the rate of inflation to 15 percent in 1972. Moreover, continuing increases in the cruzeiro unit value of exports are being translated into higher ranchgate prices to a limited extent -- i.e., to about the same extent to which Brazil's total slaughter is exported (10%) -- so that ranchgate prices apparently have continued to increase somewhat more than proportionately with the general price level in 1972. Thus there is no reason to expect that present Brazilian pricing policies will either discourage livestock development or unduly encourage internal beef consumption.

137. In order to make its internal price fixing arrangements effective the government -- early in 1972 -- established an export quota of 70,000 tons. This was increased later in the year and, for 1972, was set at 120,000 tons. The export quota system contains elements designed to promote the stockpiling of frozen beef for the inter-slaughter period (August-December) -- and thus to forestall reasonal price fluctuations -- and also to stimulate the attainment of greater value-added in export processing.

Table 27: BEEF EXPORT QUOTAS, 1972

(Tons per year)

Basic Export Quota	55,000
Rio Grande do Sul	30,000
South-Center	25,000
Export Quota Contingent Upon Internal Stockpiling	40,000
Rio Grande do Sul (one ton export/five tons stockpiled)	20,000
South-Center (one ton export/1.5 tons stockpiled)	20,000
Special Export Quota for New South-Center Frigorificos	10,000
Special Quota for Export of Front Quarters to Israel	15,000
TOTAL	120,000

Source: Ministry of Finance.

138. The fact that the export quotas are expressed in terms of weight with no qualification as to degree of processing has induced firms to maximize export earnings by exporting frozen special cuts as well as cooked beef. The value of Brazil's beef exports increased by 75 percent to US$150 million in 1971, while volume increased by only 7 percent. This was attributable partly to increased world prices and partly to a shift by Brazilian processors in the direction of cooked beef and special cuts.

Table 28: BRAZILIAN BEEF EXPORTS

(In thousand of tons and US$ millions)

	1970		1971	
	Volume	Value	Volume	Value
Fresh, chilled and frozen	98.3	69.6	88.8	98.8
"Industrialized (i.e., cooked beef)	16.6	16.6	34.3	50.0
TOTAL	114.9	86.2	123.1	149.7

Source: CACEX.

139. Another important measure taken in 1971 by the Government to stimulate beef exports was limitation of access to major urban markets to those frigorificos meeting federal rather than state inspection standards. The federal inspection service enforces international standards so that those frigorificos licensed by it automatically are qualified for export markets. Other important measures will be taken in the context for export markets. Other important measures will be taken in the context of the export corridors program. For example, in the State of Sao Paulo the group convened to conduct local planning for the program contemplates financing the construction of 20,000 tons of additional frozen meat storage capacity at the port of Santos and another 20,000 tons of capacity at the state's 17 major frigorificos. A similar program is being put together for the Port of Vitoria and for the State of Minas Gerais.

140. Especially in view of the time lags involved in accelerating the growth of beef production (see para. 133), and of the rapid increases in Brazilian per capita income, development of other meat sources would greatly enhance Brazil's chances of achieving the exportable beef surpluses it now envisages. Despite a threefold increase in output between 1967 and 1970, the poultry industry still accounts for less than 3 percent of apparent annual per capita meat consumption. Development of pig meat production has been much slower, its participation in total meat supply remaining roughly constant over the past decade at about 27 percent. Apart from the provision of credit, mainly for the establishment of poultry production and processing facilities, and a limited import program of pig breeding stock, Government assistance to these industries has been minimal. While it is true that private sector interests have already made significant investments in poultry production and are beginning to become interested in specialized pig enterprises, there is little doubt that much remains to be done.

141. The pig industry in particular requires stimulation. Its main problem is the present low level of productivity and the unsuitability of the bulk of the national herd for meat production. Local breeds, such as the Piaui, are essentially lard types. On the other hand, Brazil has many of the factors needed to develop efficient modern pig production. These include the volume of production of corn and soya, the main feed items; the large internal market in the major urban centers of Sao Paulo, Belo Horizonte, and Rio de Janeiro; and the relatively high level of agricultural technology in the center-south states.

