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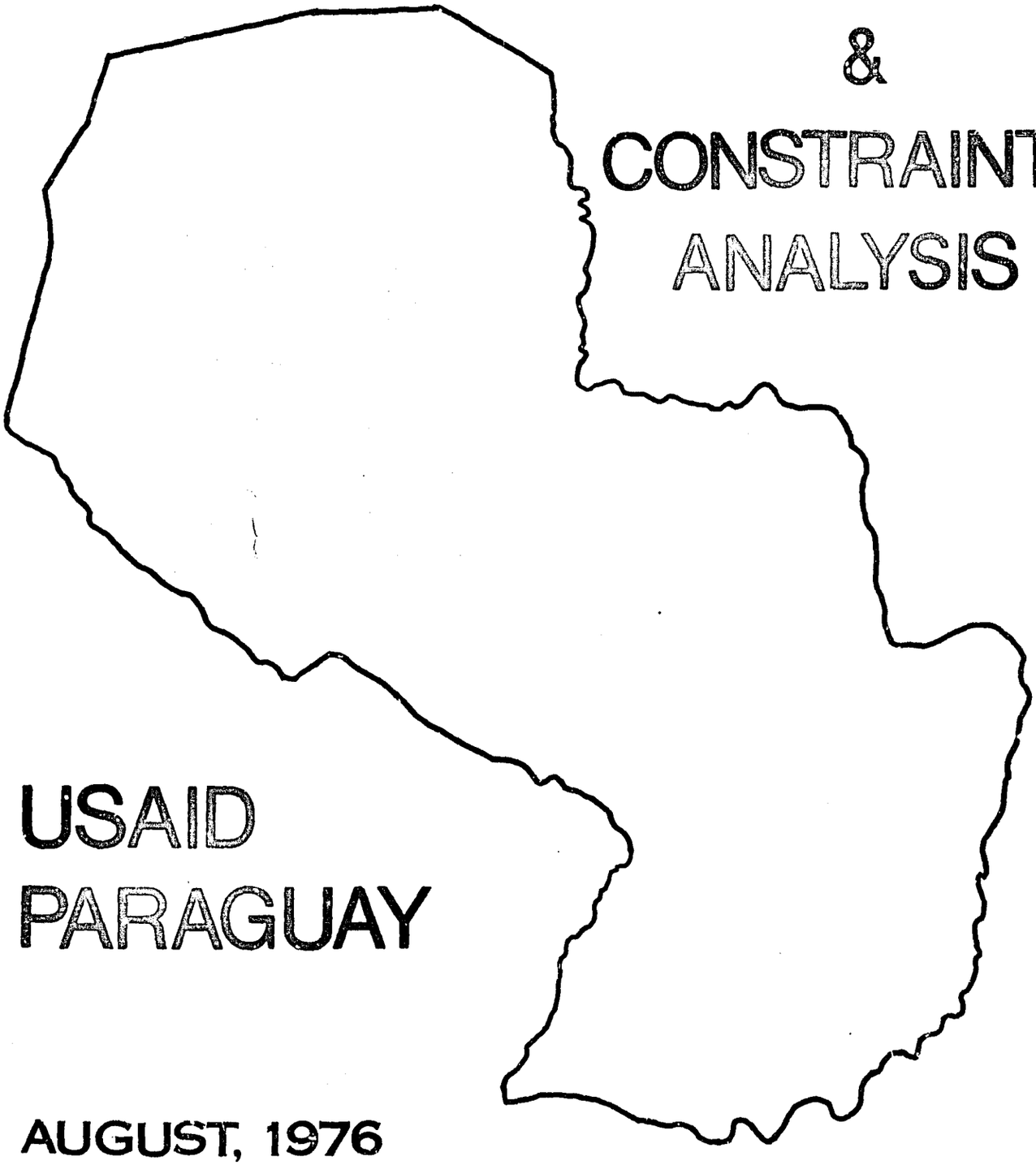

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CONTRIBUTORS

Although many individuals collaborated in the preparation of the Small Farmer Sub-Sector Assessment, one individual in particular deserves special recognition. Robert W. Adler who served as Program Economist for the AID Mission in Asuncion from October 1971 until October 1975 provided the conceptual framework for the sub-sector assessment, wrote much of it himself, and furnished guidance and supervision to those apart from himself, who contributed to the assessment's various sections. He also served as principal liaison between the AID Mission and the staff of the Gabinete Tecnico, or Planning Unit, within the Ministry of Agriculture, who participated in the preparation of the sub-sector assessment. Without Dr. Adler's unwavering enthusiasm, determination, and vision over a nine-month period, the project could not have been completed.

Part A, Introduction and Summary, was written by David L. Peacock, and Part B, Economic and Physical Environment, by Robert W. Adler. Part C, Analysis of Crops, is the work of Robert W. Adler and Ing. Agr. Isidro Enrique of the Gabinete Tecnico with assistance from Robin Henning, Enrique Gomez, Ing. Agr. Ronaldo Dietze and Ing. Agr. Bartolome SAnchez, the latter two on the staff of the Gabinete Tecnico. Part D, Profile of Small Farmers. was written jointly by Robert W. Adler and Enrique Gomez while Part E, Support Institutions and Services, was prepared by Christina Schoux with assistance from Sanford W. White, Malcolm S. Novins, Oscar Carvallo, Teodoro Arvizo, Robert W. Adler, Antonio Penayo and members of the Gabinete Tecnico: Ing. Agr. Oscar Meza Rojas, Director; Ing. Agr. RonaldoDietze, Ing. Agr. Isidoro Enrique Gomez, and Ing. Agr. Bartolome Sanchez. Part F, Conclusions and Recommendations, is the work of David L. Peacock, Jerry Nehman and Bastiaan Schouten of LA/DR.

TRANSLATIONS AND ABBREVIATIONS

Agency for International Development.....AID
United States Agency for International Development.....USAID
Government of Paraguay.....GOP
Ministerio de Agricultura y Ganadería.....MAG
(Ministry of Agriculture)
Servicio de Extensión Agrícola Ganadera.....SEAG
(Extension Service for Agriculture and Livestock)
Servicio Técnico Interamericano de Cooperación Agrícola.....STICA
(Institute of Inter-American Affairs, Food Supply Division)
Programa Nacional de Investigación y Extensión Ganadera.....PRONIEGA
(National Livestock Research and Extension Program)

Banco Nacional de Fomento.....BNF
(National Development Bank)
Banco Interamericano de Desarollo.....BID
(Inter-American Development Bank)

Facultad de Agronomía y Veterinaria.....FAV
(Faculty of Agronomy and Veterinary Sciences)
Instituto de Bienestar Rural.....IBR
(Institute of Rural Welfare)

Asociación de Usuarios del Crédito Agrícola.....AUCA
(Agricultural Credit Facility)
Credit Union National Association.....CUNA

Central de Cooperativas de Ahorro y Crédito.....CREDICOOP
(National Credit Union Central) or (National Savings and Credit Cooperatives Central)
Unión Paraguaya de Cooperativas.....UNIPACO
(National Paraguayan Cooperatives Union)

Servicio Nacional de Lucha Contra la Fiebre Aftosa.....SENALFA
(National Service against Foot and Mouth Disease)
Servicio Nacional de Semillas.....SENASE
(National Seed Service)

Proyecto Integrado de Desarrollo Agropecuario del Paraguay.....PIDAP
(Integrated Project for Agriculture and Livestock Development of Paraguay)
Programa de las Naciones Unidas para el Desarrollo.....PNUD
(United Nations for Development Program

Campaña Mundial Contra el Hambre.....CMCH
(World Campaign Against Hunger)
Food and Agriculture Organization.....FAO
(Organización de las Naciones Unidas para la Agricultura y la Alimentación)

Instituto Agronómico Nacional.....IAN
(Nacional Institute of Agronomy)

Facultad de Ingenieros Agrónomos.....FIA
(Faculty of Agronomy)

Facultad de Médicos Veterinarios.....FMV
(Faculty of Veterinary Sciences)

Servicio Nacional de Promoción Profresional.....SNPP
(National Service for Professional Promotion)

P R E F A C E

The following is the first edition of what is planned to be an expanding and changing document designed to provide a current assessment of the agricultural sector in Paraguay. As additional information is obtained, modifications of the present document will be made and sections will be expanded and updated to reflect new information. Hopefully, this assessment and its future revisions will serve as a basic reference for those involved in agricultural sector programs both in national and international organizations.

Part of what is found in this document is a compilation of information not previously brought together in an organized form. A major portion--"The Profile of Small Farmers"--is based upon recently generated survey data. As will be noted, considerable emphasis has been given to the analysis of the economics of small farms which reflects the priority given by AID and other international development institutions to improving the well-being of the poor majority of rural inhabitants.

The document is the culmination of a year's study by two economists working in collaboration with the Planning Division of the Ministry of Agriculture and represents the contributions of several individuals. At this writing another survey of small farmers is being planned and additional studies are under consideration. As information from these activities is available, it will be incorporated in periodic revisions of this document.

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A. INTRODUCTION AND SUMMARY

1. Introduction

The purpose of this document is to provide under one cover a general assessment of the agricultural sector of Paraguay and, at the same time, rather detailed information about small farmers. (For reasons described more fully in the development of the paper, small farmers are those with farms of less than 20 hectares. More than 85 percent of all farmers in Paraguay are of this size.) This emphasis, we believe, is particularly timely, given the priority assigned in recent years to improving the well-being of this sizable segment of the disadvantaged population by national and international institutions. A deliberate effort is therefore made to treat in some detail a subject which is both timely and, as a rule, neglected in agricultural assessments.

Section A provides an overview of certain key characteristics of the Paraguayan agricultural sector which are supported by more detailed data and analysis in later sections. Section B is a description of the environmental setting in which the agricultural sector functions. Section C is an analysis of production and of present knowledge about marketing these commodities. Section D focuses upon production from the point of view of the production unit, providing an analysis of the economics of small farm operations and comparisons of economic behavior by farm size. The current institutional setting and services provided by these institutions are set forth in Section E. Finally, Section F presents tentative conclusions about the agricultural sector which have been drawn from existing information; an exploration of various possibilities for its development; and a few recommendations for future directions in rural development.

2. Summary

a. Importance of the Agricultural Sector in Paraguay's Development

The Paraguayan agricultural sector is the major source of national income, export earnings, and employment. Approximately 36 percent of gross domestic product, 85 percent of the value of exports (1972-1974), and 51 percent of employment is provided by the agricultural sector. (An additional 14 percent of exports is contributed by forestry related products.)

In contrast with the low rate of growth experienced within the basic productive sector in the Paraguayan economy, which may be attributed to inadequate growth in the manufacturing sector, the

recent rate of growth in agricultural production has been reasonably good--5.9 percent annually for the 1970-1974 period. Estimates of the annual rate of growth of crop production indicate that those commodities which are mainly exported have expanded in volume at an average of 16.6 percent per year as contrasted with a figure of 1.4 percent per year for crops principally consumed domestically.

For several reasons, a strategy of expanding agricultural production will continue to be basic to future economic progress of Paraguay. First, the alternative of heavy emphasis upon manufacturing, especially for massive import substitution, is limited by the size of the domestic market (2.4 million people with a low per capita income) and the proximity of two much larger countries, Argentina and Brazil, both at relatively advanced stages of development. Further, the more dynamic segment of the manufacturing sector is presently engaged in processing agricultural commodities for export. Since such a large portion of employment is in agriculture, growth in domestic demand for locally manufactured products is also closely related to development of the agricultural sector. Thus, a strategy of emphasizing agricultural development is in no sense a substitute for industrial development but rather a necessary condition for development of both export-linked industry and manufacturing for domestic consumption.

Paraguay's latest development plan calls for a six-percent annual average growth rate in GNP over the 1971-1975 period, including growth rates of five percent for agriculture and 6.7 percent for manufacturing. The IBRD estimated that to achieve this level of growth, commodities exports would have to increase at a rate of 7.0 percent. As most exports are of agricultural or forestry origin, a considerable expansion of crop and livestock production destined for export markets must occur to sustain a continued high rate of economic growth. Viewed historically, expansion of crop production has proceeded at a more rapid rate than livestock production, and this high rate of growth in crop output appears to depend critically upon export markets. Thus, it appears that not only agricultural development, but expansion of agricultural exports is essential for Paraguay's economic progress.

b. Agricultural Development Opportunities/Constraints

Relative to its population, Paraguay has an abundance of land. With 5.8 inhabitants per square kilometer, it is among the least densely populated of Latin American countries. A gross figure of this sort is, of course, meaningless if populations are concentrated on limited amounts of productive land. There is indeed a concentration of population surrounding the city of Asunción in the Department of Central and in adjacent departments, an area referred to as the minifundia zone. The density of population (rural only) in Central is 126 persons

per square kilometer (compared to country-wide densities in excess of 50 persons per square kilometer in Costa Rica, Mexico, Guatemala, and most of the Caribbean). Adjacent departments--Cordillera, Guairá, Paraguarí--have densities of 24 to 42 persons per square kilometer. The remaining ten departments in Eastern Paraguay (the portion which offers greatest potential for agriculture) have population densities of 12 or less people per square kilometer. More importantly, the greatest population densities do not appear to be in the areas with the most productive soils. In fact, present estimates indicate that there are 8.8 million hectares of land suitable for cropping with only 953,000 currently being used. In all probability the area suitable for cropland is understated if one considers the possibility of irrigated rice on large areas of poorly drained soils which are not suited for other crops. Even the area used for livestock grazing (14.8 million hectares) is considerably less than the area suitable for this purpose (39.7 million hectares). In general, land area does not represent a constraint to expansion of agricultural production. Recent expansion of crop production has come, to a large extent, from increasing the amount of land under cultivation. Certainly this trend toward cultivation of more land may be expected to continue and provides an avenue toward agricultural development.

A large array of crops can be and are produced in Paraguay. Part of the diversity is related to the subsistence nature of much of farm production. At the same time, there is considerable diversity of agricultural exports. Average export earnings from 1972 to 1974 from sales of cotton, tobacco, and soybeans were $35.5 million; from sales of other crops, $32.4 million. Ten of these other commodity export groupings had FOB values from $1.0 to $5.0 million. Thus, Paraguay does have the advantage of exporting a diversity of agricultural commodities.

At the same time, Paraguay faces some major constraints posed by its location and its internal market. The internal market for agricultural products is limited because the total population is only 2.4 million. Further, Paraguay's population is mainly rural with only one major urban area (Asunción and adjoining small towns) of 486,730, and only six other towns with populations in excess of 10,000. Consequently, rapidly expanded production for domestic consumption could quickly exceed local demand at a price which would be remunerative at the farm gate. There is evidence, for example, that cassava and corn (number one and number two in gross value produced among annual crops) are grown largely for on-farm consumption because they have little market value. Thus, expanded production for domestic consumption must be carefully coordinated with internal demand while export opportunities are exploited in Paraguay's agricultural development programs.

As an exporter, Paraguay has a geographic disadvantage. A 1973 study indicated that freight costs, including handling charges in ports, ranged from US$30 to US$80 per metric ton from the major Paraguayan ports of origin to FOB Buenos Aires. The additional cost to a European port would generally fall in the range of US$25 to US$50 per metric ton. Consequently, the Paraguayan farmer is at a competitive disadvantage to producers in countries having lower transport costs to principal markets and would therefore receive a lower price for his products. It should be noted that with relatively large fixed transport costs, a small variation in price at the import location can cause a proportionally larger change in the price received by farmers. As an example, if the price of soybeans in Rotterdam drops from US$200 to US$180 per metric ton--a 10 percent decrease--and transport costs are US$55 per metric ton, FOB price in Asunción would fall from US$145 to US$125--a 13.8 percent decrease. This larger percentage change would be reflected in farm level prices.

Paraguay's locational disadvantage may also affect the choice of agricultural technology by increasing real costs of agricultural machinery and other imports such as fertilizers and insecticides. With the exception of soybeans, the evidence is clear that most of Paraguay's crop-related exports are produced by labor intensive technology without any major degree of mechanization which may reflect the high cost of imported inputs.

A third problem related to location is the restriction placed upon the types of exports. Low value commodities such as corn and cassava cannot become commercial exports because such a great proportion of their CIF value would be transport costs.

c. Technology and Labor Productivity

Labor output is low in agriculture, equaling about one-half of the average production per agricultural worker calculated for Latin America. Within the country, productivity of agriculture labor is 62 percent of average productivity for the total labor force. Moreover, labor productivity in general has grown at a rate of 1.8 percent annually in Paraguay, while the productivity of agricultural labor has increased at only 1.2 percent per year.

As expected, incomes in rural areas are generally lower than in urban communities. According to best available data, the average wage of rural workers is approximately 62 percent of the average wage for urban workers. Further, while 28 percent of urban workers received wages of Gs. 2,500 per week (roughly $1,000 per year), only 14 percent of all farm units were of sufficient size to provide equivalent earnings.

This low level of labor productivity and earning appears to relate very well with some available facts about the Paraguayan population. First, while population grew at an annual rate of 2.69 percent from 1962 to 1972, the difference between birth and death rates would indicate a population growth rate ranging from 3.02 to 3.69 percent annually. Supplementary information suggests that there is significant net emigration from Paraguay. Data from Argentina indicate a net immigration of 203,493 Paraguayans in the period from 1961 to 1972 (most of whom settled in provinces bordering Paraguay). There is also migration within Paraguay in pursuit of better income opportunities. The central minifundia area appears to be the major area of exodus and the poles of attraction seem to be Asunción and new settlement areas in the eastern half of Paraguay.

The level of output and earnings of farm labor is, of course, dependent upon technologies employed in producing various crops and livestock. As noted earlier, the major contribution to increased agricultural production in Paraguay seems to have been expanded area under cultivation, not increased yields. The analysis of the small farmer survey data (Section D) indicates that farmers who own more land and have relatively more access to capital do not adopt a different production technology but use more of the same inputs. The major change emerging as farm size and available capital increases is a shift in farm organization from crop production which is labor intensive to livestock production which is (as practiced in Paraguay) more capital intensive. Increasing land holdings for the smallest of farmers (below five to 10 hectares) would increase the utilization of family labor and probably family income, but expansion of the land resource base for these farmers to 10 or 20 hectares would not be expected to markedly change the technology used to produce specific commodities. Thus, increased labor productivity and income for a large proportion of small farmers appear to depend upon the introduction of new technologies which either increase the area that can be cultivated per man (presently three hectares seems to be roughly the capacity of one man-year of labor) or the yield per hectare utilizing the same labor input.

d. Marketing

The built-in disadvantage in marketing costs incurred by exports and the close relationship between economic and export growth suggests that Paraguay can ill afford inefficiencies in its internal marketing system. Further, the limits of the domestic market require careful organization of production if local market opportunities are to be fully exploited without creating price fluctuations resulting in unstable incomes for those farmers producing primarily for internal consumption.

Since considerable information is provided in Section C about marketing, only a few general observations are included here. First, much of the analysis apparently has been addressed to structural questions and their impact upon competition and relative market power. It is often observed that a few buyers and middlemen control the market. That monopsony power is thought to exist due to the limited number of processing facilities and that this market power results in lower farm gate prices even though the product enters a competitive international market. At the farm level, it is often argued that only one country merchant or itinerant trucker is the farmer's sole outlet, and may also be his only source of information about prices. Responsible persons believe that marketing margins are excessive and it is observed that the marketing system cannot cope with overproduction, however small. In Paraguay, governmental regulation of prices and marketing have usually been considered a necessary policy instrument to avoid possible private uses of de facto monopoly positions. Thus, it would appear from available information about agricultural marketing that perhaps not enough attention has been given to concepts of market performance and behavior. Little data seems to be available on costs of performing various functions in the marketing system, who finances these functions, and who bears the risks. Further, although it is generally believed that certain participants in the marketing system are in monopolistic or oligopolistic positions, there is little data indicating that such marketing power is exercised.

A second observation regards the logistics of moving agricultural production. Three-quarters of all national merchandise moves by road. Although the road system has expanded substantially in the last decade (from 1,345 miles in 1960 to 4,144 in 1972) only 733 miles are paved all-weather roads. Large areas of the country are still serviced by dirt roads which are closed whenever it rains (40 to 130 days per year) complicating transportation of agricultural products. Vehicular transport appears to be increasing at 8 to 19 percent annually and increased agricultural production typically results in a more than proportional expansion in product marketed. Thus, it would seem that lack of adequate roads continues to present a bottleneck to improving marketing efficiency.

Certain other general problems which have an impact upon the efficiency of the agricultural marketing system are worth highlighting. Farmers typically lack current market information, especially on prices (although this situation is improving). With the exception of a few products sold in export markets, there is little if any formal grading, and standards have not been developed for domestically consumed products. Moreover, much of agricultural marketing is done on a very small scale,

especially domestically consumed commodities, with the associated high handling costs per unit. And finally, the lack of adequate on-farm or community storage facilities forces small-scale farmers to sell most of their production during and shortly after harvest.

e. Small Farm Production

From the information available with respect to small farms, several important generalizations can be highlighted. First, the degree of concentration of farms in the smallest category does not appear to be as great as might be expected, generalizing from other Latin American countries. Of the 141,000 farms less than 21 hectares, there are roughly 10,000 less than one hectare (not considered viable farms in Paraguay), 57,000 between one and five hectares, 31,000 between five and 10 hectares, and 41,000 between 10 and 21 hectares. In terms of location, the highest concentration of small farms is in the four departments surrounding the city of Asunción. In this area, 90 to 96 percent of the farms are less than 21 hectares. Approximately one-half of all the nation's small farms are located within this area. In very rough terms, the density of small farms seems to decrease in concentric circles as one moves away from the city of Asunción.

There seems to be little basis to argue that differentiation exists between small and large farms in terms of the crops produced (with the exception of mint). Second, small farmers do appear to be involved in the production of export crops (59 percent of cotton, 26 percent of soybeans, and 72 percent of tobacco--all export crops--are produced by farmers of less than 20 hectares). The area of field crops bears a very weak relationship to farm size, with proportion of land utilized for crops decreasing rapidly as farm size increases. As mentioned earlier, production technology appears to change little with increasing farm size. Expenses as a proportion of gross farm income differ little for farms of less than 20 hectares, independent of size. Hired labor as a percent of cash expenses is not greatly different between farms less than five hectares and farms between five and 20 hectares. Wage payments per hectare of land cropped are about the same for all farms smaller than 20 hectares. Larger farms tend to use the same implements as smaller farms, but simply use a greater amount in approximately fixed proportions. Finally, the value of production of annual crops per hectare varies little by farm size.

One major difference between large and small farmers is that small farms (below five hectares) do not use all of their family labor in farm production and appear to supply labor to larger farms. From

the sample survey data, farmers with less than five hectares earned more income off-farm than they paid for hired labor, while on farms with five to 20 hectares, payments to labor hired approximately equaled off-farm earnings. The seasonality of labor demand is not as pronounced as might be expected, and the peak labor requirements for subsistence crops such as corn and cassava tend to be complementary to those of commercial crops such as cotton (typical of the crop combinations grown in the minifundia areas). This situation permits the smallest farmer who is producing primarily subsistence crops to work for larger farmers who are producing export crops. (Approximately one-half of the gross production of farms less than five hectares is consumed on the farm compared with approximately one-third of gross production consumed on-farm for farms from five to 20 hectares.)

The major organizational difference between small and larger farms is that larger farms are more involved in capital intensive livestock production. This explains some of the following observations.

1. Gross and net farm income increase with farm size, but gross and net farm income per hectare are inversely related to farm size.

2. Gross capital increases withfarm size, but gross capital per hectare is inversely related to gross farm income per hectare.

3. The ratio of value of capital to value of output decreases as farm size increases.

4. Value of annual expenses per hectare is inversely related to farm size.

5. Value of implements per hectare is inversely related to farm size.

The organizational difference does not directly explain, however, the reason why the value of land per hectare was found to have a strong inverse relation to farm size.

Survey data also revealed that only 22 percent of all farmers used credit for agricultural production inputs and only 15 percent of farmers with less than five hectares used credit for production. Field observations suggest major sources of informal credit for small farmers are local businessmen.

B. ECONOMIC AND PHYSICAL ENVIRONMENT

1. History and Situation

Paraguay is among the smallest and least developed countries of Latin America. Its population in 1972 was 2,357,955 while its Gross National Product (GNP) (1972) $719 million accounts for 0.4 percent of Latin American GNP. Per capita GNP is slightly less than one-half the Latin American average. Its population density is lower and arable land per capita higher than in most of Latin America. With a geographical extension of 157,000 square miles, Paraguay is approximately the same size as California.

Neither history nor geography nor easily exploitable natural resource wealth have thus far favored Paraguay, and it has not emerged into a state of rapid nor possibly self-sustaining economic growth. While possibilities for future economic and social development are perhaps more favorable for Paraguay than at any period over the past century, exceptionally rapid economic progress in the immediate future appears unlikely. Since 1962, Paraguay's GNP has grown at an average annual rate of 5.2 percent as compared with only 2.8 percent in the previous decade. Available data and historical conjecture suggest that the past two decades represent the first period of continuous, if modest, economic growth. The 1960's also represented a favorable conjuncture of political and financial stability as well as sustained inflow of external capital and technology.

A more complete understanding of Paraguay's present can be obtained through brief reference to principal historical factors impinging on its development. (i) Prolonged economic and cultural isolation combined with low levels of immigration which reduced inflows of external technology. (ii) External wars and domestic political disruptions that accentuated an agrarian tradition based on small-scale subsistence agriculture. (iii) Lack of stable government and depletion of population which retarded spread of land settlement and continuous improvement in transportation and communication. The above features also contributed to a greater ethnic homogeneity than is observed in most Latin American countries and to the lack of a traditional landed aristocracy.

Most men in Paraguay today still make their living by producing the food and necessities which keep them and their families alive by their own muscles with the aid of animal power and relatively simple tools. Economic life and family life are not separated and family life includes a broad network of parents, grandparents,

uncles, aunts, and cousins and all their kin. While some social change is occurring in Paraguay, the demands and protection of the extended family are still strong. The destitute, delinquent, and alienated marginal man is less evident in Paraguay than in many Latin American countries. There are few overt signs of deep social antagonisms or class struggle; this social tranquility can be attributed at least in part to the dominance of an independent small-farm tradition, availability of new lands for settlement, the ease of emigration to Argentina for those attracted by higher wages and urban living, and the populist appeal of the dominant (Colorado) political party.

Paraguay's relatively small population, geographical situation, relative inexperience with modern technologies, and natural resource base have important implications for developmental strategies. The scope for massive import substitution, as has been utilized by several Latin American countries, is reduced by the proximity of two much larger countries, Argentina and Brazil, both at relatively advanced stages of industrialization. These impediments underline the fact that exports acceptable to world markets of commodities based on Paraguay's agricultural and forest resources are the more dynamic possibility for its economic progress, that is, the increase of income and productivity of its human and land resources through the utilization of modern technology.

In the case of Paraguay, agricultural development, in the sense of increased productivity and utilization of land resources and rural labor force, is in no sense a substitute for industrial development but rather an indispensable and necessary condition for development of both the export-linked component of manufacturing industry and the residentiary component--whose growth and development is limited by growth in national income. Thus, growth in export earnings and industrial development are limited fundamentally by the growth in volume of agricultural production. Some additional growth increment also arises from the continuous shift toward export of products with higher value-added through utilization of new technologies, providing foreign exchange earnings and increasing opportunities to employ labor and capital.

2. Economic Growth

a. Sectoral Performance

Table B-1 contains basic data from Paraguay's national accounts that focus upon sectoral composition and growth of Gross Domestic Product (GDP). The shift in sectoral composition of Paraguay's GDP tends to replicate performance of other less-developed economies; for example, a decline in agriculture's weight in GDP and an increase in weight of manufacturing industry, services,

TABLE B-1

GROSS DOMESTIC PRODUCT (GDP) BY SECTOR OF ORIGIN AND SECTORAL RATES OF GROWTH 1965-1974

	1974 GDP (= Value Added)		Composition of GDP		Average Annual Growth in Output[a]		
	Millions of 1974 Gs.	Millions of 1974 US$	1962-1964 (Percent)	1972-1974 (Percent)	1965-1969 (Percent)	1970-1974 (Percent)	1965-1974 (Percent)
I. Basic Productive Sectors	(95,285)	(756.2)	(55.7)	(55.6)	(2.8)	(6.6)	(4.7)
A. Agriculture	59,305	470.7	37.6	35.8	1.7	5.9	3.8
1. Crop Production	32,865	260.8	22.5	19.2	1.8	7.4	4.6
2. Livestock Production	19,576	155.4	11.4	12.5	1.8	3.9	2.8
3. Forestry	6,740	53.5	3.6	4.0	2.1	5.8	4.0
4. Hunting and Fishing	124	1.0	0.1	0.1	16.4	4.2	10.3
B. Other Productive Sectors	35,979	285.5	18.1	19.8	5.0	7.9	6.5
1. Mining	298	2.4	0.2	0.2	1.3	34.0	17.6
2. Manufacturing Industry	30,338	240.8	15.7	16.7	4.7	7.3	6.0
3. Construction	5,343	42.4	2.3	2.8	8.8	10.9	9.8
II. Service Sectors	(67,448)	(535.3)	(40.5)	(40.5)	(5.5)	(6.7)	(6.1)
A. Basic Service Sectors	8,214	65.2	4.9	5.1	3.9	9.9	6.9
1. Electricity	1,730	13.7	0.6	1.2	10.8	21.1	15.9
2. Water & Sanitary Services	346	2.7	0.1	0.2	5.1	17.0	11.1
3. Transportation & Commun.	6,138	48.7	4.2	3.7	3.0	7.5	5.3
B. Other Service Sectors	59,234	470.1	35.7	35.5	5.7	6.2	6.0
1. Commerce	39,853	316.3	22.3	23.2	6.5	6.1	6.3
2. Housing	4,118	32.7	13.5	2.5	0.3	4.2	2.3
3. Other, n.i.e.	15,264	121.1	9.8	9.8	5.9	7.1	6.5
III. Government	(5,285)	(41.9)	(3.8)	(3.9)	(9.5)	(1.2)	(5.3)
IV. Total	168,018	1,333.5	100.0	100.0	4.1	6.4	5.2

Source: Prepared by USAID/Paraguay from Banco Central del Paraguay, Departamento de Estudios Económicos, Cuentas Nacionales 1974 (July 1975).

Note: a/ Calculated from data in 1972 constant guaranies.

and government. However, the shift in the sectoral composition of Paraguayan output over the past decade has been quite small. (Obviously, sectoral growth rates would have to be quite disparate to produce a substantial shift in the sectoral composition of the GDP.)

In terms of economic performance, while the GDP grew at an annual rate of 5.2 percent in the period 1965-1974, the output of Paraguay's basic productive sectors increased at an average annual rate of only 4.7 percent, output of the service sectors grew at a rate of 6.1 percent, and output of the government sector at a rate of 5.2 percent. The low rate of growth for the basic productive sectors derives more from the scant growth of manufacturing industry, an annual average rate of growth of only 6.0 percent, than from the growth performance of the agricultural sector.[1] Weakness in the growth impulse in manufacturing industry derives mainly from the fact that the most dynamic segment of the manufacturing sector is based mainly on the processing of agricultural commodities for export rather than on the successive substitution of domestic manufacturing of goods that were previously imported. The scope for import-substitution industrialization of the type practiced by many Latin American countries is limited in the case of Paraguay. Growth of output of Paraguay's agricultural sector is not obviously or substantially inferior to Latin American performance in general and it has increased markedly in the last five years.

Within the service sector, it appears appropriate to separate basic service sectors; i.e., electricity, water, sanitary services, transportation, communications and warehousing, which provide essential services related to modern technology, from other service sectors. Although certain sectors within the heading "Other Service Sectors" in Table B-1 are important (notably commerce and finance), "Other Services, n.i.e." is mainly domestic servants and casual laborers. Rapid growth for other services, if it existed, would suggest a result of slow growth of employment opportunities in other sectors of the economy and, therefore, deterioration in the quality of economic growth.

During the past five years, (1970-1974), the annual rate growth of output of other service sectors (6.2 percent) was lower than that of the service sector as a whole (6.7 percent). This contrasts with the previous five-year period, 1965-1969, when output of the "Other Service Sector" grew by 5.7 percent per annum, output of the service sector as a whole grew by 5.5 percent per annum, and output of the basic productive sectors grew by only 2.8 percent per annum. Therefore, insofar as data admit, it appears that the overall quality of Paraguay's economic growth has improved

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1/ Typically, for countries at Paraguay's level of development, the growth of output of manufacturing industry is about twice the rate of growth of GDP.

during the past five years.

b. Labor: Employment and Productivity

Table B-[illegible] presents data on labor utilized by various sectors of the Paraguayan economy and calculations of labor productivity. Data on the labor employed by sectors are from the censuses of population and housing carried out on October 13, 1962 and July 9, 1972. From 1962 to 1972 Paraguay's employed labor force grew from 557,163 to 730,576 persons. The 173,413 increase in the employed labor force is equivalent to an annual rate of growth of 2.7 percent. The total labor force was somewhat higher than the employed labor force. At the 1962 censal date 29,252 persons were unemployed and at the 1972 censal date 21,880 persons were unemployed.

During the decade from 1962 to 1972 the average annual rate of growth of employment in Paraguay's basic productive sectors was 2.0 percent. The annual rate of growth of agricultural employment was 1.7 percent and that of mining, manufacturing industry, and construction (as a whole) 2.9 percent. The annual rate of growth of employment in all other sectors of the Paraguayan economy (including the basic service sectors, government, commerce, personal services, and all other sectors) was 4.7 percent. In 1962 agriculture provided 57 percent of all employment; in 1972 it provided 51 percent of all employment. Mining, manufacturing industry and construction provided 18 percent of all employment both in 1962 and in 1972. Other sectors provided 26 percent of all employment in 1962 and 31 percent in 1972.

Labor productivity in each sector depends upon many and varied circumstances. Mining and basic service sectors are generally capital intensive and therefore output per worker is high. Labor productivity in crop production, construction and other service sectors is usually low, and, in general, Paraguay fits this pattern. Output per worker in Paraguayan agriculture is about two-thirds of the Latin American average and output per worker in Paraguayan manufacturing industry is about one-third of the Latin American average. Thus, the outstanding feature of labor productivity in Paraguay is that it is relatively low both in agriculture and in manufacturing industry. Taking the average economy-wide output per worker as a norm equal to 100, in 1972 output per worker was 62 in agriculture, 114 in other productive sectors, 192 in basic service sectors, and 157 in other service sectors (which includes government, finance, domestic services and commerce).

Labor productivity for the economy as a whole grew at an average annual rate of 1.8 percent for the ten-year period 1962-1972. For the agricultural sector as a whole, the growth rate was

TABLE B-2

EMPLOYEE LABOR FORCE IN 1962 AND 1972, ANNUAL RATE OF GROWTH IN EMPLOYED LABOR FORCE AND OUTPUT PER WORKER 1962-1972

	Employed Labor Force (Thousands)		Composition in Percent		Annual Growth of Labor Force in Percent 1962-1972	Output per Worker (in Thousands of 1967 $s)		Annual Growth in Output Per Worker
	1962	1972	1962	1972		1962	1972	
I. Basic Productive Sectors	(414.4)	(503.9)	(74)	(69)	(2.0)	(66,547)	(79,818)	(1.8)
A. Agriculture	315.3	372.2	57	51	1.7	58,070	65,468	1.2
1. Crop Production	255.1	349.6	46	48	3.2	38,828	39,591	0.2
2. Livestock Production	31.2	18.6	6	3	-5.0	191,747	389,771	7.4
3. Forestry, Hunting, Fishing	29.0	4.0	5	1	-17.9	83,416	772,173	24.9
B. Other Productive Sectors	99.1	131.7	18	18	2.9	93,494	120,376	2.6
1. Mining	0.4	1.0	-	-	9.6	125,714	197,868	4.6
2. Manufacturing Industry	84.3	102.4	15	14	2.0	96,917	129,189	2.9
3. Construction	14.4	28.3	3	4	7.0	72,514	85,750	1.7
II. Other Sectors	(142.8)	(226.7)	(26)	(31)	(4.7)	(149,766)	(161,853)	(0.8)
A. Basic Service Sectors	14.2	22.4	3	3	4.7	171,732	201,952	1.6
1. Electricity, Water, Sanitary Services	0.9	2.0	-	-	8.3	379,116	591,440	1.5
2. Transpot., Commun, Warehs.	13.3	20.4	3	3	4.4	158,127	163,294	0.3
B. Other (Commerce, Services, Government, and n.i.e.)	128.6	204.3	23	28	4.7	147,289	157,459	0.7
III. Total Employed Labor Force	557.2	730.6	100	100	2.7	87,857	105,266	1.8
IV. Unemployed	29.3	21.9						
Laid-Off	26.2	6.7						
Seeking Work for First Time	3.0	7.5						
Other		7.6						
V. Total Labor Force (=III+IV)	586.4	752.5			2.5			

TABLE B-2 (Continued)

Source: Prepared by USAID/Paraguay from data from:

(1) Banco Central del Paraguay, Departamento de Estudios Económicos, Cuentas Nacionales 1973 (May 1974)

(2) Ministerio de Hacienda, Dirección General de Estadística y Censos, Censo de Población y Vivienda 1962 (1966)

(3) Dirección General de Estadística y Censos, Censo Nacional de Población y Viviendas 1972 (July 1975)

1.2 percent. Inasmuch as this sector provides over one-half of all employment, the trend in productivity for this sector bears significant weight in the trend in labor productivity for the economy as a whole. The 2.9 percent annual growth in labor productivity in manufacturing industry explains in large part the 2.6 percent annual growth in labor productivity in "Other Productive Sectors." The 0.8 percent annual growth in labor productivity for all other sectors arises mainly from the fact that in Paraguay, as elsewhere, productivity of persons employed in commerce, finance, domestic services, and government sectors grows only slowly, if at all.

Inasmuch as census data register workers according to what they state their principal occupation to be, calculations of output per worker can give rise to inconsistencies. Such is the case with productivity trends within the subsectors of agriculture. It is doubtful that employment in the livestock and forestry, hunting and fishing subsectors changed in the manner shown in Table B-2. If the 1972 employment in these subsectors is assumed equal to that of 1962, the 1972 outputs per worker are as follows (in 1967 Guaraníes): Gs. 44,365 for crop production, Gs. 237,048 for livestock production, and Gs. 107,793 for forestry, hunting and fishing production. The implied annual rates of growth in output per worker are as follows: 1.2 percent for crop production, 2.1 percent for livestock production, and 2.6 percent for forestry, hunting, and fishing production.

In summary, the absolutely low labor productivity in various sectors of the Paraguayan economy and low growth in productivity underline the need for greater efforts to ascertain the feasibility of more advanced technology and to disseminate such technology as is found to be economically feasible.

c. Limits of Economic Growth

In a study on Paraguay, the CIAP Secretariat fitted Cobb-Douglass production functions to the Paraguayan economy as a whole and to various subsectors.[1] Insofar as GDP and its growth are related to the stock of capital and to the active labor force, such a production function is useful for revealing certain aspects of Paraguay's economic performance. For the period 1962-1971, growth in employed labor and capital explained an annual rate of growth of 3.42 percent in GDP while the observed annual rate of growth of GDP was 4.5 percent. Growth in the stock of capital explained 40 percent of growth in GDP, growth in the employed labor force accounted for 36 percent of growth in GDP, and the remaining unexplained 24 percent may be attributed to qualitative changes in

[1] OAS-CIAP, El Esfuerzo Interno y Las Necesidades de Financiamiento Externo para el Desarrollo del Paraguay, vol. I (Washington: CIAP, April 18, 1973) pp. III-2-3.

these factors of production and to improved management. According to data estimates utilized by CIAP for derivation of this production function, the stock of capital grew at an annual rate of 5.6 percent and the employed labor force at an annual rate of 2.4 percent.

One implication for accelerating the GDP rate of growth is that if the same production function persists for the next few years, an annual 6.0 percent GDP growth rate would require a 7.5-percent growth rate in the capital stock and a 3.2-percent growth rate in the employed labor force. An 8.0-percent annual GDP growth rate would require, for example, a 9.9-percent growth rate in the capital stock and a 4.3-percent growth rate in the employed labor force. An 8.0-percent GDP growth rate would probably exceed the feasible growth limits both for the capital stock and for the employed labor force--at least within the context of the present production function.

The GOP's latest development plan (1971-1975) calls for the achievement of a 6-percent average annual growth in GDP over the period 1971-1975, including growth rates of 5.0 percent for agriculture, 6.7 percent for manufacturing industry, 5.5 percent for basic services, and 5.2 percent for other services (including government).[1/] The Plan sets the rate of growth of private consumption at 5.4 percent, total consumption at 5.7 percent and gross investment at 9.3 percent. A growth model employed for Paraguay by the World Bank demonstrated that a 6-percent GDP growth rate would encounter no unusual constraints in the external sector provided that commodity exports grow by 7 percent annually.[2/] The GOP's development plan sets the annual growth of commodity exports at 7.0 percent and the annual growth of commodity imports at 9.1 percent.

3. Demographic Trends

a. Growth of Population

Between October 1962 and July 1972 Paraguay's total population grew from 1,819,103 to 2,357,955. From 1950 to 1962 Paraguay's population grew at an average annual rate of 2.65 percent and from 1962 to 1972 at an average annual rate of 2.69 percent. According to differences in methods used, the Paraguayan gross birth rate is between 39.7 and 45.4 per 1,000.[3/] The gross death rate (based on

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1/ Secretaría Técnica de Planificación, Plan Nacional de Desarrollo Económico y Social, 1971-1975, Tomo II (Asunción, November 1970).

2/ IBRD, Current Economic Position and Prospects of Paraguay (July 12, 1971).

3/ Centro Paraguayo de Estudios Sociológicos, La Población de Paraguay (Asunción 1974), p. 30.

1962 census data) is 9.5 per 1,000. It is obvious that the difference between birth and death rates would yield annual rates of growth of population ranging from 3.02 percent to 3.69 percent, which are substantially higher than the observed (2.69 percent) rate of growth.

Supplementary information indicates that there is significant net emigration from Paraguay. The Argentine census of 1960 registered 155,269 Paraguayans resident in that country. Data supplied by the Government of Argentina indicate a net immigration of 203,493 Paraguayans during the 12-year period 1961-1972.[1] For the period 1950-1973 the Argentine immigration data indicate an average annual inflow of 19,426 Paraguayans; i.e., an annual rate approximating one percent of Paraguay's total population. Argentine census data of 1960 indicated that approximately two-thirds of all resident Paraguayans live in the Provinces of Chaco, Formosa and Misiones.[2] In Formosa and Misiones, bordering Paraguay, Paraguayans accounted for 21.5 percent and 12.9 percent of total population.

b. Age and Sex Distribution

According to the 1972 census, 44.8 percent of Paraguay's population is in the 0-14 year age group, 51.2 percent in the 15-64 year age group, and 4.0 percent is 65 years of age or older. These percentages are little changed from those revealed by the 1950 and 1962 censuses. The 1972 census revealed a continuation of the increasing ratio of masculinity. Paraguay's male population was reduced by the Chaco war and civil conflicts of the 1940's. The ratio of male to female increased from 0.956 in 1950 to 0.967 in 1962 to 0.983 in 1972. In 1972 this ratio was 1.046 in rural areas and 0.894 in urban areas.

c. Density

Paraguay ranks among the least densely populated countries of Latin America, with 5.8 inhabitants per square kilometer. In comparison, Costa Rica, Mexico, Guatemala and most of the Caribbean countries have country-wide densities in excess of 50 per square kilometer. Within Paraguay (in 1972) the department of Central (excluding the municipality of Asunción) has a density of 126 persons per square kilometer. Figure B-1 indicates population density by departments according to the 1972 census. The Chaco has the lowest density (0.3 inhabitants per square kilometer). In eastern Paraguay the three departments immediately east of Asunción (Cordillera, Guairá, and Paraguarí) have the highest densities, ranging

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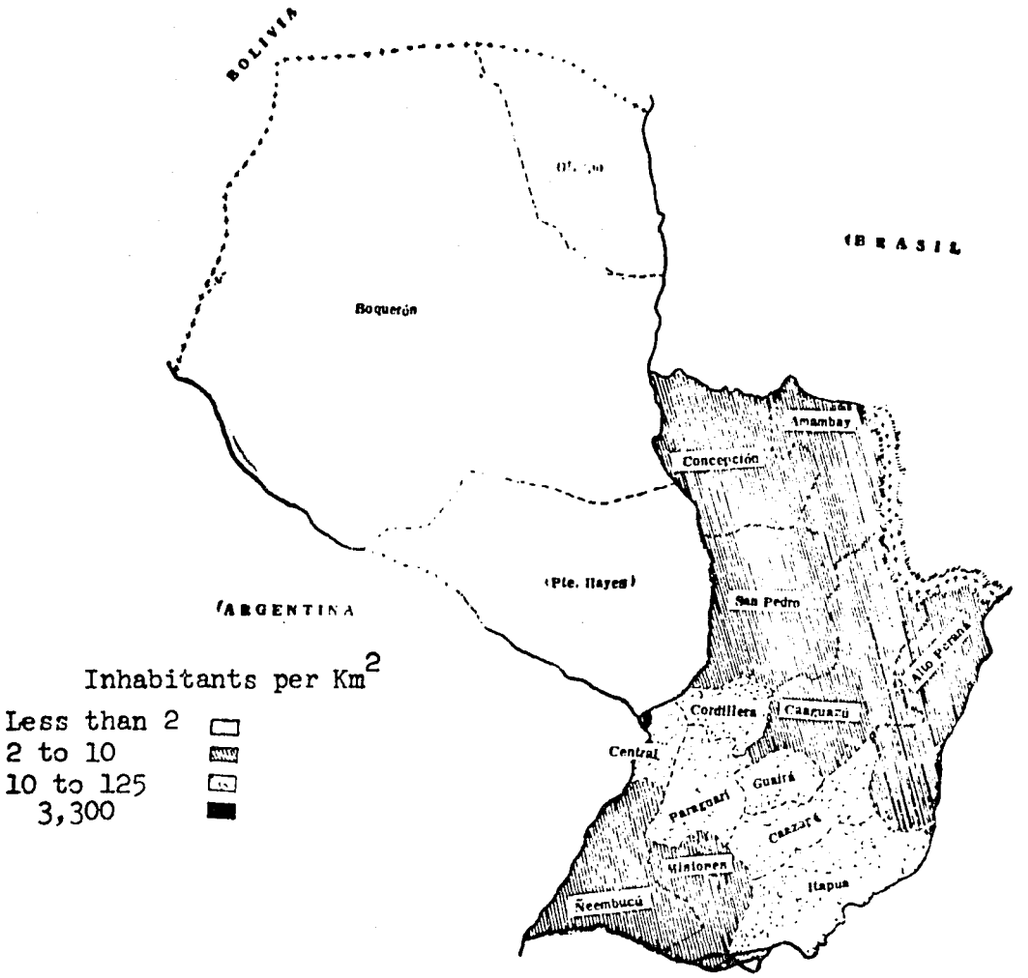
1/ Centro Paraguayo de Estudios Sociológicos, La Población de Paraguay (Asunción 1974), p. 45.

2/ ibid., p. 51.

FIGURE B-1

POPULATION DENSITY BY DEPARTMENTS
(1972 Census)



from 24 to 42 inhabitants per square kilometer in 1972. Apart from the department of Itapúa with a density of 12.2 inhabitants per square kilometer, the remaining departments have densities of less than 10 inhabitants per square kilometer.

d. A Rural Country

Paraguay is basically a rural and agricultural country. Asunción is the only sizable city. According to the 1972 census the population of Asunción was 392,753. However, inclusion of the satellite towns of Fernando de la Mora, Lambaré, Luque, and San Lorenzo brings the total population of the greater Asunción area to 486,730. Although the population of Asunción grew at an average annual rate of 3.1 percent during the 1962-1972 intercensal period, the annual rate of growth of population in the greater Asunción area was 5.1 percent. Outside of this area there are only six towns with populations in excess of 10,000--Encarnación (23,343), Pedro Juan Caballero (21,033), Concepción (19,392), Villarrica (17,687), Coronel Oviedo (13,786) and Pilar (12.506).1/

One of the notable characteristics of Paraguay's population is the relative stability of its urban and rural components. In 1950 the proportion of Paraguay's urban population to its total population was 34.6 percent. By 1962, this proportion had increased to 35.8 percent and 1972 census results indicate 37.4 percent. The definition of urban areas for censal purposes includes the principal towns of departments and municipalities as well as certain other selected towns and, by law, the municipalities of Asunción, Fernando de la Mora and Lambaré.2/ If only the greater Asunción area and towns with more than 10,000 inhabitants are considered as urban, the urban population would constitute 27.2 percent of total population.

e. Internal Migration

During the 1962-1972 intercensal period, there were shifts in population within Paraguay comprised both of rural-urban migration, and, more importantly, of rural-rural migration. Figures B-2 through B-6 illustrate this regional migration pattern. Inasmuch as tendencies by departments are frequently contradicted by tendencies at district level (subdepartmental geographical-political units), the maps presented in Figures B-2 through B-6 are based upon the 139 districts of eastern Paraguay and the three Chaco departments which existed at the time of the 1962 census.

1/ Dirección General de Estadística y Censos, Censo Nacional de Población y Viviendas 1972 (Cifras Provisionales) (July 1973) p. 24.

2/ ibid., p. 3.

FIGURE B-2

AREAS WHERE POPULATION DECREASED BETWEEN 1962 AND 1972

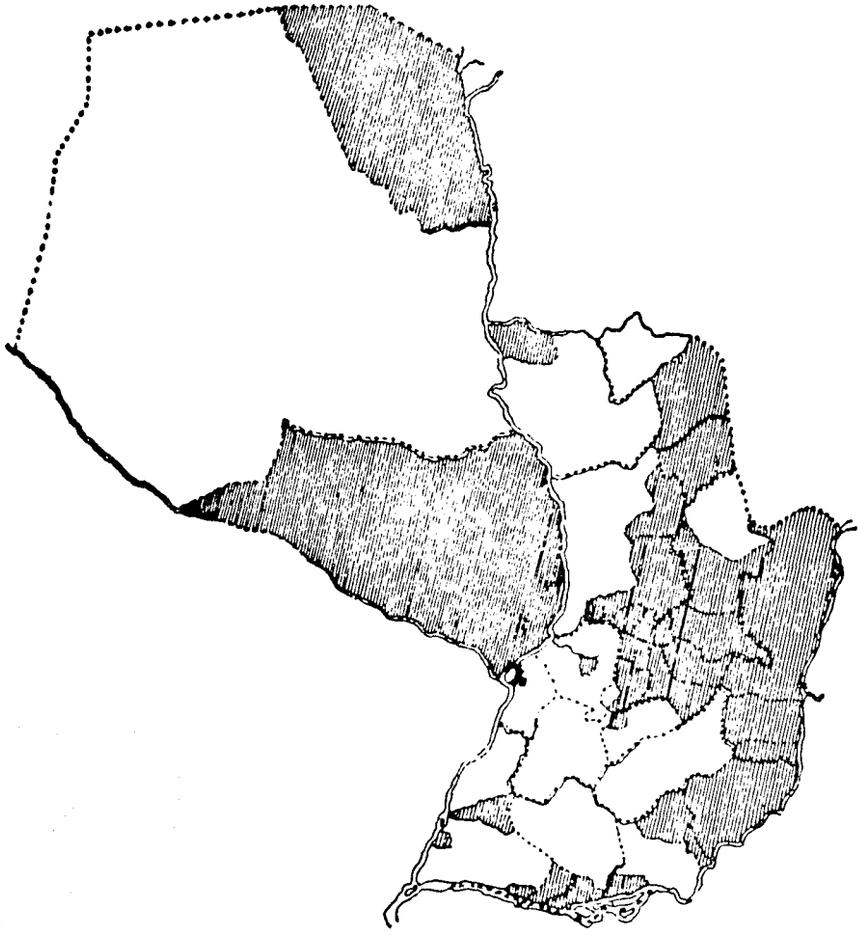


FIGURE B-3

AREAS WHERE POPULATION INCREASED BY 0 TO 15 PERCENT
BETWEEN 1962 AND 1972

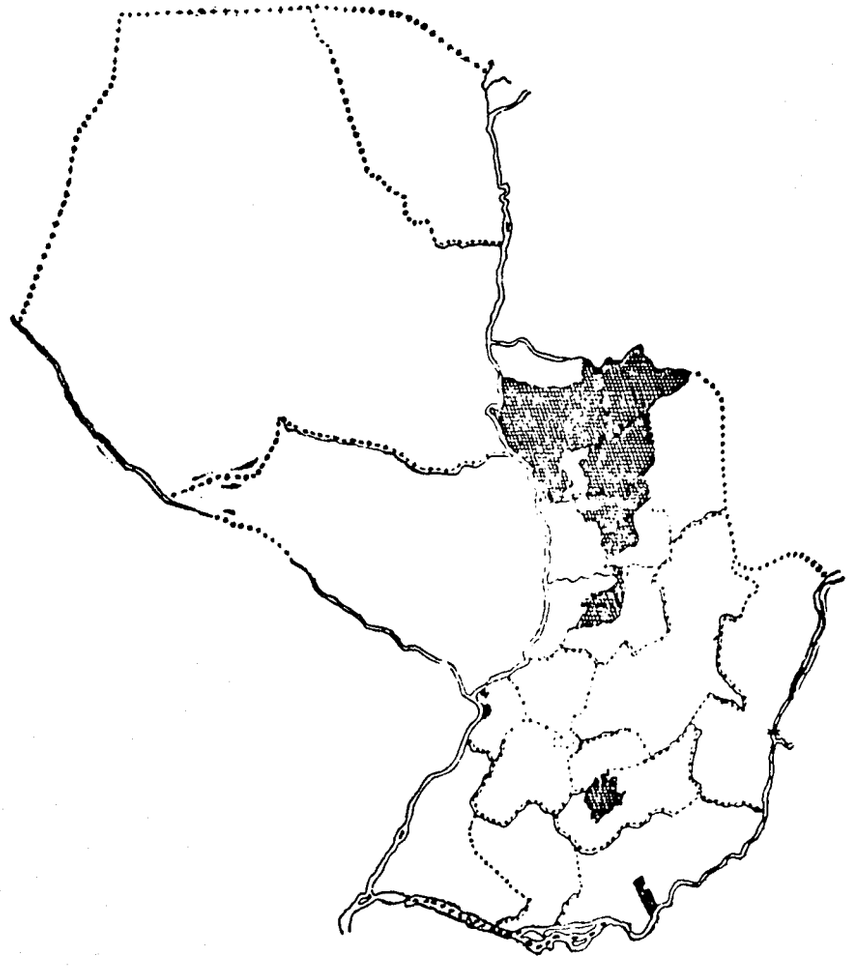


FIGURE B-4

AREAS WHERE POPULATION INCREASED BY 15 TO 30 PERCENT
BETWEEN 1962 AND 1972

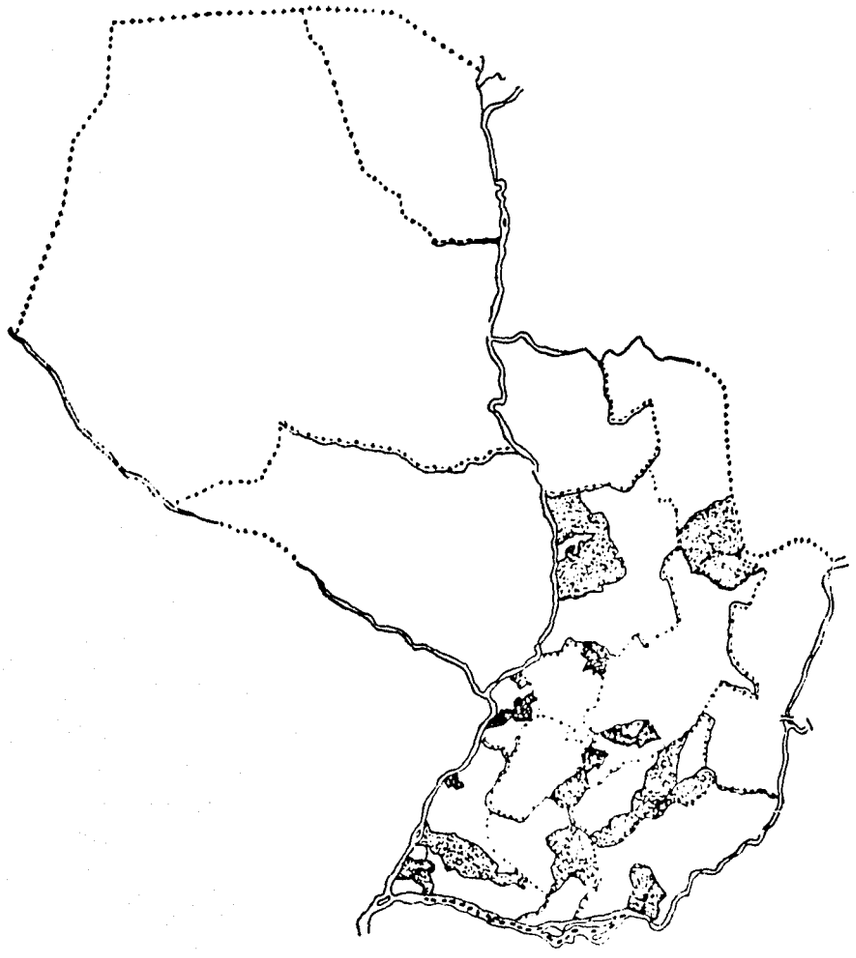


FIGURE B-5

AREAS WHERE POPULATION INCREASED BY 30 TO 45 PERCENT
BETWEEN 1962 AND 1972

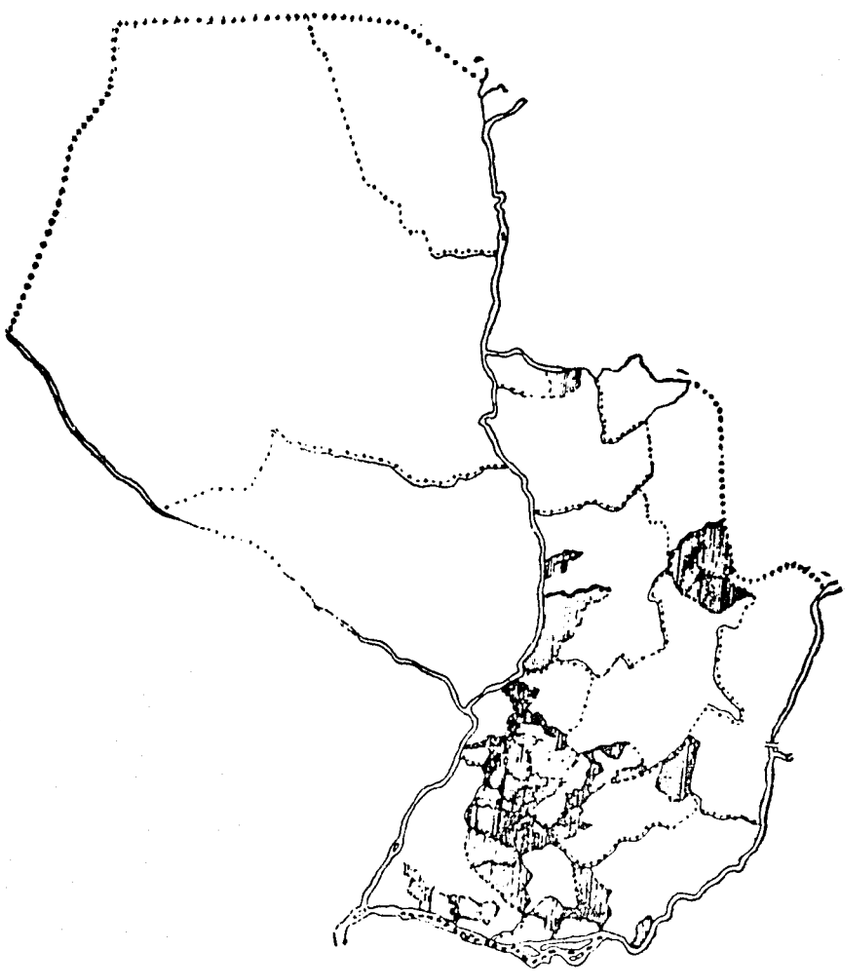


FIGURE B-6

AREAS WHERE POPULATION INCREASED BY MORE THAN 45 PERCENT
BETWEEN 1962 AND 1972

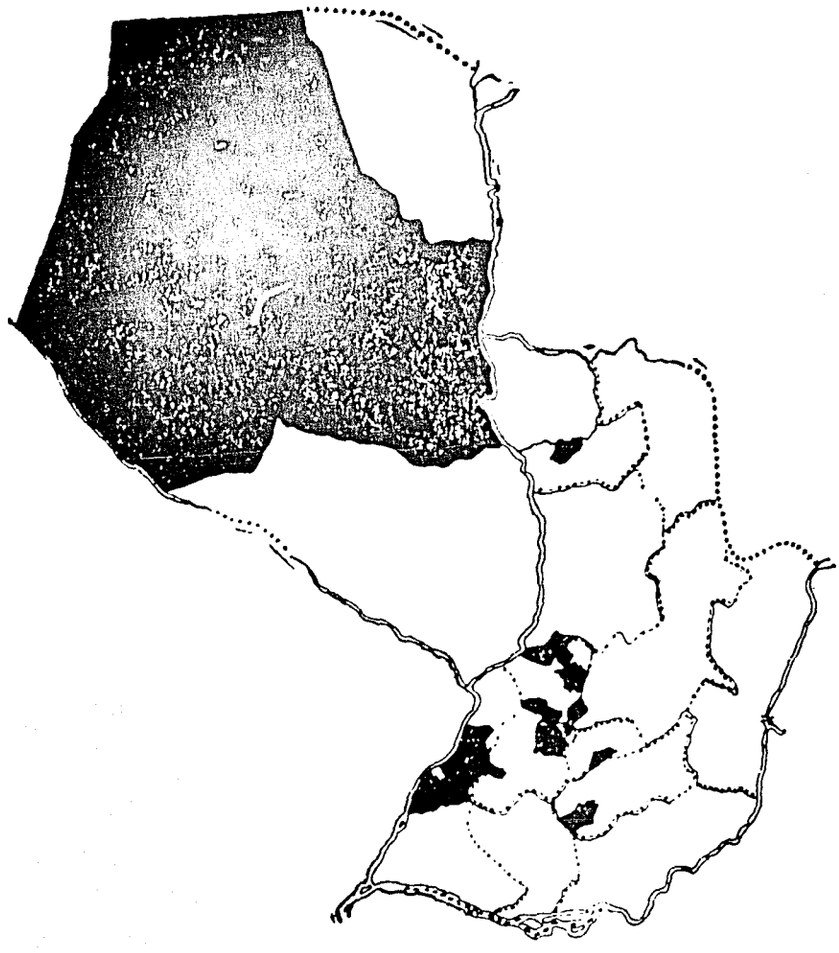


Figure B-2 indicates areas which had fewer inhabitants in 1972 than in 1962. These areas include Boquerón (a Chaco department), 7 (of 17) districts of the department of Cordillera and 5 (of 16) districts of the department of Paraguarí, and 2 (of 16) districts of the department of Ñeembucú. Figure B-3 indicates those areas where population grew within the range of 0 to 15 percent. These areas include 8 (of 16) districts of the department of Cordillera, 8 (of 13) districts of the department of Caaguazú, 10 (of 16) districts of the department of Paraguarí, 5 (of 17) districts of the departments of Central, 5 (of 9) districts of the department of Misiones, 4 (of 16) districts of the department of Ñeembucú, and 4 (of 11) districts of the department of Itapúa. These data suggest that people left the areas of old settlement commonly known as the central minifundia zone.

Paraguay's total rural population grew by 26.4 percent in the 1962-1972 intercensal period and total population grew by 29.6 percent. Figure B-4 indicates those areas with rates of growth in the range of 15 to 30 percent and could, therefore, be considered as having little net emigration or immigration. These areas include 3 (of 13) districts of the department of Guairá, 3 (of 8) districts of the department of Caazapá, 5 (of 17) districts of the department of Central, 3 (of 9) districts of the department of Misiones, 6 (of 16) districts of the department of Ñeembucú, 2 (of 11) districts of the department of Itapúa, 2 (of 10) districts of the department of Caaguazú, and three other districts.

Figure B-5 indicates those areas where population grew by 30 to 45 percent. These areas include only 11 districts, 2 (of 6) in the department of Concepción, 4 (of 10) in the department of San Pedro, 2 (of 17) in the department of Central, and one district each in the departments of Caazapá, Amambay, and Itapúa.

Figure B-6 indicates those areas where population grew by 45 percent or more during the 1962-1972 intercensal period. These areas include 3 (of 10) districts in the department of San Pedro, 4 (of 17) districts in the department of Central, 4 (of 16) districts in the department of Ñeembucú, 7 (of 10) districts in the department of Caaguazú, 2 (of 3) districts in the department of Amambay, all districts of the department of Alto Paraná, 4 (of 11) districts in the department of Itapúa, and the Chaco departments of Presidente Hayes and Olimpo.

The areas shown in Figures B-5 and B-6 have population growth in excess of 29 percent, were recipients of net immigration, and were principally areas of new settlement. These areas are mainly in the eastern half of eastern Paraguay. By and large, even in 1972 these areas had population densities of less than 10 inhabitants per square kilometer. In comparison, the Asunción metropolitan area had a 63.6 percent increase in population during the 1962-1972

intercensal period (but the Municipality of Asunción had only a 34.6 percent increase). In conclusion, the area of exodus is the central minifundia zone (the departments of Cordillera, Guairá, and Paraguarí which contained 22.5 percent of total 1972 population) and the poles of attraction within Paraguay are Asunción and the areas of new settlement in the eastern half of eastern Paraguay.

4. Conditions of Life

The ensuing discussion touches upon fundamental conditions of life in Paraguay: health, formal education, income and employment opportunities.

a. Health

Life expectancy at birth averaged 57.4 years according to the 1962 census, with life expectancy of 55.4 years for men and 59.3 years for women. The annual mortality rate is estimated at about 10-12 per 1,000 people. The principal causes of death in declining order of magnitude are diarrhea (rate of 76.4 per 100,000 persons), influenza and pneumonia (70.8), tumors (60.8), heart disease (58.0), lesions to the central nervous system (44.0), and tuberculosis (27.3).[1]

The infant mortality rate is estimated between 80-90 per 1,000 live births. This relatively high rate of infant mortality is characterized by a relatively high death rate for infants of less than one month of age (41.1 per 1,000 live births). The distribution of deaths by age groups (estimated in 1968) indicates relatively high mortality for children of less than five years of age (34.2 percent of deaths) with more normal mortality for other age groups: 5 to 40 years of age (14.4 percent), 40 to 70 years of age (20.7 percent) and over 70 years of age (30.5 percent).

Data on disease (morbidity) are obviously affected by exclusion of unreported cases. However, the general pattern of reported cases is suggestive of the health problems of Paraguayans. Principal causes of sickness by order of magnitude are hookworms (2,719 per 100,000 population), diarrheas and enteritis (1,324), influenza (1,188), severe pneumonias (898), and lower incidence for such other diseases as syphilis, hypertension, whooping cough, and tuberculosis. Diarrheas, influenza, and pneumonia have a higher incidence among children of less than five years of age. Hookworm infestations have high incidence in all age groups. In general, infectious and parasitic diseases predominate.

1/ Ministerio de Salud Pública y Bienestar Social, Plan de Desarrollo y Perfeccionamiento de Instituciones y Programas de Salud 1969-1973 (Asunción, 1968) pp. 7-8 (data for 1965 and 1966).

There are several aspects conditioning health of Paraguayans: nutrition, climatic conditions, housing, environmental sanitation and the availability of medical attention.

In regard to nutritional levels, deficiencies of certain vitamins and minerals such as riboflavin and iodine are evident, principally because of a diet heavy in cassava, beef, corn and wheat derivatives and weak in milk products and green vegetables. Some evidence of malnutrition, particularly for low income families, is evident from slow physical development and maturation.

Climatic conditions favor propagation of respiratory diseases. The average temperature in the more populated region of Paraguay is 74°F, but extremes range from 23°F to 110°F. Climatic conditions favor mosquitos, flying insects, and rodents and thereby pest-borne diseases such as malaria.

According to the 1972 census data, housing conditions for the bulk of Paraguayans are unfavorable in terms of sanitation. Some 42 percent of all dwellings had only one room, and they house approximately 38 percent of the total population. Comparatively few houses had piped water (4 percent), bath or shower facilities (39 percent), a sizable number lacked electric lighting (83 percent) and approximately 6 percent lacked rudimentary latrines.

There are a number of institutions which provide medical services. In general there is comparative abundance of resources for the urban sector and dearth for the rural sector. The Social Security Institute provides medical services to less than 10 percent of the population. In 1970 Paraguay had one physician per 2,185 persons, one hospital bed per 586 persons; ratios only slightly less favorable than for Latin America as a whole. From 1962 to 1972 the number of practicing physicians increased by 22 percent, the number of practicing nurses by 123 percent and the number of hospital beds by 35 percent. In comparative terms, the quality of medical services in Paraguay appears satisfactory, and substantial progress has been made in control of certain diseases (malaria, poliomielitis, leprosy). Major deficiencies exist, however, in the diffusion of medical services and health education to rural areas.

b. Education

Primary education embraces six years. However, rural children with access to schools are likely to have an opportunity for only two to three years of schooling because approximately three-quarters of the schools which offer all six grades are located in the capital city of Asunción or "urban" centers in the interior.

According to Ministry of Education figures, although 77 percent of Paraguayan children of ages 7 through 14 are enrolled in the primary system, only 13 percent go beyond the third grade.

Secondary education facilities exist mainly in Asunción. Slightly over one-half of all secondary school students receive education from private schools. The proportion of secondary school age population enrolled in all secondary schools in Paraguay is substantially below the Latin American average.

Approximately 40 percent of Paraguay's population speak only Guaraní, the local Indian language. The remainder of the population is conversant in both Guaraní and Spanish, and both languages are recognized as official by the government. Few people read Guaraní (although there is some scholarly interest in its written use); the Paraguayan who speaks only Guaraní is not literate. Most of the monolingual Guaraní speakers are small farmers whose major contact with Spanish is through the school their children attend briefly. The difficulty these children experience in school, where almost all instruction is in Spanish, is reflected in the extremely high dropout and repeat rates. The education system tends to perpetuate functional illiteracy in rural areas, which greatly complicates the spread of better farming technology and other factors of practical importance. While education is considered valuable for its own sake and the educated person enjoys respect, most rural Paraguayans have been content with little or no education. Even though rural parents wish for a better life for their children, parents are not distressed when children stop attending school and they feel no qualms about keeping their children away from the classroom to work as farm laborers.

A substantial majority of the work force has had only limited education opportunity. Many have never attended school at all; only a small percentage have completed 3 years or more of formal education. Also, the current high elementary-school dropout rate means that additional thousands of Paraguay's youth will enter the labor force with less than three years of education, which means that what little investment in education was made for them will have meager results. Over the next 15 years, and regardless of the population growth rate during those years, the potential labor force (15-49 year age bracket) will more than double as the 1,080,000 under-fifteens are added to the 809,000 people currently in the labor force.[1] Although there are shortages of skilled workers, unemployment or under-employment is already high among the young and less-educated who are entering the labor force.

1/ ATAC, Family Planning Activities in Paraguay (August 1972), pp. 16-17.

c. Income Distribution and Underemployment

Adequate data on the distribution of personal or of family income in Paraguay do not exist. The collection of such data is difficult due to conceptual as well as practical reasons. These difficulties can be overcome more readily in urban areas than in rural areas. The best available data on urban incomes are from the PREALC (Programa Regional del Empleo para America Latina y el Caribe) survey of approximately one thousand households conducted in May 1973 in the greater Asunción area. The best available data on rural incomes are from the CPES-AID surveys of 1,272 farm families in rural eastern Paraguay for the 1972-1973 crop year.

The income data collected by the PREALC surveys are weekly wages received by persons. The income data collected by the AID-CPES surveys are annual net farm family income. The PREALC survey found that in May 1973 the average weekly wage was Gs. 3,809 for persons whose employment implied a fixed wage and Gs. 2,805 for persons whose occupations yielded a variable income. The largest AID-CPES survey (Survey One) found an average yearly net farm family income of Gs. 197,600.[1] Conversion of this income by the statistic of 2.28 man-years of available family labor (also generated by a survey) yields a daily shadow wage of Gs. 289 on the basis of a 300 man-day work year and a weekly shadow wage of Gs. 1,735.[2]

Tables B-3 and B-4 present the relevant findings from the PREALC and CPES-AID surveys. In regard to the question of absolute magnitudes of real income, one can suppose that there are certain costs (such as transportation to and from place of work) that absorb a sizable portion of cash income of urban workers. The average weekly shadow wage of the rural worker was 62 percent of the average weekly wage of the fixed-wage urban worker. Even if the urban workers 1973 weekly wage is discounted by Gs. 200 to account for transportation, this percentage would increase to only 76 percent.

In regard to the global distribution of personal income in Paraguay, about 28 percent of urban income recipients received wages or equivalent income in excess of Gs. 2,500 per week, and about 14 percent of all farm units have over 20 hectares of land. This latter group has income which, if adjusted for higher cost of urban living, would imply a weekly wage in excess of Gs. 2,500. A weekly wage of

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1/ The average weekly wage received by farmers when performing off-farm work (both in agricultural and nonagricultural activities) found by this survey was Gs. 1,631.

2/ The assumption of a 300 man-day work year is not critical for this comparison. The feasible rural work year might be only 240 man days or some other reasonable estimate. Here we obtain a shadow weekly rural wage only for purposes of comparison. The relevant unknown is the number of work days or weeks existing in the urban workers' work year.

TABLE B-3

STRUCTURE OF WEEKLY PERSONAL INCOME IN ASUNCION (MAY 1973)

Weekly Income Strata (Guaranies)	Persons Receiving: Fixed Wages (Percent)	Persons Receiving: Variable Incomes (Percent)
0 - 449	20	19
500 - 999	11	20
1000 - 1499	13	34
1500 - 2499	28	
2500 - 4999	18	12
5000 and over	10	15
	100	100

Source: PREALC, Situación y Perspectivas del Empleo en Paraguay (Santiago, Chile: January 1975), Cuadros 16, 23.

TABLE B-4

STRUCTURE OF NET FARM FAMILY INCOME BY SIZE OF FARM (1972-1973 CROP-YEAR) IN SIX DISTRICTS OF EASTERN PARAGUAY

I. Size of Farm (Hectares)	II. Number of Farm Sampled	III. Average net Farm Family Income (Thousand Gs.)	IV. Mean Standard Deviation of III (Thousand Gs.)	V. Shadow Wage per Week a/ (Guaranies)
Less than 5	175	102.01	5.89	1,000
5 - 8	236	138.38	6.07	1,083
9 - 13	192	183.71	9.01	1,364
14- 24	177	241.80	19.85	1,795
25 and over	219	314.25	19.91	2,303
	999	197.60	6.57	1,735

Source: USAID/Paraguay from CPES, Survey One.

Note: a/ Calculated by dividing Average Net Farm Family Income by labor availability proxies in man days, specifically 612.08, 766.65, 807.84, 807.84, 818.54, for the five farm size strata and 683.39 for the average (all based on 300 man-day work year) and multiplying this result by .02.

Gs. 2,500 is roughly equivalent to US$1,000 in annual income. Thus, approximately 80 percent of all Paraguayans receive annual incomes below US$1,000. Given a typical family size of five or six persons, it is fairly obvious that the one-worker family would receive an annual per capita income of less than $180 and the two-worker family would receive an annual per capita income of less than $400.

Overt urban unemployment does not appear to be a major problem in Paraguay. Up to the present there have been no periodic annual or quarterly surveys of employment and unemployment in Asunción. The PREALC survey indicated a rate of unemployment of 12 percent in the greater Asunción area in May 1973.[1] However, the rate of unemployment was only seven percent when only heads of households were counted as unemployed. The 1972 census indicated a rate of unemployment of 2.9 percent; see Table B-2.

Expert opinion is in broad agreement that there is underemployment, and underutilization of labor in Paraguay. However, there are doubts regarding the correct methodology of calculations required for estimates of underemployment. The PREALC study derived rates of 22 percent of the active labor force in the greater Asunción area and 31 percent of the active rural labor force (exclusive of women and children who work principally during harvest periods.)[2] According to the 1972 census, Asunción's gross labor participation rate (active labor force divided by total population) approximated 55 percent; this is higher than that of most Latin American urban areas. Despite the growth of population in the greater Asunción area, the high participation rate as well as casual observation suggest that Paraguay's primary urban center has not yet received a sizable influx of marginally employable persons. The several factors which would explain this situation are: (1) the unattractiveness of Asunción as a labor market due to its lack of substantial industrialization, (2) internal migration to areas of new agricultural colonization, and (3) emigration to Argentina and, to a lesser extent, to Uruguay and Brazil.

5. Physical Infrastructure

Throughout the last decade the GOP placed great emphasis on the building of physical infrastructure. Despite the importance of foreign trade to the Paraguayan economy, at the beginning of the 1960's Paraguay's transportation systems as well as communication, and energy systems were primitive. Substantial domestic and external resources

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1/ PREALC, Situación y Perspectivas del Empleo en Paraguay (Santiago, Chile, January, 1975). Cuadro 1.

2/ PREALC, op cit. p. 12.

have been devoted to overcoming these deficiencies. This task is not finished. Proposed solutions to some of the present problems are also discussed herein.

a. River Transport

River transport through the Paraná and Paraguay rivers carries approximately 80 percent of Paraguay's foreign trade. During the 1960's, Paraguay's State Merchant Fleet added 27 vessels to the national fleet for a total of 31 ships with a total carrying capacity of 20,000 tons. The Paraguay river permits navigation of river craft and small ocean freighters (1,000 to 2,000 tons) with varying degrees of difficulty from Confluencia, where the Paraguay river joins the Paraná river, to Asunción and as far as Corumbá, Brazil. Although obstructed by rapids, the Paraná river, which separates Paraguay from Argentina and Brazil, is navigable by small vessels between the Guairá Falls and Confluencia. The Argentine Government has agreed to maintain a 10-foot deep channel in the Paraná-La Plata river and to maintain a 6-foot deep channel between Asunción and Confluencia. The principal limitations on river transport are (1) lack of adequate depth at various passes on the Paraguay river which impedes transit of vessels with more than a 6-foot draft during periods of low water and (2) the cost of transhipment of cargo at Buenos Aires.

In the past five years several improvements have been made in port facilities. However, for many years little was done to improve the river system. In recent years dredging operations have been stepped up. The principal recommendations of the 1973 IBRD/UNDP study on transportation are (a) to continue dredging operations on the Paraguay river south of Asunción and to excavate channels to ensure a minimum nine-foot depth, (b) to dredge the Paraguay river north of Asunción and to improve the channel markers, (c) to improve various port facilities, and (d) to improve labor work rules, particularly at the port of Asunción, which could effectively double the port's capacity.

b. Roads

From 1960 to 1973 Paraguay's road system expanded from 1,346 miles to 4,144 miles, an increase of 208 percent. During the same period, miles of paved roads increased 348 percent from 121 to 543. Paraguay has two major paved highways, the Asunción-Puerto Presidente Stroessner route, paving completed in 1965, and the Asunción-Encarnación route, paving completed in 1969. Other roads in the present system are graded earth and graveled roads. Earth-graded roads are not permanently passable, being closed during rainy periods (approximately 40 to 130 days per year depending upon soil characteristics) to protect them from traffic erosion

and thus reduce major maintenance expenditures. While existing highways are not subject to intensive use, trucks and buses inflict substantial damaging pressure on road bases. It is estimated that about three-fourths of national merchandise and 95 percent of domestic passenger travel utilize the existing road system, and that vehicular travel is increasing by 8 to 10 percent annually in eastern Paraguay.

At present the GOP is initiating reconstruction and paving of a segment of the Trans-Chaco highway which will absorb a large share of domestic fiscal resource counterpart during the next few years. The transportation study sponsored by the IBRD and UNDP, recommends the paving before 1980 of some 266.3 miles of various roads in eastern Paraguay which have high economic benefits;[1] namely the following roads, Concepción to Pedro Juan Caballero, Encarnación-Hohenau-Capitan Meza, Coronel Oviedo-Mbutuy, Villarrica-Ñumi and a four-lane highway from Asunción to San Lorenzo. There is also the need for improvement of secondary feeder roads in the Eje Este (East Axis) colonization area. However, all these efforts run the risk of becoming ineffectual unless a plan of improved road maintenance is adopted.[2]

In the periods 1973-1977 the GOP has slated four major highway projects: the Trans-Chaco highway, completion of rehabilitation of a portion of Routes 2 and 7, paving of routes in the Asunción-Encarnación-Puerto Presidente Stroessner triangle, and construction of a bridge over the Paraguay river at Villa Hayes as well as additional highway widening and construction of feeder roads. The costly projects are the paving of the Trans-Chaco highway (in excess of $40 million) and the Paraguay river bridge ($10-14 million). Whatever the economic merits of these projects, the integration of the Chaco into the Paraguay economy is a major goal of the GOP.

c. Railroads

Paraguay's principal railroad, the President Carlos Antonio López Railroad, the oldest in South America, traverses the southwestern portion of eastern Paraguay between Asunción and Encarnación passing through Villarrica on a route approximately 234 miles in length. The basic infrastructure of this railroad is in a state of

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1/ Ministry of Public Works and Communications, UNDP/IBRD, Paraguay Transport Survey, Final Report, Part IV (Asunción, July 1973), pp. 11- 12

2/ Plan Nacional de Desarrollo Económico y Social, 1971-1975, Sector: Transporte y Comunicaciones, p. 164

advanced deterioration and its rolling stock is basically the same as in 1913, the year of the system's completion. Up to 1955 this line operated at a profit. In 1959 the private owners suspended operations and subsequently the GOP purchased it. A substantial effort was made by the GOP to increase revenues from railroad operations and to reduce costs. Freight traffic decreased during the 1950's, due in part to the opening of the Encarnación-Asunción highway, and freight traffic during the 1960's has remained relatively static. At present the railroad is carrying most of the traffic that it can attract and the majority of what it can handle with its present capacity. In recent years, annual operating deficits have averaged $620,000. A 1969 study indicated that an investment of $9 million would be required in the near future to maintain present capacity.[1] A marginal cost comparison showed that a fivefold increase in traffic volume would be necessary for the railroad to be more economical than a parallel road network. In effect, the railroad will have to be completely rebuilt and nearly all its existing rolling stock replaced by the end of this decade or the present road system must be expanded to replace the railroad.

d. Electrical Energy

Between 1960 and 1966 Paraguay's installed electrical generating capacity doubled, and by 1970 it had increased fivefold. Per capita consumption of electricity is, however, still comparatively low. Up to 1968, 75 percent of generating capacity was steam-thermal and 25 percent diesel-powered. A high proportion of industrial firms have their own generators. In some cases industrial by-products are used as fuel, and until recently, ANDE, the Administración Nacional de Electricidad, had a very limited distribution network and service was unreliable. Even in 1971 it is estimated that 31 percent of total electrical energy production was by private firms mainly for their own use.

Since 1961 ANDE has received a series of external loans, mainly from the IDB, for a hydroelectric project on the Acaray river, main transmission lines to Asunción, transformer sub-stations, distribution lines and ancillary equipment. At present ANDE supplies electrical energy to the Asunción metropolitan area and to more than 45 localities in the interior from the Acaray hydroelectric installation.[2] In isolated localities thermal-generating plants have been

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1/ IBRD, Current Economic Position and Prospects of Paraguay. (July 12, 1971), pp. 35-36

2/ GOP, Paraguay: El Esfuerzo Nacional y Las Necesidades de Financiamiento Externo (Asunción, Mayo de 1973), p. 80

installed. Up to 1968 ANDE's generating capacity was only 33,700 KW. The first turbine at Acaray came on stream in later 1968 and the second in 1970 (each 49,000-KW capacity).

ANDE's domestic sale of electrical energy increased at a rate of 11.1 percent annually from 1960 to 1973. The objective of ANDE's present program is to expand service to some 85 localities, mainly in the populated central zone and in the areas adjacent to Encarnación, Concepción, and Pedro Juan Caballero. Since 1970 ANDE has made interconnections with adjacent areas of Argentina and Brazil to export surplus electrical energy and (in the case of Argentina) to facilitate re-importation to service the Encarnación area.

At present, ANDE is finishing a $38.8-million expansion program financed with a $29-million loan from the IDB. The major elements of this project include construction of a second power station at Acaray which will contain two 45,000 KW generators, construction of the first stage of a regulatory dam on the Iguazú river (the principal tributary of the Acaray), installation of two 15,000 KW gas turbines for emergency use near Asunción, two major transformer sub-stations, extension of distribution lines in the Asunción area and to 10 new localities in the interior, and creation of a northern system (not connected to Acaray) to supply Concepción and adjacent towns.

The rates charged users by ANDE are relatively high even after implementation of a tariff schedule in 1969 which reduced rates. The high rate structure is due to the fact that ANDE depends in large measure upon current revenues to finance expansion and working capital requirements instead of depending upon central government resources. In effect, present users are paying for expansion of electrical services to the interior of the country. The reduced real cost of electric installation has not been passed on to the users but was plowed back into expansion.

e. Other Infrastructure

Telephone service has also been expanded in the past decade. ANTELCO, Administración Nacional de Telecomunicaciones, is a public enterprise in charge of Paraguay's telephone and telegraph systems. Approximately 90 percent of Paraguay's telephone installations are in Asunción. In 1969 the German Development Bank made a $7.5 million loan to ANTELCO for expansion of telephone installations. The Government of Japan made a loan to ANTELCO for installation of a ground station for a satellite communications relay system and a telecommunications microwave system. The present phase of ANTELCO's activities emphasizes training of its personnel for handling these telecommunications systems, which are new to Paraguay.

CORPOSANA, Corporación de Obras Sanitarias, is the only important public entity providing potable water and sewerage systems in Paraguay. Virtually all its installations are in Asunción. In 1972 some 34,000 houses received potable water from CORPOSANA and 24,000 houses were connected to its sewage system.

6. Physical Environment

a. Climate

In general, the climate of Paraguay is characterized by a nonstable balance between the cold masses of air from the south and the very hot masses of tropical air from the north. Sharp changes of temperatures are quite notable and may fluctuate as much as 40°F in 24 hours. By taking into account the ecological characteristics, Paraguay's climate is generally within the descriptions of continental subtropical climates, somewhat mitigated by the abundant water in rivers and marshes.

Situated near the center of the continent, between two major climatic systems with no well-defined topographic barrier, Paraguay is open to currents of cold air from the south and warm air from the north.

As to whether the climate should be considered tropical or subtropical has always been somewhat controversial. The maximum summer temperature may hover around 95°F for periods of from 10 to 15 days before relief comes by a rain storm.

The winters also have uncomfortable periods of a week or 10 days of damp cold weather with south winds. The temperature may drop below 32°F but not for sustained periods. It is almost never cold enough for ice to form in the Asunción area.

The amount of annual precipitation decreases rapidly from the very humid climate of the eastern part of the country to the western part where the climate is from sub-humid to semi-arid due to the effects of the Andes range. The annual rainfall variation is from 67" near the Brazilian border to 20" near the Bolivian border.

The mean annual temperature varies from about 70°F near the southern border to about 79°F near the northern border. Frosts occur annually but they are more frequent in the southeast. Highest mean temperatures occur in December and January and vary from 73°F in the northeast town of Pedro Juan Caballero, to 85°F at Mariscal Estigarribia in the western Chaco.

The coldest months are June, July and August. The lowest mean temperatures are in July and vary from 60°F at Pedro Juan Caballero to 70°F at Bahía Negra on the Paraguay River near the northern boundary. The colder temperatures at Pedro Juan Caballero, a northern town (slightly colder than the most southern town of

Encarnación), reflects the higher elevation of the northeast at about 1,500 feet as compared with about 300 feet at Encarnación.

Although the smallest variation of elevations within the country appears to influence local climate, no detailed studies are available. Presently, the meteorological observation stations are too few and most of them are too recently established to permit reliable conclusions.

The Paraguay and Paraná rivers produce certain local effects by the high temperature of the waters which they bring from tropical regions as they flow southward. A strip of about one kilometer in width adjacent to the rivers is characterized by fogs during the morning and the general absence of freezing. Six regional climates can be found within the territorial limits of Paraguay.[1/]

Tropical, semiarid, with deficient rainfall throughout the year--Mariscal Estigarribia (Boquerón).

Tropical, subhumid, with deficient rainfall throught the year--Bahía Negra (Olimpo).

Tropical, subhumid, with rainfall deficient in the winter--Puerto Casado (Boquerón), Horqueta (Concepción), and Asunción (Central).

Mesothermal, humid, with winter-deficient rainfall--Pedro Juan Caballero (Amambay), Puerto Presidente Franco (Alto Paraná), San Juan Bautista (Misiones), and Pilar (Ñeembucú).

Mesothermal, humid, with sufficient rainfall throughout the year--Villarrica (Guairá).

Mesothermal, subhumid, with sufficient rainfall year round--Encarnación (Itapúa).

b. Land Resources

The area devoted to livestock production in Paraguay constitutes 36.53 percent of the total. (Table B-5.)

Even if all the land potentially suitable for crop production (8,788,000 hectares) were fully utilized, there would still be over

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1/ Teófilo Fariña Sánchez in Paraguay Ecological Essays, J. Richard Gorham (ed.), (Miami, Florida Academy of the Arts and Sciences of the Americas, 1973), p. 33

TABLE B-5

DISTRIBUTION OF TOTAL LAND BY PRINCIPAL USES

Use Suitability	Actual Use Hectares (1000)	Actual Use Percent	Potential Use a/ Hectares (1000)	Potential Use a/ Percent
Crops	953	2.32	8,788	21.6
Livestock	14,849	36.53	39,724	97.7
Forests	23,929	58.85	31,048	76.4
Water and Others	944	2.30	951	2.3
TOTALS	40,675	100.00		

Sources: MAG, Encuesta Agropecuaria por Muestreo 1972 and Adlai F. Arnold, Structure and Performance of Paraguayan Agriculture 1956-1967, 1968.

Note: a/ Potential use of components do not add to totals because all except water and other land is potentially suitable for livestock and all except 9,670,000 hectares is potentially suitable for forests.

31,000,000 hectares available for other purposes. At present, only 14,849,000 hectares are being used for livestock production. The availability of land is not a factor limiting expansion of crop and livestock production.

The soils of Paraguay have never been mapped in sufficient detail for land use planning of small sections. However, in general, a good deal is known of the geological history of the area and the parent rocks from which the soils were formed. Some areas have been studied in more detail by soil scientists.[1/]

(1) Eastern Paraguay

About one-third of eastern Paraguay is formed by the western part of the Paraná basin which also occupies a part of western Brazil. The latisoils and reddish brown laterites here are very deep soils on basaltic rock. The native vegetation is dense tropical forest.

The rest of eastern Paraguay is known as the central Paraguay swell or anticline. The parent material is Misiones sandstone and the soils are red and yellow podzolics, with integrates to latesols. The native cover is semideciduous tropical forest. Some deep depressions in this area are covered by planosols. Nearer Asunción the soils are principally deep red and yellow podzolics on Misiones sandstone.

The number of hectares of soils in eastern Paraguay by regions and classes is shown in Table B-6. Estimates of the amount of Paraguayan soils suitable for agriculture are variable. There are probably about 8.1 million hectares in classes I and II, although, in general, there is a considerable scarcity of essential minerals, especially phosphorus, calcium and magnesium. About 5.5 million hectares of alluvial soils present problems due to their physical structure and the large proportion subjected to alternate flooding and drought.

1/ For examples, see Pedro Tirado Sulsona et al, A Reconnaissance Soil and Land Classification of Paraguay, STICA (February 1952), and the Plan Triángulo. The Plan Triángulo or Triangle Plan was a study financed by a United Nations special fund grant to Paraguay approved in 1963 and completed in 1967. The name is from the

TABLE B-6

HECTARES OF SOILS IN EASTERN PARAGUAY BY REGIONS AND CLASSES

Regions	Soil Classes 1/ (Million Hectares) I	II	III	IV	V	Total	Percent
Central	.40	.58	1.06	.26	0	2.30	14
Itapúa	.92	.15	.42	.16	0	1.65	10
Misiones-Ñeembucú	.08	-	2.49	0	0	2.57	16
Alto Paraná .	2.79	1.38	.78	.43	0	5.38	35
San Pedro-Concepción	.59	1.03	1.59	.43	.41	4.05	25
TOTAL	4.78	3.14	6.34	1.28	.41	15.95	100
Percent	30	20	40	8	2	100	100

Source: María Pilar Sánchez Fauquier, Estudio Agrohidrológico (Asunción: Secretaría Técnica de Planificación, 1969).

Note: 1/ Classes are as follows:

Class I : Soils suitable for intensive use.

Class II : Soils suitable for moderate agriculture and Livestock use.

Class III: Soils suitable for extensive use, mainly livestock farming.

Class IV : Soils limited to forest use.

Class V : Soils not identified.

(a) Central Region

Often referred to as the minifundia, or congested area, this is economically and socially the most important part of the country. This region contains 2.3 million hectares or about 14 percent of eastern Paraguay. It comprises the political departments of Cordillera, Guairá, a great part of Central, Caazapá and Paraguarí, and a small part of Caaguazú.

By topography, the soils can be grouped into three categories: (i) The alluvial lands of the low plains, partially flooded, and covered with native pastures, are used rather extensively for livestock grazing. (ii) The terraces and plains are a little more elevated than the alluvial lands but have serious drainage problems. The natural vegetation consists of grasses and scattered forests. These soils are also generally used for extensive livestock raising. (iii) The high lands, rolling and at times hilly, were originally covered by forests but are presently in crop production.

The predominant geological formations of the central region are

--The Misiones formation, distributed in two areas, is characterized by a hilly relief from the Upper Triassic period. The soils are predominantly sandy and of medium to low fertility. The natural vegetation on these soils is native coco (Mbocaya or Acrocomia total) and natural forests.

--The Independencia formation consists of sandy rocks of the Permian period. The soils are sandy to indurate sandstones of hilly relief and moderate fertility. Only the more level parts are used for cultivation; the roughest parts are covered with forests.

--The sandstones of the Coronel Oviedo series, attributed to the Upper Carboniferous period, are among the most fertile soils of the area because of good physical conditions, mineral reserves and topography. Coronel Oviedo and Villarrica are located within this formation.

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angular shape of the area studied. The vertices of the triangle are Asunción, Encarnación, and Puerto Presidente Stroessner. The area comprises 19,690 square miles or about one-third of eastern Paraguay. There is also some unpublished soil reconnaissance work in the colonies.

--The Caacupé sandstones of the Lower Silurian period have very shallow rocky and sandy soils of low fertility and water retention.

--The soils of the Itacurubí formation from the Lower Silurian period are the most productive of the zone and occupy the greater part of the higher elevations. These are found between Eusebio Ayala and Itacurubí.

According to observations of the Instituto Agronómico Nacional the principal soil problems of the higher elevations are due to low content of phosphorus and, in some cases, of microelements including zinc, sulfur and magnesium. Yield of the majority of the crops could be greatly increased by the use of phosphate fertilizers. Due to their sandy texture, the water retention of these soils is very low and conservation practices are needed to reduce the considerable loss of nutrients from erosion aggravated by the hilly topography.

The principal problems of the low-land soils are both internal and external drainage, plus the risks of flooding. Some soils having a deficient internal drainage could probably be improved by an application of limestone.

Unlike the higher elevations, conditions of the lowlands do not favor the establishment of a forest cover. The natural vegetation includes a great proportion of forage grasses which have influenced the economic use. These soils provide extensive livestock grazing despite the difficulties and risks of flooding.

(b) Itapúa Region

Representing about 10 percent of eastern Paraguay and consisting of the political department of Itapúa, this region embraces an area of 1.7 million hectares. The higher elevations comprise 71 percent, or about 1.2 million hectares. The region is traversed by a number of streams which break the continuity of the high lands.

The most important formations are: (i) The sandy rocks of the Misiones type which take in about 20 percent of the area (332,000 hectares) and are a continuation of those of the Central region. The topography is hilly and generally covered by forests. (ii) The Alto Paraná formation and subformations, which cover 54 percent (890,000 hectares), are attributed to the Triassic-Jurassic

period, and were created by a flow of basaltic rocks. These are among the best soils of the country. (iii) The low soils of the Quaternary period, covering 25 percent of the region (400,000 hectares), are principally covered by natural pastures.

Almost two-thirds of the soils of the Itapúa region are suitable for crop production. The upper elevations in the Alto Paraná formation present practically no fertility problems during the first few years of cultivation. However, in the absence of good management practices the soil structure will tend to deteriorate and generate internal drainage problems. A low content of phosphorus also becomes prevalent after a few years of cultivation, making fertilization necessary to maintain a high level of production. The low lands possess about the same characteristics as described for the Central region.

(c) Misiones-Ñeembucú Region

With an area of 2.6 million hectares and constituting 16 percent of eastern Paraguay, this division takes in the departments of Misiones, Ñeembucú, and part of the departments of Central and Paraguarí. The region is mainly formed by deposits of recent alluvial origin from the Paraguay and Paraná Rivers, plus sediments from the Quaternary period. High lands which appear as islands occupy a small fraction of the area.

This region was not included in the Plan Triángulo study and there is no adequate quantity description of the soils. However, according to Tirado Gulsona et al, there are two soil formations; the Pilar complex and the Tebicuary complex.

The Pilar complex occupies a strip about 10 to 20 kilometers wide along the Paraná River and accounts for approximately 10 or 12 percent of the region. This area, subject to frequent flooding, is formed by recent alluvial deposits from the Paraguay and Paraná Rivers. The soils are inadequately drained. Another narrower strip of the same characteristics is found along the Paraguay River. The Pilar complex was originally covered by forests.

The Tebicuary complex, occupying the rest of the area is a broad drainage basin which appears to be full of old terraces. Large quantities of clay are washed in from the near elevations during rainy periods. Soils throughout the complex have a moderate to severely impeded drainage.

Of the total region, only about three percent in the higher parts are cultivated (approximately 77,000 hectares); the

rest is dedicated to extensive livestock raising. There are no data on the extent of the non-flooded area during the flooding season nor of the areas permanently flooded. However, it is believed that a great part of the area could be used more intensively if properly drained.

(d) Alto Paraná Region

This region of 5.4 million hectares and 34 percent of eastern Paraguay takes in the departments of Amambay, Alto Paraná, most of Caaguazú and part of Caazapá. Although this area is generally considered to have the best agricultural soils in the country, it is relatively undeveloped and sparsely populated.

The topography is generally rolling and cut by numerous streams, principally in the basins of the Acaray and Monday Rivers. Basalt formations cover more than 60 percent of the area, Alto Paraná sandstone about 23 percent, and deposits of alluvial origin, chiefly in the basin of the Acaray River, about 14 percent. The rest of the region is covered by the Misiones and Independencia sandstones.

The soil problems of the region are the same as those described above for soils derived from the Alto Paraná and the Misiones formation. In general, for sustained production the soils must be corrected by adequate drainage and fertilization.

(e) San Pedro-Concepción Region

This region takes in the departments of San Pedro and Concepción and a small part of Caaguazú, comprising a total of about 4.0 million hectares, about 25 percent of eastern Paraguay.

The majority of the soils are derived from sandstones, of the same formation which occurs in the Central region and from alluvial sediments from the Quaternary and more recent periods. In the northern part of the region there is an outcropping of Precambrian rocks, covering approximately 600,000 hectares.

Among the sandstones the most important is the Coronel Oviedo formation of glacial origin, with an area of about 1.4 million hectares or 34 percent of the region. The above described Misiones and Independencia sandstones cover approximately 700,000 hectares or about 17 percent of the area.

The rest of the region is covered by sediments of the Quaternary or more recent periods, especially in the valleys of

the streams flowing toward the Paraguay River. The part nearest to the Paraguay River is covered with recent alluvial deposits and is subject to flooding.

An adequate evaluation of the soil potential in the region awaits a more detailed investigation.