142. Analysis of national slaughter data for 1970 shows that of the total of about 11.2 million pigs slaughtered, average carcass weight was 68 kg and average dressing percentage was about 38 kg. No figures for feeding levels are available. The application of intensive management practices using meat rather than lard breeds could produce 80 kilo animals in 24 weeks. The dressing percentage for such animals would be about 72 percent. They would thus yield about 57 kg of meat from a feed input, including provision for breeding stock, of about 360 kg per animal. At 1971 prices, a ration consisting of about 80 percent of corn plus soybean

meal, fish meal and minerals would cost no more than US$60 per ton, assuming the use of home produced corn and on-farm mixing. Feed costs would thus be about US$22 per animal slaughtered, or US$0.39 per kg of meat produced. Under modern management, feed represents about 80 percent of direct production costs; thus pig meat might be produced at about US$0.49 per kg. The retail price of pig meat in December 1971 was about US$0.99 (Cr$5.80) per kg. At the same time, beef cost US$0.63 (Cr$3.65) per kg and broilers US$0.66 (Cr$3.83) per kg. Thus there is very substantial room for improvement in pig meat production which would have the effect of making pig meat very attractive -- price wise -- to the Brazilian consumer relative to beef. Such improvement might be achieved through a pig production project having as its main elements importation of breeding stock, credit for purchase of foundation stock, buildings and feed mixing equipment, carcass grading facilities and technical assistance to individual producers and cooperatives in main corn, soya and pig producing areas of the center-south such as Parana and Minas Gerais. Foreign exchange costs would be limited to imported breeding stock.

143. Even assuming that pig meat productivity increases are limited to the modest 5 to 10 percent projected in para. 81 above in connection with the forecast of Brazil's exportable corn surplus, the domestic availability of corn should be consistent with annual average increases in domestic supplies of pig meat and poultry of at least 8 percent. The optimistic export projection of this report assumes that Brazil passes the 500,000 ton mark in its beef exports only by 1978. Assuming that beef production growth does exceed the recent historical rate by about 50 percent and that pig and poultry output does grow at an 8 percent pace, this level of beef exports would be consistent with 2.5 percent annual growth of per capita consumption of the main meat products. This would imply an income elasticity of demand for meat on the order of 0.45 if the overall economy grows at the expected 8 to 9 percent pace and the distribution of income does not change. While lower than in many other countries at a similar stage of development this income elasticity of demand for meat would still be much higher than the recent Brazilian experience. The same can be said of the income demand elasticity which would be consistent with a more modest -- 5 rather than 6 percent annually -- growth of beef output if the beef exports and pig meat and poultry output assumptions are not changed. Under these conditions the elasticity would be 0.38.

Table 29: PROJECTION OF BEEF PRODUCTION, EXPORT AND INTERNAL CONSUMES

(Values in '000 metric tons unless otherwise specified)

	1970	1971	1974	1976	1978	Annual Average % △
Population (millions)	93.2	95.8	104.1	110.0	116.2	2.8
Pigmeat and Poultry Production	850	920	1,160	1,350	1,570	
Beef Production Optimistic	1,660	1,760	2,100	2,355	2,645	6.0
Export 1/	140	150	305	425	545	18.5
Internal Consumption	1,520	1,610	1,795	1,930	2,100	4.1
Kg Beef per Capita	16.3	16.8	17.2	17.5	18.1	1.3
Kg Beef, Pork, Poultry per Capita	25.3	26.4	28.3	29.8	31.6	2.5
Beef Production, Moderate	1,660	1,740	2,020	2,225	2,450	5.0
Export 1/	140	150	305	425	545	18.5
Internal Consumption	1,520	1,590	1,715	1,800	1,905	2.8
Kg Beef per Capita	16.3	16.6	16.5	16.4	16.4	-
Kg Beef, Pork, Poultry per Capita	25.3	26.2	27.6	28.6	29.9	2.1

1/ Bone in carcass weight equivalent.

Coffee

144. Brazil's coffee problem is best illustrated by comparing the production capacity -- some 21-22 million bags per year -- of the existing stand of coffee trees with the external -- 18 to 19 million bags -- and internal -- 8 to 9 million bags -- markets for Brazilian coffee. The resulting 6 million bag annual gap together with the fact that stocks in the hands of Brazilian producers and of Brazil's Coffee Institute (the IBC) totalled some 27 million bags as of June 30, 1972 -- the end of the 1971-72 coffee year -- means that short and long term measures to improve production capacity will have to be implemented expeditiously if Brazil is not to lose ground in the world coffee market.

145. Coffee has been produced in Brazil since the beginning of the 19th century; by the 1880's it had become a major Brazilian export item. In 1906-07 the Brazilian coffee crop exceeded total estimated world demand. In that year the first market levelling arrangements were introduced when the governors of the three principal coffee producing states (Sao Paulo, Minas Gerais and Rio de Janeiro) established a system whereby producers were guaranteed a certain price in local currency for each bag of coffee delivered to ports of shipment and the state governments stockpiled all coffee in excess of world requirements. Such arrangements have characterized Brazilian coffee policy ever since.

146. From 1918 until 1970, Brazil underwent two distinct coffee cycles. During the first of these -- which ended in 1944 -- coffee production rose from an annual level of about 10 million bags, to a peak level of 27.9 million bags and then declined to 14 million bags. Stocks opened at 6.6 million bags and closed at 11.0 million; some 78 million bags of coffee were destroyed between 1931 and 1944. The number of coffee trees at the outset of the cycle was 1.7 billion, at maximum (1933) they numbered 3.0 billion and by 1944 they were down to 2.0 million. During the second cycle production and the number of trees peaked in the 1958-60 period at 37.9 million bags and 4.3 billion trees, respectively. Stocks reached their peak in 1966 at 70.6 million bags; some 9.8 million bags were destroyed. By 1970 trees numbered 2.3 billion, production 11.0 million bags and stocks some 33.8 million bags.

147. The upturn and decline of the first cycle were associated with the post World War I recovery period and with the subsequent depression which brought U.S. coffee prices in 1940 to their lowest recorded level. The upturn and decline of the second cycle were associated with the post World War II recovery period and with the depressing effect on world prices of the tremendous accumulation of Brazilian stocks in the early 1960's.

148. Two important differences distinguish the second cycle from the first. During the earlier cycle, there was a general north-western movement of coffee cultivation into the better lands of the interior of Sao Paulo state and the northern border region of Parana state. During the 1945-70 cycle movement in this direction was reactivated so that much

of the interior of Parana came under coffee cultivation. This exposed coffee culture to a factor not prevalent in the first cycle, the risk of freeze in coffee areas. It was the severe freeze of 1969 which reduced the 1970 crop to 11.0 million bags, providing a major stimulus to the initiation of a new coffee cycle now underway.

149. The 1945-70 cycle also saw the introduction of a far greater degree of Brazilian government control than previously existed. This culminated in 1965-66 when the government established clear supremacy over coffee interests such that it could effectively control producers' prices. This facilitated implementation of the coffee diversification program which had begun earlier in the 1960's; more than a billion coffee trees were uprooted during the 1965-67 period.1/

150. This brief historical review has been included to illustrate: (a) that the kind of upswing in Brazilian coffee production which would be required to forestall loss of present international market share is not without precedent in Brazil; (b) that the government is now in an institutional position to take a more active role in stimulating such an upturn; and (c) that, on the other hand, coffee growers now are subject to greater uncertainties in taking a decision to expand their production capacity than in the past owing to the freeze factor.

151. In addition to freeze coffee growers face three other constraints which distinguish the outset of this third coffee cycle from the outset of the previous two. One is the coffee leaf rust (Hemileia Vastatrix) which began in Bahia in 1970 and by now has spread throughout Sao Paulo and Parana. This disease can be combatted by spraying the trees with fungicide,but expense for the fungicide, for spraying apparatus and for the labor required to spray and to properly space the trees has increased the cost of coffee production. This is not to say that problems with pests and disease have not been confronted previously by Brazilian coffee growers; the prevalence of the coffee berry borer which results in a heavy incidence of damaged beans known as "broca" has long plagued Brazilian coffee.

152. The second "new" impediment is the fact that coffee lands are growing old, requiring an increasing degree of chemical fertilization, where as the shifting cultivation which characterized the previous cycles required little if any fertilization to achieve high levels of productivity.

153. The third -- and perhaps most important -- new element is the increasing attractiveness of other crops alternative to coffee. Soybean and corn as well as other crops can be planted in the coffee areas and -- as indicated -- these crops will now be the subject of a major new stimulus in the form of the export corridors program. To a great extent this new competitiveness between crops is a function of the scarcity of agricultural labor, particularly of the seasonal labor required for coffee picking and on-farm processing. Unlike field crops, no method of mechanized cultivation

1/ The discussion in paragraphs 144-148 is based largely on "Coffee in Brazil", International Coffee Organization, London, May 1972.

and harvesting has been developed for coffee. The Brazilians are experimenting in this respect -- seeking to adapt U.S. berry picking machinery to coffee, for example -- but mechanization of coffee is by no means in near term prospect.