(2) Western Paraguay (Chaco)

The following discussion of soils in the Chaco is only very approximate, as data are quite limited. For discussion purposes the Chaco is divided into Lower Chaco (southern) and Upper Chaco (northern) regions.

(a) Lower Chaco

The Lower Chaco comprises the political department of Presidente Hayes, and forms a great inverted triangle of 36,420 square kilometers (5.8 million hectares) of area. It may be described as a great plain originating from non-consolidated sediments. In general, the Chaco appears to be a vast alluvial plain of mixed materials accumulated by soils which eroded from the Andes area during the Upper Tertiary period. The surface is quite level, forming a plain of small elevations with a general slope of about one and one-fourth feet per mile; surface drainage is very slow. The soils have insufficient internal drainage due to impermeable clay hardpans of variable thickness at different depths. Much of the area is covered by water during three or four months of the year. The depth of the water table varies from a few inches to about three feet, depending upon the relief and the obstacles to surface drainage.

(b) Upper Chaco

This region, formed by the departments of Boquerón, and Olimpo and comprising 117,355 square kilometers (18.8 million hectares), is larger than the entire eastern section of Paraguay.

The soils are of sedimentary origin from the Quaternary and more recent periods. The essential difference between this and the Lower Chaco is the smaller incidence of flooding due to the generally higher elevation and greater distance from the Paraguay River over most of the region. The soils are principally salty and alkaline. The pools of stagnant water which form during the rainy period are eliminated only by evaporation.

The predominant plants are pasture grasses. Semi-arid tropical forests and cactus are found at the higher elevations.

The quebracho and black palm forests Copernicia australis are near the Paraguay River. Agricultural development is still quite limited. The semi-arid climate and the soils generally do not favor crop farming. In some areas the conditions are more favorable, especially near the creeks and the Paraguay River, but even these are subject to flooding during periods of high water. However, the Mennonite colony near Filadelfia has demonstrated what can be done by determination, experience and capital. Solving the problem of water scarcity would open the prospect of a more intensive agriculture. Basic water studies are needed.

C. ANALYSIS OF CROPS

1. Data on Production

a. The Composition and Value of Agricultural Production

Table C-1 presents data on agricultural production from Paraguay's official national accounts. These data are estimates and thus subject to error, but they can be used for a rough-and-ready approximation to the gross value of Paraguay's agricultural production. Gross value of production (Gross Value Added in Table C-1) is the total value of production; that is, the sum of each crop or livestock item produced multiplied by its farmgate price. Net Value Added is Gross Value Added less an adjustment for cost of inputs purchased from within the sector and from other sectors (but not for services of land, labor, or capital). As can be seen in Table C-1, there is a greater gap between the gross and net values of livestock production than for crop production; this reflects the value of crops used to feed livestock.

The gross value of production (Gross Value Added) of crop is less complicated than that of livestock production. Livestock production in any year is composed of three items: animals slaughtered, the change in the inventory of animals, and the production of livestock products. In regard to the item noted in Table C-1 as "Other Livestock Slaughtered", 93.7 percent of the value of 1972-1974 production was swine, and the remainder was composed of horses, sheep and goats. In regard to the item noted as "Livestock Products" in the period 1972-1974, 50.9 percent of the value was milk, 45.6 percent was eggs (of chickens and other poultry) and the other 3.5 percent was composed of wool, honey and animal hair.

If we consider aggregate agricultural production in 1974, exclusive of the change in animal inventories (excluded because a large part of this inventory valuation adjustment is merely change in price of the stock of beef animals resulting from increased prices), the gross value of Paraguay's agricultural production is equivalent to $444 million and is composed as follows: 14.2 percent from permanent crops, 48.2 percent from annual crops, 21.4 percent from beef animals slaughtered, 7.1 percent from the slaughter of pigs and other livestock, 6.2 percent from livestock products (mostly eggs and milk) and 2.9 percent from poultry slaughtered. Although one cannot be confident of the accuracy of estimates of production volumes for many items nor of the estimated unit prices, it is doubtful that even substantial changes in the estimated values of particular items would alter significantly the over-all composition of agricultural production.

TABLE C-1

COMPOSITION OF AGRICULTURAL PRODUCTION, 1972 - 1974

	In Millions of Guaranies			In Millions of US$ *		
	1972	1973	1974	1972	1973	1974
Gross Value Added						
Crops	17,978.3	26,975.4	34,956.7	142.7	214.1	277.4
Permanent	4,454.5	7,622.8	7,966.4	35.4	60.5	63.2
Annual	13,523.8	19,352.7	26,990.3	107.3	153.6	214.2
Livestock	16,026.4	21,390.8	25,366.5	127.2	169.8	201.3
Beef Animals Slaughtered	9,412.3	11,043.7	11,946.6	74.7	87.6	94.8
Other Livestock Slaughtered	2,471.9	3,139.5	3,962.6	19.6	24.9	31.4
Poultry Slaughtered	281.3	352.3	498.1	2.2	2.8	4.0
Change in Livestock Inventory	1,319.5	3.404.5	4,373.7	10.5	27.0	34.7
Livestock Products	2,541.4	3,450.9	4,585.5	20.2	27.4	36.4
Net Value Added						
Crops	17,020.4	25,842.4	32,865.0	135.1	205.1	260.8
Livestock	12,379.8	16,443.0	19,576.5	98.3	130.5	155.4
Forestry	3,926.2	4,911.7	6,739.9	31.2	39.0	53.5
Hunting and Fishing	68.4	94.9	124.0	0.5	0.8	1.0
	33,394.8	47,292.2	59,305.4	265.0	375.3	470.7

Source: Banco Central del Paraguay, Departamento de Estudios Económicos, Cuentas Nacionales 1974 (June 1975).

Note: * Guaranies are converted to U.S. dollars at rate of ₲126 = US$ 1.00

Table C-2 presents data on crop production in 1974 by gross value and is also based solely on national accounting data. As noted above, crop production accounts for approximately 60 percent of the gross value of agricultural production. Paraguay produces a broad array of crops. The large number of crops arises from the subsistence character of Paraguayan agriculture; that is, the fact that most rural families in Paraguay produce a high proportion of what they consume. It is the exceptional farmer who does not produce cassava and at least two of the following crops: corn, beans and sweet potatoes. In addition, watermelon, melons, squash, bananas and other tree fruit are grown by most farmers. In a developed country, a region geographically as small as eastern Paraguay and with similar homogeneity of soil and climate would undoubtedly be devoted to fewer crops, nearly all of which would be exported (or converted to exports) from the region.

In Table C-2 crops are divided into two groups, annual crops and permanent crops. For both groups particular crops with gross values of more than Gs. 200 million are grouped as "major" crops and are ranked according to gross value. The other crops; i.e., minor crops, are listed but not ranked. There are 27 crops with gross values in excess of Gs. 200 million ($1.59 million), of which 15 are annual crops and 12 are permanent crops. Permanent crops include those with production cycles exceeding one year.

Table C-2 also notes the principal uses of "major" crops. Numerous crops are consumed primarily on the farms where they are grown. Although we lack firm data for making a determination of the proportion of each crop that is commercialized, available data coupled with subjective assessment suggest the proportion implied in Table C-2. For those crops where more than one-third of total production is sold, their status is noted as sold commercially. If more than one-third of total production is used for on-farm consumption, there is an asterisk (*) in the column under "On-farm consumption". Several crops fit both categories with more than one-third used for on-farm consumption and more than one-third sold; e.g., corn, round (dry) beans, watermelon, sugar cane, bananas, oranges and pineapple. Designation of exportation is made for those crops for which exportation of the commodity or related by-products is significant; e.g., more than 10 percent of commercialized production is exported. If exportation is in the form of a processed commodity or by-product, the designation (*) is shown in Table C-2.

In the following sections, data on a number of crops are presented as well as their prices, geographical concentration, and participation of farms of various sizes in their production. It should be noted that volume and price data presented in Tables C-1 and C-2 vary greatly in reliability. For many crops, production

TABLE C-2

COMPOSITION OF CROP PRODUCTION: GROSS VALUE IN 1974, RANKING OF CROPS BY GROSS VALUE, AND PRINCIPAL USES

Annual Crops	Rank by Gross Value Among: Annual Crops 1974	Annual Crops 1973	All Crops (1974)	Gross Value Millions of ¢	Millions of US$	Principal Uses On-Farm Consumption	Commercial Sale	Export
Major Crops								
Cassava	1	1	1	8,048.1	63.9	*		
Soybeans	2	2	2	3,724.0	29.6		*	*
Corn	3	3	3	3,181.0	25.2	*	*	
Cotton	4	4	4	2,975.0	23.6		*	(*)
Sweet Potatoes	5	6	6	1,194.1	9.5	*		
Tobacco	6	5	7	1,105.5	8.8		*	*
Beans (Round)	7	8	9	970.1	7.7	*	*	
Rice	8	10	11	810.3	6.4		*	
Wheat	9	14	12	810.0	6.4		*	
Watermelon	10	9	14	590.3	4.6	*	*	
Peanuts	11	11	17	463.3	3.7		*	
Pumpkins & Squash	12	13	19	336.3	2.3	*		
Onions	13	7	20	285.1	2.3		*	
Melon, Cantaloup	14	15	23	253.8	2.0	*	*	
Potatoes	15	12	26	205.0	1.6		*	
Minor Crops								
Alfalfa				185.7	1.5			
Broom corn				36.3	.3			
Flowers				60.8	.5			
Garlic				51.9	.4			
Lima Beans				143.6	1.1			
Peas				102.8	.8			
Sorghum				78.1	.6			
Strawberries				26.4	.2			
Vegetables				1,215.0	9.6			
Other				138.3	1.1			

TABLE C-2 (Continued)

Permanent Crops	Rank by Gross Value Among: Annual Crops 1974	Annual Crops 1973	All Crops (1974)	Gross Value Millions of ₲	Millions of US$	Principal Uses On-Farm Consumption	Commercial Sale	Export
Major Crops								
Sugar Cane	1	2	5	2,006.4	15.9	*	*	(*)
Bananas	2	4	8	1,080.0	8.6	*	*	
Oranges (Native)	3	1	10	878.9	7.0	*	*	
Coffee	4	5	13	800.0	6.3		*	*
Tung Nuts	5	8	15	577.9	4.6		*	(*)
Coconuts	6	7	16	550.0	4.4		*	
Castor Beans	7	3	18	462.8	3.7		*	*
Pineapple	8	9	21	283.4	2.2	*	*	
Tangerines	9	10	22	256.8	2.0		*	
Yerba Mate	10	12	24	227.6	1.8		*	*
Sour Orange Leaves	11	6	25	216.5	1.7		*	(*)
Grapes	12	11	27	200.7	1.6		*	
Minor Crops								
Apples				34.9	.3			
Avocados				40.8	.3			
Grapefruit				89.7	.7			
Guava				36.2	.3			
Improved Oranges				94.1	.7			
Lemons (large)				6.9	.1			
Lemons (small)				27.2	.2			
Limes				12.9	.1			
Mangos				19.8	.2			
Papaya				9.7	.1			
Peaches				23.6	.2			
Pears				5.8	-			
Plums				28.7	.2			

Source: USAID/Paraguay

volumes are based on agricultural censuses which, at present are so outdated as to preclude the acceptability of the data. For a number of crops, and particularly since 1969, data exist which offer the possibility of systematic analysis. For analytical purposes, the adequacy of crop data depends upon existence of reliable estimates of area harvested and the geographical distribution of production as well as the volume of production. This combination of data permits an assessment of changes in yields and of the geographical distribution of production, and this is the lifeblood of analysis. Even though the MAG's annual agricultural surveys have improved the richness and reliability of crop production data, in regard to livestock these data are limited solely to animal inventories. At present, available data on production of livestock products and livestock consumed or sold are simply inadequate to the purposes of responsible analysis. Thus, even though production of pigs, chickens, milk and eggs is extremely important in Paraguayan agriculture, and even more so for small farmers, we eschew its consideration.

b. Trends in Crop Production, Area and Yields

Table C-3 contains data on crop production, area harvested, and yields comparing three different periods; 1965-1967 (three years), 1969-1970 (one year) and 1973-1974 (one year). The crops presented in Table C-3 account for approximately 3/4 of total Paraguayan crop production and include all crops of major economic importance.

In regard to the crops presented, seven crops--beans, peas, wheat, sweet potatoes, strawberries, potatoes and onions--are used for human consumption. In regard to the production of soybeans, corn, cassava, peanuts, sugar cane, coffee, and rice, a portion is utilized for human and animal consumption and a portion is exported as raw material in the form of grain or as industrialized export commodities such as sugar and vegetable oil. Tung nuts, coconuts, castor seeds and yerba mate are utilized in their totality as raw material for industrialized products destined mainly for external markets.

Table C-4 presents indices of volume of production, surface area harvested and yields for the 1969-1970 and 1973-1974 crop years in reference to the average of the three base crop years 1965-1967. Seventeen of the 22 crops included in Table C-4 had higher production volumes in the 1969-1970 crop year than in the three crop year base period 1965-1967. By the 1973-1974 crop year, 19 of the 22 crops had higher production volumes than during the 1965-1967 base period. Coffee, peanuts, alfalfa, yerba mate and potatoes are the only crops whose production was lower in the 1969-1970 crop year than in the 1965-1967 base period. The only crops with lower production volumes

TABLE C-3

EVOLUTION OF CROP PRODUCTION: VOLUME, AREA HARVESTED, AND YIELDS FOR THE PERIOD 1965/1967 (THREE CROP YEARS) AND THE 1969/1970 AND 1973/1974 CROP YEARS

	Annual Average for 1965/1967			1969/1970 Crop Year			1973/1974 Crop Year		
Crop	Volume in MT	Area in Has.	Yield in Kgs/Ha	Volume in MT	Area in Has.	Yield in Kgs/Ha	Volume in MT	Area in Has.	Yield in Kgs/Ha
Soybeans	17,167	11,800	1,455	51,800	39,500	1,311	174,000	137,300	1,267
Cotton	28,567	46,067	620	39,600	46,900	844	90,500	100,500	900
Rice	16,333	6,933	2,356	45,200	23,000	1,965	44,600	22,400	1,991
Beans (Round)	21,800	31,966	681	34,900	54,400	641	34,200	43,400	788
Tobacco	14,733	12,033	1,224	17,800	13,600	1,309	33,400	24,900	1,341
Wheat	13,800	12,133	1,137	47,700	44,700	1,067	35,200	32,100	1,096
Sugar cane	892,667	24,200	36,887	1,415,000	40,500	34,938	1,150,000	42,000	27,381
Corn	190,167	167,833	1,133	258,600	187,300	1,381	242,500	291,400	832
Cassava	1,467,000	99,867	14,689	1,580,100	103,300	15,296	1,200,000	90,000	13,333
Coffee	6,059	13,833	438	4,300	9,700	443	8,500	17,100	497
Peas	2,366	3,900	606	2,600	4,100	634	4,160	6,090	683
Peanuts	19,900	23,433	849	17,000	21,800	779	20,140	24,265	830
Sweet Potatoes	93,100	9,566	9,732	134,300	12,500	10,744	88,100	11,800	7,466
Alfalfa	23,466	6,175	3,800	19,300	4,810	4,012	27,710	6,641	4,172
Strawberries	384	-	-	436	-	-	507	-	-
Coconut	134,913	-	-	209,700	-	-	275,000	-	-
Tung Nuts	58,600	25,478	2,300	88,600	36,070	2,456	125,640	38,861	3,233
Castor Beans	9,800	8,000	1,225	15,500	11,900	1,302	26,000	19,637	1,324
Yerba Mate	22,066	13,373	1,650	19,760	11,740	1,683	18,550	10,600	1,750
Sorghum	3,613	3,329	1,085	4,800	4,092	1,170	6,100	5,525	1,104
Onions	15,533	3,700	4,198	18,800	4,043	4,649	23,500	5,071	4,634
Potatoes	9,066	2,100	4,317	6,600	1,200	5,500	9,320	2,260	4,123

Sources: Prepared by MAG Gabinete Técnico from:

1) MAG, Secretaría de Coordinación Técnica, Manual Estadístico del Paraguay 1969.
2) MAG, Departamento de Censo y Estadísticas Agropecuarias, Encuesta Agropecuaria por Muestreo (for 1970, 1971, 1972, and 1973)
3) MAG, Dirección de Comercialización y Economía Agropecuaria, Boletín Informativo No. 5, June 1974.
4) Banco Central del Paraguay, Departamento de Estudios Económicos, Cuentas Nacionales, May 1974.

TABLE C-4

INDEX NUMBERS FOR PRODUCTION, AREA HARVESTED AND YIELDS OF SELECTED CROPS FOR 1965/1967, AND THE 1969/1970 AND 1973/1974 CROP YEARS
(1965-1967 = 100)

	1965/1967 (Average)			1969/1970			1973/1974		
Crop	Vol.	Area	Yield	Vol.	Area	Yield	Vol.	Area	Yield
Soybeans	100	100	100	302	335	90	1,013	1,164	87
Cotton	100	100	100	139	102	136	317	218	145
Rice	100	100	100	277	332	83	273	323	84
Beans (Round)	100	100	100	160	170	94	156	135	115
Tobacco	100	100	100	121	113	107	227	207	110
Wheat	100	100	100	346	368	94	255	265	96
Sugar cane	100	100	100	159	167	95	129	174	74
Corn	100	100	100	136	112	122	128	174	73
Cassava	100	100	100	108	103	104	82	90	91
Coffee	100	100	100	71	70	101	140	124	113
Peas	100	100	100	109	105	104	175	156	112
Peanuts	100	100	100	85	93	91	101	103	98
Sweet Potatoes	100	100	100	144	130	110	94	123	76
Alfalfa	100	100	100	82	77	105	118	108	109
Strawberries	100	-	-	113	-	-	132	-	-
Coconut	100	-	-	155	-	-	203	-	-
Tung Nuts	100	100	100	151	141	106	214	152	140
Castor Beans	100	100	100	158	148	106	265	245	108
Yerba Mate	100	100	100	89	87	102	84	79	106
Sorghum	100	100	100	132	122	107	168	165	101
Onions	100	100	100	121	109	110	151	137	110
Potatoes	100	100	100	72	57	127	102	107	95

Source: Based on Table C-3.

in 1973-1974 were cassava, which decreased by 18 percent, sweet potatoes, which decreased by 6 percent, and yerba mate which decreased by 16 percent in regard to the base period. For cassava the decrease in production was due to a reduction in area accompanied by a drop in per hectare yields. For yerba mate the decrease in production was due to reduction in area cultivated, inasmuch as yield per hectare increased. For sweet potatoes, lower yields outweighted an increase in area harvested.

In the years 1965-1967, the total area harvested of crops presented in Table C-3 averaged 525,719 hectares. By 1973 area cultivated increased to 931,850 hectares; that is, an increase of 77 percent. During the same period, the total volume of these crops increased from 3,061,100 metric tons to 3,637,627 metric tons--the equivalent to a 19-percent increase. This suggests that increased yields were not the primary cause of increased production--at least in aggregate. However, 14 of the 20 crops for which yield data exist had increased yields in 1969-1970 as compared with the base period and 11 crops had higher yields in 1973-1974. (See Tables C-3 and C-4.)

Soybeans had the most notable increase in production both in terms of volume and of area. From an annual average of 17,167 metric tons in the 1965-1967 base period, soybean production increased to 51,800 metric tons in 1969-1970 and to 174,000 metric tons in 1973-1974. In percentages these increases are 202 percent and 913 percent, respectively. The surface area harvested increased even in greater proportion than the volume because yields decreased by 13 percent during the entire period. The increase in area harvested from the base period is of the order of 235 percent for the 1969-1970 crop year and 1,064 percent for the 1973-1974 crop year. (See Table C-4.)

Wheat is in second place in regard to the increase of the volume of production; 13,800 metric tons were produced in the period 1965-1967; 47,700 metric tons in 1969-1970 and 35,200 metric tons in 1973-1974--increments of 246 percent and 155 percent respectively. The substantial increase in the production of wheat was due to implementation of the National Wheat Program in 1967, as a result of which the area harvested increased from the base period by 268 percent in 1969-1970 and 165 percent in 1973-1974. Wheat yields actually decreased by more than 4 percent during the period and remained at about 1,050 kilograms per hectare.

Rice is a crop for which production volume has increased substantially. This increase was due to an expansion of the area planted in spite of a reduction in yields. Rice production in the

1969-1970 crop year was 177 percent higher than the average of 1965-1967 production while the area harvested had increased by 232 percent. In the 1973-1974 crop year the volume of production had increased by 173 percent in regard to the base period and the area harvested had increased by 223 percent. Rice yields were 2,356 kilograms per hectare in 1965-1967 but they decreased to 1,991 kilograms per hectare in 1973-1974. This is equivalent to a 16-percent decrease in yield. (See Table C-4.) Dry-land rice has been preferred in the new colonization areas of Canendiyú, Alto Paraná and Amambay in the last five years. Lower yields resulted at least partly from the introduction of dry-land rice with lower average yields relative to the yield potentials of irrigated rice.

The volume of cotton production also increased substantially from 1965-1967 to 1969-1970 and 1973-1974 with increments of 39 percent and 217 percent, respectively. Area harvested increased by 118 percent from 1965-1967 to 1973-1974 and yields increased by 45 percent. The significant increase in yields was due to the introduction of new varieties and to the adoption of improved cultivation practices.

During the period 1965-1967 to 1973-1974 there were also improvements in the yields of certain other crops. The yield of coffee was 13 percent higher; tung nuts, 40 percent higher; beans, 15 percent higher; tobacco, 10 percent higher; peas, 12 percent higher; and onions, 10 percent higher. (See Table C-4.)

In regard to production volumes, three of the 22 crops presented in Table C-4 have index numbers in excess of 200 in the year 1969-1970; i.e., production doubled. They are soybeans, rice and wheat. By the 1973-1974 crop year the number of crops with volume indices exceeding 200 included the three crops mentioned above plus cotton, tobacco, coconuts, tung nuts and castor seeds.

In regard to the surface area harvested, in the 1969-1970 crop year 15 of the 20 crops noted in Table C-4 had an index number greater than 100; that is, area cultivated had increased. In 1973-1974, 18 of the 20 crops presented in Table C-4 had index numbers larger than 100 and six crops had index numbers of more than 200. These six crops are soybeans, cotton, rice, tobacco, wheat and castor seeds.

In regard to indices of yields, in the 1969-1970 crop year 14 of the 20 crops noted in Table C-4 had index numbers larger than 100 and six had index numbers of less than 100. By the 1973-1974 crop year, 11 crops had yield index numbers larger than 100. For cotton and tung nuts, increments in yields were substantial.

c. Crop Price Performance

Table C-5 presents the annual averages of monthly farmgate prices for major crops during the calendar years 1965 through 1973. Despite the fact that these data include months during which sales may be relatively low, these are the only data available to us.

Of the 23 crops included in Table C-5, 13 had higher prices in 1966 than in 1965 while the 10 remaining had lower prices. In 1967, seven crops had higher prices than in 1966 and 15 had lower prices. In 1968, 10 crops had higher prices than in 1967 and 12 crops had lower prices. The period from 1965 through 1971 can best be typified as one of variation but no sustained movement in farmgate crop prices. In 1972, 15 of the 23 crops listed in Table C-5 had higher prices than in 1965. Even as late as 1972 only five crops had farmgate prices 20 percent higher than in 1965. In 1973, 20 of the 23 crops listed in Table C-5 had higher farmgate prices than in 1965. Moreover, 16 crops had prices 20 percent higher than their 1965 prices. For some crops the 1973 prices were substantially higher than 1972 prices; this group includes soybeans, beans, tobacco, wheat, coffee, strawberries, castor seeds, yerba mate, onions and potatoes.

It is difficult to assess the impact of increased prices upon production of particular crops. The magnitude of increase in prices appears so low up to 1969 that until the 1969-1970 crop year changes in production volumes were probably little influenced by price movements. The same claim cannot be made for 1973-1974 crop year results. In 1973 the farmgate prices of soybeans and tobacco were 163 percent and 67 percent higher than their 1965 prices. Soybean production was approximately 913 percent higher and tobacco production 127 percent higher than 1965-1968 volumes. (See Table C-4.)

Undoubtedly the realized and expected profitability of a particular crop is a more important determinant of area sown and production than is the absolute price. The increasing farmgate prices in 1972, 1973 and 1974 should have had a favorable impact on profitability. That this impact caused major shifts in production is a moot question because price increases were generalized over a broad spectrum of crops.

d. The Geography of Crop Production

Table C-6 presents the percentages of the major crops produced in eight geographical zones in Paraguay. This table divided Paraguay into eight zones, some of which contain more than one department. Zone 1 includes the departments of Paraguarí, Central and Cordillera. Zone 2 includes the departments of Caazapá and

TABLE C-5

AVERAGE ANNUAL FARMGATE PRICES OF SELECTED CROPS, 1965-1973
(Calendar Years)

Crop	Average Farmgate Prices in Guaraníes per Kilogram								
	1965	1966	1967	1968	1969	1970	1971	1972	1973
Soybeans	8.0	10.4	8.2	8.0	7.5	7.1	8.6	9.5	21.0
Cotton	16.5	14.4	14.2	16.0	14.0	11.7	17.0	19.9	21.5
Rice (Unhulled)	11.0	11.2	9.3	10.0	9.0	8.7	9.8	11.6	13.8
Beans (Round)	11.0	11.8	10.8	10.0	12.0	9.0	11.8	14.4	18.7
Tobacco	24.5	26.3	23.6	22.0	16.0	20.5	14.9	24.9	40.9
Wheat	9.0	7.8	6.8	10.0	10.0	9.4	9.5	8.8	15.0
Sugar Cane *	740	632	740	710	630	728	732	731	817
Corn	4.5	6.4	4.7	4.6	5.0	3.6	3.5	4.6	6.9
Cassava	2.5	2.8	2.9	2.0	2.7	2.2	2.0	2.0	2.8
Coffee	49.2	49.5	48.8	48.9	52.3	53.6	58.0	53.0	94.0
Garlic	30.0	25.8	29.5	34.0	37.0	39.9	40.2	36.9	37.0
Peas	14.0	13.7	13.8	13.3	12.0	13.2	15.1	15.5	18.9
Peanuts	14.4	13.8	12.1	12.0	12.0	12.6	11.3	11.9	15.9
Sweet Potatoes	3.2	3.1	3.2	3.0	3.0	3.9	3.0	3.0	4.8
Alfalfa	4.6	4.8	5.0	5.0	4.0	4.0	4.0	5.0	4.2
Strawberries	19.1	25.2	18.2	20.0	20.4	20.4	20.4	22.4	52.0
Coconut	2.0	1.8	0.8	0.9	1.0	0.8	0.9	1.5	1.5
Tung Nuts	5.0	2.8	2.3	2.4	3.6	4.3	5.0	2.0	5.0
Castor Beans	10.8	11.8	11.7	11.8	11.6	12.6	12.1	17.0	40.0
Yerba Mate	7.0	6.7	6.3	6.0	6.5	6.5	6.5	8.3	16.0
Sorghum	6.7	7.3	6.5	6.8	7.5	7.5	8.5	9.3	10.2
Onions	12.5	13.5	13.5	11.0	12.0	13.0	14.0	15.0	23.0
Potatoes	11.5	13.1	15.2	11.0	12.0	7.5	7.7	14.7	16.2

* Gs/Ton.

Source: Prepared by the MAG Gabinete Técnico based on data from:

1) MAG, Secretaría de Coordinación Técnica, Manual Estadístico del Paraguay (1962-69).
2) MAG, Dirección de Comercialización y Economía Agropecuaria, Boletín Informativo No. 85, June, 1974.
3) Banco Central del Paraguay, Departamento de Estudios Económicos, Cuentas Nacionales, May, 1974.
4) MAG, Oficina Fiscalizadora de Algodón y Tabaco.
5) MAG, Departamento de Censo y Estadísticas Agropecuarias, Encuesta Agropecuaria por Muestreo (for 1970, 1971, and 1972).

TABLE C-6

REGIONAL DISTRIBUTION OF PRODUCTION OF SELECTED CROPS BY VOLUME IN 1970 - 1972*: EIGHTS ZONES** ENCOMPASSING WHOLE COUNTRY

Crop	Zone: (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	TOTAL
Cotton	28.8	9.7	20.4	15.0	15.3	6.5	0.1	4.2	100
Upland Rice	2.0	3.4	41.7	2.6	14.1	0.1	36.0	-	100
Sweet Potatoes	33.6	8.5	23.8	11.5	11.6	8.6	0.6	1.7	100
Soybeans	3.8	4.0	10.8	2.4	70.6	0.2	8.2	-	100
Tobacco	19.3	13.1	31.8	31.2	4.0	0.6	-	-	100
Corn	21.6	13.4	18.3	13.8	24.2	4.4	3.8	0.4	100
Cassava	23.6	24.6	17.5	17.6	12.9	0.8	2.8	0.2	100
Sugar Cane for Sugar	25.6	61.6	2.8	-	-	-	-	9.0	100
Sugar Cane for Molasses and Forage	57.7	27.7	9.9	1.0	2.1	1.5	0.1	-	100
Irrigated Rice	26.2	6.5	1.9	2.8	59.5	3.2	-	-	100
Onions	34.7	13.4	22.9	7.6	15.4	3.8	1.6	2.1	100
Wheat	14.1	1.3	4.8	21.9	53.6	-	3.5	0.8	100
Peas	45.5	11.7	14.8	5.5	14.6	3.2	1.1	3.6	100
Peanuts	31.2	6.8	11.2	9.8	9.0	5.0	2.5	24.5	100
Potatoes	34.5	12.4	28.1	0.5	22.1	1.9	0.5	-	100
Beans (Round)	31.5	14.6	16.7	12.1	13.2	9.6	1.5	0.8	100
Lima Beans	18.1	13.1	30.5	9.9	16.0	1.5	9.2	1.7	100
Coffee	7.1	-	27.0	2.7	-	-	63.2	-	100
Alfalfa	32.5	16.3	16.6	6.5	21.2	2.5	1.7	2.7	100
Castor Beans	9.0	1.3	2.5	75.6	1.1	-	3.8	6.7	100
Sour Orange Leaves	85.1	0.7	3.2	10.9	-	0.1	-	-	100

Source: Prepared by MAG Gabinete Técnico from: MAG, Departamento de Censo y Estadísticas Agropecuarias Encuesta Agropecuaria por Muestreo (for 1971, 1972, and 1973).

Notes : * Averages for crop years 1970/1971, 1971/1972, and 1972/1973.

** Departmental composition of zones is as follows: (1) Paraguarí, Central, Cordillera; (2) Caazapá, Guairá; (3) Caaguazú, Alto Paraná; (4) Concepción, San Pedro; (5) Misiones, Itapúa; (6) Ñeembucú; (7) Amambay; (8) Chaco.

Guairá; Zone 3, Caaguazú and Alto Paraná; Zone 4, Concepción and San Pedro; and Zone 5, Misiones and Itapúa. The remaining zones contain only one department each; thus Zone 6 is Ñeembucú; Zone 7 is Amambay; and Zone 8 is the Chaco. (See Figure C-1.)

Hereinafter, we refer to zones by their respective departmental compositions. The following paragraphs describe the distribution of crop production among these eight zones. Production of certain crops is more concentrated in specific regions while production of other crops is less regionally concentrated. Crops which appear regionally concentrated are soybeans, sugar cane, irrigated rice, wheat, peas, coffee, castor beans, and sour orange leaves. Certain crops, such as sweet potatoes, cassava, corn, green beans and dry beans, are heavily influenced by regional concentrations of relatively small farms inasmuch as these crops are utilized primarily for on-farm human and animal consumption.

Paraguay's major export crops are cotton, tobacco, and soybeans. The regional production characteristics of these crops are as follows:

Cotton. In the years 1970-1973 the largest zonal producer of cotton was the Paraguarí-Central-Cordillera zone with 29 percent of total production. The Caaguazú-Alto Paraná zone was in second place with 20 percent of total production, and the third largest producer was Misiones-Itapúa zone with 15 percent.

Tobacco. The largest share of tobacco production occurred in the Caaguazú-Alto Paraná zone and the Concepción-San Pedro zone, each of which produced about 31 percent of total tobacco production. The Paraguarí-Central-Cordillera zone accounted for 19 percent of total production, and the Caazapá-Guairá zone accounted for 13 percent of total production.

Soybeans. The Misiones-Itapúa zone accounted for 71 percent of soybean production in 1970-1973. The next zone in terms of production volume was Caaguazú-Alto Paraná with 11 percent of total soybean production.

Paraguay's major subsistence crops include sweet potatoes, cassava, corn, green beans, and dry beans.

Sweet Potatoes. In regard to production of sweet potatoes, 33 percent of total production occurred in the zone of Paraguarí-Central-Cordillera in the period 1970-1973. This relates to the fact that this area contains a large number of small farmers and has a relatively high density of rural population.

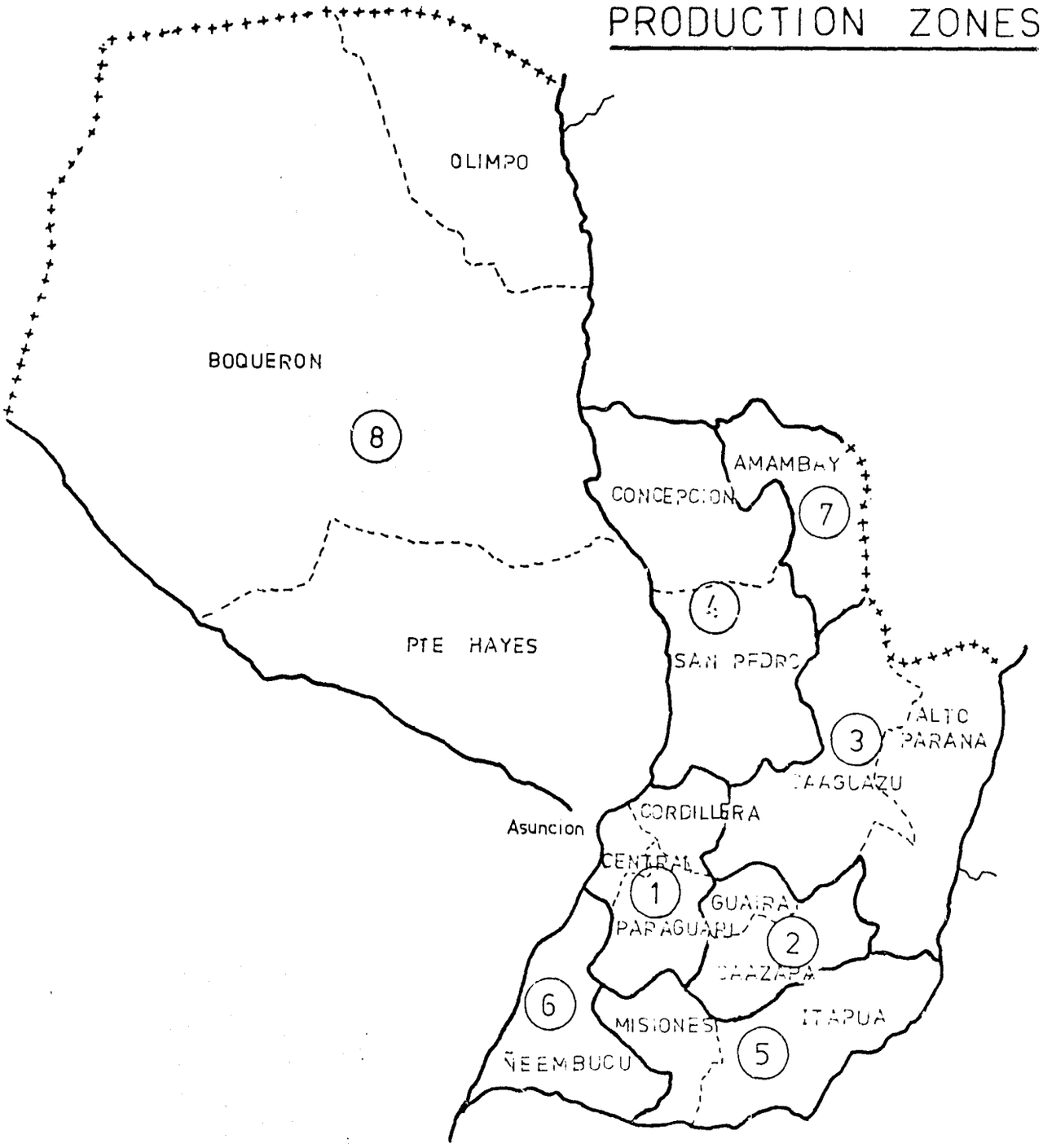
PRODUCTION ZONES
OLIMPO
BOQUERON
8
AMAMBAY
CONCEPCION
7
4
PTE HAYES
SAN PEDRO
ALTO PARANA
3
CAAGUAZU
CORDILLERA
Asuncion
CENTRAL
1
GUAIRA
PARAGUARI
2
CAAZAPA
6
MISIONES
ITAPUA
5
ÑEEMBUCU

FIGURE C-1

Cassava. Cassava production is widely dispersed throughout eastern Paraguay. The Paraguarí-Central-Cordillera zone accounted for 24 percent of total 1970-1973 production and the Caazapá-Guairá zone for approximately the same percentage. The Caaguazú-Alto Paraná and Concepción-San Pedro zones each accounted for approximately 18 percent of total cassava production and the Misiones-Itapúa zone for 13 percent. The Ñeembucú and Chaco zones accounted for less than 4 percent of production (which corresponds to the overwhelming ranching character of these zones).

Corn. Corn production is also relatively dispersed. The Misiones-Itapúa zone accounted for 24 percent of the 1970-1973 production. This percentage is relatively high due to the relatively high natural soil fertility in the department of Itapúa. In addition, yields in this area have increased in recent years due to the importation of hybrid seeds from Brazil. A substantial portion of the corn raised in this area is used for feeding swine. The Paraguarí-Central-Cordillera zone was the second largest producer of corn, accounting for 22 percent of total production in the period 1970-1973. In this area as well as adjacent zones (2, 3 and 4), corn is raised on a small farm and is used primarily for on-farm human and animal consumption.

Beans. Round beans and lima beans are crops used mainly for on-farm consumption. The quantity produced of each of these crops in each zone is related, to a certain extent, to the number of farmers that live in each zone. The Paraguarí-Central-Cordillera zone accounted for 32 percent of the round beans and 18 percent of the lima bean production of Paraguay in the 1970-1973 period. For the Caazapá-Guairá zone, 14 percent and 13 percent, and for the Caaguazú-Alto Paraná zone the percentages were 17 percent and 30 percent.

There are several crops which exhibit pronounced regional location preferences. This group includes coffee, rice, wheat, sugar cane, sour orange leaves, and to a lesser extent, onions, peas and potatoes.

Coffee. Coffee production in Paraguay is limited mainly to northeastern Paraguay. In the years 1970-1973, 63 percent of total production occurred in the department of Amambay, 27 percent in the Caaguazú-Alto Paraná zone, and only 7 percent in the Paraguarí-Central-Cordillera zone. With the exception of the last zone, production occurs principally on larger-scale, specialized farms.

Rice. Irrigated rice is grown mainly in the Misiones-Itapúa zone. This zone accounted for 60 percent of total production during the period 1970-1973. The Paraguarí-Central-Cordillera zone accounted

for 26 percent of the total irrigated rice production in this period. In regard to upland rice production, 42 percent of total production occurred in the Caaguazú-Alto Paraná zone and 36 percent in the Amambay zone.

Wheat. Paraguayan wheat production is concentrated principally in the Misiones-Itapúa zone. This zone accounted for 54 percent of total production in the 1970-1973 period. The Concepción-San Pedro zone and the Paraguarí-Central-Cordillera zone accounted for 22 percent and 14 percent of total wheat production, respectively. In Paraguay wheat is grown primarily as a winter crop, frequently in rotation with soybeans as the summer crop.

Sugar cane. Production of sugar cane is divided into two categories: sugar cane produced for refined sugar and sugar cane used for forage and/or molasses. About 60 percent of the production of sugar cane for refined sugar is concentrated in the Caazapá-Guairá zone, in which four sugar refineries are located. Approximately 26 percent of total production occurs in the Paraguarí-Central-Cordillera zone, which contains three sugar refineries. The Chaco zone contains one sugar refinery which processes about 10 percent of total sugar cane (for refined sugar). In regard to sugar cane produced for forage and/or molasses, the Paraguarí-Central-Cordillera zone produces about 58 percent of total production. The location factor here is the necessary proximity of Paraguay's major dairy area to Asunción, Paraguay's major urban center.

Castor Beans. The production of castor beans is regionally concentrated. The Concepción-San Pedro zone accounted for 76 percent of 1970-1973 production. The Paraguarí-Central-Cordillera zone accounted for 9 percent of total production, and all other zones for only small percentages.

Sour Orange Leaves. Sour orange leaf production is also quite regionally concentrated. Eighty-five percent of the total 1970-1973 production occurred in the Paraguarí-Central-Cordillera zone and 10 percent of total production in the Concepción-San Pedro zone.

The proximity of the Asunción market is undoubtedly a principal factor in the location of onion, potato and pea production.

Onions. Onions are grown in nearly all areas of Paraguay. The Paraguarí-Central-Cordillera zone and the Caaguazú-Alto Paraná zones accounted for 35 percent and 23 percent, respectively, of total 1970-1973 production.

Potatoes. Potatoes are grown principally in three zones: the Paraguarí-Central-Cordillera zone accounted for 35 percent of 1970-1973 production, and the Caaguazú-Alto Paraná zone and the Misiones-Itapúa zone followed with 28 percent and 22 percent of total production, respectively.

Peas. Peas are a winter crop. Production of this crop is concentrated in the area adjacent to Asunción. The Paraguarí-Central-Cordillera zone accounted for 46 percent of total production.

Alfalfa. The production of alfalfa is obviously related to its utilization as animal forage. Thus, the Paraguarí-Central-Cordillera zone with its dairy industry accounted for 33 percent of 1970-1973 production and the Misiones-Itapúa zone accounted for 22 percent of total production.

Peanuts. The production of peanuts relates principally to two zones: The Paraguarí-Central-Cordillera zone accounted for 31 percent of total production in 1970-1973 and the Chaco zone accounted for 25 percent of total production for the same period. The production in the Chaco occurs exclusively in the Mennonite colonies.

e. Participation in Production by Farm Size

Table C-7 indicates the percentage of various crops produced and livestock inventory on farms of various sizes. The data base for Table C-7 is working sheets generated from the 1973 sample survey of agricultural production and is limited to the eastern region of Paraguay; i.e., excludes the Chaco. Inasmuch as these data are from a sample survey rather than from a census, the validity of the percentages stated in Table C-7 should not be viewed as absolute, but suggestive within a range of a few percentage points. It should be noted that the stratification procedure utilized does not follow land size rigidly. Farms with exceptionally large numbers of annual crops and livestock inventory are placed in the two highest land size categories even though size of farm may be less than indicated in Table C-7. Therefore, strictly speaking, the production shares of farmers with 0 to 51 hectares of land is understated.

The definition of what is a small- or medium-size farm as opposed to a large farm is fraught with practical difficulties. A farm with less than one hectare is hardly a farm in Paraguay. As is discussed in Part D, most farms with less than five hectares do not provide full-time employment for the farm family. A farm from 5 to 20 hectares generally provides full-time employment, particularly if the farm produces crops. We define as small farms all farms with 0 to 20 hectares of land. It should be noted, however, that this definition discriminates to some extent against agricultural units engaged exclusively in beef production.

TABLE C-7

DISTRIBUTION OF PRODUCTION OF SELECTED CROPS AND LIVESTOCK INVENTORIES IN PERCENTAGE BY SIZE OF FARM IN THE 1972/1973 CROP YEAR (EASTERN PARAGUAY)

(First Five Columns sum to 100 Percent)

	Farm Size					
	600 Has. & Over	51 to 600 Has.	10 to 51 Has.	1 to 10 Has.	Less than 1 Has.	0 - 20 Has. (est.)
Crop Production						
Cotton	6.2	25.4	23.0	38.4	6.9	59.1
Rice - Irrigated	33.0	39.7	11.8	15.5	-	22.6
- Upland	48.0	19.1	22.1	10.5	0.3	24.1
Peas	1.0	12.6	29.7	55.8	0.9	74.5
Sweet Potatoes	0.9	11.3	31.9	53.5	2.4	75.0
Sugar Cane for Sugar	5.5	25.6	15.0	51.9	2.0	62.9
Sugar Cane for Molasses	1.3	42.6	11.4	36.3	8.4	51.5
Corn	3.8	15.2	25.7	32.0	23.2	70.6
Cassava	2.2	12.8	37.8	44.6	2.5	79.3
Peanuts	1.3	21.9	30.8	43.1	2.8	64.4
Round Beans (Dry)	2.1	11.2	32.3	50.4	4.0	73.8
Soybeans	24.3	40.8	20.9	13.5	0.4	26.4
Tobacco	0.6	8.5	48.2	40.8	1.8	71.5
Mint	93.3	3.3	2.8	0.6	-	2.3
Lima Beans	12.4	14.0	36.6	34.6	2.3	58.9
Castor Beeds	0.6	13.6	52.5	32.3	1.0	64.8
Sorghum for Grain	28.3	31.5	0.5	39.6	-	39.9
Garlic	0.2	8.5	66.6	24.7	-	42.7
Livestock Inventories						
Bovine	48.0	14.2	12.8	21.3	3.6	32.6
Swine	3.8	15.4	30.7	45.8	4.3	68.5
Goats	17.9	11.7	8.2	57.4	4.8	67.1
Sheep	23.7	16.7	18.5	37.2	3.9	52.2

TABLE C-7 (Continued)

	600 Has. & Over	51 to 600 Has.	10 to 51 Has.	1 to 10 Has.	Less than 1 Has.	0 - 20 Has. (est.)
Horses	22.6	16.1	23.5	34.7	3.0	51.8
Chickens	5.1	13.3	28.0	48.1	5.5	70.4
Ducks	3.6	14.5	26.8	49.6	5.6	71.3
Geese	13.5	20.2	6.5	45.7	14.0	63.6
Guinea	3.8	13.1	20.3	57.0	5.8	75.0
Turkeys	10.1	14.7	14.3	58.2	2.7	69.5
Number of Farmers	(4.4)		33.6	54.4	7.5	79.9

Source: Prepared by MAG Gabinete Técnico from worksheets of the Encuesta Agropecuaria por Muestreo, (MAG, Dirección de Censo y Estadística Agropecuaria).

The final column of Table C-7 is our estimate of the percentage of crop production or animal inventories on farms with 0 to 20 hectares of land. This column is the sum of percentages stated for farms with less than one hectare, plus those with 1 to 10 hectares, plus 60 percent of the percentage noted for farms with 10 to 51 hectares. Approximately 80 percent of all farms in eastern Paraguay have 20 hectares of land or less.

This calculation indicates that small farmers produce over one-half of eastern Paraguay's cotton, peas, sweet potatoes, sugar cane, corn, cassava, peanuts, dry beans, tobacco, green beans and castor seeds. Within this group only peas have a farmgate value of less than $1.0 million. Cotton, tobacco and castor seeds are cash crops, while sweet potatoes, corn, cassava and beans are used mainly for on-farm consumption. In regard to livestock, with the exception of beef animals small farmers own over one-half of all livestock.

Table C-8 presents estimates of the number of farms producing specified crops or having inventories of specified livestock by five strata of farm size. These estimates permit an assessment of the importance of various crops and livestock from the viewpoint of the number of farms participating in their production. About 3/4 of all farms in the strata 10 to 51 hectares of land have less than 20 hectares of land. With this proviso, on the basis of data presented in Table C-8, it is fairly safe to assert that over 10,000 small farms (0 to 20 hectares) participate in the production of each of the following: cotton, sweet potatoes, sugar cane for forage, corn, cassava, peanuts, round beans, soybeans, Lima beans, tobacco, castor beans, and also have beef animals, pigs, sheep, chickens, ducks, and guinea fowl. Nearly all farms of all sizes participate in production of corn, cassava, and chickens. A significant percentage of farms of all sizes produce round beans, sugar cane for forage, swine and beef animals (purpose unspecified).

The data presented in Tables C-7 and C-8 have further implications, such as average production of specified crops per producing farm by size of farm. These data may be useful to determine differences in scale production by size of farm. In regard to commercial crops, the largest share of rice, soybeans, mint, and wheat is produced by large farms (because production is mechanized). However, small farmers also participate in the production of some of these crops. For example, we estimate that farms smaller than 20 hectares produced 26 percent of soybeans in 1973 (Table C-7) and this production occurred on approximately 12.3 thousand farms (Table C-8). In the 1972-1973 crop year, total soybean production in eastern Paraguay was 122,637 metric tons. Therefore, farms smaller than 20 hectares produced roughly 2.6 metric tons per soybean-producing farm, as compared with 8.8 metric tons per soybean-producing farm for the group of farms 51 to 600 hectares in

TABLE 3-8

ESTIMATED NUMBER OF FARMS (IN THOUSANDS) PRODUCING SELECTED CROPS AND LIVESTOCK BY SIZE OF FARM IN THE 1971/1972 CROP YEAR (EASTERN PARAGUAY)

	600 Has. & Over	51 to 600 Has.	10 to 51 Has.	1 to 10 Has.	Less than 1 Ha.	Total
Crop Production						
Cotton	0.1	4.8	20.4	24.4	1.3	51.1
Rice - Irrigated	0.1	0.9	1.8	0.7	0.1	3.6
- Upland	0.2	1.4	1.1	1.3	0.2	4.1
Peas	-	1.2	3.3	5.1	0.2	9.8
Sweet Potatoes	0.2	4.5	15.0	23.6	1.5	44.8
Sugar Cane for Sugar	-	0.8	1.4	4.4	0.5	7.3
Sugar Cane for Molasses	-	1.3	2.2	3.7	0.3	7.5
Sugar Cane for Forrage	0.3	4.7	10.3	14.0	0.8	30.2
Corn	0.8	15.6	43.6 *	74.9	7.2	142.1
Cassava	1.0	15.4	43.6 *	78.6	9.1	147.7
Peanuts	0.1	4.7	16.2	23.0	0.9	45.0
Round Beans	0.4	9.0	32.3	53.0	3.5	98.2
Soybeans	0.3	5.7	7.8	6.2	0.2	20.2
Tobacco	-	2.5	15.7	14.2	0.9	33.3
Lima Beans	0.1	3.3	10.7	11.7	0.5	26.4
Castor Beans **	-	1.8	9.6	10.0	0.6	22.0
Sorghum for Grain	-	0.2	-	0.2	-	0.4
Garlic **	-	0.7	1.8	2.4	0.2	5.1
Wheat	0.2	2.6	2.4	1.8	0.1	7.1
Onions	0.1	1.4	3.0	4.4	0.3	9.1
Potatoes	-	0.2	0.5	0.5	-	1.2

TABLE C-8 (Continued)

	600 Has. & Over	51 to 600 Has.	10 to 51 Has.	1 to 10 Has.	Less than 1 Ha.	Total
Livestock Inventories						
Bovine	1.5	14.9	36.4	55.4	5.6	113.8
Swine	1.1	14.4	34.4	65.1	7.3	126.3
Goats	0.2	0.8	1.1	1.1	0.2	3.4
Sheep	0.9	3.6	5.2	5.0	1.6	16.2
Horses	1.4	11.6	28.9	35.4	6.9	84.2
Chickens	1.3	15.9 *	43.6 *	82.0	11.0	153.8
Ducks	0.6	6.0	12.8	15.5	1.7	36.6
Geese	0.3	1.7	1.4	1.9	0.1	5.3
Guinea	0.4	3.2	8.4	9.1	0.7	21.8
Turkeys	0.4	1.6	2.4	2.1	0.1	6.6
Number of Farms	1.8	15.9	43.6	86.1	11.4	157.1

Source: Prepared by MAG Gabinete Técnico from worksheets of the Encuesta Agropecuaria por Muestreo, (MAG, Dirección de Censo y Estadística Agropecuaria).

Notes : * Estimate held at maximum number of farms in group. Statistical expansion factors give results which exceeded maximum.

** Corresponds to 1972/1973 crop year.

size and 99 metric tons per soybean-producing farm for the group of farms with over 600 hectares. Apparently, soybeans are (or were in 1972) economically profitable for both small farmers and large farmers. To state that a crop belongs exclusively to "large farmers" or to "small farmers" is very clearly not useful for analytical purposes in regard to subsistence crops (grown by farmers without regard to size of farm) and in regard to those commercial crops where small farmers are a substantial percentage of all producers.

In case of a crop such as soybeans, where several thousand small farmers engage in production, one must assume that the crop is profitable for small farmers, and, therefore, of interest to them. The situation in regard to wheat and rice is similar to that of soybeans. Large farmers account for the largest share of production but the small farmers continue to engage in production. Production on the large farms is more mechanized and entails higher cash costs per hectare and per kilogram of output than does production on small farms.

f. An Enquiry Regarding Indices of Production

The Ministry of Agriculture does not prepare or publish any indices of agricultural production. Whether this is good or ill is a moot question. The following are among the several reasons why indices of agricultural production ought to be prepared. An index of production provides a brief statement of agricultural performance. If production is increasing, a well-constructed index is unlikely to miss this fact. In some circumstances higher value products replace lower value products, and an index picks up this fact while gross tonnage data do not. More importantly, however, an index can be structured to include various sub-indices each of which is reasonably representative of particular types of crops, e.g. export, domestic urban consumption, and subsistence.

The mode of preparation of Paraguay's national accounts is such that the crop production aggregate can serve as a crop production index. At present, this is the only data series which can be used as a crop production index. The national accounting crop production aggregate includes over 50 separate crops, as is shown in Table C-2, and 23 of the crops had values of less than Gs.200 million. Thus, this aggregate is broadly based. Its defects are that it is not structured to serve any particular analytical purpose, and that estimates for at least one-half the crop items are imaginative, to say the least.

Table C-9 presents an experimental index of crop production constructed solely from data already presented in Tables C-3 and C-5. There are five component groups of crops: major export crops (soybeans, cotton and tobacco), other export crops (coffee, tung nuts, castor beans and yerba mate), major subsistence crops (round beans, corn and cassava), major domestic cash crops (rice, wheat, sugar cane, coconuts, onions and potatoes), and other crops (strawberries, peas, peanuts, alfalfa and sorghum). Production volumes of each crop (which appear in Table C-3) are multiplied by average farmgate crop prices for the three calendar years 1966-1968; see Table C-5. The 1965-1967 crop years serve as the base period with index total and components equal to 100.0.

As is indicated by Table C-9, the total index was 127.76 for the 1969-1970 crop year and 145.79 for the 1973-1974 crop year. The national accounts aggregate for crop production (total crop production in constant prices) was 100.00 for the calendar years 1966-1968, 115.61 for the calendar year 1970, and 151.27 for the calendar year 1974. Both sets of indices do not differ substantially. It is also probable that the production of those crops included in our index grew faster than production of all crops, and that this fact (as well as differences in estimated production volumes for various crops) accounts for the disparities in index numbers.

The average annual growth in crops which are mainly exported in some form was 16.6 percent as contrasted with an average annual rate of growth of 1.4 percent for crops which are principally consumed domestically. The high rates of growth of soybeans, cotton, and rice affect export and domestic components. The performance of index components, even though influenced by the economic circumstances of particular crops, suggest that the relatively high rate growth of crops included in this experimental index (5.5 percent per annum) depended critically upon exports. The growth of production of domestic crops conforms to a priori expectation: that the growth in domestic demand was approximately equal to the rate of growth of population plus the rate of growth of real national income per capita. In recent years annual rates of growth for these items were 2.6 percent for population and 1.9 percent for real national income per capita.

2. Utilization

It is important to examine utilization of crops for a variety of reasons. As is noted in section 1. above, many crops can be characterized as export crops or as subsistence crops, or as domestic market crops, and a number of crops fit more than one category. For

TABLE C-9

AN EXPERIMENTAL VOLUME INDEX FOR CROP PRODUCTION

	1965-67 (3 years)	1969-70 (1 year)	1973-74 (1 year)
1. Major Export Crops Soybeans, Cotton, Tobacco	100.00	158.07	394.47
2. Other Export Crops Coffee, Tung Nuts, Castor Beans, Yerba Mate	100.00	108.59	167.27
3. Major Subsistence Crops Round Beans, Corn, Cassava	100.00	115.56	94.03
4. Major Domestic Cash Crops Rice, Wheat, Sugar cane, Coconuts, Onions, Potatoes	100.00	173.85	167.21
5. Other Crops Strawberries, Peans, Peanuts, Alfalfa, Sorghum	100.00	89.54	115.26
Total (= 1+2+3+4+5)	100.00	127.76	145.79
6. Export Crops (6 = 1+2)	100.00	136.08	293.52
7. Domestic Crops (7 = 3+4+5)	100.00	125.75	110.22

Source: Based on data presented in Tables C-3 and C-5.

most crops, data which permits the separation of the portion consumed on the farm from that which is marketed is indeed scant. In this section 2. we present and discuss data on exports and on-farm consumption.

Discussion of the evolution of production of specific crops; their principal uses, markets, and related data; and domestic research activities and technical assistance programs is undertaken in the subsequent section, 3. Finally, section 4. focuses on marketing. It seems obvious that crops which are grown solely for on-farm consumption involve the domestic economic system to a more limited extent than to crops which are grown mainly for off-farm sale. For the latter, farmgate price per kilogram rather than a felt or habitual consumption need is most likely to be the signal that causes a farmer to expand or reduce production. In turn, farmgate prices for crops which are grown mainly for off-farm sale are likely to be determined by the efficiency of marketing channels, the existence of imperfect markets, trends in supply and demand in other countries (and hence prices in principal international markets).

a. Exports

Paraguay exports a rather wide array of agricultural commodities, many of which undergo some processing prior to export. Any description of Paraguayan commodity exports must contend with a number of problems: (a) nomenclature, (b) valuation, and (c) unregistered exports. The nomenclature problem is one that can be resolved with some difficulty, but a balance must be struck between too much and too little detail. The valuation problem cannot be resolved easily, and its resolution is not attempted here.[1/]

1/ The problem arises from so-called aforo price system and is related to the fact that exporters must pay exchange and fiscal taxes upon exports. In order to reduce tax evasion, the GOP has a system under which all principal exports are assigned an aforo price upon which taxes must be paid. This aforo price is adjusted periodically to reflect international market conditions. In general, however, this system gives exporters an incentive to undervalue exports and these figures are included in the statistics which are the only ones available to us. The degree of undervaluation has diminished in the last five years in comparison with what existed previously.

The nomenclature utilized in Tables C-10 and C-11 is based upon 46 commodity groups and all further discussion of export earnings utilizes the average annual FOB values for the period 1972-1974. During this three-year period, total annual commodity export earnings averaged (U.S.) $127.6 million. As is shown in Table C-10, forestry-related exports amounted to $17.7 million, livestock-related exports amounted to $40.2 million, and crop-related exports amounted to $67.9 million. Mineral exports, i.e. portland cement, and all other exports amounted to only $1.8 million. Beef products (excluding hides), with $35.2 million in FOB export value, are clearly Paraguay's leading export. Five groupings of exports accounted for $90.3 million or 70.6 percent of total export earnings. These five groupings are wood products (lumber, manufactured wood products; $15.3 million), beef products (canned beef, frozen beef, beef extract, other beef products and hides; $39.2 million), cotton (cotton fiber and cotton seed cake; $12.0 million), tobacco($8.5 million) and soybeans (soybeans, soybean oil, and soybean cake and meal; $15.0 million). These five groups accounted for the following percentages of 1972-1974 commodity export earnings: wood products, 12.0 percent; beef products, 30.7 percent; cotton, 9.4 percent; tobacco, 8.5 percent; and soybeans, 11.8 percent.

In comparison with most countries at Paraguay's stage of development, the more atypical characteristics are her relative lack of dependence upon a single export and the relatively large number of export products. All livestock products accounted for only 31.5 percent of commodity export earnings while all crop-sector products accounted for 53.2 percent of commodity export earnings. Apart from commodity exports derived from cotton, tobacco, and soybeans, which provided $35.5 million in export earnings, the crop sector provided an additional $32.4 million in commodity export earnings--25.4 percent of total commodity export earnings.

The nomenclature presented in Table C-11 comprises 32 basic commodity groups including processed products derived from cotton and soybeans. In regard to these 32 groups, only one group, cotton fibers, had an FOB value in excess of $10 million; two groups, tobacco and soybeans, had an FOB value of more than $5 million. There were ten groups with FOB values between $1 million and $5 million and nineteen groups with FOB values of less than $1 million.

Nine major product groupings shown under "Major Crop-Related Products" had average annual export earnings in 1972-1974 in excess of $1 million: cotton fibers, tobacco, oil seeds, vegetable oil, cake, expeller, and meal (treated as one group), essential oils, sugar products, coffee and palm hearts. Examination of basic commodity groups under these nine product groupings also reveals a sizable number of products with an average annual export value in excess of $1 million; e.g., castor seeds, tung oil, coconut and coconut kernel oil, cotton-seed cake, coconut expeller cake, soybean

TABLE C-10

COMMODITY EXPORTS BY SECTOR OF ORIGIN

	Average Annual Value, 1972-74 (Millions of US$)	Group As Percent of Total, 1972-74	1972-74 Tonnage As Percent 1965-67 Tonnage	Registered FOB Value Per MT, 1972-74 in US$	Predominant Market (60% or more)
Forestry-Related Exports	17.65	13.8	n.a.		
Lumber	12.74	10.0	413	114	Argentina
Mkg. Wood Products	2.32	1.8	1,006	332	Brazil-Arg.
Logs	0.27	.2	2	54	Argentina
Quebracho Extract	1.89	1.5	51	152	Ex-LA
Wild Animal Skins	0.43	.3	72	3,102	Ex-LA
Livestock-Related Exports	40.16	31.5	n.a.	n.a.	
Beef Products	(35.15)	(27.5)	n.a.	(466)	Ex-LA
Canned Beef	14.91	11.7	55	1,447	
Frozen Beef	16.07	12.6	788	1,030	
Beef Extract	2.99	2.3	71	7,489	
Other Beef Products	1.18	0.9	217	422	
Other Livestock Products	(5.01)	(4.0)	n.a.	n.a.	
Hides	4.02	3.2	108	466	Ex-LA
Horsemeat	.52	0.4	61	459	Ex-LA
Other	.47	0.4	112	79	Ex-LA
Crop-Related Exports	67.91	53.2	n.a.	n.a.	
Portland Cement	0.47	.3	xx	26	Argentina
Other, n.i.e.	1.39	1.1		239	Unknown
TOTAL	127.60	100.0			

Source: Banco Central del Paraguay

Notes : n.a. = not applicable.
xx indicates no export during period 1965-1967.

TABLE C-11

CROP SECTOR EXPORTS BY COMMODITY GROUP

	Average Annual Value, 1972-74 (Millions of US$)	Group As Percent of Total, 1972-74	1972-74 Tonnage As Percent 1965-67 Tonnage	Registered FOB Value Per MT, 1972-74 in US$	Predominant Market (60% or more)
Major Crop-Related Exports					
Cotton Fibers	10.65	15.7	192	731	Ex-LA
Tobacco	8.53	12.6	183	406	Ex-LA
Oil Seeds	(12.50)	(18.4)	(683)	(159)	Ex-LA
Soy beans	9.73	14.3	2,813	149	
Castor Seeds	2.68	3.9	139	211	
Other	.10	0.1	1,153	175	
Vegetable Oil	(8.55)	(12.6)	(172)	(323)	Ex-LA
Coconut and Coconut Kernel	3.74	5.5	166	641	
Tung	3.84	5.7	154	275	
Soy beans	0.77	1.1	xx	456	
Other	0.21	0.3	818	649	
Cake, Expeller and Meal	(6.86)	(10.1)	(387)	(97)	Ex-LA
Cotton Seed	1.34	2.0	327	96	
Coconut	0.87	1.3	939	41	
Soy bean	4.51	6.6	311	136	
Other	0.15	0.2	236	55	
Essential Oils	(6.35)	(9.4)	(186)	(8,306)	Ex-LA
Petit grain	4.48	6.6	126	12,084	
Mint	1.51	2.2	4,420	6,846	
Other	0.35	0.5	156	2,035	
Sugar Products	(4.53)	(6.7)	(6,176)	(333)	Ex-LA
Sugar	4.36	6.4	6,892	342	
Sugar Products	0.17	0.3	2,388	206	
Coffee	3.26	4.8	103	886	Argentina
Palm Hearts (Canned)	2.73	4.0	139	609	Unclear
Sub-Total	63.96	94.2			

TABLE C-11 (Continued)

	Average Annual Value, 1972-74 (Millions of US$)	Group As Percent of Total, 1972-74	1972-74 Tonnage As Percent 1965-67 Tonnage	Registered FOB Value Per MT, 1972-74 in US$	Predominant Market (60% or more)
Minor Crop-Related Exports					
Processed Fruit Products	.92	1.4	790	315	Argentina
Fresh Vegetables	(.96)	(1.4)	(880)	(164)	Argentina
Tomatoes	.55	0.8	487	198	
Peppers	.24	0.4	9,638	310	
Other	.17	0.3	2,879	72	
Raw Silk Cocoons	.72	1.1	xx	6,738	Japan
Sweet Potatoe Pudding	.46	0.7	xx	198	Argentina
Cereals	(.37)	(0.5)	(64)	(98)	Ex-LA
Corn	.22	0.3	47	75	
Rice	.15	0.2	xx	205	
Other	.03	-	570	73	
Fresh Fruit	.30	0.4	51	96	Argentina
Yerba Mate	.20	0.3	16	120	Chile
Palm Straw	.06	0.1	31	47	Argentina
Sub-Total	3.95	5.8			
TOTAL	67.91	100.0			

Source: Banco Central del Paraguay

Note: xx indicates no export during period 1965-1967.

cake and meal, petit-grain oil essence and mint oil. The eight groupings presented in Table C-11 under "Minor Crop-Related Exports" include commodity groups which had average annual export earnings in 1972-1974 of less than $1 million and which had total earnings of only $3.95 million.

A number of Paraguay's crop-related exports undergo only rudimentary processing or physical transformation prior to export. This approximates the situation for cotton, tobacco, soybeans, castor seeds, coffee, tomatoes, red peppers and fresh fruit. The degree of processing required for essential oils, tung oil, sugar and sugar products, and processed fruits is clearly more substantial. By and large, the degree of processing of exports which takes place in Paraguay appears to be dictated by economic considerations, specifically transportation costs and competition from exporters in other countries.

The incidence of these two considerations varies depending upon the nature of the products. One never finds sugar cane or raw cotton transported over long distances anywhere in the world, and the reasons are that the transport costs are much reduced by processing in the vicinity of the production site. Certain products such as coffee and soybeans can be transported over longer distances after initial and rather rudimentary processing. Transportation costs from any point in Paraguay to major world markets are high.

The degree of domestic consumption of crop-related exports varies widely. Crops grown or gathered principally for export include tobacco, castor seeds, tung nuts, sour orange leaves (petit-grain), palm hearts and raw silk cocoons. Cotton, soybeans, coconut, and coffee and their by-products are consumed domestically as well as exported. A substantial portion of the oil derived from the crushing of cotton seeds, coconut, and soybeans is consumed domestically as vegetable oil, but a substantial proportion of the derived meal and expeller from crushing is exported. The vegetable oils and meals undoubtedly merit further examination. Most of the minor exports, particularly fruit, vegetables, corn, rice, yerba mate and sugar, are consumed domestically, and exports of these products constitute only a small portion of total production.

Paraguay's crop-related exports have grown substantially in recent years. Inasmuch as year-to-year changes in export volume are influenced by weather conditions and by the timing of shipment, the comparison presented in Table C-11 is based upon two three-year periods. The 1972-1974 tonnage of each commodity group is stated as a percentage of 1965-1967 tonnage. If the number shown in the third column of Table C-11 is greater than 100, growth in volume of the

commodity has occurred. Conversely, a number less than 100 signifies decline. Several basic commodity groups had small or non-existent export volumes in 1965-1967; e.g., soybeans, soybean oil, mint oil, sugar products, red peppers, raw silk cocoons, sweet-potato pudding and rice. For these commodities, growth rates are very high or infinite.

Growth performance of commodities which were exported in substantial quantity in 1965-1967 serves as an important test of overall agricultural performance. For these commodities, corresponding annual rates of growth stated as percentages are as follows:

Cotton Fibers	9.8
Tobacco	9.0
Castor Seeds	4.8
Tung Oil	6.4
Coconut Oil	7.5
Cake, Expeller, and Meal	21.3
Petit-grain Essence	3.4
Coffee	0.5
Palm Hearts	4.8
Cereals	-6.2
Fresh Fruit	-9.2
Yerba Mate	-23.0

Rates of growth exhibited by these commodities are in general quite favorable. Annual rates of growth in excess of four percent in export of agriculturally based commodities are suggestive of favorable performance, particularly if production of commodities for domestic consumption does not decline. In regard to exports, the major disaster was yerba mate whose demise relates mainly to Argentine trade restrictions. The cereals (rice and corn) have always been exported in minor quantities—apparently due to relatively low value per weight. The very low rate of growth for coffee exports appears related to the selected base period which was approximately the peak of the production cycle. The prices of most of Paraguay's export crops were increasing during the years from 1965 through 1974, and this increase probably helped to bring forth additional production. However, the major upthrust in prices occurred in 1973 and 1974, so rapidly increasing profitability does not explain the growth in production of several of Paraguay's export commodities during the period from 1965 to 1974.

Six commodities (not listed above) exhibited the highest annual rates of export growth: soybeans, 61.1 percent; mint oil, 71.8 percent; sugar, 80.2 percent; processed fruit products, 34.4 percent; tomatoes, 25.4 percent; and red peppers, 92.1 percent.

Soybeans constitute the most important case because export earnings grew from $0.2 million in 1965-1967 to $9.7 million in 1972-1974. Sugar constitutes the most trivial case inasmuch as domestic production was quite substantial $34,900 MT in 1965-1967 and 69,000 MT in 1973), and only a minor shift to export produced the high rate of growth in its export volume. The other four commodities enjoyed high rates of growth but were extremely small export earners both in 1965-1967 and in 1972-1974.

b. Economic Implications of Paraguay's Location

A principal economic factor determining the composition of Paraguay's exports is the cost of transportation of these commodities to foreign markets. The fourth column of Tables C-10 and C-11 shows the registered value of each commodity group on an FOB basis. Even though many registered exports are undervalued, most export commodities, and particularly those with principal markets outside Latin America, have registered quite high FOB values. A 1973 study of Paraguay's export sector indicated that freight costs, inclusive of port handling charges, ranged from $30 per metric ton to $80 per metric ton from predominant Paraguayan points of origin to FOB Buenos Aires.[1/]

The additional cost to a European port would generally fall in the range of $25 to $50 per metric ton. Although freight rates and handling charges are continually changing (particularly in the past 18 months as a result of the world petroleum crisis), the predominance of high value products in Paraguay's export trade is hardly surprising.

It appears obvious that commodities with an FOB value in excess of $400 per metric ton are not hindered by transportation costs; e.g., wild animal skins, beef products, cotton, tobacco, essential oils, coffee, palm hearts, and raw silk cocoons, nor are those products which find ready markets in Argentina, such as lumber and wood products, fresh vegetables, fresh fruit, sweet-potato pudding and processed fruit products. There are, however, numerous commodities whose exportation depends critically upon external prices; e.g., soybeans and cake, expeller and meal (of cotton seed, coconut, and soybeans). Corn and rice are particularly interesting in this regard inasmuch as both commodities have been and are grown in Paraguay in significant quantity, but their exportation has been occasional and unsubstantial.

Recognition of high transportation costs from Paraguay to principal world markets has numerous implications. For example, the producers of agricultural products in another country having

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1/ Análisis del Sector Exportador del Paraguay (February 1974).

lower transportation costs to its principal market and employing the same technology in the production of a particular crop will be able to obtain more sterling pounds, Deutsche marks, dollars or yens, and hence real goods from those principal buyers in exchange for their goods. Thus, the Paraguayan farmer in the context of a competitive market structure, both within Paraguay and outside of Paraguay, would have a lower real income derived from the production of goods for export than producers in other countries.

The location disadvantage of Paraguay may also manifest itself in Paraguay's agricultural technology. High transport costs increase the real costs of agricultural machinery and advanced technological inputs, such as fertilizers and insecticides. With the exception of soybeans, the evidence seems quite clear that most of Paraguay's crop-related exports are produced by labor intensive or unmechanical technology.

A third manifestation of the location disadvantage may take the form of restriction in the set of commodities which enters Paraguay's export trade. If, for example, cassava (mandioca), corn, and sweet potatoes were commercial exports, farmers would undoubtedly specialize in their production and the large scale operation would warrant a more efficient technology. In summary, on the basis of transportation costs alone, Paraguay appears to be a disadvantaged producer. This disadvantage involves lower real income for agricultural producers, relatively high cost of modern agricultural inputs, and restricted demand for commodities presently produced in Paraguay.

The overall performance of Paraguay's crop-related exports in recent years suggests substantial growth in the domestic crop production even if one considers a high margin of error due to unregistered exports. More importantly, there are definite indications of changing composition of production. How fast some of the new export crops will grow is, of course, quite speculative. The new export crops do not appear to be replacing the traditional exports. Globally, the substitution effects appear to be of little importance.

c. On-Farm Consumption

Table C-12 presents data from a sample survey carried out in the Loreto, Itacurubí, and Coronel Oviedo districts in eastern Paraguay. The 486 farms of these districts are grouped by land size in Table C-12. Eight crops were encoded and are therefore available in detail, but the remaining annual and permanent crops were not encoded. Table C-12 indicates the percentage of each crop that was consumed on the farm and the percentage that was sold.

TABLE C-12

PERCENTAGE OF ON-FARM CONSUMPTION AND OFF-FARM SALES FOR SELECTED CROPS IN 1972-1973 CROP YEAR BY SIZE OF FARM

	On-Farm Consumption			Sales (and Seed)		
	0 to 5 Ha.	5 to 20 Ha.	20 Ha. and Over	0 to 5 Ha.	5 to 20 Ha.	20 Ha. and Over
Number of Farms	(98)	(297)	(91)	(98)	(297)	(91)
Annual Crops						
Cassava	85	93	90	15	7	10
Corn	90	75	65	10	25	35
Round Beans	71	68	73	29	32	27
Sweet Potatoes	40	78	97	60	22	3
Tobacco	-	1	-	100	99	100
Soybeans	-	-	-	-	100	100
Cotton	-	-	-	100	100	100
Castor Beans	-	-	-	100	100	100
Other	71	17	30	29	83	70
All Annual Crops	50	38	33	50	62	67
All Permanent Crops	42	21	20	58	79	80
All Crops	49	37	31	51	63	69

Source: CPES, Survey One (Farms in Loreto, Itacurubí de la Cordillera and Coronel Oviedo); see also Part D.

(Use of crop for seed is treated as an off-farm sale.) Formally the data are in terms of value; however, tonnage data multiplied by weighted average price for each stratum would give the same results. Therefore, for the eight crops listed, tonnage data would give percentage breakdowns that are identical to those presented in Table C-12.

Table C-12 reveals that tobacco, soybeans, cotton and castor beans are clearly cash crops with almost no on-farm consumption. Cassava, corn, round beans and sweet potatoes are grown principally for on-farm use. For these crops there appears to be little or no correlation between commercialization and size of farm. In fact, the smallest farms (0 to 5 hectares) sell higher percentages of their cassava, round beans, and sweet potatoes than the largest farms (20 hectares and over). Although this finding may appear strange, farm location may be the influence (even though unknown) which causes this behavior. In regard to total crop production, farm size and percentage of crops commercialized is positively correlated. This result undoubtedly arises from the greater participation of the larger farms in production of cash crops.

d. On the Adequacy of Domestic Food Consumption

At the more trivial level of analysis (a) all agricultural produce not exported from Paraguay is consumed or wasted in Paraguay and (b) domestic food production less food exports plus food imports equals domestic consumption. Neither formula seeks to state anything about the adequacy of domestic food production in terms of the welfare of human beings. Of course people may not have a nutritious diet out of ignorance or out of poverty, but conjuring with aggregative data does not alter this situation. Findings from the latest and most complete study on nutrition in Paraguay are summarized below.

The Nutrition Survey of Paraguay, May-August 1965, was conducted by a team of Paraguayan and U.S. specialists. As part of this Survey, a survey of family food consumption by the one-day recall method was carried out on 307 families. These families represented a 20-percent systematic random sample of the families included in the brief medical study and corresponded to those who had received the detailed medical examination. Of the 307 families surveyed by the 24-hour recall method, 88 percent, or 269 families, were Paraguayan; the other 12 percent belonged to four special population groups, including German Mennonites, Japanese, and Indians. The Paraguayan families belonged to 25 localities representing most parts of the country and were selected from urban, semiurban, and rural sectors, the rural comprising 61 percent of the total. Families from Asunción and four smaller cities were classified as urban, and those from larger villages and towns were considered semiurban.

Data on family food consumption for the day prior to the medical study were obtained by interview, almost always in health centers or at schools where the medical study took place. The data obtained on food represented amounts prepared for consumption.

Table C-13 indicates per capita consumption obtained by the survey. The nutritional values are discussed as follows in the source document:[1]

--In contrast to most developing areas and to most other Latin American countries, meat is the principal protein source in Paraguay, providing over 40 percent of the total. Cereals contributed over 25 percent of the protein; legumes, 10 percent; and milk and eggs combined, 8 percent. Protein from animal sources amounted to 50 percent of the total protein. The proportion of animal protein was higher in the urban population group than in the rural.

--Starchy roots, principally mandioca, accounted for over a third of the total Calories, and cereals for over a fourth. In the urban population cereals were, however, more important than starchy roots. Meat contributed 11 percent of the Calories for the population as a whole, fats and oils 9 percent, and, the other groups various smaller amounts.

--Cooking fats and oils accounted for nearly 45 percent of the total fat in the diet. Meat provided another 30 percent and milk and eggs combined, 8 percent. Meat, eggs, milk, and lard accounted for about 60 percent of the total fat. The proportion of fat from animal sources was greater in the rural areas. Fat is not a scarce commodity in Paraguay as in some other countries.

--Starchy roots contributed nearly 50 percent of the carbohydrate in the diet and cereals 30 percent. Sugar contributed only about 8 percent but the proportion was three times as high in the urban as in the rural group.

--Starchy roots contributed nearly 40 percent of the calcium in the Paraguayan diet. Calcium from milk represented about 50 percent of the total calcium in the urban diet but less

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1/ U.S. Department of Health, Education, and Welfare, Public Health Service Republic of Paraguay Nutrition Survey (May-August 1965), pp. 319, 322.

TABLE C-13

DAILY PER CAPITA CONSUMPTION OF FOODS IN URBAN, SEMIURBAN AND RURAL AREAS BY PARAGUAYANS, 1965, RECALL METHOD

(Grams of edible portion per person)

	Urban	Semiurban	Rural	All Families
Cereal products	266	204	143	177
Starchy roots and tubers	314	402	648	541
(of which cassava)	(211)	(351)	(574)	(466)
Vegetables	99	41	30	45
Fruits	299	209	301	286
(of which oranges)	(97)	(124)	(222)	(181)
Leguminous seeds, dry	5	8	34	24
Sweets, sugar equivalent	65	43	16	31
(of which white sugar)	(58)	(41)	(17)	(29)
Meat, poultry	180	158	118	137
(of which beef)	(145)	(127)	(88)	(105)
Fish, fresh water	0	1	0	0
Eggs	14	10	18	12
Dairy products (milk equivalent)	199	92	67	89
(of which milk)	(151)	(81)	(56)	(78)
Oils and fats	25	23	23	23
Miscellaneous	34	13	9	13

Source: Nutrition Survey, op.cit., pp. 283-285

than 20 percent in the rural. Fruits were the only other significant calcium source and provided 15 percent of the total.

--Starchy roots provide about a third of the iron in the diet; meat, one fourth; and cereals, one fifth. The urban diets obtain more iron from meat than from starchy roots. The iron cooking pots in the rural households contribute amounts of iron to the diet which are not represented in the figure.

--Meats, particularly liver, provided nearly 45 percent of the vitamin A value of the diet. Vegetables contributed over 25 percent and fruits nearly 15 percent.

--Starchy roots were the largest thiamine source in the Paraguayan diet and provided nearly 40 percent of the total. Cereals, so often the principal thiamine source in other countries, contributed less than 20 percent of the thiamine in the Paraguayan diet. Fruits supplied 15 percent.

--Starchy roots were also the largest riboflavin source and contributed 35 percent of the total. Meat provided over 25 percent, and milk 15 percent of this vitamin.

--Meat was the principal niacin source, accounting for 35 percent of the pre-formed niacin in the Paraguayan diet. The proportion was greater in the urban diets and smaller in the rural. Starchy roots provided 28 percent of this vitamin for the group as a whole, but less in the urban diet and more in the rural. Legume seeds including peanuts contributed nearly a fifth of the niacin in the rural diet but little in the urban.

--On a raw-food basis, starchy roots provide 56 percent of the ascorbic acid in the Paraguayan diet; vegetables, 3 percent; and fruits, 40 percent. The vitamin is, however, decreased by cooking. A large proportion of the ascorbic acid is, nevertheless, provided by fruits eaten raw.

The standards of comparison used for Calories and most nutrients were the then current figures of FAO and/or the U.S. National Research Council and represent values close to requirements. Figures for adults were adjusted to average body weights of male and female Paraguayans 20 to 29 years of age, developed from data obtained in clinical studies. Since the survey took place in the Paraguayan winter, a mean season temperature of 10°

Centigrade was taken as representative of that time in the adjustment of Calorie requirements.

Table C-14 shows the distribution of families of each area according to levels of adequacy for Calories and nutrients. Table C-14 is almost self-explanatory. The obvious deficiencies in the Paraguayan diet relate to the intake of calcium and vitamin A. Only one-half of all families fulfilled their calcium needs. In regard to Vitamin A only 27 percent of all families actually had diets with 100 percent or more of vitamin A needs.

Three principal observations of the 1965 Nutrition Survey appear sufficiently important to bear repeating here:

> "The Calorie and nutrient intakes in the Paraguayan population as a whole were uniformly more than 100 percent of the nutritional standards used. The ranges around the averages were, however, wide; and deficits, most marked in calcium, vitamin A, riboflavin, and niacin, occurred in varying proportions in the different residential and geographic areas. The apparent niacin intake would have been greater had it been possible to include in the calculations the trytophan precursor of niacin in the diet, which in Paraguay is relatively high in meat. On the other hand, the intake levels in Calories and nutrients would have been lower if the foods actually ingested, rather than those prepared for consumption, could have been measured. Well-off farming families, for example, cook more mandioca than they eat, giving the excess to animals.
>
> "Although the families in this Survey were not classified by economic level, the economic factor appeared to be the single greatest influence in food consumption. The better-off families enjoyed the more varied diets, and ate more meat, milk, eggs, and certain foods of foreign origin. Nevertheless, a very small percent of all Paraguayan families had diets totally lacking in animal protein. While urban poor existed, the general economic level in the cities was higher than in rural sections. In numerous respects, the food habits and other characteristics of semiurban groups fell between those of urban and rural groups.
>
> "While regional differences in food consumption also appeared, these were less important as a rule than urban-rural differences. Urban families were generally of higher economic level than rural families. They had more education, better housing, food preparation and sanitary facilities, health services, and

TABLE C-14

DISTRIBUTION OF URBAN, SEMIURBAN AND RURAL PARAGUAYAN FAMILIES BY LEVEL OF ADEQUACY OF CALORIES AND NUTRIENTS (1965)
(RECALL DATA)

Percent Distribution of Families

Level of Adequacy	Calories	Protein	Calcium	Iron	Vitamin A	Thiamine	Riboflavin	Niacin	Vitamin C
100% and over									
Urban	53	93	66	83	62	79	71	48	98
Semiurban	46	78	35	76	24	61	46	41	98
Rural	58	78	47	91	15	82	43	50	98
All Families	55	81	49	87	27	78	49	48	98
75% to 99%									
Urban	36	5	12	10	5	12	14	33	0
Semiurban	33	7	22	15	4	24	17	17	0
Rural	34	15	21	7	12	10	26	21	0
All Families	34	12	19	9	9	13	22	23	0
50% to 74%									
Urban	7	2	9	5	17	7	14	16	0
Semiurban	20	13	24	4	15	13	28	35	0
Rural	7	5	22	2	19	5	27	23	0
All Families	9	6	19	3	18	7	24	23	0
Under 50%									
Urban	3	0	14	2	16	2	2	3	2
Semiurban	2	2	20	4	57	2	9	7	2
Rural	1	2	10	1	54	2	4	5	2
All Families	1	1	12	1	46	2	4	5	2

Source: Nutrition Survey, op.cit., p.329

markets. The urban families purchased most of their foods, whereas rural families produced much of their own, especially mandioca, maize, legumes, fruit, pigs, and chickens. While about 40 percent of the rural families milked cows, much of the milk was sold."

In regard to recommendations, three recommendations made by the Nutrition Surveys are not at all outdated:

1. "This food consumption study encompassed a numerically large and geographically dispersed sample of the Paraguayan population. However, more detailed studies of food consumption are needed to decipher the enigmas posed by the totality of information derived from the Survey as a whole. Certain findings, e.g., the delayed growth and development of children are not compatible with average daily nutrient intake data, indicating a need to determine accurately the intrahousehold distribution of nutrient intake as well as that of the whole household. It is recommended, therefore, that food consumption studies be continued at regular intervals and that they stress differences in nutrient intake among members of household, among days of the week and among seasons of the year. Using this and previous food consumption surveys for comparison, changes in food consumption practices with time and changing economic conditions should be recorded. If at all possible, such studies should be conducted in conjunction with clinical and biochemical evaluations of nutritional and general health status."

2. "In regard to contemporary Paraguayan food consumption patterns, the consumption of more milk, eggs, vegetables, fruit, and certain other foods could raise the levels of calcium, vitamin A and riboflavin in the Paraguayan diet."

3. "Improvements in cooking facilities are desirable. Nearly 90 percent of the rural families cook on the ground. Under these circumstances, sanitation is difficult and food preparation is limited to simple processes. Special foods for children could be prepared more readily with better facilities. Rural kitchens are smoke-filled sheds removed from the dwellings, leaving homes with no protection against abrupt temperature changes and cold in the Paraguayan winters. Some kerosene stoves have been introduced but mainly in semi-urban homes. Until modern stoves are within reach of the rural family, a raised hearth of brick or adobe would be a practical improvement."

e. Imports

Table C-15 offers a rapid view of the composition and magnitude of Paraguay's total registered imports. Foodstuffs account for a relatively small portion of imports. Even if one were to assert that unregistered imports of foodstuffs and processed food products were substantial, Paraguay's agricultural sector net commodity trade balance is very favorable. Wheat and wheat products constitute the largest share of Paraguay's registered foodstuff imports; in 1974 they alone accounted for 74 percent of all food products.

It is appropriate to distinguish between an extremely favorable foodstuff balance in foreign trade and an agricultural sector balance. A sizable portion of the import bill is comprised of products used to grow, transport and process agricultural exports. Thus, as shown in Table C-15, apart from "Agricultural Equipment," which is clearly identified with agriculture, a substantial portion of "Raw Materials" and "Machinery and Equipment" are utilized in the agricultural sector or in related industrial and transport activities. Economic theory gives few guidelines regarding the relationship between value of imports required to produce exports and the value of exports. On balance, the ratio is probably less than unity. However, due to the indivisibility of investments, any calculation might uncover commodity specific situations in which the ratio is below the unit value.

It is observed in Table C-15 that the value of total imports has increased by 168 percent from 1970 to 1974. The item experiencing the most rapid increase is clearly in the value of petroleum products, mainly because of the worldwide increment in oil prices of 1974. As a matter of fact, if the value of petroleum products had remained at the 1970 level, the value of total imports would have increased by only 112 percent from 1970 to 1974.

Other items showing substantial increments in the 1970-1974 period are "Agricultural Equipment" (273-percent increment) and "Chemicals and Pharmaceuticals" (191-percent increment).

3. Crop Specific Analysis

This section contains a crop-by-crop discussion of the economic importance, evolution of production, in-country research work, and technical assistance to producers. The first group of crops discussed includes soybeans, cotton, tobacco, cassava, corn, sugar

TABLE C-15

COMMODITY IMPORTS, 1970 - 1974
Millions of U.S. Dollars (FOB)

	1970	1971	1972	1973	1974
Consumer Goods	21.63	21.63	19.46	22.49	45.11
Food Products	6.26	5.69	5.57	5.26	14.42
Beverages and Tobacco	6.53	7.21	6.12	7.44	11.24
Paper Products	2.13	2.03	2.46	2.79	5.02
Chemicals and Pharmaceuticals	3.48	4.20	3.58	4.69	10.13
Textiles	3.22	2.51	1.75	2.31	4.30
Raw Materials	11.68	14.69	12.91	18.23	55.99
Petroleum Products	6.15	6.35	5.95	6.81	41.90
Metal Products	5.53	8.34	6.96	11.42	14.09
Machinery and Equipment	21.25	22.79	26.73	49.23	52.36
Transportation Equipment	8.94	8.47	9.01	13.83	18.74
Agricultural Equipment	1.54	1.52	2.07	4.58	5.75
Machinery and Motors	10.77	12.80	15.65	30.82	27.87
Other	9.27	11.16	10.75	14.84	17.93
TOTAL	63.83	70.27	69.85	104.79	171.39

Source: Banco Central del Paraguay, Customs data.

cane, rice, wheat and coffee. In Table C-16 these nine crops are ranked according to gross value of production, total hectares harvested, and value of export earnings. According to one or more of the criteria cited, these crops rank high. Soybeans, cotton and tobacco are leading export crops; cassava and corn are major subsistence crops; rice and wheat are major domestically-consumed commercial crops; and sugar cane and coffee are exported and consumed domestically. During the three-year period 1972-1974, these nine crops aggregate to 65 percent of the gross value of all crops and to 64 percent of the registered export earnings of all crops.

In regard to data presented in Table C-16, gross value of production of each crop is stated in 1972 constant Guaraníes, and the source of data is the Central Bank's National Accounts. Neither the volumes nor values utilized for calculating the gross value of production of each crop necessarily coincide with data presented in Tables C-3, C-5, C-8 and C-9. The National Accounts data are utilized because its list of crops is comprehensive and this feature facilitates ranking. In regard to data on export earnings, data presented in Table C-16 are consistent with the presentation in Table C-11. The sole difference is that the processed by-products of each crop are attributed to it. Thus, cotton exports include cotton fiber and cottonseed cake and meal; soybean exports include soybean grain, soybean oil, and soybean meal cake, and expeller; and sugar exports include refined sugar and sugar-cane based alcoholic beverages. Table C-17 presents data on volume of production and area harvested for each of the nine major crops. Inasmuch as year-to-year variations in production for a crop are highly dependent upon weather conditions (as a general rule), averages for each of three five-year periods are also presented in Table C-17.

Our rationale for analysis of particular crops relates fundamentally to the fact that marketing and research problems are specific to particular crops. There are dangers in focusing solely upon the problems of a particular crop, but there are equally serious dangers in analysis based solely upon agreegate crop data. In the past, serious studies of Paraguayan agriculture have followed the latter focus, which is a temptation, of course, when there are over 50 identifiable crops. Among specialists in research and marketing there is the opposite tendency--to generalize the problems of particular crops to the crop sector as a whole.

a. Soybeans

(1) Economic Importance

Paraguay ranks fourth among soybean producers in South

TABLE C-16

RANKING OF NINE MAJOR CROPS BY GROSS VALUE (1972-1974), HECTARES HARVESTED (1974), AND EXPORT EARNINGS (1972-1974)

Crop	Ranking Among All Crops: Gross Value 1/	Hectares Harvested 2/	Export Earnings 3/	Gross Value Ave. 1972-1974 (Millions ₲)	Percentage of Gross Value of All Crops	Export Earning Ave. 1972-1974 (Millions US$)	Percentage of Export Earnings of All Crops
Soybeans	3	2	1	1,503	7.5	15.01	22.1
Cotton	4	4	2	1,467	7.4	11.99	17.7
Tobacco	7	9	3	727	3.7	8.53	12.6
Cassava	1	3	-	5,611	28.2	-	-
Corn	2	1	-	1,696	8.5	0.22	0.3
Sugar Cane	5	6	4	926	4.7	4.53	6.7
Rice	11	12	-	436	2.2	0.15	0.2
Wheat	22	8	-	200	1.0	-	-
Coffee	17	13	8	352	1.8	2.73	4.0

Source: Tables C-3 and C-11 and Banco Central del Paraguay, Departamento de Estudios Económicos, Cuentas Nacionales 1974 (May 1955).

Notes : 1/ Gross value is the average annual output for the period 1972-1974 stated in 1972 constant Guaranies. Data are from Cuentas Nacionales 1974.

2/ Data on hectares harvested is from 1973-1974 crop year; see Table C-3.

3/ Data on export earnings is from Table C-11 but restated to include by products from each commodity. Data are in U.S. dollars and are for period 1972-1974.

TABLE C-17

AREA (A) AND VOLUME (Q) HARVESTED OF NINE MAJOR CROPS: 1965-1974
(Data in Thousands of Hectares and Metric Tons)

	Soybeans		Cotton		Tobacco		Cassava		Corn	
	A	Q	A	Q	A	Q	A	Q	A	Q
A. Annual Crop-Year Data										
1964/65	11.2	18.0	56.7	42.0	14.4	18.0	108.0	1,512.0	161.5	210.0
1965/66	14.2	20.0	62.8	28.9	7.0	8.7	102.0	1,437.0	150.5	165.5
1966/67	12.8	18.0	38.2	26.7	10.8	13.5	97.3	1,460.0	173.0	225.0
1967/68	8.4	13.5	37.2	30.1	18.3	22.0	100.3	1,504.0	180.0	180.0
1968/69	12.2	22.0	60.0	40.5	20.0	24.0	103.3	1,549.1	127.5	153.0
1969/70	39.5	51.8	46.9	39.6	13.6	17.8	103.3	1,580.1	187.3	258.6
1970/71	54.6	75.3	33.2	17.5	16.1	17.9	94.5	1,195.8	190.1	230.5
1971/72	75.8	97.1	57.2	52.9	17.5	23.5	93.3	1,208.2	184.4	209.3
1972/73	81.4	122.5	81.1	85.3	20.4	26.7	79.6	1,107.9	185.6	246.0
1973/74	137.3	174.0	100.5	90.5	24.9	33.4	90.0	1,200.0	291.4	242.5
B. Five-Year Averages										
1. 1959/60 - 1963/64	3.0	4.8	37.3	29.4	11.9	14.0	76.6	1,083.7	110.3	140.5
2. 1964/65 - 1968/69	11.8	18.3	51.0	33.6	14.1	17.2	102.2	1,492.4	158.5	186.7
3. 1969/70 - 1973/74	77.7	104.1	63.8	57.2	18.5	23.9	92.1	1,258.1	207.8	237.4
Percentage change										
2/1	293	281	37	14	19	23	33	38	44	43
3/2	559	469	25	70	31	39	-10	-16	31	27

TABLE C-17 (Continued)

	Sugar Cane		Rice		Wheat		Coffee	
	A	Q	A	Q	A	Q	A	Q
A. Annual Crop-Year Data								
1964/65	26.8	991.6	8.0	21.6	10.8	7.0		6.0
1965/66	26.0	988.0	4.6	10.1	7.2	7.2		6.5
1966/67	26.0	988.0	7.2	18.1	8.3	9.1		7.1
1967/68	20.6	702.0	9.0	20.8	20.9	25.1		6.1
1968/69	23.5	821.3	13.2	30.2	34.3	31.4		6.8
1969/70	40.5	1,415.0	23.0	45.2	44.7	47.7	9.7	4.3
1970/71	39.7	1,407.4	21.6	38.8	51.5	54.8	12.4	5.8
1971/72	30.9	1,044.5	21.5	43.7	32.0	17.6	14.4	7.7
1972/73	28.0	1,100.8	21.4	41.7	20.3	23.0	15.6	6.9
1973/74	42.0	1,150.0	22.4	44.6	32.1	35.2	17.1	8.5
B. Five-Year Averages								
1. 1959/60 - 1963/64	23.1	718.4	5.7	16.8	10.9	8.5		
2. 1964/65 - 1968/69	24.6	898.2	8.4	20.2	16.3	16.0		6.5
3. 1969/70 - 1973/74	36.2	1,223.5	22.0	42.8	36.1	35.7	13.8	6.6
Percentage change								
2/1	7	25	47	20	50	126		
3/2	47	36	162	112	121	123		2

Sources: 1) For all years 1964-1973 and all crops except coffee, MAG, Encuesta Agropecuaria por Muestreo 1973, pp 38-41.

2) Data on coffee is from MAG, División de Sanidad Vegetal, Sección de Café y Estimulantes.

3) Data for 1973-1974 crop year are crop estimates of MAG, Departament de Censo y Estadísticas Agropecuarias, with exception of cassava and sugar cane which we have assumed.

Note: Production of wheat and coffee occurs on calendar year basis; for these crops production in a given year is attributed to preceeding crop year, e.g. 1970 to 1969/1970 crop year.

America. At present it appears that 1975 production exceeded the 216,000-metric-ton production goal established by the National Soybean Program. Soybean production in Paraguay ranks second in area cultivated, third in total value of production, and first in export value among all crops. In the period 1972-1974 the annual farmgate value of soybean production averaged Gs. 1,503 million in 1972 constant prices, and annual export earnings from soybean-related products averaged US$15.0 million. (See Table C-11.) Soybeans are grown on farms of all sizes. Over 20,000 farmers cultivate soybeans. (See Table C-8.)

(2) Evolution of Production

Soybean cultivation was introduced in Paraguay around 1921 but not widely practiced until the beginning of the 1960's. Production has increased dramatically in the last five years due to increasing demand in the international market and to the accumulated experience of national technicians and producers. The mechanization of soybean production was initiated in Paraguay in 1968 together with the introduction of the National Wheat Program.

Soybean production has increased markedly since 1970, as total area harvested grew from 39,500 hectares in the 1969-1970 crop year to an estimated total area of 137,300 hectares in the 1973-1974 crop year and 160,000 hectares in the 1974-1975 crop year. In 1970 soybean production was about 51,800 metric tons. An average annual growth rate of 33 percent has brought production to an estimated 216,000 metric tons in 1975. The main soybean-producing departments are, in order of importance, Itapúa, Alto Paraná, Misiones, Amambay, Caaguazú and San Pedro.

(3) Research and Technical Assistance

The Interamerican Institute of Agricultural Sciences (IICA) Southern Area has been cooperating with the MAG in a research program to improve soybean production. Two Brazilian advisors arrived in recent years; they are Dr. Shiro Miyasaka from the Agricultural Secretariat of the State of Sao Paulo and Dr. Francisco de Jesus Vernetti from the School of Agronomy of the Federal University of Pelotas, Rio Grande do Sul. At present, the research and experiment program for soybeans is executed by the National Agronomic Institute of Caacupé and the Regional Research Center of the Experiment Station in Capitán Miranda (Itapúa). The research being implemented includes the following:

Genetic Selection. This includes collection and evaluation of the varieties introduced from Brazil, Argentina, and the U.S. The varieties that have given good results in terms of high yields and adaptation to local ecological conditions are: L-326 (Santa Rosa), Visoja, Galaxia, Davis, and L-7, brought from Brazil and the U.S. since 1969.

Ecology. Trials are made to compare the results of the crops planted at three different dates in the two institutions mentioned above and various agricultural schools.

Fertilization. Different fertilization rates are applied to determine the optimum levels, utilizing seven different formulas of nitrogen, phosphate and potassium, and distinct cultivation practicies.

Other. Trials are done also on density of planting, seed treatment, and weed control. The herbicides being applied are designed to control broad leaf and other weeds.

Technical assistance to farmers is made available through the Agricultural and Livestock Extension Service (SEAG), in coordination with the research personnel. The continuous participation of the technicians working in the field, the National Development Bank (BNF), and the Agricultural Credit Service (CAH), through their respective agencies in the soybean producing areas should also be mentioned.