154. Some evidence of the growing scarcity of agricultural labor in the coffee areas is provided by Table 29, which shows daily coffee worker wage rates to have risen since mid-1968 at average annual rates ranging from 34 percent in Parana to 26 percent in Minas Gerais. Over this same period general price level changes have averaged about 20 percent.

Table 30: DAILY WAGES OF COFFEE WORKERS

		Parana		Sao Paulo		Minas Gerais		Espirito Santo	
		Nominal	Real[1/]	Nominal	Real[1/]	Nominal	Real[1/]	Nominal	Real[1/]
1968	July	3.00	1.86	3.45	2.14	2.83	1.76	2.50	1.55
	December	3.10	1.79	3.51	2.03	2.92	1.69	2.50	1.45
1969	July	4.00	2.07	4.00	2.07	3.52	1.82	4.08	2.11
	December	4.00	1.92	4.40	2.11	3.92	1.88	4.08	1.96
1970	July	4.68	2.03	5.84	2.53	5.58	2.42	4.80	2.08
	December	5.35	2.16	6.93	2.79	6.68	2.69	5.30	2.14
1971	July	7.85	2.79	7.93	2.82	6.23	2.22	5.95	2.12
	December	9.85	3.32	9.45	3.18	6.39	2.15	6.80	2.29
1972	July	9.67	2.98	9.83	3.02	7.10	2.18	7.52	2.31

1/ Deflated by General Price Index, Internal Supply: "Conjuntura Economica" series 2. Base 1965-67 = 100.

155. Although the very high level of stocks then prevailing gave them considerable latitude, the authorities began in 1968 to stimulate an upturn in coffee production capacity by increasing coffee producers' prices relative to other commodity prices. Table 7.27, Statistical Appendix shows that from the end of 1967 until the first quarter of 1972 coffee producers' prices increased 4.4-fold while agricultural producers' prices in general increased 2.8-fold. Increasing world prices have contributed to this increase to a certain extent. A more important contribution, however, has come from a decline in the effective rate of Brazil's coffee export tax. Table 7.29, Statistical Appendix, shows that the incidence of this tax declined from about 52 percent of the minimum export registration price as of the end of 1967 to about 44 percent of this price -- on average -- during the first quarter of 1972.

156. Another important contribution to the improvement in Brazilian coffee producers' prices was made by termination in 1971 of IBC sales of coffee out of stock to domestic consumers. The IBC maintains a coffee price support mechanism. Support prices generally are set at the local currency equivalent of the minimum dollar export registration price minus: (a) a margin for exporting costs; and (b) the coffee export tax (see Table 7.33, Statistical Appendix). Until it ceased such sales the IBC charged for coffee sold internally only a fraction of the support price. This subsidy mechanism meant that almost all coffee consumed locally flowed through the IBC. When such sales ceased domestic processers were forced to go directly to the producer. This plus the scarcity of coffee enabled the producer to sell domestically at high prices low quality coffees -- which formerly would not have been acceptable to the IBC. With coffee quality largely a question of labor-intensive, on-farm processing, this institutional change certainly improved the profitability of coffee production.

157. Data on the profitability of coffee production are sparse and conflicting. However, the International Coffee Organization has made an estimate of profitability at varying levels of productivity and at prices prevailing as of end 1971. The estimate shows profit over capital (land and improvements) ranging from a negative 8.0 percent at a yield of 6.25 bags per 1,000 trees to a positive 53.0 percent at a 25 bag yield. At a yield of 12.5 bags per 1,000 trees, profit/capital = 7.6 percent. The average productivity of Brazil's stand of mature trees is estimated at 9.9 bags per 1,000 trees. By end-1972 coffee profitability should exceed these levels: the price support already established for January 1973 indicates that farmgate prices will have increased by about 50 percent during 1972.

158. The authorities began in 1969 to finance the planting of new coffee trees. Special credit lines were created for this purpose. Some 256 million trees were planted during the three coffee years ending June 30, 1972 (Brazil's coffee years run from July 1 to June 30). This performance apparently fell substantially short of targeted levels except during the 1970-71 coffee year when 136 million trees were planted.

159. In 1972 the IBC introduced a new Cr$4.3 billion (1972 prices) coffee development program for the July 1972-June 1975 period. A Cr$2.4 billion of this amount is destined to finance the production of seedlings and the planting of 600 million new coffee trees. The remainder is to be used to finance improvement -- beginning immediately -- in the productivity of mature trees. This is to be accomplished by improving the spacing of the trees by increasing the percentage of the total tree population regularly treated with fertilizer from 30 to 50 percent and by widespread application of fungicides and pesticides against leaf rust and the coffee berry borer, respectively. Special credit lines set up in the Central Bank are to finance 80 percent of this program; the remainder will come from the commercial banks. Terms on these loans range from 6 years in the case of the tree planting credits to 2 years in the case of the fertilizer loans. Interest rates are

3 percent with no monetary correction; the Central Bank will reimburse commercial banks for the difference between interest at this rate and interest at 15 percent. The initial response of the coffee growers has been very favorable; in contrast to the 1972-73 coffee year target of 200 million trees, financing for the planting of 360 million trees had been contracted as of September, 1972.

Table 31: PROFITABILITY OF COFFEE PRODUCTION IN SAO PAULO AND PARANA, 1971

(Values in current cruzeiros)

Yields/1,000 Trees	6.25 Bags	12.50 Bags	18.75 Bags	20.00 Bags
Variable cost per bag	164.0	124.7	102.4	93.3
Labor	89.7	62.7	53.1	44.4
Anti-Rust Treatment 1/	53.8	26.9	17.9	13.4
Other 2/	20.5	35.1	31.4	35.5
Price Per Bag	137.4	137.4	137.4	137.4
Profit Per Bag	-26.6	12.7	35.0	44.1
Profit Per Hectare	-166.3	158.8	656.3	1,102.5
Capital per Hectare	2,080.0	2,080.0	2,080.0	2,080.0
Land	1,490.0	1,490.0	1,490.0	1,490.0
Improvements	590.0	590.0	590.0	590.0
Profit Capital	-8.0%	7.6%	31.6%	53.0%

1/ Anti-rust treatment is estimated to cost US$60/ha regardless of yield.
2/ Includes fertilization.

Source: International Coffee Organization.

160. Assuming -- as appears to be justified -- that this new coffee development program is successful, what is the outlook for Brazilian coffee production and exports? Tables 7.35 and 7.36 of the Statistical Appendix which detail the coffee supply and disposition projections of this report may be summarized as follows:

Table 32: PROJECTED PRODUCTION AND DISPOSITION OF BRAZILIAN COFFEE

(In millions of 60 kg bags)

	Production	Internal Consumption	Exports	Year End Stocks
1971-72	24.6	8.5	20.0	26.9
1972-73	21.5	8.1	18.5	21.8
1973-74	20.5	8.3	19.0	15.0
1974-75	24.8	8.5	19.3	12.0
1975-76	26.3	8.7	19.7	9.9
1976-77	23.5	8.9	20.1	4.4
1977-78	30.7	9.1	20.5	5.5
1978-79	32.1	9.3	20.9	7.4

161. This projection accepts the IBC's estimate that increased treatment with fertilizer and pesticides will improve the productivity of presently mature trees by 15 percent, i.e., to about 11.5 bags/1,000. As indicated, coffee production should be profitable at this productivity level assuming end-1972 price relationships continue to prevail. It should also be noted that productivity varies widely; the more progressive farmers in the more productive regions of the coffee zone who would be most likely to avail themselves of alternative crop opportunities are also likely to achieve coffee productivities substantially above this average level.

162. The projection takes into account the July 1972 freeze which is expected to reduce the 1973-74 crop by 5 million bags to the 20.5 million bag level shown above. Another freeze of equal magnitude also is assumed to occur during the projection period.

163. There are varying estimates as to the speed with which newly planted trees attain full productivity and, also as to what the full productivity of the improved varieties will be. In effect, the above projection takes the average of IBC and ICO estimates in this respect.