(4) Destination of Production

The largest share of Paraguayan soybean production is sold in external markets. The total volume of registered exports of soybeans and secondary products in the period 1972-1974 was 298,657 metric tons. Registered soybean grain exports during this period amounted to 195,565 metric tons. Since inception of legal soybean grain exports, registered soybean grain exports have been as follows in metric tons: (1971) 12,000, (1972) 41,467, (1973) 53,447, and (1974) 100,651. In regard to processed by-products, export of soybean oil has been relatively minor, amounting to an average annual value of US$0.77 million in the years 1972-1974. During this period, annual exports of soybean cake, meal, and pellet averaged 33,157 metric tons in volume and US$4.51 million in value.

b. Cotton

(1) Economic Importance

Cotton is a traditional cash crop in Paraguay and plays an important economic role. It occupies fourth place among agricultural crops when ranked by gross value of production and hectares harvested, and holds second place among crop exports. In the period

1972-1974 the annual farmgate value of cotton production averaged Gs. 1,467 million in 1972 constant prices and annual export earnings from cotton fibers and cottonseed cake (and meal) averaged US$12.0 million. (See Table C-11.)

Cotton in Paraguay is produced mainly on small- and medium-sized farms. At least 50,000 farmers cultivate cotton, and small farmers account for three-fifths of total production. The National Cotton Program (PNA) has been in existence since 1972. The present PNA production goal for the entire country is 100,000 metric tons. About 70 percent of total cotton production is exported, and fluctuations in the level of national production are strongly correlated with international market prices.

(2) Evolution of Production

Cotton production has increased substantially during the past five years, going from 46,900 hectares harvested in the 1969-1970 crop year to an estimated 100,500 hectares in the 1973-1974 crop year and 114,000 hectares in the 1974-1975 crop year. The volume of production grew from 39,600 metric tons in the 1969-1970 crop year to an estimated 90,500 metric tons in the 1973-1974 crop year and an estimated level of 100,000 metric tons in the 1974-1975 crop year.

The most important cotton producing departments are, in order of importance, Paraguarí, Caaguazú, Itapúa, Cordillera, San Pedro, and Misiones. The first three departments produced about 48 percent of the total national production in the period 1971-1973.

(3) Research and Technical Assistance

Research work is being carried out by a team of Paraguayan technicians with the advice of a French Technical Mission which has been working in Paraguay since 1967. The varieties that were traditionally cultivated in the country were of U.S., Argentine and Brazilian origin. With the arrival of the technical mission from the Research Institute of Cotton and Exotic Fibers (IRCT), sent to Paraguay by the French Government, research was undertaken to study the intensity of attack of Bacterioris (Xanthomonas malvacearum). It was observed that the most common varieties, such as Empire and Carolina Queen, were very sensitive to the Bacterioris attack with a resulting negative impact on cotton yields and quality. Hence, African varieties resistant to this disease, Reba-B-50 and Reba-BTK-12, were introduced.

These two varieties (but mainly Reba-B-50) were widely accepted by cotton producers because they showed a high degree of adjustment to climate and weather conditions in the main cotton

producing areas in the country. The average yields recorded have been about 17 percent higher than the yields observed in the best trials with cotton seeds imported from the U.S. As for the quality of the fiber, it is superior to the American varieties, particularly in the length of the fiber, strength and micronaire index (indice micronaire).

The cotton research project (PIEA) presently being implemented has the following objectives:

(a) New varieties: to produce higher yielding varieties with a superior quality of fiber, resistant to the local insect and pest attacks.

(b) General Agronomy: to study the development and fructification of the Reba-B-50 variety, make fertilization trials, and determine the efficiency of chemical herbicides and pesticides.

At present, cotton research work is being done at the National Agronomic Institute of Caacupé (IAN) and the Regional Research Center of the Experiment Station of Capitán Miranda (Itapúa). In addition, trials are conducted in the main cotton producing areas: Concepción, San Pedro, Cordillera, Caaguazú, Itapúa, Caazapá, and Paraguarí.

Technical assistance at the farm level is provided by the Agricultural Extension Agents, Technical Assistance Officers of the BNF and CAH Supervisors, according to the location in which the corresponding institutions operate.

(4) Destination of Production

Domestic production of cotton fiber more than satisfies the demand of the local industries. Exports of ginned cotton in recent years account for approximately 70 percent of domestic cotton production.[1/] Most of the cotton seed is processed for oil. The oil is marketed domestically and is used for human consumption. The other by-product, cottonseed cake, is sold mainly in the external market. In the period 1972-1974, the annual export of cotton fiber averaged 14,555 metric tons worth approximately US$10.6 million. During the same period, the annual export of cottonseed cake averaged 13,953 metric tons worth approximately US$1.3 million.

1/ The total volume of cotton fiber exported during the four-year period 1971-1974 equals 46,547 metric tons, which is equivalent to 150,545 metric tons of ginned seed cotton. During this same period domestically-marketed seed cotton approximated 215,000 metric tons.

c. Tobacco

(1) Economic Importance

Tobacco has occupied an important position in the Paraguayan economy for over a century. Tobacco occupies third place among crops when ranked by export earnings, seventh place by gross value of production and ninth place by hectares harvested. (See Table C-16.) Tobacco is produced mainly on small farms. Over 30,000 farmers engage in the production of tobacco, and small farms account for approximately 70 percent of total production. Nearly all production activities such as preparation of the soil, weeding and cultivation practices are carried out with hand tools. Although the use of improved seeds is being introduced, most farmers still produce their own seeds.

(2) Evolution of Production

In the past five years tobacco production in Paraguay grew from a total of 17,800 metric tons harvested in the 1969-1970 crop year to an estimated 33,400 metric tons in the 1973-1974 crop year. The area cultivated increased from 13,600 hectares in the 1969-1970 crop year to 24,900 hectares in the 1973-1974 crop year. Production in the 1973-1974 crop year sets the record so far; presently estimated production for the 1974-1975 crop year is 25,000 metric tons. Production decreased due to unfavorable weather conditions and to less than robust market conditions in 1974.

Tobacco is produced in all the departments in the eastern region of Paraguay. The most important departments for production are Caaguazú, San Pedro, Cordillera, Caazapá, Alto Paraná and Paraguarí. The first three departments accounted for 62 percent of the total national production in the period 1971-1973.

(3) Research and Technical Assistance

The research work carried out by the Ministry of Agriculture through the National Tobacco Program (PRONATAO and the National Institute of Agronomy (IAN), includes the following activities: introduction and trials of light and dark types of tobacco; experiments with sun-cured tobacco at the IAN and in the main tobacco producing areas; the testing of varietal behavior to different levels of fertilization, time and density of planting, and application of insecticides to control virus infections. Economic surveys related to the cost and profitability of various tobacco production techniques are also being carried out.

Technical assistance provided by the Ministry of Agriculture under the advice of PRONATA is implemented by SEAG and by technicians from the National Development Bank (BNF), the Agricultural Credit Service (CAH), the Institute for Rural Welfare (IBR), and Central National Cooperative for Savings and Credit (CREDICOOP). Due to the work of these institutions, a larger number of tobacco farmers have received information on the advantages derived from the adoption of technical innovations in tobacco production and on marketing perspectives. The more important results obtained are the following:

(a) Increased adoption of pure and reliable seeds of the recommended varieties.

(b) Increased application of phytosanitary products.

(c) Greater farmer awareness of the importance of tobacco classification in a viable marketing setup.

(d) Wholesale level marketing of tobacco in the main production areas.

(e) Increased application of commercial string, which allows more rapid and uniform curing.

Credit assistance is provided mainly by the BNF to individual producers as well as groups of farmers organized in cooperatives or committees.

(4) Destination of Production

The predominant type of tobacco produced in Paraguay is dark, sun-cured tobacco. The thinner leaves give a "mild" quality tobacco with low-nicotine and tar content and the heavier leaves give a "strong" type of tobacco with a high nicotine and tar content. Mild tobacco is exported basically to the French market where it is mixed with other tobaccos to produce cigarettes and thin cigars. Mild tobacco is also utilized in the domestic market for the production of high-quality cigars and of cigarettes. The strong tobacco is used within Paraguay mainly for cigars, chewing tobacco, and for cheaper cigarettes.

About 95 percent of domestic tobacco production is exported. In the period 1972-1974 annual tobacco exports averaged 21,000 metric tons worth approximately US$8.5 million. The mild

type tobaccos in leaves and trimmings accounted for 56 percent of tobacco exports. The strong type tobaccos accounted for the remainder. The major importers of Paraguayan tobacco are, in order of importance, France, Spain, Germany, the U. S., Belgium and Tunisia.

d. Cassava (Mandioca)

(1) Economic Importance

Cassava ranks first among Paraguay's crops when ranked by gross value of production and third when ranked by hectares harvested. Cassava is grown on nearly all of Paraguay's farms and ranches. Cassava is a plant of South American origin, whose nutritional value was discovered by indigenous people prior to the arrival of the Spanish. From that time to the present it has constituted an important daily food for millions of human beings around the world, principally in America and Africa. Both in its natural and processed form, it is suitable for livestock feed. Paraguay holds second place in the production of cassava in South America, with about 5 percent of total production, while Brazil holds first place with about 83 percent of total production.

The average yield of cassava in Paraguay is approximately 15 metric tons per hectare. This yield is quite satisfactory in comparison with yields obtained in other tropical and sub-tropical areas of the Western hemisphere. However, it is possible to obtain higher yields with good cultivation practices and with fertilization.

(2) Evolution of Production

The production of cassava in Paraguay has been relatively stable in recent years; in the period 1965 through 1969, production was about 1,500,000 metric tons per year. Perhaps the decline registered in Table C-17 beginning in 1970 is due mainly to improvement in basic data. However, it may also be that production of cassava has been lower in recent years due to higher prices of competitive crops, such as soybeans and cotton, and to the changing circumstances of industrial users of cassava. The most important production areas are the departments of Caaguazú, Paraguarí, Itapúa, Cordillera, Guairá, and Caazapá. (See Table C-6.)

(3) Research

Research work and experimentation are carried out by the National Agronomic Institute at Caacupé. Trials are being performed to determine those varieties with favorable performance in

terms of yields and quality. These trials include improvements based upon seed selection, cultivation practices and fertilization.

The types of cassava grown in Paraguay can be classified as bitter, bitter-sweet, and sweet. The bitter varieties include Mandió-ró and Ytú which are industrially processed for flour. At present these varieties are not being planted. The bitter-sweet varieties include the following: San Quintin, Clavel, and Toledo which are used mainly for animal forage and for making starch (which is consumed after cooking alone or mixed with other food), and finally the sweet varieties which include the group Tapo-yoá, Mandió pytá and others. The sweet varieties are consumed after being boiled.

(4) Utilization

A high proportion of production is consumed on farms, principally by human beings either directly or in processed form. (See also Table C-12.) A significant quantity is also used for the feeding of pigs, oxen, dairy animals and horses. Cassava is also used in the preparation of flour which is mixed with wheat flour to produce bread sold in urban areas. Legal measures have been used to attempt to create an industry for the production of cassava based on the mixing of cassava flour and wheat flour (beginning with Decree 1544 of 1965). This accounts for the growth of production after 1965. However, problems in the commercial demand for cassava flour have idled a large number of the processing plants. In addition a large number of mills produce "Topi" (dried cassava chips), another subproduct of cassava.

The impediment to increased cassava production is principally the demand side. One could think seriously about the opening of new markets for cassava by-products inasmuch as production possibilities are much larger than domestic requirements. The principal markets for cassava by-products are in Europe. Germany is the principal importer of cassava chips. The Netherlands and Belgium are also important markets. The major markets for cassava flour are the U.S. and France.

e. Corn

(1) Economic Importance

Corn ranks first among crops in terms of hectares harvested and second in terms of gross value of production. Corn is grown on nearly all of Paraguay's farms and ranches. Corn is a basic ingredient in the diet of the Paraguayans and is also used to feed small farm animals and, in some cases, livestock. The

seasonality of corn production causes periodic saturation of the internal market, and, therefore, corn prices may fluctuate widely during any given year. Corn is produced both for subsistence and as a commercial crop. Corn produced for on-farm consumption, which covers most of the area planted in the country, registers relatively low yields due to the low quality of the soils utilized. This is the case most commonly observed in the departments of Central, Cordillera, Paraguarí, and Ñeembucú.

Corn is produced commercially principally in the departments of Itapúa and Caaguazú. The high level of productivity of the soil in these areas permits high yields at relatively low costs. In addition, in these areas there is increasing utilization of hybrid seeds brought from Brazil and Argentina.

Paraguay's exports of corn are quite small. During the period 1970-1974 registered exports of corn were 47,123 metric tons. Total domestic production during the same period was about 1,200,000 metric tons; ie., exports amounted to only four percent of total production. The potential level of production would easily exceed domestic requirements if corn yields were at the level commonly obtained with chemical fertilization. However, given the high cost of chemical fertilizer, only superior soils can provide yields necessary to produce the quality of corn required by the export market at a profit.

(2) Research

The research work carried out by the Ministry of Agriculture is directed toward a search for higher yielding varieties, shorter crop production cycles, and hard grains (flint type) which is the type required by the export market. Trials with hybrid seeds imported from Brazil and Argentina are being carried out at the National Agronomic Institute of Caacupé and the Regional Agricultural Research Center of Capitán Miranda. The most important are the following:

(a) Trials of adaptation of the varieties;
(b) Trials with different fertilizer levels;
(c) Trials with different planting dates; and
(d) Trials with mixtures of advanced lines to obtain synthetic varieties.

At present some varieties have already been selected because of their good results in relation to the Control Variety (Venezuela 1). The most important varieties in this group are: Central mex., IAN mex., Cordillera, Perola, and Parbra. They

satisfy the requirements of the export market with average yields of about 4,000 kilograms per hectare when 40:60:30 fertilizer is used.

f. Sugar Cane

(1) Economic Importance

Sugar cane was introduced into Paraguay by the Spanish expeditions in the sixteenth century. Subsequently, cultivation of this crop spread throughout the entire country. Presently, it constitutes a source of cash income in the areas surrounding the sugar mills. Initially, sugar production in Paraguay did not suffice for domestic consumption and had to be supplemented by imports. Later the situation reversed, and Paraguay now exports sugar. Among Paraguay's crops, sugar cane ranks fourth in export value, fifth in gross value of production and sixth in area harvested. In the period 1972-1974 the annual export of sugar cane by-products amounted to US$4.5 million.

About 75 percent of sugar cane production for refined sugar is concentrated in the department of Guairá where four sugar cane mills are located. Other areas of production are as follows: the department of Central with two mills, Paraguarí with one mill, and Benjamín Aceval (Chaco) with one mill. Sugar cane is grown for molasses principally in the departments of Paraguarí, Cordillera, and Caazapá.

(2) Evolution of Production

Sugar cane in Paraguay is used to produce sugar, molasses and livestock feed. This multiple usage somewhat complicates data on sugar cane, as is shown in Table C-18. Annual crop survey data suggest that production of sugar cane for processing into sugar and for forage has increased in recent years. According to data prepared by the MAG on basis of reports from sugar mills, 470,588 tons of sugar cane were processed in the calendar year 1970 and usage increased to 676,981 metric tons in 1974. Data on area harvested and on domestic production of refined sugar as well as data on consumption and export corroborate growth in sugar cane production for processing and decline in usage for molasses.

Up to 1973 the domestic price of sugar cane for refined sugar was stable. In 1973 the sugar cane price was increased to 900 Gs/MT and in 1974 to 1,470 Gs/MT. The retail price of refined sugar was also increased from 22 Gs/Kg in 1972 to 24 Gs/Kg in 1973 and 34 Gs/Kg in 1974.

TABLE C-18

DATA ON SUGAR CANE AND REFINED SUGAR

	1969/70	1970/71	1971/72	1972/73	1973/74
Quantity of Sugar Cane Harvested (000 MT)					
-- for Processed Sugar -*-	972.6	982.5	666.3	758.9	
-**-	(470.6)	(552.9)	(527.9)	(674.8)	(676.9)
-- for Molasses -*-	442.9	424.9	378.2	341.8	
Area of Sugar Cane Utilized (000 HA)					
-- for Processed -*-	26.0	25.4	17.6	17.7	
-**-	(13.2)	(14.5)	(15.3)	(16.6)	(15.9)
-- for Molasses -*-	14.5	14.3	13.3	10.3	
-- for Forrage -*-	10.4	9.2	10.0	14.4	
Refined Sugar (000 MT)					
-- Production -**-	48.4	56.0	52.9	68.7	70.4
-- Domestic Consumption -**-	40.0	44.7	49.5	54.2	49.1
-- Export	0.1	-	11.8	6.5	20.0

Source: -*- from MAG, Encuesta Agropecuaria por Muestreo 1973, p.22.

-**- from MAG, División de Sanidad Vegetal, Sección de Caña de Azucar.

(3) Cropping Patterns

Sugar cane production is carried out mainly by small farmers settled in the vicinity of the sugar mills with an area of influence radiating out to about 15 kilometers. About two-thirds of the sugar cane producers own less than 10 hectares of land and obtain yields of less than 30 metric tons per hectare. (See Table C-8.) The use of mechanical equipment is limited, and labor inputs are a predominant component of the total production costs. The highest yields are obtained in the land owned by the sugar mills where improved techniques and cultivation with mechanical implements are being introduced. The mills utilize tractors, subsoilers, seeders, and, more importantly, harvesting equipment that is recently being introduced. If the introduction of harvesting implements proves feasible, labor scarcity during the harvest season would no longer be a problem.

(4) Research and Technical Assistance

The sugar mills and the National Agronomic Institute (IAN) are carefully studying and testing several new varieties in order to select those higher yielding varieties which are resistant to the local pest and weed attacks. Furthermore, they are trying to identify the varieties best suited for the different uses. The varieties more frequently cultivated for sugar production are Tucuman 2645 or Canela-í and POJ 2878 or Caramelo. These varieties have shown good agricultural results, good processing yields and resistance to Ustilago sictaminae (carbon).

(5) Destination of Production

The domestic demand for refined sugar has been continuously increasing. Domestic consumption increased from 40,041 metric tons in 1970, to 49,149 metric tons in 1974. As is shown in Table C-18, the remaining production is marketed outside of the country. Exports of sugar and other sugar cane products have increased from only 108 metric tons exported in 1970 to a high of 20,000 metric tons in 1974. The main consumers of Paraguayan sugar are the U. S. and Argentina.

g. Rice

(1) Economic Importance

Paraguay's rice production is grown mainly for domestic consumption; only minor amounts are exported. About 80 percent of domestic rice is produced by irrigation, and the remainder is upland rice. Irrigated rice is cultivated mainly in the departments of

Itapúa and Misiones. Upland rice is cultivated mainly in the departments of Alto Paraná and Caaguazú. Among Paraguay's crops, rice ranks eleventh in terms of gross value of production and twelfth in area harvested. Approximately 7,000 farms engage in rice production and large farms account for approximately two-thirds of total production. (See Table C-7.)

(2) Evolution of Production

In the five crop years 1969-1974, domestic rice production averaged 20,200 metric tons as compared with 16,800 metric tons in the previous five-year period. The substantial increase in production was due to introduction of mechanized cultivation in commercial farms and dryland rice production in the new colonization areas.

(3) Cropping Patterns

In Paraguay, irrigated rice is cultivated on small, medium and large farms. The degree of mechanization of production depends upon the scale of operation. The small farmers with one to 10 hectares in cultivation work their fields with oxen or hired machinery. Farms with more than 50 hectares in cultivation utilize tractors of 30 to 35 HP with the corresponding tools, harvesting combines and dryers. The most commonly utilized procedure for cultivation is by flood irrigation, with the seeding done directly, in some cases mechanically, and also by hand.

Rice is frequently cultivated by producers who rent land and move to new lands after two or three consecutive years. Land owners use a system of rotation of two to three years of rice cultivation followed by grazing cattle for a period of four or more years, and again another rice crop for a two- to three-year period. Fertilizers are not utilized unless cultivation of the high yielding variety Cica 4 is involved; Cica 4 requires adequate fertilization to assure optimum yields. Inasmuch as the Cica 4 variety is widely accepted in the international market and is high yielding, the Ministry of Agriculture hopes to increase production of this variety in order to obtain a larger exportable surplus.

(4) Destination of Production

Most of Paraguay's rice is sold in the domestic market (at higher prices than those prevalent in the export market). A relatively small portion of domestic production is exported; out of a total of 44,600 metric tons produced in 1974, only 1,370 metric tons were exported; that is, only three percent of the total production.

h. Wheat

(1) Economic Importance

The production of wheat is important to Paraguay because it is the single foodstuff which is imported in substantial amount, is a vital foodstuff in the diet of many Paraguayans, and can be grown in the winter in rotation with summer crops. At present, the annual domestic demand for wheat is in excess of 100,000 metric tons. Registered imports of wheat and wheat flour approximated $5,000,000 annually in the period 1970-1974. The objective sought by the National Wheat Program is the gradual substitution of domestically produced wheat for imported wheat.

(2) Evolution of Production

The National Wheat Program which began in 1968 aimed to increase domestic wheat production. This program provided credit for machinery and for annual production costs. Wheat production increased from 25,100 metric tons in 1968 to 54,800 metric tons in 1971. Due to unfavorable climatic conditions in 1972 which induced a strong incidence of plant disease, production fell to 17,600 metric tons. In 1973 and 1974 domestic wheat production was 23,000 metric tons and 32,000 metric tons, respectively.

(3) Research and Technical Assistance

Plant selection and field trials up to the present have developed a number of varieties that are recommended for planting. They are 281/60, Itapúa 1, Itapúa 5, Itapúa 6, and Norteño. The principal factor which limits production of wheat is fungus disease.

The Wheat Research Program for 1975-1979 of the MAG has the following basic objectives: selection of new varieties, testing for seasonality, sanitary treatments, and most importantly, genetic selection seeking resistance to the most common diseases (Septoria, Helminthosporia, Giberella, and Erisiphe). The group in charge of this work includes one expert supplied by the Government of Israel and five Paraguayan specialists. Technical assistance is provided to farmers by SEAG in cooperation with the Banco Nacional de Fomento and the Crédito Agrícola de Habilitación.

(4) Destination of Production

All domestically produced wheat is consumed within Paraguay. Total domestic production plus registered imports of

wheat (and wheat equivalent of wheat flour) amounted to 476,400 metric tons in the period 1970-1974. Domestic production amounted to 36.8 percent of the total apparent availability of wheat and wheat products. The principal suppliers of wheat are Argentina and the U. S.

i. Coffee

(1) Economic Importance

Coffee production developed in Paraguay during the sixties, and it is one of the most important crops in the departments of Amambay, Alto Paraná, and Canendiyú. Coffee exports represent 2.7 percent of the crop exports and coffee accounts for 1.8 percent of total crop production. Coffee is produced mainly in northeastern Paraguay on approximately 150 farm-plantations. Average coffee cultivation per farm approximates 60 hectares. Thus, coffee is produced on large commercial farms with the exception of some small farms located in the departments of Cordillera and Paraguarí. In this area coffee production is basically a family-run enterprise and the plantings usually do not exceed one hectare.

Coffee production on commercial farms has received a special treatment from the government.1/ In view of the advantages accorded by law, coffee growers act in a dual capacity as producers and exporters. This enables them to obtain higher profits in normal years to help overcome the problems resulting from adverse climate conditions, mainly frosts, when they occur, and cryptogenic diseases, such as rust (Roya), very common in this rubiaceous plant. Coffee production creates a significant demand for labor throughout the year and especially during the harvest months from May to October. According to the calculations of the Section of Coffee and Stimulants, the labor utilization during the peak months is about one man-day for every 2 hectares, that is to say, that about four thousand pickers are engaged in coffee harvesting in Paraguay.

About 90 percent of the coffee is cultivated under the "open field" system so that it is possible to inter-plant additional annual crops in the coffee plots during the period of active growth prior to the first harvest.

1/ In order to stimulate the development of this type of farm, the government issued Decree No. 38 (Coffee Statutes) of March 31, 1954, and its supplement, Law No. 1196 of August 31, 1966, which confer special treatment to farms with more than 20,000 cobas. A coba consists of setting several small plants in the same hole in order to ensure that at least one plant will be viable.

(2) Evolution of Production

Coffee production in Paraguay increased continuously from 1960 up to 1967. The price fluctuations experienced since 1967 have resulted in fluctuations in the quantity of coffee produced. Nevertheless, production for the period 1960-1974 increased at an average annual rate of 10.5 percent, going from 2,084 metric tons in 1960 to 8,480 metric tons in 1974. The annual increment in area cultivated in the period 1970-1974 ranged from approximately 1,500 hectares to 3,000 hectares. During this period the area cultivated increased at a lower rate than production due to maturation of coffee plants.

The departments of Amambay and Alto Paraná accounted for 81 percent of the total national production during the period 1970-1974. A new area of coffee production has been initiated in the area of Salto del Guairá (now in the Canendiyú Department) --basically on the plateau of the Mbaracayú mountains and part of the Amambay mountains.

(3) Destination of Production

Paraguay's coffee production is consumed domestically and exported. In 1974, 53 percent of domestic coffee output was consumed domestically. Total coffee exports were at 4,152 metric tons in 1972, 2,858 metric tons in 1973, and 4,025 metric tons in 1974. About 98 percent of coffee exports are in the form of unroasted beans. The most important external markets for Paraguayan coffee are the U.S., Argentina, Uruguay, Spain, Holland and Belgium.

j. Minor Crops

(1) Pineapple

Pineapple is cultivated by small farmers. Some producers utilize advanced technology. Annual production in Paraguay stands at about 16,000 metric tons. About 85 percent of production is sold locally; the remainder is exported in the form of fresh fruit and canned fruit. Production is geographically concentrated in the departments of Cordillera, Paraguarí and Central. A well-cultivated field of pineapple yields an average of 15,000 marketable fruits per year from the second to the fifth year of production. At a price of Gs. 25 per fruit, annual gross income per hectare amounts to Gs. 187,500. Most of the harvest is done in the months of December and January. Japanese-immigrant farmers use calcium carbide to speed up the bloom in order to obtain earlier

fruit maturation. In the Argentine market the early (October-November) fresh pineapple commands premium prices.

(2) Grapefruit

Commercial production of grapefruit in Paraguay is geographically concentrated in the departments of Central, Cordillera and Paraguarí. The more common varieties are: Marsh Seedless, Foster and Duncan. The harvest season extends from July to September; the average yield is about 100 kilograms of fruit per plant. With a density of 144 plants per hectare, it is equivalent to 14,400 kilograms per hectare every year.

Between the years of 1973 and 1974, an average of 23,000 metric tons was produced per year; about 20 percent of the total production was exported (in the form of juice and fresh fruits). Presently, commercial production of grapefruit shows certain signs of stagnation, with a gradual shift to other crops in the areas of traditional production. A principal problem with grapefruit is the bacterial plant disease Cangrosis Xanthomonas spp. This disease attacks oranges, lemons, grapefruit, limes, and tangerines and spots fruit shines and diminishes plant vigor. No economically feasible remedy to this disease is known at present.

(3) Garlic

Garlic is produced mainly by small farmers located principally in the department of Itapúa (which accounts for about 60 percent of the total production) and to a lesser extent in the departments of Cordillera, Caaguazú and Amambay. The highest yields are obtained in Itapúa and Caaguazú with averages of 4,300 kilograms per hectare. Total production amounted to 1,200 metric tons in 1972 and 2,370 metric tons in 1973. Registered exports have been nearly zero. The harvest is made in October, November and December, most of the production being sold in the domestic market. The more popular varieties are Amarante and Criolla. New varieties with higher quality and yields have been selected at the experimental level, such as: Hsi-Kang, Indonesia Precoz, and Fungsan Selección No. 2. All these varieties have been brought from the Orient.

(4) Tomatoes

Tomato production in Paraguay has special significance because high cash returns per hectare can be obtained with favorable climatic conditions. Tomatoes are planted generally in two periods, the first one in April and May with production for export, and the second in July and August with production for domestic consumption.

The harvest season for the tomatoes consumed locally is November and December, and the harvest season for the tomatoes exported to Argentina is August and September, since that is the time when the supply in Argentina is slack. Production is concentrated in the central zone because of its proximity to the consumer market, but not precisely on account of its outstanding soil and climatic conditions. According to a census carried out in the central zone by agricultural extension agents in 1972, about 600 families produced approximately 10,000 metric tons of tomatoes, which represent a total value of Gs. 100 million (in 1972 current prices). The average yield per hectare is about 50 metric tons with normal weather conditions and with application of chemical fertilizers. The varieties planted depend upon the tastes and preferences of the market. Those produced for export are Platense, Santa Cruz, and on a small scale, Marglobe. Those produced for the local market are Marglobe and Japanese varieties, both of which are of larger size and juicier than those mentioned above.

(5) Potatoes

The potato is a very important tuber in the Paraguayan diet. Production is concentrated in the departments of Caaguazú, Guairá, Caazapá, Paraguarí, and part of the departments of Cordillera and Central. Production can be carried out in two seasons; the first one with planting in March for harvesting in May and the second one with planting in July and August for harvesting in November and December. Domestic production is less than the quantity normally consumed due to the limited storage capacity in relation to the quantity demanded. Yields are about 7,500 kilograms per hectare. However, yields above 18,000 kilograms per hectare have been obtained by some farmers in the area of Caazapá and La Colmena, and experimental yields as high as 24,000 kilograms per hectare have been recorded. Productivity is strongly influenced by the quality of the seed, basically that it should be free of virus. The annual volume of production in 1974 was about 9,300 metric tons which was only slightly higher than the level of about 9,000 metric tons produced in the period 1965-1967.

(6) Sweet Peppers

Sweet peppers are a very important cash crop for small farmers in certain regions. The main types are red peppers for the Argentine market and green peppers for the local market. The former is cultivated mainly in the departments of San Pedro, Concepción and Central, and the latter is cultivated mostly in the departments of Central, Paraguarí and Caaguazú. Complete statistics of production are not available. However, an estimate of the production in the department of Central in 1972 indicated that about 250 families produced approximately 700 metric tons worth Gs. 20 million at 1972 current prices. Most producers are organized as producers' committees. Green pepper production requires about 222 man days per hectare for

the entire production process. The yield obtained in red pepper production (economically the more important), with a density of 35,000 plants per hectare, is about 18,000 kilograms. Approximately 70 percent of the output is of export quality and the remainder is marketed locally. In Paraguay, planting is made in the months of April and May and the harvest is in August and September.

(7) Peanuts

Peanuts are an oil seed cultivated mainly for on-farm consumption in Paraguay. It is estimated that about 50 percent of the production is consumed on the farms and the remainder is sold to processing plants and in urban markets. Peanuts are produced throughout the Región Oriental and by Mennonite colonies in the Chaco. The average yield is about 850 kilograms per hectare, with the highest yields recorded in the departments of San Pedro, Amambay and Itapúa where some farmers have obtained yields of 1,000 kilograms per hectare.

Peanuts are cultivated in two seasons in Paraguay: in the first one, planting is in August and September for harvesting in December and January; and in the second one, planting is in December and January for harvesting in March.

(8) Sour Orange Leaves

Production of petitgrain essence (a product derived from the distillation of the sour orange leaves) in Paraguay began in the 1950's as a small home industry. It has developed into an important activity, particularly in eastern Paraguay.

Paraguay is the largest producer of petitgrain essence in the world; it supplies about 80 to 90 percent of the world demand. Export of petitgrain essence for the 1972-1974 period represented 6.6 percent of the total agricultural exports in the country with an average annual value of US$4,480,000.

Production of essence in 1973 was 391,800 kilograms. The production figures of the previous years have not been recorded; but according to estimates provided by the Dirección de Estudios de Productos, CEPEX, production fluctuates from 100,000 to 400,000 kilograms per year. The production centers are located mainly in the departments of Cordillera, San Pedro, Caaguazú and Caazapá. The points of traditional production are Arroyos y Esteros, Caraguatay, 1° de Marzo, Santa Elena, Itacurubí de la Cordillera, Isla Pucú, and others, most of them in the department of Cordillera.

The varieties presently used in the production of essence are:

Common sour orange: this variety is the most popular in the country. It is found throughout eastern Paraguay and is the most important, economically.

Naranja Jhu: It has a higher yield and is not widely produced in the country with the exception of the Caraguatay, 1° de Marzo, Santa Elena and Villarrica areas.

Petitgrain essence is used entirely for export to two clearly differentiated zones or economic regions, which are the Asociación Interamericana de Libre Comercio (ALALC) area, and the off-ALALC area. The first one is relatively unimportant, covering about eight percent of Paraguayan exports, the main markets being Argentina, Brazil and Mexico.

The second area is considerably more important, since it covers more than 90 percent of the Paraguayan exports; the most important purchasers being the U.S., France, England and Germany.

(9) Mint

Mint production has been recently introduced in Paraguay. Its production has rapidly grown principally in the new colonization areas in the eastern portion of eastern Paraguay.

It is exported only as an essential oil, mostly to Brazil and Argentina. Export of mint oil in the last three years totaled US$4,539,000, placing Paraguay as one of the largest exporters of mint essence in the world.

Mint essence production in 1973 was about 730 metric tons produced in 6,400 hectares. In 1974 the area cultivated increased substantially to a high of 9,120 hectares with a production of about 1,000 metric tons of essence.

The main producing areas are located in the departments of Alto Paraná, Canendiyú, Caaguazú and San Pedro.

Mint is produced as a winter crop; planting is done in May. The first cut is made by the end of October or the first half of November. Three cuts are made throughout the year in time periods that last from 80 to 95 days each. A well-cultivated hectare will produce about 4,000 kilograms of leaves in each cut, which

is equivalent to an essence production of 80 to 120 kilograms per hectare per year, depending upon the conditions of the crop and the process of distillation.

4. Marketing

a. An Overview

Paraguay has distinctive features between its internal and external market systems. Many commodities are produced and marketed almost exclusively for internal consumption while others are produced mainly for export. Production units supplying the domestic market are small, with many farmers selling a little surplus beyond the family consumption, while producers for export include small as well as commercial-type farmers. Much of the production for the domestic market is concentrated in the area surrounding Asunción while products for export are produced in areas more distant from urban areas, with a large degree of concentration of production.

The two systems serve separate purposes. The internal production and marketing system must furnish an adequate supply of food for the population. As is noted in section C.2., it provides a diet which satisfies Paraguayans and is of adequate nutritive value, except perhaps for the very poor. Production and marketing for export serves several functions: provides producers with cash income, earns a substantial portion of Paraguay's foreign exchange income, and provides useful employment to labor and capital in related industrial operations.

The distinctions between the internal and external markets appear in terms of volumes of particular goods handled, in terms of different problems, and different solutions to problems. Generally, the size of unit sale in the internal market is small compared with those moving into export. Except for flour, pastas, bread products, cooking oil, sugar and some fruit preserves, most products for the internal market are unprocessed. On the other hand, many export products are processed into primary and finished products.

(1) Export Marketing Channels

Agricultural products traditionally in export markets characteristically are sold and handled in relatively large sales unit volumes, and marketing channels and practices reflect a considerably greater degree of organization and standardization than those for domestic markets. Generally, adequate processing, packing, storage, handling and transportation facilities are available, although not always at the exact time or location needed. However,

when buying agricultural products sold in export markets, the type, quality and conditions required by the ultimate user or consumer, together with the corresponding price, necessarily must be reflected in the quality and condition of the product purchased from the Paraguayan producer. The buyer-exporter also must consider the need and obtain or provide the conditions and facilities necessary to secure and maintain the quality required, from the time of purchase to the time of delivery to the buyer.

Consequently, the type, qualities and quantities of products exported from Paraguay are strongly influenced by the demands of the international markets, and handling practices and facilities have been developed, borrowed, rented, adopted or built with the strong "pull" incentive of the external market.

(2) Internal Marketing Channels

Asunción is Paraguay's only sizable concentration of population, and the population of the entire Asunción urban area is only about 1/2 million, which represents only a small- to medium-sized city. The next largest cities each have only 1/10, or less, of the population of Asunción, and there are only about ten cities of this general magnitude, indicating a total urban population in Paraguay of less than one million. Nearly all available information regarding consumption patterns and marketing problems related to domestically consumed goods is limited to Asunción, which is clearly the most urbanized of Paraguay's urban areas. As a by-product of the small farmer survey, limited information is available on farmer sale of subsistence crops.

There are a variety of marketing channels for domestically consumed foodstuffs. For foodstuffs requiring little or no processing, the following channels appear prevalent:

(a) The farmer's wife brings a basket of citrus fruits, vegetables, dry beans, or cassava into Asunción by bus early in the morning. Here she tries to sell the meager surplus of the farm at the Pettirossi market or at one of the numerous street markets scattered throughout the city.

(b) A small country merchant buys the farmers' products or takes them in payment of a debt and brings them to the market by horse and wagon, or small truck.

(c) A small acopiador (merchant middleman) collects a truckload of oranges or bananas in a local community, brings it to Asunción, and sells to consumers from his truck or to small retailers.

(d) A revendedora (female merchant) buys from a farmer or small merchant a basket of mandioca or eggs, a few chickens, a piece of homemade cheese, or a few liters of molasses and takes them to a public retail market for selling. Or she may peddle the product from door to door.

The marketing pattern is relatively simple; characteristically rudimentary with a large amount of direct selling by producers. In contrast to a more complex society, in which there is a great deal of specialization in marketing, both as to crops handled and services performed, marketing for domestic foodstuffs in Paraguay is relatively unspecialized. Many farmers located near Asunción deliver and sell perishable products, including milk, direct to retailers or consumers. Small livestock producers sell direct to local slaughterers. There are no specialized wholesale markets or farmer markets as we know them, although most towns have a small central market that serves as a wholesale-retail market. Market No. 4, or Pettirossi, in Asunción, although larger in size and volume, does not differ in nature from markets in smaller cities. The trend, however, is toward more integrated operations, as in broilers in the United States, where one firm controls the production, processing, and marketing functions up to the wholesaler-retailer. Also, new central market facilities are being constructed by the city of Asunción but there is no assurance that this alone will result in any change in system of marketing. (See Annex C-1 for a description of Mercado No. 4 in Asunción.)

Despite deficiencies which are often obvious, marketing firms in Paraguay do a reasonably good job of transferring products from farmers to consumers, or to buyers in foreign markets. Production is expanding, food is plentiful, and exports are increasing. On the other hand, responsible persons say that margins are excessive. A few buyers or middlemen control the market, and the system cannot cope with over-production, however small.

Except for a few products sold in export markets, there is little if any formal grading, and grade standards have not been developed for domestic products. Some sorting by size and appearance takes place, and also some separation by condition or ripeness, usually done by the retailer. Retail prices vary widely because of these conditions.

Farmers generally lack current market information, especially on prices. Often one country merchant or an itinerant trucker is their sole outlet, and may also be the only source of information on prices. This situation is, however, changing due to portable radios and improved land communications.

The more permanent factors explaining the operation of the marketing system include the following:

(a) No definite marketing period exists for many products for domestic consumption--they are sold throughout all or most of the year, from domestic production, or from nearby producing areas in Argentina and Brazil.

(b) Most urban households purchase food frequently (at least once a day) and in minute quantities because of limited incomes and lack of storage facilities. Very little comparison shopping is done except for fresh vegetables. (Annex C-2 presents the results of a study of food marketing conducted in two working class barrios of Asunción in 1971.)

(c) Improvements in land communications through the construction of all-weather roads have opened access to some more distant internal sources of supply. However, large areas of the interior are still serviced by dirt roads which are closed whenever it rains.

(d) The proximity of Asunción to Argentina and Brazil generally ameliorates excessive price movements.

b. Rural Marketing Structure

The Ministry of Agriculture study El Acopio (published in 1972) provides useful information on the internal marketing structure for the major commercialized crops. The study is based upon questionnaires and interviews with 103 so-called acopiadores. An acopiador is literally an accumulator and, for our purposes, the central man in the drama of the marketing of crop production. The acopiador or local market buyer generally lives in the community in which he operates and provides the essential link between the farmer and the exporter or industrial firms or the Asunción market, as the case may be, depending upon the product in question. In 1971 the Ministry of Agriculture attempted to obtain information from 153 identified acopiadores, and obtained information from 103 acopiadores operating in 26 towns and cities in eastern Paraguay.

In general, the acopiadores buy agricultural products in the towns in which they reside and in surrounding towns and villages. For example, an acopiador in Coronel Bogado purchases crops in that town plus Artigas, General Delgado and Colonia Fram, but an acopiador in Itacurubí de la Cordillera may provide services as far as San Estanislao and Colonia Repatriación.

Acopiadores generally purchase without grading. For example, 66 of the 103 acopiadores do not employ any grading in their purchasing operations. Tobacco appears to be the crop in which purchase by grade is most prevalent. There are acopiadores who buy tobacco, corn, beans, cotton and other crops but only utilize grading in the purchase of tobacco or cotton. The reason for this disparity arises from the fact that the persons and institutions to whom the acopiadores sell, buy products according to their own systems of classification and not according to those of the acopiadores. The acopiadores complain that exporters and industrialists frequently employ an arbitrary grading system in the purchase of products from them and that the industrialists or exporters do not shy away from classifying grade 1 or grade 2 cotton as grade 5 and 6 cotton, which is obviously prejudicial to the acopiadores. More specific information provided in the cited publication indicates that 19 of the 103 acopiadores purchased tobacco with grading, seven purchased cotton with grading, four purchased rice with grading and three purchased soybeans by grading and the remaining four cases entail acopiadores who used grading for purchase of wheat (1), corn and tobacco (1), rice, soybeans and wheat (1), soybeans and wheat (1).

In regard to the general channels through which the marketing of crops flows the study makes several observations. Inasmuch as the acopiador purchases some products in small quantities and is at the same time the owner of a general store, the usual destination of the crop might be thought to be the consumer in the same community. However, this is not the predominant situation. Although the acopiadores could sell their products directly to final consumers, in the majority of cases they sell to other acopiadores, wholesalers and retailers, to truckers, to exporters and industrialists. On a product-by-product basis, in 1971 the acopiadores identified the final buyers of soybeans predominantly as industrialists, the final buyers of beans as wholesalers and retailers, and the final buyers of unpolished rice as themselves. Although it is difficult to quantify, corn and beans are generally sold to buyers in Asunción, unpolished rice is milled in the production zone and sold to consumers, and soybeans are sold in those cities which have vegetable oil plants.

A large number of acopiadores buy products in the field from farmers as well as at their place of business. The situation is rather complicated; for example, 20 of the 103 acopiadores stated they only purchased at their place of business or warehouse; 28 acopiadores stated that they purchased at their place of business and at that of a sub-acopiador and at the producers' farms; 37 acopiadores stated that they purchased at their place of business and the producers' farms; 15 stated that they purchased at their

place of business and that of a subacopiador, two stated that they purchased only at their producers farms and one stated that he purchased only at the place of business of a subacopiador. Excluding those who stated that they only purchased crops at their places of business, 81 percent stated that they either went to the farmers or approached the farmers through the intermediation of a subacopiador. This use of subacopiadores arises from the opening of new areas of settlement. Thus, as the areas of production have expanded or moved away from the traditional towns, the long established acopiadores have attempted to meet the competition of new acopiadores through the use of subacopiadores and truckers. It is obviously costly and difficult to move one's warehouse and family to a new community. All of the acopiadores stated that they carried out their operations in their own names. This statement should be interpreted to mean that even though the products might be destined for sale to other firms and persons, all the operations, from purchase through warehousing, conservation, sale, and in some cases transport, are the exclusive responsibility of the acopiador. Fifty-nine of the 103 acopiadores dealt directly with the farmers and 32 utilized subacopiadores.

Forms of transportation utilized in the marketing system in Paraguay include nearly all conceivable conveyances. Conveyances used to transport goods from the farm to the acopiadores' warehouses include wagons, carts, trucks and horses. Generally the carts and wagons are owned by the farmers. In the case of trucks, which are frequently owned by third parties, either the acopiador or the farmer pays the transportation charges. For example, 31 acopiadores used third-party trucks, 17 used their own trucks and 23 utilized their own trucks and those of third parties. In some cases when there are small volumes of products such as castor seeds, coconut seeds, at times small bags of cotton, one can still find farmers carrying such products on their backs, on their wives' heads or on the back of a horse.

The central feature of the acopiadores' operation is their warehouses. These buildings are generally of brick or wood construction, generally closed, even though there are some with open walls, but they are never without roofs. Ninety percent of the interviewees stated that they owned their own warehouse. Thus, acopiadores are definitively established in the communities in which they operate. Moreover, they have invested part of their capital in permanent installations and this makes it difficult for them to transfer their operations to new areas of production. Two-thirds of the interviewees stated that they have sufficient capacity in their warehouses to handle the peak season volumes of production. The remaining one-third had to utilize third-party installations during the harvest season.

Less than one-half of the interviewees carried out any work of product conservation or improvement. Of course these replies related to the types of products handled. For example, tobacco and soybeans would require more care than cotton. Eighty-six percent of the interviewees stated there were losses during the warehousing period. For cotton the most generalized percentage of losses cited by acopiadores was five percent. For corn, peanuts and beans, the most generalized percentage was 10 percent. For soybeans, the most generalized percentage was two to three percent, and for tobacco the most generalized percentages were 10 and 20 percent.

c. The Processing of Crops

The processing of crops is an activity that is necessary, in greater or lesser degree, depending upon the crop and the location of its major market. An industrial census of recent vintage would be useful for a survey of the existence of processing facilities, but the most recent industrial census is of 1963 vintage. At that time only 20 of the firms in Paraguay's manufacturing industry employed more than 100 persons and 37 firms employed 50 to 99 persons. By any standard of comparison, Paraguay's industrial sector is small, and a significant portion of it functions as an adjunct to agricultural production.

In regard to the crop sector, as is shown in Table C-11, the descending order of magnitude of crop export values is as follows (inclusive of by-products): soybeans, cotton, tobacco, sugar cane, coconuts, coffee, palm hearts, castor beans, mint, processed fruit products, fresh vegetables and raw silk cocoons. Several products, such as soybean grain, tobacco, coffee, castor beans, fresh vegetables and raw silk cocoons require little processing prior to export. Thus while handling, classification, and packing are necessary for these products, the capital requirements for fixed installations and the complexity of transformation processes are not as great as exists in the processing of oilseeds, the ginning of cotton, the distillation of essential oil, the refining of sugar and the processing of fruit and palm hearts. For these products, capital investment in fixed installations may serve as effective barriers to entry. It is not our intent herein to demonstrate that less than perfect competition exists due to the small number of processing plants for particular crops--nor to advocate an expansion in the number of plants as a method of reducing monopoly power. Economic efficiency may be sacrificed by a serious attempt to create competitive conditions through an expansion in the number of processing plants. However, monopsonistic-

oligopsonistic market structures may result in the lowering of farm-gate buying prices even though the international markets for the processed products are competitive. The scant number of plants and GOP price policies argue convincingly that monopoly power is felt to exist.

In the following paragraphs the crop-related industries are discussed under the following headings: vegetable oil, essential oils, cotton gins, sugar mills, processed fruit and vegetables, and canned palm hearts.

(1) Vegetable Oil

The vegetable oil extraction industry processes mainly soybeans, cottonseed, coconuts (pulp and kernel), peanuts, sunflower seed, castor beans, and tung nuts. According to a 1971 study, this industry was composed of 22 plants belonging to 19 firms.[1/] There were 75 mechanical presses with a total pressing capacity of 962 metric tons of raw material per 24-hour work day. In addition, four firms had solvent process extractors with a total capacity of 190 metric tons of raw material per 24-hour work day. Various plants are engaged in the extraction of oil from more than one type of oilseed. The number of plants processing each type is as follows:

	Number of Plants
Coconut Kernel	11
Coconut Pulp	7
Soybeans	8
Cottonseed	8
Peanuts	5
Sunflower Seed	31
Castor Beans	2
Tung Nuts	6

Total domestic production of oilseeds increased from 353,000 metric tons in 1970 to 553,000 metric tons in 1974. Production of coconut, soybeans, cottonseed, sunflower seeds, and castor beans increased during the period 1970-1974 while production of peanuts and tung nuts remained relatively constant. Export of unprocessed oilseeds consists mainly of soybeans and castor beans. In 1974 these exports amount to 59 percent of domestic production of soybeans and 88 percent of domestic production of castor beans.

1/ Ministerio de Industria y Comercio, CEPEX, Aceites Vegetales, 1971.

Table C-19 presents estimates of the average annual oilseeds available in the period 1972-1974 for the domestic oilseed industry after export of unprocessed grain, retention for seed, and waste. A portion of oil from coconut, soybeans, peanuts, cottonseed, and sunflower seed is sold in external markets in crude form but a substantial portion is refined further and mixed to produce cooking oils which are sold in the domestic market. Eight firms have refineries for this purpose.

In the period 1972-1974 the average annual registered export of vegetable oil was as follows, in thousands of metric tons: coconut pulp oil, 4.5; coconut kernel oil, 5.9; soybean oil, 1.7; and tung oil, 13.9. Ignoring changes in vegetable oil inventories, percentages of domestic production exported in the period 1972-1974 were as follows: 42 percent of the coconut pulp oil, 73 percent of the coconut kernel oil, 20 percent of the soybean oil, and 92 percent of the tung oil. Exports of peanut oil, cottonseed oil, sunflower seed oil were insignificant or non-existent. Exports of the meal, expeller, and cake by-products of oil extraction were substantial for cottonseed, soybeans, and coconut--amounting to 14,000, 33,200, and 21,000 metric tons, respectively. These data suggest that most of the soybean oil, cottonseed oil, and peanut oil are marketed domestically. Meal, cake, and expeller products are sold in external markets unless external prices are exceptionally low. Export sales of coconut meal and expeller are most affected by changes in external prices due to their relatively low value per ton.

(2) Essential Oils

An essential oil is a volatile oil found in plants and imparting odor and, often, other characteristic properties. The essential oils produced in Paraguay include petitgrain, palosanto, mint, cedron and lemongrass. Paraguay's most important essential oils in terms of value and volume are petitgrain and mint. In the period 1972-1974, average annual tonnage of registered exports of petitgrain oil and mint oil were 371 and 221, and the respective export values were US$4.48 million and US$1.51 million. As is indicated in Table C-11, these essential oils possess high values per unit of weight.

The leaves and buds of the sour orange tree (*citrus aurantium*) constitute the best raw material for the distillation of the petitgrain essential oil. The primary distillation of this essential oil is carried out by small production units. One thousand kilograms of sour orange leaves yield three to four kilograms of crude petitgrain oil. The harvest period for sour orange leaves extends from April to December, and this harvest period serves to utilize labor during a period of relative abundance. Sour orange trees are

TABLE C-19

ESTIMATED AVAILABILITY OF RAW MATERIAL, EXTRACTION YIELDS, AND PRODUCTION OF CRUDE VEGETABLE OIL BY TYPE, 1972-1974 ANNUAL AVERAGES

Seed of Fruit	Available Raw Material (000 metric tons)	Extraction Yield %	Production of Crude Oil (000 metric tons)
(Edible)			
Coconut 1/	135.5	-	-
Pulp	40.7	26	10.6
Kernel	13.6	60	8.1
Soybeans	50.4	17	8.6
Peanuts	10.6	42	4.4
Cotton seed	37.7	16	6.0
Sunflower seed	2.4	35	0.8
(Inedible)			
Castor Beans	1.6	48	0.8
Tung Nuts	88.7	17	15.1

Source: Prepared by MAG, Gabinete Técnico.

Note: 1/ Pulp and kernel are estimated at 30% and 10% of the weight of the fruit.

grown principally by small farmers of eastern Paraguay. As is indicated in Table C-6, 85 percent of the total production in the period 1971-1973 occurred in the departments of Paraguarí, Central, and Cordillera. The only available source of information on the number of producers of sour orange leaves is the Agricultural Census of 1960-1961 which indicated that approximately 11,700 farm families engaged in this activity. The location of production, the winter harvest period, and available data on number of farms engaged in production suggest that sour orange trees are grown mainly on small farms.

There are no data available on the number of primary distillers of petitgrain oil. Our best guess would place the number of stills at more than 2,000. In the opinion of knowledgeable persons, the presently existing primary distillation equipment is generally rudimentary, and this, as well as inadequate technical knowledge, causes a relatively low yield in the primary distillation.[1/] Through a technical assistance agreement between the Institute of Tropical Products of Great Britain and Paraguay's National Institute of Technology and Norms (INTN), a new method of distillation of the raw material has been installed in the district of Caraguatay for experimental purposes.

In regard to final processing (filtration, sedimentation, and redistillation) and export, at present there are two petitgrain oil refineries in Paraguay. They have an annual processing capacity of 720 metric tons of crude petitgrain oil--which indicates that they are being utilized at about 60 percent of total capacity. Paraguay is the principal world supplier of petitgrain oil; her production accounts for approximately two-thirds of total world production.[2/] This is the only export commodity in which Paraguay possesses significant market power; i.e., ability to influence price through a substantial period of time.

Mint production was initiated in Paraguay in the early 1960's. Production intensified in the second half of the decade with the participation of Brazilian immigrants especially in the departments of Alto Paraná (and now Canendiyú). At present, the main producing areas are Alto Paraná, Canendiyú, Caaguazú, and San Pedro. During the 1972-1973 crop year, 6,400 hectares were cultivated with

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1/ AID, BCP, CEPEX, CDP, Análisis del Sector Exportador del Paraguay, p. 103.

2/ ibid, p. 109.

a total production of 774 metric tons of mint essence; and during the 1974-1975 crop year, 13,680 hectares were cultivated with an estimated production of 1,650 metric tons of essence.

Mint cultivation starts in the month of May (during the winter), taking advantage of increased humidity. The first cutting is made at the end of October, or during the first part of November. Three cuttings are made during the year with periods of 85 to 90 days between them. One hectare of mint properly cultivated should produce 4,000 kilograms of leaves at each cutting. With the usual one percent essence yield, this represents an annual 120 kilograms of essence per hectare.

The extraction of the essential oil from the mint plant is a distilling process involving steam. The oil, thus obtained, undergoes industrial processes to disaggregate its components. These components are mainly crystalized peppermint and the so-called unmentholated oil. All present Paraguayan exports are in the form of the essential oil, and the most important purchasers are Brazil and Argentina. Paraguay is presently an important world exporter of mint essence.

There are no data available concerning the number of stills and their capacities. However, the stills can operate efficiently because mint can be cut three times a year (in comparison, sour orange leaves can be harvested only once a year). A recent study of Paraguay's export sector recommended that at least two plants be established to process mint oil for crystalized peppermint.1/ These plants would act as an impediment to illegal exportation because the market prices of mint oil would be more competitive and generally higher.

As is shown in Table C-7, mint is produced principally on large commercial farms. The machinery needed for its cultivation undoubtedly explains this situation. However, the location of production is also an area of recent settlement. Mint may well be susceptible to cultivation on medium-size farms in the eastern region of eastern Paraguay as they become mechanized.

(3) Cotton Gins

Paraguay's cotton gins are owned by 12 enterprises, including cooperatives, and are located in 15 plants. These cotton gins are located in the principal producing areas, near Asunción,

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1/ op. cit., pp. 108-109

and at major transshipment points. The gins near Asunción process mainly cotton produced in areas served by the Asunción-Puerto Presidente Stroessner highway; those at La Colmena, the Mennonite colony, Concepción, Encarnación, and Coronel Bogado process cotton grown in adjacent zones.

The cycle for the ginning of cotton includes the months of March, April, May and June; ginning within this period avoids chemical and physical changes that could damage the raw material and consequently the quality of the cotton fiber. On the basis of a three-month ginning period, Paraguay's cotton gins have an installed capacity of 136,000 metric tons of seed cotton. As is shown in Table C-20, in 1974 they processed approximately 75,000 metric tons of seed cotton, which signifies 54 percent utilization of the installed capacity or an average working period of 49 days. The fact that the gins are presently underutilized signifies that they could handle a substantial increase in cotton production. Such an increase would reduce average per-unit processing costs.

(4) Sugar Mills

The total production of sugar in Paraguay increased from 35,000 metric tons in 1963 to 70,400 metric tons in 1974. Paraguay has eight sugar mills. The harvest period for sugar cane runs from June through December of each year. Based on this harvest period, estimated installed capacity in 1973 was 79,650 metric tons of refined sugar. According to this capacity measure, utilization was 86 percent in 1973 and 88 percent in 1974.

Data related to area in sugar cane used to produce sugar (and adjacent to the mills), sugar cane processed, and production of refined sugar are presented in Table C-21. In 1973 and 1974, three mills accounted for 72.6 percent of sugar cane processed and 73.3 percent of refined sugar production. The scant production of two mills producing the least sugar and the above evidence suggest that some of the mills are antiquated and could not operate in a market in which sugar cane and refined sugar prices were uncontrolled. That Paraguay could export sugar over a period of years which include both those with low international prices as well as those with high prices is open to question.

At present a Brazilian firm intends to establish a large sugar mill and plantation in the department of San Pedro. This installation would have a capacity of 60,000 metric tons of sugar production. In addition, Azucarera Paraguaya projects a plant expansion which would double its capacity.

TABLE C-20

INSTALLED CAPACITY OF COTTON GINS (1974)

	Number of Gins a/	Capacity in Metric Tons of Seed Cotton b/	Quantity of Seed Cotton Processed c/ (Metric Tons)	Utilization	
				In Percent	Equivalent Work Days
Manufactura de Pilar, S.A.	8	20,000	10,951.7	54	48
CAPSA	17	29,000	25,752.2	88	80
Algodonera Guaraní, S.A.	9	15,000	6,919.2	46	41
La Industrial del Norte, S.A.	4	5,000	7,510.2	150	135
Concepción Industrial, S.R.L.	3	3,500	1,019.0	29	26
Textil, S.A.	4	4,000	149.4	3	-
ITASA	7	18,100	10,405.6	57	51
Cooperativa Hortitzer	4	7,500	2,195.5	29	26
Cooperativa Fernheim	2	3,000	2,050.3	68	62
Cooperativa La Colmena	1	1,000	150.7	15	14
José Vargas Peña	4	5,600	2,396.5	42	38
América Textil	3	25,000	5,253.9	21	19
TOTAL	66	136,700	74,754.2	54	49

Source: MAG, Oficina Fiscalizadora de Algodón y Tabaco.

Notes: a/ Corresponds to 1974.
b/ Full utilization for period of three months.
c/ Data refer to 1974.

TABLE C-21

DATA OF PRODUCTION OF SUGAR FOR EACH SUGAR MILL (1972-1974)

Milling Area	Hectares by Milling Area			Sugar Cane Processed (000 Metric Tons)			Production of Refined Sugar (000 Metric Tons)		
	1972	1973	1974	1972	1973	1974	1972	1973	1974
Dpto. GUAIRA									
Azucarera Paraguaya	5,400	5,900	6,450	167.7	222.9	211.4	17.0	23.1	22.4
Azucarera Friedman	5,041	5,041	5,566	138.3	172.2	165.9	13.8	17.5	17.0
Azucarera Iturbe S.A.	3,201	3,201	3,200	79.4	100.0	109.0	7.8	10.0	11.5
Azucarera Guairá S.A.	615	550	500	3.7	4.2	-	0.3	0.3	-
Dpto. CENTRAL									
Azucarera Guarambaré S.A.	1,303	1,400	1,400	47.5	61.4	62.3	4.8	6.1	6.5
Azucarèra La Felsina S.A.	1,106	1,106	1,111	34.4	36.2	42.1	3.5	3.6	4.3
Dpto. PARAGUARI									
Azucarera María Auxiliadora	727	800	810	8.8	21.7	22.6	0.7	1.9	2.0
BENJAMIN ACEVAL (Chaco)									
Azucarera Cenci & Pirotta	1,564	1,521	1,700	48.2	56.1	63.7	5.0	6.1	6.8
TOTAL	18,957	19,519	20,637	527.9	674.8	676.9	52.9	68.7	70.4

Source: From MAG, División de Sanidad Vegetal, Sección de Caña de Azucar and División de Inspección Agrícola.

(5) Processed Fruit and Vegetables

The industrial processing of fruit and vegetables consists essentially in the production of juices, canned fruit or vegetables, packaged fruit and bakery products. This activity is relatively new and undeveloped in Paraguay. The two principal plants are located in the central zone. One plant is located in Areguá and the other at Capiatá.

The Areguá plant can process up to 2,650 liters of citric juices per hour (from oranges, grapefruit, tangerines and lemons); that is, 21,000 liters per 8-hour workshift. The Capiatá plant has a capacity to process 150 metric tons of oranges or grapefruit per 20-hour shift, which is equivalent to 15,000 liters of juice. This plant can also produce tangerine, lemon and orange juice in amounts of 70 metric tons per 20-hour shift. In addition, this plant produces orange marmalade in amounts up to 150 metric tons per year. The Capiatá factory also produces sweet potato pudding (a bakery product) in a capacity of about 2,000 metric tons annually. This plant can also produce canned pineapple and has installations enabling it to process up to 30 tons of pineapple per 8-hour shift. The Capiatá factory also has installations to pack fruit which are used to facilitate export shipments.

One of the principal problems preventing the processing of fruit, vegetables and similar products is the lack of production facilities in the major producing zones. For example, citrus fruit from Itapúa cannot be shipped to the central zone for processing due to the high cost of transportation and the difficulty in maintaining product quality. On the other hand, low availability of raw material for the preparation of fruit juice has limited the expansion of production at existing plants.

(6) Canned Palm Hearts

The plant which is used to produce palm heart, Euterpe Edulis, only grows wild and only grows in Paraguay in the area of Alto Paraná. The canning of palm hearts is carried out in Alto Paraná. There are five firms engaged in the canning of palm hearts. The major problem encountered by processing plants is that the palm tree shoots necessary to their operation are more and more distant from the processing plants. In order to overcome this difficulty, some of the canning plants operate mobile units which are taken to the harvest areas.

Total production of palm hearts grew from 60 metric tons in 1960 to almost 7,000 metric tons in 1970. Since 1970, there

has been a decline in production due to the increased distance of the raw material from the processing plants and to depletion of the stock of raw material. Eventually the plant specie utilized for the production of palm hearts will disappear as will the production of canned palm hearts unless this plant can be domesticated.

According to a 1970 study, the palm heart processing plants have an annual capacity of approximately 16,500,000 cans of 800 grams and the utilized capacity was about 8,250,000 cans--a utilization equivalent to about 50 percent of capacity. In 1973 and 1974 average annual production was approximately 4,800,000 cans. Nearly all production is exported. The demand for canned palm hearts has increased in European countries and in Latin America in recent years, and prices have increased as a consequence of the decline in Brazilian production.

d. Logistical Aspects of Marketing

The price of an agricultural commodity is related to the point of its delivery to the buyer and the form of the product. Within Paraguay cash crops must be transported from the farm to point of processing or consumption, and those crops which are exported are transported over even more substantial distances. Paraguay is a landlocked country, and as has been noted in Section C.2., its crop exports tend to have high FOB values per metric ton. Inasmuch as both Paraguay's total crop production and crop exports are relatively small, economies of scale in handling and shipment that are available in many countries are not available to Paraguayan producers and exporters.

An analysis of the cost of transportation and handling for products shipped to overseas markets can be divided into four stages. First, there is the cost of transportation from the farm to the processing or final assembly plant. Second, from the plant to the port of embarkation, the corresponding cost includes internal transportation, stevedoring, and port charges. Third, from the port of shipment in Paraguay to the port of transshipment, the corresponding cost includes river, rail or highway freight charges and port charges in the ports of transshipment. Fourth, from ports of transshipment to the overseas port, the corresponding cost includes only ocean freight charges and insurance. For crops consumed domestically, transportation costs are those of the first stage plus that from the processing plant to consumer; the typical crops are rice, sugar and wheat flour. For crops such as cassava, beans, most fresh fruit and vegetables, there is generally only the cost of transportation from farm to market.

The predominant form of internal transportation in Paraguay is the truck-road system. In 1973 Paraguay had 6,669 kilometers of

roads, of which 871 kilometers were asphalted, 555 kilometers were gravel, and the remainder, dirt roads. In 1971 there were 10,490 trucks and pickups with a carrying capacity of 34,195 metric tons.[1/] The makes most used were Ford (19.65 percent), Volvo (15.66 percent), Bedford (11.04 percent) and Chevrolet (9.92 percent).

Truck freight rates vary according to the condition of road traveled as well as distance hauled. This is illustrated dramatically by comparing the 1974 charge of Gs. 1,500 per ton for soybeans between Encarnación and Asunción, a distance of 365 kilometers, with the Gs. 2,000 per ton charged between Encarnación and Puerto Triunfo, a distance of less than 150 kilometers. The Asunción-Encarnación road is a first class all-weather asphalt surface highway on which sustained speeds of 50-60 mph (90-100 km/h) are reasonably attainable, while the Puerto Triunfo-Encarnación road is partly cobblestone, partly improved gravel, and partly unimproved dirt.

The sharp increase in fuel prices in 1974 resulted in a corresponding increase in the direct cost of moving goods by trucks. In 1971, with diesel fuel at Gs. 11.50 a liter, the cost of transporting an average load from Asunción to Encarnación (10,000 Kg. one way, 3,000 Kg. return load) was Gs. 1.32 per ton-kilometer. With diesel fuel at the 1974 price of Gs. 26 a liter and other costs the same, the cost would be Gs. 1.80 per ton-kilometer. In summary, the cost of transport of agricultural commodities from farm or village to major town, processing plant, or point of export depends upon distance and road condition; these conditions are quite varied.

Paraguay's principal routes of access to overseas markets are by means of river transport, land transport and railroads. During the two-year period, 1972-1973, approximately 76 percent of Paraguay's exports were handled by river transport, 16 percent by highways and eight percent by railroads. The Paraná/Paraguay River system gives access to overseas ports by loading at the principal Paraguayan ports of Asunción and Encarnación and transshipment at Buenos Aires and Montevideo. This system of river freight and transshipment has been in existence for a long time and is still predominant. The 1,240 kilometers from the confluence of the Paraguay and Paraná Rivers to Buenos Aires are navigable throughout the year, but ship movements upstream to Asunción are occasionally restricted by low water between October and March. More recently, paved highways have been built which connect Asunción, Encarnación, Puerto Presidente Stroessner and several interior towns with Buenos Aires

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1/ "Sistema de Transporte de Carga en el Paraguay" October 1971.

and with the Brazilian ports of Paranaguá and Santos by means of the highway systems of Argentina and Brazil. In regard to railroad transportation, Paraguay's major internal railroad (which connects Asunción and Encarnación) connects with the Argentine railways at Posadas, Argentina. The Brazilian railway system serves Pedro Juan Caballero through the adjacent Brazilian city of Punta Porá.

In the two-year period 1972-1973, 61 percent of Paraguay's gross export tonnage was handled by the port of Asunción and adjacent river ports. Approximately 19 percent of Paraguay's gross export tonnage passed through the port of Encarnación (by river, rail and highway). The port of Concepción and other ports along the upper Paraguay river handled approximately 13 percent of Paraguay's gross export tonnage and the port of Puerto President Stroessner handled approximately eight percent of gross export tonnage.

In general, the river-freight system is the preferred method of transport to overseas markets. The products which utilize this system almost exclusively include tobacco, cotton, sugar, essential oils, cake, meal and expeller products and vegetable oils. Approximately 85 percent of the seed crops, 50 percent of coffee and 50 percent of the processed palm hearts, fruits and juices are also handled by the river freight system. Fruit and vegetables that enter into export trade (and are sold almost entirely in Argentina) are carried by trucks. In regard to coffee, canned palm hearts, and soybeans, it should be noted that for those areas of eastern Paraguay that are adjacent to Brazil the use of the Brazilian ports reached by rail and highway transport is probably more advantageous than the use of the river transit system through Buenos Aires.

By means of a survey of exporters, a recent study identified the following factors as those which control the type and size of packaging of export products originating in Paraguay: (i) Most of Paraguay's processing plants lack the equipment needed to manipulate containers that are larger than those that can be handled solely by human efforts. (ii) With the exception of the port of Asunción, the loading of cargo is effected with equipment that the river boats carry. (iii) A sizable number of exporters are unaware of the cost advantage that they could obtain through the use of larger containers in the form of reduced freight rates and insurance.1/ Soybeans and corn as well as cake, meal and expeller are shipped principally by river barges in bulk form. Most other crop-related export commodities are packed in containers such as bags, crates, barrels and boxes. Typical sizes are as follows:

1/ Análisis del Sector Exportador, op. cit., p. 243.

Product	Type of Container	Kg. per Unit
Essential Oils	Barrels	220
	Boxes	45
Tobacco	Bales	100
Cotton	Bales	200
Coffee	Bags	60
Castor Beans	Bags	50
Sugar	Bags	50
Soybeans	--	
Vegetable Oils	Barrels	200
Canned Palm Hearts	Boxes	25/30
Canned Fruit	Boxes	25/30

Calculation of transportation charges from Asunción to European ports for Paraguay's several export commodities is beyond the scope of this paper. Our calculation of the cost of transporting soybeans from Asunción to Rotterdam in the first half of 1975 is illustrative and yielded US$47.40 per metric ton. Due to higher river freight charges for tobacco, coffee, cotton and castor beans, the rates generally would be US$15 per metric ton higher. Thus $60 to $70 per metric ton might be a good estimate for the metric ton transport charges from Asunción to Rotterdam for the principal exports. For such speciality exports as essential oils, the cost could be substantially higher. Transportation costs within Paraguay depend significantly upon the point of origin, with $20 to $25 per metric ton for soybeans for a 300-kilometer trip. Our calculation on soybeans indicated that with rather favorable assumptions the farm-gate price would be equivalent to 65 percent of a CIF Rotterdam price of $240 per metric ton. There is no doubt that for higher value products this ratio would be substantially higher.

e. Relation of External and Internal Prices

The relationship of internal prices of agricultural products in Paraguay to prices in international markets varies considerably for different products. (See Tables C-22 and C-23.)

For soybeans, which have become a strongly export-oriented item in recent years, prices to producers in Paraguay show a generally consistent relationship to prices on the Rotterdam market. Before the abrupt price increase in 1973, prices reported paid to Paraguayan producers averaged around $60 per metric ton below the CIF United Kingdom price, as shown in Figure C-2.

The violent price movement in 1973 and 1974, accompanied by similar variations in transportation and other costs resulted

TABLE C-22

PRICES RECEIVED BY PRODUCERS AT COUNTRY POINTS IN PARAGUAY
(Dollars per kilo) ($1 = ₲126)

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Soybeans													
1971	.063	.071	.056	.063	.063	.065	.071	.079	.071	.079	.071	.079	.067
1972	.071	.071	.079	.071	.071	.071	.071	.075	.083	.087	.103	.143	.087
1973	.175	-	.119	.143	.159	.182	.214	.222	.214	.206	-	-	.175
1974	.175	.167	.151	.127	.143	.135	.159	.159	.167	.175	-	-	.159
Cotton No. 1													
1971	.119	.119	.127	.127	.143	.151	.151	.143	.151	.143	.127	.135	.135
1972	.151	.159	.167	.167	.167	.167	.167	.167	.167	.159	.159	.159	.167
1973	.182	.151	.159	.167	.167	.175	.182	.190	.182	-	-	-	.175
1974	.190	.286	.301	.301	.310	.294	.278	.294	.286	.301	-	-	.286
Wheat													
1971	.079	.079	.079	.079	.079	.075	.075	.079	.083	.079	.079	.071	.079
1972	.071	.079	.075	.071	.071	.071	.079	.075	.079	.079	.071	.079	.077
1973	.079	.079	.095	.111	.083	.083	.079	-	-	.135	.135	.135	.095
1974	.135	.119	.135	.143	-	-	-	.135	.151	.214	.214	.214	.159
Corn (Yellow)													
1971	.026	.020	.028	.024	.024	.028	.028	.032	.032	.040	.036	.040	.032
1972	.032	.040	.046	.046	.052	.048	.048	.048	.056	.063	.056	.060	.052
1973	.056	.048	.059	.063	.063	.063	.063	.071	.087	.095	.107	.103	.071
1974	.079	.079	.079	.079	.079	.095	.095	.079	.079	.103	.111	.111	.087
Steer (350 Kg)													
1971	.159	.151	.175	.175	.175	.182	.182	.182	.190	.198	.214	.222	.183
1972	.222	.238	.246	.246	.254	.262	.270	.278	.278	.278	.278	.317	.262
1973	.317	.333	.341	.381	.365	.357	.381	.381	.397	.365	.377	.397	.365
1974	.389	.405	.405	.405	.405	.405	.405	.397	.436	.421	.436	.436	.413

Source: MAG, Dirección de Comercialización y Economía Agropecuaria, Boletín Informativo (various dates).

TABLE C-23

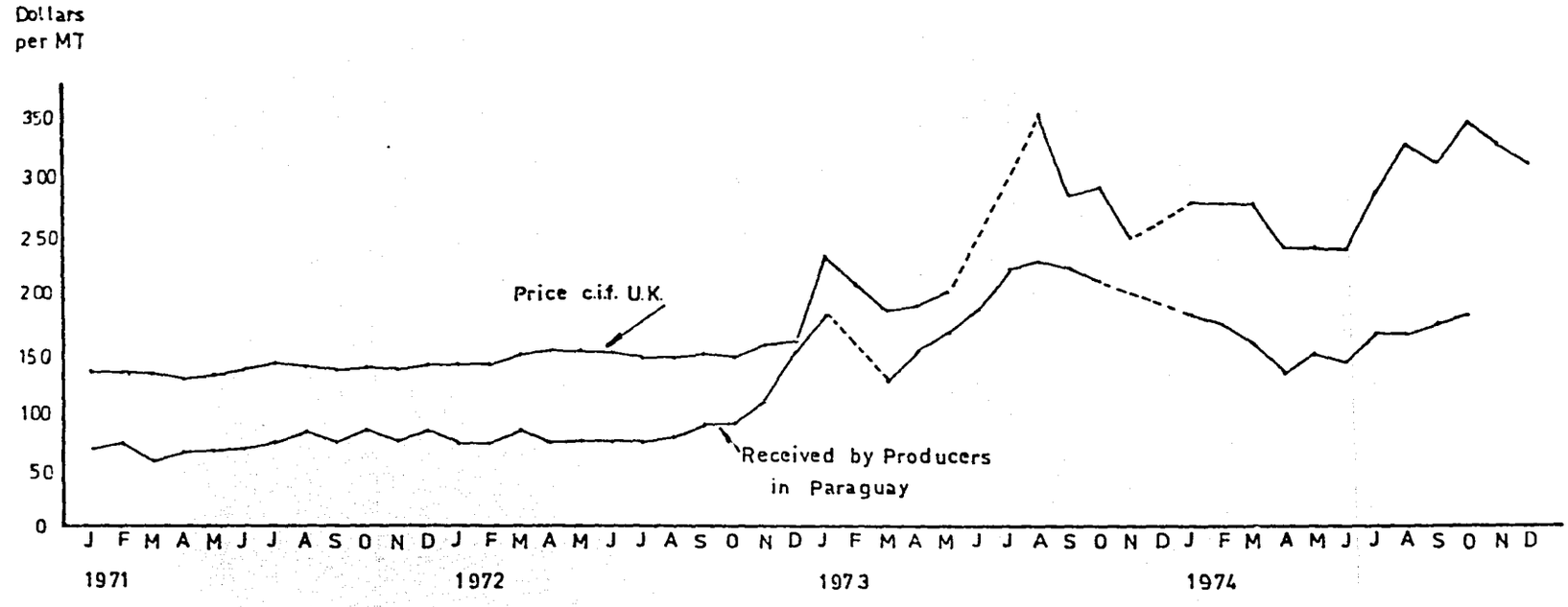
PRICES OF AGRICULTURAL PRODUCTS OF INTERNATIONAL MARKETS
(Dollars per Metric Ton)

		Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Soybeans US No. 2														
Cif U.K.	1971	129	130	128	123	125	131	135	133	131	132	131	134	130
	1972	134	135	143	147	145	144	140	140	143	142	151	153	143
	1973	224	203	179	182	197	n.g.	n.g.	343	277	286	240	n.g.	237
Cif Rotterdam	1974	272	272	269	232	231	232	281	(320)	(303)	341	323	306	282
	1975	262	237	226	232	210								
Cotton SM 1/16"														
Cif Livespool	1971	682	692	706	714	739	738	763	787	777	795	803	863	756
Cif U.K.	1972	914	919	925	828	813	775	751	721	691	718	805	855	810
	1973	934	959	1,012	1,019	1,141	1,218	1,433	1,759	1,988	1,957	1,785	1,949	1,430
	1974	2,061	1,810	1,639	1,541	1,403	1,382	1,441	1,416	1,332	1,278	1,183	1,152	1,470
	1975	1,129	1,142	1,125	1,206	1,237								
Wheat US # 2HW														
Cif U.K.	1971	78.4	75.9	78.1	75.5	75.2	75.1	75.0	72.4	70.7	70.1	70.4	70.8	73.97
Cif Rotterdam	1971													66.50
12%	1972	65.8	66.1	66.1	66.5	66.9	65.4	66.5	69.4	83.0	92.2	91.5	106.9	75.53
	1973	109.5	100.3	99.9	102.9	112.4	129.3	143.7	203.2	210.9	206.1	200.2	222.7	153
Ord. Prot.	1974	234	237	218	178	165	178	189	196	194	216	209	198	201
	1975	171	158	150	151	138								
Corn Argentine														
Cif U.K.	1971	78.0	76.2	73.3	69.7	68.8	74.6	74.4	71.7	69.1	66.3	66.0	66.7	71.23
Cif U.K.	1972	70.8	69.7	66.5	75.9	76.0	75.5	76.5	76.1	82.3	(88.1)	(89.3)	(98.7)	78.78;
Cif Rotterdam	1972	63.2	63.0	63.2	67.5	68.9	68.1	68.5	68.5	75.6	80.7	81.9	91.3	71.70
	1973	94.1	90.2	87.8	86.6	98.4	125.6	145.2	155.3	132.7	136.2	131.7	143.3	152
	1974	155	158	157	147	144	147	154	167	158	171	176	171	159
	1975	166	149	152	157	151								
Beef 90% lean, frozen														
Fob US Port	1971	n.g.												1,345
of entry	1972	1,386	1,404	1,455	1,499	1,506	1,538	1,511	1,492	1,472	1,466	1,487	1,566	1,482
	1973	1,699	1,893	1,991	1,856	1,845	1,795	1,992	2,537	2,284	2,199	2,150	2,104	2,029
	1974	2,037	1,982	1,736	1,618	1,545	1,445	1,641	1,606	1,397	1,385	1,323	1,264	1,582
	1975	1,145	1,146	1,143	1,279	1,383								

Source: U.S. Department of Agriculture, Economic Research Service, Foreign Agricultural Trade of the United States (various months).

FIGURE C-2

SOYBEANS - Comparison of Average Monthly Prices Received by Producers in Paraguay, and Prices c.i.f. U.K. 1971 - 1974



in generally higher, but fluctuating, price levels for soybeans and other agricultural commodities in both internal and external markets. The wide price variations preclude any precise evaluation of price spreads in the past two years, but generally it appears that the spread between internal and external soybean prices also increased in absolute terms, but may have not changed much in percentage terms.

For wheat, principally an important product, the internal price received by producers in Paraguay approximated the price delivered CIF Rotterdam, except during the period of turbulent markets in 1973 and 1974. This probably reflects the situation that prior to 1973 Paraguay normally received a major part of its wheat from the U.S. and the cost of wheat delivered to Paraguay is similar to that delivered to Europe. (See Figure C-4.)

In the absence of some administrated means of differential pricing, economic forces dictate that prices paid to Paraguayan producers for domestically produced wheat necessarily approximate prices of imported wheat. In 1973, Paraguay shifted to Argentina as its principal supplier of wheat, which also meant a major shift in price and cost structure.

Internal prices are not as closely related to external prices for products produced for domestic use but which are also important export items, such as cotton and beef. These products are also subjected to a major physical transformation which has a direct, but complex impact on economic value (e.g., seed cotton vs. baled cotton fiber; live steers vs. boned, frozen beef). (See Figures C-3 and C-6.)

Movements of prices to Paraguayan producers for unginned seed cotton generally parallel price movements in external (European) markets. Because the product, raw seed cotton, undergoes a major transformation--ginning and baling--in addition to normal marketing, analysis of the absolute internal-external price spread will not be attempted here.

Similarly, prices to producers for live steers in Paraguay showed an upward trend, roughly parallel to price movements of beef imported into the U.S. from 1971 through mid-1973. However, internal cattle prices in Paraguay continued a general upward trend through 1974, a period when international beef prices, as indicated by prices of U.S. imported beef, declined sharply. This apparently inconsistent relationship probably reflects efforts of Paraguayan cattlemen to prevent lower prices through emphasis on administered internal prices, some holding back on marketing of cattle, augmented by accumulated growth in internal demand for meat. It is expected that internal cattle prices will return to a consistent relationship with external

FIGURE C-3

COTTON - Comparison of Average Monthly Prices Received by Producers for seed cotton in Paraguay and Prices of SM 1 1/16 inch Cotton Fiber c.i.f. Liverpool 1971 - 1974

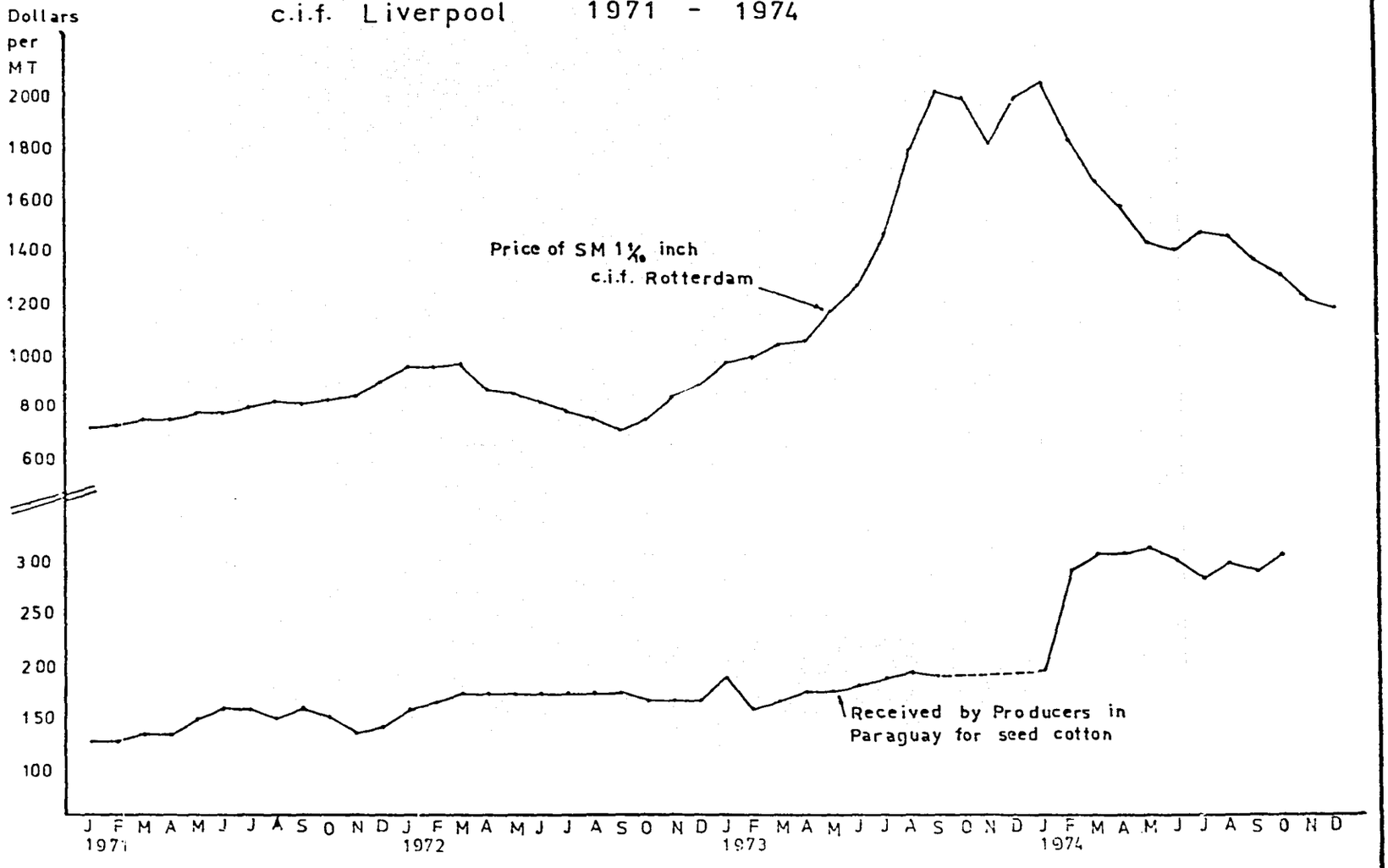


FIGURE C-4

WHEAT - Comparison of Average Monthly Prices Received by Producers in Paraguay, and Prices c.i.f. Rotterdam 1971 - 1974

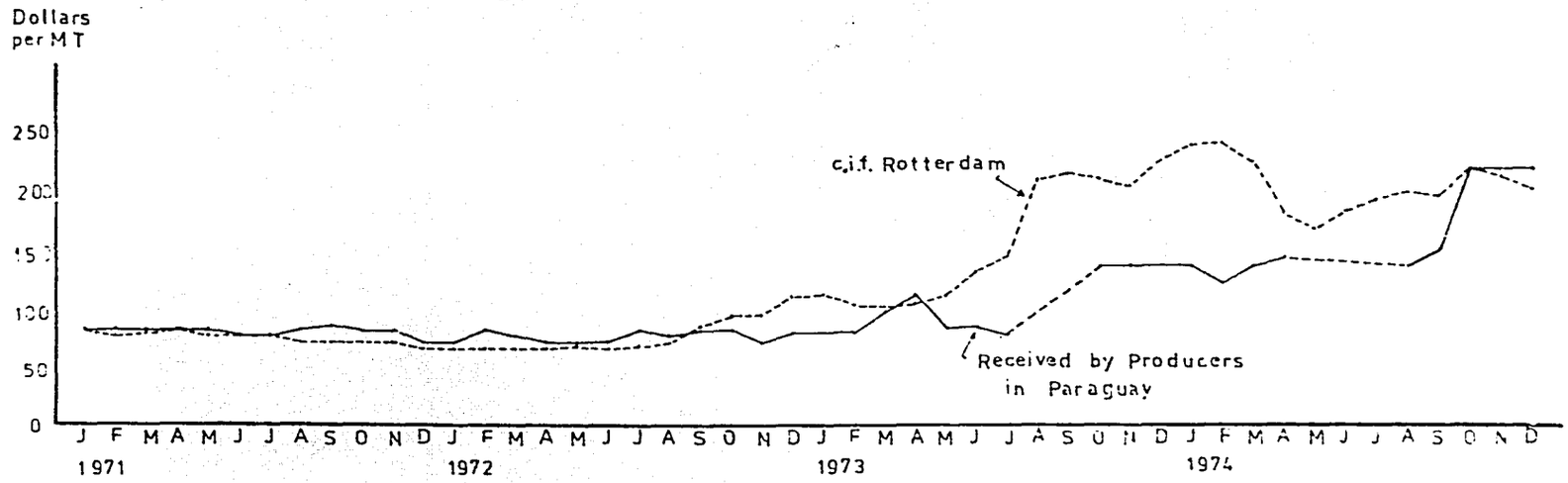


FIGURE C-5

CORN - Comparison of Average Monthly Prices Received by Producers in Paraguay and Prices of Argentine Corn, c.i.f. European Ports 1971 - 1974

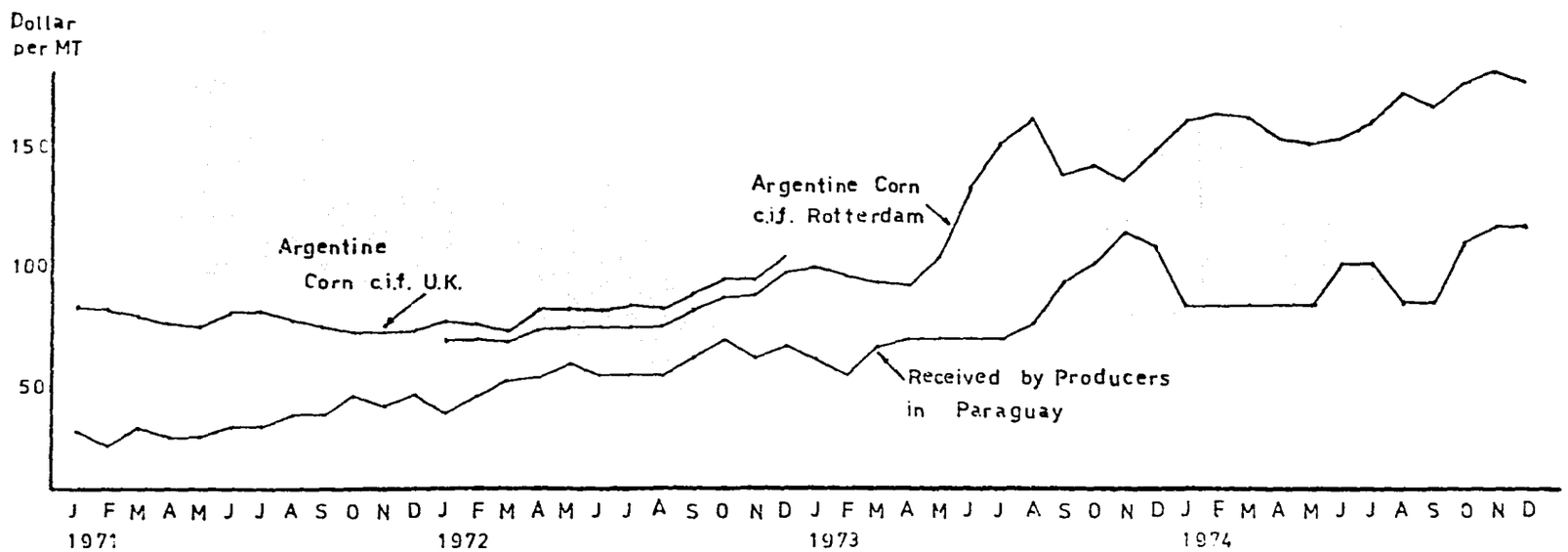
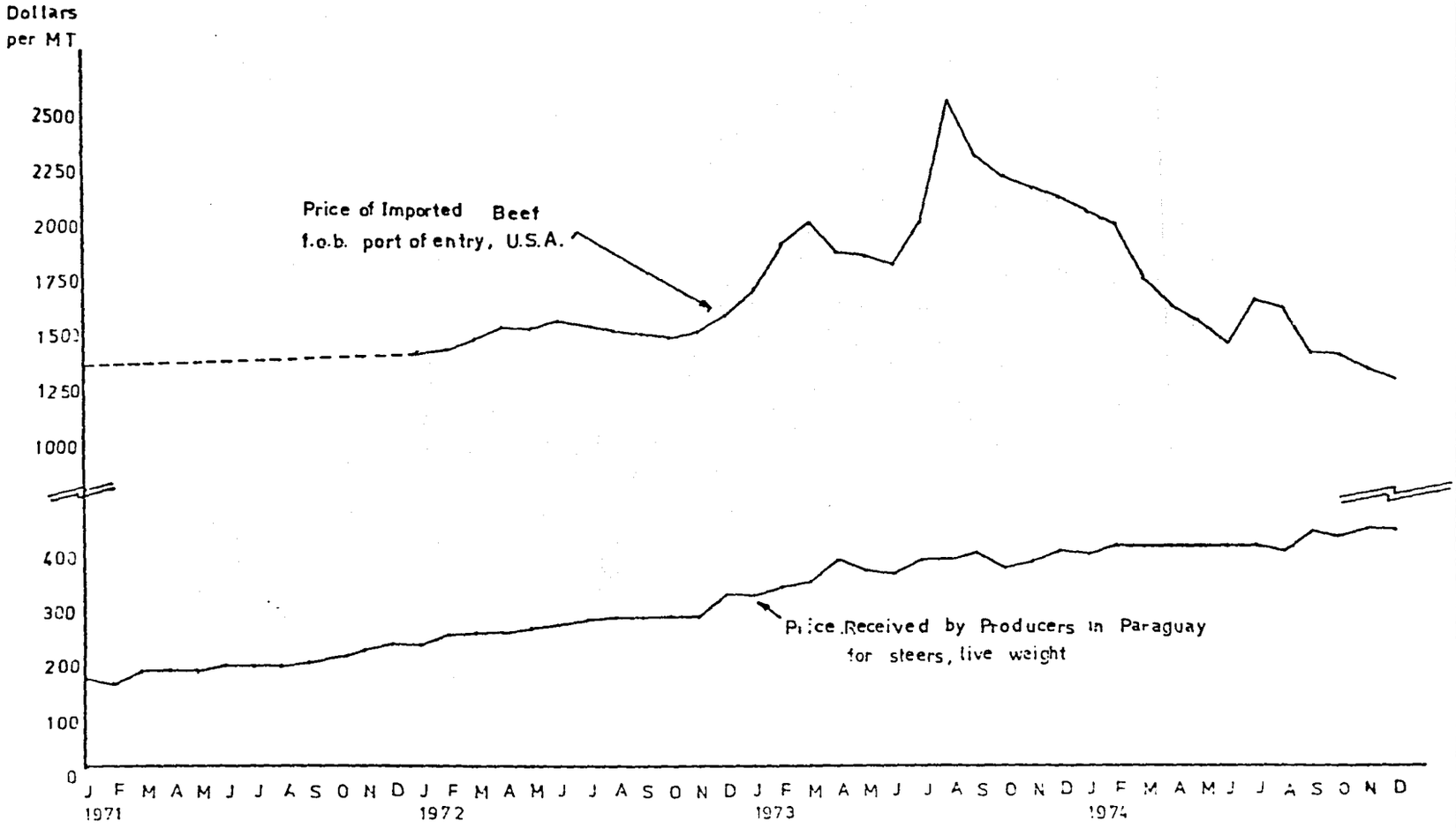


Figure C - 6

BEEF- Comparison of Average Monthly Prices Received by Producers for live steers in Paraguay, and Prices of Beef Imported into the U.S.A. 1971 - 1974



meat prices, as these changing conditions adjust to the current supply and demand situation. Indications of such adjustment were seen in the first semester of 1975 when external meat prices began increasing from the low level reached in January-March and domestic prices showed a downward adjustment promptly after elimination of administered maximum retail prices.

Some agricultural products such as cotton, sugar, soybeans and beef exported by Paraguay are similar or identical in type and quality to those exported by other producing countries. A common problem encountered in exporting is convincing foreign buyers not personally familiar with them that Paraguayan-produced products are actually of the same type and quality as those produced in the U.S. and other major producing countries.[1/]

Paraguayan products continue to suffer price discounts in international markets because Paraguay is relatively new and still a small-volume exporter of these products, and has not established a reputation for consistent and reliable grades and inspection procedures.

Other products possess characteristics of type, condition or quality with varying degrees of uniqueness to Paraguay.

The inherent qualities of tobacco are strongly influenced by the soil and climate where grown as well as by cultural and harvesting practices. Consequently, Paraguayan tobacco is probably

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1/ Brazilian soybeans is an example of efforts, probably successful at least in part, to establish a reputation for a national product in world markets.

During the last year or so there have been claims that Brazilian soybeans have a higher oil content than soybeans produced in other countries, and Brazilian soybeans have been reported to be commanding $5 to $8 more per ton in international markets than U.S. soybeans, apparently reflecting higher quality. However, there are only small differences in oil content of soybeans among varieties, and differences in oil content or other quality factors because of locality where grown have not been demonstrated. Consequently, the value per ton of beans sold can be enhanced significantly only by removing a higher percentage of moisture and foreign material, and it is possible that these factors are the reasons for recent higher price quotation for Brazilian soybeans.

unique in terms of flavor, odor, etc. However, because of the relatively small volume produced and the absence of some outstanding or unique desired characteristic, Paraguayan tobacco has not become known as a type of its own, and is used mostly for blending with other dark tobacco.

Some other export products such as essential oils (petitgrain, palo santo,[1] etc.) tung oil, and castor beans are more commonly identified with Paraguay because Paraguay is a major producer.

Few of these products are known for special features or exceptional quality, however. On the contrary, there are occasional reports of complaints regarding the quality or condition of Paraguayan products, particularly for those processed in rural areas. Lack of uniformity in quality and excessive impurities or foreign material content in these processed products are common since relatively little has been done in Paraguay to ensure uniform and high quality products.

5. Agricultural Price and Trade Policies

a. Policy Establishment and Evaluation

The establishment and implementation of a government policy in any particular sector of activity invariably involves three basic phases or areas of action:

First, the establishment of a policy objective is the primary step in determining the direction or focus of programs and activities in which a government should become involved.

Second, specific programs and activities to implement the established policy must be selected or designed.

Third, these programs and activities require practical administration and execution.

An evaluation or assessment of agricultural price and trade policy basically involves identification of the principal problem areas of the sector, and determination of what the government has decided should be done about them (i.e., the government's policy). The indicated action should be generally considered a desirable and feasible alternative to the existing problematic situation. An assessment of the programs and activities chosen to implement the policy objective, then, involve evaluation of the appropriateness of these programs in achieving their purposes. Finally, the practical

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1/ *Bulnesia sarmientoi*

administration or execution of the programs or activities should be evaluated from the viewpoint of their effectiveness in implementing the program purpose.

b. GOP Policy Objectives

The GOP policy objectives for prices, marketing and trade of agricultural products has not been presented in a single concise policy statement dealing specifically with this area of economic activity. However, the policy objectives and programs for the Paraguay agricultural sector are discussed in the "Plan Nacional Económico y Social 1971-1975." This discussion concerning prices, marketing and trade of agricultural products appears to represent the policy position of the government of Paraguay.

Based on statements in this document, the basic policy objectives for prices, marketing, and trade of agricultural products in Paraguay appear to be oriented toward stimulating an increased volume and variety of agricultural products for the purposes of:

(1) Increasing exports and reducing imports, to increase the net foreign exchange balance.

(2) Increasing production and variety of food items of high nutritive value to provide a better balanced diet for the domestic population.

(3) Supplying domestic industries with adequate volumes and varieties of raw materials of agricultural origin to satisfy demand for industrial production in domestic and export markets.

Policy objectives which deal principally with facilitating the marketing of the increased production are:

(1) Correction of deficiencies in marketing of agricultural products through:

(a) Provision of facilities for storage and conditioning of basic agricultural products; including central market facilities in urban centers.

(b) Provision of adequate information on market prices and conditions.

(c) Regulation of prices of primary agricultural products which affect a large number of producers.

(d) Establishment and administration of quality standards.

(e) Encouragement of producer organization and strengthening of buying power, including provision of adequate financing to facilitate marketing of agricultural products, and

(2) Provision of protection for development of domestic industries in order that they might take advantage of the opportunities in local markets and also increase the volume of exports.

The policy objectives for prices and trade of agricultural commodities are based on the premise of active and free participation of the private sector in performing production, marketing and financial functions, with a minimum of government regulation. However, intervention by the government is accepted as necessary to correct existing deficiencies in the marketing system. These policy objectives appear to be consistent with the conditions existing in Paraguay, and are generally oriented toward desirable changes and development of Paraguay's agricultural sector and toward improvement of the economic and social welfare of sizable segments of the population.

c. Price and Trade Programs

The price and trade programs for agricultural products consists of a mixture of programs, minimum prices to producers, maximum retail prices to consumers or users, and volume quotas for domestic consumption and for export, with accompanying implicit regulation of operating margins. Also there are quality standards or official grades for some products, and inspection of the products to ascertain the grade or quality of the product or that the product meets the minimum quality requirements.

The purpose of maximum prices to consumers is to prevent or deter price increases and thus protect consumers' purchasing power. The purpose of minimum prices to producers is generally to assume that producers receive a "fair or just" price for their product. Establishment of operating margin is partly a necessary concomitant to establishing minimum and maximum prices, and partly a direct effort to prevent excessive marketing margins (or frankly stated, to prevent profiteering by monopolistic buyers or sellers).

Quality regulation through establishment of official grades, minimum standards and inspection service to assure compliance, is obviously intended to provide an assurance or guarantee of the inherent economic value of agricultural products moving in trade channels.