164. Since full productivity is reached only after several years of tree life and in view of the fact that additional tree planting can take place after the present program ends in 1975, the production and stock levels shown could be expected to increase subsequent to the end of the projection period. This, in fact, may be the most problematic aspect of the present situation. At some point in the next several years the government will have to dampen incentives if a new phase of overproduction is to be avoided. In the short-term, however, Brazil is likely to draw down its stocks to very low levels during the next few years. It should be noted that owing to the timing of the coffee harvest -- January-June -- stocks tend to be lower at the end of each coffee year than at any other time during the year. Thus, projected mid-year stocks do not decline below the 11.5 million bag level so that the projection given in Table 32 probably

does not imply a decline of stocks below minimum working levels. In this respect, however, levels of domestic consumption are crucial: it is assumed that price relationships will be such as to leave per capita consumption constant at the 1972-73 level.

Prospects for Overall Agricultural Growth

165. It is difficult to break Brazilian agricultural products down between exports and domestic consumption owing to lack of data differentiating value added by industry from value added by agriculture in export products. This, in turn, is important for projecting the impact of the growth of agricultural commodity exports on the overall growth of the sector. Thus the total value of principal agricultural exports has been taken as a proxy for agricultural value added in Brazilian exports overall. In 1970 -- the latest year for which such data are available -- about 92 percent of Brazil's agricultural products were foodstuffs and the remainder non-food products such as fibers, inedible oil stuffs, rubber, wood, etc. The gross value of principal agricultural exports was the equivalent of 22.6 percent of total agricultural products and, of these exports, 85.3 were foodstuffs.

Table 3 : BRAZILIAN AGRICULTURAL PRODUCTION AND PRINCIPAL AGRICULTURAL EXPORTS IN 1970

(Values in million current Cr$)

	Total		Domestic Consumption		Exports	
	Value	%	Value	%	Value	%
Total	33,964	100.0	26,283	77.4	7,681	22.6
Food	31,297	92.1	24,746	72.9	6,551	19.3
Non-Food	2,667	7.9	1,538	4.5	1,130	3.3

Source: Staff estimates.

166. Clearly, for the future, the basic impetus for agricultural sector growth will have to come from internal demand for food. Historically, Brazil has supplied the great bulk of its own food requirements. As indicated the only foodstuff imported in substantial quantity at the present time is wheat. For the future it can safely be assumed that the role of imports in total food supply will not change significantly.

167. Brazil's population growth can be projected at 2.8 percent annually, a slight decline from the population growth rate of the past decade. Volume I of this report takes the position that Brazil can sustain for some years an average annual growth rate of 8 to 9 percent. Assuming no change in the distribution of incomes this means that existing individual incomes would grow at an average annual rate of about 5.5 percent.

168. Not much is known about the income elasticity of demand for foodstuffs in Brazil. A 1967 Getulio Vargas Foundation study based on data which is now out of date owing -- inter alia -- to changes in the distribution of income, estimated this elasticity at 0.5. New calculations will be made possible by a national family budget survey conducted late in 1972 by the Brazilian Institute of Geography and Statistics. Until such calculations are made, however, there is no reason to reject the 0.5 elasticity calculated by the Getulio Vargas Foundation.

169. Thus, increasing per capita incomes and demographic growth can be expected to increase internal demand for foodstuffs at a combined rate of 5.6 percent annually.1/ Internal demand for non-food products is projected to grow at a pace equal to Brazil's overall economic growth rate, i.e., 8.5 percent annually. The industrial sector can be expected to grow more rapidly than this but the traditional subsectors which use much of Brazil's non-food agricultural output -- e.g., cotton -- have not been as dynamic as the industrial sector overall.

170. Taking into account the projections made in this volume of exportable surpluses in corn, soya, beef and coffee, Brazil's principal agricultural exports -- as of 1978 -- are likely to have grown at an average annual pace of about 7 percent in real terms vis-a-vis 1970. Putting these three elements -- growth of internal demand for food and non-food agricultural exports -- together, suggests that Brazil's agricultural output can be expected to grow at a 6 percent annual pace over the 1971-78 period.

Table 34: GROWTH AND CHANGE IN COMPOSITION OF THE AGRICULTURAL SECTOR

	1970	Average Annual % Δ 1971-78	1978
Exports	22.6	6.9%	24.1
Internal Supply: Food	72.9	5.6%	70.5
Internal Supply: Non-Food	4.5	8.5%	5.4
TOTAL	100.0	6.0%	100.0

Source: Staff estimates.

1/ Income demand elasticity -- 0.5 -- times per capita income growth -- 5.5 percent equals an income related increase in food demand of 2.75 percent, i.e., on this account, food demand in year t+1 equals 1.0275 food demand year t. Combined with the effect of population growth -- 1.0275 x 1.0280 -- overall food demand in year t+1 equals 1.056 food demand year t.