Generally, Paraguay's agricultural price and marketing programs and activities can be classified into four categories according to major characteristics of production and marketing of the products involved:

(1) Commodities which are principally imported:

The major items of particular interest in this category are wheat, wheat flour, and other wheat products. Other items are canned goods, dairy products. The price in the exterior market where these products are purchased generally is the principal factor in determining the domestic resale price.

For wheat, the pricing and trade mechanism is complicated because the wheat is imported as grain, processed and sold to consumers as flour or other wheat products. The maximum retail prices to consumers for the flour and wheat products are established on the basis of the cost of purchasing the wheat at origin, transporting it to flour mills in Paraguay, plus milling costs, flour yield, etc.

The pricing mechanism for wheat is further complicated, since minimum prices to producers are also established for wheat produced in Paraguay. Since three-fourths or more of wheat and flour consumed in Paraguay is imported, and differential pricing is neither feasible nor desirable, these prices also must be based principally on cost of imported wheat. For a number of years up to 1973, a substantial part of the wheat was imported from the U.S. under P.L. 480 loan programs, which gave the GOP considerable freedom in establishing and maintaining domestic price levels, because the wheat acquisition did not involve purchase with hard cash, and differences in internal pricing were easily absorbed as a difference in the amount of counterpart funds generated.

Due to relatively small 1972 crops of wheat and grain in major producing countries, principally Russia and China, and the subsequent exhaustion of U.S. government-held stocks, together with the concomitant sharp increase in prices, beginning 1973 wheat under U.S. P.L. 480 programs was no longer available. Consequently, in 1973 the Government of Paraguay entered negotiations with Argentina to purchase the needed wheat for cash, based on current world market prices. However, an additional quantity, 25 percent of the volume purchased, was donated by the Argentine government, as a special concession to Paraguay. In addition, an undetermined quantity of Argentine wheat flour and products, estimated to be as much as one-third of total Paraguayan wheat consumption in some years, enters regularly as unregistered imports.

Most canned foods and other processed food items consumed in Paraguay also are imported. For these items the retail selling price is based on acquisition cost plus costs of transport, import duties, and a marketing margin. Except for wheat products, prices to domestic producers or processors are not regulated, probably because there is little domestic production and thus little reason for such action.

(2) Commodities produced principally for domestic consumption

Prices and trade of several of the more important, basic products in this category are regulated, including sugar, coffee and rice. Of these, sugar is the most important in volume and is also subject to the most regulation.

Prices to producers for sugar cane and domestic retail prices of refined sugar and caña (sugar cane rum) are established by GOP (MIC) for each season. The price to producers for sugar cane has been based principally on domestic sugar prices, less a processing margin. Exports, however, have increased sharply in recent years, reaching nearly 30 percent of sugar production in 1974. If Paraguayan production continues to increase as predicted, world prices will become a governing factor in determination of the prices producers receive for their cane.

The volume of production and domestic resale prices of sugar are fixed by the Comisión Mixta de Venta y Distribución de Azúcar, composed of representatives of the sugar industry, in collaboration with MAG and MIC. The volume of sugar sold on domestic markets and exported is also controlled, and additional refining capacity cannot be built in Paraguay without the approval of the Comisión Mixta.

Retail (consumer) prices are also established for other processed products including locro (hominy), yerba mate, edible fats and oils, and polished rice. Maximum retail prices are established officially for fluid milk and mixed feed concentrates (balanceados).

Generally the prices and trade of other products produced and consumed principally within Paraguay (corn, sorghum, cassava, sweet potatoes, tomatoes, and other vegetables, pineapple, citrus and other fruits, etc) are not regulated by government action. Production, prices, packaging, and qualities, types and volumes bought and sold are left completely to the discretion of the individuals and firms operating the market place.

Some of these products, however, enter external markets sporadically or in relatively small volumes. In these instances the product exported must meet conditions required by the export market, including the price paid. Usually the external price has only an indirect impact on the price of domestically marketed production and arises from the spillover of the technology focused on products intended for export onto production for internal markets. Of course, occasionally a commodity produced specifically for export does not meet export requirements and is sold within Paraguay, thereby adding to the domestic supply and reducing domestic prices.

(3) Commodities produced for both domestic and export markets

A third group of commodities is consumed domestically, but a substantial portion of the production is sold in export markets. Soybeans, cotton, and tobacco are the most important commodities in this category. For cotton and soybeans, an increasing portion of production (which has grown faster than domestic demand) has been sold in external markets until, in recent years, the export market has become a dominant factor in the pricing and marketing of these crops. Earlier, minimum prices to producers were established each year to provide price protection at the grower level. In addition, volume quotas for domestic sale of cotton and export of soybeans were imposed on individual handlers, millers, etc. to assure that domestic needs were met.

The possiblity of collusion as well as abuse of de facto monopoly positions has long been an important consideration in establishing and executing marketing policies and programs. In Paraguay, governmental regulation of prices and marketing has usually been considered a necessary policy instrument to avoid possible private abuses of the de facto monopoly positions.

A break from this policy came in the 1975 season, when no minimum price was established for soybeans, and they were also permitted to be marketed without individual export quotas. Official minimum prices to producers for cotton were established for the 1975 harvest; these minimum prices were based on world market prices, which strengthened somewhat during the season, permitting normal harvest and marketing of cotton. Free marketing of soybeans became feasible because the volume of soybean production and number of soybean handlers (particularly exporters) have increased. In addition, with the larger volume sold in export markets, prices on the international markets have become the dominant factor affecting the price that exporters can pay for soybeans.

Since buyers for domestic use must compete with export buyers for supplies, prices for products purchased for internal

consumption must also conform to those established in external markets. Consequently when domestic production of a commodity grows from domestic-marketed status to export-marketed status, a minimum price to producers loses a substantial part of its meaning in terms of protecting farmers from domestic monopolists. Minimum prices can become an obstacle to the orderly marketing of a crop.

When minimum prices are imposed, if prices in international markets are high enough to permit payment of the minimum price to producers after subtracting marketing, transportation costs, and export charges, then the minimum prices to producers are complied with. If a minimum price for a crop (e.g. soybeans) is established for the season and if prices in world markets fall below the level on which the minimum price was based, it becomes impossible for handlers to pay minimum prices to Paraguayan producers. In this situation one or more of the following activities occur:

(a) Buying and movement stops, awaiting pricesto rise again.

(b) The government may permit paying a price lower than the minimum temporarily, or on an emergency basis, or some other reason, or simply permit movement at the lower price without taking action to obtain compliance.

(c) Unscrupulous buyers by-pass established marketing channels, paying as little as producers will accept, and exporting via contraband.

(4) <u>Commodities produced principally for export</u>

This group of products includes:

Tung, spurge, palm hearts, and essential oils which are produced in Paraguay, but, all or a substantial part, is sold in external markets.

The government of Paraguay does not intervene directly in the pricing or marketing of this group of products; the prices and requirements of external markets where they are sold determine both the price received by producers and the form or manner in which these products are prepared and marketed. As for all products exported, however, these are also subject to export taxes, duty fees and other costs of exporting.

d. Administration

In practice, the resulting agricultural price and trade regime is seen as a series of programs, activities and decrees by the government, which are only partially effective in achieving their objective. Because of the shortage of adequately trained and experienced technicians, particularly in Economics and Agricultural Economics (policy, marketing, and business management), it has been difficult to formulate and to achieve approval of appropriate and feasible marketing and price programs.

Official government decisions on price or trade programs on actions including those affecting agricultural products, are made by the Ministry of Agriculture, and concurred in by the Ministry of Industry and Commerce and the National Development Bank. Producer prices of agricultural commodities and other regulations dealing directly with raw agricultural products--inspection, storage, etc.--are administered mainly by the Ministry of Agriculture. Domestic retail prices, processing margins, and quotas generally are the responsibility of the Ministry of Industry and Commerce. There is necessarily an area of overlap, interaction, or mutual impact of these activities. Consequently, there is a substantial amount of collaboration and consultation between these two ministries (MAG and MIC) in establishing and administering price and trade programs.

One of the most difficult areas is the determination of specific price to be established, especially prices to producers. It is easy to say that the price to producers should be reasonable or "fair." However, it is usually difficult and sometimes impossible to reach an agreement on what is a "fair" price. Usually, a pragmatic compromise is necessary, with the prevailing prices in external markets often playing a dominant part in determination. For products which are produced domestically as well as imported, administered prices paid to producers and those paid by consumers must be closely coordinated to avoid problems.

An example of the problems which can be encountered can be seen in the 1974 season, when minimum price to producers for wheat was established at Gs. 27 per kilo, while maximum resale flour prices were maintained at a level reflecting wheat price of Gs. 19 per kilo (the value of imported wheat currently arriving, but negotiated at a lower price). Millers were permitted to receive wheat and pay Gs. 19 per kilo to producers. Thus a difference of Gs. 8 per kilo had to be financed from some source other than commercial channels.

Domestic wheat production amounts to only one-fourth of Paraguay's consumption, but in absolute terms it totaled about 32,000 tons. The Gs. 8 per kilogram difference, which had to come as a direct subsidy from government funds if payment was to be accomplished as promised, amounted to Gs. 256,000,000, which is the general magnitude of the annual budget for the entire Ministry of Agriculture. Although subsidies are not a part of the GOP policy for prices and trade of agricultural products, lack of close coordination in the administration of minimum prices to producers, imports and maximum prices to consumers forced the government to obligate itself to pay a direct subsidy to wheat producers.

In addition to establishment of minimum and maximum prices, and regulations for specific commodities, the Government of Paraguay has established a series of export taxes, and duty fees in addition to port and handling charges for commodities exported. The purpose of the taxes and duties is principally to provide a source of fiscal revenue rather than to regulate or otherwise control exports. Occasionally, however, attempts are made to effect a reduction in export taxes to permit higher producer prices. These reductions have been achieved by reducing the valor aforo, the base value on which the taxes are calculated, rather than by reducing or eliminating the export taxes or duties (which have been established by a complex series of resolutions, laws and presidential decrees).

In addition to these specific regulations on volumes and prices, retail food establishments are required to display their current retail prices for the following specified basic staple products: flour, sugar, rice, fideos (spaghetti, noodles, macaroni, etc.), dry beans, yerba mate, locro (hominy products), kerosene, potatoes, onions, domestic edible oils and fats, salt, facial soap, bread and crackers. Regulation is involved insofar as these retail prices are required to be "consistent with current market price levels" and cannot be changed for "speculative reasons."

ANNEX C-1

ASUNCION'S CENTRAL WHOLESALE PRODUCE MARKET

The central market of Asunción, Mercado No. 4, over the years has grown in volume of products to the detriment of the other Asunción produce markets, which generally have deteriorated.

The current condition of Mercado No. 4 is a heterogeneous conglomeration of people, shops, products, junk, mud, vehicles and garbage, where a wide assortment of food (and other) products are bought and sold in a system completely inadequate and unsanitary. Also, a variety of vices have become characteristic of the market such as usury, promiscuity, prostitution and the whole range of imaginable vices.

The general nature and conditions of Mercado No. 4 have not changed significantly during the last 20 years, according to reports written by numerous consultants during this period. The only major improvement was paving the streets in the market area, which considerably reduced the problem of mud in rainy weather. Otherwise, the market has grown as the population of Asunción has increased simply by spreading farther out along the streets adjacent to the market; no new facilities have been built or provided. Thus, the market today functions basically as it did 20 or more years ago.

Consequently, in 1972 the municipal government of Asunción, after consideration of the problem and possible solutions, embarked on a project to construct a new central wholesale market for Asunción, to replace the antiquated, antihygenic and inefficient Mercado No. 4.

The project, with an estimated construction cost of Gs. 100 million, was approved in August 1972, with anticipated completion by August 15, 1973. An initial budget of Gs. 140 million for total cost of the market was established, including land acquisition and improvements. Actual construction proceeded considerably slower than estimated, however, and prices of materials, labor, fuel and transport increased so that by mid-1975 the construction of the market was approaching the last stages of completion, with a total construction cost approaching Gs. 263 million, in addition to land acquisition costs of Gs. 15 million and paving of market grounds of Gs. 33 million, representing a possible total investment of Gs. 311 million.

Construction of the market is being financed by three loans from the Banco Central to the Municipalidad of Asunción totaling Gs. 200 million and an additional Gs. 45 million from the municipal budget.

The new Central Market is intended to replace the present Mercado No. 4 as the principal wholesale market for Asunción. Apparently it is intended that the numerous retailers now operating in Mercado No. 4 will move to the new Central Market. A complete large building is intended for retail sales of shoes and clothing.

ANNEX C-2

PURCHASING HABITS OF ASUNCION HOUSEHOLDS

A study of food marketing was conducted in January, February and March of 1971, in two working class barrios of Asunción, the capital city of Paraguay, by Mitchell, Centron and Costello. Considering the per capita gross national product of $238 in 1970, Paraguay has a well-fed population. However, a study done in 1965 indicated that 50 percent or more of the people surveyed had certain nutritional and/or calorie deficiencies. The following paragraphs are drawn from this study.

Household sizes averaged approximately 6.4 persons in Vista Alegre and an average of 5.8 persons in Herrera. The average household in the survey had 1.57 persons working at the time of the survey, mainly in blue-collar and minor white-collar jobs. Disposable household incomes ranged from the equivalent of $25 to $300 a month with the average being approximately $144 for Vista Alegre and $112 a month for households in Luis A. de Herrera. The majority of the families had a man as head of the house, but in 16.2 percent a woman was the head.

The decision on what to buy in the way of foods and where to buy was practically always a female prerogative. Over 90 percent of the time, the woman also did the shopping. The majority of people selected a store near them for distance, convenience and credit assortment reasons. The minority buying from public markets and the supermarkets bought in large quantities were more price-conscious and had more education and higher incomes. People buying at the public markets selected them because of price and assortment reasons. The majority of households bought in more than one retail outlet, but tended to center their purchases at one place. Most households purchased food every day. Purchases tended to be small and frequent. There appeared to be little "warehousing" or buying for more than one week at a time.

Shopping behavior for meat, bread products, cassava, tripe, cheese, oil, fresh tomatoes, sugar, rice and vegetables were described. With the exception of tripe, practically all were purchased in small quantities by the majority of consumers, mainly within four blocks of the house and at the neighborhood grocery (with the notable exception of meat). Very little comparison shopping was done, except by the persons buying in the public markets and the supermarkets. Food

purchasers generally went by foot to the market and returned by foot. (People going to the public markets frequently returned by public transportation.)

Noticeable was the limited consumption of fresh tomatoes by the households living in Herrera (the lower income barrio) and the limited consumption of fresh vegetables in both barrios. Income differences were noticeable in increased consumption of meat, bread products, noodles and cheese by higher income groups. Conversely, sugar, rice, cassava and tripe were consumed more by households with lower incomes.

About 89 percent of the meat purchases were of the lower cuts of meat--puchero and carnaza. Most families bought meat every day with an average purchase of over one kilogram. Meat is used greatly in the Paraguayan diet, often in stews and soups. Only about one of every 16 meat purchases was pork, chicken, mutton, duck or other forms of non-beef. The use of lomo (the better cut of beef) and non-beef products is closely correlated to income. Since formal education and income appear to be closely correlated, it is difficult to separate these two factors and their effect. Since on holidays we find the majority accepting mutton, pork, fish, chicken, turkey, etc., we could assume that this income group would be willing to consume different types of meat. Both from opinion questioning and from comparison of different income groups within the survey, it appears that the demand for more meat is still present as income rises in these income categories.

The majority of households within the last week had bought milk, generally in a natural (non-pasteurized) state. A few (5.4 percent) bought bottled pasteurized milk and 12.6 percent bought powdered milk. Milk consumption varied among members of the family but was significantly below the one pint per day per person often recommended by nutritionists. Milk appears to be in the dichotomy of being priced high relative to the mass markets, which makes it very easy for milk which has less processing costs to substitute for the pasteurized, bottled milk. At the time of the survey, dried milk was not significantly cheaper on a per quart basis and was used principally in higher income, better educated households.

Over 40 percent of the families reported they bought on credit. This may be under-reported as many persons felt if you had an open account and paid in 30 days or less that it was not credit. Over one-half of the households were making monthly payments on indebtedness for other than foodstuffs. Retail food prices were similar to those in the United States in that most stores did some "over" and "under"

pricing so that comparisons were difficult. Not all outlets handled the same products or those of similar qualities. In general, it could be said that prices were lower in the public markets and supermarkets by about two percent for the Herrera groceries and about seven percent for the neighborhood groceries of Vista Alegre. Vegetables as a group were much cheaper in the public markets. The effective price of meat as a group was lower in the public markets and at the supermarkets. Prices in the neighborhood groceries of Herrera, farther away from the public markets, were about five to six percent higher than in Vista Alegre. Neighborhood groceries often differed by offering more credit and other means of differentiating their services and products.

Households using the public markets and the supermarkets appeared to have not only higher income and more formal education but also to be more price conscious, more innovative about acceptance of new products and more desirous of consumer education and information. A majority of the housewives interviewed said they would like to know more about consumer economics and household management.

Although it may be for social reasons, it appeared that the reasons for frequent purchases of food (over 10 times a week) was due to limited incomes and lack of storage. Only one-third of the households had refrigerators. Although not a part of this study, it appeared that the high cost of installing electricity plus the high rates were discouraging its use and the consequential use of appliances.

The average household in Vista Alegre had reported monthly disposable income of Gs. 18,133 per month of which they spend about 49.6 percent or Gs. 8,933 on food consumed in the house. (Food consumed away from the house and alcoholic beverages were not considered part of the food bill.) The average Luis A. de Herrera household spent Gs. 7,153 for food monthly or 51.3 percent of their monthly disposable income (Gs. 14,122). When the families were divided into five income groups, the total amount spent for food increased as income increased (ranging from Gs. 4,234 on the lowest income group in Herrera to Gs. 13,027 in the highest income group in Vista Alegre), while the percent of income spent for food decreased from approximately 63.5 percent in the lowest income group to 41.4 percent in the highest income group.

Households having income of $50 a month spent about 63.6 percent of their disposable income for food, whereas families with around $150 of monthly income spent approximately 41.4 percent of their income for food consumed within the home. If we can extrapolate the relatively high income elasticity of over 0.7 revealed in this survey for beef, we can readily see that increases in per capita income,

population and urbanization will cause great pressure on the beef cattle industry to expand, product prices to tend to rise, and Paraguay could easily follow in the path of Argentina, which now experiences beef-less weeks.

D. PROFILE OF SMALL FARMERS

1. The Number and Size of Farm Units

According to 1969 data utilized by the Ministry of Agriculture (MAG) in its annual production surveys[1] there are 141,216 farm units in eastern Paraguay with less than 21 hectares of land. These units represent 87.4 percent of all farm units. Within this group 10,173 farms have less than one hectare and thus can hardly be considered as viable units. In other small-farm size ranges, 56,693 farms had one to five hectares of land, 31,266 had five to 10 hectares of land, and 41,203 farms had 10 to 21 hectares of land. Thus, a total of 129,162 farm units or 79.9 percent of all farm units in eastern Paraguay, ranged from one to 21 hectares. While the number of farms of this area in this section of the country has undoubtedly increased since 1969, the total is probably not more than 140,000.

Approximately one-half of all small farm units are larger than five hectares. Table D-1 illustrates some of the complexities of the spatial distribution of small farms in eastern Paraguay. The four departments adjacent to Asunción encompass most of the central minifundia zone. Over 90 percent of all farm units in these departments have less than 21 hectares of land. In these central-zone departments, over 43 percent of farms range from one to five hectares and over 80 percent of farm units range from one to 21 hectares.

In six other departments (designated as the small-farm zone in Table D-1), farms of less than 21 hectares account for between 75 percent and 90 percent of all farm units. In these six departments, farm units in the 1- to 21-hectare range exceed 72 percent of all units. Two of these departments, Caazapá and Misiones, have a rather substantial portion of farm units in the one- to five-hectare range. In the remaining four departments, between 35 and 47 percent of all farm units fall in the 10- to 21-hectare range, and between 54 and 67 percent of all farm units are in the five- to 21-hectare range.

The remaining three departments of eastern Paraguay had very few farm units in the one- to 21-hectare range in 1969. In the past three years, subdivision of land in Alto Paraná has proceeded rapidly. For this reason, data presented in Table D-1 do not accurately reflect the present land distribution in that department.

1/ See MAG, Encuesta Agropecuaria por Muestreo 1972, p. 24

TABLE D-1

DISTRIBUTION OF FARM UNITS IN EASTERN PARAGUAY BY LAND SIZE (1969)

Department	Percentage of Farm Units in Size Category by Hectares a/					
	0 - 21	1 - 5	5 - 10	10 - 21	1 - 21	No. Farms 1 - 21 Has.
Minifundia Zone						
Cordillera	92.0	46.9	23.9	14.3	85.1	15,973
Guairá	92.5	43.6	17.3	19.3	90.2	11,809
Paraguarí	90.2	47.1	21.4	15.0	83.5	20,996
Central	96.6	55.1	17.6	7.5	80.2	11,133
						59,911
Small-Farm Zone						
Caazapá	89.4	40.5	18.8	25.5	84.8	8,880
Caaguazú	88.6	21.3	25.2	41.4	87.9	13,437
Concepción	88.3	19.8	17.8	47.3	84.9	7,348
San Pedro	84.7	19.8	17.1	43.1	80.0	11,817
Itapúa	76.3	20.0	19.3	34.8	74.1	12,528
Misiones	78.2	38.7	18.8	15.1	72.6	5,197
						59,207
Other						
Alto Paraná	58.6	11.5	12.1	29.6	53.2	2,737
Ñeembucú	71.7	6.3	36.9	13.7	56.9	5,192
Amambay	73.2	1.7	7.2	64.3	73.2	2,115
						10,044

Source: MAG, Encuesta Agropecuaria por Muestreo 1972, p.24.

Note: a/ Remaining farm units include (1) farms with 21 hectares and over and (2) units for which land size data are not available.

The Departamento de Censo y Estadísticas Agropecuarias (DDEA) of the Ministerio de Agricultura y Ganadería has conducted annual sample surveys of agricultural production since 1970. The samples are drawn from a listing of all the individuals engaged in agriculture. The original list was created in 1969-1970. Approximately 8,000 enumerators were sent to the countryside under the supervision of six DDEA officials. At that time, the country was divided into 156 districts, and a district supervisor was designated for each district to supervise the preparation of the list of farmers with the assistance of the enumerators. For purposes of the list, a farmer was defined as any person cultivating more than 0.1 hectare. Within each district, the farms were stratified by size into five groups.

In the annual production surveys, the highest stratum is interviewed in its entirety while varying percentages of the farms in each of the remaining strata are interviewed. The size of the sample in each stratum obeys the criteron of covering a larger percentage of the universe in those strata where a higher degree of variation exists while reducing the sample size in the other strata.

The main purpose of annual production surveys is to obtain production estimates for the entire country, although the design of the sample allows an expansion of the figures by regions and strata.[1/] The accuracy of the expanded estimates obtained depends mainly upon two things: First, the sample results are only statistical estimates of the real parameters valid for all the farms in each region and stratum. In other words, a random error is introduced by the nature of the sample. The degree of accuracy of the sample estimate is expressed by the coefficient of variation (this is defined as the ratio between the sample standard deviation and the sample mean).[2/]

1/ The entire country divided into four regions constitutes the framework of the sample surveys. The largest region covers the entire zona oriental (Eastern Paraguay) while the other three are in the Chaco. Since production estimates by department were strongly desired, estimates are calculated on the assumption that the average per-farm estimates obtained for each stratum in the entire region are valid for each one of the departments within the region.

2/ The accuracy of the sample estimates obtained varies depending on the region and the crop. The more commonly produced crops like cassava provide land use estimates with a coefficient of variation (C.V.) of 0.01 for the country as a whole, while other less common crops yield higher coefficients of variation. In the case of potatoes, the land use estimate has a C.V. of 0.20 for the entire country. Similarly, the accuracy of the estimates, as measured by the C.V., varies with the district.

Secondly, once the sample estimates are obtained, the next step is to expand them by region and stratum. This is where another potential source of error arises: The final estimates are based on the estimates of the number of farms in each category as they appear on the original list prepared in 1969-1970. It is obvious that the distribution, as well as the size of the universe, has changed in the last five years, and so the lists should be revised if more accuracy is desired. In an effort to correct this deficiency, the lists have been updated in 1972 in the Amambay, Alto Paraná and San Pedro departments.

Annex D-1. presents the boundary values used to stratify the farm in each one of the four regions, as well as the sample design used in the 1972 survey, indicating the number of interviewed farms in each stratum and region.

2. Economic Profile

a. Income.

The two following tables, which give profile of gross farm and net family income, are based on data collected in interviews with farmers by the Centro Paraguayo de Estudios Sociológicos (CPES) under two A.I.D. Contracts. Table D-2 is from 271 farms in three districts (Itá, Quiindy and Santa Rosa). The sample utilized was a stratified random sample with stratification on the basis of available information on distribution of farms by land size.

Table D-3 is from 484 farms in three districts (Loreto, Itacurubí and Coronel Oviedo). The sample utilized was basically a stratified random sample with the restriction that approximately one-half of the farmers interviewed were members of credit unions affiliated with CREDICOOP (233 of the 484 farmers were members). The questionnaires employed in each survey were identical in regard to income, production and cost information and were based upon detailed production estimates and utilization of specific crops and expenses. (The initial testing of the questionnaire revealed substantially larger variation in amounts stated by farmers unless within the context of less exhaustive questioning)

One important characteristic of the valuation of production utilized in tabulation of all production is that valuation is given by the farmer. For example, if he sells 100 kilograms of cassava at Gs. 5 per kilogram, the same value is given to 10,000 kilograms of cassava used to feed pigs. For this reason relatively large variance in gross farm income may occur for farms of nearly identical characteristics. In large groups, however, this methodology does not create

TABLE D-2

PROFILE OF FARMERS: COMPOSITION OF GROSS FARM AND NET FAMILY INCOME ACCORDING TO FARM LAND SIZE IN ITA, QUIINDY AND SANTA ROSA (MINIFUNDIA ZONE)

	(161 Farms) Less than 5 hectares		(88 Farms) 5 to 20 hectares		(22 Farms) 20 hectares and over	
	Gs.1,000	Percent	Gs.1,000	Percent	Gs.1,000	Percent
Gross Farm Income	57.6	100.0	129.6	100.0	937.8	100.0
Sales	(26.2)	(45.5)	(79.5)	(61.3)	(811.1)	(86.5)
Annual Crops	14.6	25.4	46.2	35.7	558.1	59.5
Permanent Crops	2.7	4.7	14.6	11.3	44.5	4.8
Forestry Production	0.0	0.1	0.6	0.5	10.4	1.1
Livestock	6.4	11.2	12.2	9.4	53.0	5.7
Livestock Products	2.3	4.0	5.7	4.4	144.8	15.4
On-Farm Consumption	(31.1)	(54.0)	(48.3)	(37.3)	(93.1)	(9.9)
Annual Crops	15.9	27.7	26.5	20.5	36.7	3.9
Permanent Crops	2.4	4.3	2.8	2.2	5.7	0.6
Forestry Production	0.0	0.0	0.6	0.5	1.6	0.2
Livestock	3.4	5.9	4.3	3.3	13.1	1.4
Livestock Products	9.2	16.1	14.0	10.8	35.8	3.8
Other Farm Income	(0.2)	(0.5)	(1.7)	(1.4)	(33.5)	(3.6)
Gross Farm Income	57.6	100.0	129.6	100.0	937.8	100.0
Annual Crops	30.6	53.1	72.8	56.2	594.6	63.4
Permanent Crops	5.2	9.0	17.5	13.5	50.6	5.4
Forestry Production	0.1	0.1	1.3	1.0	12.2	1.3
Livestock	9.8	17.1	16.5	12.7	66.6	7.1
Livestock Products	11.6	20.1	19.7	15.2	180.0	19.2
Other Farm Income	0.3	0.5	1.8	1.4	33.8	3.6
Expenses	8.9	15.5	20.9	16.2	211.8	22.6
Labor	4.4	7.8	11.5	8.9	59.7	6.4
Other	4.5	7.7	9.4	7.3	152.1	16.2
Net Farm Income	48.7	62.0	108.6	88.3	726.0	88.0
Off Farm Income	29.9	38.0	14.3	11.7	98.5	12.0
Net Farm Family Income	78.6	100.0	123.0	100.0	724.5	100.0

TABLE D-3

PROFILE OF FARMERS: COMPOSITION OF GROSS FARM AND NET FAMILY INCOME ACCORDING TO FARM LAND SIZE IN LORETO, ITACURUBI, AND CORONEL OVIEDO (OTHER ZONE)

	(98 Farms) Less than 5 hectares		(295 Farms) 5 to 20 hectares		(91 Farms) 20 hectares and over	
	Gs.1,000	Percent	Gs.1,000	Percent	Gs.1,000	Percent
Gross Farm Income	91.5	100.0	166.2	100.0	391.7	100.0
Sales	(50.0)	(54.6)	(111.0)	(66.8)	(296.5)	(75.7)
Annual Crops	34.0	37.2	83.1	50.0	134.2	34.3
Permanent Crops	4.6	5.0	10.8	6.5	29.6	7.6
Forestry Production	3.3	3.6	0.5	0.3	9.6	2.5
Livestock	5.4	5.9	11.9	7.2	24.2	6.2
Livestock Products	2.5	2.7	4.6	2.8	98.8	25.2
On-Farm Consumption	(41.4)	(45.2)	(54.6)	(32.9)	(93.2)	(23.8)
Annual Crops	23.8	23.8	26.5	15.9	29.2	7.5
Permanent Crops	3.3	3.6	2.8	1.7	7.5	1.9
Forestry Production	2.0	2.2	0.1	0.0	0.9	0.2
Livestock	5.0	5.5	9.1	5.5	11.9	3.0
Livestock Products	9.1	9.9	16.0	9.6	43.9	11.2
Other Farm Income	(0.0)	(0.1)	(0.5)	(0.3)	(2.0)	(0.5)
Gross Farm Income	91.5	100.0	166.2	100.0	391.7	100.0
Annual Crops	55.8	61.0	109.6	65.9	163.4	41.7
Permanent Crops	7.9	8.6	13.6	8.2	37.1	9.5
Forestry Production	5.3	5.8	0.6	0.4	10.5	2.7
Livestock	10.4	11.4	21.0	12.6	36.1	9.2
Livestock Products	11.6	12.7	20.6	12.4	142.4	36.4
Other Farm Income	0.0	0.1	0.5	0.3	2.0	0.5
Expenses	9.7	10.6	19.4	11.7	54.1	13.8
Labor	4.6	5.0	9.7	5.8	33.1	8.5
Other	5.1	5.6	9.7	5.8	21.0	5.4
Net Farm Income	81.8	86.4	146.7	93.6	337.6	94.9
Off Farm Income	12.9	13.6	10.0	6.4	18.2	5.1
Net Farm Family Income	94.7	100.0	156.8	100.0	355.8	100.0

significant distortion and is preferable to assigning arbitrary shadow prices to all production items. The data are based on the 1972-1973 crop year, and the interviews were made from November 1973 to March 1974.

Table D-2 is representative of areas of the central zone in which minifundia predominate. With the exception of the Itacurubí district minifundia do not predominate in the areas covered by Table D-3.

Gross farm income as shown in Tables D-2 and D-3 is identical to gross farm production. (Both concepts can be altered for a variety of analytical purposes.) Gross farm income as used in Tables D-2 and D-3 includes all sales of farm produce and all on-farm consumption of farm produce by human beings. (Changes in livestock inventory, consumption of crops by animals and crops used for seed are not included in these two tables but are used in further discussion.)

Tables D-2 and D-3 confirm the following general composition characteristics of gross farm production.

(1) Increasing proportion of cash sales of farm produce as size of farm increases;

(2) Increasing proportion of gross farm income absorbed by cash expenses as size of farm increases.

Sales, plus on-farm consumption of annual crops, account for over one-half of gross farm income in all farms except those in Table D-3 with over 20 hectares. On-farm consumption (only that of human beings) accounts for over 30 percent of gross farm income on farms of 5 to 20 hectares and approximately one-half of gross farm income of farms of less than 5 hectares.

On-farm consumption of livestock and livestock products ranges from 13 to 20 percent of gross farm income on farms of less than 20 hectares. Livestock products account for 22 to 30 percent of on-farm consumption for all farms with less than 20 hectares.

The principal source of cash income for farms smaller than 20 hectares resulted from sales of annual crops. Sale of livestock is generally the second most important source of cash income. Sales of permanent crops, forestry products and livestock products are relatively unimportant sources of cash income for farms smaller than 20 hectares.

The different geographical areas encompassed in Tables D-2 and D-3 reveal significant differences in regard to farms with less

than five and more than 19.9 hectares. In the minifundia area, over 38 percent of net family income for farms with less than five hectares is from off-farm employment; in the "other" zone, only 13.6 percent of net farm family income is from off-farm employment. In the minifundia zone, the large farms are more commercialized and have a higher ratio of annual expenses to gross farm income.

These facts suggest a symbiotic relationship of large and small farmers in the minifundia zone which is lacking in other areas. Large farms in the "other" area commercialize a lower percentage of their production and are more oriented toward livestock and livestock products than their counterparts in the minifundia area.

Table D-4 presents basic income and production data for 1,001 farms in six districts of eastern Paraguay. These districts are Puerto Presidente Stroessner (Department of Alto Paraná), Villarrica (Department of Guairá), San José (Department of Caaguazú), Loreto (Department of Concepción), Coronel Oviedo (Department of Caaguazú), and Itacurubí de la Cordillera (Department of Cordillera). There are a sufficient number of farms in each size stratum to ensure that average income data are meaningful. The stratum with the least farms is that which contains farms of less than three hectares (only 62 observations). The data are not necessarily representative in the sense that farms were selected in accordance with proportion of farms in each size stratum in each district. For this reason the aggregative data from which Table D-4 is constructed are not necessarily representative of total production of the six districts nor of each district. However, it does appear justifiable to consider these data as generally representative of average farms in each size category for most of eastern Paraguay, with the possible exceptions of farms of over 30 hectares and farms of less than three hectares.

One of the principal objectives of the survey was to obtain estimates on gross farm income and production in such a way as to include on-farm consumption of human beings. (Previous studies usually obtained information limited to sales of farm produce.) Prior to undertaking the survey, it was found that farmers could not estimate the gross value of total production accurately and that a very detailed questionnaire was needed to detect gross farm production. The solution to this problem added greatly to the length of field interviews, hand calculations after interviews and to computer programming work and computer machine time. The average cost per farmer for the work undertaken in Survey One was approximately $30.00, including field administration of a 33-page questionnaire. The deficiencies in the final data result mainly from the fact that additional detail could have been programmed for computer calculation, which would have increased the accessibility of more detailed information.

TABLE D-4

PROFILE OF FARMERS: AVERAGE GROSS FARM INCOME AND PRODUCTION, NET FARM INCOME, AND NET FARM FAMILY INCOME FOR STUDY ONE AREA BY SIZE OF FARM
(1972-73 Crop Year in Thousands of Guaranies)

	30 hectares and over	20 to 29 hectares	10 to 19 hectares	5 to 9 hectares	3 and 4 hectares	Less than 3 hectares
A. Excluding Change in Animal Inventories						
On-Farm Consumption	111.1	72.4	56.7	49.6	46.5	22.9
Sales of Farm Products	306.7	167.8	124.6	81.0	58.7	24.1
Other Farm Income	7.0	1.2	0.6	0.4	0.1	0.0
Gross Farm Income	424.8	241.4	181.9	131.0	105.3	47.0
(Gross Farm Production)	(426.1)	(242.4)	(182.6)	(132.4)	(105.4)	(48.2)
Annual Expenses	114.7	38.4	28.8	16.6	12.1	6.3
Net Farm Income	310.1	203.0	153.1	114.5	93.1	40.7
Off Farm Income	33.1	16.3	18.2	11.7	13.3	20.8
Net Farm Family Income	343.2	219.3	171.3	126.2	106.5	61.4
B. Including Change in Animal Inventories						
Change in Animal Inventories	91.7	21.5	21.9	8.3	15.5	4.3
Gross Farm Income	516.5	262.9	203.8	139.3	120.8	51.4
(Gross Farm Production)	(517.8)	(263.9)	(204.5)	(140.6)	(121.0)	(52.6)
Annual Expenses	114.7	38.4	28.8	16.6	12.1	6.3
Net Farm Income	401.7	224.2	175.0	122.7	108.7	45.0
Off Farm Income	33.1	16.3	18.2	11.7	13.3	20.8
Net Farm Family Income	434.9	240.8	193.2	134.4	122.0	65.8
Wages-Paid	55.0	20.8	15.5	8.9	6.1	3.1
Number of Farms	134	190	236	266	113	62
Average Farm Size (Hectares)	58.4	22.8	12.7	6.5	3.6	1.4

Definitions of income and production utilized in Table D-4 are as follows: Gross farm income is the sum of on-farm consumption by human beings of farm produce (both crops and animal products), sales of farm products, and other farm income. Other farm income includes cash income arising from use of specialized on-farm machinery and installations; e.g., stills, grinding mills, etc.

Part A of Table D-4 excludes change in animal inventories. Change in value of animal inventories is defined as final value of stock (June 30, 1973), minus purchase of animals during the 1972-1973 crop year, plus sale and consumption of livestock, minus initial value of animal inventories (July 1, 1972). In effect, if sales and consumption of animals exceeds intra-year growth and purchase, the change in animal inventory is negative, and in the reverse case it is positive. For a period of time as short as one year, we should expect an addition to a farmer's net worth because of an increase in the physical volume of animal inventories. The 1972-1973 crop year was also a period of increasing value of livestock. Therefore, it appears reasonable to assert that a statement of farm income inclusive of change in animal inventories tends to overstate farm income in comparison with years before and after the survey year in which the value of livestock did not increase as rapidly.

It is valid to include the increase in animal inventories in income concepts encompassing change in net worth. Part B should be utilized if the definition of income which is desired is to be consistent with changes in net worth. If one desires a concept of income limited to realized cash income and on-farm consumption, Part A should be utilized.

Gross farm production is equal to gross farm income plus retention of annual crops for seeds and produce delivered by sharecroppers. As is evident from inspection of Table D-4, gross farm production is almost the same as gross farm income for all farm strata.

Net farm income is defined as gross farm income minus annual expenses. Net farm family income is defined as net farm income plus the off-farm cash income of persons who are members of the family group which includes the farm owner or operator. Annual expenses of the farm include cash payments for expense items. These items include hired labor, rent paid for machinery and work animals, purchase of seeds, fertilizers, and insecticides, cost of care of animals, land rents and cash payments for other services which may include bottles, transportation, taxes, interest, fuel, etc.

There are several general observations which appear worthwhile. Farm income, both gross and net, increases by size of farm. It would be surprising if this were not the case. There appears to be a significant break in net farm income between farms of less than three hectares and those between three and four hectares. Based solely on area, net farm income and land size for other strata are the following multiples of the smallest farms.

Strata *	Multiple of Smallest Farms: Land Size	Multiple of Smallest Farms: Net Farm Income
Less than 3	1.0	1.0
3-4	2.6	2.3
5-9	4.6	2.8
10-19	9.1	3.8
20-29	16.3	5.0
30 +	41.7	7.6

Farm size has significant influence on net farm income. As the average size increases from 1.4 to 3.6 hectares (a 160-percent increase in average farm size), net farm income increases by 130 percent. In the following strata the relationship between land size and income is much weaker; e.g., as average size increases from 3.6 to 6.5 hectares--an 81-percent increase--net farm income increases by only 23 percent. And, as one compares farms with 10 to 19 hectares against those of 5 to 9 hectares, a 95-percent increase in average farm size net farm income increases by only 34 percent.

It appears obvious that the smallest farms could use more land and produce more income but the relationship between land size and income is strong only up to about four hectares. The data in Table D-4 suggest that farms with less than three hectares are too small to provide the farm family with adequate income. Families on the smallest farms obtain 34 percent of their income from off-farm employment. This suggests that many farm families with the least land continue to live on their small farms due to (1) independent social or cultural reasons and/or (2) because they lack access to higher-paying off-farm employment. The net farm and family incomes of the smallest farmer families permits little doubt regarding their relative poverty.

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* All land size data are encoded to whole hectares. For example 2.5 hectares become 3 hectares; 2.4 hectares become 2 hectares.

A striking similarity of status of farm family units exists in regard to on-farm consumption for farms of 3 to 19 hectares. The value of on-farm consumption increases by only Gs. 10,200 as average size of farm increases from 3.6 to 12.7 hectares. This suggests that the farmer generally takes care of his consumption requirements first and then turns to the marketable production.

b. Capital:

Table D-5 includes data from Survey One for the 1,001 farms organized into the six land-size categories previously utilized for composition of production and concepts of farm income.

Fixed capital is defined as the value of land (and improvements of land) and permanent structures. Data on permanent structures were collected in the following detail, noting in particular farm houses, barns, machine sheds, chicken houses and pens, water tanks, wells, hog houses and pens, stills for essential oil and molasses, and other structures. The value of land and structures was that stated by the farmer.

Working capital is defined as comprising animal inventory and implements, and is used here only to signify that the capital involved depreciates or rotates in a period generally limited to 10 years; e.g., the farmer can alter the mix of such capital over a few years. The questionnaire employed the following detail to obtain the animal inventory: oxen and bulls, cows, steers, calves, horses, burros, pigs (male and female), piglets and fowl. The questionnaire employed the following detail in regard to implements: carts, wooden plows, steel plows, harrows, seeders, dusters, wheelbarrows, drag saws, shovels, rakes, brush knives, axes, hoes and other implements and machinery.

Circulating capital is simply cash annual expenses.

The sum of these three types of capital is gross capital. Net capital is gross capital less indebtedness. As is indicated by Table D-5, gross capital increases as size of farm increases. For farms of over 30 hectares, the average gross capital is $11,300. Average gross capital per farm drops off rather sharply as farm size declines: $3,850 (20 to 29 hectares), $2,800 (10 to 19 hectares), $1,890 (5 to 9 hectares), $1,300 (3 to 4 hectares), and $760 (less than 3 hectares).

The composition of capital, particularly of fixed capital, varies markedly by size of farm. The percentage of gross capital

TABLE D-5

PROFILE OF FARMERS: AVERAGE FIXED CAPITAL, WORKING CAPITAL, CIRCULATING CAPITAL, GROSS CAPITAL AND NET CAPITAL FOR STUDY ONE AREA BY SIZE OF FARM
(1972-73 Crop Year in Thousands of Guaranies)

	30 hectares and over	20 to 29 hectares	10 to 19 hectares	5 to 9 hectares	3 and 4 hectares	Less than 3 hectares
A. Fixed Capital	799.7	289.0	178.2	134.7	80.2	52.1
1. Permanent Structures & Improvements	596.4	194.3	112.3	74.0	28.9	12.7
2. Land	203.3	94.6	65.9	60.7	51.2	39.3
B. Working Capital	509.6	158.6	145.9	86.1	71.7	38.3
1. Animals	381.1	134.9	125.2	74.9	63.5	32.0
2. Implements and Machinery	128.5	23.7	20.7	11.2	8.3	6.2
C. Circulating Capital = Annual Expenses	114.7	38.4	28.9	17.7	12.1	6.3
1. Wages	55.0	20.8	15.5	8.9	6.1	3.1
2. Other	59.7	17.6	13.3	8.8	6.0	3.2
D. Gross Capital	1,424.1	486.0	352.9	238.5	164.0	96.7
1. Net Capital	1,383.8	452.2	341.7	227.0	159.2	95.8
2. Indebtedness	40.3	33.8	11.2	11.5	4.8	0.9
E. Economic Capital A (= A1 + B + C)	1,220.8	391.4	287.0	177.8	112.7	57.3
F. Economic Capital B (= A1 + B)	1,106.1	353.0	258.2	160.2	100.7	51.0
G. Number of Farms	134	190	236	266	113	62

invested in land increases as size of farm decreases, and the percentage of gross capital invested in permanent structures decreases as size of farm decreases. The percentages for each are as follows:

Farm Size (hectares)	Percentage of Gross Capital In Land	Percentage of Gross Capital In Permanent Structures
30 and over	14.3	41.9
20-29	19.5	40.0
10-19	18.7	31.8
5-9	25.5	31.0
3-4	31.2	17.6
less than 3	40.6	13.1

Table D-6 presents data on income and capital on a per hectare basis. Gross capital per hectare and gross farm income per hectare are inversely related to farm size. Inasmuch as labor intensity undoubtedly increases as farm size decreases, and larger farms occupy less productive land than small farms, these inverse relationships between farm size and capitalization and income are normal.

The composition of capital by farm size contains some unexpected characteristics. The value of land per hectare has strongly inverse relationship to size of farm. Value of land is normally related to location and to land fertility. The increase in value indicated in Table D-6 as size of farm decreases appears acceptable down to the 3-4 hectare stratum. However, it is difficult to believe that parcels smaller than 3 hectares are worth twice as much as parcels of 3-4 hectares. It may be that respondents on the smallest farms included a portion of the valuation of roads, fences and other permanent structures in the value of their land. There appears to be no significant change in the value of permanent structures per hectare for the six strata. The values of implements and annual expenses are also inversely related to land size; the absolute values of both are small as compared with gross capital. (A few tractors on the largest farms may account for doubling in value of implements on farms of over 29 hectares.) The rather sharp increment in value of implements on farms of less than three hectares suggests that indivisibility of implements is the major reason.

The animal inventory per hectare reveals a sustained increase as size of farm decreases. The composition of farm animal inventories undoubtedly changes as size of farm decreases. It is probable that beef animals predominate on large farms and oxen, milk cows and chickens on small farms. Unfortunately, data on animal inventories were not encoded for line-item computer computation.

TABLE D-6

PROFILE OF FARMERS: AVERAGE FARM CAPITAL AND NET INCOME PER HECTARE IN AREA ONE BY SIZE OF FARM
(1972-73 Crop Year in Guaranies)

	30 hectares and over	20 to 29 hectares	10 to 19 hectares	5 to 9 hectares	3 and 4 hectares	Less than 3 hectares
A. 1. Land	3,482	4,153	5,203	9,331	14,334	29,015
2. Permanent Structures	10,214	8,529	8,864	11,384	8,092	9,407
3. Animals	6,527	5,920	9,887	11,516	17,754	23,646
4. Implements	2,201	1,042	1,634	1,725	2,296	4,603
5. Annual Expenses	1,964	1,686	2,280	2,721	3,393	4,607
6. Gross Capital	24,387	21,331	27,867	36,676	45,869	71,342
B. 1. Economic Capital (A)	20,906	17,178	22,664	27,345	31,534	42,327
2. Economic Capital (B)	18,941	15,491	20,384	24,624	28,156	37,657
C. 1. Gross Farm Income	7,274	10,596	14,366	20,160	29,487	34,829
2. Gross Farm Income (including change in animal inventories)	8,844	11,540	16,095	21,446	33,834	38,022
D. 1. Net Farm Income	5,310	8,908	12,087	17,601	26,051	30,035
2. Net Farm Income (including change in animal inventories)	6,880	9,852	13,815	18,871	30,393	33,215
E. 1. Rate of Return D.L./A.6.	.218	.418	.434	.480	.568	.421
2. Rate of Return D.2./A.6.	.282	.462	.496	.515	.663	.466
F. Proprietary Income (Cost of Capital 20% per annum)	433	4,642	6,514	10,266	16,878	15,767
G. Payment to Labor and Land (Cost of capital 20% per annum)	2,060	6,387	8,782	13,501	21,455	23,874
H. Payments to Labor (Cost of land and capital 20% per annum)	1,364	5,556	7,741	11,635	18,588	18,071

The gross capital less the value of land is included in Table D-6 in "Economic Capital A." The additional deletion of annual expenses defines "Economic Capital B." Even with these exclusions, purely economic definitions of capital reveal the same generally inverse relationship to farm size as does gross capital.

Gross farm income per hectare and net farm income per hectare are strongly inversely related to farm size. A hectare on the smallest farms (less than 3 hectares) produces over four times as much gross income as a hectare on the largest farms (over 29 hectares). The comparative change in net farm income is even stronger. The most acceptable explanation for this result is that the largest farms produce mainly livestock, and on these farms additional use of labor will add little to net farm income. In contrast, the smallest farms produce mainly crops and net farm income includes substantial income remunerating the family labor employed in crop production.

The rate of return on gross capital; i.e., net farm income divided by gross capital, is shown in Table D-6, line E. This is a straightforward calculation of net return on capital. For example, if the average farm in one of these strata is bought and the labor is supplied to the same extent as at present, the rates of return on capital presented would apply. With certain exceptions, the rate of return on gross capital increases as size of farm decreases. The smallest farms have a lower rate of return than farms with 3-4 hectares. The largest farms have a significantly lower rate of return on gross capital than other farms. This probably reflects imperfection in the capital market (large farms compete with uses of capital outside of agriculture and not with uses of capital on smaller farms) and production technology of larger farms is more capital intensive than that of the smaller farms (beef production as practiced in Paraguay is more capital intensive than crop production).

Line F of Table D-6 represents the adjustment of net farm income by an annual deduction of 20 percent charged for gross capital.

Line G is the sum of wage expenses plus net farm income less a 20-percent per annum charge for use of economic capital (A). This is equivalent to proprietary and labor income from land after a charge is made for use of economic capital. This statistic indicates the magnitude of income per hectare which can be considered as land rent and labor income, and is inversely related to farm size.

Line H adjusts the above statistic by charging 20 percent per annum in land rent based on the value of land. This statistic comes as close to net income from labor as the data permit. If the amount of labor does not change significantly as farm size increases (as appears to be the case up to 10 hectares), a crude approximation of farm family productivity can be derived.

c. Land

According to 1969 data utilized by the Ministry of Agriculture in its annual production surveys, there are 141,216 farm units in eastern Paraguay with less than 21 hectares of land. Within this group, 8.5 percent have less than one hectare (or give no information), 40 percent have 1 to 4.9 hectares, 22 percent have 5 to 9.9 hectares, and 29 percent have 10 to 21.9 hectares. In Survey One, 667 farmers had less than 20 hectares, and within this group 26 percent had from 0 through 4 hectares, 40 percent had 5 through 9 hectares, and 35 percent had 10 through 19 hectares. Thus, the distribution of farms in Survey One was not identical to the distribution of farms by land size in eastern Paraguay. However, there are adequate numbers of farms in each size category to draw some conclusions.

As noted earlier, land appears to be a significant determinant of income only for absolutely small farms. Table D-6, line H offers a rough approximation to labor income per hectare. As can be observed, labor income per hectare generally declines as farm size increases. This decline is normal in the sense that the available family labor force has to be spread over more land, and additional labor-saving capital may be economical as size of farm increases. In addition, as less productive land is included in the farm, income maximization may alter the composition of output, thereby shifting the production function toward land extensive and away from labor intensive production; i.e., toward livestock and away from annual crops.

Total returns to labor (hired workers, farm family members and proprietors) for work on the farms of Survey One are as follows by size of farm:

Size of Farm (in hectares)	Annual Labor Income (in Guaraníes)
1	18,069
2*	36,649
3*	52,380
4	68,118
5	71,231
6	74,343
7*	77,456

8	81,115
9	84,773
10	88,432
11	92,091
12*	95,749
13	99,153
14	101,962
15	104,770

Data for land size other than 1, 2, 4, 7, and 12 hectares are merely interpolations of these. What is striking is the sharp decline in the returns to labor from hectare size increments in total land on farms larger than five hectares. We do not know how many man-days of labor are included with each size, but the total number of man-days undoubtedly increases with size of farm. However, data on wages paid by size of farms suggest that the increase in number of man-days is not large. For this reason, the relationship between total annual labor income and farm land size behaves almost as if the amount of labor utilized were constant. Differences in land fertility and location might explain a marginal return to labor of Gs. 15,732 in a four-hectare farm as compared with Gs. 2,808 in one of 15-hectares. It does not explain Gs. 3,123 marginal return to labor in a six-hectare farm.

From the data presented, we cannot reject the idea that the technology used by most farmers to produce crops is labor-intensive, that the available labor supply is utilized first on annual subsistence and cash crops, and that the remaining labor is utilized on less productive (and land extensive) livestock production. Value of capital per hectare by size of farm in implements and permanent structure does not suggest that larger farms utilize more capital intensive production. It may be that, apart from very few crops (rice and soybeans), such technology is either unavailable or uneconomic.

Survey One contains only limited information on the pattern of farm land utilization. Data were collected on eight crops: cassava, corn, beans, sweet potatoes, tobacco, soybeans, cotton and castor seeds. All except the latter are annual crops (castor seeds grow on bushes which are replanted every four to five years).

Presentation of data on annual crops from Survey One requires a brief review of composition of that survey by districts and farm

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* Adjusted observations (from Table D-6).

size. Table D-7 includes these data. Six farm sizes and six districts generate 36 cells for ensuing data on crop frequency, average hectares planted (or harvested), and average yields. Seven of the 36 cells contain less than 10 observations; for these cells average yields and area planted are based upon so few observations that even unbiased errors in farmer-supplied information are unlikely to cancel out.

As is indicated in Table D-8, nearly all farms (and all sizes of farms) produce cassava. The frequency of cultivation of corn is nearly as high, and, with the exception of farms of less than three hectares, over three-fourths of all farms cultivate corn. The cultivation of beans is less widespread. Although over one-half of the farms in most strata grow beans, the uniformity of bean production by region is less striking than that of cassava and corn. Beans are less frequently cultivated in the Stroessner and Loreto districts than in other districts. Sweet potatoes have a low frequency of cultivation apart from the Stroessner district and on farms with less than three hectares of land.

Table D-9 indicates frequency of occurrence of farm "cash" crops: tobacco, soybeans, cotton and castor seeds. These data reveal marked regional differences. Soybeans appear significant only in the Stroessner district, but their popularity undoubtedly increased after the 1972-1973 crop year. Tobacco is a popular cash crop in the Stroessner and Coronel Oviedo districts. Elsewhere less than 30 percent of the farmers grew tobacco. Cotton is a popular crop in the Loreto, Coronel Oviedo and Itacurubí districts, with cultivation occurring on more than one-half of the farms with three or more hectares. Castor seeds are favored in the Loreto district, but are not so popular elsewhere.

Table D-10 includes data on area planted and on yields of the four predominant annual crops by region and size of farm. All cells containing less than 10 observations are denoted by an asterisk (*). The area of cassava harvested is only slightly related to farm size. Farms with less than three hectares cultivated 0.6 hectare; farms with 30 hectares and over cultivated 1.6 hectares of cassava. The change in area utilized for corn cultivation by size of farm is more pronounced, with 0.6 hectare used on farms of 3 and 4 hectares to 1.2 hectares on farms of 10 to 19 hectares, and 2.1 hectares on farms with 30 hectares and over. For beans, there appears to be, if anything, a decrease in cultivation with increase in size of farm. Farms with 20 hectares and over planted 0.8 hectare; farms with 3 to 19 hectares planted 1.0 hectare. In summary, the area of farm land

TABLE D-7

NUMBER OF FARMS AND TOTAL HECTARES IN AREA ONE SURVEY BY SIZE OF FARM

	30 hectares and over	20 to 29 hectares	10 to 19 hectares	5 to 9 hectares	3 and 4 hectares	Less than 3 hectares	Total
A. Number of Farms (Interviews)							
Stroessner	50	104	10	12	3	0	179
Villarrica	40	20	33	28	18	28	167
San José	11	8	45	79	18	10	171
Loreto	16	36	76	24	16	8	176
Coronel Oviedo	14	15	54	73	17	0	173
Itacurubí	3	7	18	50	41	16	135
TOTAL	134	190	236	266	113	62	1,001
B. Total Hectares (of A)							
Stroessner	2,380	2,410	128	60	11	0	4,989
Villarrica	2,401	428	385	175	65	35	3,489
San José	508	190	591	512	60	12	1,873
Loreto	953	778	992	170	58	12	2,963
Coronel Oviedo	911	356	663	492	60	0	2,482
Itacurubí	672	167	230	321	150	24	1,564
TOTAL	7,825	4,329	2,989	1,730	404	84*	17,360
C. Average Hectares	58.4	22.8	12.7	6.5	3.6	1.4	17.3

* Increased by one hectare to account for five observation with "0" hectares.

TABLE D-8

FREQUENCY OF OCCURRENCE OF CULTIVATION OF CASSAVA , CORN, BEANS, AND SWEET POTATOES IN AREA ONE BY SIZE OF FARM DURING THE 1972-73 CROP YEAR (Data in Percent)

Crop and District	30 hectares and over	20 to 29 hectares	10 to 19 hectares	5 to 9 hectares	3 and 4 hectares	Less than 3 hectares
A. Cassava						
Stroessner	100.0	100.0	100.0	91.7	100.0	-
Villarrica	97.5	100.0	97.0	89.3	100.0	82.1
San José	90.9	100.0	100.0	97.5	100.0	100.0
Loreto	93.3	97.3	97.4	95.8	93.8	75.0
Coronel Oviedo	92.9	100.0	100.0	100.0	100.0	-
Itacurubí	100.0	100.0	100.0	100.0	95.1	93.8
B. Corn						
Stroessner	100.0	99.0	100.0	100.0	100.0	-
Villarrica	92.5	95.0	97.0	75.0	77.8	57.1
San José	100.0	100.0	100.0	97.5	100.0	90.0
Loreto	93.3	89.2	90.8	100.0	87.5	37.5
Coronel Oviedo	92.9	93.3	98.2	95.9	100.0	-
Itacurubí	100.0	100.0	100.0	100.0	95.1	93.8
C. Beans						
Stroessner	68.0	59.6	50.0	66.7	33.0	-
Villarrica	60.0	60.0	81.8	75.0	50.0	60.7
San José	100.0	50.0	84.0	83.5	77.8	60.0
Loreto	60.0	45.9	44.7	37.5	75.0	25.0
Coronel Oviedo	50.0	53.3	66.7	68.5	64.7	-
Itacurubí	66.7	100.0	88.9	88.0	80.5	75.0
D. Sweet Potatoes						
Stroessner	26.0	32.7	100.0	66.7	33.3	-
Villarrica	10.0	5.0	12.1	7.1	12.5	60.7
San José	18.2	0.0	8.9	7.6	11.1	60.0
Loreto	0.0	10.8	6.6	8.3	12.5	25.0
Coronel Oviedo	10.4	6.7	37.0	6.8	11.8	-
Itacurubí	0.0	0.0	11.1	16.0	17.1	75.0

TABLE D-9

FREQUENCY OF OCCURRENCE OF CULTIVATION OF TOBACCO, SOYBEANS, COTTON, AND CASTOR SEEDS IN AREA ONE BY SIZE OF FARM DURING THE 1972-73 CROP YEAR (Data in Percent)

Crop and District	30 hectares and over	20 to 29 hectares	10 to 19 hectares	5 to 9 hectares	3 and 4 hectares	Less than 3 hectares
A. Tobacco						
Stroessner	48.0	26.0	20.0	41.2	66.7	-
Villarrica	0.0	15.0	6.1	7.1	11.1	0.0
San José	36.4	0.0	22.2	20.5	5.6	0.0
Loreto	13.3	8.1	9.2	29.2	0.0	0.0
Coronel Oviedo	57.1	46.6	46.3	57.5	41.2	-
Itacurubí	0.0	0.0	16.7	20.0	16.6	0.0
B. Soybeans						
Stroessner	82.0	72.1	20.0	25.0	0.0	-
Villarrica	52.5	15.0	15.2	7.1	12.5	0.0
San José	18.2	0.0	0.0	0.0	0.0	0.0
Loreto	6.7	2.7	1.3	0.0	6.3	0.0
Coronel Oviedo	7.1	0.0	0.0	0.0	5.9	-
Itacurubí	0.0	0.0	0.0	0.0	0.0	0.0
C. Cotton						
Stroessner	8.0	5.8	20.0	8.3	0.0	-
Villarrica	12.5	30.0	15.2	21.4	11.1	0.0
San José	16.7	62.5	17.8	29.1	27.8	10.0
Loreto	66.7	78.4	78.9	62.5	50.0	30.0
Coronel Oviedo	57.1	53.3	74.1	74.0	70.6	0.0
Itacurubí	66.7	100.0	72.2	94.0	82.9	81.3
D. Castor Seeds						
Stroessner	4.0	1.9	0.0	8.3	0.0	-
Villarrica	5.0	0.0	6.1	7.1	11.1	3.6
San José	18.2	12.5	8.9	13.9	11.1	0.0
Loreto	66.7	94.6	85.5	100.0	87.5	40.0
Coronel Oviedo	7.1	6.7	9.3	11.0	5.9	-
Itacurubí	0.0	14.3	5.6	8.0	7.3	6.3

TABLE D-10

AVERAGE YIELD AND AREA CULTIVATED OF CASSAVA , CORN, BEANS, AND COTTON IN AREA ONE BY SIZE OF FARM DURING THE 1972-73 CROP YEAR

Crop and District	30 hectares and over	20 to 29 hectares	10 to 19 hectares	5 to 9 hectares	3 and 4 hectares	Less than 3 hectares
A. Cassava						
1. Yield (Metric tons)						
Stroessner	17.1	17.5	13.9	10.0	-	-
Villarrica	16.4	17.3	14.8	13.6	17.7	12.5
San José	15.2	16.9 *	16.3	13.6	14.1	16.0
Loreto	21.0	17.8	20.3	21.1	9.6	21.1 *
Coronel Oviedo	15.7	16.8	17.7	19.5	10.0	-
Itacurubí	15.0 *	17.5 *	14.4	14.3	14.4	12.0
2. Area Cultivated (Hectares)						
Stroessner	1.3	1.1	1.5	1.5	1.1	-
Villarrica	1.8	1.3	2.8	1.0	0.9	0.5
San José	1.8	2.1 *	1.4	1.2	1.1	0.7
Loreto	1.4	1.3	1.0	0.9	0.7	0.5 *
Coronel Oviedo	1.1	1.2	1.1	0.7	1.[illegible]	-
Itacurubí	2.0 *	1.1 *	1.1	0.8	0.7	0.5
B. Corn						
1. Yield (Metric tons)						
Stroessner	2.1	2.3	1.6	1.3	-	-
Villarrica	2.1	1.9	1.5	1.2	1.1	1.8
San José	1.0	1.4 *	1.1	1.2	1.0	1.2
Loreto	1.7	1.7	1.6	1.9	1.1	1.0 *
Coronel Oviedo	1.8	2.0	1.9	2.1	2.4	-
Itacurubí	1.7 *	1.6 *	1.4	1.5	1.4	1.1
2. Area Cultivated (Hectares)						
Stroessner	3.1	2.5	1.6	0.8	-	-
Villarrica	2.2	1.2	0.9	0.8	0.5	0.4
San José	1.5	1.5 *	0.9	0.8	0.6	0.3
Loreto	2.5	1.4	1.0	0.9	0.5	0.3 *
Coronel Oviedo	1.3	1.0	1.2	0.7	0.7	-
Itacurubí	2.1 *	2.7 *	1.7	1.0	0.8	0.4

TABLE D-10 (Cont'd)

Crop and District	30 hectares and over	20 to 29 hectares	10 to 19 hectares	5 to 9 hectares	3 and 4 hectares	Less than 3 hectares
C. Beans						
1. Yield (Metric tons)						
Stroessner	0.7	1.1	1.8 *	1.0 *	1.6 *	-
Villarrica	0.9	0.6	0.8	1.2	0.5	1.1
San José	0.7	0.6 *	0.7	0.7	0.9	0.5 *
Loreto	0.8 *	0.9	0.8	1.0 *	0.7	0.7 *
Coronel Oviedo	0.8 *	1.1 *	0.8	0.9	1.3	-
Itacurubí	0.8 *	0.7 *	0.9	0.8	0.8	0.7
2. Area Cultivated (Hectares)						
Stroessner	0.5	0.5	0.4 *	0.4 *	0.2 *	-
Villarrica	0.8	0.8	0.6	0.5	0.3	0.4
San José	0.5	0.8 *	0.4	0.3	0.3	0.2 *
Loreto	0.7 *	0.4	0.4	0.5 *	0.5	0.4 *
Coronel Oviedo	0.6 *	0.5 *	0.4	0.3	0.3	-
Itacurubí	1.0 *	0.3 *	0.4	0.3	0.3	0.2
D. Cotton						
1. Yield (Metric tons)						
Stroessner	1.1	1.7	0.5	1.0	-	-
Villarrica	1.3	2.1	1.2	1.0	1.0	-
San José	0.9	1.2	0.8	1.0	0.8	1.2
Loreto	1.3	1.1	1.2	1.1	1.0	1.3
Coronel Oviedo	1.5	1.1	1.3	1.6	1.3	-
Itacurubí	2.1	1.5	1.3	1.2	1.1	1.2
2. Area Cultivated (Hectares)						
Stroessner	1.5 *	0.7 *	0.7 *	1.0 *	-	-
Villarrica	1.0 *	1.0 *	1.6 *	1.2 *	0.6 *	-
San José	2.0 *	2.1 *	1.1 *	0.8	0.5 *	0.5 *
Loreto	3.8	2.3	1.8	1.2	1.4 *	1.4 *
Coronel Oviedo	3.6 *	1.2 *	1.4	1.2	0.8	-
Itacurubí	5.0 *	1.8 *	2.4	1.7	1.1	0.5

Note: * Indicates less than 10 observations.

devoted to annual food crops (a large portion of which is consumed on the farm) is not highly related to farm size. The behavior of farmers in cultivating these crops suggests that they have an imputed value higher than possible alternatives but that off-farm sales are not viewed as profitable and may not be so.

The performance of food crops contrasts with that of cotton. By decreasing farm size, the average cotton planting for cells observed in Table D-10 is as follows in hectares: 2.8, 1.5, 1.5, 1.2, 0.8 and 0.8. Although it is also true that a decreasing proportion of total farm land is devoted to cotton production as farm size increases, a positive correlation exists between size of farm and area planted to cotton.

Survey One offers some data on utilization of farm land by size of farm. As is shown in Table D-11 there is a strong inverse relationship between size of farm and the proportion of land utilized for crops. Data were collected on land utilized for each of eight annual crops, all other annual crops and all permanent crops. Farmer responses were entered to the 1/100th of a hectare (100 square meters) with typical entries of 1/10, 1/4, 1/2 and 3/4 of one hectare. In some cases two crops such as beans and corn may be grown on the same land. In such cases, surface area is entered for both crops. For this reason there is undoubtedly some double-counting, and data on hectares utilized for annual crops are overstated. Closer inspection of questionnaires suggests that the amount of overstatement does not exceed 20 percent on the average.

The percentage of land utilized for crops decreases rapidly as farm size increases, from over 80 percent for farms smaller than four hectares to 41 percent for farms with 10 to 19 hectares, and 20 percent for farms larger than 30 hectares. Decreasing quality and fertility of land, decreasing demand for on-farm consumption, and decreasing availability of farm family labor as size of farm increases are suggested as probable causes of the pattern of land utilization revealed by Table D-11.

Payments for wages offer an approximation to increases in the labor requirements as farm size increases. Wage payments per hectare of <u>all</u> farm land decrease as farm size increases. This tendency is consistent with the smaller proportion of labor per hectare required by livestock operations. For farms with less than 20 hectares we assume that labor is hired mainly to produce crops. When wage payments are divided by hectares in crop production, wage payments per hectare increase. This behavior is consistent with the hypothesis that the farm family supplies the bulk of labor required for crops and that outside labor is hired to handle peak labor requirements (almost without regard to size of farm).

TABLE D-11

UTILIZATION OF FARM LAND FOR CROPS AND WAGE PAYMENTS
IN AREA ONE SURVEY BY DISTRICT AND SIZE OF FARM

	30 hectares and over	20 to 29 hectares	10 to 19 hectares	5 to 9 hectares	3 and 4 hectares	Less than 3 hectares
A. Average Farm Size (Hectares)						
Stroessner	47.6	23.2	12.8	5.0	3.7 *	-
Villarrica	60.0	21.4	11.7	6.3	3.6	1.3
San José	46.2	23.8 *	13.1	6.5	3.3	1.2
Loreto	59.6	21.6	13.1	7.1	3.6	1.5 *
Coronel Oviedo	65.1	23.7	12.3	6.7	3.5	-
Itacurubí	224.0 *	23.9 *	12.8	6.4	3.7	1.5
All Farms	58.4	22.8	12.7	6.5	3.6	1.4
B. Hectares Utilized for Crops per Farm						
Stroessner	9.0	7.5	5.5	3.3	2.6 *	-
Villarrica	13.7	14.4	6.3	3.5	2.7	1.3
San José	10.2	9.2 *	4.9	3.7	2.8	1.4
Loreto	9.8	6.9	5.1	4.7	3.3	1.5 *
Coronel Oviedo	9.8	4.6	4.7	3.6	3.2	-
Itacurubí	62.2 *	6.2 *	7.1	4.4	3.1	1.6
All Farms	11.9	7.9	5.3	3.9	3.0	1.4
C. Utilization of Land for Crops (in Percent)	20	34	41	60	83	100
D. Wages Paid (Guaranies)						
1. Per Farm	55,004	20,845	15,548	8,905	6,117	3,122
2. Per Hectare	942	915	1,228	1,369	1,711	2,304
3. Per Hectare of Crops	4,633	2,636	2,929	2,310	2,045	2,119

Note: * Less than 10 observations.

Survey Two affords a more detailed categorization of farm land utilization. Farmers were asked to state utilization of their land in the following categories: annual crops, permanent crops, fallow, natural pasture, artificial pasture, indirectly productive land, forest land and other. A thorough examination of responses converted all replies to multiples of one hectare and subjected the total to the test that the sum of uses had to differ by no more than one hectare from the farm size stated by the interviewee.

Data on land use in the Survey Two area are shown in Table D-12. On farms with less than five hectares, annual crops utilize 80 percent of the farm land. Average size for these farms is only 2.34 hectares. Farms with 5 to 19 hectares use 53 percent of farm land for annual crops. Average farm size for these farms is 8.41 hectares. Farms with 20 hectares or more utilize 21 percent of the land for annual crops. These results are strikingly similar to those registered in the Survey One area. Table D-12, line 2, also records data on the basis of summation of stated uses of land for specific crops in which data were recorded to 1/100 of one hectare. (Rounding off to the nearest hectare and double-cropping produces some discrepancies.)

The most interesting result of both surveys is the amount of land utilized on large farms for annual crops. It may be that the annual crops have differing labor intensities; e.g., that large farms in the minifundia area grow labor intensive crops and that those outside this area grow crops requiring less labor. In any event, the areas in crops per farm are quite similar.

Surveys One and Two requested interviewees to state if they were not cultivating all of the land they considered as potentially cultivable (See Table D-13). Those farmers utilizing all cultivable land amounted to 15.4 percent of interviewees in Survey One and 51.7 percent of those of Survey Two. Those farmers stating lack of labor, means of production, and forest to be cleared amounted to 41.6 percent of Survey One interviewees and 14.4 of Survey Two interviewees. Thus, there were significant differences in responses between the districts included in the two surveys. These differences appear related to the relative abundance of labor and scarcity of land among interviewees in the Survey Two area districts chosen as representative of minifundia conditions.

d. Labor

Each farm unit can be viewed as having the proprietor's labor and that of his family available to it. Additional labor

TABLE D-12

UTILIZATION OF LAND ON FARMS IN AREA TWO SURVEY:[a] AVERAGE PER FARM

	In Hectares			In Percent		
	Less than 5 hectares	5 to 19 hectares	20 hectares and over	Less than 5 hectares	5 to 19 hectares	20 hectares and over
A. Type of Use						
Annual Crops	1.87	4.47	38.77	80	53	21
Permanent Crops	.13	.71	4.23	5	8	2
Fallow	.15	.93	30.09	6	11	16
National Pasture	.06	.69	88.18	3	8	47
Artificial Pasture	-	.11	9.18	0	1	5
Indirectly Productive	.07	.32	.86	3	4	1
Forest	.01	.55	5.50	0	7	3
Other	.06	.63	8.95	3	8	5
Total	2.34	8.41	185.77	100	100	100
B. Used for Crops [b]						
Annual Crops	1.78	4.66	21.93			
Permanent Crops	.39	1.35	2.64			
Total	2.17	6.01	24.57			
C. Number of Farms						
Reporting	141	88	22			
Total Possible	161	88	22			

Notes: a/ Minifundia area, districts of Itá, Quiindy, and Santa Rosa.

b/ Based on data recorded to 1/100 of one hectare.

TABLE D-13

REASONS GIVEN FOR NOT USING ALL CULTIVABLE LAND

	Survey One		Survey Two	
	Number	&	Number	%
A. Interviewees not Using All Cultivable Land and Reason Gives				
Lack of Labor	138	13.8	0	0.0
Lack of means of production	233	23.3	27	10.0
Low or Unstable Prices	8	.8	1	0.4
Follow land	109	10.9	44	16.2
Forest land	166	16.6	12	4.4
Not necessary to cultivate more land	45	4.5	6	2.2
Other	148	14.8	41	15.1
Total Interviewees Stating Reason	847	84.6	131	48.3
Total Interviewees not Stating Reason (i.e. using all cultivable land)	154	15.4	140	51.7
Total Interviewees in Survey	1,001	100.0	271	100.0

B. Amount of Cultivable Land not Utilized: Survey One (hectares)	Interviewees	Percent
Less than 1.0	72	8.5
1 to 2	130	15.3
2 to 4	143	16.9
4 to 7	129	15.2
7 to 11	100	11.8
11 to 15	73	8.6
15 and over	200	23.6
Total	847	100.0

may be hired by the farm proprietor. However, the labor of the proprietor's family may be only partially available for work on the farm. The questionnaire employed in Survey Two requested data on age and time available from the head of the household for on-farm work by all family members (including relatives and others who lived with the family group). Obviously, persons within the family group, so defined, who are employed off the farm to such an extent as to be noticed by the head of the household are not counted as fully available.

These data were converted to man-days according to the following criteria. All persons of age 15 and over were counted as equivalent to one man-year on proportion of availability thereof given by the respective interviewee. Males of age 13 and 14 were counted as equivalent to 1/2 man-year and females as equivalent to 1/3 of one man-year. Males of ages 6 through 12 were counted as equivalent to 1/3 of one man-year and females of ages 6 through 12 were counted as equivalent to 1/4 of one-man year. The percentage figure of availability given by the interviewee applies to all persons six years of age and over. One man-year was considered as containing 300 man-days. Results of this calculation are presented in Table D-14, where farm units are separated in two strata by size of net capital; (A) less than Gs. 67,500 and (B) greater than Gs. 67,500. (Gs. 67,500 is equivalent to US$536.)

The availability of farm family labor to each farm does not appear to vary significantly by size of farm. Even though the larger farms have more labor available to them than do the smaller farms, this difference probably arises only from the quasi-permanent off-farm work of members of families of the smaller farms. If a worker from a small farm has a permanent (full-time) or part-time job on an adjacent farm or nearby town, the questionnaire response is likely to record this fact in utilization. If the entire small-farm family works for three weeks off their farm picking cotton, and such labor is occasional, such fact may or may not be recorded in labor utilization.

Any assumption regarding man-days of labor available in one man-year in Paraguayan agriculture is open to question. The 300-man-day assumption would appear as a theoretical maximum: 50 weeks of six work-days each. A 270-man-day assumption would allow for 30 days when effective work is canceled by rain. A 240-man-day assumption would allow 30 days for market-related activities and approximately 60 days of such activity for the family unit. While a 240-day assumption appears low, it is the equivalent of 48 weeks containing five work-days. Selection of theoretical maximum of work-days in a year is obviously important and somewhat arbitrary.

The maximum number of man-days of labor that can be utilized by a farm may be less than the number available to it. Land size poses one constraint on labor utilization. There may be other constraints, of which the most important is seasonality of labor requirements. Economic motives alone would create a strong tendency for farmers to select crops and plan work so as to utilize labor up to the maximum available. However, it may be quite impossible to make the maximum that can be utilized coincide with the maximum available because of peak seasonal labor requirements of particular crops. A farm family may maximize income without utilizing all labor available to it.

The selection of Gs. 67,500 of net capital as the dividing line between two groups of farmers was because substantial numbers of farmers would result in each district. Survey Two encompassed 271 interviews in three districts; therefore, further division of data into two groups by size of net capital results in six data cells.

It appears safe to assume that farmers with net capital below Gs. 67,500 have less than five hectares of land.[1/]

What is clear is that farm families with net capitals below Gs. 67,500 do not use even as much as one-half of their available labor on their own farms. (See Table D-14.) This group undoubtedly accounts for the high percentage of off-farm income in net farm family income for farm families with less than five hectares of land. (See Table D-2.) Farm families with net farm capital greater than Gs. 67,500 appear to hire labor if tested against the more conservative assumptions of available family labor. It is fairly clear that in the minifundia area, manpower from the very small farms is utilized on the larger farms. This hiring of labor may result in substantial underemployment of labor in the minifundia zone as compared with other areas. Although this hypothesis may be true, further investigation is precluded by lack of data on labor utilization in other areas.

Table D-15 indicates labor utilization by type of task. The major share of labor on small and large farms is used to produce annual crops. Only on the larger farms of Quiindy and Santa Rosa does labor devoted directly to livestock production account for a substantial

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1/ The farm size for farmers with less than Gs. 67,500 of net capital is generally less than five hectares. For example in Survey Two 85 percent of the farms with less than Gs. 50,000 of net capital and 75 percent of farms with less than Gs. 100,000 of net capital had less than five hectares. Approximately 40 percent of farmers with a net capital of less than Gs. 100,000 also had less than three hectares.

TABLE D-14

AVERAGE AVAILABILITY OF LABOR FROM FARM FAMILIES AND UTILIZATION OF LABOR ON FARMS IN THE SURVEY TWO AREA IN MAN DAYS

	District					
	Itá		Santa Rosa		Quiindy	
	(A)	(B)	(A)	(B)	(A)	(B)
A. Availability of Labor from Family for on-farm Employment						
1. Man days per year (based on 300 man day assumption)	636.1	718.9	690.5	778.0	632.2	645.8
2. Man days per year (based on 270 man day assumption)	572.5	647.0	621.5	700.0	560.9	581.2
3. May days per year (based on 240 man day assumption)	508.9	575.1	552.4	622.4	498.6	516.6
B. Utilization of Labor on Each Farm	238.6	585.8	223.5	828.0	249.0	581.7
Number of Farms	55	36	45	43	38	51
C. Other Information on Availability of Labor (Based on 300 man day assumption)						
1. Median	546.9	625.7	573.9	626.2	485.6	594.0
2. Standard deviation of observations	389.0	385.2	424.8	437.3	354.6	308.7

Notes: Group (A) includes farms with net capital less than Gs. 67,500.
Group (B) includes farms with net capital equal to or greater than Gs.67,500.

TABLE D-15

AVERAGE UTILIZATION OF LABOR ON FARMS IN SURVEY TWO AREA[a] BY TYPE OF TASK AND STRATIFIED INTO TWO GROUPS BY SIZE OF NET CAPITAL [b]

	Itá		Santa Rosa		Quiindy		Itacurubí	
	(A)	(B)	(A)	(B)	(A)	(B)	(A)	(B)
A. In Man Days								
Annual Crops	170.4	339.8	178.3	666.8	189.0	290.4	454.4	631.2
Permanent Crops	35.5	185.3	13.5	22.2	15.3	49.2	23.3	45.3
Livestock Care	22.1	50.3	22.2	126.4	34.4	209.7	35.1	62.0
Poultry Care	10.4	10.5	9.4	12.4	10.1	32.4	10.4	11.0
Total	238.6	585.9	223.5	828.0	249.0	581.7	523.3	749.6
B. As Percent of Total								
Annual Crops	71.5	58.0	79.8	80.6	76.0	49.9	86.8	84.2
Permanent Crops	14.9	31.6	6.0	2.7	6.1	8.5	4.5	6.0
Livestock Care	9.3	8.6	9.9	15.3	13.8	36.0	6.7	8.3
Poultry Care	4.4	1.8	4.2	1.5	4.1	5.6	2.0	1.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C. Number of Farms	55	36	45	43	38	51	17	22

Notes: a/ Also includes 39 farms in Itacurubí.

b/ Farms with net capital of less than ₲67,500 are included in Group (A); Farms with net capital equal to or greater than ₲67,500 are included in Group (B).

percentage of total labor utilization. The classification system utilized to account for the distribution of labor between crops and livestock is biased against livestock in the sense that labor used to grow crops which are fed to livestock and poultry is counted as utilized in crop production. In addition, the methodology used by CPES to obtain man-days used for livestock and poultry is understood to be based on a conversion table prepared from limited in-depth interviews and is directly related to the number of animals rather than being based on complete survey-interviewee responses. Even though this methodology might tend to understate utilization of labor for livestock and poultry care, the absolute number of man-days used on the larger farms of Quiindy and Sant Rosa appears sufficiently high to overcome reasonable doubts.

Information prepared by the Ministry of Agriculture (MAG) and published in its Cuentas Culturales 1972-1973 provides an overall impression of labor requirements for annual crops. These data are based on opinions of experts who work with farmers, but not upon detailed interviews and sample surveys. Table D-16 presents data from the above source and compares it with the estimates published by the ILO in its 1975 report on labor conditions and its perspectives for Paraguay, and also with the labor input estimates obtained from the Survey Two data; that is, the CPES/AID survey of 271 farmers.

The figures are shown in Table D-16; the estimates drawn from the three sources come extraordinarily close to 135 man-days per hectare for tobacco production.

The MAG coefficients for both cotton and soybeans do not include labor for harvesting, and this probably explains why they are relatively low in comparison with the other estimates. The Survey Two column shows three different estimates because cotton production was classified by technological groups that result also in varying expected yields.

The Survey Two coefficients for cassava and corn are larger than the others, but this is not reason enough to believe that they must be wrong. The Survey Two figures do not result from armchair guesses but from actual field observations of 271 farms. Furthermore, since the frequency distribution of the observation might not follow a normal symmetrical distribution around the mean, the median and not the mean was used as a measure of the central tendency.

The PREALC and MAG estimates are not very different for sweet potatoes, rice and castor seeds.

TABLE D-16

MAN-DAYS OF LABOR PER HECTARE

Crop	MAG	CPES/AID Survey Two a/	PREALC
Cassava	87.0	111.3	73.0
Corn	48.0	60.7	42.0
Beans	26.5 b/	-	45.0
Lima Beans	26.5 b/	-	48.0
Sweet Potatoes	56.0	-	55.0
Sugar Cane	51.0 b/	-	94.0
Cotton	59.0 b/	108.6 86.5 59.1	74.0
Tobacco	134.0	135.0	139.0
Soybeans	24.5 b/	36.9	34.0
Rice	85.0	-	92.0
Castor Seeds	50.0	-	38.0

Sources: 1) MAG, Secretaría de Coordinación Técnica, Cuentas Culturales (1972-1973).

2) OIT, Programa Regional del Empleo para América Latina y el Caribe, Situación y Perspectivas del Empleo en Paraguay, January, 1975.

Notes: a/ See Tables D-29 to D-36.

b/ It odes not include labor for harvest.

In the three remaining crops: beans, lima beans and sugar cane the MAG estimates are clearly below the ones drawn from PREALC, the reason probably being that the MAG coefficients did not include the labor required for harvesting, but assumed that it was performed by off-farm labor under a contract.

Table D-17 contains the average monthly utilization of labor on farms in four districts in eastern Paraguay: Itá, Santa Rosa, Quiindy, and Itacurubí. The first three districts are those of Survey Two.[1/] The seasonality of employment is not as pronounced as one might expect. On the smaller farms, the months with lowest labor utilization are December, January and February. At the larger farms, seasonality of labor requirement is more dissimilar. In Itá, the peak is clearly July and is relatedto the citrus harvest. In Santa Rosa, peak requirements occur in January, March, April and November and are related to rice and cotton. In Itacurubí, peak requirements are in March, April, July, August and October, and cotton is the principal crop. Ingeneral, there is a fairly even degree of labor utilization throughout the year.

The farms in the Survey Two area included in the labor utilization survey were selected as representatives of all farms in the three districts. For this reason, labor not utilized on the smaller farms is available to larger farms. Apart from the use of family labor, labor from outside the sample district and possibly some unrecorded labor available to larger farms, labor demands by large farms must be satisfied by the smaller farms. According to the test that labor must be supplied from within the same district, 76 percent of available labor is utilized in the Itá district, 89 percent in the Santa Rosa district, and 82 percent in the Quiindy district. These results are rather surprising because they imply labor utilization of at least 70 percent on the basis of 240 work days per year. One conclusion is that a pool of permanently unemployed labor does not exist on the small farms. This result suggests that local labor markets operate with adequate efficiency to supply labor from small farms to larger farms and suggests that the timing of labor utilization by small and large farms is complementary and organized so as to reduce farm-level labor deficits and surpluses.

A large group of farmers in the four districts grow cotton, corn and cassava. Information supplied by these farmers on monthly labor utilization is summarized in Table D-18 and Figure D-1. The monthly pattern of labor utilization for these farms suggest that

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1/ Data on labor availability exist for the three districts in Survey Two, but do not exist for districts in Survey One.

TABLE D-17

AVERAGE MONTHLY UTILIZATION OF LABOR ON FARMS (IN AREA TWO SURVEY AND ITACURUBI) STRATIFIED INTO TWO GROUPS BY SIZE OF NET CAPITAL a/

	Itá		Santa Rosa		Quiindy		Itacurubí	
	(A)	(B)	(A)	(B)	(A)	(B)	(A)	(B)
January	11.3	22.8	11.2	79.7 *	21.9	45.4 *	40.5	46.3
February	12.3	20.8	11.4	58.7 *	15.5	47.0 *	42.5	58.4 *
March	14.0	29.7	15.9	87.5 *	17.8	43.7 *	55.6 *	81.3 *
April	21.5	34.7	18.4	112.1 *	17.9	44.7 *	45.6 *	84.6 *
May	23.9	37.9	24.3	71.3 *	15.8	49.2 *	29.0	41.6
June	18.3	32.7	26.0	43.9	18.3	46.8 *	28.0	49.0 *
July	26.7	174.9 *	16.8	35.9	21.6	54.6 *	30.1	79.5 *
August	25.1	43.8	23.9	68.4 *	29.1	54.0 *	50.6 *	72.1 *
September	31.9	37.6	23.1	52.8 *	25.8	57.4 *	45.8 *	54.7 *
October	22.9	56.7 *	20.7	57.7 *	25.5	50.6 *	63.2 *	71.4 *
November	16.0	47.1	19.8	107.5 *	19.9	46.7 *	47.5 *	63.2 *
December	14.0	46.9	12.7	52.0 *	19.7	41.2	44.3 *	47.0
TOTAL	238.6	585.8	223.5	828.0	249.0	581.7	523.3	749.6
Availability b/ Per Month	42.4	48.8	46.0	51.9	41.6	43.0	43.3 c/	47.6 c/
Annual	508.9	575.1	552.4	622.9	498.6	516.6	520.0	571.5
Number of Farms	55	36	45	43	38	51	17	22

Notes: * Indicates utilization exceeds farm availability.

a/ Farms with net capital of less than ₡67,500 are included in Group (A); farms with net capital equal to or greater than ₡67,500 are included in Group (B).

b/ Based on assumed 240 man-day year.

c/ Hypothetical; average of other districts.

TABLE D-18

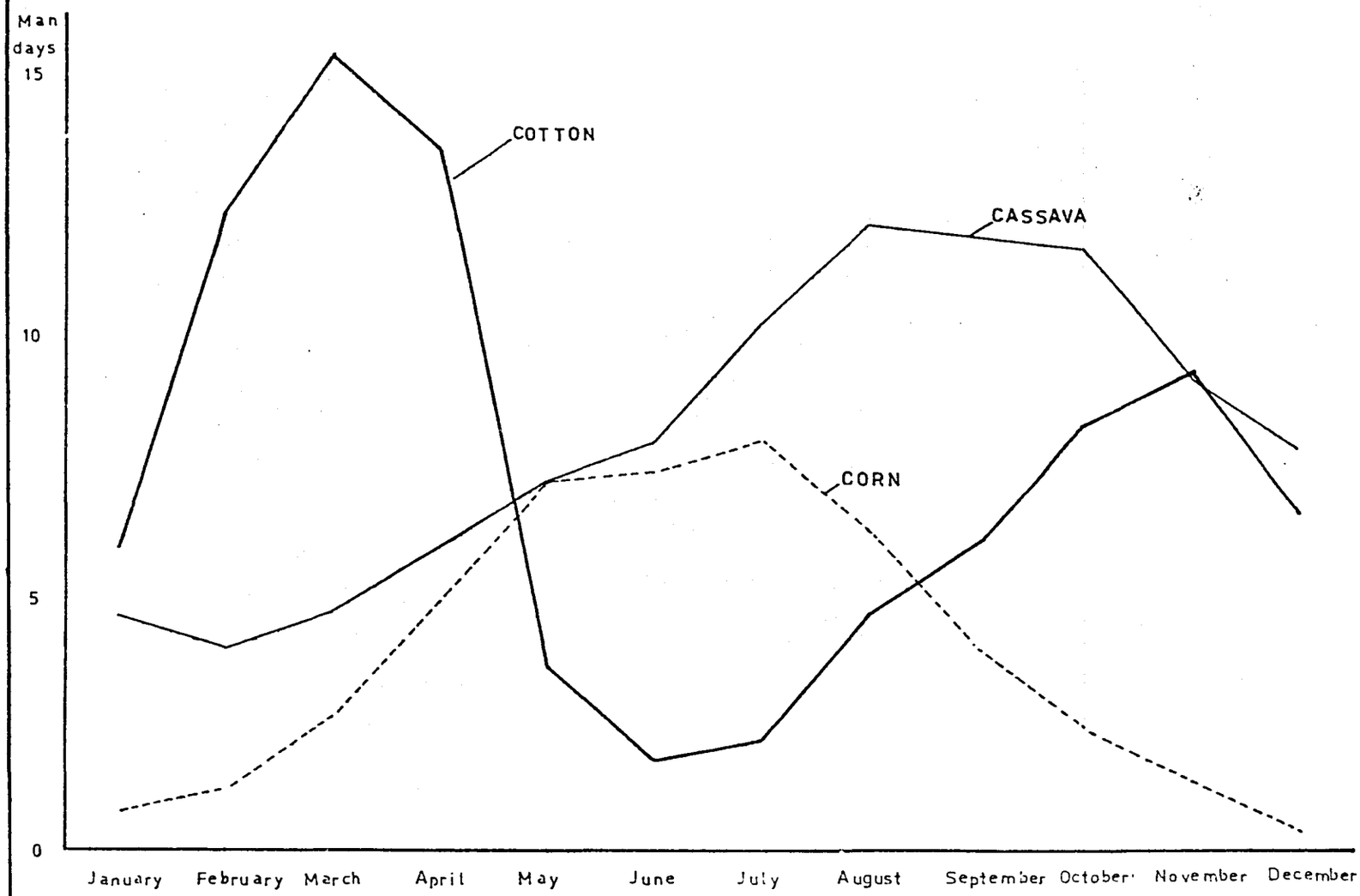
MONTHLY UTILIZATION OF MAN-DAYS OF LABOR FOR PRODUCTION OF ONE HECTARE OF COTTON, CORN, AND CASSAVA

(Man-Days)

	Cotton	Corn	Cassava
January	5.71	0.84	4.41
February	12.22	1.21	3.87
March	15.20	2.60	4.61
April	13.35	4.75	5.86
May	3.58	7.08	7.08
June	1.80	7.29	7.77
July	2.55	7.86	10.14
August	4.68	6.22	12.04
September	5.88	4.00	11.80
October	8.18	2.53	11.56
November	9.19	1.52	9.10
December	6.51	0.59	7.75

FIGURE D-1

MONTHLY UTILIZATION OF LABOR



the two subsistence crops (corn and cassava) are complementary to cotton. It may be that farmers defer or speed up work on the subsistence crops in order to make labor available for the cash crop. The peak monthly labor requirements for cotton (in February through April) and cassava (July through October) pose obvious limitations on the annual crop area that a farm family can cultivate. There is a further implication: farmers who exceed the limits of family labor must be able to hire additional labor when necessary.

e. Statistical Testing

The survey data reveal general economic characteristics of small farms in eastern Paraguay. Thus far, no examination of significance of differences among farms of different sizes has been presented. Annex D-2 contains the conclusions from the analysis of variance of selected data from Survey One. On several points, Annex D-2 gives further weight to relationships which appear obvious from data already presented. In order to incorporate a more equal number of farms in each stratum, the stratification utilized in statistical testing differs from that utilized previously. The purpose of statistical testing is to determine whether the averages of various economic variables are sufficiently different to ensure that such differences do not arise from chance occurrence. In one sense, where averages are greatly different, this exercise may appear to prove the obvious. Nevertheless, it is wise to prove what can be proven. These strong proofs are as follows:

(1) The ratio of annual crop hectares to total hectares is consistently lower as farm size is increased; the hypothesis of equality of averages is rejected (at 95% probability level) in all six districts.

(2) Gross farm income, net farm income and net farm family income increase with the size of farm in all districts; the hypothesis of equality of averages is rejected in all districts.

(3) The value of production of annual crops per hectare in the six districts does not vary with farm size in any district; the hypothesis of equality of averages fails to be rejected in any of the districts. Moreover, the value of gross farm production divided by the total hectares in annual and permanent crops does not vary significantly with size of farm in five of the six districts.

(4) Both net and gross farm income divided by capital in land and fixed capital (structures, animals and implements); i.e., the gross and net output/capital ratio, decrease as farm size increases. In four of the six districts the difference between averages for the net output/capital ratio is statistically significant.

(5) Wage payments to off-farm labor increase as farm size increases. The differences between average wage payments by farm size are statistically significant in four of the six districts (the exceptions are Loreto and Stroessner).

Table D-19 presents the average values of each of the above variables for the data of the six districts combined, stratified in accordance with the number of total hectares of the farm.

f. Economic Model

The productive factors utilized by a farming enterprise in Paraguay in the long run can be grouped into three categories: managerial talent, family labor and capital. Land is conceptually reduced to a form of capital since any given farm in the long run can transform its land assets into other forms of capital and vice versa (by selling and purchasing land).[1/] The same conceptual treatment is given to all other inputs such as off-farm labor, equipment, fertilizer, chemicals, etc.

With regard to family labor it seems reasonable to assume that it is a randomly given value with a common expected value for every farm, this expected value being estimated by the average family labor size for the entire sample.

The other two factors are historically given for every farm: capital and managerial talent. The analysis will ignore at this time the possible differences in managerial talent and will concentrate on the other two inputs, although it could be argued that in the long run a substantial portion of the managerial talent a farmer has is related to the amount of capital he had available to be invested in his formal education.

An attempt will be made to show that considering family labor as a random value, the remaining factor, capital, is what differentiates farms.

Farms with a large capital endowment cannot operate solely with family labor, and will have to hire additional labor at higher

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1/ The correlation coefficient between capital and total land for the Survey Two sample is 0.86 in Santa Rosa, 0.89 in Quiindy, and 0.68 in Itá. Land covered an average of 45 percent of the total capital in those three districts.

TABLE D-19

AVERAGE VALUES OF RELEVANT PARAMETERS FOR THE FARMS STRATIFIED BY THE AMOUNT OF TOTAL HECTARES OF LAND

Variable	0 to 4 Has.	5 to 8 Has.	9 to 13 Has.	14 to 24 Has.	25 Has. and over	Total
Number of Farms	175	236	192	178	219	1000
Annual/total has.	0.747	0.483	0.338	0.257	0.191	0.397
Gross farm income (Gs x 1000)	96.1	143.5	198.9	249.7	375.0	215.4
Net farm income (Gs x 1000)	86.1	126.7	169.7	221.0	287.5	179.8
Net farm family income (gs x 1000)	102.0	138.4	183.7	241.8	314.3	197.6
Value of annual crops/has. annual crops (Gs x 1000/Ha.)	27.04	31.31	31.80	32.15	30.60	30.65
Gross farm product/has. annual and permanent crops (Gs x 1000/ha.)	40.85	41.68	42.86	40.44	43.25	41.82
Net farm income/fixed capital	1.168	0.855	0.846	0.822	0.560	0.838
Gross income/fixed capital	1.261	0.964	0.981	0.907	0.663	0.944
Wages to off-farm labor (Gs x 100)	5.05	8.29	15.61	15.88	42.86	18.05

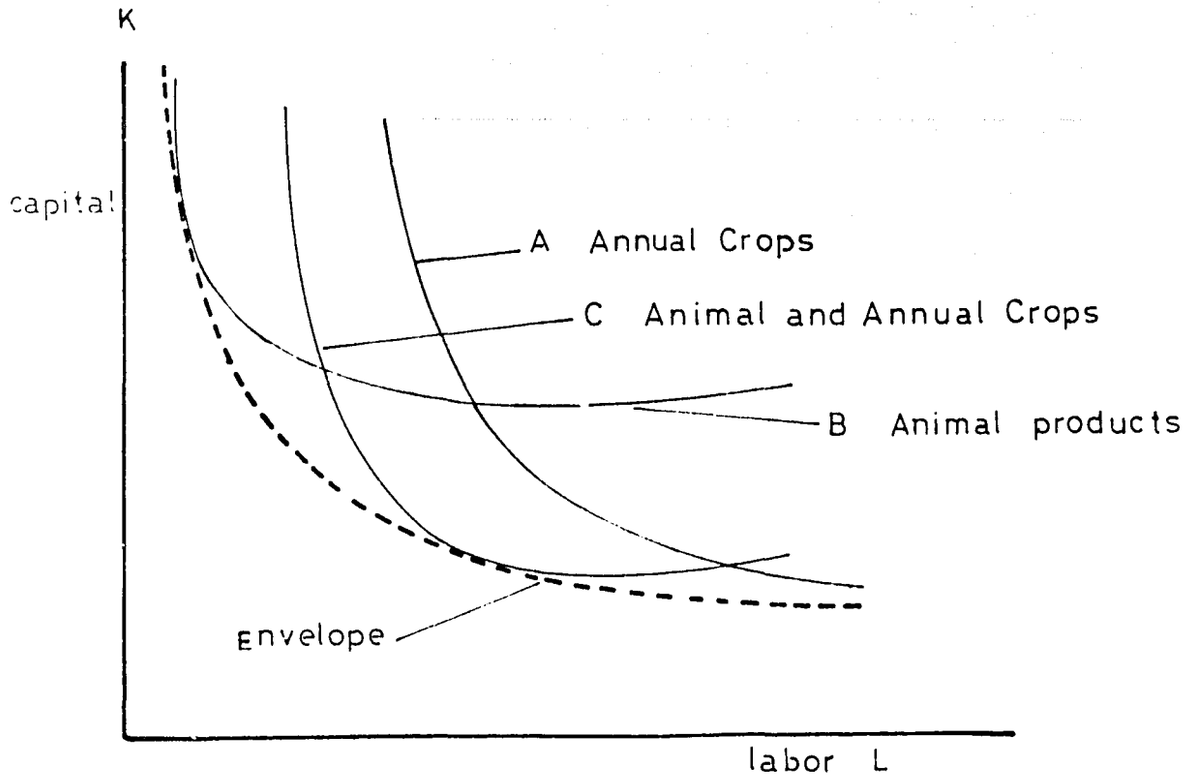

Figure D-2 Hypothetical isoquant curves for capital intensive products (B), labor intensive products (A), and intermediate combinations (C).

costs. These farms will enjoy a relative advantage in production activities that are less labor intensive, cattle raising being the most easily identifiable one. In other words, rather than adopting a relatively greater capital intensive technology in the production of the same items produced by the farms with less capital, the farms with more capital have turned to capital-intensive products. Summarizing, farms with more capital are relatively more constrained by labor, whereas their counterparts with less capital are relatively more constrained by capital.

(1) Theoretical Analysis

Only two relevant input categories are considered here to represent the production process in the small farm in Paraguay. These two inputs are capital and labor. Since it is assumed that land can be purchased and sold without any restrictions, it is reduced to a form of capital in the model.

The production of a given quantity of agricultural goods can be attained by using varying combinations of the two inputs: labor and capital. 1/

Plotting down all these points results in an isoquant. Isoquant A in Figure D-2 represents the different combinations of the two inputs required to produce Gs. 1,000 of annual crops.

A different isoquant represents the possible input combinations required to produce Gs. 1,000 of animal products. Being a more capital intensive process will have an isoquant like B in Figure D-2. If the Gs. 1,000 of total product is to be reached by a combination of annual crops and animal products, then an isoquant of type C could represent the input combinations required. A number of similar isoquants exists for the different product combinations that the farm might produce and the envelope of all of these curves constitutes the primary isoquant that the farm firm faces.

It is customary at this point of the analysis to introduce the outlay (expenditure) lines which are common to all firms and to find the least cost combination of the factors at the point where the isoquant is touched by an outlay line tangent to the curve.

Different scales of production (or firms of different size) are represented merely by parallel outline curves in which the slope is the ratio of the price of labor to the price of capital.

1/ Implicit is the assumption of a common technological level for all the farms.

The points where the outline curves are tangent to an isoquant curve give the least cost-input combinations for the different scales of operation. A line passing through all these points is defined as a scale curve. (See Figure D-3.)

In the event of constant returns to scale and equal input price ratios for all firms, the scale curve is a straight line starting at the origin, resulting in one ratio of capital to labor common to all firms, regardless of their size.

There is no reason to believe that the small farm sub-sector of the agriculture in Paraguay presents production characteristics that invalidate the constant returns assumption, but it is apparent that they work under different input price ratios and cannot be represented by a single outlay curve.

Every farm has a given quantity of capital and family labor available. All farms have about the same amount of family labor (L_f), but radically different amounts of capital which are historically given, as represented by points K_1 and K_2 on Figure D-4.

If a perfectly competitive market existed for capital, then farms could change their original capital endowment and trade it for future payments by either borrowing or lending capital; thus they would all face the same opportunity cost of capital at the equilibrium point. But this is not the case and, for the purpose of simplifying the model, it is assumed that they do not borrow or lend capital.

Starting from their original factor endowment, the farms can trade their labor for additional capital at a certain price ratio which is common to all. (Going from R_2 to K_2' and from R_1 to K_2' where both lines are parallel.)

If the farms desire to hire additional labor, they face a positively sloped supply function. In order to hire more labor, the larger farms must bid for laborers who live farther away, and so climb up along a supply function that is not perfectly elastic. To simplify the figure, it is assumed that the supply function increases stepwise. This results in kinked outlay lines with price ratios of labor to capital increases as more labor is hired. That is, the lines are steeper along the R_2 L_2' kinked outlay curve as they go from L_f to L_2' (Figure D-4).

In Figure D-5 all farms in the model are reduced to a common scale of production and represented by one isoquant curve

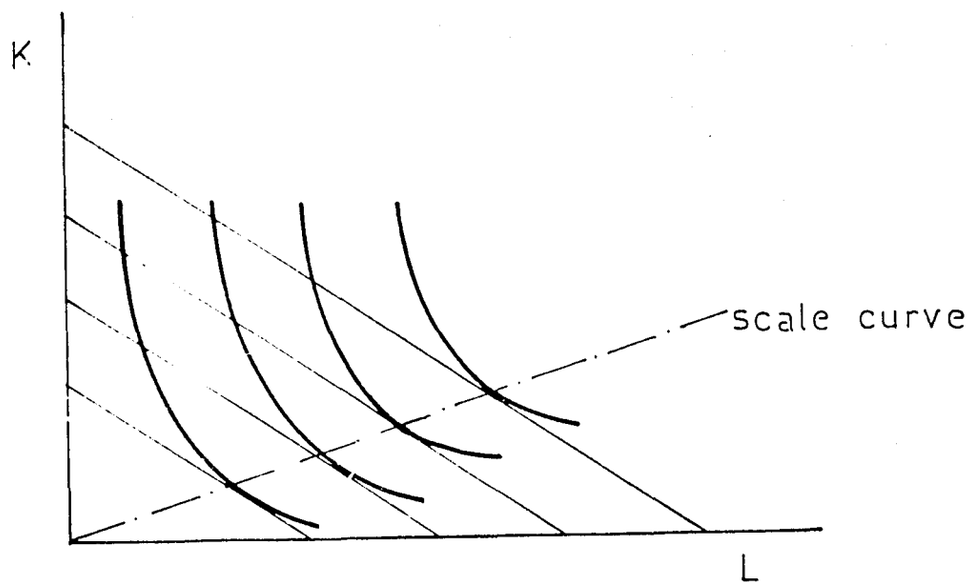

Figure D-3 Constant returns to scale and equal price ratios of labor to capital for all firms.

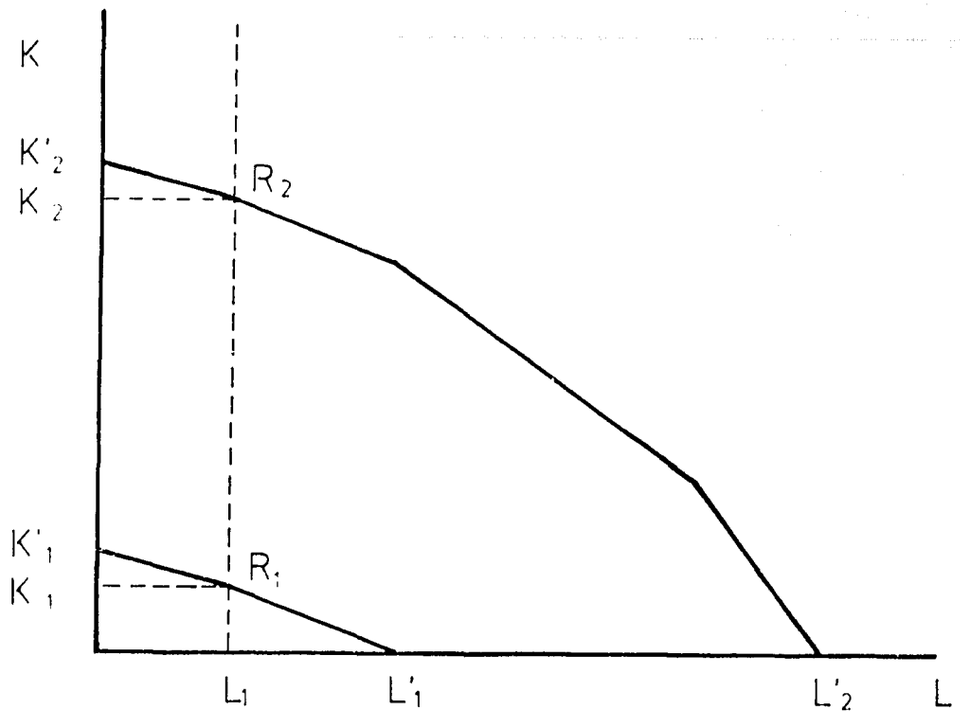

Figure D-4 Kinked outlay lines.

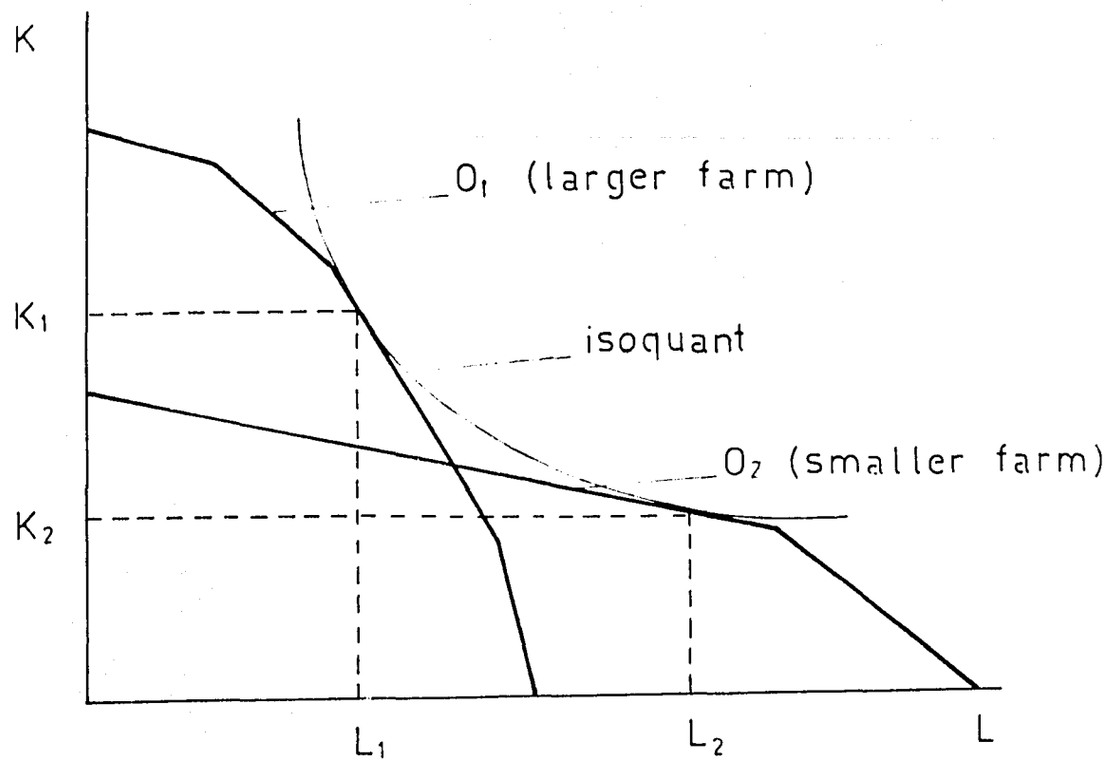

Figure D-5. Hypothetical outlay lines and isoquant curves of all farms reduced to a common scale.

(since constant returns to scale are assumed). Reducing the outlay curves of Figure D-4 to a common scale results in outlay lines that have different input price ratios due to their kinks as explained above. To simplify the model only two cases will be considered: the farm having relatively more capital per unit of labor, illustrated in Figure D-5 by outlay line O_1, and the farm having relatively less capital per unit of labor illustrated by O_2. The slopes of the outlay lines are given by the input price ratios PL/PK and reflect differing labor availabilities per unit of capital. Importantly, two different tangency points are obtained on the primary isoquant curve.

The farm using more expensive labor will have a steeper outlay line (O_1) and it will therefore engage in production activities that are relatively less labor intensive than the farm using less expensive labor which has outlay line (O_2). A number of intermediate outlay lines could be drawn for farms with intermediate combinations of labor and capital.

The model specifies importantly that farm managers are not able to hire labor or capital under conditions of perfect competition with unlimited quantities of labor and capital at unchanged prices; i.e., perfectly elastic supply functions.[1/]

If the theoretical model presented above is valid, several hypotheses must be true.

(2) Hypotheses to be Verified

Therefore, farms with more capital should have:

(a) Lower ratios of gross product per unit of capital investment.[2/]

(b) Lower ratios of gross product per unit of land. Land being a form of capital.[2/]

1/ With perfectly elastic supply functions for labor and capital, land fertility and specialized managerial talent would be the principal explanatory factors for farm specific differences in factor utilization.

2/ Since $K_1 > K_2$, $Y/K_1 < Y/K_2$, where Y is the value of the isoquant output. (See Figure D-5.)

(c) Higher ratios of gross product per unit of labor.[1]

(d) Higher capital/labor ratios.[2]

(e) Higher land/labor ratios, or rather, lower labor/land ratios.[3]

(3) The Evidence

(a) It is shown at the bottom of Table D-20 that the ratio of gross product to total capital declines as the total amount of hectares (which is a form of capital endowmment) increases.[4]

(b) The ratio of gross product (gross farm income) to total hectares also decreases significantly as the farm size is increased. The ratio varies from Gs. 34,500 per hectare for the farms with less than five hectares to a low of Gs. 8,700 per hectare for the farms larger than 25 hectares. (See Table D-20.)

(c) The total labor force used in the farm has been estimated for every stratum. Table D-20 shows that the ratio increases from Gs. 166 per man-day for the smaller farms to a maximum of Gs. 377 per man-day for the largest farms. The average ratio for the entire sample is Gs. 303 per man-day.

(d) The ratio of capital to labor increases steadily from a low of Gs. 226 to a high of Gs. 938 per man-day as the farm size is increased. The average ratio is equal to Gs. 558 per man-day.

1/ Since $L_1 < L_2$, $Y/L_1 > Y/L_2$. (See Figure D-5.)

2/ Since $K_1/L_1 > K_2/L_2$. (See Figure D-5.)

3/ This is a mere reiteration of hypothesis (d), land being a form of capital.

4/ Undoubtedly, a farm stratification by total capital would be preferred but, since it was not available, the best alternative is to select farm size with the assumption that a high positive correlation exists between both parameters.

TABLE D-20

RELEVANT RATIOS FOR FARMS STRATIFIED BY TOTAL HECTARES

	0 to 4 Has.	5 to 8 Has.	9 to 13 Has.	14 to 24 Has.	25 Has. and over	Total
A. Basic Data						
1. Total hectares	2.783	6.186	10.724	18.758	42.991	16.760 a/
2. Hectares cultivated	2.502	3.799	4.885	6.324	9.868	5.559
3. Gross farm income (Gs x 1000)	96.13	134.54	198.88	249.66	375.05	215.42
4. Total labor used b/ (man days/year)	580.20	768.54	860.78	846.57	993.50	728.92
5. Total fixed capital (Gs x 1000)	131.44	214.94	294.81	405.80	931.48	406.56
B. Ratios						
1. Gross income per hectare of total land (Gs x 1000/ha)	34.5	23.2	18.5	13.3	8.7	12.9
2. Gross income per unit of labor (Gs/man day)	166	187	231	295	377	296
3. Total capital per unit of labor (Gs/man day)	226	280	342	479	938	558
4. Labor used per hectare of total land (man days/ha)	208.5	124.2	80.3	45.1	23.1	43.5
5. Labor used per hectare of cultivated land (man days ha)	231.9	202.3	176.2	133.9	100.7	131.1
6. Gross product per unit of total capital c/	1.261	0.964	0.981	0.907	0.663	0.944
7. Number of observations	175	236	192	178	219	1000

Notes: a/ This differs from the 17.3 hectares estimate of Table D-7 because of the deletion of one questionnaire with 600 hectares of total land.

b/ From Table V, Annex D-3.

c/ From Table IX, Annex D-2.

(e) The labor to total land ratio drops rather drastically as the farm size is increased, going from 208.5 to 23.1 man-days per hectare. If the estimate of cultivated hectares is used to replace the total hectares, the ratios are more homogeneous but still decrease from 231.9 to 100.7 man-days per hectare of cultivated land. The average ratios for the entire sample were 43.5 and 131.1 man-days per hectare of total land and of cultivated land, respectively. (See Table D-20.)

g. Conclusions

The model proposed and verified above permits three general conclusions:

(1) Inasmuch as the smallest farmers are labor rich and capital poor, if they are given more capital (either financial or land), their production would increase, but they would tend to shift toward more livestock production. Inasmuch as the largest farmers are labor poor and capital rich, if they are given more labor, their production would increase, but they would shift toward crop production. All farmers adjust the composition of output in an attempt to utilize the factors of production which they have or can hire most cheaply.

(2) All statistical evidence is consistent with behavior by farm proprietors which attempts to maximize net farm income. However, substantial evidence suggests less than perfect competition in factor markets.

(3) There is little evidence to suggest that differences in farm capital are related to different technologies of production. For example, physical productivities of commercial crop production and beef production are about the same on all farms.

The model does not state unequivocally how to increase the income of farmers in the sample. However, inasmuch as land and income are strongly related up to about five hectares of land, facilities to enable the smallest farmers to buy or hire land might be beneficial because they could utilize their own labor more fully.

The most striking constraint upon small farmer income is the labor intensity of crop production. Presently available and utilized technology appears to dictate that one man-year is equivalent to three hectares of annual crops. Inasmuch as the average

farm family contains slightly less than two man-years of labor, optimum farm size even considering some differences in land quality (but including six hectares of fertile crop land) does not exceed 10 hectares.

Within the range of land size up to the optimum, increases in land size and net farm income are strongly related and nearly proportional. Crop and livestock production increase together and livestock production takes the form of pigs, chickens, milk cows and oxen. Beyond the optimum and also beyond 10 hectares, land fertility, availability of labor, and location are undoubtedly more dominant. Within the minifundia zone (which is also closer to Asunción, the principal urban market) farmers with more land engage in crop production because of the availability of labor and markets for produce. Elsewhere, labor may be a pressing constraint.

The totality of data derived from a survey of economic variables is wholly inadequate for exploring historical tendencies. There can be little doubt that the hand of history rests heavily upon our findings. One cannot state unequivocally that the net income of any defined group of farmers has increased or decreased over the past few decades. There can be little doubt that the number of children of the average farm family would represent a doubling of population in one generation. The inequality in the distribution of land by farms and the percentage of farms with less than five hectares suggests the influence of population growth in the minifundia zone. In the absence of settlement of virgin lands, urban growth and net emigration, rural impoverishment would probably be worse than it is at present.

One has to look beyond the agricultural sector to unravel various tendencies. One can surmise that large farms are not likely to be broken down as readily upon inheritance even with a roughly equal number of offspring as smaller farms, because the family capital goes beyond the agricultural sector. The differential rate of division of farm land, in turn, leads to greater inequality in the distribution of farm land, the emergence of nearly landless agricultural laborers (such as those with less than three hectares), and to the availability of a pool of cheap labor available to largerfarmers. For these reasons, in the absence of significant change in technology and net emigration from the areas of old settlement, one should expect to find increasing inequality in the distribution of land and, therefore, in the distribution of farm family income.

Social, economic, and cultural factors are intermingled. From a purely economic viewpoint, it may be observed that even with less than full employment on one's own farm, children are a guarantee

against even greater impoverishment in old age, and for those farmers with sufficient land, a child represents 10 years (if not man-years) of available labor.

3. Technology

Technology has a rather wide variety of meanings. One meaning is the science of the study of the practical art of production. A second meaning is applied science. Herein we shall utilize both meanings. At the first level we want to know the technology employed by the farmer to combine land, labor and capital to produce crops and livestock. At the second level we shall examine the application by farmers of the more recent innovations which are clearly identifiable and scientifically superior inputs.

The terms labor-intensive and capital-intensive methods of production tend to obscure rather than to clarify the important elements of technology utilized by small farmers. It is obvious that small-farm crop production is more labor intensive than animal production, but this only signifies that a hectare of crop production utilizes more labor than a hectare of animal production. It is also obvious that small-farm animal production is more capital intensive than small-farm crop production because Gs. 1,000 of animal production ties up a greater quantity of capital than does an equal amount of crop production. These statements regarding factor intensity tend to disguise the fact that, broadly speaking, farmers have technologies for producing crops which utilize oxen and rather simple implements and substantial human labor; and, on the other hand, technologies for producing animals which are capital intensive because production includes bovines, and these animals invariably appear as a portion of the farmer's capital stock, which must be true because of the time dimension of their maturation.

In Tables D-5 and D-6, farm capital is decomposed with as much detail as is available from the encoding uses for computerized data processing. Much greater detail is available from the questionnaires and these data are useful for obtaining a more complete understanding of the production technologies employed by farmers. Such a detailed analysis of the entire sample would have been very demanding in terms of time and effort even though only an overview of the technology used is attempted. Therefore, a subsample of the farmers was randomly selected from the farms interviewed in the Itacurubí district with six questionnaires in each stratum when the farms are classified by total land into four groups: 0-4 hectares, 5-9 hectares, 10-16 hectares and 17-29 hectares.

a. Animal Traction

Table D-21 indicates the quantity of particular items of the farm livestock inventory and the value thereof for each group of six farms in the subsample. It also gives the average number of hectares of total land, annual crops and permanent crops for each stratum.

Table D-22 presents the number and value of farm implements and fixed structures.

The data presented in Tables D-21 and D-22 indicate that on farms larger than five hectares nearly every farmer has a pair of oxen, a cart, a plow and a harrow or weeder/cultivator.

Only one farmer in the 0-4 hectares of total land bracket owned a pair of oxen while five out of six had one in the next higher bracket (5-9 hectares). Table D-21 shows the average number of hectares cultivated with annual crops for the subsample. The average increases from 2.33 to 4.45 hectares of annual crops as the farms are grouped according to total land. Therefore, it is observed roughly that farmers with less than three hectares of annual crops tend not to own a pair of oxen but rent it, while those with more than three hectares find it more convenient to own a pair. Nearly all farms have some type of shed for their implements. All farms have a house, a cow and some chickens. Taken together, these facts indicate that farmers utilize human muscle for the lighter implements and oxen for the heavier implements used to break the soil and cultivate it. Comparing Tables D-21 and D-22, it is observed that the oxen are more valuable than the total stock of farm implements for each group of six farms.

In other words, farmers who own more land and have relatively more access to capital do not adopt a different production technology which would require more expensive mechanical implements but rather buy more of the same inputs in a seemingly constant proportion.[1/]

b. Advanced Technological Inputs

It is observed in Table D-23 that more than one-half of the interviewed farmers use certain advanced inputs such as plaguicides, insecticides, and vaccines for bovines while a very limited proportion (12 percent) apply fertilizers. This is due to the weather and

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1/ In simpler terms, a farmer who cultivates eight hectares will have about twice of the same inputs (oxen, artifacts and tools) as one cultivating only four hectares.

TABLE D-21

ANIMAL INVENTORY ON TWENTY-FOUR FARMS IN THE ITACURUBI DE LA CORDILLERA DISTRICT: NUMBER AND VALUE BY SIZE OF FARM (SIX FARMS PER GROUP, JUNE 30, 1973)

	Number of Animals			
	0 - 4 hectares	5 - 9 hectares	10 - 16 hectares	17 - 27 hectares
Livestock				
Oxen or Bulls	2	11	16	27
Cows	7	8	29	27
Steers or Heifers	2	-	7	9
Calves	5	11	21	25
Horses	3	6	3	5
Donkeys	1	-	-	2
Boars	4	2	7	30
Sows	1	1	6	8
Suckling Pigs	-	11	8	9
Poultry	150	106	138	225
	Value of Animals (Gs. x 1000)			
Oxen or Bulls	70.0	300.0	425.0	518.0
Cows	121.0	136.0	790.0	484.0
Steers or Heifers	25.0	-	29.5	64.0
Calves	21.0	116.5	44.0	85.0
Horses	18.0	36.0	21.0	59.0
Donkeys	2.0	-	-	4.5
Boars	16.0	4.0	23.0	88.0
Sows	11.0	3.0	16.5	23.0
Suckling Pigs	-	13.1	24.0	4.5
Poultry	15.7	21.4	22.8	46.0
	299.7	630.0	1,394.8	1,376.0
Sale of Livestock a/				
Oxen or Bulls	2	2	5	(1) 4
Cows	1	2	2	(1) 1
Steers or Heifers			2	
Calves		1	(2)	
Horses			1	
Donkeys				
Boars	(11)		3	6
Sows	(3) 1	(1)		1
Suckling Pigs		(2)	(3) 1	
Poultry	(90)			(152)
Land				
Total land	3.00	7.08	13.42	24.00
Annual crops	2.33	4.45	4.62	5.29
Permanent crops	0.21	0.67	0.75	2.32

Note: a/ In addition, some animals died in the farm. The number of deaths appears in parenthesis.

TABLE D-22

IMPLEMENTS AND FIXED STRUCTURES ON TWENTY-FOUR FARMS IN THE ITACURUBI DE LA CORDILLERA DISTRICT: NUMBER AND VALUE BY SIZE OF FARM (SIX FARMS PER GROUP)

	Number of Implements				Value of Implements (Gs. 000)			
	0-4 ha.	5-9 ha.	10-16 ha.	17-27 ha.	0-5 ha.	5-9 ha.	10-16 ha.	17-27 ha.
Implements								
Carts	1	4	4	5	20.0	65.8	51.0	82.0
Wooden Plow								
Steel or Iron Plows	1	5	2	9	4.0	20.5	6.0	30.5
Harrow		3		4		7.0		28.3
Seeder	1		1		6.0		0.5	
Sprayer or Duster	1	4	3	5	4.0	36.5	18.0	16.5
Wheelbarrow	1	1	1	1	0.6	0.7	0.5	0.5
Drag saw or saw	1		2		0.5		2.1	
Shovel	2	6	7	8	0.7	1.8	3.2	3.4
Rake	1	1	1	1	0.1	0.1	0.3	0.1
Brush Knife	12	7	22	17	1.4	1.3	2.6	1.9
Axe	4	5	11	10	1.9	2.3	5.5	4.1
Hoe	9	3	17	24	2.4	2.0	4.2	5.1
Weeder/Cultivator	2	4	1	2	7.5	13.0	3.0	6.5
Other	2	1		2	0.3	0.2		15.5
					49.3	151.1	96.9	194.4
Fixed Structures								
Farm House	6	7	8	8	275.0	422.0	161.0	543.0
Machine Shed	2	6	3	4	15.0	118.5	13.0	43.5
Chicken House				1				7.0
Well or Water tank	2	5	4	5	19.0	31.0	24.0	34.0
Hog Pen or Corral		1	1	3		0.5	3.0	29.0
Still for Essential Oil		2	1	1		32.0	16.0	35.0
					309.0	604.1	217.0	691.5

TABLE D-23

USE OF ADVANCED TECHNOLOGICAL INPUTS BY FARMERS SAMPLED:
Number and Percent

	Fertilizers	Plaguicides	Bovine Vaccines	Hog Vaccines	Fowl Vaccines	Ant Insecticides
A. Number of Farmers						
1. Do you use:						
Yes	153	658	926	522	175	782
No	1,116	603	24	514	1,047	431
No response	3	11	322	236	50	59
Total	1,272	1,272	1,272	1,272	1,272	1,272
2. If not, why not?						
Cannot be purchased	31	5	0	30	76	5
Do not know how to use	133	50	4	82	194	14
They are too expensive	110	59	0	27	43	21
They are unnecessary	783	459	8	272	567	370
No response	1	2	3	7	9	0
Total	1,116	603	24	514	1,047	431
3. Did use of item give response?						
Yes	145	641	862	475	152	763
No	4	16	61	39	17	15
No response	4	1	3	8	6	4
Total	153	658	926	522	175	782
B. As percent						
1. Do you use?						
Yes	12	52	73	41	14	61
No	88	47	2	40	82	34
No response		1	25	19	4	5
Total	100	100	100	100	100	100

TABLE D-23 (Continued)

	Fertilizers	Plaguicides	Bovine Vaccines	Hog Vaccines	Fowl Vaccines	Ant Insecticides
2. If not, why not?						
Cannot be purchased	3	1		6	7	1
Do not know how to use	12	8	17	16	19	3
They are too expensive	10	10		5	4	5
They are unnecessary	70	76	33	52	54	86
Other	5	5	38	19	15	5
No response			12	1	1	0
Total	100	100	100	100	100	100
3. Did use of item give response?						
Yes	95	97	93	91	87	98
No	3	2	7	7	10	2
No response	3			2	3	
Total	100	100	100	100	100	100

climatic characteristics of the country, which make it more profitable to fallow the land and pay the land clearing costs rather than maintain the fertility of the soil by means of fertilizer applications.

If farmers do not make use of these advanced inputs, it is not because of ignorance or lack of information but mainly because it is not economically efficient to use it. In the farmers' words, the inputs are not applied because they are "too expensive" or "unnecessary." (See Table D-23.)

The notion that the farmers know what they are doing when applying these inputs is reinforced by noticing that more than 85 percent of all farmers using any of the advanced inputs were satisfied with the results.

c. Other Technological Differences

It was stated in the previous section that no striking differences exist in the technology of production among the small farmers, all of them plow the soil with a yoke of oxen, very few apply any fertilizer, and more than one-half of them use herbicides, insecticides and vaccines for their cattle and pigs. (See Table D-23.) Nevertheless, even though no differences were observed in the nature of the inputs and implements used, there could be some other differences in the intensity of application of certain inputs in the production of a given crop.

The cost-of-production data obtained in Survey Three provided the required information for only two crops: cotton and corn. The number of interviews was not large enough in the other crops.

It was attempted to break down the farmers by four input parameters: "Animals and equipment" (Gs/Ha), "Man-days of cultivation" (MD/Ha), "Man-days of land preparation" (MD/Ha), and "Expenditures in Physical Inputs" (Gs/Ha). The last parameter includes the expenditures in seeds, fertilizers, chemicals, bags, animals and equipment, interests and miscellaneous expenses. In order to verify if the farmers did in fact have a different technology, the sample was divided into subgroups according to the level of application of the above input parameters, and then it was verified whether the subgroups had significantly different yields or did not.

No statistically significant differences in the yields were observed in the case of corn production, that is, no technological groups could be perceived.1/

1/ F tests were performed in every case, and the analysis was done

With regard to cotton production, it was observed that the Itacurubí district not only has significantly higher yields than those in the other three districts but at the same time the district ranks first in the intensity of application of labor for land preparation, cultivation, harvesting and expenditures in animals and equipment and ranks second in the application of fertilizer and chemicals. For all practical purposes, herein, cotton production in Itacurubí is then treated as a separate technology of cotton production. (See Table D-24.)

In the three remaining districts the cotton producers were divided into two groups according to the level of input used in each of the four selected parameters: man-days of land preparation, man-days of cultivation, expenditures in animals and implements, and expenditures in physical inputs (seeds, fertilizers, chemicals, bags, interests, animals and equipment and miscellaneous expenditures). Using an F test, a hypothesis of equality of yields was verified for the two groups in each of the input parameter classifications. The results appearing in Table D-25 show that the hypothesis of equal average yields was rejected in all districts only when the farmers in the sample are classified by expenditures on physical inputs. In consequence, three different cotton producing technologies were observed: first, the Itacurubí growers; second the producers in the other three districts using more than Gs. 16,000 of physical inputs per hectare; and third, those with Gs. 16,000/Ha or less spent in physical inputs. The average yields for the three groups were 1.443; 1.178; and 0.876 MT/Ha, respectively.

4. Cost of Production

a. Introduction

There are two inherent difficulties in attempting to generate cost of production tables representative for the farmers in any given geographical area.

The first problem arises from the varying proportion in which the required physical inputs are combined, in the case of per hectare costs: the amount of each input utilized per hectare of production of a given crop. The second difficulty lies in estimating the prices both of input factors and output products.

Two additional points that should not be ignored are the cost variations due to scale of the farm (moving along the average total

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for each separate district since the corn yields proved to be significantly different in the comparisons between districts. The F test is defined in Annex D-2.

TABLE D-24

PER HECTARE AVERAGE INPUT USE AND AVERAGE YIELD
IN COTTON PRODUCTION IN THE FOUR DISTRICTS

District	Input					Average Yield (MT/Ha)
	Man Days for Cultivation (MD/Ha)	Fertilizer & Chemicals (Gs/Ha)	Man Days for Land Preparation (MD/Ha)	Man Days for Harvesting (MD/MT)	Animals & Equipment (Gs/Ha)	
Itacurubí	36.16	2,034	7.78	46.42	1,999	1,443
Santa Rosa	26.52	2,277	6.70	40.20	1,494	1,043
Itá	23.74	675	5.40	33.00	1,111	1,257
Quiindy	28.00	500	7.86	40.05	1,421	0.870

TABLE D-25

F VALUE OBTAINED PER DISTRICT AND TYPE OF CLASSIFICATION

Parameter Used	District		
	Santa Rosa	Itá	Quiindy
Animals and equipment	0.16	0.38	2.94 +
Man days of cultivation	0.58	0.65	0.02
Man days of land preparation	0.16	10.01	7.81 *
Physical inputs	3.05+	3.18+	12.70 *

Notes: * Significantly different yields, at a 95% probability level.

+ Significantly different yields, at a 90% probability level.

cost curve) and the differences stemming from the efficiency of operation of the farm manager (points above the average total cost curve).

(1) Physical Inputs

Differences in the proportion in which the physical inputs are combined derive from three of the circumstances mentioned above. Different technologies might exist in the production of a given crop (depicted by shifts in the average total cost curve); that is, some farmers might have adopted newer production methods that require improved seeds, chemicals, mechanized operations, etc. Certain differences will also come from the indivisibility of the inputs, and/or the spreading of the fixed factors of production over a given land base, thus producing cost differences which are due to the scale of production. A good example of this is the management cost, which is not significantly affected by the size of the entire farming enterprise.

Finally, some of the observed differences might be due to the degree of efficiency with which the farm firm is administered. A good farmer will schedule every operation so that less physical inputs are used per hectare, while higher yields are obtained, all these within a given technology and scale of production.

Geographical location can also have an impact on the physical input mix. The rainfall, humidity of the air, mean temperature, soil type and access to irrigation will undoubtedly influence the method of production and the expected yields.[1/]

(2) Prices

Any given cost-of-production table quotes one single price or cost estimate for each factor used and each product obtained, an idyllic situation far removed from the commonly observed conditions.

It is obvious that factor prices will vary from one farm to another as the distance to the supply market points varies, but at the same time, the prices of the factors might vary throughout the year as the market equilibrium price changes with shifts in the supply and/or demand curves, a phenomenon better known as the seasonality of factor prices.

1/ Geographical location also means distance to the product and factor markets, which will be mentioned in the next section.

Something very similar occurs in the product market: the farm prices received depend on the distance to the relevant market and the time of the year.[1]

The prices commanded by certain crops such as cotton, tobacco and cassava are also particularly sensitive to the quality of the product.

Finally, the opportunity cost of the input factors supplied by the farm family raises another difficulty. If the portion of the factor coming from the farm and the one purchased at the market (seeds, labor, fertilizer, etc.) are exactly identical, then both should command the same price at a given time, in a given market. Quoted at the farmgate, the price of the purchased factor will have increased by an amount equal to the transport costs from the relevant market to the farm, while the opportunity cost of the farm factor will have decreased by that same quantity. Therefore, the opportunity costs of both sets of the same factor will differ by an amount equal to twice the transportation costs from the farm to the relevant market. This is particularly important in a country such as Paraguay, where transport costs can cover a significant portion of the total price of a product or factor.

b. Methodology

The data required to provide estimates of the production function coefficients were obtained basically from the second survey which covered four districts: Itá, Santa Rosa, Quiindy and Itacurubí. The first three districts had no cooperative members and each included about 90 interviews, while the 38 interviews in Itacurubí were restricted to cooperative members. The survey was designed following a random sampling procedure; the number of interviews attained for each crop were: cotton, 161; corn, 279; cassava, 295; tobacco, 23; and soybeans, 10.

In the analysis of the survey data, the cotton producers were broken down into three subgroups since enough evidence of significantly different technologies was found (see the technology section); the subgroups are: cotton in Itacurubí (38 interviews), cotton with more than Gs. 16,000/Ha spent in physical inputs[2] (48 interviews) and those with Gs. 16,000/Ha or less (75 interviews). Hereafter these three subgroups will be called cotton I, cotton II, and cotton III, respectively.

1/ Once the farmer has quoted a product or factor price the researcher must also be careful to examine if it refers to the farmgate, the local market or the urban market.

2/ This includes seeds, fertilizers, chemicals, bags, rented animals and equipment, interest payments and other expenditures.

TABLE D-26

AVERAGE EXPECTED YIELDS

Crop	MT/Ha.
Cassava	16.18
Corn	1.89
Tobacco	1.25
Soybeans	1.38
Cotton I (Itacurubí)	1.44
Cotton II (above 16,000) a/	1.24
Cotton III (0 to 16,000) a/	0.88

Note: a/ It refers to the Gs. spent in physical inputs per hectare.

TABLE D-27

WEIGHTED AVERAGE OF THE EXPECTED PRICES

	Quantity Produced			Value of Production			
	Survey 1 MT/farm	Survey 2 MT/farm	Average MT/farm	Survey 1 Gs/farm	Survey 2 Gs/farm	Average Gs/farm	Price GS/MT
Number of Observations	1,001	271	1,278	1,001	271	1,278	
Cassava	11.85	7.87	10.950	40,440	26,910	37,381	3,414
Corn	2.26	1.25	2,035	16,180	10,150	14,825	7,285
Tobacco	0.18	0.03	0.147	8,220	1,610	6,780	46,122
Soybeans	0.56	0.54	0.553	10,450	13,570	11,078	20,033
Cotton	0.88	0.72	0.842	13,430	15,020	18,404	21,857

(1) Production Coefficients

Unless otherwise stated, the median was used as a measure of the central tendency in order to generate production coefficients representative of the entire population of farmers.1/

(2) Yields

The yield estimates used for all the crops, except cotton, were the average yields obtained in the first survey (1001 interviews). Since the cotton technological classification was applicable only to the second survey, the average yields were obtained from there. All differences between districts were ignored in order to simplify the procedure, one single average expected yield was assumed in each case. (See Table D-26.)

(3) Product Prices

Here the results of both surveys were combined and a weighted average was calculated in every case, as shown in Table D-27.

In order to provide a more clear view of the situation, Table D-28 presents a time series of the prices quoted at the farm-gate in the last five years. These figures are published by the MAG.

The survey prices of Table D-27 are quite close to those estimated by the MAG for 1973. Table D-28 shows that tobacco and soybean prices increased markedly in 1973, and therefore provided windfall profits to tobacco and soybean producers.

(4) Factor Prices

The opportunity costs of animals and equipment used were the estimates obtained by the "Centro Paraguayo de Estudios Sociológicos". These prices were calculated from a subsample of the farms.

The expenditures on seeds, chemicals and bags do not carry any indication of price and quantity, but only the median value of the total expenses.

1/ Hypotheses of equal average transport costs and other expenditures were verified for the three cotton subgroups. The hypotheses failed to be rejected and the average of the entire group of cotton producers was used in both cases. A similar test was applied to expenditures in bags; the hypothesis was rejected and, therefore, the median values of each subgroup were adopted.

TABLE D-28

FARM PRICES
(Gs/Kg)

Crop	Year 1969	1970	1971	1972	1973	1974
Cassava	2.7	2.2	2.0	2.0	2.78	2.5 a/
Corn	5.0	3.6	3.5	4.6	6.97	6.5 a/
Tobacco	16.0	20.5	14.9	24.9	44.00	33.5
Soybeans	7.5	7.1	8.6	9.5	23.02	20.0 a/
Cotton	14.0	11.7	17.0	19.9	21.53	40.0 a/

Source: MAG, Encuesta Agropecuaria por Muestreo. (1970 to 1973)

Note: a/ Preliminary estimates.

As indicated before, the median is also used to estimate transportation costs and other expenditures in all crops except cotton, where the weighted average of the three subgroups is calculated.

It has been estimated that the average daily wage a farmer is paid for agricultural labor is equal to Gs. 180.4 regardless of the district and period of the year. In order to reflect the opportunity cost of the family labor, it is estimated that the farm family labor at the farm is worth 20 percent less (because of the transportation costs and losses that the farmer assumes when working away from his farm), that is Gs. 144.32 per day.[1/]

(5) Operating Capital

Ideally, every expenditure or operation performed should be compounded at the rate of interest that reflects the opportunity cost of capital, until the product is sold and the investment recovered. This procedure would be extremely lengthy and therefore has been simplified, estimating that an amount equal to one-half of the total costs is tied up during the entire production period.

The length of the entire production process has been roughly estimated at: corn and soybeans, six months; cotton and tobacco, eight months; and cassava, 12 months.

The opportunity cost of capital for a farmer must surely be above eight percent per year, which is the rate paid on the savings accounts by the commercial banks. The interest rates paid by the savings and loans cooperatives have an adjustment built in for price inflation, and the nominal rates they pay have been as high as 18 percent in some years. It appears that a 15-percent figure will reflect adequately the opportunity cost of capital.

c. The Results

Tables D-29 to D-35 present the cost of production estimates for each selected crop. Once all the costs have been deducted from the total revenues, an estimate of the net returns to land and management is obtained. These expected net returns appear in Table D-36.

The results should be interpreted with caution; any given farmer, because of his geographical location, might be facing a different set of product and factor prices as well as yields. Moreover,

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1/ See Annex D-3.

TABLE D-29

CASSAVA, PER HECTARE PRODUCTION COSTS

Item	Labor MD/Ha.	Labor MD/MT	Animals and Implements Gs/Ha.	Animals and Implements Gs/MT	
Land preparation	6.00		40.77		
Plowing	4.00		524.00		
Harrowing	0.53		45.11		
Planting and preparing the branches	6.28		89.62		
Seed			500.00		
First weeding	8.00		23.12		
Second "	7.00		23.12		
Third "	5.79		19.12		
Fourth "	1.06		4.08		
Harvesting and handling		4.49		6.23	
Bags			120.00		
Other miscellaneous expenditures			901.01		
Total	38.66	4.49	2,289.95	6.23	
Operating costs at yield of 16.18 MT/Ha. and wages of 144.32, Gs/MD Gs/Ha.	5,579.41	10,484.59	2,289.95	100.80	18,454.75
Opportunity cost of operating capital, (18,454.75 x 0.15 x 1/2)					1,384.11
Total variable costs, Gs/Ha.					19,838.86
Receipts at 2,000, Gs/MT					32,360.00
Net returns to land and management					12,521.14
Receipts at 1,500, Gs/MT					24,270.00
Net returns to land and management					4,431.14

TABLE D-30

CORN, PER HECTARE PRODUCTION COSTS

Item	Labor MD/Ha.	Labor MD/MT	Animals and Implements Gs/Ha.	Animals and Implements Gs/MT	
Land preparation	6.80		33.70		
First plowing	3.00		393.00		
Second plowing	0.74		96.76		
Harrowing	0.20		34.94		
Planting	3.70		94.59		
Seeds			120.00		
First weeding	6.00		20.22		
Second weeding	4.64		18.77		
Third weeding	1.45		6.30		
Harvesting		4.86			
Handling and loading		2.52		8.59	
Shelling		8.88			
Transportation and handling		1.83		416.74	
Bags			160.00		
Other			338.49		
Total	26.53	18.09	1,316.77	499.33	
Operating costs at yield of 1.89 MT/HA. and wages of 144.32, Gs/MD Gs/Ha.	3,828.81	4,934.32	1,316.77	943.13	11,023.60
Opportunity cost of operating capital, (11,023 x 0.15 x 1/2 x 6/12)					413.39
Total variable costs, Gs/Ha.					11,437.02
Receipts at 7,285, Gs/MT					13,768.65
Net returns to land and management, Gs/Ha.					2,331.63
Receipts at 3,900 Gs/MT					7,371.00
Net returns to land and management					-4,066.02

TABLE D-31

TOBACCO, PER HECTARE PRODUCTION COSTS

Item	Labor MD/Ha.	Labor MD/MT	Animals and Implements Gs/Ha.	Animals and Implements Gs/MT	
Land preparation	8.00		43.03		
First plowing	4.00		399.24		
Second plowing	4.00		199.62		
Harrowing	1.75		73.10		
Seed bed preparation	6.00 a/		5.15		
Planting	5.59 b/				
Replanting	8.66 b/		20.71		
Fertilization	5.00				
Seed			150.00		
Fertilizers			1,380.00		
First weeding	8.00		23.12		
Second "	8.00		23.12		
Third "	7.00		20.22		
Fourth "	7.00		20.22		
Pruning	7.10 b/				
Spraying	6.00		122.18		
Chemicals			391.30		
Harvesting		14.85 b/			
Handling and classifying		15.78 b/			
Packing		5.29 b/			
Transportation		2.36		480.21	
Total	87.10	38.28	3,073.18	480.21	
Operating costs at yield of 1.25 MT/Ha. and wages of 144.32 Gs/MD	12,570.27	6,905.71	3,073.18	600.26	
Gs/Ha.					23,149.42
Opportunity cost of operating capital, (23,149.42 x 0.15 x 1/2 x 8/2					1,157.47
Total variable costs, Gs/Ha.					24,306.89
Receipts at 46,122, Gs/MT					57,652.50
Net returns to land and management					33,345.61
Receipts at 20,100, Gs/MT					25,125.00
Net returns to land and management					818.11

Notes: a/ MAG tables. b/ Mean value from the survey.

TABLE D-32

SOYBEANS, PER HECTARE PRODUCTION COSTS

Item	Labor MD/Ha.	Labor MD/MT	Animals and Implements Gs/Ha.	Animals and Implements Gs/MT	
Land preparation	6.00		27.18		
Plowing	3.00		393.00		
Harrowing	1.40		170.80		
Planting	3.00		133.29		
Seeds			4,800.00		
First weeding	6.00		20.22		
Second "	4.20		14.15		
Third "	1.60		4.04		
Spraying	4.20		72.86		
Chemicals			391.30		
Harvesting	10.00	3.69			
Threshing	1.25	0.46			
Drying and handling	2.00	0.74		42.75	
Bags			160.00		
Transportation				337.17	
Other	1.50	0.55			
Total	29.40	5.44	6,186.84	379.92	
Operating costs at yield of 1.38 MT/Ha. and wages of 144.32 Gs/MD	4,243.01	1,083.44	6,186.84	379.92	
Gs/Ha.					11,893.21
Opportunity cost of operating capital, (12,617.57 x 0.15 x 1/2 x 6/12), Gs/Ha.					446.00
Total variable costs, Gs/Ha.					12,339.21
Receipts at 20,033, Gs/MT					27,645.54
Net returns to land and management, Gs/Ha.					15,306.33
Receipts at 8,400 Gs/MT					11,592.00
Net returns to land and management, Gs/Ha.					- 747.21

TABLE D-33

COTTON I, PER HECTARE PRODUCTION COSTS

Item	Labor		Animals and Implements		
	MD/Ha.	MD/MT	Gs/Ha.	Gs/MT	
Land preparation	11.00		74.69		
First plowing	3.00		393.00		
Second plowing	1.74		227.63		
First harrowing	1.53		195.52		
Second harrowing	0.21		35.96		
Planting	6.13		48.26		
Seeds			452.50		
First weeding	8.00		28.90		
Second weeding	7.00		28.90		
Third "	6.08		20.08		
Fourth "	2.68		9.13		
First spraying	2.00		104.08		
Second "	2.00		104.08		
Third "	1.48		68.47		
Chemicals			1,670.00		
Harvesting		30.07			
Burning and cleaning	4.00		22.36		
Drying and handling		2.93			
Bags			400.00		
Transportation		2.96		269.96	
Other			875.31		
Total	56.85	35.96	4,758.77	269.96	
Operating costs at yield of 1.44 MT/Ha. and wages of 144.32 Gs/MD, Gs/Ha.	8,204.59	7,472.89	4,758.77	388.74	20,824.99
Opportunity cost of operating capital, (20,824.99 x 0.15 x 1/2 x 8/12), Gs/Ha.					1,041.25
Total variable costs, Gs/Ha.					21,866.24
Receipts at 21,857, Gs/MT					31,474.08
Net returns to land and management, Gs/Ha.					9,607.84

TABLE D-34

COTTON II, PER HECTARE PRODUCTION COSTS

Item	Labor MD/Ha.	Labor MD/MT	Animals and Implements Gs/Ha.	Animals and Implements Gs/MT	
Land preparation	6.00		39.42		
First plowing	4.00		524.00		
Second plowing	1.50		196.50		
First harrowing	0.72		109.56		
Second harrowing	0.15		19.19		
Planting	3.81		159.66		
Seeds			645.00		
First weeding	8.00		23.12		
Second "	8.00		23.12		
Third "	7.67		22.16		
Fourth "	2.00		7.71		
First spraying	1.04		87.33		
Second "	1.46		56.91		
Third "	0.71		36.86		
Chemicals			1,200.00		
Harvesting		25.00			
Burning and cleaning	3.00		5.58		
Drying and handling		3.31			
Bags			500.00		
Transportation		1.69			
Other			979.92	269.96	
Total	49.31	30.00	4,636.04	269.96	
Operating costs at yield of 1.24 MT/Ha. and wages of 144.32, Gs/MD	7,116.42	5,368.70	4,636.04	334.75	
Gs/Ha.					17,455.91
Opportunity cost of operating capital, (17,455.91 x 0.15 x 1/2 x 8/12)					872.80
Total variable costs, Gs/Ha.					18,328.71
Receipts at 21,857, Gs/MT					27,328.71
Net returns to land and management, Gs/Ha					8,773.97

TABLE D-35

COTTON III, PER HECTARE PRODUCTION COSTS

Item	Labor MD/Ha.	Labor MD/MT	Animals and Implements Gs/Ha.	Animals and Implements Gs/MT	
Land preparation	6.00		41.35		
First plowing	3.00		393.00		
Second plowing	1.48		193.88		
Harrowing	0.39		49.47		
Planting	3.77		102.68		
Seeds			375.00		
First weeding	6.00		18.78		
Second "	5.00		17.34		
Third "	3.87		11.17		
Fourth "	1.07		3.08		
First spraying	0.57		29.84		
Second "	0.47		24.29		
Third "	0.16		8.33		
Chemicals			600.00		
Harvesting		23.13			
Burning and cleaning	2.00		5.77		
Drying and handling		3.71			
Bags			250.00		
Transportation		1.95		269.96	
Other			770.27		
Total	33.78	28.79	2,894.25	269.96	
Operating costs at yield of 0.88 MT/Ha. and wages of 144.32, Gs/MD	4,875.13	3,656.35	2,827.58	237.56	
Gs/Ha.					11,596.62
Opportunity cost of operating capital, (11,596.62 x 0.15 x 1/2 x 8/12), Gs/Ha.					579.83
Total variable costs, Gs/Ha.					12,176.45
Receipts at 21,857, Gs/MT					19,234.16
Net returns to land and management, Gs/Ha.					7,057.71

TABLE D-36

EXPECTED PER HECTARE NET RETURNS TO LAND AND MANAGEMENT

Crop	Total Cost Gs/Ha	Gross Returns Gs/Ha	Net Returns Gs/Ha
Cassava	19,838.86	32,360.00	12,521.14
Corn	11,437.02	13,768.65	2,331.63
Tobacco	24,306.89	57,662.50	33,345.61
Soybeans	12,339.21	27,645.54	15,306.33
Cotton I	21,866.24	31,474.08	9,607.84
Cotton II	18,328.71	27,102.68	8,773.97
Cotton III	12,176.45	19,234.16	7,057.71

some of the crops, particularly cotton and tobacco, require an intensive use of labor during certain periods of the year, thus using outside labor hired at prices well above the assumed opportunity cost of labor.

Tobacco yields the highest expected net returns: Gs. 41,000 per hectare, followed by soybeans at Gs. 15,000 per hectare, cassava at Gs. 12,000 per hectare, cotton at Gs. 7,000 to Gs. 9,000 per hectare and corn at Gs. 2,000 per hectare.

As explained in Section (3), tobacco and soybean producers collected windfall profits as the result of sudden price rises in 1973. In order to see more accurately what farmers expected to earn in each crop in 1973, their price and net return expectancies could be calculated using the average price received in the previous three years. Table D-37 presents the average price for 1970-1971 and 1972, and the net returns that result from those prices. No price changes are assumed in the factor prices, so their costs are inflated since factor prices, mainly labor, were at a lower level. The result should not be interpreted rigorously as a quantitative parameter but as an indicator of the relative level of expected returns.

Returns to corn at current prices were very low, and this is confirmed by the fact that corn production decreased from 259,000 to 209,000 metric tons between 1970 and 1972, since farmers were abandoning corn production. Another factor is that only about 35 percent of all corn production is marketed. In facing a price drop, farmers will not entirely cease producing corn, because the opportunity cost of purchasing it would be above the market price quoted.

The returns to soybean production at pre-1973 prices are negative;[1/] but production increased as prices were consistently increasing, going from 52,000 hectares in 1970 to 97,000 in 1972 and 123,000 in 1973. As a result of the sudden increase in prices from 8.40 (three-year average, 1970-1972) to 20.03 Gs/Kg in 1973, the returns to soybean production also increased dramatically, providing the farmers with unexpected windfall profits. The estimates drawn here show an increase from a net loss of Gs. 747 at 8.4 Gs/Kg to Gs. 15,306 per hectare at 20.03 Gs/Kg, a net gain.

1/ The estimated costs are higher than the returns because the post-1973 factor prices are being assumed in combination with the lower pre-1973 product prices. The results, therefore, should be utilized not as absolute estimates but as indicators of the relative profitability of each crop-raising alternative.

TABLE D-37

AVERAGE FARM PRICES FOR 1970-71, AND 72, AND THE EXPECTED NET RETURNS TO LAND AND MANAGEMENT THAT RESULT

Crop	Average Price Gs/Kg	Net Returns Gs/Ha
Cassava	2.07 (1.50)	13,654 (4,431)
Corn	3.90	- 4,066
Tobacco	20.10	818
Soybeans	8.40	- 747
Cotton I	16.20 (40.00)	1,467 (35,734)
Cotton II	16.20 (40.00)	1,759 (31,271)
Cotton III	16.20 (40.00)	2,080 (23,024)

Note: In parentheses are some of the alternative prices assumed in the calculations and the expected net returns derived.

Tobacco production also shows a very similar picture. A sudden price increase gave rise to windfall profits, net expected returns going from a low of Gs. 818 per hectare at 20.10 Gs/Kg to a high of Gs. 33,346 per hectare at 46.12 Gs/Kg. This development was obviously followed by a consistent increment in tobacco production in Paraguay from 17,286 MT in 1969 to 23,496 MT in 1971.

Only about 14 percent of all cassava produced is sold in the market. Practically every farmer produces all the cassava he needs for in-farm consumption. This is so because transportation costs can easily raise cassava prices from two to eight Gs/Kg. A farmer trying to buy cassava might easily face a price well above two Gs/Kg.

On the other hand, it is obvious that not all of the production could be marketed at such high prices. If enough farmers in a given area try to sell more of their cassava, they would soon saturate the market and pull down prices below two Gs/Kg. At an assumed price of 1.5 Gs/Kg, net returns are reduced to Gs. 4,431 per hectare.

Cotton prices for the two periods in consideration also increased, but not as fast as did tobacco and soybean prices. The expected net returns for cotton I increased from Gs. 1,462 per hectare at a price of 16.20 Gs/Kg to Gs. 9,608 per hectare at 21.857 Gs/Kg. Under the same prices, the expected net returns for the other two cotton producing technologies went from Gs. 1,759 to Gs. 8,774 per hectare (cotton II), and from Gs. 2,080 to Gs. 7,058 per hectare (cotton III).

It is strange to observe that under the pre-1973 product prices, cotton production is more profitable at the lowest technological level [1/] (cotton III), as shown in Table D-37. Such an odd result is possible only under the set of simplifying assumptions. As explained before, product prices are being brought down to their pre-1973 level while factor prices are maintained at 1973 levels, the most important factor being labor. Such a distortion will introduce a bias against the labor intensive crops, unduly inflating their total cost estimates. That is why the less advanced cotton producing technologies, being also less labor intensive as shown in Table D-38, appear to be more profitable when pre-1973 prices are assumed for cotton, while input prices are kept at their higher 1973 level.

Cotton prices increased more markedly in 1974; the preliminary estimates place the average at Gs. 40.00 per kilogram (See Table D-28).

1/ That is, the one with the lowest expected yield and less intensive input application.

TABLE D-38

INTENSITY OF LABOR USE AND LABOR COST
AS A PERCENT OF TOTAL COSTS

Crop	MD/Ha.	%
Cassava	111.31	87
Corn	60.72	79
Tobacco	134.95	84
Soybeans	36.91	45
Cotton I	108.63	75
Cotton II	86.51	72
Cotton III	59.12	74

At that price, cotton production becomes the most profitable alternative, with a value of expected net returns ranging from Gs. 35,734 per hectare for cotton I to Gs. 31,271 for cotton II and Gs. 23,024 for cotton III (See Tables D-36 and D-37).

As a result of the relatively high expected net returns, cotton production has rapidly increased from a low of 17,461 MT in 1970 to 85,241 MT in 1972.

d. Comments

If a very succinct description is to be made of the technological characteristics of the small-farm agricultural subsector of Paraguay, it must be mentioned that it is of a fairly homogeneous nature. No marked contrasts were observed in the type of implements utilized, such as tractors versus oxen. None of the sharp contrasts between traditional versus modern agriculture sectors, characteristic of dual economies, were observed.

Labor is by far the basic ingredient in the production functions; it engulfs more than 75 percent of the total costs for the production of every crop except soybeans, in which case it is only 45 percent, as presented in Table D-38.

On the other side, machinery and implements prove to be the least cost element in the small-farm capital, even below the value of farm animals for every farm size stratum considered (See Tables D-21 and D-22).

The only technological differences statistically verified referred not to the nature of the inputs but to the intensity of application. Such differences were observed in cotton production in relation to the value of per hectare expenditures in physical inputs, such as seeds, fertilizers, rented animals and equipment, bags, interest costs and others.

It was statistically verified that such differences were instrumental in setting up significantly different yields; the higher yields obviously corresponding to the more factor-intensive technologies.

5. Crop Packages and Income

a. Potential Yields Under the Project

In order to estimate the yields that could be obtained under improved production technologies for each crop, it is important to determine the yields presently obtained in other countries. The United States provides a good example of production with advanced technology; the yields obtained by the three countries neighboring with Paraguay might also throw additional light. In the case of Bolivia, the yields refer to the eastern low lands and not to the entire country.

The yield estimates appear in Table D-39. All figures refer to 1972 data, except for the column for the United States in 1960, which provides an indication of the progress made in the last 15 years.

After examining the yield figures as shown in Table D-39, it has been arbitrarily assumed that the availability of an improved technology and credit could raise the yields of the representative farmer as outlined in Table D-40. It will be observed that the assumed before-the-project yields are below the estimates appearing in Table D-39. The project is aimed at the small-farm subsector deprived of the advantages offered by cooperative membership, hence it is obvious that its yields should be somewhat below the total population averages that include the larger farms and farms already in the project, all of them with access to improved production technology.

On the other hand, the expected with-the-project yields are not overly optimistic; all of them are below the United States averages for 1960.

b. The Crop Package

(1) The Composite Hectare

In order to depict what an improved technology can do in the small farm subsector, a composite hectare is constructed based on the findings of Survey One.

Once the farmers have access to the newer production practices as presented by the credit program, they will tend to assign a larger proportion of their land to crops offering higher profits. In consequence, the assumed structure of the composite hectare has been adjusted to reflect a relative increase in tobacco, soybeans, and cotton in detriment of the other annual crops, as shown in Table D-41. It has

TABLE D-39

PER HECTARE YIELDS RECORDED IN VARIOUS COUNTRIES IN 1972
(MT/Ha)

Crop	USDA Estimates						MAG	SURVEY 1
	USA	Brazil	Argentina	Bolivia	USA 1960	Paraguay	Paraguay	Paraguay
Corn	5.99	1.29	2.67	2.04 b/	3.43	-	1.13	1.89
Tobacco	2.29	0.91	0.99	1.05	1.91	1.15	1.34	1.25
Soybeans	1.88	1.43	0.98	1.19 b/	1.58	1.40	1.28	1.38
Cotton	1.81 a/	0.91 a/	0.88 a/	1.90 b/	1.63	0.88 a/	0.93	0.88
Rice c/.	3.45	0.84	2.49	1.83 b/	2.52	1.34	1.55 d/	-

Source: USDA Agricultural Statistics 1973.

Notes: a/ Preliminary.

b/ Economic Analysis of the Agricultural Sector in Santa Cruz, Bolivia. Unpublished PhD dissertation, Utah State University, 1974. Enrique Gómez.

c/ Milled-rice equivalent.

d/ Dry-land rice.

TABLE D-40

EXPECTED YIELD INCREMENTS WITH THE PROJECT

Crop	Before MT/Ha	After MT/Ha	Percent Increment %
Corn	1.0	2.0	100.0
Tobacco	1.0	1.5	50.0
Soybeans	1.0	1.5	50.0
Cotton	0.8	1.4	75.0

TABLE D-41

COMPOSITE HECTARE OF ANNUAL CROPS

Crop	Survey One Has.	Survey One %	Assumed %
Cassava	0.75	18.5	15.0
Corn	1.27	31.4	20.0
Tobacco	0.14	3.5	10.0
Soybeans	0.41	10.1	15.0
Cotton	0.70	17.3	30.0
Other	0.78	19.2	10.0
Total	4.05	100.0	100.0

also been estimated that the fixed costs per hectare with the project are 30 percent higher in order to reflect the higher costs and/or more intensive use of certain inputs such as seeds, labor, etc., while the variable costs (per unit of product) remain constant. This assumption is instrumental in the calculations of Table D-42.

It is estimated also that the marketing cooperatives will give the farmers at least a 10-percent price increase in those areas covered by the program.[1/]

Under these assumptions it has been calculated that the farmer would obtain a net gain of Gs. 7,805 per hectare as a result of his participation in the program, producing cassava, corn, tobacco, soybeans and cotton, all of which cover 90 percent of the composite hectare. (See Table D-42.) No technological change is assumed in cassava production, nor any market price advantage as a result of the program. The same two assumptions apply also to the "other crops" category which cover 10 percent of the composite hectare.

(2) Average Farm Size and the Income Gain

A weighted average of the estimates has been obtained combining the estimates of Survey One (CREDICOOP areas only) and Survey Two. The final estimates are presented in Table D-43.

The farmer in the 0 to 5 hectares of total land category cultivates an average of 2.06 hectares of annual crops. That would result in a total net gain of Gs. 16,078 for the average farmer who has less than five hectares of total land.

Similarly, it was estimated that the costs of production would increase by 32 percent, from Gs. 11,696 to Gs. 15,443 for the composite hectare, an increment of Gs. 3,747.

The total costs of production per farm increment equal, therefore, Gs. 7,718 for the smaller farms (0 to 5 hectares), and Gs. 15,400 for the larger ones (5 to 20 hectares).

It is assumed that the entire cost increment is covered by credit issued at a 20-percent annual rate of interest. If the farmer receives the entire amount at the beginning of the production period, paying it back at the end of the production period, the actual

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1/ It is expected that the prices received by non-participants in the program areas will also be increased, since other intermediaries will be forced to compete for the purchasing of farm products. Thus the price gap between participants and non-participants might be below 10 percent.

TABLE D-42

NET RETURNS IN THE COMPOSITE HECTARE
(Guaraníes)

Before	Corn	Tobacco	Soybeans	Cotton	Cassava
Cost Gs/Ha	5,145.58	15,643.45	10,429.85	7,702.71	7,869.36
Cost Gs/MT	3,110.08	6,004.78	1,165.02	4,424.93	654.23
Yield MT/Ha	1.00	1.00	1.00	9.80	16.18
Total Costs a/	8,255.66	21,648.23	11,594.87	11,242.65	18,454.75
Price Gs/MT	7,285	46,122	20,033	21,857	2,000.00
Net Returns	- 970.66	24,473.77	8,438.13	6,242.95	13,905.25
Area	0.20	0.10	0.15	0.30	0.15
Net Returns x Area	- 194.13	2,447.38	1,265.72	1,872.89	2,085.79
Total net returns					7,477.65
After					
Yield MT/Ha	2.0	1.5	1.5	1.4	16.18
Price Gs/MT	8,013.5	50,734.2	22,036.3	24,042.7	2,000.00
Cost Gs/Ha b/	6,689.25	20,336.49	13,558.81	10,013.52	7,869.36
Cost Gs/MT	3,110.08	6,004.78	1,165.02	4,424.93	654.23
Total Costs	12,909.41	29,343.66	15,306.34	16,208.42	18,454.75
Net Returns	3,117.59	46,757.64	17,748.11	17,451.36	13,905.25
Net Returns x Area	623.52	4,675.76	2,662.22	5,235.41	2,085.79
Total net returns					15,282.70
Net difference Gs/Ha					7,805.05

Notes: a/ It has been assumed that the per hectare costs under the improved technology are 30 percent higher due to the application of better seeds, and other inputs.

b/ It does not include the opportunity cost of operating capital.

TABLE D-43

HECTARES OF LAND CULTIVATED WITH ANNUAL CROPS [a]

Hectares of Total Land	Survey 1, CREDICOOP		Survey 2		Total	
	Average	Number of Observations	Average	Number of Observations	Average	Number of Observations
0 to 5 has.	2.51 (1.72)	98	1.78 (1.33)	161	2.06 (1.48)	259
5 to 20 has.	3.94 (2.94)	295	4.66 (3.80)	88	4.11 (3.14)	383
20 and more	6.10 (4.84)	91	21.93 (20.64)	22	9.18 (7.92)	113

Note: a/ In parentheses are the estimates of land not intercropped.

rates paid for each crop would actually depend on the length of the period. If this consideration is introduced in the calculations, it would render the procedure much more difficult without adding much accuracy to the results. In consequence, a production cycle of 10 months has been assumed for all the crops thus turning the 20-percent annual rate into a 16.67-percent flat rate applicable to the entire cost increment.

Given the preceding assumptions, the cost of the credit covering the cost increment for the composite hectare (Gs. 3,747) equals Gs. 624. If this cost is included, the net gain of Gs. 7,805 for the composite hectare (due to the participation in the project) is lowered to Gs. 7,181.

Once the cost of credit is considered, the total net gain attained by the average farm is reduced to Gs. 14,793 and Gs. 29,514, respectively, for the farms with the average of 2.06 and 4.11 hectares of annual crops.

(3) Expansion in Land Devoted to Annual Crops

The income gains are even higher if the CREDICOOP goal of a 50-percent expansion in land assigned to annual crops is assumed. The per hectare gain net Gs. 30,726 (see Table D-44) on the land added, the only additional costs being the rent of the land (Gs. 1,490) and the financing of credit.[1/]

The cost increment per hectare of additional land equals Gs. 15,443. Both this cost estimate as well as the previous one on the income gain refer to the composite hectare where corn, tobacco, soybeans, cotton and cassava cover only 90 percent of the land. If it is assumed that the proportional expansion of these five crops will cover the entire land expansion, the per hectare gain in gross returns becomes Gs. 34,140 while the cost increase equals Gs. 17,159.

The cost of financing the cost increase, at a flat 16.67-percent rate, equals Gs. 2,860 per hectare. Once the land rent and the credit cost estimates are included, the cost is increased to Gs. 27,509, the net gain being equal to Gs. 12,630 per hectare of expansion.

1/ It must be kept in mind that the same structure of the composite hectare is being assumed for the additional land even though it is not likely that the farmer would do so, particularly with regards to increasing his cassava production. Furthermore, it is implicit in the calculations that there is no difference in returns with or without the project for the portion of the land devoted to cassava production (15 percent).

TABLE D-44

GROSS RETURNS AND TOTAL COSTS FOR THE COMPOSITE HECTARE
(Guaraníes)

Before	Corn	Tobacco	Soybeans	Cotton	Cassava
Total Cost	8,255.66	21,648.23	11,594.87	11,242.65	18,454.75
Area	0.20	0.10	0.15	0.30	0.15
Weighted Average					11,696.19
Gross Returns	7,285.00	46,122.00	20,033.00	17,485.60	32,360.00
Weighted Average					19,173.84
Net Returns					7,477.65
After					
Total Cost	12,909.41	29,343.66	15,306.34	16,208.42	18,454.75
Weighted Average					15,442.94
Gross Returns	16,027.00	76,101.30	33,054.45	33,659.78	32,360.00
Weighted Average					30,725.64
Net Returns					15,282.70

The farmer in the 0 to 5 hectares of total land stratum would increase his annual crop cultivation from 2.06 to 3.09 hectares on the average, while the average farmer in the 5- to 20-hectare category would increase the land allocated to annual crops from 4.11 to 6.16 hectares, the land expansion being equal to 1.03 and 1.95 hectares, respectively.

The net gain obtained by the land expansion equals Gs. 13,009 and Gs. 24,629 for the average farmer in the total land brackets as defined above. Hence the total net gain accrued by the farmers as a result of their participation in the project and having expanded their annual crop land by 50 percent is equal to Gs. 27,802 (13,009 + 14,793), and Gs. 54,143 (24,629 + 29,514), respectively.[1/]

(4) The Impact on Farm Income

Using the figures for Survey One presented in Table D-3 it is possible to calculate the average gross farm income for the total land classification: 0 to 5 hectares (but not equal to 5), 5 to 20 (but not equal to 20), and finally 20 and more hectares. The weighted averages are Gs. 84,640; Gs. 154,920 and Gs. 317,250, respectively.[2/]

Similarly, net farm income for the average farm in Survey One is calculated at Gs. 74,535, Gs. 132,647 and Gs. 247,294, respectively.

Table D-45 gives the percent impact of the income gain on the farm income: if land to annual crops is allowed to increase by 50 percent (Case II) the participation in the project generates an increment in net farm income (NFI) of the order of 37.4 percent for the smaller farms (0 to 5 hectares of total land), and 40.8 percent for the larger ones (5 to 20 hectares of total land). If no increment in land is assumed (Case I) the expected increases in net farm income equal 20.1 and 22.2 percent of the net farm income, respectively.

6. Credit Supply and Demand for the Small Farmer

a. Credit Supply

According to published data of the Banco Central del Paraguay,

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1/ The figures 14,793 and 29,514 are presented in Section (2) (Average Farm Size and the Income Gain).

2/ Does not include changes in animal inventories.

TABLE D-45

THE INCOME IMPACT OF THE PROJECT [a]

Hectares of Total Land	Gross Farm Income	Net Farm Income	Net Income Gain		Income Gain as Percent of GFI		Income Gain as Percent of NFI	
			I	II	I	II	I	II
0 to 4.9	84,640	74,353	14,973	27,802	17.7	32.8	20.1	37.4
5 to 19.9	154,920	132,647	29,514	54,143	19.0	34.9	22.2	40.8

Note: a/ Case I includes only the participation in the project; Case II allows for a 50 percent increase in land allocation to annual crops.

the outstanding banking system balances for loans to agriculture amounted to the equivalent of $91 million in December 1973 (See Table D-46). If these loan balances were distributed equally among all farm units, the average loan balance per farm-ranch unit would exceed $500. Of course, loans are not distributed equally, but by the more logical banking criteria of net worth repayment history, willingness to mortgage property and cash flow. In addition, commercial banks are forced to allocate a portion of their loan portfolios to agriculture, but some portion of their agricultural loans may represent little more than improper classification.

TABLE D-46

AGRICULTURAL LOAN BALANCES, ORGANIZED CREDIT INSTITUTIONS

December 21, 1973

(Millions of U.S. Dollars)

	Crop Production	Livestock Production
Banco Nacional de Fomento	45.1	8.8
Fondo Ganadero	-	22.0
Commercial Banks	4.3	7.7
Ex-Banco del Paraguay	2.3	0.5
	51.8	39.4

Source: Banco Central del Paraguay

Loan data published by the Agriculture Department of the BNF are listed under four general lending categories for the period 1968-1972. These data, converted to millions of dollars, are shown in Table D-47.

While it might appear logical that a $90 million institutional loan portfolio should supply the legitimate credit requirements of the agricultural sector, apart from credits of doubtful recuperability, the average size of loans suggests that small farmers (at least according to our definition) are not the major borrowers. For example, in 1972 the average loan from the BNF's Agricultural Department amounted to $21,937 for Agricultural Enterprises, $6,916 for current credits, $54,266 for sugar cane credits, and $1,187 for credits in the "Agricultural Promotion Program." The average loan from the Fondo Ganadero in 1972 was $21,422.

TABLE D-47

ANNUAL LOAN DISBURSEMENTS OF THE AGRICULTURAL DEPARTMENT OF THE NATIONAL DEVELOPMENT BANK, 1968 - 1972

	1968	1968	1970	1971	1972
Agricultural Enterprises	4.67	11.62	4.21	6.94	3.42
Agricultural Promotion Program	3.89	4.65	4.67	3.94	7.36
Current Credits	.24	.33	.22	.05	.88
Sugar-cane Credits	.20	.59	.59	.51	.43
Total	9.0	17.20	9.69	11.44	11.26

Source: Banco Nacional de Fomento, Departamento Agropecuario, Informe Anual 1972, p. 58.

The BNF Agriculture Department's Programa de Promoción Agropecuaria is aimed to help small and medium farmers (crop producers, small ranchers, poultry producers, silkworm producers, cooperatives, and others) and appears to reach medium-size farmers and ranchers. The number of borrowers reached and the average loan size for 1972 lending operations of the Programa de Promoción Agropecuaria are shown in Table D-48. Two BID loans support this program and, by the end of 1972, $5.0 million of these loans had been utilized. To qualify for these BID-funded loans a small rancher may not have a net worth exceeding $40,000 and a small farmer may not have a net worth exceeding $15,000.

All authorities who have examined the availability of credit to small- and medium-size farmers recognized the nonexistence of such credit on reasonable terms:

> "Virtually all of the small and medium size farmers are faced with an acute shortage of credits both for crop financing and capital investments... It is estimated that there are approximately 83,000 farms in the 5 to 50 hectare category; less than 10,000 of these farms have thus far received credits from official agencies."1/

> "In spite of this significant increase in credits to agriculture the great majority of small and medium farmers in Paraguay continue to be faced with extreme scarcity of credit to finance crops and farm investments. Moreover, the possible benefits of greater credit to agriculture have been diminished to a certain point because many of the loans made since 1970 have been directed to the wheat program whose benefits have been much less than those foreseen due to inadequate selection of borrowers, inadequate soils and poor climatic conditions."2/

Although it cannot be denied that there has been an expansion of credit available to the agricultural sector of the Paraguayan economy in the last decade, as a result of efforts of external lending agencies (the BID, the Banco Mundial Group and AID) operating through the BNF and the Fondo Ganadero, the average loan sizes suggest that, despite labels commonly employed, the small farmer receives little credit from the organized lending institutions.

1/ Banco Internacional para Reconstrucción y Fomento, Current Economic Position and Prospects of Paraguay (August 25, 1972, p. 21.

2/ BID, Las Condiciones Socio-Económicas y las Prioridades de Desarrollo en el Paraguay (July 20, 1973) pp. 72-73.

TABLE D-48

LOANS UNDER THE AGRICULTURAL PROMOTION PROGRAM IN 1972
(U.S. Dollar Equivalent)

Borrower-Producer	Number of Loans	Total ($ Millions)	Average Loan $
Crops	5,649	5.256	930
Livestock	234	1.406	6,011
Silk Worms	43	0.074	1,710
Poultry	90	0.234	2,066
Pork	24	0.035	1,458
Milk	87	0.187	2,148
Cooperatives	37 a/	0.161	4,344
4-H Clubs	32	0.005	137
	6,196	7.357 b/	1,187

Notes: a/ Comprises 1,100 cooperative members.

b/ Equivalent to 65.5 percent of the credits made by the Agriculture Department in 1972.

Table D-49, based on a sample of 271 farmers, collected by CPES Survey Two applies to the 1972-1973 crop year, and includes three districts in which CREDICOOP has not established credit unions. While the sample size is small, the data are indicative of the sources and magnitudes of credit presently available to small farmers. Banks, probably the BNF, supply about 76 percent of credit used by all farmers surveyed in Survey Two. Local businessmen supply 17 percent and the remainder comes from friends, family, moneylenders and others. The dollar equivalent of all credit used by the 271 farmers in the sample is $35,700 or $132 per farmer. However, there is substantial variability between districts. For example, the Santa Rosa district received the bulk of credit probably because there are more larger farms in that district.

For farms with less than five hectares in annual and permanent crops, local businessmen (comerciantes) supply 81 percent of credit used. For farms of 20 hectares and over, banks supply 98 percent of credit used. Thus, comerciantes are the major source of credit for the smallest farmers, and banks are the major source of credit for large farmers. From the standpoint of availability of credit, the demarkation of five hectares in annual and permanent crops appears useful in that most credit below that demarkation comes from comerciantes.

Table D-50 lists the average size loan received from each source of credit. A total of 59 farmers received credit, but six received credit from more than one source. Table D-50 lists the amount of credit utilized by farmers in each size category of crop land. The average farmer who utilizes credit (in an area not served by credit cooperatives) obtained an average credit of $17[illegible] if he had less than five hectares in crops; $512 if he had five to 20 hectares in crops; and $3,783 if he had more than 20 hectares in crops. Thus, there is a strong positive correlation between the size of farm and the amount of credit utilized. The most important facts, however, are that credit was used only by 22 percent of all farmers interviewed and only by 15.5 percent of farmers with less than five hectares in crops. One-half of the larger farmers, those with over 20 hectares in crops, used credit.

Comerciantes provide credit to the largest number of farmers with less than five hectares and comerciantes are also a significant source of credit to farmers with five to 20 hectares. Moneylenders are a rather insignificant source of credit (only three out of 59 borrowing farmers utilized moneylenders). Banks provide most of the credit to large farms and farms with five to 20 hectares in crops.

TABLE D-49

AVAILABILITY OF CREDIT TO FARMERS BY DISTRICT AND BY CULTIVATED LAND SIZE
(In Thousands of Gs. and Percent)

	Total	District			Cultivated Land		
		Itá	Quiindy	Sta. Rosa	Less than L 5 Has.	5 to 200 Has.	20 Has. and over
A. In Thousands of Gs.							
Family or Friends	55	8	24	23	55	0	0
Moneylenders	205	0	0	205	5	200	0
Local Businessmen	746	415	55	276	562	184	0
Banks	3,417	160	110	3,147	60	1,024	2,333
Other	77	0	15	62	15	12	50
Total	4,501	584	204	3,713	698	1,420	2,383
U.S.$ Equiv. (thousands)	(35.7)	(4.63)	(1.90)	(29.47)	(5.54)	(11.27)	(18.91)
U.S.$ Equiv. (thousands) for whole district	(101.30)	(47.98)	(522.50)				
B. In Percent							
Family or Friends	1.2	1.4	11.8	0.6	7.9	-	-
Moneylenders	4.6	-	-	5.5	0.7	14.1	-
Local Businessmen	16.6	71.1	27.0	7.4	80.6	13.0	-
Banks	75.9	27.4	53.9	84.8	8.6	72.0	97.9
Other	1.7	-	7.3	1.7	2.2	0.9	2.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE D-50

DISTRIBUTION OF FARMERS WHO RECEIVED CREDIT IN 1972/1973 CROP YEAR BY SOURCE AND AVERAGE
(In Guaraníes)

	Total Sample		Hectares in Annual and Permanent Crops					
			Less than 5 Has.		5 to 20 Has.		20 Has. and over	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Family or Friends	10	5,550	10	5,550	0		0	0
Moneylenders	3	68,500	2	2,750	1	200,000	0	0
Local Businessmen	32	23,343	19	29,603	13	14,193	0	0
Banks	16	213,562	2	30,000	9	113,777	5	446,600
Other	4	19,250	1	15,000	2	6,000	1	50,000
Total	65	69,246	34	20,529	25	56,800	6	397,167
Total without Repetition	59	76,288	32	21,826	22	64,569	5	476,600
Total Sample	271		206		55		10	
U.S. Dollar Equivalent								
Family or Friends		44		44		0		0
Moneylenders		544		22		1,587		0
Local Businessmen		185		235		113		0
Banks		1,695		238		903		3,703
Other		153		119		48		397
Average without Repetition		605		173		512		3,783

Source: CPES, Study Two, Computer print-out, Table 11-1.

Table D-51 contains data collated from the Survey Two questionnaire related to use and nonuse of credit, reasons for not using credit, need for credit, and potential use of a new credit facility. All data refer to frequency of farmers and are grouped according to net capital.

Inasmuch as there might be some difference between the number of farmers who used credit in the 1972/1973 crop year and those who obtained credit during a multi-year period, Questionnaire Two included a question which asked interviewees if they had obtained credit during the last three years. Neither the number of farmers nor the sources of credit were substantially different from the results shown in Table D-50. A high percentage of farmers with net capital less than Gs. 750,000 ($5,952) did not use credit even during the past three years, and a high percentage of farmers with net capital of Gs. 750,000 or more used credit.

One indication of the real interest charges small farmers might have to pay for credit is indicated by the fact that 82 percent of those farmers who received credit from comerciantes also sold farm produce to the same comerciantes. It could well be that many money advances from comerciantes to small farmers bear no interest, but nevertheless result in extremely high rates of interest because the comerciante probably ties the producer to a price at the time the credit is given.

In regard to the use of credit, all farmers fall into three categories: (1) those who used credit during the last year, (2) those who did not use credit and stated that they did not need credit, and (3) those who did not use credit but stated they needed credit. This latter category encompasses 61 percent of all farmers surveyed, 66 percent of those farmers with less than Gs. 250,000 in net capital, 55 percent of farmers with Gs. 250,000 to Gs. 750,000 in net capital, and 38 percent of the large farmers. Such a large number of farmers stated that they needed credit but did not use it, as to give reason to suspect that credit facilities are nonexistent; i.e., even comerciantes are not serving the existing market.

The predominate reasons given for nonuse of credit by farmers who needed it are (1) could not pay for it, and (2) could not obtain credit. Although the percentage of farmers mentioning the high cost of credit is relatively low, the number of "could not pay for credit" responses suggests that many farmers believe the cost of credit is too high to be used advantageously even if it were available. That many farmers might state credit is too costly or that they cannot pay for it does not explain why such a large number of farmers would state that it cannot be obtained.

TABLE D-51

DISTRIBUTION OF FARMERS ACCORDING TO USE AND NONUSE OF CREDIT, REASONS FOR NOT USING CREDIT, NEED FOR CREDIT, AND POTENTIAL USE OF NEW FACILITY

	Total		Net Capital					
			Less than ¢250,000		¢250,000 to 750,000		¢750,000 and over	
	Number	%	Number	%	Number	%	Number	%
A. Uae of Credit During last three years: Total Users	66	100.0	34	100.0	19	100.0	13	100.0
1. Family or friends	11	16.7	6	17.6	4	21.1	1	7.7
2. Moneylenders	2	3.0	2	5.9	0	-	0	-
3. Local businessmen	33	50.0	25	73.5	8	42.1	0	-
4. Banks	19	28.8	1	2.9	7	36.8	11	84.6
5. Other	1	1.5	0	-	0	-	1	7.7
B. Users and Non Users of Credit last three years:	271	100.0	179	100.0	71	100.0	21	100.0
1. Those not using credit	205	75.6	145	81.0	52	73.2	8	38.1
2. Users (A)	66	24.4	34	19.0	19	26.8	13	61.9
C. Local Businessmen also those to Whom Produce Sold (A.3)	33	100.0	25	100.0	8	100.0	0	-
1. Yes	27	81.8	19	76.0	8	100.0	0	-
2. No	5	15.2	5	20.0	0	-	0	-
3. No response	1	3.0	1	4.0	0	-	0	-
D. Users and Nonusers of Credit during past year: Total	271	100.0	179	100.0	71	100.0	21	100.0
1. Used credit	59	21.8	33	18.4	17	23.9	9	42.9
2. Did not use & did not need	47	17.3	28	15.7	15	21.1	4	19.0
3. Did not use but need credit	165	60.9	118	65.9	39	54.9	8	38.1

TABLE D-51 (Continued)

	Total		Net Capital: Less than ¢250,000		Net Capital: ¢250,000 to 750,000		Net Capital: ¢750,000 and over	
	Number	%	Number	%	Number	%	Number	%
E. Reasons for Non-Use of Credit by Farmers who needed it (D.3)	165	100.0	118	100.0	39	100.0	8	100.0
1. Could not pay for credit	52	31.5	41	34.7	10	25.6	1	12.5
2. Credit is very costly	12	7.3	8	6.8	2	5.1	2	25.0
3. Could not obtain credit	71	43.0	53	44.9	15	38.5	3	37.5
4. Other	26	15.8	15	12.7	10	25.6	1	12.5
5. No response	4	2.4	1	0.8	2	5.1	1	12.5
F. Statement Regarding Present Need	271	100.0	179	100.0	71	100.0	21	100.0
1. Need Credit	188	69.4	129	72.1	44	62.0	15	71.4
2. Do not need credit	83	30.6	50	27.9	27	38.0	6	28.6
G. Statement Regard Use of Facilities of new lending office of system	271	100.0	179	100.0	71	100.0	21	100.0
1. Would request loan	242	89.3	164	91.6	59	83.1	19	90.5
2. Would not request loan	21	7.7	9	5.0	11	15.5	1	4.8
3. Do not know or answered	8	3.0	6	3.4	1	1.4	1	4.8

Replies to a second question, "Do you presently need credit?", confirm that at least as many farmers stated a present need for credit as stated they did not use credit but needed it. A third question, following those noted above, asked, "If a new office similar to a bank were established in this town (or colony) dedicated to lending money to small- and medium-size farmers at a low rate of interest, would you ask (it) for a loan?" Here the responses are overwhelmingly positive from both small and larger farmers.

b. Demand for Credit Services

It was pointed out in the supply section that the results of the sample of 271 farmers indicate that relatively few individuals that are considered to be small farmers (capital of less than Cs. 750,000; i.e., $5,952) have experience with credit (see Table D-46). Even including large farmers, only 24.4 percent of interviewees have used credit during the past three years and 21.8 percent used credit last year. When questioned regarding the use of credit during the last year, 60.9 percent of all interviewees stated that they did not use credit but needed it. As expected, the percentage of those that needed but did not use credit last year declines as the size of net capital increases. The interviewee statement regarding current need for credit required only a "yes" or "no" answer; the responses to this statement are, however, entirely consistent with unfulfilled credit needs during the past year. The statement regarding loan requests by interviewees from a new credit system is tilted in favor of positive answers because the question mentions a low rate of interest. This accounts for the high percentage of potential users among large farmers as well as small farmers.

Globally, 90 percent of all interviewees stated demand for credit for at least one of 14 purposes. The question which elicited these responses was: "If you could obtain sufficient credit for all your requirements, how much would you ask for for each of the following operations?"

The total amount of credit which a respondent stated as sufficient for his requirements is in no way limited by his income, capital, landholdings, or other restrictions which would normally be considered by a banker, nor is it limited by the influence of a stated rate of interest or cost per loan. Although it may be thought that the failure to include these inhibitions would have been meaningful only if a large number of interviewees already had experience with institutional credit, and as noted above, only the large farmers

have had such experience. Smaller farmers borrow mainly from comerciantes, who may or may not charge interest on advances. (In reducing produce prices by 10 to 20 percent, a comerciante may be receiving a 50 to 100 percent annual rate of interest on an advance on which no direct charge for interest is made.) Thus, the tying of responses to particular rates of interest probably would have yielded a more misleading picture of potential credit demand than that obtained.

The questionnaire utilized in Survey Two permits a complete yet detailed picture of total potential demand for credit. The interviewee was permitted to state his requirement for credit within 14 classes. These categories are grouped in four major categories in Table D-52: (1) for annual costs, (2) for multi-year costs, (3) for purchase of land, and (4) for personal expenses. As shown in Tables D-51 and D-52, respondents are grouped by size of net capital, the points of demarkation being Gs. 250,000 ($1,984) and Gs. 750,000 ($5,952). Of a total of 271 interviewees in the Survey Two sample, only 245 stated any demand for credit. By amount of net capital, credit needs were stated by 166 of the 179 farmers with net capital less than $1,984, 59 of the 79 farmers with net capital between $1,984 and $5,952, and 20 of the 21 farmers with net capital in excess of $5,952. For analytical purposes, we assume that those interviewees who abstained from stating any credit requirement, 10 percent of the total, do not have a present demand for credit.

Table D-52 (Part B) indicates the average demand per borrower for credit in US dollars. These data on potential demand are constructed from the total demand data shown on Table D-53. Table D-53 indicates the number of borrowers requesting credit for each of the 14 classes in the questionnaire and the total credit requirement for each class in thousands of Guaraníes. These data are aggregated to reveal the four major categories and are converted to US dollars at Gs. 126 = US$1.00. The dollar equivalent data are then divided by the total number of interviewees stating any demand for credit; i.e., 245 for the total and 166, 59, and 20 for the respective subpopulations. This procedure gives rise to an understatement of credit demand for particular categories of credit use. For example, the total number of individual borrowers stating any demand for annual-cost credit is 204 instead of 245, and therefore the average per-borrower demand is $1,073 instead of $893. The average per-borrower credit demands shown in Table D-52 (Part B) are, therefore, theoretical minimums. However, the results can be interpreted unequivocally. If the interviewed farmers were to come to a credit institution and all their credit requests were filled, the average loan per borrower would be as shown in Table B-52, and would be composed of the constituent elements--annual costs, multi-year costs, purchase of land, and personal expenses. As shall be discussed

TABLE D-52

INDICATORS OF DEMAND FOR CREDIT; TOTAL AND BY SIZE OF NET CAPITAL OF FARMERS

	Total		By Size of Net Capital					
			Less than $1,984		$1,984 to 5,952		$5,952 and over	
	Number	%	Number	%	Number	%	Number	%
A. By Number and Percent of Interviewees								
1. States quantitative demand for credit	245	90.4	166	92.7	59	83.1	20	95.2
2. Total number of respondents	271	100.0	179	100.0	71	100.0	21	100.0
B. Average Per Borrower Demand for Credit (in US$ 1.00)								
1. Annual Costs	893		392		693		5,640	
2. Multi-Year Costs	1,302		649		1,583		5,897	
3. Purchase Land	786		529		680		3,234	
4. Personal Expenses	273		222		265		722	
5. Total	3,255		1,792		3,222		15,494	
C. Past Year Data (In US$ 1.00)								
1. Average Credit per Borrower	606		171		319		2,738	
2. Average Credit per Potential Borrower	146		34		92		1,232	
3. Net Capital (Average)	5,329		838		3,444		49,990	
4. Gross Farm Income (Average)	1,210		479		1,162		7,601	
5. Net Farm Income (Average)	977		427		943		5,784	
6. Net Farm Family Income (Average)	1,219		579		1,173		6,831	
7. Ratio Net Farm Income to Gross Capital (%)	17.9		49.1		26.8		11.3	

Sources: (A) CPES, Survey Two, Computer print-out, Table 12-A.
(B) Annex D-4 and CPES, Survey Two, Computer print-out, Table 12-C.
(C) CPES, Survey Two, Computer print-out, Tables 1-1, 2-1, and 11-1.

TABLE D-53

TOTAL DEMAND FOR CREDIT BY SIZE OF NET CAPITAL
(By Number of Respondents and Thousands of Guaranies)

	Total		By Size of Net Capital (in Thousands)					
			Less than ₲ 250		₲ 250 to ₲ 750		₲ 750 and over	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
For Annual Costs		27,565		8,196		5,155		14,214
Cultivate More Land	134	10,709	85	3,936	38	1,968	11	4,805
Cultivate the Same Land	107	8,581	65	1,090	31	1,101	11	6,390
Rent Land	39	1,220	31	1,038	8	182	0	0
Rent Animal Traction	28	348	22	244	5	90	1	14
Rent Machinery	31	2,209	20	284	7	460	4	1,465
Hire Labor	134	4,498	78	1,604	40	1,354	16	1,540
For Multi-Year Costs		40,208		13,577		11,771		14,860
Buy Work Animals	131	8,155	97	5,135	26	1,970	8	1,050
Buy Implements and Machinery	141	17,605	91	2,858	37	6,062	13	8,685
Make Improvement and Fixed Installations	76	5,253	45	1,437	22	2,161	9	1,715
Buy Livestock	127	9,195	89	4,147	27	1,638	11	3,410
Purchase Land	163	24,261	115	11,055	37	5,056	11	8,150
For Personal Expenses		8,437		4,646		1,971		1,820
Housing	99	3,881	68	2,019	23	1,102	8	760
Personal Necessities	100	3,984	71	2,332	25	852	4	800
Other	11	572	8	295	2	17	1	260
Total	245	100,473	166	37,476	59	23,953	20	39,044
U.S. Dollar equiv. ($1,000)								
Annual Costs		218.8		65.0		40.9		112.8
Multi-Year Costs		319.1		107.8		93.4		117.9
Purchase Land		192.5		87.7		40.1		64.9
Personal Expenses		67.0		36.9		15.6		14.4
Total		797.4		297.4		190.1		309.9

Source: CPES, Survey Two, Computer print-out, Table 12-A.

further, for small farmers even the demand for credit for annual costs exceeds the limits which would have to be imposed by a reasonably liberal banker.

Table D-54 indicates the relative popularity of particular credit categories by showing the frequency of response calculated as a percentage of total respondents stating any demand for credit and by indicating the average size of the demand. The use of credit to purchase land is popular among all farmers, as shown by the response frequency and size of average credit request.

Within annual cost categories, farmers with less than Gs. 750,000 ($5,952) of net capital give cultivating more land, cultivating the same land, and hiring labor a high percentage of responses. Thus, the credit union program for financing annual costs should encounter a large number of small farmers desiring loans to finance annual costs. Average credit requests for these items also indicate a substantial demand. While renting land, animal traction and machinery do not have high response frequencies, they suggest ways in which credit can aid small farmers to overcome production constraints.

For large farmers, the sample is too small in absolute numbers to draw conclusive statements.

As expected, the average credit requests for multi-year cost items are generally larger than those for annual cost items. For the smallest farmers, buying work animals, implements and livestock have high response frequencies.

The item that elicited the highest response among farmers in the lowest bracket is the purchase of land. Such constraint appears to be more important for these farmers than for those with more net capital. This idea is reinforced by noticing that these same farmers—who have less capital and face land constraints--are also less interested in buying implements and making improvements since they are making use of their land resource with a technology that is more labor intensive and less capital intensive as compared with the farms with more net capital. (See the section on the Economic Model.)

The major question regarding the hypothetical or "wishbook" demand for credit given by interviewees is to what extent it can become effective demand. This question involves both the supply as well as the demand for credit. On the supply side, any banker who would lend even $392 to a farmer with a net family income of $579, or $693 to a farmer with a net family income of $1,173, and

TABLE D-54

AVERAGE CREDIT REQUEST (ACR) IN U.S. DOLLARS AND PERCENT OF FARMERS REQUESTING CREDIT FOR EACH PURPOSE

	Total		By Size of Net Capital					
			Less than $1,984		$1,984 to $5,952		$5,952 and over	
	%	ACR	%	ACR	%	ACR	%	ACR
For Annual Costs								
Cultivate More Land	54.7	627	51.2	365	64.4	405	55	3460
Cultivate Same Land	43.7	634	39.2	127	52.5	278	55	4603
Rent Land	15.9	246	18.7	262	13.6	175	0	0
Rent Animal Traction	11.4	95	13.3	87	8.5	143	5	111
Rent Machinery	12.7	563	12.0	111	11.9	516	20	2904
Hire Labor	54.7	262	47.0	159	67.8	262	80	762
For Multi Year Costs								
Buy Work Animals	53.5	492	58.4	413	44.1	595	40	1040
Buy Implements	57.6	984	54.8	246	62.7	1294	65	5301
Make Improvements	31.0	548	27.1	246	37.3	754	45	1508
Buy Livestock	51.8	571	53.6	365	45.8	476	55	2460
For Purchase of Land	66.5	1174	69.3	762	62.7	1079	55	5873
For Personal Expenses								
Housing	40.4	309	41.0	230	59.0	373	40	754
Personal Necessities	40.8	309	42.8	254	42.4	270	20	1587
Other	4.5	413	4.8	286	3.4	63	5	2063
Total Credit Requesters	(245)		(166)		(59)		(20)	
Total Credit Requests	(1321)		(885)		(328)		(108)	
Average Credit Request		603		333		579		2865

Source: CPES, Survey Two, Computer print-out, Table 12-B.

who would expect repayment in less than one year probably has unrealistic expectations. The average smallest and intermediate farmers' demands for credit for all purposes (and certainly only that portion for annual costs) do not appear outrageous if such credits could be amortized over several years. However, the focus of the credit union program on annual costs suggests that capacity to repay loans has to bear a more immediate relationship to income and capital. The amounts of annual-cost credit that would be made available to the three groups of farmers (by size of net capital) could be limited by the following criteria: (a) not to exceed 25 percent of net farm income, (b) not to exceed 50 percent of cash farm income, and (c) not to exceed 15 percent of net farm capital. (Entries under (d) signify average per borrower credit demand for annual costs.) These limits are applied to the average farmer in each net capital subpopulation and are as follows (in US dollars):

Average Borrower by Size of Net Capital	(a)	(b)	(c)	(d)
1. Less than $1,984	107	144	126	392
2. $1,984 to $5,952	236	379	517	693
3. $5,952 and over	1,446	3,413	7,499	5,640

These limits are only suggestive of the case of the average farmer; however, it should be noted that each category of capital covers a substantial range of net farm income, cash farm income, and net capital. A substantial number of potential borrowers, particularly those with the smallest incomes, will not receive loans from the credit union system which are substantially in excess of the limits stated above. Specifically, there are 179 farmers with capital of less than $1,984 in the Survey Two sample; of these, 71 own less than three hectares and 136 own less than five hectares. Therefore, on the average the bulk of the smallest farmers could not request financing for more than one hectare of cash crops from a credit union; we estimate this financing currently at about $125. Even though we expect the smallest farmers to request and receive loans from credit unions, the total effective demand for annual cost credits from this group of farmers will be composed of a large number of relatively small loans.

Annual cost financing may be the safest route to supply the credit demands of small farmers. As can be calculated from Table D-46, the total demand for credit for the average borrower with a net capital of less than $1,984 is 214 percent of his net capital and 374 percent of his net farm income. The total demand for credit

for the average borrower with a net capital of $1,984 to $5,952 is 94 percent of his net capital and 342 percent of his net farm income. These results should not be viewed as surprising for several reasons; interviewees were not given an amortization term for potential debt, were not supplied with a specific cost for the credit, nor even told that annual-cost credits were to be repaid annually. Except for the large farmers, who borrow from the BNF, and a few of the intermediate farmers who borrow from the BNF if they can, farmers borrow from comerciantes or they do not borrow. This situation explains the inability of interviewees to view institutional credit realistically as well as the difficulties in designing a questionnaire to elicit responses to a reality which does not as yet exist.

One can speculate on the shape of the demand schedule of credit by farmers (see Annex D-4). For such a speculation it should be noted that the effective demand for credit can be described as a demand schedule which slopes downward to the right, that is, the lower the rate of interest, the greater the effective demand for credit. The available evidence indicates that some farmers obtain credit in areas not served by credit unions. As is indicated by Survey Two data, only 24.4 percent of the interviewed farmers used credit in the last three years, and 60.9 percent of all interviewees did not use credit last year but stated that they needed credit. For this group, 49 percent (31 percent of all interviewees) stated that credit is very costly or that they could not obtain credit and 32 percent (19 percent of all interviewees) stated that they could not pay for it. This evidence suggests that the majority of farmers perceive that they either could not obtain credit or could not pay for it. Excepting the larger farmers, who borrow from the BNF and possibly from other banks, the evidence of lack of use of credit suggests that credit is not available at any price which would make its use remunerative. As is indicated in Table D-52, the smallest farmers have a gross rate of return on gross capital of 49.1 percent and the intermediate farmers have a return of 26.8 percent. This evidence suggests that small farmers could afford to use credit from credit unions. In fact, one can suspect that a demand schedule for credit by the smallest and intermediate farmers will be elastic (responsive to a reduction in the rate of interest) above an interest rate of, say, 20 percent. The fact that so few of the smaller farmers use credit suggests that many of them would come into the market for credit if the interest rate were lower, and we cannot state with any degree of certainty what the rate would be if they were to borrow at present.

7. Cooperative Movement

a. Small Farmer Attitudes Toward Cooperatives and Perceived Benefits

There are a number of questions in regard to the services provided by cooperatives which are worth exploring. A first and obvious question is the attitudes farmers have regarding potential membership. Do they think joining a cooperative would be a good thing, and if so, what are their motivations for joining? A second question is whether present members of cooperatives think that they are obtaining benefits from membership. A third question which can be asked and answered is whether UNIPACO is paying higher prices than other buyers for farm produce.

Table D-55 is based on Survey Two data. This survey was effected in three districts in which no cooperatives, either credit or marketing, are in operation. In response to the question "Do you think it would be a good idea to form a cooperative in this district?" 89 percent of interviewees stated "yes." Only one farmer thought it would be a bad idea. In response to the question, "Would you join a cooperative if one were formed in this district?" 86 percent of interviewees stated "yes." The bulk of the remaining replies indicate that the interviewee did not know or did not choose to respond to the question. These questions did not specify what type of services the cooperatives would make available to potential members.

A separate question included in Survey Two asked, "If the farmers in this district formed a group to sell in common, would you be interested in joining?" Here the positive response was very high, 89 percent of all interviewees. This response undoubtedly reflects the dissatisfaction of interviewees with the prices paid for their products.

In response to the question, "Are you satisfied with the prices paid by local businessmen and other buyers for your products?" about half of all interviewees were not satisfied, one-third were satisfied, and the remainder did not respond to the question. As indicated by Table D-55 the larger the farmer, the more dissatisfied he was with prices paid. There is substantial price variability in Survey Two for products which are sold in small quantities, such as corn, beans, and cassava, and some range for other products. However, a difference in quantities, quality and geographical location may explain this variance.