171. Even assuming these projections of average growth rates are born out there could be wide deviations from them on a year by year basis. In 1971 and 1972 agriculture sector growth in fact greatly exceeded these rates. This was attributable to recovery of coffee production in 1971 from a very poor year in 1970 and to exceptionally good climatic conditions in 1972. Also, overall economic growth substantially exceeded 8.5 percent level in both of these years. The government is projecting a 7 percent rate of annual agricultural growth during 1972-74 and this appears to be easily achievable in view of the large increase in crop output which appears to have taken place in 1972. However, over the longer run, 6 percent seems to be the most likely agricultural growth path barring deviations from the projected overall economic growth rate and/or changes in the distribution of income.

BRAZIL - ORGANIZATION OF THE PUBLIC SERVICE TO AGRICULTURE

Authority for decision making regarding agricultural development is vested in a range of organizations. At the ministerial level the Ministers of Agriculture, Industry and Commerce, Finance, Planning, Interior and Education all possess some authority in the agricultural field and this complexity is vastly magnified by the large number of autarkies and mixed enterprises upon which the ministers depend to carry out their decisions. In a general sense, the jurisdictions of the ministers include the following decentralized agencies:

Agriculture

Supply Superintendency (SUNAB)
Fishing Industry Development Superintendency (SUDEPE)
Colonization and Agrarian Reform Institute (INCRA)
Forestry Development Institute (IBDF)
National Cooperative Credit Bank (BNCC)
Federal Agriculture and Livestock Fund (FFAP)
Executive Group for Lands in the Southwest of Parana (GETSOP)
Commission of Production Financing (CFP)
Brazilian Storage Company (CIBRAZEM)
Brazilian Foodstuffs Company (COBAL)
Brazilian Credit and Agricultural Assistance Association (ABCAR)

Industry and Commerce

Coffee Institute (IBC)
Sugar and Alcohol Institute (IAA)

Interior

Northeast Development Superintendency (SUDENE)
Amazon Development Superintendency (SUDAM)
Center-West Development Superintendency (SUDOESTE)
Southern Region Development Superintendency (SUDESUL)
Sao Francisco Valley Superintendency (SUVALE)
National Indian Foundation (FNI)
Irrigation Coordination Group (GEIDA)
National Counter-Drought Department (DNOCS)
National Department for Drainage and Sanitary Works (DNOS)

Finance

Central Bank (FUNAGRI, FNRR, CONDEPE, FUNDAG)
Bank of Brazil (CREAI)
Executive Commission for Cacao Rehabilitation (CEPLAC)
Rubber Superintendency (SUDHEVEA)

Planning

Bank of Northeast Brazil (BNB)
Bank of Amazonia (BASA)
Other Regional Development Banks

The Ministry of Planning also has allocated to it for repassing to entities, such as INCRA, those federal funds earmarked for the PIN, PROTERRA, PRODOESTE and PROVALE regional rural development programs.

Education and Culture

Federal Universities and Technical Schools

In addition to this complex of federal level ministries and decentralized agencies, the universe of institutions operating in the agricultural sector includes the state secretariats of agriculture and various important private entities such as:

The National Agricultural Development Association (ANDA)
The Rio Grande do Sul Rice Institute (IRGA)
The Federation of Wheat Growers Cooperatives (FECOTRIGO)

The administrative complexity indicated above and their general tendency to proliferate coordinating groups and protocols, cannot but move to complicate the clear definition of agricultural development problems and their solutions. Furthermore, these organizations with action programs in agriculture have varying degrees of financial autonomy and different methods of presenting their accounts. These factors conspire to prevent an evaluation of their contribution to the sector or indeed, an accurate assessment of the volume of public funds devoted to agricultural development. The following figures, in current cruzeiros, indicate the declining share of Ministry of Agriculture in the federal budget, but this trend may well be more than offset by increased expenditure on agricultural development activities within other ministries and organizations:

	1968	1969	1970
	---------- Million Cr$----------		
Ministry of Agriculture	254.6	281.3	340.7
Total Federal Budget	11,542.9	18,651.5	28,115.7
Ministry of Agriculture Share of Total Federal Budget (%)	2.2	1.5	1.2

Source: Anuario Estatistico, 1971.