TABLE D-55

OPINIONS OF NONMEMBERS OF COOPERATIVES (STUDY TWO) REGARDING FORMATION AND INTEREST IN JOINING A COOPERATIVE AND SATISFACTION WITH PRICES RECEIVED FROM FARM PRODUCE

	Total		By Size of Cultivated Hectares					
			Less than 5		5 to 20		20 and over	
	No.	%	No.	%	No.	%	No.	%
Do you think it would be a good idea to form a cooperative in this district?								
Yes	240	88.6	181	87.9	49	89.1	10	100.0
No	1	.4	1	.5	0	.0	0	.0
Does not know or does not respond	30	11.0	24	11.6	6	10.9	0	.0
Total	271	100.0	206	100.0	55	100.0	10	100.0
Would you be interested in joining a cooperative if one were formed in this district?								
Yes	232	85.6	174	84.5	48	87.3	10	100.0
No	11	4.1	10	4.8	1	1.8	0	.0
Does not know or does not respond	28	10.3	22	10.7	6	10.9	0	.0
Total	271	100.0	206	100.0	55	100.0	10	100.0
Are you satisfied with the prices paid by local businessmen and other buyers for your products?								
Yes	90	33.2	69	33.5	17	30.9	4	40.0
No	139	51.3	97	47.1	36	65.5	6	60.0
Does not respond	42	15.5	40	19.4	2	3.6	0	.0
Total	271	100.0	206	100.0	55	100.0	10	100.0
If the farmers in this district form a group to sell in common, would you be interested in joining?								
Yes	242	89.3	184	89.3	48	87.3	10	100.0
No	3	1.1	0	.0	3	5.5	0	0.0
Does not know or does not respond	26	9.6	22	10.7	4	7.2	0	.0
	271	100.0	206	100.0	55	100.0	10	100.0

Source: CPES, Survey Two, Computer print-out, Table 14.

Survey Two data presented in Table D-56 permitted interviewees a broad array of replies to explain the motives which make potential cooperative membership attractive to them. The single predominant reply is "to produce more or obtain better prices." The principal motives given for becoming cooperative members were: "obtain more land," 16.7 percent; "obtain credit at a low rate of interest," 10.5 percent; and "receive improved economic assistance for himself or family," 10.5 percent. Other responses are low, even "to receive technical assistance or obtain implements," 6.1 percent.

Preliminary data from Survey One indicate a similar response pattern for interviewees who are not presently members of cooperatives but who expressed interest in joining cooperatives. (See Table D-56.) Inasmuch as interviewees in districts where there are credit or marketing cooperatives might have heard about them, these interviewees should have a better idea regarding the degree to which cooperatives might fulfill their aspirations. The single substantial difference is that interviewees in these Survey One districts give a higher percentage of responses to the desire "to receive technical assistance or obtain implements."

One particularly interesting revelation of Survey One data is that there are many farmers in districts presently served by UNIPACO or CREDICOOP cooperatives who desire to join but have not done so. Thus, 60 percent of the nonmembers of UNIPACO cooperatives in districts served by it expressed desire to join a marketing cooperative, and 72 percent of the nonmembers of CREDICOOP cooperatives in districts served by it expressed a desire to join a credit cooperative.

One way to ascertain the existence of benefits obtained by members of cooperatives is to ask their opinions regarding specific benefits and to ask nonmembers in districts served by the cooperatives the same question, and finally, to ask farmers in districts not served by cooperatives. A comparison of answers for these three groups of interviewees should give an approximation of the bias in responses in favor of cooperatives by nonmembers and against cooperatives by members.

Table D-57 indicates replies for three such groups to four questions regarding benefits obtained from credit cooperatives. Approximately two-thirds of interviewees in districts not served by CREDICOOP credit unions indicate that they do not know the answer to the questions asked, and with the exception of the question, "Who charges the least interest?" responses of those asserting knowledgeability are split about evenly between cooperatives and other suppliers of credit. Thus, replies of noncredit union members in districts not served by credit unions appear to conform to a priori expectations.

TABLE D-56

MOTIVES FOR JOINING COOPERATIVES OF NONMEMBERS FROM STUDY ONE AND STUDY TWO

	Study Two		Study One: Nonmembers			
	All Nonmembers		UNIPACO a/		CREDICOOP b/	
	No.	%	No.	%	No.	%
What is the principal motive explaining your desire to join a cooperative?						
Obtain more land	38	16.7	27	16.2	25	13.7
Produce more or obtain better prices	87	38.0	68	40.7	58	31.9
Practice cooperative principles	8	3.5	4	2.4	4	2.2
To help the poor	8	3.5	4	2.4	14	7.7
To obtain credit at a low rate of interest	24	10.5	12	7.2	26	14.3
To receive technical assistance or obtain implements	14	6.1	26	15.6	22	12.1
To receive improved economic assistance for self or family	24	10.5	23	13.8	28	15.4
To save money	4	1.7	1	.6	4	2.2
Other	22	9.6	2	1.2	1	.5
Total Replies	229	100.0	167	100.0	182	100.0
Total in Group	271		276		251	
Those who indicate no desire to join	39	14.4	109	39.5	69	27.5

Source: CPES, Survey Two, Computer print-out, Table 14.
CPES, Survey One, Computer print-out, Table 12-1.

Notes: a/ Nonmembers of UNIPACO cooperatives in districts where UNIPACO coops exist who express interest in joining a marketing cooperative.

b/ Nonmembers of CREDICOOP credit unions in districts where CREDICOOP coops exist who express interest in joining a credit cooperative.

TABLE D-57

DISTRIBUTION OF OPINIONS OF STUDY ONE INTERVIEWEES ON BENEFITS OF CREDIT COOPERATIVES

	UNIPACO Districts		CREDICOOP Districts			
			Members		Nonmembers	
	No.	%	No.	%	No.	%
Who changes the least interest?						
Cooperative	105	20.3	194	83.3	122	18.6
Others	70	13.5	11	4.7	21	8.4
Does not know	342	66.2	28	12.0	108	43.0
Total	517	100.0	233	100.0	251	100.0
Who requires the least paperwork?						
Cooperative	82	15.9	183	78.5	90	35.9
Others	85	16.4	21	9.0	41	16.3
Does not know	350	67.7	29	12.5	120	47.8
Total	517	100.0	233	100.0	251	100.0
Who is more willing to lend?						
Cooperative	90	17.4	193	82.8	103	41.0
Others	78	15.1	9	3.9	24	9.6
Does not know	349	67.5	31	13.3	124	49.4
Total	517	100.0	233	100.0	251	100.0
Who delivers credit more opportunely?						
Cooperative	86	16.6	187	80.3	87	34.7
Others	77	14.9	18	7.7	40	15.9
Does not know	354	68.5	28	12.0	124	49.4
Total	517	100.0	233	100.0	251	100.0

Source: CPES, Survey One, Computer printOout, Table 10-2.

The response pattern of credit union members suggests, of course, that members feel they receive benefits. Approximately 12 percent of members plead ignorance in responses to the four questions (see Table D-57). Members of credit unions give a high percentage of affirmative responses to credit unions; 83.3 percent of all responses to the effect that the credit unions charge less interest than other credit suppliers, and 82.8 percent of responses to the effect that credit unions are more willing to lend. A high proportion of members also state that credit unions have the least paperwork and deliver credit more opportunely. On the basis of the 233 credit union members (which in some districts included a substantial proportion of all credit union members), one could conclude that the vast majority of credit union members are more satisfied with borrowing from credit unions than from other sources.

Table D-57 also bears out the hypothesis that credit unions are highly regarded by noncredit union members in those districts in which credit unions operate. Even though a substantial proportion of the interviewees state that they cannot answer the questions posed, the response pattern of those answering the questions is highly favorable to credit unions. Again credit unions are given high marks for charging less interest and for being more willing to lend, this time among nonmembers.

Table D-58 indicates perception by interviewees of Survey One on benefits received from cooperative marketing of their produce and from purchase of inputs from cooperatives. Inasmuch as UNIPACO marketed produce from its own members and some of the CREDICOOP members, all members of UNIPACO and CREDICOOP interviewed are shown in Table D-58. Available information from Survey One does not include, however, all nonmembers of cooperatives but only those who are nonmembers of cooperatives in districts which have UNIPACO cooperatives. For this reason, the total number of interviewees shown in Table D-58 does not correspond to total interviews for Survey One (1,001) but includes only 750.

Farmers' responses to questions related to marketing farm produce and selling inputs are shown in Table D-58 in terms of frequency, with total interviewees for each subpopulation representing 100 percent. (The total number of farmers interviewed in each subpopulation is also shown in Table D-58.)

Responses of cooperative members (both CREDICOOP and UNIPACO) indicate that 80 percent of them believe that marketing cooperatives give a better price for farm produce, 76 percent believe that they

TABLE D-58

DISTRIBUTION OF OPINIONS OF STUDY ONE INTERVIEWEES
ON BENEFITS OF MARKETING COOPERATIVES IN PERCENTAGES

	Total	Members UNIPACO coops	Members CREDICOOP coops	Total Coop Members	Non Members (A)	Total UNIPACO Districts
Total Interviewees (Number)	(750)	(241)	(233)	(474)	(276)	(517)
A. Commercialization of Farm Produce						
1. Who gives the better price?						
Cooperative	64.1	74.3	85.0	79.5	37.7	54.7
Other Buyers	16.0	13.7	9.0	11.4	23.9	19.2
Does not know or respond	19.9	12.0	6.0	9.1	38.4	26.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
2. Who fulfills agreements better?						
Cooperative	59.2	66.8	85.4	75.9	30.4	47.4
Other Buyers	16.9	19.1	6.0	12.7	24.3	21.8
Does not know or respond	23.9	14.1	8.6	11.4	45.3	30.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
3. Who gives better terms?						
Cooperative	57.3	65.6	82.0	73.6	29.3	46.2
Other Buyers	18.6	19.5	8.6	14.1	26.1	23.0
Does not know or respond	24.1	14.9	9.4	12.3	44.6	30.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

TABLE D-58 (Continued)

	Total	Members UNIPACO coops	Members CREDICOOP coops	Total coop Members	Non Members (A)	Total UNIPACO Districts
B. Commercialization of Inputs						
1. Who gives the better price?						
Cooperative	45.3	33.6	84.5	58.6	22.5	27.7
Other Buyers	17.3	22.8	8.6	15.8	19.9	21.3
Does not know or respond	37.4	43.6	6.9	25.6	57.6	51.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
2. Who fulfills agreements better?						
Cooperative	43.9	32.4	85.8	58.6	18.5	25.0
Other Buyers	16.0	22.0	7.3	14.8	18.1	19.9
Does not know or respond	40.1	45.6	6.9	26.6	63.4	55.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
3. Who gives better service?						
Cooperative	43.6	32.0	85.4	58.2	18.5	24.8
Other Buyers	14.7	22.0	5.6	13.9	15.9	18.8
Does not know or respond	41.7	45.0	9.0	27.9	65.6	56.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: CPES, Survey One, Computer print-out, Table 9.

Note: (A) Includes only nonmembers in districts served by UNIPACO cooperatives.

fulfill agreements better, and 74 percent believe that they give better terms. Nonmembers of cooperatives (in districts served by UNIPACO) are less disposed to have these beliefs. However, the number of nonrespondents is extremely large. Only 24 percent of noncooperative members believe other buyers give a better price for farm produce and about the same percentage believe that other buyers fulfill agreements better and give better terms.

Responses of cooperative members to questions related to sales of inputs (shown in Table D-58), while containing a large number of nonresponses from members of UNIPACO cooperatives, are generally favorable. Approximately 26 percent of cooperative members did not respond to this set of questions; of total responses, 58 percent of cooperative members believe that cooperatives provide inputs at a lower price, fulfill agreements better and give better service.

Nonmembers of cooperatives give a much higher percentage of nonresponses and "do not knows" to these questions; however, even a majority of nonmember respondents believe that cooperatives give better treatment to farmers in supplying inputs.

One known benefit given by UNIPACO cooperatives in the 1973 crop year (not related to farmer opinion) is the price paid by its cooperatives for soybeans and cotton. The Survey One questionnaire included the farmer's identification of the buyer of his cotton and soybeans, the prices received, and the quantity sold.

These data are summarized below:

	Soybeans	Cotton
Quantity Sold (Metric Tons)		
- to cooperatives	380.1	397.2
- to others	156.9	488.5
Number of Farmers Selling		
- to cooperatives	68	153
- to others	64	292
	132	445
Average Price Paid (Gs. per KG)		
- by cooperatives	18.8	23.1
- by others	18.4	21.0

These data indicate that farmers selling through cooperatives received a higher price for their soybeans and cotton. Moreover,

the cooperatives paid 10 percent more for cotton. Although cooperatives paid only 2.1 percent more for soybeans, it should be noted that the average price received by farmers for soybeans in 1973 varied from Gs. 6.0 to Gs. 35.0 per kilogram, depending upon quality. A sizable portion of the soybeans sold had been spoiled by bad weather at harvest. In addition, the amount purchased by UNIPACO from interviewees was 143 percent higher than that of other buyers. This may reflect the fact that UNIPACO bought soybeans that could not have been sold otherwise.

b. Small Farmer Participation in the Cooperatives

(1) Introduction

Ideally, in order to fully use the available productive resources, all farmers should have access to credit for production, technical assistance for the introduction of the most economically efficient technologies, marketing services for the provision of inputs, and sale of the farm produce.

If the above services were to be provided by the cooperatives--in the absence of other institutions--then the efficacy of their work could be tentatively valued among the following parameters, stated in the form of goals to be reached:

A. All farmers should know that the cooperatives

1 - exist
2 - provide credit for production
3 - provide technical assistance
4 - sell inputs
5 - buy farm produce

B. All cooperative members should be familiar with the organizational structure of the cooperative and statutes.

C. All cooperative members should attend and participate in the cooperative meetings.

D. All cooperative members who so desire should be able to make use of the services offered by the cooperative in regards to:

1 - Credit
2 - Marketing of produce
3 - Sale of inputs
4 - Technical assistance

(2) Summary of the Services Being Provided

Presently, UNIPACO offers marketing services of farm produce (cotton, soybeans, tobacco and tartago), not only to UNIPACO cooperatives but to all other cooperatives as well. It offers very limited sale of inputs and no agricultural technical assistance.

CREDICOOP, in addition to providing agricultural credit, is also engaged in the sale of inputs for agricultural production, although in reduced scale, and technical assistance mainly through the ayudantes de campo. All these services are circumscribed to the districts with CREDICOOP cooperatives.

(3) Results of the Survey

The results of the survey will be scrutinized within the framework of the objectives outlined in the introduction. (Hereinafter, the citations in parentheses refer to two documents prepared by CPES. Inside the parentheses, the capital letter indicates the source and the number refers to the table number in the source.)1/

A.1. Almost every farmer in the CREDICOOP districts has heard about the credit and savings cooperatives; only four percent of the farmers visited indicated to have no knowledge of the existence of such cooperatives. (A-100.)

On the other hand, only 13 percent of the farmers in the UNPACO districts answered that they do not know of any cooperatives other than the credit and savings ones. (A-101.)

Hence, a significantly large proportion of the farmers know about the cooperatives whenever they have one in their district.

A.2. With regards to credit, 23 percent of the farmers interviewed in the CREDICOOP districts did not know that the cooperative offers it. (A-111.) Within the group of cooperative members only seven percent did not know about it while a 37-percent estimate is calculated for nonmembers. (B-153.)

1/ The CPES documents are:

A. CPES, Información Sobre Cooperativas Agrícolas, Primera Parte, Cuadros Básicos, 1975.

B. CPES, Información Sobre Cooperativas Agrícolas, Primera Parte, Anexos, 1975.

A.3. Technical assistance is provided in the CREDICOOP districts through the ayudantes de campo, while no technical advice is formally offered in the UNIPACO districts through the cooperative.

The results of the survey indicate that 69 percent of the farmers visited in the CREDICOOP districts know that the cooperative offers technical assistance. On the other hand, 72 percent of the farmers in UNIPACO areas failed to mention the cooperative as a supplier of technical assistance. (B-125.)

The above estimates, calculated for the subsample of cooperative members, indicate that 83 percent of them in the CREDICOOP districts are aware of the technical assistance program while 61 percent of the members in UNIPACO areas did not mention it. (B-153.)

A.4. With regard to sale of inputs for agricultural production the situation is quite similar. This service is provided in small scale in the CREDICOOP districts while very little is done in the UNIPACO districts. Hence 71 percent of the interviewees in CREDICOOP areas know that the cooperative supplies inputs, while 71 percent in UNIPACO districts fail to mention the cooperative as a supplier of inputs. (B-124.) The same parameters drawn for the cooperative members become 84 percent in the CREDICOOP areas and 56 percent in the UNIPACO districts. (B-154.)

A.5. The degree of perception of the marketing services provided for the farm products is slightly less satisfactory than what was perceived regarding the credit programs. It is observed that 35 percent of the interviewees in UNIPACO districts and 28 percent in CREDICOOP districts did not know that the cooperative offers such services. The same estimates drop to 15 and 11 percent when applied to cooperative members. (B-154.)

B. The knowledge of the cooperative's organization and statutes rates quite low. In effect, only 20 percent of the cooperative members questioned on which is the most important decision-making body in the cooperative gave the right answer by selecting the assembly of members. (A-110.) In reference to the knowledge of the statutes, 48 percent of the cooperative members did not know any of the cooperative statutes. (A-136.)

With regard to knowledge of the main decisions taken by the administrative council in the last year the picture is

even bleaker: 31 percent of the cooperative members claimed they knew it, but only five percent were able to answer satisfactorily the test questions. (A-105.)

C. Participation and communication between members is also rather poor; 41 percent of the members said they never speak in the meetings, and 37 percent of the members do not talk with other members even before the meetings. (A-137 and A-138.)

D.1. Farmers in Paraguay appear to be already familiar with the use of credit; 39 percent of all farmers responded saying that they use credit; out of those using credit, 40 percent use cooperative credit; 34 percent bank credit; and 21 percent, credit obtained from intermediaries and merchants. (A-18.)

In the CREDICOOP districts, which is where the cooperatives have credit programs, the use of credit is more frequent; 48 percent of the farmers interviewed had used credit in the last year. Out of the farmers using credit, 64 percent borrowed from the cooperative, 19 percent from merchants, and 13 percent from the banks. (A-18.)

With regard to the cooperative members, in the CREDICOOP districts the results indicate that 64 percent of them had received credit from the cooperative in the last year.

This estimate will be enhanced if it is considered that not all farmers desire to receive credit. There are no figures specific to the cooperative member population, but the estimates drawn from the entire survey should suffice, with the assumption that they are equally applicable to both members and nonmembers. Only 70 percent of the farmers answered in the affirmative when asked if they needed credit. (A-19.)

D.2. A good indicator of this is given by the question of whether the cooperative gives better prices or not, since the farmers using such service will be only those who think they are getting a price not below what is offered by other potential buyers. In the CREDICOOP districts 74 percent of the farmers thought that the cooperative offers better prices; this proportion dropped to 55 percent in UNIPACO districts. If only cooperative members are considered, the above figures are raised to 85 percent in the CREDICOOP districts and 73 percent in the UNIPACO districts. The latter figure is more reliable, since only the experience of several years should enable the farmers to answer correctly. The cooperatives in UNIPACO districts have an older membership, two-thirds of their members being in the institution more than six

years. To arrive at a comparison, in order to include two-thirds of the members the time period of membership covered drops to only one year in the CREDICOOP districts. (B-132.)

D.3. The situation with regard to the sale of input factors is very much alike. In the CREDICOOP districts, 65 percent of all farmers and 85 percent of the subgroup of members think that the cooperative offers inputs at lower prices. In UNIPACO districts, only 28 percent of all farmers and 33 percent of the cooperative members visited indicated that the cooperative provides input factors at lower prices. These figures are surprisingly low, but the situation is clarified when each district is examined. Out of all the cooperative members interviewed, 41 percent in Stroessner and 58 percent in Villarrica thought that the cooperative demands lower prices. In San José, where 77 members were sampled, 75 "did not know" who offers better prices, one chose the cooperative, and one "other" input suppliers. This indicates that farmers in San José are not aware of such services being provided by the cooperative nor by anybody else. (B-156.)

D.4. The only areas receiving any technical assistance are those in CREDICOOP districts; 45 percent of the cooperative members in those districts declared that they had been visited by the cooperative's agricultural technicians. (A-125.)

(4) Summary and Comments

It appears that the cooperative credit program has made farmers more familiar with the use of credit for agricultural production. Only 39 percent of the farmers interviewed in all the districts were using credit. This figure is increased to 48 percent in the CREDICOOP districts where the cooperative credit program is functioning, and lowered to 30 percent in the remaining districts. (A-18.)

With regard to marketing of the produce, the majority of the cooperative members think that the cooperatives offer high prices. Nevertheless, both the credit and the marketing services can be improved, because more than 10 percent of the members do not yet know that marketing of certain products is offered, and one-third of the cooperative members using credit borrow from other institutions and/or persons.

Most of the cooperative members in the CREDICOOP districts are aware of the sale of inputs by the cooperative and 85 percent think that its prices are lower, which is an impressive proportion in view of the fact that such services have been made

available on a limited scale. Farmers in UNIPACO districts are considerably less informed about it, especially in San José, where practically nobody knew about inputs being sold by the cooperatives or "other."

Technical assistance is even less accessible to cooperative members and farmers in general. Only 45 percent of the cooperative members in the CREDICOOP districts were visited by the cooperatives' agricultural technicians, while the majority of the cooperative members in UNIPACO districts did not even know of the existence of such services. Thus an ample margin for improvement in this matter exists in the organization of the cooperatives.

An area where serious deficiencies are observed is that of the members' attendance and participation in the meetings, knowledge of the decision-making process and communication among cooperative members. It is difficult for a farmer living in a paternalistic and economically underdeveloped society to grasp the idea that the cooperative belongs to its own members and must be managed accordingly. This point will be crucial in order to bring about an active participation of the cooperative members, conducive to a situation where the cooperative is able to respond to the real needs of its members, all of this contributing to the process of improving the welfare of the small farmers in Paraguay.

8. Land Tenure

Both the sampling surveys of small farmers in Paraguay contain information about the type of land tenure along a detailed classification that distinguishes the following alternatives:

1. Owner with permanent land title
2. Owner with provisional title
3. Land tenant
4. Sharecropper
5. Occupant of public land
6. Occupant of private land

a. Results of the Survey

Table D-59 presents the results obtained in Survey Two with the above classification reduced to only three categories: owner, land tenant or sharecropper and occupant. In order to examine the relationship between land size and land tenure classification, the 271 farms interviewed have been stratified by total number of hectares. The results show that the average farmer with less than seven hectares of total land owns only about one-third of the land he has, while farmers with larger farms own more than two-thirds of the land they use.

TABLE D-59

PERCENT OF THE LAND IN EACH LAND TENURE CLASSIFICATION BY FARM SIZE IN ITA, SANTA ROSA, AND QUIINDY

	0 to 2 Has.	3 to 6 Has.	7 to 19 Has.	20 Has. and over	Total
Owned	36	32	61	92	80
Rented or Sharecropped	26	26	13	1	6
Occupied	38	42	26	7	14
Total Land	5	10	12	73	100

About 40 percent of the land is occupied in the lowest two land size strata, the figure being lowered to 26 percent and seven percent for the two upper strata.

Renting and/or sharecropping the land is also prevalent among the smaller farms (26 percent of the land), while it is one-half as much for farms with between seven and 20 hectares of total land, and negligible for the largest farms.

A chi-square test[1/] for independence was applied to verify the hypothesis that the two classifications--land tenure type of land size--are independent (see Table D-60). The hypothesis of independence was rejected with a chi-square value of 8,044.0 (tabulated value, $X^2_{0.95,\ 6} = 12.6$).

The results of the statistical test only confirm what was observed in Table D-59, namely, that larger farms tend to have a different type of land tenure.

The results of Survey One (1001 interviews) indicate that 50 percent of the farmers claimed to own at least part of the land; such a figure is only slightly above the one obtained in Survey Two (271 interviews) where 45 percent of the farmers were classified as owners of the land they cultivate.

Only 10 percent of the farmers in Survey One declared that they rent or sharecrop at least a portion of the land they use; the same parameter was calculated at 25 percent in Survey Two.

It is estimated from the data of Survey One that the average annual payment for land rent is about Gs. 1,500 per hectare, although it is also observed that larger farming enterprises tend to pay a lower rent, which would be in agreement with the fact that those farms make a less intensive use of the capital and labor inputs per unit of land, and consequently obtain a lower total value product per hectare of cultivated land. (See Table D-20, Economic Model Section.) Nevertheless, such figures should be accepted with caution since they are based on a relatively low number of observations. (See Table D-61.)

In nearly all sharecropping arrangements reported (only 15), a 50-percent figure was quoted in regard to the proportion of the produce used for payment of the land resource. If that is the case, it would constitute a very large payment as compared with the

---

1/ Since the sample size is sufficiently large, the approximate procedure was used to calculate the value of X^2. (See Statistics in Research, Barnard Ostle, Iowa State University Press, 1963.)

TABLE D-60

INDEPENDENCE TEST FOR LAND TENURE VS. FARM SIZE CLASSIFICATION, IN HECTARES OF TOTAL LAND; OBSERVED, AND EXPECTED VALUES (IN PARENTHESIS), IN ITA, SANTA ROSA, AND QUIINDY

	Hectares of Land				
	0 to 2 Has.	3 to 6 Has.	7 to 19 Has.	20 Has. and over	Total
Owned	79 (174.28)	139 (349.35)	341 (446.08)	3,072 (2,661.29)	3,631
Rented or Sharecropped	56 (13.97)	115 (28.00)	75 (35.75)	45 (213.28)	291
Occupied	83 (29.76)	183 (59.65)	142 (76.17)	212 (454.42)	620
Total	218	437	558	3,329	4,542

TABLE D-61

AVERAGE LAND RENT PAYMENTS AND SHARECROPPING ARRANGEMENTS IN CREDICOOP DISTRICTS, SURVEY ONE (484 INTERVIEWS) a/

	Land Size			
	0 to 4 Has.	5 to 20 Has.	20 Has. and over	Total
Average Payment per hectare of rented land	1,340 (22)	1,671 (36)	592 (7)	1,490.45 (65)
Percent of the production given to the owner in a sharecropping arrangement	50.0 (4)	47.0 (10)	50.0 (1)	48.0 (15)

Note: a/ In parenthesis, the number of observations from where each figure is calculated.

land rent payments recorded in Table D-61. In effect, it has been estimated that the value of production per hectare of land cultivated in annual crops is equal to Gs. 30,654 (Table VI, Annex D-2); 50 percent of it equals Gs. 15,327, which is about 10 times larger than the Gs. 1,500 figure estimated as land rent payment.

b. Comments

The results show that the low proportion of farmers who own the land is an obstacle to any traditional credit program requiring land ownership as a guarantee for the loans granted.

The scarcity of land forces some small farmers to enter into sharecropping contracts that result in exorbitant payments for the land resource.[1/] More than 20 percent of the land in farms with less than seven hectares of total land was sharecropped in the sample of Survey Two.

1/ It is true, on the other hand, that the degree of risk normally involved in an agricultural endeavor is reduced, but even if this is considered, the payments reported appear to be excessively high.

On the relative scarcity of land and capital, see the "Economic Model" section.

ANNEX D-1

Design of the Encuesta Agropecuaria por Muestreo

A. Strata Boundaries Used

Different classification criteria were applied in each of the four areas as indicated below; whenever more than one criterion is listed in a given stratum they must be interpreted as sufficient but not necessary conditions for the farms to be classified in that stratum.

1. Zona Oriental (Eastern Paraguay)

Strata

I
1) 600 or more hectares of land in farm
2) 60 or more hectares of annual crops
3) 400 or more head of cattle
4) 100 or more hogs
5) 300 or more sheep
6) 500 or more fowl

II
1) 51 to 599.9 hectares of land in farm
2) 8 to 59.9 hectares of annual crops
3) 150 to 399 head of cattle
4) 50 to 99 hogs
5) 100 to 299 sheep
6) 200 to 499 fowl

III 10 to 50.9 hectares of land in farm

IV 1 to 9.9 hectares of land in farm

V Less than 1 hectare of land in farm

2. Chaco, Livestock Strata

Strata

I
1) 1000 or more hectares of land in farm
2) 600 or more head of cattle
3) 500 or more sheep
4) 500 or more goats

II	1)	600 to 999.9 hectares of land in farm
	2)	300 to 599 head of cattle
	3)	300 to 499 sheep
	4)	300 to 499 goats
III	1)	less than 600 hectares of land in farm
	2)	less than 300 head of cattle
	3)	less than 300 sheep
	4)	less than 300 goats

3. Chaco, Agriculture Strata

Strata

I	8 or more hectares of annual crops
II	3 to 7.9 hectares of annual crops
III	1 to 2.9 hectares of annual crops

4. Mennonite Colonies (Chaco)

Strata

I	1)	900 or more hectares of land in farm
	2)	24 or more hectares of annual crops
	3)	400 or more head of cattle
	4)	400 or more fowl
II		101 to 899.9 hectares of land in farm
III		31 to 100 hectares of land in farm
IV		30.9 or less hectares of land in farm

B. Number of Farms Interviewed

Table I shows the percentage of the farms included in the sample in each region and stratum. The criterion used in not selecting the same percentage of farms in every case was to minimize the value of the coefficient of variation (or ratio between the sample standard deviation and the sample mean) for the sample estimates at the national level. In other words, a larger percentage of the farms were visited in those regions and strata where the farms were less homogeneous. On the other hand, only a few interviews would suffice in those cases where the farms are highly homogeneous in regard to the relevant parameters; in this case land use and crop production.

TABLE I

DISTRIBUTION OF THE 1972 AGRICULTURAL SAMPLING SURVEY

Strata	Universe		Sample	
	Number of Farms	Percent	Number of Farms	Percent
Paraguay	162,997	100.0	6,885	100.0
Zona Oriental (Eastern Paraguay)				
I	1,803	100.0	1,803	100.0
II	15,911	10.1	820	20.9
III	43,623	27.8	1,203	28.8
IV	86,128	54.8	1,925	45.0
V	11,437	7.3	216	5.3
II to V	157,099	100.0	4,164	100.0
Sub-total	158,902		5,967	
Chaco, Livestock Strata				
I	622	100.0	622	100.0
II	92	9.5	15	22.0
III	881	90.5	50	78.0
II and III	973	100.0	65	100.0
Sub-total	1,595		687	
Chaco, Agriculture Strata				
I	33	100.0	33	100.0
II	201	21.6	16	29.0
III	728	78.4	30	71.0
II and III	929	100.0	46	100.0
Sub-Total	962		79	
Mennonite Colony (Chaco)				
I	79	100.0	79	100.0
II	447	31.1	24	35.0
III	199	13.8	19	25.0
IV	793	55.1	30	40.0
II to IV	1,439	100.0	73	100.0
Sub-total	1,518		152	

ANNEX D-2

Analysis of Variance of Survey One

A. Introduction

This annex contains an analysis of the data obtained from Survey One. The number of questionnaires processed has been slightly reduced to 999 because of the rejection of interview numbers 987 and 996, which had tabulation errors.

The questions that are addressed are:

> What can be said about the relevant economic parameters of the small farmers?
>
> Can the small farmers be classified into subgroups in a meaningful way, or are there certain parameters that can be used to stratify the small farmers into significantly different categories?

The analytical method employed is designed to answer these questions, and provides only indirect evidence of any cause-effect relationship that might exist between the parameters.

Four variables have been selected that might separate the small farmers into different subgroups. They are:

1. Total hectares of land.
2. Hectares of annual crops.
3. Hectares of permanent crops.
4. Value of the average inventory of animals.

Once the sampled farms have been stratified, the next step is to verify whether or not the strata are significantly different. This is accomplished by examining 25 additional features, resulting in a total of 29 variables including the first four already mentioned. Table XVII shows a listing of all the variables.

B. Analytical Method

The interviewed farmers were stratified into five subgroups according to each of the first four variables. Then an F test was

applied to verify the equality of averages among the strata, for each one of the remaining variables. The boundary values used for each one of the first four variables are presented in Table XVIII. An effort was made to break the sample into five groups of equal number of observations. The sizes obtained are not perfectly even because there were several observations with the same value exactly at the boundary between the strata.

Ideally, the analysis of variance should look simultaneously at all possible sources of variation: district, status in the cooperative (member or nonmember) and farm size (or any of the other four selected parameters that are used to stratify the samples), as factors to stratify the entire sample into blocks, using a completely randomized block design with subsampling, unequal numbers, model I.[1/]

In addition, other features such as interaction and nonproportional subsamples (for cooperative members and nonmembers) could be considered.

Since the computer facilities for such analysis of variance are not available locally, a simpler approach was adopted.

The method used is a one-way analysis of variance to test the hypothesis of equality of averages among the blocks or strata. In order to distinguish the portion of the variation due to the districts, rather than attempt a two-by-two classification (which was not possible with the available facilities), a separate analysis was made for each one of the six districts.[2/]

1/ All effects are random. It might be argued that the district classification actually constitutes a fixed effect, but as long as the statements are specific to the population of farmers in the six districts surveyed and not to the entire population of all districts (the country), the assumption of random effects would be justified.

2/ The hypothesis of equality of means $H: \mu_1 = \mu_2 \ldots = \mu_k$ for k normal populations, $(k \geq 2)$, with the assumption of homogeneous variance: $\sigma_1^2 = \sigma_2^2 = \ldots\ldots = \sigma_k^2$, can be tested using an F distribution with (k-1) and N-k) degrees of freedom (N) is the total number of observations $(N = \sum_{i=1}^{k} n_i)$. No additional tests are made to verify the instrumental assumption of homogeneous variance since it has been shown by other researchers that it is not critical to the validity of the test. (Consult with Dr. Donald Sison, Statistics Department, Utah State University.)
The F value is calculated using the formula:

C. Results

The F values obtained in each district, as well as in the total for each one of the four attempted classifications and each of the 29 variables, are shown in Tables I to IV.

1. Land Utilization

Examining the F values, it is observed that in general, as it should be expected, there is a noticeable correlation among total hectares of land, hectares of annual crops, hectares of permanent crops and average inventory of animals, as evidenced by the high F statistics appearing in the first four rows of Tables I to IV (although the link with permanent crops is admittedly the weakest one).

In relative terms the analysis shows that larger farms tend to have a lower percentage of land assigned to annual as well as permanent crops. The ratio of annual crop-hectares to total hectares of land (variable 21) is consistently lower as the farm size is increased, the hypothesis of equality of means is rejected at a 95-percent probability level[1/] in all of the districts (see Table I). The results are not as conclusive for the ratio of permanent crop-hectares to total hectares (variable 22). Here the ratio is also decreasing as farm size is increased, but the averages are significantly different only in Villarrica and Coronel Oviedo and for the six districts combined.

Table V shows that smaller farms make a more intensive use of the land, the combined ratio of annual and permanent crops to total land varying from 91 percent for the small farms to only 27 percent for the larger ones.[2/] In other words, the data show that smaller farms make a more intensive use of the land resource that they occupy.

$$F = \frac{\sum_{i=1}^{k} \left(\sum_{j=1}^{n_i} X_{ij}\right)^2 / n_i - \left(\sum_{i=1}^{k} \sum_{j=1}^{n_i} X_{ij}\right)^2 / N}{\sum_{i=1}^{k} \sum_{j=1}^{n_i} X_{ij}^2 - \sum_{i=1}^{k} \left(\sum_{j=1}^{n_i} X_{ij}\right)^2 / n_i} \cdot \frac{(N-k)}{(k-1)}$$

where n_i: number of observations in the ith population sample.
X_{ij}: j^{th} observation in the ith population sample.

1/ Unless otherwise specified, a 95-percent probability level will be used throughout this report.

2/ The combined ratio is calculated by adding the average ratios of annual crops to total hectares and permanent crops to total hectares for each stratum.

TABLE I

F Values

STRATIFICATION BY TOTAL HECTARES OF LAND

Variable	District						
	Loreto	Stroessner	Villarrica	C.Oviedo	Itacurubi	S.José	Total
1. Total hectares	32.48	31.62	55.33	30.57	570.97	217.07	264.95
2. Hectares annual crops	13.76	7.78	21.97	5.51	16.65	10.52	89.09
3. Hectares permanent crops	2.99	1.22*	19.77	3.88	7.13	23.65	28.39
4. Avg. inventory of animals	21.11	3.75	26.60	20.38	10.35	24.70	57.02
5. Unused cultivable hectares	73.91	22.49	66.79	26.09	2.18*	15.70	181.76
6. Value of animal products	9.43	2.33*	5.63	15.03	2.86	6.51	3.18
7. Off-farm income	0.96*	0.65*	1.40*	2.28*	0.56*	2.90	3.02
8. Salaries of hired labor	1.66*	1.60*	5.60	6.83	7.22	9.33	18.78
9. Sales & consumption annual crops	8.10	4.53	2.79	2.25*	11.35	8.43	30.01
10. Gross farm income	11.37	5.50	6.24	10.94	4.58	31.22	29.71
11. Net farm income	9.82	4.11	4.69	5.93	4.01	19.39	23.23
12. Total net income	10.20	2.90	5.13	7.47	3.98	22.63	24.66
13. Land & fixed capital	31.11	6.23	34.59	36.14	24.14	44.89	96.93
14. Operating capital	4.71	3.26	7.00	5.77	7.65	11.77	21.60
15. 9/2 sale & cons. annual crops/Ha.	1.39*	1.99*	0.27*	0.33*	0.88*	0.99*	1.11*
16. 11/13 Net farm income/Land & fixed capital	3.82	2.22*	2.16*	5.80	3.12	5.81	6.74
17. 10/ Gross income/Has.annual & perm.	0.19*	1.04*	0.32*	0.49*	6.94	1.21*	1.185*
18. 14/13 Operating/land & fixed capital	3.06	1.11*	0.64*	2.43	0.31*	1.52*	2.35*
19. 6/4 Animal products/Avg. inventory	3.40	3.33	1.87*	6.62	2.58	2.40	3.80
20. 8/ Wages/Has. annual & perm. crops	0.37*	1.06*	0.92*	8.83	5.23	3.63	3.87
21. 2/1 Has. annual/Total	43.65	13.63	18.56	42.98	21.46	34.36	175.31
22. 3/1 Has. permanent/Total	1.82*	0.83*	2.50	3.57	0.77*	0.16*	10.42
23. 5/1 Unused land/Total	2.21*	31.00	2.73	8.34	3.96	3.21	28.17
24. Sale/consumption annual crops	0.52*	0.58*	1.12*	0.41*	0.58*	1.35*	1.08*
25. Sale/consumption Total	0.84*	0.16*	0.90*	0.22*	0.97*	2.96	1.42*
26. Sale annual crops	6.98	3.32	1.60*	0.94*	8.20	4.40	18.17
27. Consumption annual crops	3.71	1.38*	10.57	4.46	5.73	9.39	36.45
28. Total sales	9.50	3.76	3.93	6.63	3.88	19.91	16.60
29. Total consumption	6.63	2.54	15.03	11.00	7.31	20.64	60.12

Notes: * Not significant at a 95 percent probability level.
a/ The stratum limits appears in Table XVIII.

TABLE II

F Values

STRATIFICATION BY HECTARES OF ANNUAL CROPS a/

Variable	District						Total
	Loreto	Stroessner	Villarrica	C.Oviedo	Itacurubí	S.José	
1. Total hectares	1.431*	8.709	18.699	0.919*	6.211	7.468	34.623
2. Hectares annual crops	126.695	69.602	165.277	115.834	154.434	446.249	725.671
3. Hectares permanent crops	1.223*	1.033*	7.517	0.283*	1.230*	5.879	2.648
4. Avg. inventory of animals	2.588	5.072	17.667	1.438*	2.821	5.731	16.771
5. Unused cultable Has.	1.364*	1.538*	12.518	0.719*	0.212*	1.757*	18.521
6. Value of animal products	8.263	2.160*	9.252	3.141	1.817*	1.751*	11.328
7. Off-farm income	1.028*	1.332*	0.325*	0.740*	1.383*	1.407*	0.782*
8. Salaries of hired labor	2.715	6.498	3.080	0.866*	5.375	8.871	7.379
9. Sales & consumption annual crops	46.503	40.135	6.571	10.410	71.144	60.074	106.003
10. Gross farm income	39.531	27.470	7.808	6.607	28.086	20.967	49.072
11. Net farm income	35.056	22.158	7.124	7.660	18.222	13.953	58.635
12. Total net income	31.242	16.835	6.123	7.476	12.251	13.433	48.013
13. Land & fixed capital	3.738	6.385	19.582	1.377*	3.954	10.617	20.637
14. Operating capital	5.210	9.230	5.706	0.769*	9.134	9.753	10.089
15. 9/2 Sale & cons. annual crops/Ha.	4.073	6.011	1.128*	2.361*	1.439*	0.411*	0.827
16. 11/13 Net farm income/Land and fixed crop	1.035*	2.092*	1.623*	0.412*	1.791*	1.084*	1.266*
17. 10/ Gross income/Has.annual & Perm.	2.661	5.435	1.130*	1.598*	8.267	1.154*	2.383
18. 14/13 Operating/land & fixed capital	0.506*	3.082	0.167*	2.090*	2.150*	1.098*	3.050
19. 6/4 Animal products/Avg. inventory	0.469*	3.962	0.465*	0.539	1.265*	2.231*	1.434*
20. 8 /Wages/Has. annual & perm. crops	2.026*	3.622	0.593*	0.061*	2.581	1.288*	0.801
21. 2/1 Has. annual/Total	2.158*	8.628	0.566*	8.898	1.697*	0.892*	3.254
22. 3/1 Has. permanent/Total	4.957	0.237*	2.846	1.100*	0.633*	0.515*	15.646
23. 5/1 Unused land/Total	7.446	7.920	2.126*	2.284*	4.723	1.520	15.447
24. Sale/consumption annual crops	0.944*	5.070	0.561*	0.519*	11.265	4.216	0.795*
25. Sales/consumption total	0.903*	3.217	0.320*	0.474*	1.643*	3.324	1.615*
26. Sale annual crops	43.844	29.220	4.440	5.492	43.344	28.557	73.564
27. Consumption annual crops	10.049	7.240	18.005	10.465	15.126	15.749	69.972
28. Total sales	38.710	20.633	4.831	4.186	21.070	19.007	31.042
29. Total consumption	13.119	6.657	20.670	8.712	13.173	13.956	67.379

Notes: * Not significant at a 95 percent probability level.
a/ The stratum limits appear in Table XVIII.

TABLE III

F Values

STRATIFICATION BY HECTARES OF PERMANENT CROPS

Variable	District						
	Loreto	Stroessner	Villarrica	C.Oviedo	Itacurubí	S.José	Total
1. Total hectares	1.858*	1.828*	6.830	3.720	6.522	13.657	21.810
2. Hectares annual crops	2.447	1.184*	5.842	1.149*	1.162*	7.175	1.250*
3. Hectares permanent crops	112.130	118.611	25.366	12.728	99.349	61.087	212.887
4. Avg. inventory of animals	3.552	2.547	9.002	2.659	2.674	11.656	29.433
5. Unused cultivable Has.	4.927	1.050*	6.200	2.815	0.529*	3.439	8.999
6. Value of animal products	5.099	1.156*	1.503*	4.534	2.284*	6.390	7.336
7. Off-farm income	1.129*	0.854*	2.681	1.518*	0.880*	0.721*	9.354
8. Gs. of hired labor	0.957*	2.922	2.309*	3.749	2.845	5.856	19.800
9. Sale & consumption annual crops	5.942	1.751*	1.292*	0.503*	1.268*	5.540	0.832*
10. Gross farm income	8.824	1.949*	2.964	2.813	6.887	26.517	18.349
11. Net farm income	8.822	1.526*	2.457	1.587*	6.767	17.954	11.409
12. Total net income	8.911	1.672*	3.097	1.974*	5.889	17.347	15.182
13. Land & fixed capital	4.479	6.338	11.144	4.773	9.005	17.782	60.022
14. Operating capital	1.753*	2.924	2.618	3.616	2.673	7.673	20.070
15. 9/2 Sale & cons. annual crops/Ha.	1.571*	0.472*	1.379*	1.195*	1.485*	1.997*	1.349*
16. 11/13 Net farm income/Land & fixed crop	1.146*	3.458	1.871*	2.182*	1.824*	3.494	10.883
17. Gross income/Has. annual & permanent	0.298*	3.087	1.082*	3.821	9.076	1.191*	5.287
18. 14/13 Operating/Land & fixed capital	2.113*	0.764*	1.719*	4.179	1.561*	0.922*	2.397
19. 6/4 Animal products/Avg. inventory	1.632*	1.032*	6.144	1.377*	1.058*	1.999*	3.914
20. Hired labor/Has. annual & permanent	1.173*	1.709*	0.776*	1.171*	1.185*	1.518*	4.860
21. 2/1 Has. annual/Total	2.731	3.231	9.993	6.539	8.641	5.646	35.037
22. 3/1 Has. permanent/Total	22.733	46.548	13.752	44.600	59.116	33.514	177.290
23. 5/1 Unused land/Total	1.375*	2.507	2.420	1.777*	2.086*	2.021*	5.436
24. Sales/consumption annual crops	0.343*	0.234*	0.548*	1.967*	0.521	0.941*	1.243*
25. Sales/consumption total	0.877*	0.246*	0.697*	1.055*	0.525*	6.809	2.571
26. Sale annual crops	3.897	0.854*	1.329*	1.033*	0.649*	1.165*	2.334
27. Consumption annual crops	6.536	2.804	5.281	1.667*	1.397*	9.605	10.132
28. Total sales	5.971	0.515*	1.928*	1.540*	0.709*	21.621	5.830
29. Total consumption	9.071	4.927	8.110	5.066	2.820	15.598	27.722

Notes: * Not significant at a 95 percent probability level.
a/ The stratum limits appear in Table XVIII.

TABLE IV

F Values

STRATIFICATION BY VALUE OF AVERAGE INVENTORY OF ANIMALS a/

Variable	District						
	Loreto	Stroessner	Villarrica	C.Oviedo	Itacurubí	S.José	Total
1. Total hectares	12.481	10.489	17.219	9.542	12.345	16.692	66.565
2. Hectares annual crops	12.480	11.895	15.193	3.126	7.122	5.582	34.292
3. Hectares permanent crops	6.261	3.554	15.911	2.188*	2.261*	10.317	40.292
4. Avg. inventory of animals	70.965	70.260	40.051	49.691	85.190	206.133	318.496
5. Unused cultivable Has.	8.017	1.882*	12.305	12.673	1.211*	7.415	28.444
6. Value of animal products	20.988	19.116	5.394	37.921	23.612	18.702	35.624
7. Off-farm income	0.830*	1.502*	1.298*	1.937*	1.233*	1.727*	5.531
8. Gs. of hired labor	2.352	3.774	5.822	2.916	7.639	4.175	23.897
9. Sale & consumption annual crops	10.915	10.258	2.179*	1.872*	4.610	4.476	14.714
10. Gross farm income	20.755	22.585	5.485	11.108	13.623	13.204	44.024
11. Net farm income	17.772	18.286	3.809	8.133	8.478	10.123	36.835
12. Total net income	17.925	20.934	4.162	9.576	6.889	10.491	39.747
13. Land & fixed capital	53.057	21.616	28.343	27.428	38.443	32.838	156.212
14. Operating capital	6.071	6.657	6.395	2.834	8.261	4.429	25.517
15. 9/2 Sale & cons. annual crops/Ha.	0.597*	1.908*	0.789*	1.746*	0.476*	0.922*	0.754*
16. 11/13 Net farm income/Land & fixed	9.504	3.647	6.149	10.969	11.125	7.243	31.508
17. Gross income/Has. annual & permanent	10.37 *	1.502*	0.378*	2.726	9.090	3.407	5.337
18. 14/13 Operating/land & fixed capital	4.352	0.524*	0.803*	2.357*	0.916*	0.851*	0.543*
19. 6/4 Animal products/Avg. inventory	10.520	9.500	6.901	34.999	9.962	10.148	55.640
20. Hired labor/Has. annual & permanent	0.413*	1.144*	2.931	1.229*	6.168	1.081*	8.660
21. 2/1 Has. annual/Total	6.020	0.884*	7.147	5.329	2.906	4.687	18.797
22. 3/1 Has. permanent/Total	0.838*	1.135*	0.788*	1.035*	0.059*	1.041*	3.565
23. 5/1 Unused land/Total	1.471*	5.913	2.057*	2.206*	1.537*	2.440	6.181
24. Sale/Cons. annual crops	1.125*	1.719*	0.639*	2.158*	3.448	0.709*	0.984*
25. Sales/Cons. Total	2.308	1.404*	1.543*	2.986	2.460	0.618*	8.063
26. Sale annual crops	9.379	5.196	1.212*	1.554*	3.681	1.217*	6.518
27. Cons. annual crops	4.938	8.605	10.528	7.083	3.101	5.637	34.188
28. Total sales	16.157	9.609	3.369	5.925	1.356	7.511	15.234
29. Total consumption	12.973	16.797	17.486	20.127	6.415	17.847	84.613

Notes: * Not significant at a 95 percent probability level.

a/ The stratum limits appear in Table XVIII.

TABLE V

LAND UTILIZATION FOR FARMS STRATIFIED BY TOTAL HECTARES OF LAND

	0 to 4 Has.	5 to 8 Has.	9 to 13 Has.	14 to 24 Has.	25 Has. and over	Total
Total hectares	2.782	6,186	10.724	18.758	42.991	16.760
Annual crops	2.057	2.973	3.574	4.765	6.643	4.051
Permanent crops	0.445	0.826	1.311	1.559	3.225	1.508
Unused land	2.143	2.869	3.740	5.348	6.420	4.128
Total usable land	4.645	6.668	8.625	11.672	16.288	9.687
Ratio of total usable land to total hectares a/	1.670	1.078	0.804	0.622	0.379	0.578
Ratio of unused land to total usable land	0.461 (0.770)	0.430 (0.464)	0.434	0.458	0.394	0.426

Note: a/ These ratios are above the unit value because of multiple cropping and/or mixed cultivation. Thus the same land is counted more than once. In these cases, the ratio of cultivable land not in use to total usable land has been calculated taking the total hectares instead of the total usable land. The correct coefficients appear in parentheses.

2. Productivity of the Land

The results indicate that gross income, net income (after the out-of-pocket expenditures have been deducted), and total net income (which includes off-farm income) increase with the size of the farm in all districts. (The F values indicate that the average values for each stratum, when classified by total land area, are significantly different in all districts. See Table I, variables 10, 11 and 12.) That is simply what anybody would guess, namely that larger farms produce more. But, in order to examine the productivity of the land, the relevant information is to be drawn in terms of production per unit of land.

There are two ratios that attempt to measure the physical productivity of the land. They are: sale of annual crops plus consumption of annual crops, divided by the number of hectares of annual crops (variable 15); and total sales plus consumption, divided by the number of hectares of annual and permanent crops (variable 17). In both ratios, as observed from Table I, the F values fail to show any significant differences among farm groups of different sizes. The F values are not significant at a 95-percent probability level in any of the districts, for the annual crop ratios; and they are significant at a 95-percent probability level only in Itacurubí, for the total gross income ratio (variable 17). Table VI shows the average of these ratios for each stratum, for the six districts combined. Both parameters fail to show significant differences in any of the other districts. In consequence, the data do not provide any evidence that farms of different scale are able to attain significantly different levels of physical productivity.

Tables II to IV show that none of the other three stratifications attempted is able to classify farms into groups that differ significantly in the physical productivity of the land (variables 15 and 17). Actually, the values are statistically different in some of the districts, but the differences appear in a random manner without any discernible trend. A corollary is that there is no evidence of a different technology of production for farms with larger scale of production.

3. Productivity of Capital

In order to examine the productivity of the total fixed investment, the ratio analyzed is net farm income divided by the total investment in land and fixed capital (variable 16). Here the analysis of variance shows that the net returns per unit of fixed investment are significantly different for the various farm groups stratified by total land size, in four out of the six districts. Furthermore, these returns tend to be lower as the farm

TABLE VI

PRODUCTIVITY OF THE LAND, AVERAGE RATIOS FOR FARMS STRATIFIED BY TOTAL HECTARES OF LAND

(Gs. x 1000/Ha.)

	0 to 4 Has.	5 to 8 Has.	9 to 13 Has.	14 to 24 Has.	25 Has. and over	Total
Value of annual crops to hectares of annual crops (variable 15)	27.04	31.31	31.80	32.15	30.60	30.65
Total sales plus consumption to hectares of annual and permanent crops (variable 17)	40.85	41.68	42.86	40.44	43.25	41.82

size is increased in all the districts. Table VII presents the results for the six districts combined together. The evidence also shows that the average ratios for the strata 2, 3 and 4 are practically the same.

The classification by average inventory of animals provides more specific results; here the F statistic rejects the equality of averages hypothesis in all the districts. (See Table IV.) The average ratio of net income to fixed investment (variable 16) almost consistently decreases in every district as it moves to farms with higher values of average inventory of animals, as shown by Table VIII. The question to be answered now is why is this difference among farm groups observed for the net returns per unit of fixed investment (variable 16), and not for the other two parameters measuring gross returns per unit of land (variables 15 and 17).

There are two possible causes or a combination of both: first, net returns being higher in smaller farms in spite of relatively homogeneous gross returns for all farms. In other words, more or less equal per hectare production levels with lower production costs in smaller farms. This is because smaller farms hire less outside labor[1] and not necessarily because they use less expensive inputs.[2] Thus, the difference in net returns is caused by the method used in estimating total costs of production, which assumes as costs only the purchased inputs. This inflates more heavily the total costs of the larger farms where the hiring of outside labor is more frequent.

The accounting method also double-counts production by including some intermediate products, as would be the case for pastures used to feed the farm animals. It could be argued that this bias also inflates relatively more the production of larger farms since they tend to have larger animal inventories, but it must be considered again that these farms would also buy a larger portion of the animal feed that they require. In consequence, it is assumed that the bias introduced by double-counting production applies evenly to all farms regardless of their total size.

Second, because larger farms have more fixed investment per unit of production (or per Gs. of gross returns). But again, how can it be explained that larger farms have more investment per unit

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1/ This is discussed in the following section.

2/ In section 2 it was concluded that there is no evidence of a different technology of production in larger farms.

TABLE VII

AVERAGE NET FARM INCOME PER UNIT OF INVESTMENT IN LAND AND FIXED CAPITAL FOR FARMS STRATIFIED BY TOTAL HECTARES OF LAND a/

	0 to 4 Has.	5 to 8 Has.	9 to 13 Has.	14 to 24 Has.	25 Has. and over	Total
Number of observations	175	236	192	177	219	999
Average	1.1684	0.8553	0.8457	0.8217	0.5603	0.8377
Standard Deviation	0.1523	0.0504	0.0731	0.0823	0.0402	0.0370

Note: a/ The ratio here is given by variable 16.

TABLE VIII

AVERAGE NET FARM INCOME PER UNIT OF INVESTMENT IN LAND AND FIXED CAPITAL FOR FARMS STRATIFIED BY VALUE OF AVERAGE INVENTORY OF ANIMALS a/

	Less than 14,500 Gs	14,500 to 53,500 Gs	53,600 to 104,000 Gs	104,100 to 192,650 Gs	192,700 Gs and over	Total
Number of observations	199	201	200	200	199	999
Average ($\bar{x}$)	1.537	0.931	0.747	0.593	0.382	0.838
Standard Deviation ($S_{\bar{x}}$)	0.158	0.055	0.036	0.030	0.022	0.037

Note: a/ The ratio here is given by variable 16.

of production than do smaller farms in spite of having the same technological level? A plausible explanation lies in the fact that larger farms engage in activities that require more capital per unit of land while maintaining the same value of total product per unit of land, namely animal production. Since total product is equal to net product plus production costs, the average ratios of total product per unit of fixed capital can be calculated by adding the ratios of net returns and operating costs per unit of fixed capital. Table IX presents the results obtained in such manner. The ratio varies between 1.26 for the group of smallest farms and 0.663 for the largest ones.

Farms with a higher amount of capital endowment (that is, farms with more land and/or higher animal inventories) tend to have lower ratios of net (as well as gross) returns per unit of investment.

A second conclusion is that these farms do not achieve such lower rates of return necessarily because they adopt a different production technology, but because they engage preferentially in capital intensive production activities, basically cattle raising.

Another issue to be examined is the intensity of capital use per hectare of land. Table X shows that the larger farms have less capital invested per hectare of land, the ratio of total capital (land, animals, equipment, facilities) to total hectares of land decreasing as farm size is increased. Larger farms leave a significant portion of the land with natural pastures, which have a very low density of capital investment. If the idle land is not included in the ratio the results are completely different, the ratio of capital per hectare of cultivated land increasing as farm size increases. (See last row of Table X.)

4. Labor

The amount of off-farm income collected by the farm family (variable 7) is not significantly influenced by the farm size, hectares of annual or permanent crops, and average inventory of animals. (See Tables I and IV.) But the amount of hired labor (variable 8) clearly tends to be higher in the larger farms. (See Table XI.) This is observed in all districts, although the analysis indicates that the averages for each stratum are significantly different only in four of the districts, as shown by the F values in Table XI.[1/]

1/ Comparing the results of Tables I and IV for variable 8 (total payments to labor) it is apparent that the most efficient stratification is the one that follows the value of the average inventory of animals.

TABLE IX

AVERAGE RATIO OF NET AND GROSS RETURNS PER UNIT OF FIXED INVESTMENT FOR FARMS CLASSIFIED BY TOTAL HECTARES OF LAND

	0 to 4 Has.	5 to 8 Has.	9 to 13 Has.	14 to 24 Has.	25 Has. and over	Total
Net income/Fixed capital a/	1,168	0.855	0.846	0.822	0.560	0.838
Cost/Fixed capital b/	0.093	0.109	0.135	0.085	0.103	0.106
Gross returns/Fixed capital c/	1.261	0.964	0.981	0.907	0.663	0.944

Notes: a/ Given by variable 16.
b/ Given by variable 18.
c/ Calculated by adding the first two rows.

TABLE X

PER HECTARE CAPITAL RATIOS FOR FARMS CLASSIFIED BY TOTAL HECTARES OF LAND [a]

(Gs. x 1000/Hectares)

	0 to 4 Has.	5 to 8 Has.	9 to 13 Has.	14 to 24 Has.	25 Has. and over	Total
Total hectares	2.782	6.186	10.724	18.758	42.991	16.760
Annual crops	2.057	2.973	3.574	4.765	6.643	4.051
Permanent crops	0.445	0.826	1.311	1.559	3.225	1.508
Annual and permanent	2.502	3.799	4.885	6.324	9.868	5.559
Land and fixed capital	131.44	214.94	294.81	405.80	931.48	406.56
Capital/Hectare total	47.25	34.75	27.49	21.63	21.67	24.26
Capital/Hectare cultivated	52.53	56.58	60.35	64.17	94.39	73.14

Note: a/ These ratios have been calculated by dividing the average capital by the average hectareage for each stratum.

TABLE XI

AVERAGE TOTAL WAGES PAID PER FARM FOR FARMS STRATIFIED BY TOTAL HECTARES OF LAND (Gs. 1,000)

District	0 to 4 Has.	5 to 8 Has.	9 to 13 Has.	14 to 24 Has.	25 Has. and over	Total	F Value
Loreto	7.13	7.43	13.55	13.39	18.98	12.67	1.66
Stroessner	0.15	2.57	15.00	14.00	20.86	17.41	1.60
Villarrica	8.18	7.25	25.60	24.41	84.01	32.94	5.60*
Coronel Oviedo	1.76	5.81	9.39	8.88	76.04	15.01	6.83*
Itacurubí	4.42	7.00	11.72	31.53	40.80	9.82	7.22*
San José	1.98	12.87	21.27	15.06	88.18	19.29	9.33*
Total	5.06	8.29	15.61	15.88	42.86	18.05	18.78*

Note: * Significantly different at a 95 percent level.

If larger farms tend to hire more outside hands, it would appear that, having a shortage of labor, the farm family should also have less off-farm activities. The data contradict such line of reasoning; the explanation probably lies in the seasonality of the demand for farm labor. During periods of peak farm labor demand, larger farms need to hire more people than do smaller farms where the family labor pool might be sufficient to satisfy the demand. In the off-season periods when there is little work to do at the farms, all farmers regardless of the size of their farms seek outside employment.

5. Animal Productivity

The hypothesis of equal averages of the ratio of the value of animal products per unit of value of the average inventory of animals (variable 19), for the different farm sizes, is rejected at a 95-percent level in the districts of Itacurubí, San José, Loreto, and Presidente Stroessner. (See Table XII.)

The fact that the estimates of the means for the total in Table XII are not consistently decreasing could be due to a random error in the estimates. It is shown that a 95-percent confidence interval for the population mean in the fourth stratum lies between 0.299 and 0.489 ($\bar{x} = 0.394$).

More definite results are obtained when farms are classified by the average inventory of animals. Table IV shows that the hypothesis of equal averages of the ratio of the value of animal products to the value of the average inventory of animals is rejected in all districts. The averages obtained for the entire sample are presented in Table XIII.

The differences between strata are striking; they vary from 1.044 for the smaller animal inventories to 0.193 for the larger ones. A good portion of the observed differences is due to the different nature of the animal inventories. Farms engaged in cattle raising will need to have large amounts of capital tied up in animal inventories, while farms engaged in poultry raising will have less invesment in the animals, with a much faster turnover ratio because the amount of time required to grow poultry is much shorter than for cattle. The average product per unit of fixed capital will tend, therefore, to be larger in smaller farms. This does not necessarily mean that the productivity of capital will be lower in larger farms, because it makes no mention of the other inputs required. In other words, it is gross returns that are being observed, ignoring the variable costs (the costs of raising the animals), which in both cases (poultry and cattle raising) will include the in-farm animal consumption of farm products (cereals, grains, etc.), which would otherwise be sold in the market, and resources that could be devoted to other productive activities.

TABLE XII

AVERAGE RATIOS OF THE VALUE OF ANIMAL PRODUCTS PER UNIT OF VALUE OF AVERAGE INVENTORY OF ANIMALS FOR FARMS STRATIFIED BY TOTAL HECTARES OF LAND

(In Parentheses the Number of Observations)

District	0 to 4 Has.	5 to 8 Has.	9 to 13 Has.	14 to 24 Has.	25 Has. and over	Total	F Value
Loreto	(24) 1.061	(19) 0.335	(51) 0.525	(59) 0.386	(23) 0.214	(176) 0.490	3.40*
Stroessner	(3) 0.591	(12) 1.369	(6) 0.476	(44) 0.555	(114) 0.449	(179) 0.540	3.33*
Villarrica	(46) 0.438	(25) 0.899	(31) 0.324	(22) 0.571	(43) 0.358	(167) 0.483	1.87
Coronel Oviedo	(17) 0.480	(62) 0.644	(56) 0.322	(18) 0.189	(20) 0.175	(173) 0.422	6.62*
Itacurubí	(57) 0.309	(47) 0.285	(13) 0.133	(11) 0.155	(5) 0.166	(133) 0.265	2.58*
San José	(28) 0.527	(71) 0.522	(35) 0.282	(23) 0.212	(14) 0.132	(171) 0.400	2.40*
Total	(175) 0.502	(236) 0.575	(192) 0.361	(177) 0.394 b/	(219) 0.355	(999) 0.441	3.80*

Notes: a/ The ratio is given by variable 19.

b/ A 95-percent confidence interval places this estimate between 0.299 and 0.489 ($t_{0.95,\ 175} = 1.97$)

* Significantly different averages at a 95-percent probability level.

TABLE XIII

AVERAGE RATIOS OF VALUE OF ANIMAL PRODUCTS PER UNIT OF VALUE OF AVERAGE INVENTORY OF ANIMALS FOR FARMS STRATIFIED BY VALUE OF AVERAGE INVENTORY OF ANIMALS a/

	Less than 14,500 Gs	14,500 to 53,500 Gs	53,600 to 104,000 Gs	104,100 to 192,650 Gs	192,700 Gs and over	Total	F Value b/
Average (x)	1.044	0.454	0.291	0.223	0.193	0.441	55.6
Standard Deviation ($S_{\bar{x}}$)	0.0977	0.0386	0.0172	0.0114	0.0193	0.0233	

Notes: a/ The ratio is given by variable 19.

b/ The hypothesis of equal averages is rejected at a 95 percent probability level.

Summarizing, there is evidence that smaller farms have higher gross returns per unit of investment in animal inventories.

6. Marketing

The common assumption is that in underdeveloped countries, with a subsector characterized by a subsistence type of agriculture, smaller farms sell a smaller portion of their produce since they market only the margin of the total product that is left over and above the consumption needs of the farm.

The statistical evidence fails to give full support to such a thesis. Even though total sales increase as the farm size is enlarged with significantly different averages in all of the districts (see Table I, variable 28); that is, rejecting the hypothesis of equality of averages ($F = 16.60$), at the same time, the amount that is consumed also increases ($F = 60.12$, variable 29).[1] The result is that the ratio of sales versus consumption fails completely to show any significant difference among the strata in any of the districts in the case of annual crops (variable 24, Table I), and in five out of the six districts for the total farm produce. Also, the F values for the six districts combined do not reach significant levels in either case.

Table XIV presents the average ratios of total sales versus consumption for the entire sample stratified following each one of the first four variables.[2] The averages of the ratios are significantly different when the farms are classified by hectares of permanent crops and by the average inventory of animals. But here the ratios are higher for farms on both ends of the classifications. The results are, therefore, not clear and it is necessary to examine this issue further.

Instead of comparing the averages of the sales consumption ratios, an alternative could be to take the ratio of the average sales to average consumption for each strata as is done in Table XV. In this case, only the first classification (by land size) shows a continuously increasing ratio. In stratifications 3 and 4 (hectares of permanent crops and average inventory of animals) the ratio of the averages increases constantly when the first stratum is not included.

1/ The results are similar, but not as clear, in the case of sale and consumption of annual crops (variables 26 and 27, Table I).

2/ Any given questionnaire could, therefore, move from one stratum group to another when the classification criterion is changed from one variable to another.

TABLE XIV

AVERAGE RATIOS OF TOTAL SALES OVER CONSUMPTION FOR FARMS STRATIFIED UNDER FOUR DIFFERENT CRITERIA a/

Stratification Criteria	Strata 1	2	3	4	5	Value	F Value
Hectares of total land	1.68	1.44	2.23	1.89	2.00	1.83	1.391
Hectares of annual crops	1.93	1.59	1.55	1.80	2.39	1.83	1.615
Hectares of permanent crops	1.96	1.49	1.45	1.75	2.51	1.83	2.571*
Value of the average inventory of animals	2.56	1.58	1.49	1.60	1.95	1.83	8.063*

Notes: * Significantly different averages at a 95-percent probability level.

a/ The ratio is given by variable 25.

b/ The boundary values used for each stratification are included in Table XVIII.

TABLE XV

AVERAGE VALUES OF TOTAL SALES AND TOTAL CONSUMPTION PER FARM AND THEIR RATIOS FOR EACH STRATUM FOLLOWING EACH ONE OF THE CLASSIFICATION CRITERIA

Stratification Criteria		Strata a/ 1	2	3	4	5	Total
1	Sales	46.44	78.27	116.10	153.47	237.63	128.22
	Consumption	49.63	64.88	82.67	94.34	132.81	85.75
	Ratio	0.94	1.21	1.40	1.63	1.79	1.50
2	Sales	51.39	96.16	101.48	130.56	276.90	128.22
	Consumption	44.73	70.55	83.23	98.47	137.40	85.75
	Ratio	1.15	1.36	1.22	1.33	2.02	1.50
3	Sales	120.04	79.15	100.47	121.26	221.70	133.51
	Consumption	67.14	69.85	80.64	87.90	126.30	85.75
	Ratio	1.79	1.13	1.25	1.38	1.76	1.50
4	Sales	78.26	78.32	99.00	130.55	255.63	128.22
	Consumption	47.44	63.01	78.02	97.64	142.78	85.75
	Ratio	1.65	1.25	1.27	1.34	1.79	1.50

Note: a/ The boundary values used for each stratification are included in Table XVIII.

The appearance of such large ratios in the first stratum is a question to be addressed. It could be that the farms with such low average animal inventories and/or land allocated to permanent crops engage in a totally different type of agricultural activities. Table XVI shows the average product value for each stratum classified by animal inventory. The calculated averages are strikingly similar for the four lower subgroups, and the hypothesis of equal averages is rejected only because of the value in the last stratum, which is significantly higher (stratum number 5, F = 5.34). In consequence, there is no evidence that the farms with less than Gs. 192,700[1/] of animal inventories engage in agricultural activities that generate significantly different levels of output per unit of cultivated land. The ratio is increased because farms in the last animal inventory bracket produce relatively more animal products while not cultivating as many hectares of annual and/or permanent crops. No clear answer can be given, therefore, to the question addressed.

Summarizing, there is partial evidence that larger farms, farms with more land in annual permanent crops, and farms with higher values of average inventories of animals tend to have higher sales/consumption ratios even though the data show certain ambiguities that can be attributed to tabulation errors or unexplained factors. Another source of error is the inclusion of in-farm consumption of crops for animal food and seeds within the category of farm consumption; as a result the consumption estimate is distorted upwards.

1/ This is the lower limit for stratum number 5.

TABLE XVI

GROSS FARM INCOME PER HECTARE OF ANNUAL PLUS PERMANENT CROPS FOR FARMS STRATIFIED BY VALUE OF THE AVERAGE INVENTORY OF ANIMALS a/

	Less than 14,500 Gs	14,500 to 53,500 Gs	53,600 to 104,000 Gs	104,100 to 192,650 Gs	192,700 Gs and over	Total
Average ($\bar{x}$)	37.74	40.50	39.50	40.26	51.48	41.82
Standard Deviation ($S_{\bar{x}}$)	2.197	2.742	1.180	1.232	4.371	1.181

Note: a/ The ratio is given by variable 17. The hypotheses of equal average values among the strata is rejected at a 95-percent probability level (F = 5.337).

TABLE XVII

VARIABLES USED IN THE ANALYSIS OF VARIANCE

Variable Number	
1.	Total hectares of land
2.	Hectares of annual crops
3.	Hectares of permanent crops
4.	Value of the average inventory of animals (Gs. x 1000)
5.	Hectares of cultivable land not in use
6.	Value of animal products (Gs. x 1000)
7.	Off-farm income (Gs. x 1000)
8.	Labor hired (Gs. x 1000)
9.	Sale plus consumption of annual crops (Gs. x 1000)
10.	Gross farm income (Gs. x 1000)
11.	Net farm income (Gs. x 1000)
12.	Total net farm income (Gs. x 1000)
13.	Total fixed investment (Gs. x 1000)
14.	Operating capital (Gs. x 1000)
15.	Ratio of sale plus consumption of annual crops to hectares of annual crops (Gs. x 1000)
16.	Ratio of net farm income to total fixed investment
17.	Ratio of gross farm income to hectares of annual plus permanent crops (Gs. x 1000)
18.	Ratio of operating capital to total fixed investment
19.	Ratio of animal products to average inventory of animals

Variable Number	
20.	Ratio of labor hired to hectares of annual plus permanent crops (Gs. x 1000)
21.	Ratio of hectares of annual crops to total hectares of land
22.	Ratio of hectares of permanent crops to total hectares of land
23.	Ratio of hectares of cultivable land not in use to total hectares of land.
24.	Ratio of sales to consumption of annual crops
25.	Ratio of total farm sales to total farm consumption
26.	Values of sales of annual crops (Gs. x 1000)
27.	Value of consumption of annual crops (Gs. x 1000)
28.	Value of total farm sales (Gs. x 1000)
29.	Value of total farm consumption

TABLE XVIII

BOUNDARY VALUES FOR THE STRATA UNDER THE FOUR CLASSIFICATION CRITERIA ADOPTED, AND NUMBER OF QUESTIONNAIRES IN EACH SUBGROUP

(In Parentheses the Number of Observations)

Strata	Total hectares of land	Hectares of annual crops	Hectares of permanent crops	Value of the average inventory of animals in Gs. x 1000
1	less than 5 (175)	less than 1.81 (201)	0 hectares (227)	less than 14.50 (199)
2	5 to 8 (236)	1.81 to 2.80 (209)	less than 0.5 (167)	14.50 to 53.50 (201)
3	9 to 13 (192)	2.81 to 3.80 (213)	0.5 to 0.9 (200)	53.60 to 104.00 (200)
4	14 to 24 (178)	3.81 to 5.80 (193)	1.0 to 1.90 (223)	104.10 to 192.65 (201)
5	25 and over (219)	3.81 and over (184)	2.0 and over (183)	192.70 and over (199)
Total	(1,000)	(1,000)	(1,000)	(1,000)

ANNEX D-3

The Labor Market

A. Conclusions

1. The average daily wage a farmer is paid for agricultural labor is equal to Gs. 180.4, regardless of the district and the size of the farm he owns.

2. Farmers who have less than 10 hectares of land perform off-farm jobs that pay a daily average of Gs. 266.2. Farmers with 10 hectares or more earn an average of Gs. 427.0 per day.

3. A corollary is that the farmers classified in the preceding two groups have different occupations, as shown by the different average salaries earned.

4. The amount of labor utilization increases with farm size but is not proportional to it. The average labor use is less than doubled (580.2 to 993.5 man-days per year) when the average farm size is increased about 15 times. (From 2.783 to 42.991 hectares, Table V.)

B. The Level of Wages in the Agricultural Sector

In the agricultural labor factor market there are two different wage levels which are of interest. The first one is the average wages that the farmer pays when hiring for farm work; the second is the average wages that the farmers receive when working outside of their farms.

1. Wages in Agriculture

The survey did not ask the farmers how much they paid to hire labor but what wages the farmers received when working in agricultural activities.

Table I presents the average wages received in agricultural activities, the farms being stratified by farm size; that is, the size of the land the farmer owns, not the farm he works for. The hypothesis of equal average wages for all farm sizes is rejected at the 95-percent probability level ($F = 3.42$), but fails rejection when

TABLE I

AVERAGE WEEKLY WAGES RECEIVED BY FARMERS IN DIFFERENT ACTIVITIES STRATIFIED BY THE SIZE OF FARM THEY OWN a/

Activity	Less than 3 hectares	3 to 4 hectares	5 to 9 hectares	10 to 19 hectares	20 to 29 hectares	30 hectares and over	Total
Agriculture	749.3 (29)	905.6 (33)	1,099.3 (41)	817.3 (17)	748.6 (15)	2,036.3 (6)	950.5 (141)
Construction	1,616.6 (12)	833.3 (3)	1,583.3 (12)	6,250.0 (2)	1,020.0 (2)	750.0 (1)	1,755.9 (32)
Cattle raising	1,162.5 (2)	1,050.0 (2)	- -	1,300.0 (2)	- -	- -	1,170.8 (6)
Commerce	2,175.0 (10)	969.2 (13)	1,003.1 (16)	2,360.0 (27)	3,173.4 (13)	2,042.8 (16)	1,979.5 (95)
Handicraft	2,826.6 (13)	2,859.6 (8)	2,359.0 (11)	2,726.1 (7)	1,696.6 (6)	3,710.0 (5)	2,667.7 (50)
Others	1,557.6 (19)	1,373.4 (17)	1,391.4 (26)	1,255.8 (14)	1,968.0 (12)	3,451.8 (13)	1,734.5 (101)
All activities	1,342.7 (85)	1,377.6 (76)	1,288.6 (106)	2,087.6 (69)	1,653.8 (49)	2,789.2 (41)	1,631.1 (426)

Note: a/ In parentheses the number of entries or observations.

the group of largest farms is excluded (F = 1.30). The average weekly wage for the first five strata is equal to Gs. 902.2. Moreover, when comparing the first five strata together, with the largest one, the hypothesis of equal averages is rejected (F = 22.0). Therefore, it appears that the farmers in the highest land bracket are hired for a different type of agricultural work and so collect wages which are significantly higher than those received by the rest of the sample.

It is estimated, therefore, that the average wages paid at the farm are Gs. 902.2 per week, or Gs. 180.4 per day if a 5-day week is assumed.

No significant difference is observed between wages when farmers are classified by district (F = 1.07). Table II presents the averages for each district.

2. Wages in all Activities

The average wages received by the farmers are significantly different when their farms are grouped by land size; the hypothesis of equality of averages is rejected (F = 8.06).

On the grounds that the largest farmers are the only odd group, the hypothesis was verified again for the first five strata. The hypothesis was still rejected at the 95-percent probability level (F = 4.01).

A more careful observation shows that the farmers in the three largest strata have wages that are above the general average (see Table I), while the other three are consistently below it.

When the first three strata are compared, no significant differences appear (F = 0.14), the average weekly wage being Gs. 1331.16.

The largest three strata have an average weekly wage of Gs. 2134.8 although the hypothesis of equal averages is rejected at a 95-percent probability level (F = 3.64). Nevertheless, it must be noted that the hypothesis holds at a 97.5-percent probability level.

When the first three strata are compared with the other three, the hypothesis is rejected with an F value of 27.12.

Therefore, it is observed that the farmers with 10 or more hectares of land tend to earn higher off-farm wages than the rest: The average daily wage being Gs. 427.0 and Gs. 266.2, respectively, when a 5-day week is assumed. (The daily average for the entire sample is Gs. 326.2.)

TABLE II

AVERAGE WEEKLY WAGES CLASSIFIED BY DISTRICT
(In Parentheses the Number of Observations)

District	Agriculture		All Activities	
Loreto	1,160.0	(15)	1,369.9	(51)
Stroessner	865.1	(21)	1,580.7	(58)
Villarrica	1,177.1	(21)	2,071.0	(63)
Coronel Oviedo	894.6	(14)	1,635.4	(39)
Santa Rosa	778.5	(12)	1,345.5	(42)
Itacurubí	783.8	(16)	1,513.0	(51)
Itá	670.9	(16)	1,638.8	(46)
Quiindy	1,247.4	(16)	1,996.8	(34)
San José	864.0	(10)	1,479.2	(42)
Total	950.5	(141)	1,631.1	(426)

Table II shows the average wages received in all activities for farms stratified by district. No significant difference exists among these averages; the hypothesis of equal averages fails to be rejected ($F = 1.27$).

C. Availability of Family Labor

The family members have been classified by sex and age in order to draw an estimate of the equivalent-man availability. Farmers were asked about the percentage of availability of each family member. When the estimates are expressed in terms of equivalent-man-days-per-year, it is done by assuming 300 work-days in the year.

The central theme of this section is that of ascertaining if farms of different sizes have significantly different amounts of family labor. Unfortunately, the conclusions cannot be made in terms of statistical F tests that verify the equal averages hypotheses.[1/]

All males of 15 or more years were counted as a unit of equivalent-man, 1/2 of a unit if they were 13 or 14 years old; and 1/3 if they were between 6 and 13 years of age. Similarly, the women in the above age brackets counted as one, 1/3, and 1/4 units of equivalent-man, respectively.

Table III shows that the availability of family labor increases steadily as farm size is increased. The percentage of availability is lowest at both ends of the spectrum; for the smallest and largest farms it is equal to 54 percent, when all family labor is pooled. Table IV gives a breakdown of percentage of availability of older men and women showing that it is lowest both for the largest and the smallest farms.

D. Labor Utilization at the Farm

Table III shows the estimates of the average number of man-days of family labor available in a period of one year for farms of different sizes. In order to draw an estimate of the amount of labor actually used in the farm, the number of man-days of off-farm work performed by the family members must be subtracted, and the estimate of labor hired by the farm must be added.

1/ The farmers were being classified by sex, age, district and farm size; to request an F test would have increased considerably the computer costs.

TABLE III

FAMILY LABOR AVAILABLE FOR THE FARMS STRATIFIED BY TOTAL HECTARES IN ITA, QUIINDY, AND SANTA ROSA

(Man-days per Year) a/

	Less than 3 hectares	3 to 4 hectares	5 to 9 hectares	10 to 19 hectares	20 hectares and over	Total
100% Availability	1,039.99	1,132.71	1,158.33	1,316.07	1,509.09	1,160.51
Real Availability	564.22	659.95	766.65	807.04	818.54	683.39
Percentage Availability	54.3	58.3	66.2	61.32	54.2	58.9
Number of Farms	80	81	60	28	22	271

Note: a/ A maximum of 300 days per year is estimated for 100% availability.

Estimates are available for all the above parameters, but they have been calculated using different boundaries for the strata. An effort has been made in Table V to reduce all of them to a common set of boundaries.

The amounts of off-farm work performed and the labor hired by the farm are given in the survey in terms of guaraníes per year. These estimates have been transformed into man-days of work by using the daily wage estimates of Section B (Annex D-3). (See Table V.)

The final estimates obtained show that on the average, farms with less than five hectares of total land use 580 man-days per year, while farms with 25 or more hectares use about 994 man-days per year.

TABLE IV

PERCENTAGE OF AVAILABILITY OF FAMILY LABOR CLASSIFIED BY SEX, AGE, AND FARM SIZE, IN SANTA ROSA, ITA, AND QUIINDY
(In Parentheses the Number of Persons)

Farm Size	Men			Women		
	6 to 12 years	13 and 14 year	15 years and over	6 to 12 years	13 and 14 year	15 years and over
Less than 3 hectares	67.5 (114)	62.0 (16)	46.4 (48)	43.0 (128)	54.0 (10)	52.3 (32)
3 to 4 hectares	76.9 (155)	46.1 (20)	48.6 (45)	36.7 (113)	44.2 (13)	43.9 (34)
5 to 9 hectares	86.6 (112)	55.5 (11)	49.9 (47)	46.0 (83)	53.9 (9)	34.0 (26)
10 to 19 hectares	81.2 (61)	50.6 (7)	51.9 (15)	41.1 (49)	47.5 (4)	22.9 (12)
20 hectares and over	70.9 (62)	50.0 (6)	39.7 (12)	30.2 (38)	25.0 (2)	32.7 (12)
Total	76.7 (504)	53.0 (60)	48.0 (167)	40.6 (417)	48.4 (38)	33.3 (116)

TABLE V

ESTIMATES OF AVERAGE TOTAL LABOR USED IN THE FARM
(Equivalent man-days per year)

1. Limits (hectares)	Less than 5	5 to 9	10 to 19	10 to 19	20 and over	Total
2. Number of observations	161	60	28		22	271
3. Family labor available	612.08	766.65	807.04	807.04	818.54	683.39
4. Limits (hectares)	Less than 5	5 to 8	9 to 13	14 to 24	25 and over	Total
5. Number of observations	175	236	192	178	219	1000
6. Wages paid (Gs. x 1000)	5.06	8.29	15.61	15.88	42.86	18.05
7. Man-days equivalent a/	28.04	45.95	86.53	88.03	237.68	100.06
8. Off-farm income (Gs. x 1000)	15.95	11.73	14.00	20.71	26.74	17.79
9. Man-days equivalent	59.92b/	44.06b/	32.79c/	48.50c/	62.62c/	54.53d/
10. Total labor (3-9+7)	580.20	768.54	860.78	846.78	993.50	728.92
11. Average total land (Has.)	2.783	6.186	10.724	18.758	42.991	16.760

Notes: a/ At an average of 180.4 Gs/day for agricultural labor.
b/ At an average of 266.2 Gs/day for all labor.
c/ At an average of 427.0 Gs/day for all labor.
d/ At an average of 326.2 Gs/day for all labor.

ANNEX D-4

Estimation of the Effective Demand for Credit for Annual Costs

One way to make sense out of the existing data on use of credit last year and the existing data on stated or desired credit is to assume that they are two observations on the same demand schedule. In order to determine a demand schedule, the following assumptions are proposed:

(1) All credit used in the past year was for annual costs (There are no data to support or refute this assumption);

(2) Definite interest rates for credit use in the past year;

(3) That each one-percent-point reduction in the rate of interest will induce an absolute expansion in the quantity of credit effectively demanded which is equal for all such reductions; and

(4) That the low rate of interest assumed by potential borrowers in stating their quantitative desires for credit is a zero rate of interest.

The assumptions and resulting calculations are shown in Table I.

These assumptions are slanted toward a conservative view. The demand schedules described in Table I are elastic above a 20 percent annual rate of interest but at 20 percent both are in their inelastic ranges. The assumption of a zero rate of interest as borrowers' perception is definitely conservative.

One way to view the results is to assume that all potential borrowers were in the market in the past year data; then each borrower's average loan was rather small; e.g., $34 for farmers with the least capital and $92 for borrowers with net capital from $1,984 to $5,952. As the rate of interest is lowered to 20 percent, each potential borrower utilizes more credit, with each of the smallest farmers utilizing $213 and each farmer in the intermediate group utilizing $350. These amounts are, of course, substantially less than the $392 and $693 stated by each potential borrower as his demand for credit for annual cost financing and reflect the impact of a 20-percent annual interest rate dampening the borrower's desire for credit.

TABLE I

EFFECTIVE DEMAND FOR CREDIT FOR ANNUAL COSTS

	Size of Net Capital	
	I. Farmers with less than $1,984	II. Farmers with $1,984 to $5,952
A. Past-Year Data		
1. Past year total demand in Gs. 1,000	712	684
2. Past year total demand in US$	5,651	5,429
3. Past year number of borrowers	33	17
4. Past year potential borrowers	166	59
5. Average borrowing per borrower in US$	171	319
6. Average borrowing per potential customer in US$	34	92
7. Assumed rate of interest	40	35
B. Potential-Demand Data		
1. Stated demand for annual cost credit		
a. In Gs. 1,000	8,196	5,155
b. in US$ 1.00	65,048	40,913
2. Stated demand per potential borrower		
a. in Gs. 1,000	49.4	87.4
b. in US$ 1.00	391.9	693.4
3. Assumed rate of interest	0	0
C. Calculations		
1. Difference between past year and stated demand in Gs. 1,000	7,484	4,471
2. Impact of one-percent-point reduction in interest rate Gs. 1,000	187.1	127.7
D. Results		
1. Effective demand at 20% interest rate		
a. total in Gs. 1,000	4,454	2,600
b. total in US$ 1.00	35,349	20,631
c. average per potential customer $1.00	213	350
2. Elasticity of demand at 20% rate	- .84	- .98

Farmers who are philosophically opposed to credit are not included in the group of potential borrowers. There is a question, however, regarding the rapidity of entry of borrowers into the credit market as the rate of interest is decreased. Obviously, the 33 smallest farmers who were in the market borrowing $171 each last year will increase their borrowing to the limits of bank criteria of credit worthiness, and the same holds true for the 17 intermediate farmers who borrowed $319 each. The provision of credit union facilities is likely to induce entry into the market of potential borrowers who have stayed away because they could not obtain credit, could not pay for credit, or found it too costly.

There are a number of indicators unrelated to a lower interest rate which suggest that demand for credit will grow through time. Three factors appear to bear significant weight in the dynamic demand for credit: (1) land title impediments and land tenure characteristics which impair access to credit due to the inability of farmers to pledge land as security for loans, (2) existence of uncultivated land, and (3) unavailability of means of production.

In regard to land tenure impediments, of the 271 interviewees in the Survey Two area, 141 farmers stated that they owned their farms, but only 120 had definitive titles; 63 farmers stated that they were squatters; 22 farmers were renters; and 45 were sharecroppers. Some farmers fit into more than one category; i.e., owned property but also rented or sharecropped, etc.

The CREDICOOP loan system should enjoy a substantial increase in the number of borrowers who have never used bank credit previously because land was required as collateral. This fact also may explain why some small farmers have had access to bank credit and why BNF officials can state that they lend to small farmers.

The CPES surveys give some indication regarding the uncultivated land which could be brought into crop production. The Survey One districts include areas outside as well as within the central minifundia, but Survey Two districts are in minifundia areas. Therefore, a higher percentage of farmers in Survey One have land which could be brought into cultivation than do farmers in Survey Two.

Fifty percent of all the interviewees of Survey Two and eighty-five percent of all the interviewees of Survey One stated that they were not cultivating all their land which they considered as potentially cultivable. Table II indicates farmers' reasons for not

TABLE II

REASONS GIVEN FOR NOT USING ALL CULTIVABLE LAND

	Survey One (Number)	Survey Two (Number)
A. Interviewees Not Using all Cultivable Land and Reason Given		
Lack of labor	138	0
Lack of means of production	233	27
Low or unstable prices	8	1
Fallow land	109	44
Forest land	166	12
Not necessary to cultivate more land	45	6
Other	148	41
Total interviewees stating reason	847	131
Total interviewees in survey	1,001	271

B. Amount of Cultivable Land Not Utilized: Survey One (Hectares)	Interviewees	Percentage
Less than 1.0	72	8.5
1 to 2	130	15.3
2 to 4	143	16.9
4 to 7	129	15.2
7 to 11	100	11.8
11 to 15	73	8.6
15 and over	200	23.6
Total	847	100.0

Source: CPES, Surveys One and Two.

cultivating all their potentially cultivable land. The existence of fallow land as an explanation for not farming all cultivable land is significant in both Survey One and Survey Two districts.

There are, however, significant differences in responses between the Survey One and Survey Two districts. Lack of labor and existence of forest land were much more important in the Survey One districts than in the Survey Two districts. This difference appears to correspond to the abundance of labor and scarcity of land in the minifundia area (Survey Two).

What is striking in Survey One and to some extent in Survey Two is the proportion of responses related to lack of means of production. In the questionnaires, the means of production signify implements, seeds, etc. Those respondents who gave fallow land, lack of labor, and forest land as reasons for not using all their potentially cultivable land can be added to those who recognize lack of means of production as the more immediate impediment to expansion of crop production. These constitute a sizable group of farmers whose crop production could be expanded through credit financing of annual costs.

Data from Survey Two indicate that farmers with less than five hectares of land have 0.2 hectares of fallow land and that farmers with five to 20 hectares of land have 0.9 hectares of fallow land. Thus, with better farming practices, these farmers could probably increase their crop land. In Survey One interviewees were asked to state amounts of cultivable land not presently utilized. Table II suggests that in Survey One districts cultivable land is not a major constraint on production.

In conclusion, the available evidence suggests that provision of credit to finance annual crop costs is likely to confront a favorable demand through time. By and large, farmers can expand production because they have unutilized and underutilized land, and, at present, many of them need credit to obtain purchased inputs.

E. SUPPORT INSTITUTIONS AND SERVICES

1. Government Policies and Objectives

a. The Five-Year Plan

In December 1970, the Secretaría Técnica de Planificación (STP) issued a "National Plan of Economic and Social Development, 1971-1975" for Paraguay's agriculture sector. The plan summarized the overall performance of Paraguayan agriculture through 1970 and set forth a series of objectives and strategies for the five-year period, 1971-1975.

While the plan did not provide a concise statement of overall sector policy, its drafters clearly implied that accomplishment of the plan's objectives would lead to the "final objective", identified as the "well-being of the producer".

Agriculture sector objectives are summarized in the Five-Year Plan as follows:

(1) To improve the marketing of agricultural products.
(2) To increase production of export commodities in the volume and of the quality required by the world market.
(3) To introduce new export commodities for the external market.
(4) To substitute, where economically feasible, domestically produced agricultural goods for currently imported commodities.
(5) To produce raw materials in sufficient quantities to meet the needs of local processing industries which produce for the local and external markets.
(6) To produce food in the volume and of the quality necessary to meet the requirements of the local market and of a balanced diet.
(7) To train farmers in the adoption of improved production techniques.
(8) To improve usage of available natural resources by bringing more land into production and through its more intensive and rational utilization.
(9) To increase utilization of farm labor.
(10) To incorporate improved production techniques.
(11) To localize or regionalize agricultural production.
(12) To improve the living conditions of the rural population.

A chart identifying the different objectives, the problems they address and the means selected to reach the objectives accompanies the Five-Year Plan and is included here as Annex E-1.

It is important to note that whatever long-range planning has been undertaken for the agriculture sector usually has been done by the National Planning Office (STP), although with considerable help from MAG technicians, on either an official or an informal basis. This arrangement arises from the STP's central function as a global planning agency at the national level. This level of planning and the preparation of five-year development plans for each major sector occupy the bulk of STP staff time and resources.

While the work of the STP is useful to the MAG as a general guide to policy making--in the sense of setting priorities and serving as a mechanism for coordinating efforts with other ministries--it is of very limited use at the level of detailed project planning and implementation undertaken by MAG.

b. Policies of MAG

In a recent speech on agricultural policy,[1/] the Minister of Agriculture stated that,

> "The main objectives of the Ministry of Agriculture and Livestock in the agriculture sector are to increase the production of those commodities which will contribute towards increased exports and import substitution for important commodities that can be advantageously produced in the country; to increase the production of commodities for processing industries; to increase food production; and, as a consequence, improve the standard of living of the rural population."

The Minister added that research, extension, and other support activities of the Ministry are concentrated in those agricultural commodities which best conform to the above objectives. Thus, MAG has established several assistance packages for such commodities as tobacco, cotton, wheat, soybeans and rice.

A second type of planning in which MAG engages is related to the implementation of the PIDAP[2/] program, which requires the preparation of annual operating plans for each subproject together with a system of evaluation.

1/ El Agricultor, March 31, 1975, Asunción

2/ PIDAP stands for Integrated Agricultural Development Program, a $14.7 million IDB loan to MAG for the purpose of increasing production and productivity of the Paraguayan agricultural sector through the improvement and expansion of the basic technical and credit services needed by the small- and medium-size farmers.

The most important recent development in agricultural planning was the establishment on January 6, 1975, of a high level technical staff unit (Gabinete Técnico) placed under the office of the Minister of Agriculture. The new Technical Unit will have responsibility for all high-level planning and policy formulation within MAG.[1] Key staff members of the unit received Master's degrees in agricultural economics, including planning and economic analysis, in the United States under an AID-funded participant training program. Two returned participants work fulltime with the Gabinete Técnico while a third is assigned on a part-time basis.

With the creation of the Technical Unit, the policy and planning function has been placed at a useful operational level, consistent with the MAG's decision to develop a competence in agricultural planning and policy formulation. Annex E-2 comprises a scope of work for the new planning unit.

2. Institutional Organizations

a. The Ministry of Agriculture

The Ministry of Agriculture (MAG) is divided into two principal sections, one comprised of staff units which report directly to the Minister (a few operational sections also report directly to the Minister) and the other comprised of five operational or line divisions under the supervision of a Director General who, in turn, reports to the Minister.[2]

The main staff units are as follows:

Secretary General (includes MAG's Publishing and Printing office) which serves as the Minister's immediate staff.

Secretariat for Technical Coordination (STC) which supervises and monitors implementation of the PIDAP[3] program. Under the

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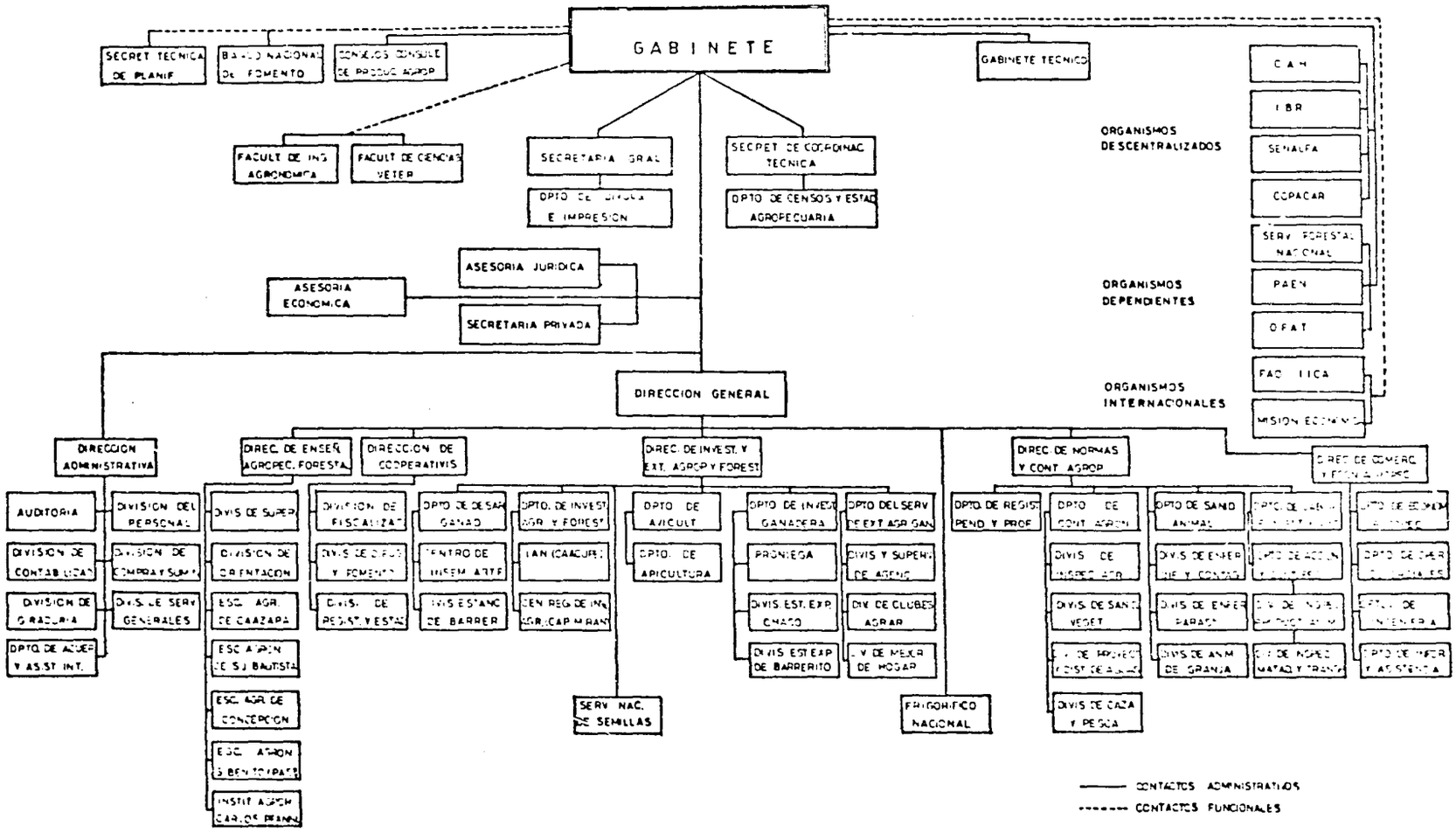
1/ Although a Planning and Budget Unit was created in 1970 within the then newly organized Secretariat of Technical Coordination (STC), an overall policy and planning function was never initiated, attributable to both lack of trained personnel and the concentration of STC efforts on implementing and monitoring the PIDAP program.

2/ The Ministry of Agriculture has no organic chart and thus no fixed organizational structure; the organization chart and accompanying narrative presented here are based on Paraguay's Budget Law and interviews with Ministry officials.

3/ Integrated Agriculture Development Project, a joint GOP/BID

MINISTERIO DE AGRICULTURA Y GANADERIA



ORGANOGRAMA PREPARADO POR EL GABINETE TECNICO DEL MAG 1975

STC as an office of Agricultural Census and Statistics which conducts agricultural censuses, annual sample surveys, and annual crop forecasting surveys with the help of a staff of 19 permanent and seven part-time employees.

Gabinete Técnico or Technical Unit, created January 6, 1975, is responsible for all high level planning and policy formulation within MAG. The gabinete serves as the Ministry's evaluation unit, coordinates its annual work plan, and undertakes studies of farm, livestock and poultry management from different regional and technological perspectives. The Gabinete Técnico is staffed by three U.S.-trained, M.S. level agricultural economists, two ingenieros agrónomos, an economist and a veterinarian.

Administrative Directorate with six subordinate offices handles accounting, disbursements, personnel, purchase and supplies, general services, and international agreements and assistance matters. The Directorate's staff totals 61.

Office of Audit, with six employees, performs more of a controller than an audit function, overseeing the use of funds on a project or program basis. For this reason, it appears as part of the Administrative Directorate on the organization chart.

Private Secretary to the Minister.

Economic Advisor to the Minister.

Legal Advisor to the Minister.

Director General of the Ministry. This office coordinates the operations of the Ministry's technical divisions and serves as liaison between them and the Minister.

Under the Director General are located the following six functional or line divisions of MAG:

Directorate of Agricultural Research and Extension. It supervises and coordinates the Ministry's research and extension activities, including its participation in the national commodity programs. The Directorate's staff comprises a director; two

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program (total cost: $21.7 million) designed to increase the productivity of small- and medium-size farmers in Paraguay through a series of subprojects in research, extension, marketing, agricultural education and agricultural credit.

vice-directors, one for agriculture, the other for livestock, statistician; entomologist; plant pathologist; and specialists in soybeans, wheat, rice, and tobacco. Under the Directorate are six departments and the National Seed Service.

(1) Department of Agricultural Research. Its main task is to undertake research, primarily in crops, to obtain improved varieties of Paraguay's principal agricultural commodities and to determine which management practices will lead to greater production efficiency. The Department's research program is conducted at two sites: The Instituto Agronómico Nacional (IAN), the agricultural experiment station located in Caacupé about 60 Km. from Asunción, and the Centro Regional de Investigación Agrícola, more commonly known as the Capitán Miranda Experiment Station, located near Encarnación in the country's southeast corner. (See section 5.a. Research, for more information on the work of these two institutes.)

(2) National Seed Service (SENASE). The Seed Service supervises the production, classification, analysis, treatment, storage, distribution and sale of improved varieties of seeds produced and selected locally. It provides the producer with grain (wheat, corn, soybeans, rice, etc.), vegetables and pasture seeds, together with fruit and forest plants, produced by IAN and the Capitán Miranda Experiment Station and by private seed producers. SENASE's 28-man staff is organized into four divisions covering processing, laboratory, promotion and technical assistance.

(3) National Program of Livestock Research and Extension (PRONIEGA). All livestock research work in the areas of ranch management, sanitation, nutrition, and forage production and management falls under PRONIEGA, which also has responsibility for transferring or extending research results to individual producers and producers' organizations. PRONIEGA, which was created in 1968, has its headquarters in the Artificial Insemination Center (AIC) complex in San Lorenzo. Its research and extension demonstration stations are located at the AIC, Barrerito Ranch, and the Chaco Livestock Experiment Station (Km. 295 of the Transchaco Road); PRONIEGA also has access to the facilities of a number of private ranches which cooperate in its program.

PRONIEGA's Livestock Extension Program is conducted in cooperation with SEAG (see following section). PRONIEGA technicians present technical information to producers[1/] and SEAG agents at

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1/ Producers have been large-scale ranchers, for the most part, although the small livestock producer is beginning to receive attention now, largely as a result of AID's new Small-Farmer Livestock Project.

technical meetings and during field days and prepare technical bulletins and materials for distribution to producers by SEAG agents. PRONIEGA operates with a professional staff of 16, including a director, two animal sanitation specialists, two animal breeders, two pasture specialists, one range management specialist, three nutrition specialists, one animal husbandry and two extension specialists, and two practical agronomists.

(4) Agriculture and Livestock Extension Service (SEAG). The Extension Service is the chief vehicle in Paraguay for providing technical assistance and information to the agricultural producer and his family; it is the main way in which the farmer learns about the latest research results emanating from MAG's experiment stations and about improved technology. SEAG's executive branch, headed by a director and his deputy, is located in MAG, while its operations branch is headquartered in San Lorenzo, comprised of the following divisions, each headed by a national supervisor: Agricultural Programs, Livestock Programs, 4-C Clubs, Home Economics and Nutritional Education Program, and field staff. The latter is composed of eight regional supervisors, chief extension agents, mid-level extension agents, 4-C club agents, and home economics agents. Technical support at all levels of operation is provided by subject matter specialists in the production of potatoes and soybeans, in nutrition and entomology, in farm management, cooperatives, programming, and communications. (Additional information on SEAG, including a list of regional and local extension offices, can be found under section 5.b., Extension.)

(5) Department of Livestock Development. This was a former STICA project which later functioned under MAG's Director General until 1975 when it became part of the Directorate of Agricultural Research and Extension. The Department has responsibility for managing Barrerito Ranch and the Artificial Insemination Center (AIC). Barrerito Ranch, located on 10,000 hectares in Caapucú, Department of Paraguarí, serves as a model ranch, produces high-quality breeders of improved breeds to upgrade Paraguayan cattle, and tests out new cattle breeds. The main objective of the AIC, located on 75 hectares near San Lorenzo, is to upgrade dairy and beef cattle herds by supplying semen from quality breeds to ranchers and dairymen. Barrerito and AIC each has a director, four or five specialists, and a number of workers on their staffs.

(6) Poultry Department. According to the National Budget, the Department is responsible for providing technical assistance to poultry producers and is part of the Directorate of Agricultural Research and Extension. In practice, however, the four-person office operates under the Directorate of Agriculture and Livestock Standards and Controls and works mainly in the area of sanitation control for broilers.

(7) Apiculture Department. This office, with a professional staff of three, provides technical assistance to help beekeepers improve their facilities, management and marketing by working through producers' associations and cooperatives.

Directorate of Agricultural Standards and Controls. It establishes and enforces quality standards and sanitation controls for agricultural and livestock products and regulates natural resource conservation, hunting and fishing operations, and so forth. The Directorate has five principal departments:

(1) Agricultural Standards and Controls Department. Its primary functions are to inspect and regulate agricultural products and operations; establish and enforce quality standards based on local and international requirements; set and enforce regulations governing the conservation of water, soil and forest resources; and inspect all agricultural products imported, in transit, or exported. The Department is organized into the following divisions:

(a) Agriculture Inspection Division. The main functions of this 10-man office, which includes six agricultural inspectors, are to establish harvesting times for fruits and vegetables destined for the export market, inspect fertilizers and pesticides, and maintain a register of Paraguay's agricultural exporters. Within the Division is a sugar cane section comprised of seven field inspectors who check adherence by sugarmills to Ministry regulations governing the marketing of sugar cane.

(b) Plant Sanitation Division. Fruits and vegetables exported or imported by Paraguay are inspected by a 14-man inspection staff.

(c) Soil and Water Conservation Division. The Division's main responsibility is to organize and supervise water distribution committees which assign distribution quotas in rice producing areas. The Division's staff includes a chief, two inspectors, and a cartographer.

(d) Hunting, Fishing and Fishculture Division. This one-man office establishes and enforces hunting and fishing regulations, provides technical assistance to fish producers, and promotes the creation of new fish ponds.

(2) Animal Sanitation Department. A five-man staff advises producers on animal sanitation; disease; diagnosis; sanitation campaigns; inspection of both imported and exported animals; and requirements generated by multicountry and national health sanitation campaigns produced by international agreements. Its three primary sections are the Division of Infectious and Contagious Diseases; Division of Parasitic Diseases; and Division of Small Farm Animals.

(3) Livestock Operation and Control Department. The Department regulates livestock products and by-products for local consumption and export through a staff of sanitation inspectors assigned to packing plants and slaughterhouses throughout the country. The Animal Production Inspection Division is staffed with a chief, 11 meatpacking inspectors, and an assistant veterinarian while the Slaughterhouse and Transportation Inspection Division functions with a chief and three regional veterinarians.

(4) Research and Control Laboratory Department. Located in the SEAG building in San Lorenzo, the laboratory investigates the origins of disease outbreaks, analyzes water intended for agroindustrial use and is responsible for quality control of vaccines and chemicals for animal use. The unit has a director and some half-dozen specialists.

(5) Chattel Mortgage and Professional Register Department. This administrative section maintains a register of chattel mortgages on agriculture products (including livestock and equipment) on any agricultural property not classified as real estate.

Directorate of Marketing and Agricultural Economics. The Directorate provides market information to agricultural producers and entrepreneurs; implements marketing regulations for agricultural commodities; assists producers in resolving marketing problems; conducts economic studies on selected agricultural products; operates MAG-owned grain-storage facilities and supervises private grain-storage facilities; and oversees the inspection of grains. Under the Directorate are the following departments:

(1) Department of Commercial Operations. This unit operates and administers MAG-owned grain-storage facilities and elevators; keeps an official register of grain dealers; and enforces all regulations governing agricultural trade. It is staffed with a director, five storage managers, storage facilities maintenance men and 10 grain specialists.

(2) Department of Engineering. Staffed with four engineers, it supervises the construction of MAG grain facilities and establishes standards for the construction and operation of private commercial grain-storage facilities.

(3) Department of Agricultural Economics. Under the supervision of an Argentine-trained agricultural economist, the department conducts marketing and economic studies and gathers and maintains economic data on agricultural products; the director is assisted by four technical personnel and two market-price enumerators.

(4) Department of Information and Assistance. The three-man unit operates a market information service for agricultural producers and dealers, and organizes marketing assistance activities for groups of agricultural producers. The latter constitute informal "marketing committees" whose formation the Ministry encourages as a more efficient technique for reaching producers than trying to assist them on an individual basis.

Directorate of Agricultural Education. The Directorate, with a staff of 11, is responsible for all mid-level (subuniversity) agricultural education in Paraguay, operating five public agricultural schools and supervising two private ones. (See section 5.c. Education for further information.)

Directorate of Cooperatives. Its principal functions are to supervise and assist cooperatives and promote the creation of new ones. Apart from the office of the Director, there is a General Coordination office; a Control Division which oversees the operations of cooperatives and their compliance with current regulations; a Register and Statistics Division whichmaintains a file on every cooperative entity containing data on legal status, membership, financial situation and so forth; and an Information and Promotion Division which distributes information on cooperative principles and organizes cooperative education programs.

Frigorífico Nacional. Once owned by the BNF (Banco Nacional de Fomento), this facility provides temporary cold storage for agricultural commodities destined for either the local or export market. Its staff is comprised of 20 administrative personnel, 17 technicians, 10 service personnel and four laborers.

Other MAG Units. These are operational units which report directly to the Minister rather than to the Director General.

National Forestry Service. Created in January 1975 by authority of Law No. 422 (Forestry Law, 1973), the Service establishes, coordinates and implements GOP forestry policy on forest conservation, forestation and reforestation, research and development of forest products, and other forestry related programs. The Service is administered by MAG employees and by one representative each from the Central Bank, IBR, Rural Association of Paraguay, National Agricultural Society, and two representatives from the lumbermen's association.

Cotton and Tobacco Control Office (OFAT). This large (44 administrative personnel, 54 technicians, and seven service personnel) office establishes and enforces quality standards for tobacco and cotton for both the local and export markets.

TABLE E-1

MINISTRY OF AGRICULTURE BUDGET BY CALENDAR YEARS
(Guaraníes x 1,000)

	1971	1972	1973	1974	1975
Minister and Staff Offices	9,185	10,449	9,969	10,639	12,262
Support Services *	28,688	34,160	35,735	31,097	31,133
Regular Budget	16,688	17,255	17,025	31,097	31,133
P.L. 480	12,000	16,905	18,710	-	-
Directorate of Agricultural Education	14,347	156,440	127,065	98,299	31,013
Regular Budget	12,347	11,905	11,752	17,227	20,926
P.L. 480	2,000	4,000	1,469	-	-
PIDAP	-	140,535	113,843	81,072	10,086
Directorate of Agricultural Research & Extension	57,546	237,121	205,057	159,035	161,033
Regular Budget	40,146	45,071	44,429	104,107	149,441
P.L. 480	17,400	41,732	47,822	-	-
PIDAP	-	150,318	112,806	54,928	11,592
Directorate of Marketing & Agricultural Economics	3,191	185,994	112,806	17,469	9,775
Regular Budget	1,691	1,782	2,221	17,469	9,775
P.L. 480	1,500	24,192	11,731	-	-
PIDAP	-	160,020	88,000	-	-
Directorate of Agricultural Standards & Controls	18,782	19,996	19,992	18,150	21,114

* Support Services comprise the Administrative Directorate, Secretariat for Technical Coordination Department of Agricultural Census and Statistics, and the Gabinete Técnico (Technical Unit).

TABLE E-1 (Continued)

	1971	1972	1973	1974	1975
Directorate of Cooperatives	2,764	4,712	4,620	3,229	2,800
Regular Budget	1,764	1,766	1,670	1,783	2,800
P.L. 480	1,000	2,946	2,950	1,446	-
Cotton and Tobacco Control Office (OFAT) 1/	25,088	25,691	49,644	78,828	124,975
Inspection Service Fees 1/	20,671	19,309	18,427	22,520	34,520
Artificial Insemination Center & Barrerito Ranch 1/	9,993	10,951	13,473	18,578	29,006
Frigorífico Nacional 1/	-	18,595	17,817	21,366	21,372
Contributions to Related Entities	106,930	120,530	122,850	166,190	153,850
Regular Budget 2/	53,530	66,530	69,050	70,490	50,010
Special Law Revenues 3/	53,400	51,000	51,500	95,200	103,840
P.L. 480 4/	-	3,000	2,300	500	-
Debt Servicing	1,088	1,061	1,027	2,430	2,396
Regular Budget	197	170	136	1,538	1,504
Special Law Revenues	891	891	891	891	891
Acquisitions and Construction 5/	600	600	3,926	3,926	24,765
TOTAL	303,301	850,168	746,967	656,404	672,934

Notes: 1/ Generate their own income.

2/ Funds are channeled from the Ministry of Finance via the Ministry of Agriculture to the following: FAO; Embassy of Israel (since 1975); CAH; IBR; Schools: Ypacaraí, Carlos Pfannl, Paraguarí; CREDICOOP; UNIPACO; COPACAR (until 1974).

3/ To SENALFA; IBR; and National Forestry Service (since 1975).

4/ To UNIPACO and CREDICOOP.

5/ Building reparations and construction of regional SEAG offices in Ybycuí, Acahay, and La Colmena (1975).

b. Banco Nacional de Fomento (BNF)

The Banco Nacional de Fomento (National Development Bank), an autonomous, state-owned financial institution under the authority of the Ministry of Finance, was established in March 1961 to replace the defunct Banco del Paraguay. Its primary objectives, as given in Decree Law No. 281, are "to promote and finance general programs and specific projects to develop agriculture, livestock, forestry, industry and commerce." The BNF is Paraguay's largest banking institution holding 50 percent of the country's loan balances and 12 percent of the deposits held by the banking system. It is the major source of medium- and long-term development loans and is far and away the single most important source of agricultural credit in Paraguay.

The BNF is governed by an eight-man administrative council comprised of a president appointed to a five-year term by the President of Paraguay and one representative each from the Ministries of Finance, Agriculture, Industry and Commerce, the Central Bank, and from the agriculture, livestock, and industry sectors, all appointed to three-year terms. The council formulates BNF policy and regulations and approves programs, budgets and accounts.

BNF financing programs are administered by three separate banking departments--Commercial and Savings, Development, and Agriculture and Livestock--and a network of 21 branches and 16 subbranches dispersed throughout the country. Each of the three departments has its own funding source(s) and its own credit programs. For the purpose of this study, discussion will be limited to the operations of the Agriculture and Livestock Department.

The BNF's authorized capital, as of December 1974, was Gs. 2,600 million (US$20.6 million) out of which Gs. 1,200 million (US$9.5 million) was allocated to the Agriculture and Livestock Department. Apart from revenues generated by its regular banking operations, the Bank's paid-in-capital has been subscribed from assets of the defunct Banco del Paraguay, interest payments on loans made by that bank, exchange charges on imports, and 20 percent of the Central Bank's annual net profits.

The Agriculture and Livestock Department is the mainstay of all BNF agricultural credit programs, providing investment and seasonal credit to crop and livestock farmers mainly under programs financed in part by external agencies.[1/]

1/ Most significant of these programs in terms of lending volume and impact on BNF finances is the National Grain Program, partly financed from USAID credits, inaugurated by the GOP in 1966 to increase local production of wheat and feed grains.

In a departure from BNF's general policy of lending only to farmers with land titles, the Agriculture and Livestock Department lends to small farmers, particularly settlers, by specific agreement with the Instituto de Bienestar Rural (IBR) and Credito Agrícola de Habilitación (CAH), and to a few cooperatives receiving assistance from AID. Its work is directed toward expanding farmer income by increasing agricultural production and small ranching operations and developing small rural industries.

Between January 1973 and June 1974, the Department financed 200,562 hectares in crops for a total amount of Gs. 2,855,453,922 (US$22.7 million). Following is a list of the commodities and amount of hectares financed:

Crop	Has.	Crop	Has.
Soybeans	91,979	Beans	968
Wheat	23,253	Pineapple	770
Corn	18,034	Tomatoes	831
Cotton	16,915	Peanuts	583
Rice	11,925	Mint	558
Tung	7,347	Vegetables	519
Pasture	3,921	Sweet potatoes	358
Tobacco	2,810	Bananas	307
Cassava	1,916	Garlic	255
Yerba mate	1,879	Potatoes	138
Sour oranges	1,796	Miscellaneous	12,217
Castor beans	1,098		
		TOTAL	200,462

Source: BNF Agriculture Department, 1973-74 Report.

The Department employs 94 in its Asunción headquarters and 191 in the BNF's 37 branches and agencies in the interior. Most of its programs are associated with external lines of credit which are channeled to the agriculture sector through the three major programs outlined below.

1. Agricultural Enterprises Program

The primary focus of this program is on increasing agricultural mechanization of large-scale agricultural enterprises in order to raise production and productivity. Loans disbursed under this program during the period January 1973 to June 1974 amounted to Gs. 957,894,655 ($7.6 million), 53.6 percent of the total used to purchase machinery and equipment and 44.8 percent to finance crop

production inputs--labor, seeds, pesticides and fertilizers. Loan funds under this program were disbursed as follows for the aforementioned period:

Lines of Credit	Amounts (Gs.)	%
Capital Investment	529,972,246	55.0
Land clearing	600,000	0.06
Building and Installations	7,099,268	0.74
Machinery and Equipment	515,702,978	53.60
Livestock	6,570,000	0.60
Working Capital	427,922,409	45.0
Crop Production	425,810,685	44.8
Baby chicks	2,111,724	0.2
Grand Total	957,894,655	100.0

Source: BNF Agriculture Department, 1973-74 Report.

The amount of crops[1/] by hectares financed by the Agricultural Enterprises Program for the same period, January 1973 to June 1974, is summarized in the following table:

Crops	Has.	Total Loans (Gs.)	%
Soybeans	23,585	218,453,849	51.3
Wheat	14,075	171,118,680	40.2
Rice	1,540	13,491,098	5.3
Others*	908**	4,564,914	3.2
	40,108	425,810,685	100.0

* Includes corn, sorghum, sunflower and coffee
** Does not include acreage of coffee

Source: BNF, Agriculture Department, 1973-74 Report.

1/ Crops financed by the program are limited to soybeans, wheat, rice, and very small amounts of corn, sorghum, sunflower, and coffee.

The program is financed with the help of external loans which are set forth in the following table along with their corresponding local counterpart funding:

Loan	Amount Authorized External Funds (In U.S. Dollars)	Amount Authorized Counterpart Funds (In U.S. Dollars)	Totals
AID	9,000,000	6,378,095	15,378,095
526-L-012	3,000,000	2,140,000	5,140,000
526-L-012 (A)	1,000,000	238,095	1,238,095
526-L-012 (B)	5,000,000	4,000,000 1/	9,000,000
Eximbank	3,000,000	-	3,000,000
No. 2634	3,000,000	-	3,000,000
Banco Do Brasil S.A.	10,000,000	-	10,000,000
Banco Nación Argentina	7,000,000	-	7,000,000
Machinery Supplier Loan	8,850,000	-	8,850,000

Source: BNF, Agriculture Department, 1973-74 Report.

2. Agriculture Promotion Program

This program is designed to provide a package of financial and technical assistance to the small- and medium-size rural producer. It accounts for 64 percent of the Agriculture and Livestock Department's total loan program; approximately one-third of Agriculture Promotion Program funds have been granted for seasonal credit 2/ and two-thirds for on-farm investment.

The program was financed originally with a $2.9-million loan in 1963 from BID, which was supplemented three years later by a second loan for $6 million. Funding for the program was substantially

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1/ Includes reinvestment of repayments.

2/ Seasonal credit is granted against land mortgages for up to 12 years, including four of grace. Agriculture Promotion Program loans are made at 9 percent annual interest with a one percent loan commission.

increased in 1971 when $8 million in agricultural credit was made available under the BID/PIDAP loan program. This portion of the PIDAP loan program is being implemented by the BNF[1/] and is designed to strengthen and develop loan programs for small- and medium-size farmers. The inflow of PIDAP funds enabled the Agriculture Promotion Program to double the number of its subloans between 1971 and 1974 and to increase the amount loaned by almost 200 percent.

Financial Resources - Agricultural Promotion Program
(In US$1,000)

BID loan	Year	BID	Local counterpart funds	Total Funding
49/TF-PR	1963	$2,900	$1,438	$ 4,338
119/SF-PR	1967	6,000	2,800	8,800
295/SF-PR (PIDAP)	1971	8,000	3,615	11,615
TOTALS		16,900	7,853	24,753

BID loans over the past decade have prompted the BNF to adjust its credit policies to the social and economic conditions of the small- and medium-size farmer. Three new categories of financing were created within the Agriculture Promotion Program.

(a) Agricultural Promotion Credit finances the production of traditional commodities--cotton, tobacco, soybeans and vegetables (the principal ones)--produced by small- and medium-size farmers.

(b) Agricultural Credit for Specific Projects finances investments on fixed and semi-fixed assets related to specific priority activities involving (according to current guidelines) beef cattle, dairy, poultry, sericulture, sheep, goats and fish culture.

(c) Agricultural Credit for Cooperatives is channeled to cooperatives in two ways:

Global loans to farmer members of cooperatives in order to strengthen their individual economic position. Under this system, a cooperative presents to the BNF a portfolio of production and financing plans for its individual members, containing sufficient technical and economic information for BNF to be able to approve or disapprove the loan. In the last few years, this portion of the program has increased its clientele substantially as a result of the growth of AID-assisted agricultural credit unions for which the BNF is the major source of loan money.

1/ Total BID loan for PIDAP (Integrated Agricultural Development Project) is $14.8 million; the remaining three of its four subprojects are implemented by MAG.

In addition, the increasing demand for credit among small farmers has led the BNF to establish a new mechanism to provide groups of farmers with access to BNF financing. These farmers' associations (Asociación de Agricultores) or farmers' committees (comités de agricultores) began operating in 1973. Each has from five to 15 small-farmer members (required to have legal ownership of or lease rights to their land) governed by a board of directors on which the BNF's local branch manager and credit supervisor and the local SEAG agent sit as ex-officio members/advisors. The groups have legal standing, with each member a guarantor of BNF loan funds and may not be dissolved unless and until all outstanding obligations have been met. Associations or committees may borrow up to Gs. 1,134,000 and individual members no more than Gs. 75,000 for production and marketing operations. Marketing is done on a collective basis through the associations.

Direct Loans to cooperatives for the purpose of upgrading their services and facilities. Table E-2 provides information on the amount of loans, number of recipient cooperatives and so forth over the 10-year period 1964-1973.

3. Special Fund for Credit to Sugar Cane Growers.

This third major program operated by the BNF's Agriculture and Livestock Department comprises a fund established to provide credit to sugar cane growers, its main goal to increase the profitability of sugar cane by increasing crop yield per acre. Funds are generated by a tax established by Decree No. 23362 of 1962; a total of Gs. 77,300,000 (US$613,492), financing 20,000 hectares, was disbursed under this program during the 1973-1974 crop period. These funds are channeled to sugar growers through the sugar mills located in their particular area.

c. Crédito Agrícola de Habilitación (CAH)

CAH, a state-owned, small-farmer credit institution, was created by Decree-Law No. 1611 of December 21, 1943, as part of the then existing Bank of Paraguay.[1/] Eight years later, CAH was granted autonomy as an independent GOP agency (Law No. 119 of November 28, 1951, amended by Law No. 382, dated August 29, 1956), operating under the overall authority of the Ministry of Agriculture; its original objective of providing supervised agricultural production credit and other services to farmers unable to qualify for loans from regular

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1/ Formal establishment was preceded by a joint MAG-STICA (Servicio) agreement signed on June 22, 1943, by which STICA undertook to train the technical personnel required by the new credit agency and to provide other needed technical assistance. The basic law for CAH was written by two representatives of the Banco Agrícola and an agricultural economist from the Institute of Interamerican Affairs.

TABLE E-2

NUMBER AND AMOUNT OF LOANS GRANTED TO COOPERATIVES AND PRODUCERS COMMITTEES, 1964/73

(In 000 Guaraníes)

Years	Number of Cooperatives	Number of Members beneficiated	Amount	Number of Committees	Number of Members beneficiated	Amount	Total Amount
1964							
1965	3	236	16,217	-	-	-	16,216
1966	7	226	7,814		-	-	7,814
1967	9	163	9,820	-	-	-	9,820
1968	6	183	6,183	-	-	-	6,183
1969	7	242	7,295	-	-	-	7,295
1970	4	259	10,187	-	-	-	10,187
1971	13	954	25,102	-	-	-	25,102
1972	15	1,120	20,253	-	-	-	20,253
1973	27	1,676	130,810	26	1,676	10,176	140,994
TOTAL	96	5,069	223,694	26	1,676	10,176	243,870

sources of production credit; e.g., BNF, Central Bank and private banks, has remained unchanged.

The organization has had a checkered history. The first 15 years of CAH activity (1944/1959) were characterized by a wide variety of services. In addition to short-term crop loans, CAH granted long-term credit for machinery and implements, livestock improvements and land purchase. It also managed pools of machinery for rental to small farm clients and was perhaps the largest agricultural supplies distributor in Paraguay. In its heyday in the early 1950's, CAH reached some 7,200 farmers and lent over $500,000 per year. From an all-time high of Gs. 55,969,000 in loan monies distributed in 1957, CAH's fortunes began a steady decline in the following year when its operating funds were drastically curtailed.[1/] A bad repayment position in 1960 forced the organization to restrict its activities increasingly to loan collections and to the distribution of surplus farm implements, seeds, insecticides, etc., carried over from previous years; yet even this form of credit could not be effectively recovered. In 1963, CAH had approximately Gs. 148 million in outstanding loans distributed among 14,500 borrowers, while its total indebtedness amounted to Gs. 145 million. Operations hit a record low in 1967 when only Gs. 778,000 in loans were disbursed (see Table E-3).

After a decade of inactivity, CAH acquired a new lease on life in 1970 when a new Administrative Council was named; a new method of assisting small farmers (see following discussion of AUCAs) was initiated; the Central Bank of Paraguay agreed to reschedule an old debt of Gs. 140 million and to provide new resources and the GOP agreed to make an annual budgetary allocation to assist with operating expenses. Despite legal provision for CAH's gradual capitalization, the GOP has failed to comply with the requirements, leaving CAH to obtain loan program financing from the Central Bank. The latter wrote off just under Gs. 59 million in delinquent CAH interest through March 1972, and the Government canceled Gs. 140 million of the remaining total debt in late 1973 (Resolution No. 47, National Council of Economic Coordination, December 26, 1973).

CAH obtained a new Gs. 50,305,400 credit from the Central Bank in February 1972 which has been fully utilized. This was followed by a Gs. 200 million loan from the same source in November 1973 of which Gs. 80 million was utilized in 1974 with the remainder to be disbursed by the end of 1975. CAH has a total operating capital of Gs. 250 million.

1/ U.S. assistance was withdrawn in 1959.

TABLE E-3

LOANS GRANTED BY CAH IN THE LAST 20 YEARS
(In Thousands of Guaraníes)

Years	Total Loans Granted	Years	Total Loans Granted
1954	43,208	1965	4,081
1955	39,667	1966	1,631
1956	18,060	1967	778
1957	55,969	1968	1,856
1958	28,813	1969	2,400
1959	23,838	1970	7,400
1960	8,443	1971	26,200
1961	4,455	1972	33,000
1962	2,873	1973	50,000
1963	6,529	1974	140,000
1964	4,081	TOTAL	503,590

Source: Crédito Agrícola de Habilitación.

Annual operating expenses for CAH amount to Gs. 27 million which are financed through a fixed annual GOP contribution of Gs. 16.2 million plus loan interest and commissions which in 1974 amounted to Gs. 10.4 million. Shortfalls in funds for operating expenses are normally covered by recuperation of old delinquent loans which brought in Gs. 4.9 million in 1974.

CAH is governed by an administrative council comprised of a president (a position filled by the president of CAH) and representatives from MAG, the Central Bank, and the Instituto de Bienestar Rural, IBR (Institute of Rural Welfare). Its managerial staff numbers 43, headquartered in CAH's central office in Asunción. CAH also maintains its own extension/supervision branch, staffed with 66 subprofessional farm-level supervisors who work out of six regional and 20 district offices. The farm input supply operations are also managed from the regional offices.

Regional Offices	District Offices
Coronel Oviedo	Coronel Oviedo, La Pastora, San José
Coronel Bogado	Coronel Bogado, General Delgado, Fram, San Pedro del Paraná, Carmen del Paraná, Santa Rosa
Eusebio Ayala	Eusebio Ayala, Itacurubí de la Cordillera, Caraguatay, Isla Pucú, Santa Elena, Piribebuy, Valenzuela
Caazapá	Caazapá
Acahay	Acahay, Ibycuí
Eje Norte	Choré

Rather than attempting to assist small farmers on an individual basis, since 1970 CAH has extended credit through informally organized groups of borrowers known as AUCAs (Associations of Agricultural Credit Users), sometimes considered as precooperatives[1] which also serve as

[1] In actuality, AUCAs are neither cooperatives nor precooperatives but might best be described as committees. They remain dependencies of CAH, having no managerial capability and no system for self-capitalization, and they are not recognized as legal institutions outside of the program.

a channel for technical assistance in production and marketing. These groups, which normally number about 25 members each, also provide an organization base for compulsory group marketing, which helps assure CAH on loan repayment (by giving CAH first lien on member harvest income) and reduces the risk of credit delinquency to a minimum. Although AUCA members acquire a collective debt repayment obligation when receiving their individual loans, in practice this device has proven unnecessary as a credit collection tool.

To qualify for membership in an AUCA a farmer must have title or lease rights to at least six hectares (15 acres) of which only one-third may be financed for cash crops.[1/] This criterion effectively prevents about one-half of Paraguay's small farmer population from participation in the program. (Six hectares is the national average farm size). It also explains why CAH's activities have been focussed in colonization areas where six hectares represent the minimum "half-lot" that Paraguay's agrarian reform program has specified as the smallest unit into which colonists may legally divide their government-granted holdings.

CAH sees its role as one of promoting commercial family farms, not subsistence agriculture. Thus, since 1970 or so, its financial and technical assistance has been oriented almost exclusively toward the promotion of cash crops (soybeans, cotton, tobacco, some potatoes and wheat) through the provision of seeds, fertilizers, pesticides and cash to AUCA members.

CAH's financial assistance generally consists of short-term (six to eight months) production credit granted for cash crops only with additional two- to three-year loans to finance the purchase of farm implements and work animals. Loans are provided at nine-percent annual interest plus a two-percent service charge on the loan principal. (This compares to interest rates of approximately 14 percent from commercial banks.) In most cases, loans are distributed in up to three installments and are made primarily in the form of inputs rather than cash. Roughly 50 to 60 percent of a borrower's cash production costs are covered. In no case are loans made for more than one-third of a farmer's landholding, to encourage the borrower to leave an additional one-third to subsistence crops and the balance to fallow. Each year the respective thirds are rotated in a cash-to-subsistence-to-fallow strategy.

1/ In practice, AUCA membership is determined by CAH field staff who, in looking for potential members, look first for ex-CAH borrowers with whom they have worked, in some cases for many years; two-thirds of the typical 25-member AUCA will probably be ex-CAH clients.

CAH's program is designed to upgrade the productivity of the small farmer within an approximate five-year period, after which he theoretically should be eligible for other public or commercial sources of agricultural credit.

The AUCA program is carefully supervised by CAH field staff who make up to five or six visits to each AUCA member per crop cycle. These field workers are paratechnicians, some with only a primary education. Traveling on Honda motorcycles or on horseback, they are required to put in five out of six days per week in the countryside. Since the regional CAH offices are storage and distribution centers for agricultural inputs, they remain open seven mornings per week, and resident staff take turns covering Sundays and holidays.

Through periodic on-farm visits and supervision by CAH field staff, improved cultivation practices--among them, application of recommended planting densities, weeding and fumigation schedules, and land rotation procedures--are introduced to the client farmer. Failure to implement the recommended practices constitutes grounds for expulsion from the AUCA and subsequent loss of credit, although in practice the system operates with greater flexibility as a result of field staff autonomy.

In addition to technical assistance in production practices, CAH field agents also supervise group marketing of AUCA crops.[1/] A marketing contract is arranged by the field worker with a local or regional buyer who pays CAH directly upon delivery of the agreed-upon production. CAH then deducts all outstanding credit obligations, including any repayment installments for previous indebtedness, clears each AUCA member's account and pays any net balance in cash.

A third function performed by the field staff is the preparation of CAH loan requests on the basis of individual consultation with each AUCA member, during which an overall production and credit proposal is agreed upon by the CAH field agent and the farmer-client.

The close, relatively inexpensive interaction between the CAH field agent and the AUCA borrower is one of the program's greatest strengths, providing agents with unusually thorough knowledge about

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1/ The average AUCA member sells about 95 percent of his cash crop production and up to 50 percent of his subsistence crop production; CAH field agents often permit clients to dispose of a portion of their harvest individually to meet harvest labor expenses not covered by their crop loans.

clients' productive potential and loan repayment capability, which permits more efficient planning of group marketing and the wiser exercise of flexibility in program implementation. However, if the AUCA program is to reach even one-tenth of its target group--the approximately 61,000 small farmers who are beneficiaries of colonization programs--CAH will have to increase its field staff substantially and create an enforceable system for "graduating" present clients to other sources of financing.

On the whole, CAH's resurgence has been impressive. Between 1970 and 1975, 140 AUCAs were organized, representing about 3,150 farmers with 11,000 hectares, roughly equivalent to three percent of Paraguay's small-farmer population. CAH's performance during the past six years is summarized in the following chart:

	1969	1970	1971	1972	1973	1974[1/]
Farmers served	100	1,300	1,700	2,600	3,000	3,150
AUCAs	-	17	100	111	124	140
Hectares	100	2,384	5,513	7,500	8,700	11,000
Total Loans (In thousand Gs.)	2,400	7,400	26,200	33,300	50,000	140,000

Since the reorganization of CAH in 1970, its credit programs have experienced a much-improved repayment rate--more than 90 percent for the period 1972 to 1974--and some of the pre-1970 indebtedness is being recovered slowly through modest annual installments tacked onto crop loans. Although AUCAs are clearly not the best way to promote self-sufficiency, they do represent a useful institutional innovation for organizing farmers for purposes of expediting loan repayment in a directed credit program. But, as noted, CAH's shortage of working capital and weak management (including some program and staffing shortcomings) are chronic deficiencies which need to be rectified before the organization can make a significant impact on the availability of agricultural credit to Paraguay's small farmers.

1/ Although only a small increase was registered in the number of farmers served in 1974, the average amount of individual loans more than doubled that year as a result of unusually large price increases for production inputs and labor.

d. Instituto de Bienestar Rural (IBR)

The Institute of Rural Welfare (IBR) is an autonomous organization of the Paraguayan Government, established by Law 852 of March 22, 1963,[1] as the implementing agent for the Agrarian Reform Law (Law 854, enacted March 29, 1963).[2] IBR has its own budget and, although nominally under the authority of the Ministry of Agriculture, is invested with broad policy-making authority in its major areas of responsibility: land reform, land settlement and rural welfare.

IBR is governed by a six-man administrative council nominated by Paraguay's Chief Executive to serve renewable five-year terms. The Institute employs a permanent staff of over 400, three-quarters of whom work in IBR's Asunción headquarters, and hires temporary or contract staff as needed for debt collection, land surveying, etc. Its technical assistance staff is limited to approximately 30 agricultural technicians (agronomers and veterinarians) in the field, backstopped by a handful of graduate agronomers (Ingenieros Agrónomos). Technical assistance is also provided by MAG's extension service (SEAG), but it operates in only a very few colonies.

IBR is financed by proceeds from land sales and leases, grazing fees, forestry and quarrying fees, GOP contributions, and by internal and external credits. IBR's budget increased from Gs. 46,844,921 in 1963 to Gs. 308,020,145 in 1973; the latter represents a 105-percent increase over 1972 and was due to an extraordinary rise in land sales with a total of 516,000 hectares sold. For a breakdown of IBR income 1963-1973, see Table E-4.

Despite its diverse mandate, IBR since its inception has concentrated most of its efforts on land settlement programs, resettling former inhabitants of urban minifundia areas and settling Paraguayans returned from Brazil and Argentina in the Northern Axis or Eje Norte (land north of Coronel Oviedo, predominantly in the Department of San Pedro) and particularly in the Eastern Axis or Eje Este comprising in

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1/ IBR has its antecedents in the old Department of Land and Colonization established in 1926, which in 1951 became the Agrarian Reform Institute.

2/ The Agrarian Reform Law, which codified much existing legislation, attempted to improve Paraguay's land tenure structure by providing for: (a) the expropriation of part of large holdings (latifundia) exceeding 10,000 hectares in the country's Eastern Region and 20,000 hectares in the Chaco on which permanent improvements represent less than 50 percent of land value; (b) the prevention of further fragmentation of

TABLE E-4

IBR INCOME, YEARS 1963/1973
(In Guaraníes)

Year	Land sales	Land Lease	Pasture lease	Govnmt. forest lease	Private forest tax	Various revenues	Govnmt. Contrib.	Central Bank loan	Total Income
1963	31,938,522	1,482,979	100,037	1,306,792	-	2,416,591	9,600,000	-	46,844,921
1964	37,972,137	1,709,061	581,089	5,678,789	16,308,501	3,442,073	9,600,000	-	75,370,580
1965	65,212,422	1,521,526	11,925	6,322,305	26,131,649	3,387,615	9,600,000	-	112,187,444
1966	52,222,275	1,182,757	128,500	6,741,418	27,467,490	4,066,651	8,800,000	-	100,709,09[illegible]
1967	61,555,006	1,502,574	57,200	7,102,543	29,031,574	4,511,696	10,400,000	6,000,000	120,160,593
1968	53,298,977	1,060,741	28,500	1,622,730	22,835,916	4,887,263	9,800,000	6,000,000	99,534,126
1969	60,583,299	1,497,180	-	2,974,830	26,893,536	4,720,058	16,200,000	11,000,000	123,869,803
1970	52,066,552	1,302,861	-	666,950	28,369,979	5,352,795	16,600,000	19,568,577	123,927,714
1971	63,025,91[illegible]	827,526	-	611,100	22,035,025	5,027,083	17,400,000	13,834,280	122,760,924
1972	94,311,621	1,006,683	-	186,050	13,810,115	7,761,005	23,000,000	10,000,000	150,075,474
1973	254,657,760	931,225	-	536,770	12,666,974	19,427,416	19,800,000	-	308,020,145

Source: IBR Statistics Division.

the main the central sections of the Departments of Caaguazú and Alto Paraná which were opened up by the Asunción-to-Puerto Presidente Stroessner all-weather highway completed in 1965. Almost all settlement and resettlement have been on previously unused Government lands; that is to say, very little expropriation of latifundia has occurred.1/

During the decade 1963 to 1973, IBR helped organize 382 colonies (291 official and 91 private) covering 3,388,387 hectares. During the same period, 53,637 plots comprising 1,611,412 hectares were surveyed and assigned, and 63,327 land titles amounting to a total of 2,836,112 hectares were issued.

IBR's massive colonization program has done much to alleviate population pressure in the urban minifundia areas. While population increased during 1962-1972 at an annual 1.3-percent rate in Asunción and its Central Department and the other traditional population centers in the Departments of Cordillera, Guairá and Paraguarí, the national annual average increase was 2.7 percent. During the same period some of the more easterly departments registered much higher population growth rates: Alto Paraná, 12.5 percent; Amambay, 6.6 percent; and Caaguazú, 5.5 percent. Although other factrs are involved, such as the nascent Itaipú project in Alto Paraná, colonization has played an important role in these population shifts.

While IBR can boast an impressive record in respect to land settlement per se, it has been noticeably weak in providing auxiliary services. One result has been a proliferation of subsistence farming caused by the settlement of large numbers of new farmers in relatively inaccessible areas without sufficient preparation, financial support or technical assistance.2/

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minifundia and encouragement of their amalgamation into viable units; (c) colonization on both public and private lands; and (d) standardization of lease and sharecropping agreements and assistance to squatters in securing land titles.

1/ Between 1962 and 1973, IBR expropriated only 30,271 hectares, representing one percent of the total area utilized in land settlement, although it did acquire by purchase some 606,000 hectares of private land.

2/ One useful activity undertaken by IBR has been to organize communal pastures for the collective use of farmers and small livestock producers with inadequate land of their own for their animals; between 1969 and 1974, 68 such communal pastures comprising 28,000 hectares were organized.

Provisions for the latter, as previously noted, are meager, and what field staff does exist is hampered by a chronic lack of transportation. Credit is also insufficient. It is estimated that institutional credit reaches less than 10 percent of all settlers, most of it provided by the BNF through loans to settlers in specific colonies secured by IBR guarantee. A total of Gs. 9,041,830 was lent to farmers in 10 colonies in 1973, while seeds valued at Gs. 7 million were distributed among colonists the same year.

These vastly insufficient resources coupled with an almost complete lack of physical and social infrastructure[1/] have compelled settlers to remain at a subsistence-level agriculture. IBR for the past few years has been promoting the organization of Rural Welfare Committees as a way of approaching production, marketing, and community projects on a cooperative basis. More than 50 such committees now function on the Departments of San Pedro, Caaguazú, Itapúa, and Alto Paraná, and one in Juan E. O'Leary is being converted into a cooperative.

For more detailed information on IBR colonization programs, see section 5.e. Colonization.

e. Cooperatives

(1) General

Cooperatives in Paraguay are limited, for the most part, to credit union affiliates of the National Federation of Credit Union Cooperatives (CREDICOOP) and the marketing cooperative affiliates of the Unión Paraguaya de Cooperativas (UNIPACO)[2/] and to a number of independent, non-affiliated cooperatives, many of which are associated

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1/ A few examples: Land clearing is left to the individual settler who fells trees by hand and burns them, leaving logs, stumps and roots to decay and hamper cultivation. Most colony roads, badly aligned at the time of construction and ill-maintained since, are in poor condition, making marketing an even greater problem. Frequently, neither schools nor other types of community services are provided.

2/ In late August 1975, a new federation of agricultural production cooperatives (Federación de Cooperativas de Producción) was founded to function as a public relations and lobby organization and assist member cooperatives with technical advice, acquisition of machinery, production planning and training. Some initial funding for the new federation will be provided by the German-based Konrad Adenauer Foundation.

with foreign-origin or religiously based colonies--Japanese, European, Mennonite--in Paraguay.[1]

Cooperatives come under the authority of a new cooperative law, No. 349, passed by the Paraguayan Congress in December 1971 which for the first time permits the organization of other than solely agricultural production cooperatives. All centrals and cooperatives in Paraguay operate under the regulatory power of the Directorate of Cooperatives (DGC) of the Ministry of Agriculture. Paraguayan cooperative law provides that the DGC conduct, among other activities, cooperative promotion, organization training, and auditing; however, because of being understaffed and underfunded, the DGC actually does little in these areas. It works closely with only a few cooperatives; the majority handle their own organizational and administrative affairs. The DGC's role vis-a-vis most cooperatives is to grant the required legal charters, assist with training activities and supervise operations to assure compliance with the law, although the Directorate still lacks the knowledge and experience to carry out even these tasks in an adequate manner.

(2) CREDICOOP

Formed in October 1973 and legally chartered by Decree No. 6094 of May 22, 1974, CREDICOOP is a credit union central or federation which provides leadership and financial and technical assistance to the Paraguayan credit union movement.[2]

1/ There may be as many as 250 or 300 registered cooperatives but the large majority do not function as true business operations; many are bankrupt while others operate more as social purpose or tax privileged ventures. CAH-sponsored AUCAs (Associations of Agricultural Credit Users), the Rural Welfare Committees sponsored by IBR in its colonies, and the BNF/SEAG-sponsored producers' committees or associations can be considered at best pre-cooperatives (even that is arguable), the former having a stronger organizational base than the last two. The "marketing committees" sponsored by MAG are too informal and temporary in nature to be considered in even a pre-cooperative light.

2/ CREDICOOP emerged as a result of the GOP request for AID assistance in carrying out a program to develop rural credit unions jointly with MAG and the BNF. Upon completion of a pilot program in the community of Caraguatay, USAID signed a contract (1970-1977, funded at over $400,000) in February 1970 with Credit Union National Association (CUNA), Inc. under which the latter was to assist the GOP in organizing independent, profitable, and broad-based credit unions, primarily in rural areas, which were to be integrated eventually into a central. These credit unions are legally separate entities whose membership in CREDICOOP is voluntary.

It helps to promote and organize new credit unions, both urban and rural, trains managerial and administrative personnel; gives assistance in accounting and auditing; maintains bonding and delinquency control programs; and provides other services to member credit unions.

CREDICOOP administers a program of directed agricultural production credit (DAPC) which is intended to channel production credit into the hands of small farmers who cannot qualify for loans from either public or private agricultural lending sources. The majority of CREDICOOP affiliates were organized initially by and for nonfarmers, the latters' leadership resources used to create institutions which serve as intermediaries for channeling credit and technical assistance to farmers; nonfarmer members are benefitted in turn by access to a cooperative capital supply considerably increased by savings contributed by farmer members. Outside financing is required for the DAPC program to work since the demand for credit for production of crops occurs for all farmers at the same time and cannot be met initially by their own savings.

CREDICOOP is currently assisting 25 rural credit cooperatives both chartered and in formation--with a total of 6,830 members. In the 1974-1975 crop year CREDICOOP members financed around 7,400 hectares. Total loans of Gs. 179,029,000 were made to rural credit union members. Following is a break-down of agricultural loans made through June 1975:

Type of Loan	Loans	Amount (Gs.)
Annual Crops	4,442	109,517,000
Animals and Poultry	117	2,977,000
Implements and Machinery	590	9,256,000
	5,149	121,750,000

While the program is concentrating its efforts on the small farmer in the rural area, the urban sector member credit unions also receive a certain amount of assistance from CREDICOOP. In the long run, providing assistance to a larger group of member credit unions, both urban and rural, will result in more economical service to all members. The urban credit unions also help create a national awareness of the importance of credit unions, as well as offering the additional management talent and experience needed by all new credit unions. Urban member credit unions had over 5,000 members as of June 1975 and almost one-half million dollars in share capital and savings.

CREDICOOP has its office in Asunción, with a staff of 17, which includes an agronomist on loan from the Ministry of Agriculture, a cooperative promoter provided by MAG's Directorate of Cooperatives (DGC), and a credit advisor on loan from the BNF. Two USAID-funded CUNA advisors and five Peace Corps Volunteers also work with the program.

At present, CREDICOOP obtains the major portion of its financing from AID on a grant basis--$164,000 during CY 1975. However, grant financing will be phased out over the four years during which AID's $3.0 million loan to CREDICOOP is disbursed.[1/] Net interest income on the loan will provide between $150,000 and $210,000 a year in gross income to cover all expenses. Additional interest income is produced from share capital generated by requiring that shares in CREDICOOP be purchased equal to five percent of each loan. Per capita dues and a small fee based on total shares and savings paid by each affiliated union also contribute to CREDICOOP's financial resources.

The credit unions themselves are financed by income produced from their loans; all losses eventually are suffered by the members of the credit union, up to the limit of their shares.

To help new rural credit unions become established, CREDICOOP provides a revolving fund to finance equipment and managers' salaries. These loans must be repaid in full within five years, the funds then becoming available for relending to other credit unions. Only a few rural credit unions are operating at a profit and none are paying dividends on savings; all profits are going into reserves for bad loans, etc.

A distinctive characteristic of the CREDICOOP program is the technical assistance it provides as part of the implementation of the agricultural production credit program. Technical assistance is conducted at different levels by personnel appropriate to each, including the CREDICOOP extension supervisor, the SEAG extension agent, and the credit union field assistant (ayudante de campo). CREDICOOP's extension supervisor is an employee of the Ministry of Agriculture (MAG) who is assigned to CREDICOOP to coordinate the technical assistance needs of the credit unions with MAG's extension service and other MAG agencies. He also develops the technical assistance packages for crops and implementation instructions, advises the credit union field assistants on a regular basis, and coordinates field demonstration activities.

1/ In November 1975, the loan was suspended in order to permit a full review of its provisions before submitting it for final GOP approval.

The SEAG extension agent trains the field assistants, assists in supervising the demonstration plots sponsored by the credit union, visits farmers with special problems, conducts or attends field day activities, etc. The credit union field assistant is the farmer's primary contact with the credit union. He assists the farmer in developing his annual investment plan and thereafter visits the farmer to encourage him to follow the practices recommended by the credit union. Recently, credit unions have begun to use a more efficient group approach in providing technical assistance to small farmers.

The performance of both urban and rural credit unions in relation to growth of members, capital, loans and income has been promising. Credit unions have been instrumental in causing a significant proven improvement in yield for one crop--cotton--traditionally grown by the small farmer. The major weakness of both urban and rural credit unions has been low loan recuperation without justifiable causes. CREDICOOP has made major efforts in this area, and the credit unions are now calculating and reporting loan delinquencies. Some newer credit unions have been able to avoid a major problem in this area in a crop year of poor prices; one recuperated 98 percent of loans made.

Successful marketing of the small farmers' crops is of great importance to the success of CREDICOOP. The small farmer's major crops are export crops with prices determined mainly by world market prices and freight rates. During the 1974-1975 cotton crop cycle, CREDICOOP coordinated the sale of the small farmers' cotton through their credit unions. To do this, the central, with the help of an additional staff member, reached price, quantity, and delivery agreements, and collected from the final buyer on behalf of the participating credit unions. CREDICOOP's ability to act quickly to provide this coordination was of great benefit to the credit unions, some of which were able to sell Type 6 cotton for Gs. 32 per kilogram instead of at the posted price of Gs. 28.

During the 1974-1975 marketing season, CREDICOOP marketed 1,700 MT of cotton on behalf of its member cooperatives,[1] over Gs. 16 million of rice, and small amounts of other food crops, principally soybeans.

1/ Members' cotton production totaled 4,700 MT, but CREDICOOP could afford to purchase only 1,700 MT. The central is making an effort to secure capital in order to be able to buy a larger percentage of its members' production to assure loan repayment.

(3) UNIPACO

In December 1970, a national federation of agricultural marketing/services cooperatives, Unión Paraguaya de Cooperativas or UNIPACO, was established by 12 large-producer cooperatives. During its five years of existence, the national central, with 21 member cooperatives representing approximately 2,700 members, has engaged in the following activities: rental of grain drying, cleaning and storage facilities; marketing (including some contracted transportation) of cotton, soybeans, castor beans, tobacco, and a limited amount of rice and petitgrain; distribution of improved corn and sorghum hybrid seeds to member cooperatives; limited amounts of agricultural processing, principally cotton ginning and soybean extraction; and, in 1973, the sale of a small amount of farm supplies.

UNIPACO has also provided needed assistance in educating, organizing and supplying technical and financial assistance to new cooperatives and pre-cooperatives, and it has trained the management of several member cooperatives and nonaffiliated pre-cooperatives.

The central has functioned out of headquarters in Asunción, staffed by a manager and 11 others, assisted by a full-time AID-funded cooperative advisor from the Agricultural Cooperative Development International (ACDI) and a number of Peace Corps Volunteers (seven in 1975); the latter have worked mainly in the field with six small farmer pre-cooperatives in a pre-UNIPACO affiliation stage. A six-member Board of Directors has determined UNIPACO policies but has exercised only very limited supervision over their implementation.

Operating capital has been a serious constraint for UNIPACO since its founding. USAID has provided almost $500,000 in grant funds plus a small amount of PL 480, Title I funds which have been used to pay UNIPACO staff salaries, rent and other administrative costs, among other things. Other funds have been obtained from commercial banks (Gs. 60 million in 1974 which was turned over six times during the marketing cycle), these commercial loans being used to pay member cooperatives for goods delivered to UNIPACO, and from warehouse warrants.1/ In addition, CAH advanced Gs. 70 million to its agents during the 1974 cotton marketing season to purchase AUCA production for marketing by UNIPACO.

1/ Warrants are guarantees by private bonding companies against stored goods which are used to obtain credit; products which qualify for warehouse warrants include cotton, soybeans, castor beans, tobacco, rice, corn, petitgrain oil and mint oil.

During the 1974 marketing season, the central sold 7,000 MT of soybeans (30 percent produced by UNIPACO member cooperatives); 1,200 MT of tobacco (seven percent from UNIPACO affiliates); 607 MT of castor beans, entirely affiliate produced; and 4,600 MT of cotton (40 percent from AUCAs, 40 percent from CREDICOOP affiliated credit unions, five percent from member and 15 percent from nonmember cooperatives). UNIPACO nevertheless sustained marketing losses in both the 1974 and 1975 marketing years; its two profitable years--1972 and 1973--were years of rapidly increasing prices during which good profits were reported all around.

Although the provision of production inputs was to be an integral part of UNIPACO operations, farm supplies worth Gs. 2,300,000 were sold only for the 1973-1974 crop season, with CREDICOOP supplying credit and both it and UNIPACO providing technical assistance for the use of the inputs sold by UNIPACO.

During the 1974 crop season, 12 UNIPACO member cooperatives marketed crops on behalf of approximately 1,250 farmers, while six nonmember cooperatives participated in the central's marketing operations on behalf of 1,000 farmers. In addition, 12 CREDICOOP credit unions serving 1,700 farmers and approximately 110 AUCAs representing 3,000 farmers marketed crops through UNIPACO.

Despite some accomplishments, perhaps the most significant being UNIPACO's instrumental role in ensuring higher prices, the central has been plagued with serious problems--financial, organization, managerial, philosophical[1/]--to the point where in 1975 its supply and marketing operations are almost at a standstill, except for a limited amount of soybean marketing made possible by a Gs. 25 million loan from the Banco Exterior. As of this writing, the future of UNIPACO is under discussion. Should it be dissolved, however, it is anticipated that a new cooperative marketing mechanism will be created, designed to assist small farmers with their clearly demonstrated farm supply, processing and marketing needs. Only a large organization able to participate in volume marketing and farm supply sale operations can offer the competitive prices required to help increase the productivity, income, and quality of life of Paraguay's smaller producers.

1/ Although UNIPACO did not start off as a small-farmer organization, it had been thought to have been moving in that direction until a recent examination disclosed that only four of the 21 cooperatives affiliated with UNIPACO are composed of small farmers--producing cotton, tobacco, and soybeans--who appear genuinely interested in the services it could provide.

f. National Commodity Programs

Some of the most important planning work done by the Ministry of Agriculture in the past eight years has focused on individual crops. Starting with the National Wheat Program in 1967, there have been national programs in Tobacco (1967), cotton (1972) and soybeans (1973) and a one-year National Potato Program in 1974.[1/] Cotton, tobacco, and soybeans constitute Paraguay's major export crops.

Provision is made in each program for research, extension, credit, marketing, and a budget. The national programs produce a detailed paper setting forth participating public and private sector agencies, the financial requirements and available resources, marketing constraints and the measures needed to overcome or alleviate them, and research requirements; each paper serves as a work manual and planning document for that particular crop campaign.

Paraguay's national commodity programs follow like patterns. They serve as a device to aggregate past and current research efforts (carried out at IAN in Caacupé and CRIA at Capitán Miranda); recommended production practices (conveyed to farmers by SEAG agents); and production credit (primarily from the BNF and CAH). Funds also go to the National Seed Service to enable it to provide seeds of crops designated under national commodity programs to the Extension Service for distribution to producers.

Although most of the commodity programs have started out in a structured, well-organized fashion, they have tended after the standard three-year opening period, to evolve along more informal lines. A case in point is the National Wheat Program. Originally administered by a National Wheat Council, the program now appears to operate through various agencies without any central direction.

A brief summary of each national commodity program follows. For more detailed information on crops, see Part C of the assessment.

1/ The National Potato Program consisted largely of financing the importation of potato seeds from Argentina and distributing the seeds along with some technical assistance through SEAG and 4-C Club agents to potato growers. The latter marketed their crop through MAG's Marketing Directorate.

(1) Wheat. Wheat was the logical starting point for a national commodity program since it is the single foodstuff which is imported in substantial amounts; it constitutes a vital ingredient in the diet of many Paraguayans; and it can be grown in the winter in rotation with summer crops. The goal of the National Wheat Program is the gradual substitution of domestically produced wheat for imported wheat.

Research conducted at IAN and at the Capitán Miranda research center has resulted in a number of recommended wheat varieties: 281/60, Itapúa 1, 5, and 6, and Norteño. Under a five-year wheat research program (1975-1979) being sponsored by MAG with some technical assistance provided by Israel, new research efforts are underway to develop varieties better able to resist the diseases, principally of a fungus type, which are most responsible for limiting wheat production in Paraguay.

Information about new varieties, recommended cultivation practices and input combinations are provided to wheat producers by SEAG in cooperation with the BNF and CAH, the agencies which provide the major portion of available production credit. Between January 1973 and June 1974, for instance, the BNF through its Agricultural Enterprises Program loaned Gs. 171,118,680 in production credit to wheat growers (representing 40 percent of its crop financing portfolio for the period) and an indeterminate sum for machinery purchases.

Originally, the National Wheat Program was administered by a National Wheat Commission comprised of representatives from MAG, the Central Bank, BNF, STP, and IAN which was replaced by a smaller National Wheat Council in late 1967. The Council promoted, among other things, wheat cultivation on large farms through a program of special incentives. (The National Wheat Program, however, has also made specific efforts to increase the area of wheat cultivated by small farmers in most of the wheat producing regions.)[1/] As previously noted, the wheat program now operates virtually on its own, the Council being all but inoperative.

From 7,766 metric tons produced in the 1965-1967 period, wheat production increased to 54,800 MT in 1971, due largely to an

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1/ Foremost among wheat producing areas is the Misiones-Itapúa zone, followed by the Departments of Concepción, San Pedro, Paraguarí, Central, and Cordillera.

expansion, under the National Wheat Program, of the area planted.[1] Production fell the following year as a result of plant disease brought on by adverse climatic conditions; 1974 wheat production was 32,000 MT.

(2) Tobacco. Tobacco is, for the most part, a small farmer crop, 95 percent of which is exported. A National Tobacco Program (referred to as PRONATA, Programa Nacional de Tabaco) was initiated in 1967, funded at approximately Gs. 18,240,000 from that time to the present (1975).[2] It replaced the old National Tobacco Commission. PRONATA is administered by an Executive Committee composed of a MAG coordinator and representatives from the Ministries of Finance and of Industry and Commerce, the Central Bank, BNF, STP, Faculty of Agronomy of National University, OFAT,[3] and the Chamber of Exporters.

Under PRONATA's aegis, research work has been carried out in the following areas: introduction and trials of light and dark types of tobacco; experiments with sun-cured tobacco at IAN and in the main tobacco producing areas;[4] testing of varietal behavior in relation to different levels of fertilization, time and density of plantings, and application of insecticides to control virus infections. Cost/benefit analyses of alternative tobacco production techniques are also conducted.

1/ Wheat yields increased no more than seven percent between 1967 and 1974, remaining at about 920 kilograms per hectare.

2/ Ministry of Agriculture data show a steadily increasing PRONATA budget, starting at Gs. 1.43 million in 1967 and increasing to Gs. 3.78 million during 1974-1975.

3/ OFAT stands for Oficina Fiscalizadora de Algodón y Tabaco. It is attached to the Ministry of Agriculture, managed by a Director General who reports directly to the Minister. The Cotton and Tobacco Control Office is self-funded by means of a service fee charged for quality certification of exported cotton (Gs. 0.20 per kilogram of cotton delivered to cotton gins) and exported tobacco (Gs. 50 per bale of exported tobacco).

4/ The most important departments for production are Caaguazú, San Pedro, Cordillera, Caazapá, Alto Paraná and Paraguarí.

PRONATA marshalls the technical assistance resources of SEAG, BNF, CAH, IBR, and CREDICOOP while credit for tobacco production is provided mainly by the BNF, either to individual farmers or to groups of producers organized into cooperatives, AUCAs, committees or associations. Capital investments of over $9 million were made during the early years of the program for barn construction and the purchase of sprayers, plows, drags, oxen, oxcarts, etc. Through these multi-institutional efforts, Paraguayan farmers have begun to adopt a more advanced technology (increased use of improved seeds, phytosanitary products, and commercial string in curing) and to be made more aware of marketing factors including the importance of tobacco classification and the advantages to be gained from volume marketing.

Tobacco production has increased from 17,800 metric tons in 1969-1970 to an estimated 33,400 metric tons in 1973-1974. The area cultivated was expanded from 13,600 hectares in 1969-1970 to 24,900 hectares in 1973-1974, while yields increased 12 percent between the inception of PRONATA and the 1973-1974 crop year.

(3) Cotton. Cotton is produced mainly on small- and medium-sized farms with 70 percent of total cotton production exported. In 1972, a National Cotton Program was introduced, its governing council comprised of representatives from the BNF, Central Bank, the Ministries of Industry and Commerce and Finance, CAH, one representative from each cotton ginning plant, and a coordinator from the Ministry of Agriculture.

As in other national commodity programs, research is carried out at the National Agronomic Institute and the Capitán Miranda experiment station with field trials conducted in the principal cotton producing areas.[1/] Since 1967, a French technical mission from the Research Institute of Cotton and Exotic Fibers has been working with a counterpart team of Paraguayan technicians on the adaptation of higher disease (primarily Bacterioris) resistant varieties; their work has resulted in the successful introduction of two African varieties, Reba-B-50 and Reba-BTK-12. Current research efforts are focused on the development of higher yielding varieties with better quality fiber and demonstrated high resistance to local insect and pest attacks, and the study of different combinations of inputs--fertilizers, herbicides, pesticides--in relation to the most widely adopted of the two African varieties, Reba-B-50.

1/ Paraguarí, Caaguazú, Itapúa, Cordillera, San Pedro, Misiones, Concepción and Caazapá.

Information on the new varieties and on improved cultivation practices are carried to cotton producers by SEAG agents and by technicians from BNF and CAH while OFAT classifies, certifies, and distributes certified cotton seed to producers. The significant increases in cotton yields registered since the establishment of the National Cotton Program can be credited to the introduction of new varieties and to producer adoption of improved cultivation practices.

Cotton production has shown measurable increases in yields, volume, and area harvested over the past five years. Volume of production increased from 39,600 metric tons in the 1969-1970 crop year to approximately 90,500 metric tons in the 1973-1974 crop year and an estimated 100,000 metric tons in 1974-1975; the present National Cotton Program production goal for Paraguay is 100,000 metric tons. Area harvested has increased from 46,900 in the 1973-1974 crop year to an estimated 114,000 hectares in 1974-1975, while yields have increased 57 percent between 1965-1967 and 1973-1974.

It is estimated that investments in the neighborhood of Gs. 3,354,681,000 have been made in cotton under the National Cotton Program from 1972 to the present, financed by the BNF, CAH, and the cotton industry.

(4) Soybeans. Paraguay ranks fourth among soybean producers in South America, despite the fact that widespread cultivation did not really get underway until the early 1960's, with mechanized production introduced around 1968. A National Soybean Program began operating in 1972 funded at approximately Gs. 1.6 billion per year, the lion's share provided by the BNF, the balance by CAH. The Program has no formal institutional structure.

Research is carried out by IAN and the Capitán Miranda Research Center with the help of the OAS-funded Interamerican Institute of Agricultural Sciences (IICA) and two Brazilian advisors. Research efforts have concentrated on genetic selection, the testing of various combinations of fertilizers and cultivation practices, and determination of optimum planting density, seed treatment, and weed control measures.

Technical assistance is provided soybean cultivators[1/] by SEAG agents in coordination with research personnel and by technicians from BNF and CAH.

1/ Soybeans are grown by over 20,000 farmers on farms of all sizes in the following principal departments: Itapúa, Alto Paraná, Misiones, Amambay, Caaguazú, and San Pedro.

Production of soybeans has risen more rapidly than that of any other crop over the past five years, both in terms of volume and area harvested. From 18,600 metric tons produced in the 1966-1967 crop year, production increased to 51,838 metric tons in 1969-1970 and to an estimated 216,000 metric tons in 1975, coinciding with the production goal established by the National Soybean Program for that year. From 39,500 hectares in the 1969-1970 crop year, total area harvested in soybeans increased to about 137,300 hectares in 1973-1974 and to 160,000 hectares the following crop year.

g. Related Public Sector Institutions

(1) National Council for Economic Coordination

Created by Law No. 47 of November 25, 1948, the Council operates directly under the Presidency of the Republic and is one of the important policy making organizations within the Government. Specific functions include the revision of proposed laws on taxation, review and revision of the national budget and the public debt, and coordination of national financial policy with the economic development of the country. The Council advises on all economic, financial, or administrative questions raised by the President.

The President of the Republic is chairman of the Council and its members include representatives of all ministries and the private sector.

(2) Secretaría Técnica de Planificación, STP

The Technical Planning Secretariat was created in 1962 and is under the direct authority of the President of the Republic. It is jointly responsible with GOP ministries for the formulation of the country's economic and social development plans by sectors and regions. Its specific functions include economic analyses; evaluation of development efforts and formulation of plans and recommendations for Paraguay's development in general and for individual sectors and regions; and coordination of public and private sector projects and programs. The STP also evaluates resources available for development and recommends their distribution in coordination with international and bilateral technical and financial assistance programs, and it advises the National Council for Economic Coordination.

The Secretariat is headed by an Executive Secretary and is organized into divisions along largely sectoral lines: agriculture, forestry, industry, energy, tourism, and so on. Serving on STP's staff are 11 economists, three ingenieros agrónomos, an industrial chemist, population expert, lawyer, and sociologist. The UN and German Government both supply an advisor to the STP.

In June 1970, an Oficina Nacional de Proyectos (ONP) was created as a branch of the STP. The National Project Office identifies, selects, formulates and evaluates GOP investment projects based on priorities established in Paraguay's Economic and Social Development Plan prepared by the STP.

(3) Ministry of Industry and Commerce (MIC)

Established by Decree Law No. 13681 dated August 4, 1950, the Ministry's duties are to promote industrial production, regulate the marketing and distribution of commodities, and increase local and international business transactions. Paraguay's industrial sector is heavily dependent on agriculture as a source of raw material; for that reason there is close coordination between MIC and the Ministry of Agriculture in establishing minimum prices and/or export quotas for wheat, sugar cane, soybeans, etc.

(4) Servicio Nacional de Lucha contra la Fiebre Aftosa (SENALFA)

Created by Law No. 1267 of September 9, 1967, its main objective is to control foot-and-mouth disease in livestock. Eradication of the disease will greatly help expand the market for Paraguayan beef by making it eligible for importation into such countries as the United States and England. SENALFA is governed by a Board of Directors made up of representatives of MAG, Faculty of Veterinary Sciences, the Rural Association of Paraguay, and the Paraguayan Meat Corporation (COPACAR).

(5) Consejo Nacional de Progreso Social (CNPS)

The National Council for Social Progress is an interinstitutional organization created by Decree No. 24879 of March 3, 1967, to plan, orient and implement rural community development programs. The Council is composed of the Ministers of Agriculture and Livestock, Public Health, and Education, the President of IBR, and the Executive Secretary of the National Planning Secretariat (STP).

The biggest undertaking of CNPS has been the implementation of an integrated program of rural development in the Eje Norte de Colonización (see Section E.3.). Negotiations are currently underway with IBRD for a $15.8 million integrated rural development program to help small farmers in three public settlement colonies (Mallorquin, Repatriación, and General Stroessner) in the Eje Este by providing production credit, extension and marketing services, roads, schools, and health and community centers.

(6) Fondo Ganadero

The Livestock Fund was created by Decree Law No. 7383 of September 12, 1969, as a branch of the Central Bank of Paraguay for the exclusive purpose of administering funds derived from World Bank (IBRD) loans. It became a legally constituted organization by Law No. 189, June 10, 1970.

The Livestock Fund's main responsibilities are to provide financing and technical assistance for the development of ranches, to arrange for the importation and financing of equipment needed for livestock development in cooperation with private contractors, and to finance the implementation and administrative costs of livestock development projects.

The Livestock Fund began operating with funds originally made available under an IBRD loan and with 50 percent of the loan recuperated from the former Banco del Paraguay, as well as other GOP counterpart funds. Since then, it has continued with its lending program with the help of two additional IBRD loans (a fourth is soon to be made), repaid loans, and interest earned on loans to cattle producers. Since 1973, the Fund has also operated with funds made available by the Central Bank of Brazil earmarked for the purchase of breeding stock from Brazil.

The following chart provides information on the amounts loaned by the Livestock Fund in the last four years:

Year	Amount Loaned (In millions of Gs.)
1972	548
1973	766
1974	659
1975*	416

Source: Banco Central del Paraguay, Boletín Estadístico Mensual #205, June, 1975

* As of June, 1975

Traditionally, the Livestock Fund's program has been oriented to larger producers in order to obtain the greatest production increases in the shortest time. However, it has recently broadened its scope with the intent of becoming a more integrated livestock program. Objectives for the fourth IBRD loan project include more emphasis on assisting medium- and small-scale producers, promoting the creation of new ranches, and extending Fund experience as well as services to sheep, hog, poultry and dairy producers.

(7) Programa de Alimentación y Educación Nutricional (PAEN)

The Food and Education Program is a triministerial program established in 1959 for the purpose of improving the nutritional standards of Paraguay's rural population. The program is managed by a central coordinating committee comprised of representatives of MAG, the Ministry of Public Health, and the Ministry of Education.

Through rural schools, health centers and their mothers' clubs, and 4-C clubs, PAEN staff members conduct courses and demonstrations in the production and nutritional preparation of fruits, vegetables, and animal protein sources--chickens, rabbits, fish, hogs, and, beginning in 1974, methods for using soybeans. (PAEN also sponsored a television program on soybean uses for Asunción audiences in 1974.) Instruction in home improvement is also given, including construction of kitchens with iron-top brick stoves and shelves for storage and a separate eating area. Fruits and vegetables grown in school gardens are used for demonstration purposes. PAEN also works with the UN's World Food Program Project No. 633 in Zone C of the Department of Cordillera, just east of Asunción. Under the project, which began in 1971, U.S. PL 480 Title II food commodities (nonfat dry milk, oil and flour[1]) and powdered eggs are distributed to pregnant and lactating women and to preschool children, and fruit, vegetable, and animal protein production and preparation are taught by PAEN staff; courses and demonstrations were given in 74 school in Zone C during the 1974 school year.

h. Related Private Sector Organizations

(1) Asociación Rural del Paraguay (ARP)

The Rural Association is an organization of ranchers in Paraguay which serves as the main spokesman and lobbyist for

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1/ The powdered milk is distributed as is; the flour and oil are used by PAEN personnel to make galletas which are then distributed to project participants.

the livestock industry, primarily on issues of government policy. The ARP also supports the organization of colonies and cooperatives and promotes new markets, domestic and foreign, on behalf of its members. Paraguay's annual livestock exposition, during which animals of superior breeding stock are auctioned, is sponsored by the ARP at its exposition grounds near Roque Alonso. Rural Association members are in the vanguard of Paraguay's livestock producers and as such are among the early adopters of new production practices.

In addition to the parent organization located in Asunción, the ARP has twelve regional organizations located in the following zones: Concepción, Pilar, Cordillera, Central Chaco, Teniente Esteban Martinez, Olimpo, Misiones, San Pedro, Chaco Sur, Guairá, Paraguarí and General Bruguez.

(2) Sociedad Nacional de Agricultura (SNA)

The National Society of Agriculture is an association representing all the farmers in Paraguay for the purpose of protecting the interests of farmers and stimulating the development of agriculture. It serves as the farming community's voice on issues of government policy and operations.

The SNA has organized two national conferences, attended by representatives from every field of activity related to agriculture and by farmers at all levels of operation and development. The first National Conference of Agriculture was held in October 1968, the second in May 1975.

The SNA has a monthly periodical "El Agricultor" which features articles on agricultural policies and issues of general interest to the farmer.

(3) Compañía Paraguaya de Desarrollo S.A. (COMDESA)

COMDESA is a private development finance institution organized to channel both local and external resources to the development of agricultural and industrial enterprises for which regular public or private bank financing at a reasonable cost is not readily available.

COMDESA has been operating since the end of 1970 with funds from shareholders and with loans from the Paraguayan Government, BNF, USAID, and an international financing corporation (ADELA).

Administering the intermediate credit institution is a 20-member Board of Directors, drawn from the banking and business community, and a six-man Executive Committee which serves as a loan committee, meeting several times each week on bank business. The number of stockholders has grown from 150 to over 200. The financiera's general manager, a Paraguayan with prior experience with the IBRD and a full year's experience in an executive capacity with COMDESA before assuming his new position at the close of 1971, is assisted by a five-man professional staff and seven others. To help supervise agricultural and livestock loans, COMDESA has on its staff two graduate agronomists and occasionally contracts with others for assistance.

An important feature of COMDESA operations is the provision of funds in combination with entrepreneurial and technical assistance so sorely needed by new and expanding Paraguayan enterprises. It is standard practice for COMDESA to include in major loans a component which corresponds to the cost of technical assistance received by the borrower; it uses over a dozen consultants to appraise applicants' collateral and to determine the feasibility of their proposed projects, thereby helping to assure sound investment decisions.

As of September 1975, COMDESA had made 268 loans worth $10.5 million. It has provided loans for a wide range of activities in several different sectors: agro-industrial operations, including meat packing, hog and poultry raising, lumber, and others; manufacturing; agriculture production loans to finance cattle breeding operations, farm produce, feed lots, and cattle fattening; transportation; tourism, primarily for hotel-motel construction, restaurants and travel agencies; and pre-investment studies. Following is a breakdown of loans granted by COMDESA in 1974:

Sector	No. of Loans	Amount (In 000 Gs.)
Agroindustry	12	68,541
Manufacturing	14	79,605
Livestock	16	91,573
Agriculture	8	15,528
Poultry	3	7,050
Transportation	3	13,800
Tourism	6	22,000
Financial Support to Private Industries	1	12,500
	63	310,597

COMDESA is now Paraguay's principal private source of medium- and long-term venture financing, helping to fill the gap caused by the country's severely limited money and capital market. Although the financiera has not been encouraged to take as fully an active role in agriculture and livestock investment projects as it might have (to avoid competing with BNF and PIDAP credit programs), a third USAID loan[1/] to COMDESA is currently being prepared which would be earmarked specifically for the development of small farmer infrastructure. Loan funds would be used to establish agro-businesses which use small farmer products or manufacture small farmer inputs, the goal being to increase both the market for small farmer products and the number of suppliers of inputs required for small farm production. Eventually, a local market situation should emerge in which small farmers sell outputs and purchase inputs at prices that reflect an effective and efficient linkage between the local, national, and international markets and thus a closer relationship between the prices in each market. Better output-input prices would result in increased income for those small farmers serviced by the expanded agro-business infrastructure.

3. Development Programs

a. Integrated Agriculture Development Project, PIDAP (BID)

With BID financing, the Ministry of Agriculture and Livestock (MAG) initiated in 1971 the Integrated Agriculture Development Project with the long-term objectives of increasing the production and productivity of Paraguay's agricultural sector. The project calls for the implementation of an integrated development plan encompassing a coordinated and simultaneous set of actions of key public organizations related to the sector as well as the upgrading of basic agricultural support services. The project is mainly designed to benefit small- and medium-size farmers and is oriented toward increasing the production of priority agriculture and livestock commodities. Comprising the program are four subprojects--in research and extension, marketing, agricultural education, and agricultural credit--each of which provides benefits to small farmers.

1/ The first loan was for $2.6 million signed in August 1970, followed by a $3 million loan signed in August 1973; the latter's chief objectives were to increase COMDESA's investable capital particularly for export-oriented projects, and to improve the institution's operational capacity to meet the demonstrated new demand for its financial services.

The total cost of the project is $21.7 million with BID financing $14.8 million of the total cost, the balance of $6.9 million financed with GOP counterpart funds.

The following chart gives a financial breakdown of the PIDAP program:

Name of Subproject	BID Loan 295 SF/PR	Local Support (000 $)	Total
(1) Agricultural Technification			
Agricultural Research	860	390	1,309
Livestock Research (PRONIEGA)	290	150	537
Agricultural Extension	514	546	1,087
Seed Service	650	350	1,031
Livestock (purchase of breeding animals)	416	34	484
Financial Costs	-	180	-
Subproject Total	2,730	1,650	4,380
(2) Marketing (Phase 1)	1,970	405	2,375
(3) Agricultural Education	2,100	1,230	3,330
(4) Agricultural Credit (BNF)	8,000	3,900	11,615
Loan Total	14,800	6,900	21,700

From the beginning, the project has concentrated its efforts on upgrading the technical efficiency of MAG as well as on expanding its technical influence. The Ministry is the implementing agent for three of the PIDAP subprojects while the fourth, in agricultural credit, is implemented by the BNF. PIDAP builds on previous MAG and BNF programs, redirecting them where needed in order to effectively reach the target group of small- and medium-size farmers and expanding where necessary the physical facilities, staff, and operations of the two implementing institutions.1/

The four PIDAP subprojects are summarized briefly below:

1/ Perhaps the most serious criticism of the PIDAP loan has been that it failed to make adequate provision of technical assistance on behalf of the program. It has relied almost entirely on existing institutions and on the technical assistance being provided them by other donors including the UN, OAS/IICA, AID and the German Government.

(1) Improved Agricultural Technology

This subproject is designed to complement the PIDAP credit subproject channeled through BNF by upgrading the technology available to small- and medium-size producers. The subproject operates in four main areas--agriculture and livestock research; agricultural extension; production, processing and distribution of improved seeds; and production and sale of livestock breeders--financing new or improved facilities and the quantitative and qualitative expansion of staffs at the principal institutions operating in these four fields. These institutions include IAN (National Agronomic Institute) at Caacupé, PRONIEGA, the Capitán Miranda Experiment Station, Chaco Livestock Experiment Station, Barrerito Ranch and Experiment Station, Artificial Insemination Center, SEAG, and SENASE (National Seed Service).

Variously, laboratory facilities have been built or upgraded; equipment, office furniture, machinery, and vehicles provided; animals purchased for research purposes; a new seed processing plant constructed and breeding bulls imported for the purpose of producing improved bulls for sale to small livestock operators. At the same time, staff capabilities at the target institutions have been upgraded through the provision of scholarships and training programs.

The subproject is administered by MAG's Directorate of Agricultural Research and Extension.

(2) Marketing

Being implemented by MAG's Directorate of Marketing and Agriculture Economics, the subproject in its first stage calls for the creation of a network of grain storage silos with a total capacity of 14,000 metric tons. Storage facilities either in operation or close to being so, include those located at Pirapó (2,653 MT), La Paz (2,653 MT), Apere'a (2,002 MT), Encarnación (1,600 MT), San Lorenzo (800 MT), San Ignacio (4,169 MT), and Campo 9 (2,653 MT).

Also called for under the marketing subproject is the creation or strengthening of institutional and financial services to promote exports. This involves improving the organization and operations of the Directorate of Marketing; establishing a price stabilization system, taking into consideration Paraguay's comparative advantage in several commodities; setting up a marketing fund and a system of warehouse certificates; and establishing quality standards for grading products destined for the export market. The work is being accomplished with the assistance of a four-man team from the International Development Foundation, a U.S. consulting firm specializing in agricultural marketing and rural development.

The second phase of the subproject is still in the planning process.

(3) Agricultural Education

This subproject is being implemented by MAG's Directorate of Agricultural Education. Its main objective is to upgrade the agricultural education system of the country in order to meet the demand for qualified agricultural manpower. This is being achieved primarily through upgrading the Agricultural Education Directorate which has responsibility for orienting, directing and supervising agriculture education; training personnel for that purpose; curriculum improvement; construction of an agriculture school in Puerto Presidente Stroessner; building improvements and equipment in the regional agricultural schools at Caacupé, Concepción and San Juan, and at the Carlos Pfannl Institute; and holding regular and in-service training programs.

(4) Agricultural Credit

Under this subproject, BID is providing $8 million in agricultural credit to the BNF in order to augment and strengthen its Agricultural Promotion Program, one of the three principal programs administered by the Bank's Agriculture and Livestock Department. The program's chief objective is to provide a package of credit and technical assistance to the small- and medium-size rural producer either on an individual basis or through some sort of cooperative or producer association. Loans are also made directly to cooperatives under the subproject for the purpose of improving their services and facilities. (See section 2.b. for more detailed information on the BNF's Agricultural Promotion Program.)

b. Small Farmer Development Loan--AID Loan No. 526-T-027

The goal of AID's $4.7 million Small Farmer Development Loan is to increase the net income, productivity, and nutrition of Paraguayan farmers who cultivate 20 hectares or less by helping to institutionalize a growing cooperative infrastructure which includes credit unions, on the one hand, and marketing /services cooperatives, on the other.

Loan funds would be used to (a) provide technical assistance to the small farmer to transmit to him new farming technology and introduce him to the grading and classifying of his production;

(b) construct facilities (grain drying, storage, and exporting facilities and a feed mill) required to market small farmers' crops and to provide them with farminputs; (c) provide credit[1] through a program of directed agricultural credit; and (d) working capital to a marketing central to enable it to purchase and market small farmer crops.

As originally drawn, the loan was to be channeled through two private organizations, CREDICOOP and UNIPACO (see foregoing sections (2) and (3) of E.2.e.). However, the readiness of these two institutions as the delivery mechanisms for the proposed $13 million project[2] is currently under review.

c. Small Farmer Credit and Rural Development Project (IBRD)

In October 1974, the Paraguayan Government signed an $11 million loan with the International Development Association (IDA/IBRD) to assist small farmers in three public settlement colonies--Mallorquin (including O'Leary), Repatriación, and General Stroessner (formerly Pastoreo)--in Paraguay's Eastern Region. Loan funds are being used to provide farm credit,[3] technical assistance and rural development infrastructure--roads (essential to improved marketing), schools, and health and community centers. Approximately 2,000 small farmers (representing 40 percent of all farmers in the three target colonies) will benefit from the loan program while the rural development investments will benefit about 7,000 families comprising 42,000 people.

1/ Credit will be made available to small farmers through their credit unions, through BNF branch offices, or in the form of physical inputs, whichever is most appropriate. Currently, the BNF provides credit to credit unions after approving the latter's global investment plans; these global plans represent the aggregation of individual farmer-member investment plans for a given crop year.

2/ Total project funds would be provided as follows: AID--$5.9 million ($4.7 million in loan funds, $1.2 million in grant funds); host country--$7.07 million (GOP--$2.7 million; CREDICOOP system--$2.09 million; UNIPACO system--$2.3 million).

3/ Project farmers, each with from 10 to 20 hectares of land, will receive both long-term investment credit and short-term credit to cover working capital costs. Crops grown by the colonists are mainly corn, cassava, cotton, soybeans, tobacco and vegetables; cattle and hogs are also raised.

The proposed integrated development scheme is to finance the following basic infrastructure:

(1) Construction, furnishing and equipping of 26 primary schools (an estimated total of 102 classrooms).

(2) Construction, furnishing, and equipping of two health centers, and equipping of the health center at Mallorquin.

(3) Construction, furnishing, and equipping of three community centers.

(4) Construction of 60 kilometers of all-weather roads.

(5) Construction of 250 kilometers of earth roads (includes purchase of an earth moving unit and construction of bridges and culverts).

The project is being implemented on a multi-agency basis under the overall coordination of the National Council for Social Progress (CNPS), an interministerial organization with experience in integrated rural development programs in public colonies (see 3.e. Eje Norte Project). Roads and community centers will be built by the Ministry of Public Works, schools by the Ministry of Education, and health centers by the Ministry of Public Health while extension will be the responsibility of the Ministry of Agriculture, land tenure matters of the IBR, and credit of the BNF.

Three UNDP-financed experts in credit, marketing, and agronomy are providing technical assistance to MAG, IBR, and BNF to train, coordinate, and supervise the field work of technicians from these institutions. (Loan funds will finance 50 four-wheel drive vehicles for use of technicians assigned to the tri-colony area.) The agronomist and the marketing specialist will guide the activities of MAG extension agents, particularly in the preparation of farm development plans for those seeking investment credit, and in the promotion of farmers' cooperatives for supply of inputs and the marketing of produce. The credit advisor will give technical guidance to BNF branch managers and agents, especially in the appraisal, supervision and recovery of loans to be made by the BNF with project funds.

The IBRD project proposes to redress the long neglected needs of three of Paraguay's colonies[1] and to provide guidelines and set a pattern which could be repeated at a later date in many of the estimated 400 or more colonies, both public and private, which are in need of similar technical and financial assistance.

Total cost of the three-year project is estimated to be $15.8 million, financed as follows: IDA--$11 million; GOP--$3.9 million; and subborrowers--$0.9 million.

d. Other External Credits (Administered by the BNF)

(1) AID Loan No. 526-L-012, $3 million, September 1964, to provide credit to middle-income farmers, dairymen and lumbermen.

(2) AID Loan No. 526-L-012(A), $1 million, October 1968, to provide credit as above and to commercial farmers.

(3) AID Loan No. 526-L-012(B), $5 million, September 1969, for credit to medium-size farmers, commercial farmers, cooperatives, colonies, and producers' associations.[2]

(4) BID Loan No. 49/TF-PR, $2.9 million, February 1963, to provide credit to Paraguay's small- and medium-size agricultural producers under the BNF's Agriculture Promotion Program (PPA).

(5) BID Loan No. 119/SF-PR, $6 million, April 1967, for credit to small- and medium-size farmers and to small livestock producers under the BNF's PPA.

(6) Eximbank Loan No. 2634, $3 million, August 1969, to provide credit to farmers for the purchase of U.S. origin irrigation systems, silos, and other storage and related facilities under the BNF's Agricultural Enterprises Program.

1/ As noted in the section on the IBR, the institute has undertaken a massive colonization program over the past decade devoted almost entirely, however, to land settlement per se with very little provided in the way of even the most basic physical and social infrastructure and financial and technical support. As a consequence, development of both farms and settlement areas has been left largely to the colonists themselves. The result has been a proliferation of subsistence farming and a generally low standard of living among settlers.

2/ Loan funds have been used principally for the importation of fertilizers, insecticides, and machinery, approximately 23 percent of the total in support of the GOP's national programs to increase production of wheat, soybeans, and rice. Approximately 25,000 to 30,000

(7) Argentina (Banco Nación) (No loan number), $7 million, February 1972, to provide credit to small- and medium-size producers (farmers, livestockmen, dairymen) for the purchase from Argentina of metal silos, water pumps and tanks, machinery, and other agricultural equipment, and breeding cattle.

(8) Brazil (Banco do Brasil) (No loan number), $10 million, July 1972, to provide credit to small- and medium-size producers for the purchase from Brazil of machinery (planters, cultivators, sprayers, harvesters, silos, tank trunks, wagons, agroindustrial machinery, and production inputs (fertilizers, pesticides, veterinary products, certified seeds, and other items).

(9) World Bank Loan No. 509/P.A., $6.2 million, September 1974, to provide production credit to small farmers under the BNF's Agriculture Promotion Program.

Currently under negotiation is a new $6 million loan from BID to finance additional agricultural capital investments.

Note: Items (1), (2), (3), (6), (7), and (8), above, represent external credits administered by the BNF's Agriculture and Livestock Department's Agricultural Enterprises Program, while items (4), (5), (9) and BID's PIDAP loan (Loan No. 295/SF-PR) are channeled through the Department's Agriculture Promotion Program.

e. Eje Norte Project

The Eje Norte Project is a five-year integrated rural development program involving 23 IBR colonies (plus the old town of San Estanislao) with 47,000 inhabitants and about 7,000 farm units averaging 20 hectares of land per unit. The project area includes all settlement colonies on both sides of the Coronel Oviedo-Concepción road beginning at the southern border of the Department of San Pedro and continuing north to the Jejui River, an area comprising 178,000 hectares.1/

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tons of grain storage and drying capacity have been financed with the loan funds.

1/ "Northern project" colonies include Liberación, Cocueré, Yurujhei, Lisiados de la Guerra del Chaco, Industrial-Cué, Coé Poti, La Niña, Ñandeyara, Mbareté, Aquidabán-Nigui, Yuaijhu, and Repatriados del Norte. "Southern project" colonies include Almeida-cué, Santa Teresa, San Francisco, Defensores del Chaco, 25 de Diciembre, Tuyango, Vaca Jhú, Navidad, Apepú, and Costa Pucú.

Begun in 1972, the "Integrated Rural Development Program--Eje Norte de Colonización" has as its chief objective the establishment of well organized rural communities emphasizing social and community development.[1] The project (a) identifies and accelerates necessary socio-economic changes in the rural population; (b) promotes the organized, permanent participation of rural inhabitants in their own manner and standard of living; and (c) identifies those factors which hinder concerted GOP and community action.

The project is sponsored and coordinated by the Consejo Nacional de Progreso Social (CNPS)[2] with assistance from UNDP and UN Special Agencies and is implemented by a host of GOP agencies including the Ministries of Agriculture and Livestock, Education, Justice and Labor, Public Works, Public Health, IBR, Programa de Alimentación y Educación Nutricional (PAEN), CAH, Dirección de Juntas Viales, and the BNF. It is organized into the following subprojects:

(1) Food Assistance. Under this activity, administered by IBR with assistance from the FAO World Food Program, colony settlers in the project area receive food rations to carry them during the first two years of settlement.

(2) Home Economics. This activity is aimed at assisting the rural family to improve its nutritional standards using available resources. Simultaneously, efforts are being made to introduce and increase the production of new and better sources of protein, the food element in which the project population is most deficient.

(3) Health. The Ministry of Public Health provides basic services and treats common diseases among colonists under this activity.

1/ The program's concentration on social and community development without a companion effort to construct roads and finance on-farm investment plus the extensive size of the project area have been cited as reasons for the as-yet limited development results of the project.

2/ The National Council for Social Progress (CNPS) is an interinstitutional organization created by Decree No. 24879 of March 3, 1967 to plan, orient and implement rural community development programs. Members of the Council are the Minister of Agriculture and Livestock, the Minister of Public Health, the Minister of Education, IBR's President, and the Executive Secretary of the National Planning Secretariat (STP).

(4) Education. The Ministry of Education has financed school construction, teacher salaries, and training programs. Emphasis has been given also to vocational education programs which have included courses in carpentry, electricity, and the training of 20 teachers in industrial arts.

(5) Agriculture. The subproject in agriculture is implemented jointly by MAG, CAH, PNF, IBR, and PAEN. It concentrates on the production of commodities best suited to the project area and most appropriate to the level of technology and marketing possibilities of the colonies' farmers. Cash crops produced include tobacco, sour orange, castor beans, cotton, soybeans, corn and cassava--the last three also being important ingredients in the family diet. Beans, peanuts, and sweet potatoes have also been introduced as components in the family diet. PAEN's primary role in the subproject is to advise on the production of commodities for home consumption and on their nutritious preparation.

The following chart provides a summary of project financing on a subproject basis by source of financing:

Sources of Financing
(In guaranies)

Subproject	Internal		External	
	Government	Community	UNICEF, PMA PNUD, OIT	Total
Home Economics	1,427,828	7,159,611	867,637	9,455,076
Health	17,922,200	2,000,000	8,212,580	28,134,780
Education	9,000,000	1,488,800	1,260,000	11,748,800
Agriculture Production	72,699,000*	99,250,000	--	171,949,000
Food Assistance	1,324,100	422,800	10,488,000	12,234,900
Land Surveying, titles, settlement, etc.	288,000	--	--	288,000
Vocational Education	3,000,000	2,728,000	8,450,000	14,178,000
TOTALS	105,661,128	113,049,211	29,278,217	247,988,556

* Includes all types of credit assistance received by colony settlers that originated from different government organizations; i.e., BNF, IBR, CAH, MAG.

4. External Technical Assistance

a. Overview

At the present time, technical assistance to Paraguay's agriculture/rural development sector is being provided by three international organizations and eight bilateral country programs which collectively sponsor approximately 80 resident foreign technicians as well as an additional number of short-term technicians in most of the basic agricultural fields. Approximately twice as many technicians are funded under bilateral agreements than are provided by international organizations. The former tend to be more engaged in projects with a specific geographical orientation[1/] or a functional orientation such as agricultural engineering and mechanics and the production of crops (fruits, vegetables, silkworms, sugar cane, cereals, and pastures), than those from international organizations who are more involved in broad national programs including agricultural extension, marketing, planning and research. Approximately 80 percent, however, of all externally financed foreign technicians now in Paraguay are involved in projects or programs designed to have a global impact on Paraguayan agriculture.

Current external technical assistance efforts in Paraguay's agriculture sector comprise a wide range of agriculture and rural development activities which, in the aggregate, tend to be extensive rather than intensive. An average of three foreign technicians work in each of 25 categories of agricultural technical assistance under one of the following institutional arrangements:

1/ Perhaps the best example of technicians working on geographically specific projects are those, often German or Japanese, assigned to help develop a specific colonia or colony cooperative group. The colonies are comprised of farmers who have the use of, or own, an average of 20 hectares each, and who utilize a cooperative system for purchasing inputs and marketing farm outputs. Some also process certain of their products in more marketable finished or semi-finished form; e.g., cheese and tung oil. In a few cases, colonies influence the sector in a wider sense. One of the Japanese colonies, for instance, has a crop research associated with it which works in cooperation with MAG; information generated by the station's research work is made available to small farmers in Paraguay's entire Eastern Region through MAG and other extension apparatus.

International Organizations

(1) Multi-country program with headquarters in Asunción; e.g., the OAS' Pilcomayo Project.

(2) In-country (Paraguay) program with a global focus, based in Asunción, working with GOP institutions such as MAG or the BNF; e.g., BID team advising the Department of Marketing and Agricultural Economics on national agricultural marketing policies and programs.

(3) Regional Paraguayan development program; e.g., UN/FAO project to assist in the development of fruit and vegetable production in the north central region (Eje Norte) of Paraguay.

Bilateral Country Programs

(1) Technical assistance provided to a GOP agency; e.g., AID's project to assist in the development of the National Extension Service (SEAG) of MAG.

(2) Technical assistance directed to a specific geographical region (none at present).

(3) Technical assistance provided to an educational or research facility or to a colony; e.g., Great Britain's project with MAG's Animal Diagnostic Laboratory, and Germany's project with Cooperativa Colonias Unidas. (See Table E-5.)

Of the agricultural subsector categories currently being provided with external technical assistance, seven are assisted predominantly by international organizations, 16 under individual country programs, while two categories receive equal amounts of assistance from international and national donors.

--International organizations provide assistance in:

Agricultural Extension
Agricultural Marketing
Agricultural Planning and Research
Agricultural Systems: Planning and Technology
Communications and Audiovisual Methods
Grain Storage and Movement
Seed Production and Multiplication

TABLE E-5

TECHNICAL ASSISTANCE TO PARAGUAYAN AGRICULTURE BY TYPE OF PROGRAM *

Type of Program	Donor	No. of Technicians	Type of Project
A. Multi-country Program with Headquarters in Asunción	OAS	1	Pilcomayo project to develop Paraguayan-Bolivian-Argentine river basin area (agricultural economics)
B. National Program with Global Focus	BID	8	1 - agricultural marketing and policy (MAG) 1 - grain handling (MAG) 1 - agricultural research (MAG) 1 - planning systems (marketing-MAG) 1 - agricultural planning for Itaipú (STP) 3 - agricultural specialists (BID headquarters)
	UNDP	3	1 - marketing and farmer organizations) Development of 1 - extension) small Ag. Enter- 1 - agricultural credit) prises Project) (MAG, IBR & BNF)
	UN/FAO	10	4 - forestry (Servicio Forestal Nacional) 1 - agricultural credit and cooperatives 5 - agricultural extension
	OAS/IICA	3	1 - agricultural extension) (MAG, STP, IBR, BNF, 2 - agricultural economics) FIA, FV)
	France	1	cotton (MAG)
	Israel	1	wheat (MAG)

* Includes only long-term (minimum one year) projects and technicians.

TABLE E-5 (Continued)

Type of Program	Donor	No. of Technicians	Type of Project
	United States	9	2 - livestock (MAG, FAV) 2 - credit unions (CREDICOOP) 2 - cooperatives (UNIPACO) 1 - farm management (MAG) 2 - agricultural specialists (AID headquarters)
C. Regional (Paraguay) Program	FAO	1	fruit and vegetable production in Eje Norte
D. Educational or Research Program	China	8	3 - swine production (CREA-Villarrica) 5 - pineapple, garlic, onion, sugarcane, grains (IAN)
	OAS	1	food technology (INTN)
	Great Britain	4	2 - livestock disease research (MAG) 1 - leaf cutting ant control (MAG) 1 - essential oils research and production (INTN)
	Switzerland	8	3 - cooperative training (Pastoreo School) 3 - forestry (Alto Paraná Forestry School) 2 - agricultural mechanics training (Caacupé)
	United States	1	soils (IAN)
E. Colony or Cooperative Development Program	Germany	7	4 - Coop. Colonias Unidas (livestock, agronomy, agricultural economics, veterinary medicine) 1 - Coop. Virgen del Rosario 1 - Coop. Agrícola Paraguaya-Alemana 1 - Colonia Nueva Germania
	Japan	13	7 - Colonia Iguazú (soils, sericulture, grass and cereals, horticulture) 1 - Colonia Alto Paraná (cereals and grass) 1 - Colonia Fram (cereals and grass) 4 - agricultural economics, engineering, crop production (grass, cereals) from Asunción, backstop Japanese colonists
	Switzerland	1	Coop. Minga Guazú Ltda. (agronomy)

--Bilateral country programs provide assistance in:

Agricultural Administration and Rural Development
Agricultural Cooperatives
Agricultural Crop Production (cereals, pastures, seeds, etc., other than fruits and vegetables)
Agricultural Economics and Statistics
Agricultural Education and Vocational Training
Agricultural Engineering and Mechanics
Agricultural Production (fruits, vegetables, sugar cane)
Agricultural Research and Extension (livestock, dairy, beef)
Animal Production (small animals: swine, poultry, etc.)
Essential Oils Improvement

--Both international and national donors provide assistance in:

Agricultural Credit and Credit Unions
Farm Management/Administration

Coordination among donors is effected through a working committee composed of representatives from most donor organizations, which meets bimonthly, chaired by each donor in turn.[1] It was initiated in 1975 at the behest of USAID (a) to elicit support for USAID's small farmer subsector assessment as a way of ensuring that all required data and other useful information would be forthcoming as needed, and (b) to institutionalize the practice of donor coordination by means of a regularized exchange of ideas and information for the purpose of improving project and program planning and implementation by external donors in the agriculture sector.

In 1971, a National Committee for Coordination of External Technical Assistance was established by the GOP, its members the Executive Secretary of the National Planning Office (STP), the Sub-Secretary for Foreign Affairs, and the Sub-Secretary from the Ministry of Finance. Its stated purpose is to work closely with the STP in approving, monitoring, and evaluating foreign technical assistance and in coordinating GOP program and project contributions.

There follows a brief summary of each technical assistance program in the agriculture sector funded by an external donor.

1/ Previously, a committee formed in the latter part of 1971 and comprised of representatives from OAS, BID, FAO and USAID met on a monthly basis to coordinate external assistance, particularly vis-a-vis the PIDAP program.

b. International Organizations

(1) UNDP/FAO. There are four main UN projects in agriculture:

(a) Forestry Development Program. Under this project, the UN is assisting the newly constituted National Forestry Service to organize itself, train staff, and develop its operational capabilities. Assistance is also given jointly with the Swiss technical mission to a forestry training program at the secondary and worker level, and, in coordination with the Cadastral Survey Project, the FAO team is helping to develop a public registry of privately owned forestry lands. Commercial aspects of the forestry program include assistance in helping to plan and initiate a national reforestation program with industrial potential (in coordination with BID); helping plan and administer the removal of trees for processing from the Itaipú dam area; and helping the National Institute of Technology and Standards and CEPEX (Paraguayan Export Center) to promote the commercialization of little known forest species. The UN funds four advisors, participant training, and commodities under the project.

(b) Agricultural Extension and Credit Assistance to Small- and Medium-Size Producers. Through this project, the UN/FAO is working primarily with SEAG and the BNF to strengthen them institutionally as a means of providing improved financial and technical assistance to Paraguay's small- and medium-size producers. In-country and external training of SEAG and BNF personnel (particularly BNF technicians who provide backstopping to the Bank's credit operations in rural areas) is sponsored, some of the latter under the integrated agricultural and rural development program of the National Training Center.

The project seeks also to improve coordination between the Extension Service and the BNF in order to upgrade and expand the package of technical, financial, and social assistance being delivered to the target group. The project also assists in organizing and training target group producers/borrowers in order to achieve more efficient use of credit and, at the same time, better utilization of existing agricultural technologies.

(c) Development of Fruit and Vegetable Production in the Eje Norte. The UN and its specialized agencies are assisting the GOP-sponsored Integrated Rural Development Program in the Eje Norte or northern axis colonization area (see 3.e. Eje Norte Project) by providing technical assistance in family fruit and vegetable production in order to raise the nutritional level of the settlers' diet; and to increase and improve the commercial production of and marketing system for fruits and vegetables in the project area as a means of raising low settler income. Research is also being done on higher yielding varieties of fruits and vegetables.

(d) Development of Small Agricultural Enterprises. This project provides the technical assistance component to the IBRD/IDA $11 million loan for the Small Farmer Credit and Rural Development Project by funding (since January 1975) three experts in agricultural credit, marketing and farmer organizations, and extension. (See 3.c. for a description of the loan.) These experts will provide CNPS, and in particular the BNF and MAG, with the technical assistance required for the IDA loan project including: helping in the preparation of implementing plans for the project's farm credit component; promoting coordination between SEAG agents and the BNF credit program; assisting in introducing procedures for preparing, supervising, and collecting short-, medium-, and long-term loans granted by the BNF under the project; promoting and assisting the effective organization of settlers in the project area for better and speedier use of credit facilities, distribution of inputs, and marketing under the project; helping to improve marketing and storage arrangements in the project settlements; and providing on-the-job training to GOP counterpart technicians working on the IDA project.

(2) OAS/IICA. A discussion of OAS activities is always difficult, given their fragmented nature and the practice of having countries select services and scholarships from a host of pre-packaged regional projects. In Paraguay, OAS contributions range from one long-term training fellowship and the provision of equipment in support of a research and demonstration program in milk production at the Faculty of Veterinary Sciences (financed under the OAS' Regional Scientific and Technical Development Program), to one- and two-month scholarships abroad in cooperativism and short-term, in-country courses in such subjects as regional development planning and the design and evaluation of agricultural projects. In September 1975, a six-month Agroindustrial Sector Analysis project was completed by three OAS-funded experts in Paraguay; the project includes in-depth analyses of essential oils and fruit and vegetable processing.

The OAS funds one long-term food technology advisor in Paraguay who is assisting in the development of fruit and vegetable processing (mainly dehydration). The project includes a pilot plant at INTN (Instituto Nacional de Tecnología y Normalización) with a capacity for processing 500 Kg. of tomatoes per day, and the conduct of quality control tests. A second facet of the project involves the development of biological insecticides for horticulture.

The OAS also sponsored two comprehensive regional development studies in Paraguay, one of them the Aquidaban Project in north central Paraguay (the completed report and recommendations are now

before the GOP). The study identifies potential investments in this remote region of Paraguay, touching on such areas as the production of cement for the Itaipú dam, navigability of the Paraguay River, electrification of Paraguay's northeast and the provision of potable water, and improvement of the beef industry.[1/] The more recent regional development scheme, the Pilcomayo project, involves studies for the eventual development of this tri-national (Paraguayan-Bolivian-Argentine) river basin along the southern border area of Paraguay's Chaco. Besides a permanent project director, the OAS funds a resident agricultural economist and short-term (average four months) specialists in soil conservation, pasture, animal production, agroindustrial development, crop production, and irrigation. The resource analysis and project identification phases are expected to be completed by May 1976 followed by design and evaluation of project proposals for submission to the GOP.

The OAS through its Interamerican Institute of Agricultural Sciences (IICA) provides additional technical assistance to Paraguay. There are currently three IICA-sponsored specialists--one in agricultural extension, two in agricultural economics--who advise some of the country's principal agricultural institutions: MAG, STP, BNF, FIA, FV, and the IBR. Projects include an analysis of rural and institutional development in Paraguay, assistance in planning at the macrosectoral level (in conjunction with MAG's Gabinete Técnico and the STP), preparation of an inventory of Paraguay's economic and social resources, assistance in improving the agricultural and forestry information and documentation system of the country, and assistance in upgrading the level of agricultural education through improved agricultural education planning, coordination, curriculum development, and the further training of agricultural teaching staffs.

(3) BID. Technical assistance is provided by the Interamerican Development Bank primarily in support of its large Integrated Agriculture Development Project (PIDAP) which makes available $14.8 million in BID loan funds to finance credit and related services for small- and medium-size Paraguayan farmers. BID has provided advisors for the project's four subprojects--in research and extension, marketing, agricultural education, and agricultural credit (see section 3.a. for more information on PIDAP), with present technical assistance concentrated

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1/ Although the proposed Aquidaban development program relies heavily on agroindustrial projects, the GOP appears to be assigning higher priority to those related to the supply of lime and cement for the Itaipú project.

most heavily in the marketing subproject. Until June 1975, a BID-funded advisor assisted in the reorganization of IBR, and until October 1975, a Government of Israeli-financed agricultural credit specialist assisted CAH in devising improved methods for working with its small farmer clients under a joint BID/GOI project.

Under a nonPIDAP related project, an agricultural planning expert funded by BID is assisting the STP with development planning for the Itaipú region.

c. Bilateral Programs

(1) Republic of China. China's technical assistance program in agriculture is concentrated on research in swine production and the development of improved varieties and cultivation practices for a number of crops--pineapple, garlic, onions, sugar cane, corn and other feed crops such as soybeans and sorghum.

The swine project, carried out at the MAG-sponsored Villarrica Regional Agricultural School, involves breeding and balanced feed trials, the latter using locally available products; farm management demonstrations and crop production systems; work on the use of manure in gas production; and artificial insemination and disease care and prevention, including the development of a hog cholera vaccine using domestic rabbits.

Crop research assisted by Nationalistic China is undertaken at IAN, the National Institute of Agronomy in Caacupé (some work on onions is also performed at the "Yataity de Guairá" farm in Villarrica). Technical assistance is provided in varietal trials with respect to the aforementioned crops; in the development of improved cultivation practices including the use of fertilizer; in disease control and prevention measures; in soil improvement to increase sugar cane production; in the induction of pineapple florescence in different seasons; and, in the case of onions, in the production of "small bulbs" for an early crop and the use of MH30 treatment for longer storage.

(2) France. Experts from the French Research Institute of Cotton and Exotic Fibers have been working with MAG since 1967 to develop better quality, higher disease resistant cotton varieties and companion input combinations. The French Government has provided for $514,850 for technical assistance and training 1972-1976.

(3) Germany. The German Government is assisting a large German colony, Cooperativa Colonias Unidas, in the southern department of Itapúa, and, while under private German church sponsorship, assistance is provided to three cooperatives in the department of San Pedro.

In Itapúa, where the project is administered in coordination with STP, MAG, the Capitán Miranda Experiment Station, SENASE and SEAG, four German technicians work in the following areas: the production of certified seeds; establishment of extension services[1/] and the organization of small- and medium-size producers into committees; introduction of profitable new crops including an annual soybean-wheat-oats crop rotation cycle; economic studies of agroindustrial opportunities (one rejected proposal: a cassava-chip factory) and commercial possibilities for various crops; livestock improvement including the introduction of a grazing system, purchase of breeding stock, and higher quality feed; and establishment of a veterinary/animal sanitation laboratory in coordination with the British-assisted animal diagnostic laboratory at San Lorenzo. The mission is also working with SEAG to organize a local market for veterinary products.

Aside from technicians, the project has provided land clearing equipment, vehicles, workshop and office equipment, agricultural machinery, pasture fencing, a dryer and seed selector, and has financed the construction and equipping of the veterinary lab. Scholarships for study in Germany have also been provided. Although channeled through Cooperativa Colonias Unidas, GOG assistance has development ramifications for the entire Itapúa region.

Turning to church-sponsored technical assistance, in Itacurubí del Rosario, a German advisor, who formerly worked with Mennonite farmers in Colonia Friesland, has helped to organize a Paraguayan cooperative, Cooperative Agrícola Paraguayo-Alemana (CAPA). Technical assistance is provided as is farm equipment through a German Government grant to set up a revolving fund. The cooperative's principal crops are wheat, soybeans and cotton. Similar programs of technical assistance and provision of farm equipment and machinery are conducted with the Virgen del Rosario Cooperative which produces wheat and soybeans and a nascent cooperative in the German settlement of Nueva Germania where colonists produce soybeans, corn, wheat, cassava, sugar cane, cotton, and livestock.

1/ A SEAG office has been established in the project area, its director serving as counterpart to the German technicians' Chief of Party.

(4) Great Britain. Under British Government sponsorship are three agricultural projects:

--A veterinary unit for disease diagnosis and research at San Lorenzo was completed in 1974 with British assistance, its main purposes to identify the principal diseases (Brucellosis, tuberculosis, parasitic diseases, etc., but not including foot and mouth disease) afflicting Paraguayan livestock and to develop and transmit to producers recommended preventative and curative measures. The project seeks to make livestock producers aware of the necessity for a continuing, regular animal sanitation program as a means of upgrading livestock quality and improving productivity. Aside from its own MAG work, the lab provides diagnostic and other services to private sector veterinarians.

--A project aimed at the investigation and control of the Ysau leaf-cutting ant, perhaps the most damaging insect pest to the Paraguayan farmer, estimated to destroy annually 20 to 30 percent of agricultural production in certain areas of the country by cutting the leaves from trees, field crops, and vegetables. The project is seeking means to both control and reduce the damage done by the ant to natural and artificial pasture, plantations, and crops, including citrus. The program, headquartered in San Lorenzo at the entomology laboratory of National University's Institute of Basic Sciences and at SEAG, focuses on biological and ecological studies and the development of effective and economical baits using local products.

--A program of research and improvement in the cultivation and production of essential oils is also assisted by the British Government. Its aims are to determine the adequacy of present extraction methods of petitgrain essence from the leaves of the "Naranja Jhai Jhu" or sour orange; its optimum harvesting period; and whether or not the species currently utilized yield the highest quality essences (in collaboration with London's Institute of Tropical Products Laboratory). The project embraces similar studies of mint (the variety known as "Japanese mint" which yields the chemical menthol), palo santo (used in colognes and perfumes), and other essences. Assistance is also provided to MAG in drawing up regulations on the cultivation and industrialization of petitgrain. Other aspects of the project focus on experiments with portable stills and improvements of locally manufactured ones; and the preparation of a marketing information program.

The British advisor in essential oils works at the project's headquarters at the Instituto Nacional de Tecnología y Normalización in Trinidad, on the outskirts of Asunción. A pilot distillation plant is located at Fulgencio Yegros (6 Km. south of Caraguatay), and it is anticipated that it will be moved to other petitgrain producing regions in the course of the project.

(5) Israel. The Israel Government funds a full-time advisor to MAG's five-year Wheat Research Program 1975-1979 which is designed to develop varieties better able to resist the diseases, principally of a fungus type, which are the single most important factor limiting wheat production in Paraguay. The program's basic objectives are: selection of new wheat varieties, testing for seasonality, sanitary treatments, and, as stated, genetic selection seeking resistance to the most common diseases (Septoria, Helminthosporiu, Giberella, and Erisiphe). The Israeli expert works with five Paraguayan specialists in charge of the Wheat Research Program.

Note: For a four-year period, ending September 1975, Israel provided an agricultural credit specialist to the Crédito Agrícola de Habilitación, the state-owned, small farmer credit institution. (See section 2.c.)

(6) Japan. The Government of Japan provides technical assistance through its Agency for International Cooperation which was established in August 1974, amalgamating the former Japanese Emigration Service, the Overseas Technical Cooperation Agency, and other entities. The Japanese technical assistance program in agriculture in Paraguay is devoted almost entirely to assisting Japanese settlers[1/] and in particular the following three colonies: (a) Alto Paraná Colony at Pirapó in the department of Itapúa which is settled by 350 Japanese families and 150 Paraguayan families who cultivate farms of between 30 and 300 hectares, producing mainly soybeans, wheat, tung, and silkworms; (b) Yguazú Colony near Puerto Presidente Stroessner on the Brazilian border where 170 Japanese families and 100 Paraguayan families--on 87,763 hectares (divided into farms of 30 to 300 hectares each) produce livestock, vegetables, soybeans, and silkworms; and (c) Fram Colony on 16,065 hectares in Itapúa department, settled by 220 Japanese families on farms of 25 to 300 hectares whose principal crops are soybeans, wheat, silkworms, and tung.

1/ Approximately 7,000 Japanese have emigrated to Paraguay, helping to introduce the cultivation of soybeans, improved vegetable varieties, and sericulture. They have also helped establish a number of agro-industrial enterprises: Cia. Agropecuaria Yguazú S.A. (CAYSA), Cia. Aceitera Itapúa Comercial e Industrial S.A. (CAICISA), Industria de Seda Paraguaya S.A. (ISEPSA), Cia. de Fomento de Apicultura del Paraguay S.A. (APSA), and Cia. Agropecuaria Omori S.A. (CAOSA). The Government of Japan provides assistance to all Japanese settlers in Paraguay, although current emphasis is on three particular colonies.

Japanese advisors have assisted these colonies in building schools, hospitals, police stations and other public buildings, silos, agricultural experiment stations,[1] silkworm nurseries, and in providing agricultural machinery and equipment. The Japanese advisors also assist the settlers with credit, cultivation, marketing, and other related agricultural activities.

The colony programs and other assistance to Japanese settlers throughout Paraguay are backstopped by a four-man staff in the Agency's Asunción headquarters, composed of an agricultural economist, engineer, and two crop specialists.

(7) Switzerland. The Swiss Government's technical assistance program in agriculture is heavily concentrated in educational and training activities. The official Swiss technical cooperation agency (COTESU) sponsors the following three projects:

--San Benito Agricultural School and Cooperative Advisor Training Center at Pastoreo (Itapúa). Assistance is provided in training cooperative advisors, teaching staff, and young farmers and in improving the school's curriculum and teaching materials. The Swiss advisors are also assisting with the development of a Brown Swiss herd, with beef cattle fattening, forage and frozen semen projects, and in the development of extension services in the area.

--Alto Paraná Forestry School at Puerto Presidente Stroessner. Assistance is provided in the training of National Forestry Service personnel at the secondary and laborer levels, and in the conduct of reforestation and seedbed trials.

--Cooperativa Minga Guazu Ltda. at Puerto Presidente Stroessner. A Swiss advisor is assisting with the development of the cooperative, principally in swine breeding and production: breeding and forage trials; the manufacture of balanced feed; and a pilot swine fattening project.

A fourth project is conducted by HELVETAS, a private Swiss technical assistance association which is partly financed by the Swiss Government. The project provides two advisors to the Agricultural Mechanics Training School at Caacupé.

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[1] One is located at the Alto Paraná Colony, while a second, larger one is situated at Yguazú Colony. The latter coordinates its crop research work with MAG, and its findings are made available to small farmers in Paraguay's eastern region through Ministry and other extension facilities.

(8) United States. The United States Agency for International Development (AID) program in the agriculture sector in Paraguay is heavily concentrated in grant and loan projects designed to benefit the small farmer. Technical assistance is currently being provided in the following areas:

--Development of Credit Unions. Under this project, independent, financially self-sufficient credit unions are being organized, primarily in rural areas, which are integrated into an independent "Central" (CREDICOOP), designed to provide member credit unions with effective technical and financial services. AID funds two advisors, participant training for central and local credit union personnel, and a major portion of CREDICOOP's operating expenses. The Peace Corps also assists the project. (For more information, see 2.e.(2) CREDICOOP.)

--Development of Marketing/Services Cooperatives. This project is helping to develop a marketing/services central and a network of member cooperatives which are well-managed and financially self-sufficient with viable farm supply and crop marketing operations designed predominantly to benefit small farmers. AID funds a full-time cooperative advisor, training for personnel from both the central and affiliated cooperatives, and a portion of the central's operating expenses. The Peace Corps also assists with the project. (For a more detailed discussion of the project, see 2.e.(3) UNIPACO.)

--Farm Management Services for Small Farmers. The project is working to establish within the Ministry of Agriculture a capacity to carry out research and extension activities in farm management for small farmers. "Farm management" concerns the organization of the entire farm operation, utilizing its resources for the greatest annual economic return. Under the project, a farm management manual will be prepared based on a number of on-farm inventories and budget analyses and existing crop research and cultivation practice information. SEAG agents will be trained in the delivery of farm management concepts to small farmers, using the farm management manual and a series of information leaflets and bulletins. A full-time farm management advisor is provided by AID as well as short-term advisors and participant training.

Under this project is a subproject in Small Farmer Economic Use of Fertilizers and Soil Improvement Practices. Assistance is being provided to establish within MAG a soil fertility evaluation and information dissemination program which will assist the small

farmer in the economic use of fertilizers and soil amendment practices. A soils specialist, provided by AID, is helping with the installation at IAN of a soils testing laboratory and the calibration of lab equipment, the development of a laboratory manual, and training of the lab director and staff. The latter will include the teaching of soil sampling and soil/fertilizer information dissemination techniques.

--Small Farmer Livestock Development. This project seeks to improve small farmer resource use efficiency in animal/poultry production by helping develop a MAG capability to transfer improved livestock technology to the small producer with livestock. Two AID-funded advisors are working with PRONIEGA, FV, and SEAG personnel to publish and distribute livestock research and extension bulletins to small farmers, hold field demonstrations and short courses to transmit improved production techniques to the small farmer target groups, and to upgrade the technical knowledge of SEAG and other extension personnel working with small farmers. In addition to two full-time advisors (a third is projected for the near future), the project also funds participant training and a limited amount of commodities.

--Agricultural Planning and Statistics. In order to help improve the quality of agriculture sector policies and plans, assistance is being provided to MAG in establishing a capability for factual analyses and rational planning based on reliable and timely data and their sophisticated manipulation. Toward this end, a technical planning unit, Gabinete Técnico, was created in the Ministry in January 1975, charged with responsibility for all high level MAG planning and policy formulation. AID will provide a full-time agricultural economist, short-term advisors and participant training.

In all, AID finances 10 permanent advisors, two agricultural specialists who administer the technical assistance program, and a number of short-term advisors.

5. Support Services[1/]

a. Research

Virtually all agricultural research in Paraguay is sponsored by the Government through the Ministry of Agriculture's Directorate of

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1/ Credit, an important support service, is addressed in earlier sections of the study. See Part D.6. and Part E.2. and 3.

Agricultural Research and Extension[1/] and the Faculty of Agronomy and Faculty of Veterinary Sciences at National University. Research is focused on solving short- and long-term problems through applied research, the results of which are then made available to farmers through SEAG and other technical assistance programs.

Research is conducted on Paraguay's main crops with major emphasis on export commodities such as cotton, soybeans, tobacco, corn, rice, sorghum, and on import commodities, the principal one being wheat. Research is also done on such important food crops as potatoes, tomatoes, garlic, onions, and cassava. Good quality research information is also available on sugar cane, sunflower, peanuts, beans, and sweet pepper, and research has also been conducted on fruits--pineapple, banana, avocado, and other citrus.

The research conducted yields information on new varieties, optimal planting dates, fertilization, and recommended cultural practices. Information on soils is still limited (there are vast regional differences in soil composition in Paraguay), but improvement is anticipated with the creation of a soil fertility and plant nutrients laboratory at Caacupé with assistance from AID and BID.

The staff of the Directorate of Agricultural Research and Extension includes a director and five other administrative personnel, 109 specialists and 116 extension personnel, divided amongst six departments--Agricultural Research, National Program of Livestock Research and Extension (PRONIEGA), SEAG, Livestock Development, Poultry, Apiculture--and the National Seed Service. Most of its research is conducted through five experiment stations, described below. The PIDAP (BID) project has financed since 1971 substantial improvements in these research facilities and the expansion and upgrading of their staffs. The PIDAP subproject in Agricultural Technification has provided $2.73 million for this purpose (including $514,000 for agricultural extension).

MAG's research capabilities were further improved with the creation in 1974 of an Animal Diagnostic and Research Laboratory located in the SEAG building at San Lorenzo and assisted by the British Government (See Section E.4.c(4) Great Britain).

(1) Instituto Agronómico Nacional (IAN)

Established in 1943 on approximately 300 hectares of land in Caacupé, 48 Km. east of Asunción, the National Institute of Agronomy

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1/ Some research is also conducted at the Regional Agricultural Education Centers in San Juan Bautista (Misiones), Concepción, Caazapá, the Carlos Pfannl School in Coronel Oviedo, and on the farms of volunteer farmers.

(IAN) has been responsible for practically all major crop research and demonstration activities in Paraguay.[1] It has undertaken studies for improved production of such crops as wheat, soybeans, sugar cane, corn, cassava, rice, citrus, and selected other fruits and vegetables, and it has introduced, adapted, or developed most of the cultivated grass species, such as Pangola, Ramirez, and Buffel, now growing in Paraguay.

The Agronomic Institute has accomplished work in variety determination, cultivation methods, and agronomic practices for over 100 species of plants from tropical and temperate areas and has conducted research on the use of fertilizers, practically unknown in Paraguay prior to 1958; IAN is now able to recommend fertilizer formulas for use on most of the crops grown in Paraguay based on its research in soil and plant nutrition. It has also tested and introduced the use of new fungicides and insecticides now helping to control plant disease in Paraguay.

IAN has introduced forestry species of economic importance to the country through work done at the Institute's forest species nursery established in 1959. It has introduced parana pine and black wattle seeds and numerous other coniferous and hard wood species, and annually sells a large quantity of eucalyptus seedlings for planting on farms. Since the mid-1960's, emphasis has been placed on adaptability trials of fast-growing softwood species.

Operated in conjunction with IAN, which supplies the only breeder seeds in Paraguay, is the Servicio Nacional de Semillas (SENASE) which sells and distributes quality seeds to farmers; arranges for their production by reputable growers, providing the latter with registered seeds for this purpose; and imports limited quantities of seeds when local production is unable to meet the demand.

IAN has progressively expanded its institutional capabilities, particularly since 1972 when it began implementing an $880,000 BID loan, under the PIDAP project, for the expansion of its applied research program. IAN is staffed with a director and vice director, two fruit specialists, three grain experts, a forestry

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1/ Caacupé is 228 meters above sea level with a median annual temperature of 26.6° centigrade and an average yearly rainfall of 1,537.7 mm. About 70 percent of IAN's acreage is under cultivation.

expert and an assistant, one specialist each in fibers and oilseed, two tobacco specialists, a seed conservation expert, a specialist in soybeans, an agronomy generalist, an entomologist, and seven seed specialists[1/] assisted by a large (40 to 60 persons) field worker labor force and a dozen clerks.

Almost all of the improved crops being grown in Paraguay were first tested, adapted, and released for planting by the Caacupé Institute; it is estimated that the increased value of crops produced is at least $2.5 million per annum. IAN's work is complemented by the adaptive research in plant and animal sciences now being done at the Faculties of Agronomy and Veterinary Sciences at National University. Most of its research in recent years has been concentrated on priority commercial crops. Fifteen years of testing over 1,400 wheat varieties led to the isolation of the five used in the National Wheat Program. Research and varietal trials, including testing for disease resistance and yields, have also been conducted at IAN in conjunction with other national commodity programs--in cotton, tobacco, soybeans--and in connection with less formal programs for a number of fruits and vegetables; particularly extensive work has been done in citrus, including the production of over 22,000 citrus plants from the propagation of citrus varieties.

More than 1,500 people visit IAN annually for technical advice or to purchase planting material. The Institute also works with the National Extension Service (SEAG), the main means by which its crop research results are communicated to the nation's farmers, and. time permitting, undertakes soil, plant, and industrial by-product analyses for private parties.

(2) Centro Regional de Investigación Agrícola (CRIA)

In 1952, a branch nursery and crop experiment station was founded at Capitán Miranda, 16 Km. northeast of Encarnación, to serve the Encarnación area.[2/] However, it was not until 1969 or 1970, with the help of PL 480, Title I funds, that the Centro, most often referred to as the Capitán Miranda Experiment Station, became fully functional.

1/ There are a total of 17 ingenieros agrónomos on IAN's technical staff, six of them with graduate level training, and seven agrónomos (technicians with secondary level education).

2/ Located on 100 hectares of land, 200 meters above sea level, the experiment station has an average annual temperature of 21.5° centigrade and average yearly rainfall of 1,750 mm.

CRIA carries out research programs on crops that are important in its area of influence; i.e., the Departments of Itapúa, Misiones, and Alto Paraná; crops include wheat, soybeans, cotton, fruits and vegetables, and corn.

The Capitán Miranda station is staffed with a director, three wheat specialists, two specialists in soybeans, one each in fruits and cotton, and two assistant researchers. Among them are four ingenieros agrónomos and two agrónomos. Additional staff include three clerks and a small field labor force.

(3) Barrerito Experiment Station

Established in 1943 on 10,000 hectares[1/] of land in southeastern Paraguay, the Barrerito Experiment Station and Ranch is the principal livestock research center for the country's eastern region. During its earlier years, efforts at Barrerito were directed toward general research and cross breeding in an attempt to develop new breeds of beef and general purpose cattle while, from around 1962 on, greater emphasis was placed on supplying improved breeding stock from strains proven to be adapted.

Pioneering work was completed in extending the use of artificial breeding techniques to beef herds, and research has been conducted on the control and/or eradication of insects, parasites, and diseases in cattle and other animals. Barrerito facilities have been used to carry on experimental work in improved pasture grasses and other forage crops and to make comparative studies of their adaptability and utilization. The ranch serves also as a demonstration center for improved farm management and operation practices.

As a result of work done at the Barrerito Station and its demonstration to visiting ranchers, improved animal handling facilities such as corrals, chutes, and improved fencing; better water supply systems; higher quality pasture; and improved quality and breeding stock have been adopted on ranches throughout Paraguay. The fact that the carrying capacity of Barrerito Ranch was increased more than 50 percent above many of its neighbors by the addition of watering facilities, subdivision of pasture, and adoption of other improved practices, placed it in an excellent demonstration position.

The experiment station is representative of pastures in the departments of Paraguarí, Misiones, and Ñeembucú which have the

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1/ Of the total, 1,000 hectares have been transferred to PRONIEGA and 1,000 to SENALFA (Servicio Nacional de Lucha contra la Fiebre Aftosa).

largest concentration of cattle (approximately 1,250,000 head) in Paraguay's eastern region. The Ranch itself has an average annual carrying capacity (natural pasture) of 1.5 head per hectare. Its climate has a well-defined seasonal pattern--cold and dry winter (June-September) and a hot and humid summer (December-May).

(4) Chaco Experiment Station

Located on the Transchaco highway, approximately 300 Km. northwest of Asunción in the Department of President Hayes, the Chaco Experiment Station was founded in 1969 in conjunction with the establishment a year earlier of the National Program of Livestock Research and Extension (PRONIEGA). It is representative of at least 25 percent of the eight million hectares of land devoted to cattle raising in Paraguay's western region, or Chaco, which has some 2.4 million head of cattle or about 40 percent of all cattle in the country.

Because the climate, soil, and vegetation are markedly different from those found in the eastern region, the work done at the Barrerito Ranch and in central Paraguay had limited relevance for cattle producers in the Chaco, hence the need for creating a new research facility focused entirely on Chaco livestock production problems.

(5) Artificial Insemination Center (AIC)

The Artificial Insemination Center, located on 75 hectares in San Lorenzo (10 Km. east of Asunción), was established in 1954. In the beginning, it concentrated on informing ranchers, ranch foremen, and agricultural students about the general principles and benefits of artificial insemination and assisting livestock owners in the selection, procurement, and installation of equipment for artificial insemination of their herds. Only semen from high-quality imported bulls of both beef and dairy breeds is used and AIC services are subsidized by the Government since fees usually cover only 30 percent of the actual cost. Through its information, training,[1/] and insemination service activities, the AIC has played an important role in improving the blood lines of Paraguayan beef and dairy cattle on large ranches as well as, more recently, on smaller ranches.[2/]

1/ Both the AIC and Barrerito have provided training in artificial insemination techniques to hundreds of livestockmen over the past two decades. Many ranches now do their own insemination work as a result.

2/ Artificial insemination, however, still accounts for only three to five percent of all cows bred in Paraguay. Many ranchers use the technique on a select herd of cows to introduce genes from improved

More recently, the Center has undertaken research on range, nutrition and sanitation. Its facilities are representative of Paraguay's central region which sustains a total herd of approximately 128,000 head of cattle; in addition, the AIC complex in San Lorenzo serves as headquarters for PRONIEGA. The National Program of Livestock Research and Extension employes full time 17 technicians (13 ingenieros agrónomos and four doctors of veterinary medicine), six of whom have Master of Science degrees financed under AID's participant training program. These technicians work at Barrerito, at the Chaco Experiment Station and at PRONIEGA headquarters in San Lorenzo[1] in the following fields: cattle nutrition and management; pasture, forage crop production, and management; livestock breeding and sanitation; livestock economics; and livestock extension.

(6) Facilities of Agronomy (FIA) and of Veterinary Sciences (FV), National University

The employment of a number of full-time professors and the formation in 1966 of a FAV[2] research and demonstration unit have enabled the Faculty to mount a significant research program over the past nine years with help from external donors. An Office of Scientific Research coordinates all research projects conducted by the more than 100 agricultural technicians affiliated with the two facilities.

Research has been conducted to determine: the economic level for fertilization of wheat; the most prevalent parasites present in animals, especially cattle, in Paraguay; the potential of some of the most promising tame grasses for beef production and the potential of native pastures under different management practices. Soil surveys and production cost studies for crops and animals have been made and considerable work done on range weed control, principally in the Chaco.

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bulls of the same breed or from bulls of new breeds for cross-breeding. The resulting male offspring are used on the general herd in natural services to continue the introduction of the improved genetic materials, while the females may enter the select herd or the general herd, depending on their quality and the goals of the breeding program.

1/ In addition, 36 full- and half-time professors from the agricultural faculties at National University participate in PRONIEGA. Of these, 14 have Master of Science degrees.

2/ Until January 1975, FIA and FV were combined in a single Faculty of Agronomy and Veterinary Sciences, FAV.

Thanks largely to the work of a U.S. advisor, coconut milk was introduced as an effective extender of bull semen used in artificial insemination, and specialized training in its use provided; the life of the semen has been extended from approximately 24 hours to eight days, and a smaller volume of semen is now needed for insemination. With the creation of PRONIEGA in 1968, most FAV livestock research has been coordinated with this national program.

Adaptive research has been carried on with respect to swine production including experiments in crossbreeding with Poland, China, Berkshire, and Duroc breeds and work on swine nutrition. Research has also been undertaken on selected crops such as wheat, cotton, sorghum, corn, and on tomatoes and strawberries, the latter two having good export possibilities, particularly to Paraguay's neighbors.

The Faculty in recent years has conducted a number of socio-economic studies describing and analyzing current farm conditions in different communities; published in 1973, the studies have been used by the Extension Service as a basis for planning future extension and research work in small farm management. Other economic studies--in agricultural marketing, farm account records, farm machinery, etc.--have been carried out under the aegis of the Agricultural Economics Research Center established in 1970. The Center, together with its statistical laboratory, is of value not only for its research per se, but also for its role in training students in the badly neglected field of data collection and manipulation.

Over the last decade, FAV's research facilities have been improved to a significant degree, again with assistance from external donors. Apart from the aforementioned Agricultural Economics Research Center, FAV now has soils, seed, and plant pathology laboratories, and new labs for research in entomology, anatomy, animal nutrition, poultry pathology, parasitology, and bacteriology. A veterinary hospital has been renovated, a greenhouse complex developed, a photography laboratory and grain drying and fumigation room built, a 20-box swine feeding facility constructed and, in conjuntion with FAV's tomato production project, a 100,000 liter irrigation storage tank installed.

Despite these physical improvements, however, FAV research and extension capabilities remain limited, primarily by monetary considerations. Year-to-year uncertainty exists about the availability of funds to support research projects and extension activities outside the Asunción area. Professors are reluctant to start research projects not knowing if funds will be available to continue, and they are also

reluctant to travel to do extension work without assurance of being reimbursed for expenses. FIA and FV should have larger budgets for research and extension, should make contractual arrangements with other institutions for funding specific research and extension training activities, and all their laboratories performing public services (to farmers, ranchers, public and private entities) should charge at least enough to cover the cost of materials and supplies.

b. Extension

In order to obtain a better idea of the requirements imposed upon agricultural extension services in Paraguay we must not forget that the majority of farmers are functionally illiterate. For this reason, improved agricultural practices must be seen to exist by the farmer prior to his adoption of said practices. This is not to say that the farmer is indifferent as to these practices and their results. We judge his responsiveness to be quite high, particularly in regard to his cash crops and livestock.

Varying among these considerations, the first concern is how practical information gets to the farmer. Until recently, the primary focus of SEAG was upon the individual producer. Obviously, the financial resources available to SEAG and other public sector institutions will never suffice to reach all farmers. In general, the method used by extension agents to reach producers has involved demonstrations, short courses, technical meetings, group discussions, field days, and radio programs. Recently SEAG has begun to reach producers by means of organized groups. These groups include ad hoc committees, credit unions, AUCAs, cooperatives, BNF-sponsored producers' committees or associations, and other common interest groups.

In this way the message of the extension service can reach a larger number of farmers. It is estimated that the extension service reaches approximately 12,000 farmers, the majority of whom are small farmers. Obviously, some objective indication of extension work exists, including number of meetings held, number of demonstrations, field days, and courses. This says little, however, regarding the quality of the message imparted. On the other hand, it must be emphasized that a high proportion of all new or innovative technical knowledge must be introduced in this way.

The number of technicians theoretically available to assist the line workers of SEAG is quite high. For example, SEAG has 83 field agents, and we find a total of 870 technicians in the various public

sector agencies providing technical assistance services to Paraguayan farmers. Although a substantial number of these technicians work on credit-related activities, there are over a hundred technicians at the National University in agricultural activities, over 200 technicians in SENALFA, and nearly 30 at IAN.

Knowledgeable observers have noticed the dichotomy between research and extension activities over a relatively long period of time. In the past, it was the conventional wisdom that the extension services have too few people and too little funding to have much of an impact. As this situation has been alleviated, the dichotomy between research and extension interests has grown more obvious. One of the factors inhibiting interaction between extension agents and researchers is the "Heterophily Principle" which proposes that communication does not occur easily between a source and a receiver unless they have similar social status, values, attitudes, education, technical competence, or whatever measure is important. Practically all research technicians have received post graduate training, are descendants of prominent Paraguayan families, and have close friends or relatives among high level government officials. By comparison, the extension service by level of academic training consists of 65 agents who are graduates of agricultural institutes (high school equivalent or less), 27 home agents with teaching certificates (up to two years of university training), and 18 agents who are university graduates. To be effective, the extension service staff and the cadres of the research institutes must operate as a team because only in that way will there be a continuous two-way communication between researchers and farmers; without this communication there can be no feedback to researchers of the problems encountered by farmers. This relationship is, if anything, much more important than absolute numbers of farmers who are touched by the extension service.

We turn now to look at the operations of Paraguay's Extension Service.

The Servicio de Extensión Agrícola Ganadera (SEAG) was established in January 1951 as a result of a recommendation made by the Institute of Interamerican Affairs to MAG. From 1952 to 1967, SEAG was operated by the jointly administered and funded Paraguayan/American Servicio Técnico Interamericano de Cooperación Agrícola (STICA). In 1967, the Extension Service formally became part of the Ministry of Agriculture, serving as its educational arm, the connecting link between the country's small farmers and the advances in agricultural technology required for them to increase their crop and livestock production and, hence, raise their standard of living.

SEAG presently has a total of 132 technicians working closely with the small farmer/livestockman. This corps includes:

--Nine area supervisors, each of whom is in charge of a SEAG regional office and who has responsibility for training SEAG field agents in programming and operational requirements;

--83 agents who work directly with adult producers;

--13 youth agents who work closely with young farmers through 4-C clubs;

--27 home agents who work with the women of farming communities on matters related to nutrition, consumption goods, health, and home improvements.

SEAG technicians are educated to the following academic levels:

Academic Training of SEAG Technicians
(Current to August 1975)

Type of Technician	2 Years Secondary School	Secondary School	2 Yrs. Post Secondary Training	Bachelor of Science	Post Graduate	Total
Specialists	-	-	-	-	6	6
Supervisors	3			4	2	9
Agents	54	11		18		83
4-C Agents	10	3		-		13
Home Agents	-	-	27	-		27
TOTAL	67	14	27	22	8	138

There are 30 field technicians with a university education or beyond and 108 with from two years of high school to two years of training beyond the secondary level. To augment his formal education and to keep him abreast of technical advances, the SEAG technician is provided with specialized courses, seminars, and opportunities for training both in country and abroad.[1/]

1/ One of the most ambitious external training efforts occurred 1971-1974 when AID funded 45 SEAG technicians (in three successive groups) in a special 10-month extension course given in Spanish at New Mexico State University.

The Extension Service maintains 58 field offices organized into nine decentralized regions, each headed by a regional supervisor, as follows:

Central Zone

1. San Lorenzo
2. Ñemby
3. Villeta
4. Benjamin Aceval
5. Yaguarón
6. Paraguarí
7. Alberdi

Ybycui Zone

8. Ybycui
9. Acahay
10. La Colmena
11. Carapeguá
12. Quiindy
13. Caapucú

Cordillera Zone

14. Caacupé
15. Eusebio Ayala
16. Caraguatay
17. Arroyos y Esteros
18. Piribebuy
19. Itacurubí de la Cordillera

Caaguazú-Alto Paraná Zone

20. Caaguazú
21. Juan M. Frutos y Campo 9
22. Repatriación
23. Juan E. O´Leary
24. La Pastora
25. Coronel Oviedo
26. San Joaquin
27. Puerto Presidente Stroessner
28. Hernandarias

Caazapá-Guairá Zone

29. Caazapá
30. Villarrica
31. Yegros
32. Iturbe
33. Yuty
34. San Juan Nepomuceno
35. Col. Independencia

San Pedro Zone

36. San Estanislao
37. Villa San Pedro
38. Itacurubí del Rosario
39. General Aquino
40. Choré
41. Salto del Guairá

Concepción-Amambay Zone

42. Concepción
43. Horqueta
44. Loreto
45. Pedro Juan Caballero

Misiones-Ñeembucú Zone

46. San Juan Bautista
47. San Ignacio
48. Santa Rosa
49. Pilar

Itapúa Zone

50. Encarnación
51. Fram
52. Hohenau
53. Capitán Meza
54. Coronel Bogado
55. San Pedro del Paraná
56. Puerto Triunfo
57. General Delgado
58. General Artigas

As previously noted, it is estimated that SEAG reaches approximately 12,000 small-[1] and medium-size producers in eastern Paraguay. A profile of the average farmer receiving technical assistance from SEAG reveals that, in comparison to his nontechnical assistance receiving peers, he

--is generally better educated (average 4.3 years of primary school education);

--tends to be 35 years of age or under;

--owns and/or operates a small farm;

--belongs to a voluntary association(s);

--purchases more production inputs;

--receives credit more frequently;

--takes advantage of technical assistance programs; and

--more readily adopts agricultural innovations.

The implication is that extension agents tend to gravitate toward the more progressive small farmers.

SEAG provides direct technical assistance for the most part to groups of agricultural producers, working at present with 125 producers' committees or associations (largely those sponsored by the BNF and organized with the help of SEAG), 70 AUCAs, and 31 cooperatives. Assistance is geared to increase production and productivity of commodities designated to be priority items by MAG: cotton, tobacco, soybeans, wheat, garlic, sweet peppers, tomatoes, sugar cane, potatoes, strawberries, silkworms, corn, and livestock.

Extension agents advise producers on soil conservation and fertility recuperation of the soil, use of farm equipment, use of high yielding varieties, utilization of high quality seeds, proper plant density according to species, right planting season, use of fertilizers

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1/ There are estimated to be over 141,000 small farmers in eastern Paraguay.

and insecticides, sanitation, timely harvesting, and preparation of the product for marketing, particularly on a group basis. With respect to livestock production, SEAG agents focus on improved feed, sanitation, and management. The following table provides information on the type and frequency of contact between SEAG agents and rural producers 1973-1975.

Number of meetings, demonstrations, trips, short courses, and meetings held by SEAG with rural producers throughout the country 1973 through the first semester of 1975

Year	Number of Meetings	Number of Demonstrations	Number of Trips	Number of Short Courses	Number of Farmers Served
1973	1,001	571	17	4	21,430
1974	438	356	11	9	24,017
1975*	200	167	10	1	15,136

* Includes only the first semester of the year.

Extension Service activities with rural youth are channeled through a network of 68 4-C clubs comprising a total membership of approximately 1,400 youths with backgrounds in farming. The 4-C clubs provide a means for encouraging and sustaining interest in agriculture, and a channel for civic education. Members are introduced to progressive crop and livestock production techniques, use of credit, use of farm implements and machinery, and leadership techniques--how to conduct meetings, organize for group action, etc.

SEAG's home extension agents work primarily through 103 home economics clubs with a total membership of nearly 2,400, most of whom are wives and daughters of farmers. The focus of the program is on better utilization of farm-produced goods (including instruction on how to start and maintain a family vegetable garden) in order to raise the level of family nutrition and improve living conditions. Assistance is also given on family budgeting and improved health practices.

In order to more effectively reach the country's small- and medium-size producers with increasingly sophisticated agricultural technologies, a consortium system of extension is being tried in Paraguay. Participating public service agencies and private enterprises are assisting SEAG with production technologies, research results, demonstration materials, supplies and services, and the technical manpower to extend information to the small farm subsector.

Although a large body of agricultural specialists affiliated with various organizations exists, much of their assistance has gone to medium- and large-size farmers under individual programs sponsored by each organization.[1] The consortium system seeks to place the resources of these organizations at the disposal of small farmers. The latter discuss their needs with the SEAG extension agent whom they know and trust. The agent then communicates these needs further up the line, defining topics of interest to the producers, and a suggested meeting date, time, and place. SEAG then coordinates the proposed field program (technical meetings, field day, etc.) with specialists from other organizations. The latter are willing to cooperate since by doing so they further their own programs. In the process, local SEAG agents are exposed to new production technologies, a form of training in itself.

The role of the extension agent in the consortium approach is to organize producers into large common-interest groups, schedule the appropriate type of meeting, demonstration, etc., with the necessary subject matter specialists from various agricultural agencies, conduct information campaigns, and provide follow-up technical assistance to producers. The system has the virtue of compensating for the small number of trained (not necessarily adequately trained and only in a few fields) extension agents and an insufficiently financed extension program and of helping to overcome the longstanding communication problem between extension and research technicians which has tended to inhibit the free exchange of production problems, ideas, and research results.

As noted earlier, there are approximately 870 trained, experienced specialists in Paraguay's public agricultural sector agencies alone, distributed amongst 248 field offices. By utilizing them through a consortium system of extension, the ratio of small farm units per technician can theoretically be reduced from 941 to one to a significantly lower ratio of 162 small farm units per technician.

c. Education

(1) Vocational (Secondary)

At this level, the aim is to produce trained, mid-level agricultural manpower who will enter one of National University's two agricultural faculties, study abroad, seek employment with SEAG or

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1/ Among them, PRONIEGA, Desarrollo Ganadero, FIA, FV, BNF, IBR, CAH, IAN, SENASE, SENALFA, Fondo Ganadero, CREDICOOP, Rural Agricultural Training Centers, MAG's Farm Management Unit, and agriculture-related industries.

some other public or private agricultural entity, or become progressive-minded farmers. At present, there are six main vocational agriculture schools in Paraguay operating at the secondary level, four run by the Ministry of Agriculture, two of them semi-private.[1] A seventh institution, the School of Agromechanics at Caacupé, began operating in 1975 with 16 students enrolled in its first course, and the Swiss-assisted Alto Paraná Forestry School at Puerto Presidente Stroessner trains National Forestry Service personnel at the secondary and laborer levels.

The four MAG-sponsored schools founded in the 1930's are known as Centros Regionales de Educación Agrícola (CREA). The oldest is located at Concepción; it has graduated 619 "Practical Agricultural Technicians" since 1931 and currently enrolls 37 students in the basic and bachillerato courses. To the south is the San Juan Bautista Agricultural School which has graduated 530 Practical Agricultural Technicians since 1937 and has a current enrollment of 123 students, 85 in the basic course, 38 in the bachillerato. The Agriculture School at Caazapá has graduated 499 since 1938 and presently enrolls 76, 45 in the basic course, 31 at the bachillerato level. The CREA at Villarrica, operating since 1939, has graduated 620 Practical Agriculture Technicians and enrolls 36 at present.

The San Benito Agricultural School at Pastoreo (Itapúa) which receives assistance from the Swiss and German Governments, was founded in 1971 and has graduated 33 to date with 98 students currently enrolled. The best of the secondary vocational agricultural schools is the Carlos Pfannl Agricultural Institute at Coronel Oviedo, founded by the Salesian Fathers. It alone of all the schools is entitled to grant the Agricultural Technician and Bachillerato Agrónomo degrees. To date, 118 technicians have been graduated and the school's current enrollment is 106 students drawn from all sections of the country. Its purpose is to provide middle-level agricultural technicians and well-qualified candidates for FIA and FV. Its graduates are eligible for admission to both faculties.

1/ Although vocational agricultural instruction is included in the curriculum of the six Regional Education Centers, most of which are equipped with "practice farms", some farm implements, and at least one teacher trained in vocational agriculture, they cannot properly be considered as vocational agricultural institutes in the sense of turning out trained mid-level agricultural technicians. Increasingly, primary schools in Paraguay's rural areas are being provided with facilities for agricultural courses (and for instruction in industrial arts and home economics), and agriculture will figure prominently in a new program of rural non-formal education being initiated in 1975. But, again, these are not vocational agriculture programs in the correct sense of the term.

The curriculum of these vocational schools, while varying to some degree, tends to follow the pattern of courses outlined as follows for the two principal secondary cycles:

BASIC COURSE Subjects	1st Course	2nd Course	3rd Course
	(Number of hours per week)		
A. General Education			
Spanish Grammar	5	5	5
Sciences			
Algebra	5	3	3
Plane Geometry	-	3	-
Solid Geometry	-	-	3
Natural Sciences	2	2	2
Social Education			
Social Studies	3	3	4
Artistic Education			
Drawing	2	2	2
Practical Activities			
Physical Education	2	2	2
Sub-Total	19	20	21
B. Professional Training			
Plant Production			
General Agriculture	4	-	-
Special Agriculture	-	3	3
Horticulture	3	-	-
Fruit Production	3	-	-
Forestry	-	3	-
Animal Production			
Introduction to Livestock Production	3	-	-
Beef cattle	-	3	-
Dairy Production	-	-	3
Poultry Production	-	3	-
Beekeeping and silk culture	-	-	3
Hog Production	-	-	3
Agriculture Engineering			
Agriculture Machines	-	3	-
Rural Industries	-	-	2

Socio-Economics			
Farm Management	-	-	2
Special Courses			
Field Activities	15	12	10
Sub-Total	28	27	26
Grand Total	47	47	47

BACHILLERATO
Subjects

A. General Education			
Spanish Grammar	3	3	2
Social Studies	3	3	2
Natural Sciences (Botany, Zoology, Biology)	3	2	-
Physics and Chemistry	3	2	-
Mathematics	4	3	2
Physical Education	2	2	2
Technical English applied to Agriculture	2	2	2
Psychology	2	2	-
Philosophy	2	2	-
Sub-Total	24	21	10
B. Professional Education			
I. Plant Production			
Ecology	2	-	-
Genetics and Plant Production	2	-	-
General Agriculture	2	-	-
Special Agriculture	-	3	-
Forestry	-	-	2
Fruit Production	-	2	-
Horticulture	-	2	-
Plant Sanitation	-	-	3
II. Animal Production			
Introduction to Livestock	2	-	-
Principles of Nutrition, Forage and Pasture	-	3	-
Hogs, Sheep, Goats, Horses	-	2	-
Poultry, Silk culture, Rabbit and Beekeeping	-	2	-
Beef and Dairy Cattle	-	2	4

III. Agriculture Engineering			
Management and Conservation of Farm Equipment	-	-	3
Motors and Tractors	-	-	2
Rural Construction	-	-	2
Agriculture Industries	-	-	2
IV. Socio-Economics			
General Economy	2	-	-
Marketing	-	2	-
Farm Management	-	-	3
Extension and Agricultural Sociology	-	-	3
V. Special Courses			
Field Practice	16	17	20
One day a week for farm visits	-	-	-
Sub-Total	26	33	44
Grand Total	50	54	54

The PIDAP subproject in agricultural education ($2.1 million) has helped upgrade the physical facilities and quality of teaching at the regional agricultural education centers and is funding the construction of a new agriculture school at Puerto Presidente Stroessner. Nevertheless, given Paraguay's need for trained agricultural manpower, the current vocational infrastructure is woefully insufficient, yielding annually only a limited number of agricultural technicians and a somewhat greater number of skilled farm laborers.

In a 1973 study of agricultural education in Paraguay, it was found that of those enrolled in secondary schools, less than one percent were studying vocational agriculture, and the majority were enrolled at the post-primary, or low-secondary, level. Yet, farm, ranch, and agribusiness account for nearly 60 percent of Paraguay's employment. Clearly, there is an urgent need for a more extensive vocational agricultural system, including more effective preparation at the university level of vocational agriculture teachers and restructuring of the vocational curriculum in agriculture to meet the increasingly sophisticated needs of the country's agricultural sector.

(2) University (FIA, FV)

The Faculty of Agronomy and Veterinary Sciences, or FAV, of National University was established in 1954 and operational by 1956, the first and only advanced agricultural education institution in Paraguay. In January 1975, the Faculty was formally divided into two separate faculties, the Faculty of Agronomy (FIA) and Faculty of Veterinary Sciences (FV). The two faculties are located 12 Km. south of Asunción near the city of San Lorenzo on a 350-hectare site known as University City. Although all National University faculties and institutes will move to the site eventually, the only other faculties now located there aside from FIA and FV are Chemistry and Pharmacy, Basic Sciences, and Economic Sciences.

There are 654 students now enrolled in agriculture, 319 in Agronomy and 335 in Veterinary Sciences (by contrast, the 1960 total enrollment was only 150). Since 1956, 324 have been graduated in agronomy, representing 55.9 percent of those admitted, while 315 students have been graduated in veterinary sciences, or 59.5 percent of the total admitted.

In 1973, a new curriculum was introduced, the first major curriculum change since FAV was founded two decades ago.[1/] Being implemented in stages, it is expected to be in full operation by 1978. Essentially, a greater degree of specialization was introduced into the agronomy curriculum and a sixth year added to veterinary sciences. Students at FIA take the same four-year program now but in their fifth year elect one of five fields to study: animal science, forestry, crop production, agricultural engineering, and agricultural economics. While they do not emerge as specialists, FIA students will have had an introduction to one particular area of agriculture which may orient them toward advanced study and/or a career in that field. The new sixth year in veterinary sciences permits the inclusion of more courses in animal science, pasture and forage crop production, socio-economics, and basic sciences, and FV students greater flexibility in selecting certain courses. The curricula are set forth in Annex E-3.

1/ Another important development occurred between 1969 and 1971 with the creation at FAV of new teaching departments in agricultural economics, anatomy, entomology, agricultural engineering, and animal production, common to both agronomy and veterinary sciences. Although animal production is the professional area encompassing the activity of greatest single economic importance in Paraguay, it was not even recognized as a career as late as 1965 but was treated only superficially as part of the general course in both the agronomy and veterinary science programs.

The teaching staffs of the two faculties are amongst the best trained of National University, with more full-time professors than any other faculty, having increased from none in 1956 to 20 in 1974. There are also 23 half-time faculty members and 71 who work less than half time. Eighteen professors hold Masters degrees and one a Ph.D.; four more are studying in the United States for Masters degrees and one for a Ph.D. Long-term training, much of it funded by AID, has been provided in such fields as animal husbandry, dairy and poultry production, soil fertility, soil chemistry, livestock production, animal sciences, agricultural economics,[1/] animal pathology and physiology, range management, forage crops production, and library sciences.

Employment opportunities in agriculture in Paraguay for graduates of the two faculties have been fairly good. The public sector employs 59 percent of graduate agronomists and 53 percent of graduate veterinarians on a full-time basis, the proportions being relatively high as a result of expanding MAG, FIA, FV, Livestock Fund, BNF, and SENALFA programs over the past several years. The employment configurations for FIA and FAV graduates 1960 to 1973 are shown in Table E-6.

Among public institutions employing FIA and FV graduates, MAG (32.7 percent) and the BNF (10.1 percent) hire the largest number of agronomists, while SENALFA (20.6 percent) and MAG (9.2 percent) hire the greatest proportion of veterinarians. It is interesting to note that a large majority of the graduates are employed full time by one organization.

In the private sector, FIA graduates for the most part are self-employed in the livestock sector (8 percent), work with commercial companies (7.1 percent), or work as consultants. Veterinary graduates are largely either self-employed in the livestock sector (13 percent), work with commercial companies (5.7 percent), work as consultants (5.1 percent), or work in veterinary clinics (5.1 percent).

One problem encountered among students at the two faculties is the fact that many are from urban areas and have little or no farm or ranch experience. They also receive little practical work experience as students. The possibility should be explored to provide at least a three-month work experience on farms and ranches during their academic career. This would not only give the students experience, but also stimulate employment opportunities for more graduates in the private

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1/ There are still less than a score of agricultural economists in Paraguay, most of them relatively young and inexperienced.

TABLE E-6

EMPLOYMENT OF FAV GRADUATES FROM 1960 TO 1973

Employer Classification	Agronomists		Veterinarians		Total	
	Number	%	Number	%	Number	%
Public Sector (full time one agency)	177	54.7	132	41.9	309	48.3
Public Sector (two or more agencies)	14	4.3	25	7.9	39	6.1
Public and Private Sectors	-	-	10	3.2	10	1.6
Private Sector (full time)	73	22.5	98	31.1	171	26.7
Private Sector (employment unknown)	19	5.9	19	6.0	38	5.9
International Agencies in Paraguay	1	.2	-	-	1	.2
International Agencies outside Paraguay	3	.9	-	-	3	.5
Foreign Missions	3	.9	-	-	3	.5
Not Working in Profession	6	1.9	5	1.6	11	1.8
Foreign Students Returned to Home Country	3	.9	1	.3	4	.6
Scholarships (without jobs)	5	1.6	2	.6	7	1.1
Without Employment	2	.6	8	2.5	10	1.6
Working in Other Countries	17	5.3	15	4.8	32	5.0
Retired	1	.2	-	-	1	.2
TOTAL	324	100.0	315	100.0	639	100.0

Source: The Beef Cattle Industry in Paraguay: A Sub-Sector Assessment, New Mexico State University/USAID, Paraguay, Asunción, March 1975.

sector. An attempt might also be made to obtain summer employment (January-March) with other institutions. This would serve not only to give the students experience, but also as a recruitment tool and interest-creator for future technicians. AID has sponsored a very successful summer scholarship program, but it provides training and experience for only a small percentage of the faculties' students.

d. Advanced Technological Inputs

(1) Seeds

Generally speaking, there are no specialized, well-established enterprises producing improved seeds in Paraguay. Most farmers produce their own seeds which acts to curtail the availability of high quality seeds on the market. This situation is particularly disadvantageous for rapidly expanding, highly financed commercial crop programs.

The Servicio Nacional de Semillas, or SENASE, is the government agency (located within MAG's Directorate of Agricultural Research and Extension) charged with supervising seeds from production point to their final distribution to the farmer. SENASE coordinates its work closely with other agricultural support organizations and with the various national commodity programs.

Seed variety trials and related activities are concentrated at IAN and the Capitán Miranda Experiment Station which are also the sole producers of breeder and foundation seeds in the country. Registered and certified seeds are the responsibility of SENASE which contracts with suppliers whose seed production operations are supervised by SENASE field inspectors at all stages to ensure compliance with minimum legal requirements. Another category of seed is the semilla fiscalizada which does not necessarily meet minimum standards set for certified seeds but which is preferable to seeds produced without any supervision.

With the exception of cotton, only a limited amount of seed is supervised and/or distributed by SENASE, most seed being produced by the farmers themselves. The following estimates were provided by SENASE on seven crops:

Percentage of Seed Supervised and/or Distributed by SENASE and Percentage from Farmers' Own Supply

Crop	SENASE	Farmer
	%	%
Soybeans	10	90
Wheat	40	60
Corn	2	98
Rice	4	96
Cotton	100	-
Garlic	40	60
Vegetables	4	96

Following is a chart indicating the amount of seed distributed by SENASE in the last four years as well as the percentage of certified seed per crop in 1975.

Distribution of Seeds by SENASE, 1972-1975, and Percentage of Certified Seed in 1975

Crop	1972	1973	1974	1975	% Certified Seed in 1975
	metric tons				
Soybeans	1,650	870	1,225	672	50
Wheat	1,001	632	813	1,332	50
Corn	30	30	40	40	100
Rice	-	-	145	700	-
Cotton	1,581	2,657	2,610	2,550	30
Potatoes	-	-	289	-	-
Garlic	-	-	64	13	-
Vegetables	-	0.6	0.5	0.7	100
Others	3	3	1.5	9	-

Source: SENASE

SENASE's activities are oriented toward making available to the producer increasing amounts of certified seeds for key commercial crops.

The availability of high quality certified seed is basic to any agricultural undertaking. This is true for the producer as well as for the organization financing production which is concerned with keeping credit risks to a minimum. The SENASE seed purchasing program is financed by the Central Bank through loans implemented by the BNF. While little difficulty is encountered with financing per se, the timing of loans sometimes creates uncertainties, and, often, delays in planting dates with adverse effects on crop yields. Another problem which increases damage hazards is late delivery of seed to the processing plant.

SENASE's 8,000 metric ton processing and storage capacity is reportedly adequate to handle the present volume of operations. Its main processing and storage plant is located at San Ignacio with small regional processing and/or storage facilities in key producing areas planned for the future in order to introduce more flexibility into its operations.

Following are some brief comments on key crops in relation to the production and distribution of seeds.

Tobacco. There are at least six improved varieties of mostly light tobacco presently recommended by PRONATA, the National Tobacco Program. These varieties are estimated to represent around 35 percent of the total number of hectares planted in tobacco with the remainder comprised of an unknown number of indigenous varieties mostly on the dark side.

The production of seeds of improved varieties of tobacco is concentrated at IAN. The seeds are distributed by OFAT, the Cotton and Tobacco Control Office, mainly through the BNF, CAH, IBR, SEAG, and cooperatives; OFAT sells the improved seeds at a nominal price in order to encourage larger plantings. Exporters are increasingly distributing seeds of improved varieties to farmers, as well.

Currently, a limited amount of Burley-type tobacco is being introduced on an experimental scale, 14 hectares of it planted by selected farmers in northern colonization areas with additional trials being conducted on a regional basis.

Cotton. Most of the cotton seed is crushed for oil. However, all cotton for seed is supplied by about 760 selected producers who are supervised by SENASE. Cotton for seed is ginned under the supervision of and distributed by OFAT. Distribution is generally made through organizations such as the BNF, CAH, and cooperatives.

Because of the price incentives established for seed and the fact that all cotton seed is the product of off-farm processing, cotton probably lends itself more than any other crop to seed quality inspection and control. The result is rapidly expanding usage of improved varieties and high quality seeds. As of February 1975, there were at least 2,209 hectares of the Reba B-50 African variety planted by selected seed producers.

Soybeans. About 2,385 hectares of soybean seeds are being supervised by SENASE for the 1975-1976 crop year involving at least three different varieties and 24 farmers qualified as seed growers. SENASE distributed only 672 metric tons of seeds for the 1974-1975 season. Most of the seed (90 percent) planted is non-certified seed produced by farmers on their own. Seed processed by SENASE is distributed through the BNF to its borrowers (70 percent), and the rest (30 percent) is sold directly to private producers. The highly speculative nature of the soybean market usually accounts for late deliveries of soybean seeds to SENASE processing plants which increases the risk of damage to seed quality, and raises processing and sanitation costs as well as the percentage of rejects. As a counter, SENASE offers Gs. 4-5 more per kilogram over current market prices to soybean producers.

Wheat. As of February 1975, there were about 2,180 hectares of wheat for seed, of at least eight different varieties, being supervised by SENASE.

Although many producers are still relying on their own seed, a fair amount (40 percent) of acreage is estimated to be planted with good quality seed. About 50 percent of the wheat seed distributed by SENASE is certified. Price for seed is established by the Government each harvest season.

(2) Fertilizer

Given the predominantly small size, subsistence type of farming in Paraguay, fertilization has not been a very common practice, with the possible exception of organic fertilization by a limited number of vegetable producers. However, chemical fertilizer use is becoming increasingly common, especially among commercial-scale farmers.

Blended fertilizer is imported in formulations and grades determined mainly by recommendations established for the National Wheat Program and based on the fact that much of Paraguay's soil is low in phosphate, making it the principal imported nutrient. A small amount of fertilizer is custom-blended by a local plant.

Diammonium Phosphate (DAP, 18-46-0), Triple Superphosphate (0-46-0), Urea (46-0-0), and 0-28-0 are among the main formulations used. In terms of volume, they comprise about 75 percent of the local market and are almost totally imported and distributed by the BNF to the relatively small number of medium- and large-scale

wheat and soybean producers. The aforementioned formulas are reportedly used, in decreasing order of importance, in Misiones, Colonia Volendam and neighboring Mennonite colonies, Central Department, and the Puerto Presidente Stroessner area. A very limited amount is used in the Encarnación area.

Other common formulations are 12-12-17-2 and 15-15-15, used mainly in horticulture (tomatoes, peppers, etc.), and citrus production. Sugar cane production absorbs a large portion of the 15-15-15 formula.

Fertilizer use for the country is estimated to be around 5,000 metric tons per year regardless of what import figures might suggest. BNF alone has a substantial volume in stock carried over from previous years' imports and unregistered amounts of fertilizer are introduced from neighboring countries.

Crop Response to Fertilizer. Although MAG has carried out some fertilizer experiments with wheat, sugar cane, tobacco, and corn over the past decade, crop response information is far from being complete. The following table illustrates yield increases normally associated with several of the more important crops, along with the amount of fertilizer required to achieve the yield response:

Crop	Traditional Yield (Kg./Ha.)	Yield with Fertilizer (Kg./Ha.)	Fertilizer Formula Required
Wheat	700	1,600	50-50-20
Soybeans	1,000	2,000	10-50-20
Corn	1,500	3,000	50-50-20
Cotton	1,500	2,500	40-60-30

Source: MAG

Note: Many farmers using wheat/soybean rotations apply a 10-50-20 formula for both soybeans and wheat, relying on the nitrogen fixation from soybeans to replace the 40 Kg./Ha. N otherwise required.

Typically, average rates of application are around:

150 Kg. per hectare in horticulture and fruit production;
100 Kg. per hectare in soybeans; and
200-250 Kg. per hectare in sugar cane.

Fertilizer Price. While fertilizer, along with other imported production inputs, has never been within easy reach of the small farmer, it has experienced a slower than average use rate over the past three years due to wild fluctuations, mostly upward, in prices. Following are some examples:

	CIF-Asunción Prices per Metric Ton		
Formula	1971/72	1973/June 1975	November 1975
DAP	$230	$595	$327
Triple Superphosphate	175	505	270
Urea	130	350	195
15-15-15	107	337	250

Reportedly, when BNF advertised for a bid to purchase 3,000 metric tons of triple superphosphate in mid-April 1975, the prices bid ranged from approximately $390 to $430 per metric ton. BNF called off the April bid and advertised for a new one in May which brought down the price, finally, to about $260 per metric ton.

Medium- and commercial-size producers, it might be noted, are increasingly importing their own fertilizer, largely as a way of avoiding a mark-up which, in the case of fertilizer sold by the BNF, can be as high as 20 percent of CIF prices. Minimum orders for direct imports are down to as low as 50 metric tons, and suppliers' credit of up to six months and more is available to farmers with good credit standing. Cooperatives are taking advantage of this arrangement, too. Nevertheless, lack of credit and the absence of retailers in some key producing areas continue to limit access by the small farmer to convenient supplies of fertilizer.

Import charges and expenses usually run about 11 percent of the CIF prices and truck freight from the Asunción port to a location such as Coronel Oviedo is about Gs. 1.30 per kilogram.

Average retail price for 12-12-17-2, or an equivalent formulation, is about Gs. 50 per kilogram.

Fertilizer Imports. Although there is no single reliable source of information on fertilizer imports in Paraguay, inquiries made to local dealers and to the BNF yielded the following information:

Fertilizer Imports, 1972-1975
Nutrients
(Metric Tons)

Year	N	P_2O_5	K_2O	Minor Nutrients
1972	1,157	1,989	615	12
1973	1,626	2,300	810	46
1974	711	1,401	435	29
1975	776	2,750	450	30

(3) Machinery

Farm mechanization is probably the result, more than anything else, of the massive resources assigned to the National Wheat Program since the late 1960's and of additional resources assigned for the production of related rotation crops; i.e., soybeans, rice, etc. In fact, from 1968 through mid-1974, the BNF loaned close to $20.0 million for the purchase of farm machinery and related equipment.

The following farm machinery was financed by the BNF in the period 1968 to June 1975:

Tractors	480
Combines	305
Plows	405
Harrows	355
Planters	246

Although no reliable information exists on the actual amount of farm equipment imported into the country, the following table shows what farm machinery was in use in 1973 as compared to 1968:

	Amount of Farm Machinery	
	1968	1973
Tractors	1,798	4,046
Harvesting Machines	287	541
Plows	89,776	94,878
Cultivators	12,893	13,764
Harrows	20,447	21,465
Planters	10,098	12,031

Source: Diagnóstico de la Situación Alimentaria y Nutricional, Vol. I, STP/ONPS, 1975.

Based on additional information obtained from the BNF, the following numbers are estimated as of June 1975:

Tractors	4,200
Harvesting Machines	600

Although the number of tractors in the above table provides a relatively good indication of the level of mechanization, the figures on farm implements and tools are somewhat less meaningful since no distinction is made as to how many of the harvesting machines are combines, or how many of the plows, cultivators, etc. are animal- or tractor-drawn.

Although all farm machinery/equipment dealers are located in Asunción, many of them have distributors and/or franchise repair shops in key agriculture producing areas. There are about 17 different makes of tractors on the Paraguayan market with Massey Ferguson and Fiat reportedly being the most popular. This is mainly due to a more aggressive sales policy and a wider distribution network within the country.

The following makes are available in the local market:

Massey Ferguson	Stayr
Hannomag	David Brown (CASE's subsidiary in England)
John Deere	
Valmet	International
Volvo	SAME
Malvet	Caterpillar
Ford	CASE
Fiat	Oliver
Deutz	CBT

Small garden type tractors are also available, but there is apparently a rather limited market for them. Four relatively well-known makes are Yanmar, Iseky, Kubota, and Agrale.

Most tractors are imported from Argentina and Brazil. Although U.S. and European made tractors have a good reputation, machinery produced in neighboring countries is preferred because spare parts are more readily available and at much lower prices. Also, BNF lines of credit for U.S. and European equipment are either exhausted or nonexistent.

The following market price information is provided on some of the makes and models of farm machinery sold locally. All prices quoted are based on cash payments.

H.P.	Make and Origin	Model	Price
43	Massey Ferguson (Argentina)	50X	Gs. 1,167,000
43	Stayr (Austria)	430	1,275,000
45	Fiat (Argentina)	400	1,300,000
47	Volvo (Sweden)	430	1,626,000
47	John Deere (Argentina)	1420	1,200,000
48	David Brown (England)	-	1,400,000
54	Stayr (Austria)	540	1,475,000
60	Massey Ferguson (Argentina)	65X	1,480,000
64	Fiat (Italian)	500	1,500,000
65	Stayr (Austria)	650	1,675,000
72	John Deere (Argentina)	2,420	1,740,000
72.3	Fiat (Argentina)	700	1,670,000
88	Fiat (Argentina)	800	1,800,000
109	C A S E (U.S.)	-	2,600,000

Although the above quoted prices are regular dealers' listed prices, 10-15 percent discounts are common in cash payment transactions.

Financing for the purchase of tractors and major farm implements is generally available through the BNF and local dealers. BNF's financing terms for capital investment on farm equipment is up to five years with 12 percent annual interest on the balance and a one percent one-time service commission. Financing through private dealers usually involves a down payment of 30-35 percent, the balance being negotiated in installments generally up to a two-year term with the equivalent of 1-1.5 percent monthly interest charged on the balance.

Even though there are some advantages in price, credit terms, and conditions in dealing with the BNF, the farmer generally becomes tied up in an unusual amount of red tape due to BNF importing policy. In buying a tractor through the BNF, the farmer actually becomes a part-time importer who orders the tractor through a local dealer. When the tractor arrives in the country, the farmer hires the services of a customs broker in order to have it cleared through customs. This is a long and complex exercise. Ironically, the process

for dispatching one tractor is just as expensive and grueling as for several tractors. Farm machinery and equipment are more readily available from local dealers when needed. It goes without saying that timeliness in the supply of equipment can be the difference between success or failure in such a highly seasonal activity as agriculture. It is doubtful, though, that farmers other than those in the upper levels can qualify as clients for private dealers.

(4) Other

A list of other important technological inputs besides fertilizers would include chemicals such as insecticides, fungicides, herbicides, products for animal sanitation, plant innoculants, etc.

Reportedly, there is a wide variation among different crops as to the percentage of total area treated with chemicals as compared to their total production area. The following estimates are based on information provided by local pesticide dealers:

Crop	% of Area Treated
Cotton	100
Soybeans	100
Tomatoes	100
Wheat	100
Watermelon, Cantaloupe, etc.	100
Rice	25
Tobacco	40
Citrus	10
Pasture	10
Potatoes	50
Sugar Cane	2.8

The above estimates indicate that pesticide use is quite extensive even among small farmers; e.g., 100 percent of cotton, a traditional small farmer cash crop, and a fair amount (40 percent) of tobacco, another small farmer cash crop. It should be pointed out here that a farmer who wants to qualify as a supplier of certified seeds of tobacco or cotton, and thus receive a premium price, must comply with all the sanitation practices and spraying schedules established by SENASE and OFAT. This requirement, together with the price incentives involved, may in time result in the more ready adoption of advanced technology by the small farmer.

The following chart provides information on the volume and type of chemicals imported during the past three years.

Chemicals Imported
(in Metric Tons)

Product	1972	1973	1974
Insecticides	486	380	554
Fungicides	28	36	14
Herbicides	4	7	8
Seed Innoculants	-	6.3	5.8
	518	429.3	581.8

Source: MAG, División de Sanidad Vegetal

The estimated costs of the pesticide component--no labor or equipment included--in some of the typical pest control programs are provided for three main crops produced by the small farmer. The estimates are based on information provided by local pesticide dealers and MAG technicians and are subject to slight variations depending on the products used, their concentrations, pest virulence, etc.

Cotton (one hectare)
1-2 sprayings with a systemic insecticide
500 cc. per application at Gs. 1,200[1] per liter
3-4 sprayings with a contact/ingestion insecticide
1 lit./Kg. per application at Gs. 1,000[1] per lit./Kg.

Tobacco (one hectare)
A total of about four sprayings using the following:
Systemic insecticide, 1 liter at Gs. 1,200 per liter
Contact insecticide, 1 liter/Kg. at Gs. 1,000 per liter/Kg.
Fungicide, 1/2 liter at Gs. 500 per liter/Kg.

Soybeans (one hectare)
0.2 Kg. seed innoculant at Gs. 400 per Kg.--Gs. 80
A total of about 3-4 applications with a total of 3 to 4 liter/Kg. of a contact/ingestion insecticide at Gs. 1,000 per liter/Kg.

1/ BNF, CAH, and cooperative borrowers pay around 20 percent less than is charged by country stores for identical products. Farmers not in areas served or reached by the BNF, CAH and cooperatives have to rely on country stores and intermediaries (acopiadores) for their supply of pesticides.

e. Colonization

Most colonization in Paraguay is undertaken by, or with the approval of, the Instituto de Bienestar Rural (IBR), the autonomous GOP agency established in 1963 to administer programs in land settlement, land reform, and rural welfare.

Although a limited amount of colonization occurred earlier in the century,[1] it was not until the 1960's that an organized effort was made in earnest. The result has been the creation 1963-1973 of 248 colonies on unused state lands involving more than 40,000 families on 2.8 million hectares of land. Further colonization has taken place during the decade on a private basis (but with IBR approval under the provisions of the Agrarian Reform Law of 1963--see section 2.d.) involving some 17,000 families in 60 colonies on .7 million hectares. Thus there are now over 400 publicly settled colonies in Paraguay and at least 60 private settlements.[2]

There are a few large colonization areas in the Chaco or Western Region of Paraguay where the average plot size is 1,500 hectares, but the majority are in the more fertile, populated Eastern Region where the average public colony plot size is 20-25 hectares. The greatest proportion of privately settled areas are located along the Brazilian border. Much of the recent colonization has occurred in two principal areas: the Eje Norte or Northern Axis, comprising an area in the Department of San Pedro, and the Eje Este or Eastern Axis in the Departments of Caaguazú and Alto Paraná along the Asunción -to-Puerto Presidente Stroessner all-weather highway which, when completed in 1965, opened up this section of the country to development.

The economic base of colonies may rest on livestock alone, on agriculture and forestry, or on agricultural production alone, or in combination with some level of livestock production; most are of the latter two types.[3]

1/ Between 1908 and 1962, approximately 45,000 settlers were settled under Government schemes on .9 million hectares of land in 170 colonies.

2/ Accurate data are hard to come by, and even IBR reports sometimes do not agree. It is estimated that as many as 291 official and 91 priviate colonies may have been organized by or with the consent of the IBR between 1963 and 1973, and that 63,327 land titles were issued; the latter figure, in particular, appears inflated.

3/ It has been estimated that a ninefold increase in the area under crop cultivation is possible in Paraguay (at forestry land expense). Increase in livestock production, on the other hand, is more a question of technical improvements than any expansion of pasture lands.

Settlers, in general, are transplants from minifundia areas in Paraguay (the Asunción-Villarrica axis, primarily), are Paraguayans returning from Brazil or Argentina, or are members of foreign and/or religious groups. Let us look at one hypothetical but presumably prototypal settler.

Rubén Sánchez' application for resettlement in an Eastern Region colonization area has been approved by the IBR. When the time comes for the move, the Rural Welfare Institute transports Sánchez and his family and their belongings to the colony. After that they are completely on their own, though they may receive some food rations from the World Food Program. Sánchez is given a set of instructions: he must begin clearing his 20-hectare plot and constructing a house within half a year and have at least 20 percent of his plot cleared within three years with a fence built around the cultivated area. Should he fail to do these things or for some reason fail to cultivate at least a portion of his land for two consecutive years, he risks forfeiting his right to occupancy. At the same time, he receives a letter of entitlement (adjudicación) with information on how to secure full title to his plot under the Agrarian Reform Law; if he pays his land off within seven years (including two of grace), the land will be registered in his name.[1/] If he buys his plot outright at the start, he receives a 15 percent discount. Since Rubén Sánchez is neither a disabled veteran of the Chaco War nor do he and his wife have seven or more dependent children, he is not eligible for up to 20 hectares of free land.

Sánchez hears from his fellow colonists that it is easier to obtain land titles in the Eje Norte zone. There a settler only need cultivate a minimum of three hectares though not own more than 25 with at least a quarter of the purchase price paid off; as long as his production record is satisfactory and he agrees to pay IBR the balance on the purchase price of his plot, he can be granted title to it at that time.

Sánchez sets to work clearing his land by hand, but the work is slow and only partially completed when he plants his first crop of

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1/ A settler will pay Gs. 500-5,000 per hectare based on an IBR pricing scheme which in turn is based on the current value of fiscal land in the area plus the costs of surveying and plot allocation. The settler is also charged four percent of the purchase price to provide a "savings fund" as a reserve against crop failure. Although the law permits a maximum purchase period of 15 years, seven years appears to be fairly standard.

tobacco (corn or soybeans will be next). He tills the land by hand, working his way around the logs and trunks left over from his family's clearing efforts. He hopes that within a few years when the land has been more fully cleared, he can secure some draft animals--a pair of bullocks or horses--to help with the tilling, planting, harvesting, hauling, and clearing of more land. If Sánchez can't afford to purchase the animals himself, he may pay or exchange labor for custom plowing of some of his land. Sánchez also hopes to be able, eventually, to build a small shed for tools or storage and acquire a dairy cow and a few chickens and pigs. In the meantime, however, his main interest is in keeping his family alive--clothed and fed.

Rubén Sánchez may find that that is still his goal three or five years later. The lack of working capital and investment credit, technical assistance, land titles, and basic rural infrastructure of both a physical (e.g., roads) and social (e.g., schools, health centers) nature acts to constrain increased production and serves instead to keep settler farmers very close to a subsistence level. The farther away the settler is from easily traveled roads, the more remote his chances of securing credit, extension service counsel, production inputs, marketing assistance, etc. An unknown number of settlers become discouraged and abandon their land. In many places, fragmentation has occurred, often because the occupant needs cash, thereby reducing original plot size to 10 to 20 hectares (down from 20 to 25 hectares). Countless unauthorized and unrecorded changes of occupants have taken place. In addition, there often is confusion about the amount actually owed IBR by settlers with the result that only a small percentage of colonists possess definitive titles which then prejudices access to BNF and other sources of institutional credit.

On the positive side, however, is the fact that, despite these shortcomings, IBR was able to issue 1962-1972 some 40,000 titles covering over two million hectares of land which contributed significantly to a reduction in the proportion of squatters from 45 percent in 1961 to 29 percent in 1971. This marked the first time that real progress had been made with fundamental problems of land distribution and titling. The Rural Welfare Institute has colonized three times more land in its decade or so of existence than had been settled during the previous half century. On the average, about 4,000 families are settled each year--at minimal cost (an estimated $500 per family) according to data on settlement efforts in other parts of the world, although this has had serious effects on settler prosperity and well being.

In the last two or three years, IBR land sales have increased markedly, particularly in 1973 when the Institute sold 516,000 hectares, representing a 105 percent increase over 1972. It appears that this increase is due in part to more new settlers, especially those granted larger lots, paying for their land in full at the time of allotment. Rising agricultural prices have also put the small farmer settler in a better position to pay installments on the purchase price of his land. If this trend continues and with it an increase in the number of land titles granted, there should be a corresponding stabilization in land holding patterns in colonization areas.[1/]

What remains for IBR to do is to improve its administrative apparatus and, more than anything else, establish a vastly improved (and financed) capability to provide settlers with the financial and technical assistance, including the creation of colony physical and social infrastructure, so overwhelmingly absent at present. Without these supporting services, the majority of settlers will remain at a subsistence level with little hope of raising their productivity and standard of living--or of contributing to national income. For more information on IBR and on colonization development projects, the reader is referred to section 2.d. and sections 3.c. and 3.e.

1/ One source of help: a legal provision which stipulates that for a period of 10 years after issuance of title, the land may not be attached, alienated, sold or transferred without IBR consent.

ANNEX E-1

AGRICULTURAL SECTOR: GENERAL OBJECTIVES

(Excerpted from Five-Year Plan, Ministry of Agriculture)

IMPROVE MARKETING SYSTEM	INTRODUCE IMPROVED PRACTICES	INCREASE PRODUCTIVITY	EXPAND FARM LAND	INCREASE PRODUCTION	INCREASE INCOME & EMPLOYMENT	WELL BEING OF THE PRODUCER
- Excessive participation of intermediaries in the marketing process - Individualism of producers Discriminatory procedures applied	- Inefficient technical assistance - Producer's own resistance - Widely scattered production areas - Inputs cost - Costs of production equipment	- Non-rational use of natural resources - Disguised under-employment - Producers lack training - Underutilization of processing facilities	- Minifundia farm operations - Unawareness of the potential of natural resources - Lack of coordination among institutions - Land distribution	- Limited internal market - External market not fully utilized - Inefficient marketing system - Inefficient production system	- Low profitability of farm operations - Subsistence level farming - Limited number of cash crops - Seasonal employment	- Low educational level - Low income - Nutritional deficiency - Inadequate housing
- Information on actual market for major cash crops - Strengthening technical & financial assistance to facilitate export - Organization of producers - Creating a mechanism to improve marketing - Establishment of purchasing organizations - Elimination of discriminatory practices	- Precise definition of assistance service objectives - Improvement of extension methods - Regionalization of production - Improve marketing system for production equipment and inputs	- Better soil management and conservation - Adequate combination of crops - Better range management - Forestry legislation - Labor intensive capitalization - Rural industries - Community construction - Education & training programs in agriculture - Determining needed equipment	- Rearrangement of minifundia - Study of natural resources - Improve system for settlement and consolidation of new areas - Establishment of a system of policy decisions for colonization	- Import substitution - A legal system to expedite exports - Development of new export items - Credit facilities - Programs for product development - More industrialization	- Efficient farm management - Promote organization of economically viable units - Diversification of commercial production	- Educational program - Public health program - Assistance in home economics - Assistance in home improvement

ANNEX E-2

Following is a translation of MAG's Resolution No. 6 listing the functions and duties of the Technical Unit.

FUNCTIONS AND ATTRIBUTES OF TECHNICAL UNIT

Resolution No. 6

"Through which the Functions and Attributes of the Technical Unit are established"

Asunción, 6 January 1975

Given: Law No. 479 "Budget for 1975 Fiscal Year" promulgated by the Executive Power on 27 November 1974 and

Considering: That the referred Law foresees the creation of a Technical Unit, and

That is is necessary to establish with greater precision its functions and attributes, in order to facilitate understanding of the objectives of the creation of the entity created;

The Minister of Agriculture

RESOLVES:

Article 1. The Technical Unit reports directly to the Minister and is the unit responsible for the preparation of plans for the agricultural sector and renewable natural resources.

Article 2. The Technical Unit will:

- Permanently study and evaluate the general situation of agriculture, livestock and renewable natural resources in order to identify the positive and negative factors conditioning their development within the framework of the general economy, as a basis for a sector policy to be adopted by the Ministry;

- Conduct studies on farm, livestock, and forestry management for the different areas of the country and for different levels of technology;

- Prepare in coordination with the planning office of semi-autonomous institutions and institutions related to the Ministry, development plans and programs for the agriculture sector and renewable natural resources in accordance with the National Planning Office of the Presidency of the Republic;

- Coordinate preparation of annual work plans of the Ministry with its various Directorates and Technical Departments;

- Prepare specific projects to be carried out by the Ministry in conformance with priorities established in collaboration with the National Office of Projects;

- Evaluate and inform the Minister on agriculture development, natural resources plans, programs and projects prepared by semiautonomous organizations and organizations related to agriculture and to be implemented by one or more organizations;

- Periodically evaluate and inform the Minister on the implementation of sector policy, plans, programs and projects, and propose necessary adjustments;

- Advise all technical branches of the Ministry on matters related to planning and implementation of plans, programs and projects under the Ministry;

- Analyze and evaluate investment projects submitted to the Ministry by private enterprises seeking the benefit of Investment Law 217/70 for Economic and Social Development, or any other such law to be eventually dictated;

- Prepare with the National Planning Office programs for foreign technical assistance related to the agriculture, livestock and renewable natural resources;

- Assist the Minister in all matters related to the social and economic development of the country, particularly the primary sector which is the specific concern of the Ministry;

- Carry out technical advisory work as directed by the Minister.

Article 3. The Technical Unit will be headed by a Director appointed by the Minister, who shall be a professional with university degree and experience in agricultural planning.

Article 4. Communicate to those responsible and archives.

Signed: HERNANDO BERTONI
Minister

ANNEX E-3

CURRICULUM, SCHOOL OF VETERINARY SCIENCES
NATIONAL UNIVERSITY

Year of Study	Subjects	Hours Per Week
First	Mathematics	6
	Chemistry	6
	Physics	4
	Comparative Anatomy	8
	General Botany	4
	Biophysics	4
	Zoology	5
	Library Use	3
		40
Second	Physiology	6
	Biochemistry	3
	Histology and Embriology	6
	Topographic Anatomy	6
	Microbiology and Immunology	5
	Parasitology	3
	General Genetics	2
	Animal Science	4
	Agricultural Economics	3
	Statistics	2
		40
Third	Pathological Anatomy	6
	Parasitic Diseases	3
	Infectious and Contagious Diseases	4
	Medical Pathology	6
	Pathological Surgery and Medication	4
	Ruminant Pathology	3
	Pharmacology, Toxicology and Toxic Plants	3
	Semiology	4
	Applied Genetics	3
	Special Animal Science	4
		40

Fourth	Therapeutics	4
	Clinic I	8
	Obstetrics and Reproduction Pathology	4
	Soils	4
	Poultry Pathology	3
	Surgery Techniques	6
	Farm Management	2
	Clinical Analyses	3
	Radiology	2
	Artificial Insemination	4
		40
Fifth	Clinic II	8
	Beef Production	6
	Milk Production	5
	Pastures and Forages	4
	Bromatology and Animal Nutrition	4
	Sheep and Goat Production	3
	Horse Production	2
	Swine Production	3
	Poultry Production	3
	Fish Culture	2
		40
Sixth	Clinic III	8
	Meat Inspection and Technology	6
	Milk Inspection and Technology	5
	Animal Health	3
	Epidemiology	3
	Beekeeping	3
	Rabbit Production	2
	Public Health and Preventive Medicine	4
	Agrarian Legislation and Legal Medicine	3
	Agricultural and Livestock Extension and Rural Sociology	3
		40

ANNEX E-4

CURRICULUM, SCHOOL OF AGRONOMY
NATIONAL UNIVERSITY

Year of Study	Subjects	Hours per Week
First	Mathematics	6
	Inorganic Chemistry	6
	Physics	6
	General Botany	3
	Zoology	3
	Political Economics	2
	Technical Drawing	2
	Library Use	2
		30
Second	Systematic Botany	3
	Statistics	3
	Genetics	2
	Microbiology	3
	Plant Physiology	3
	Organic Chemistry and Biochemistry	3
	Topography	2
	Geology	2
	Climatology and Meteorology	4
	Ecology	3
	Agricultural Economics	2
		30
Third	Applied Botany I	2
	Soils	3
	Plant Diseases	4
	Entomology	3
	Farm Construction I	2
	Farm Machinery	5
	Water Management	3
	Animal Physiology and Anatomy	3
	Rural Legislation	2
	General Animal Science	3
		30

Fourth		Soil Fertility	3
		Applied Botany II	3
		Pastures and Forages I	3
		Animal Science	3
		Animal Nutrition	3
		Animal Clinic	2
		Rural Administration	3
		Rural Sociology and Extension	3
		Horticulture	3
		Fruit Production	2
		Silviculture	3
			31
Fifth*	A.	Crop Production	
		Soil Management	3
		Applied Botany III	5
		Plant Therapeutics	5
		Experimental Analyses and Designs	3
		Agricultural Industries	3
		Beekeeping and Silk Culture	3
		Fruit Production II	5
		Production Economics	3
			30
	B.	Animal Production	
		Reproduction Methods	4
		Animal Nutrition II	3
		Pastures and Forages II	3
		Meat Industries	3
		Horse, Sheep and Goat Production	3
		Beef Production	3
		Milk Production	3
		Swine Production	2
		Poultry and Rabbit Production	3
		Production Economics	3
			30
	C.	Forestry	
		Forestry, Special	4
		Lumber Technology and Anatomy	4
		Biometrics	3
		Reforestation	3
		Forest Inventory	4
		Forest Industries	4
		Forest Policy and Administration	3
		Management of Wild Areas	3
		Electives	2
			30

* Student selects one of these specializations.

D. Agricultural Engineering

Mathematics	2
Thermodynamics	2
Hydrology	2
Machinery Elements	2
Rural Electrification	3
Agricultural Product Processing	4
Farm Construction II	4
Water Drainage and Irrigation	3
Agricultural Machinery II	4
Agricultural Mechanization Organization	2
Electives	2
	30

E. Agricultural Economics

Production Economics	3
Economic Analyses	4
Marketing of Agricultural Products	4
Pricing of Agricultural Products	3
Social and Economic Development	4
Agricultural Credit	4
Agricultural Records	3
Agricultural Appraisals	3
Electives	2
	30

F. SUMMARY AND CONCLUSIONS

1. Summary and priorization of identified constraints to Target Group Development

a. The Target Group

The target group is defined as those rural dwellers who exhibit the conditions of production and income typified by farmers holding less than 20 hectares in Paraguay's central zone. To operationalize this definition for Paraguay's new settlement (colony) areas, 0-20 hectares of cleared land is thought to be roughly equivalent to 0-20 hectares holdings in the Central zone. Table F-1 provides data which characterizes differing size farm holdings in Central Paraguay (to date the Mission lacks this type of information for the colony areas).

First, farms of less than 20 hectares are characterized by low levels of income. As may be observed (line 1, 3, and 4), farm income increases with increases in farm size, but far less than proportionally. There is a significant break in net farm income between farms of less than three hectares and those between three and four hectares. Beyond this size, the size strata bear a much weaker relationship to income as is illustrated by the multiples of the smallest farm size (lines 5 and 6).

Small farms can be divided into two categories, (1) those without sufficient land area to utilize effectively available family labor (less than five hectares) and (2) those which are utilizing a significant amount of their land area for crops (five to 20 hectares). Land size thus appears to be a significant determinant of income only for smallest farms. It may be useful then to divide the target group into three subgroupings:

--Farmers whose land holdings are inadequate to absorb family labor, i.e. holding less than 3 hectares; these number approximately 21,000. 1/

--Farmers located in traditional farming areas whose land holdings exceed the area that can be cultivated with family labor using existing technologies, i.e., 3-20 hectares; these number approximately 88,000.

--Farmers located in new colony areas who have less than twenty hectares of cleared land; these number approximately 37,000.

1/ Data from 1969 figures.

TABLE F-I

ECONOMIC CHARACTERISTICS OF SMALL PARAGUAYAN FARMERS (CENTRAL ZONE)

		Less than 3 Has.	3 and 4 Has.	5 to 9 Has.	10 to 19 Has.	20 to 29 Has.	30 Has. and above
1.	Gross Income a/ US$*	373	836	1,040	1,444	1,916	3,371
2.	Annual Expenses US$*	50	96	132	229	305	910
3.	Net Income US$* a/	323	740	908	1,215	1,611	2,461
4.	Net Cash Income US$ b/ *	141	370	511	760	1,027	1,524
	Multiples of the Smallest Farm c/						
5.	Size (multiples of 1.4 ave.farm size)	1.0	2.6	4.6	9.1	16.3	41.7
6.	Net Income	1.0	2.6	2.8	3.8	5.0	7.6
	Farm Size and Land Use						
7.	Average Farm Size	1.4	3.6	6.5	12.7	22.8	58.4
8.	Has. Used for Crops	1.4	3.0	3.9	5.3	7.9	11.9
9.	Percent (8) ÷ (7)	100%	80%	60%	41%	34%	20%
	Indicators of Family Labor Usage						
10.	Wage Payments/Ha. Crops US$	17	16	18	23	21	37
11.	Off-Farm Income-Wages Paid US$	140	57	22	21	-36	-174
	On Farm Consumption						
12.	On-Farm Consumption/Gross Farm Income	48.7%	44.2%	37.9%	31.2%	30.0%	26.2%
	Capital and Return to Capital						
13.	Capital US$ d/	787	1,302	1,893	2,800	3,857	11,302
14.	Capital/Hectare US$	566	364	291	221	169	193
15.	Return to Capital	.421	.568	.480	.434	.418	.218
	Technology Indicators						
16.	Value of Implements/Hectare US$	36.5	18.2	13.7	13.0	8.3	17.5
17.	Annual Expenses/Gross Farm Income	13.4%	11.5%	12.2%	15.9%	15.9%	27.0%
18.	Wages/Annual Expenses	49.2%	50.4%	53.6%	53.8%	54.7%	48.0%

* Calculated at the official rate of ₲126 to one US dollar, overestimating the number of dollars.

a/ Includes on-farm consumption.

b/ Includes only sales minus annual expenses

c/ Average farm size and farm income within each strata are used to derive these multiples.

d/ Includes land, permanent structures, animals, implements, annual expenses.

Although these target group subgroupings face certain common constraints, their principal problems vary; a strategy designed to improve their productivity and income should take these variations into account.

Decreasing quality and fertility of the land, decreasing requirements for on-farm consumption, and decreasing availability of family labor are suggested as reasons for decreasing percentages of land under cultivation as farm size increases. Lack of remunerative prices, high unit cost of production, and lack of market facilities might also be suggested. Additional information suggests that as farms become larger they tend to become more oriented toward livestock rather than cropping.

Some data exist for examining the proposition that lack of family labor is a limiting factor to increased crop production on farms above four to five hectares. Assuming that the family supplies the bulk of the labor requirement for crops and that outside labor is hired to handle peak requirements, wages paid per hectare of crops (line 10) appear to be roughly consistent with the contention that crop area is limited by the availability of family labor. A crude test of this hypothesis can also be made by subtracting wages paid for labor from the family's off-farm income (keeping in mind the possibility of different wages rates) to determine which sizes of farms are net suppliers or users of labor. The small size farms tend to be net suppliers of labor, (line 11), while farms 20 hectares and above appear to be net users of labor.

Small farms tend to use a significant proportion (one-third to one-half) of gross farm output for on-farm consumption (line 12).

Small farms are poorly capitalized (line 13 provides an estimate of capital in land, improvements, livestock, tools and equipment, and annual expenditures), yet on a per hectare basis are more highly capitalized than larger farms (line 14). The most reasonable explanation is that larger farms are more oriented toward extensive livestock. Also, the value of land per hectare was found to be greater on small farms than on larger farms. Further, the returns to capital are greater on small farms than large farms. This undoubtedly reflects both differences in farm organization and imperfections in the capital market (line 15).

There is little evidence to suggest that farms under 20 hectares differ markedly in the technology applied, except in the case of the smallest farms--where the indivisibility of implements per hectare does not vary greatly (line 16). In other words, farmers who own more land and have relatively more access to capital do not appear to own more expensive mechanical implements, but rather buy more of the same inputs in relatively constant proportions. Further,

the relatively constant ratio between gross farm income and annual expenses indicates a minimal level of purchased inputs on farms less than 30 hectares of size (line 17). Finally, wages are nearly a constant proportion of annual expenses over all sizes of farms examined (line 18). This apparent lack of difference in technology correlates well with additional survey information which indicates little difference in yields for various crops by size of farm.

With regard to the general level of technology, yield comparisons indicate that present Paraguayan production does not compare favorably with current U.S. levels or even with U.S. yields in 1960. Paraguayan yields do, however, compare more favorably with their neighboring countries, Brazil, Argentina, and Bolivia.

b. The Economic Environment

For several reasons, expansion of agricultural production will continue to be basic to the economic progress of Paraguay. Approximately 36 percent of GDP, 85 percent of the value of exports, and 51 percent of employment is presently provided by the agricultural sector. In contrast to the inadequate growth of the domestic manufacturing sector--which is limited by the size of the domestic market and dwarfed by two large neighboring countries who are at a more advanced stage of industrialization--the growth of agricultural production at 5.9 percent annually in the 1970-74 period was reasonably good. Further, the more dynamic segment of the manufacturing sector is presently engaged in processing agricultural products for export. Since a large portion of employment is in agriculture, growth in domestic demand for locally produced goods is also closely related to the development of the agricultural sector.

To what extent small farmers will participate in the anticipated future growth of the agricultural production will depend in part upon the programming of the sector's development. Estimates of the annual growth rate of crop production indicate that those commodities which are mainly exported have expanded in volume at an average of 16.6 percent per year as contrasted with a figure of 1.4 percent per year for crops principally consumed domestically. Further, the above mentioned increase in production for export arose largely from bringing additional land under cultivation. Thus the small farmer's ability to participate in future growth will depend upon (1) his ability to expand production for exports (through increasing yields or expanded acreage under cultivation) and (2) upon the extent to which the domestic market can be enlarged.

There is no reason to believe that Paraguayan small farmers will necessarily be excluded from production for the export market. To the contrary, there is little basis for arguing that a clear

differentiation can be made between small farms and large farms in terms of crops they produced. Table F-2 illustrates this point.

TABLE F-2

DISTRIBUTION OF PRODUCTION OF SELECTED CROPS B SIZE OF FARM 1972/73 CROP YEAR
(by percentage of total production)

Crop Production	600+ Has.	51 to 600 Has.	10 to 51 Has.	1 to 10 Has.	Less than 1 Ha.	0-20Has (Estim.)
1. Corn	3.8	15.2	25.7	32.0	23.2	(70.6)
2. Cassava	2.2	12.8	37.8	44.6	2.5	(79.3)
3. Irrigated Rice	33.0	39.7	11.8	15.5	-	(22.6)
4. Cotton	6.2	25.4	23.0	38.4	6.9	(59.1)
5. Tobacco	0.6	8.5	48.8	40.8	1.8	(71.5)
6. Sugar Cane for sugar	5.5	25.6	15.0	51.9	2.0	(62.9)
7. Soybeans	24.3	40.8	20.9	13.5	0.4	(26.4)

To state that a particular crop beongs exclusively to "large farmers" or "small farmers" is clearly not very useful for analytical purposes. As indicated in the above table, basically subsistence crops such as cassava and corn are grown without regard to farm size. Further, although a commercial crop such as rice lends itself to mechanization, we nonetheless find it being produced on small farms. Finally, small farmer production of primarily export crops varies from a small but significant amount of the soybeans to the major share of cotton and tobacco.

The question emerges whether present small farmers can participate in an expanding export market if the basic form of growth in output continues to be increasing the area under cultivation. First, the existence of small farms in Paraguay is not the result of an overall land constraint. Present estimates indicate that there are 8.8 million hectares suitable for cropping with only 953,000 hectares currently being used. Migrations of the rural population from areas of extablished settlement (the minifundio zone in the immediate area of Asunción) to virgin lands has occurred at a substantial pace during the last two decades. More importantly, the new areas seem to have more productive soils than are found in the areas of historically high population densities. Reasonable explanations of the continued existence of small farms might be (1) the historical concentration of farms around Asunción in order to be near the one major urban market, (2) the lack of labor-saving technology to expand the capacity of family labor to farm larger acreages, or (3) the lack of infrastructure and marketing facilities in potential colonization areas.

As noted earlier, there also is unused land on a large number of small farms. The analysis of this situation indicates that one probable explanation is that available family labor is not adequate to expand the area under cultivation. This presupposes the question of why nonfamily labor is not hired to expand production. There is probably not a pool of unemployed labor which can easily be drawn upon for this purpose. An additional consideration is the low level of productivity in the Paraguayan agricultural sector (estimated at 66 percent of the average production per agricultural worker in Latin America). The level of output and earnings of farm labor is, in turn, dependent upon the technologies employed in producing various crops and livestock. Perhaps improved technology is needed not simply to raise per hectare yields, but to make the return to labor sufficiently high so that there is an incentive for family members to continue to work on the farm or, alternatively, to permit the farmer to pay wages which will attract hired laborers. The case could be made that net emigration from Paraguay and migration within the country--from the minifundio area to Asunción and new settlement areas--is an indication of the lack of reasonable income opportunities in the traditional farming areas. In turn, the lack of economic opportunities can be attributed to the lack of applying more technological production alternatives to small scale farming.

An important consideration in expanding small farmer production is the need to provide remunerative and stable prices to producers. Unfortunately, Paraguay faces some major marketing constraints posed by its internal market. The internal market for agricultural products is limited because the total population is only 2.6 million. Further, Paraguay's population is mainly rural with only one major urban area (Asunción and adjoining small towns) of 486,730, and only six other towns with populations in excess of 10,000. Consequently, rapidly expanded production for domestic consumption could quickly exceed local demand at a price which would be remunerative at the farm gate. Thus, expansion of production for domestic consumption must be carefully coordinated with increases in internal demand and efforts to enlarge domestic consumption by tapping unexploited markets with new and improved products.

Paraguay also faces a major obstacle in the export market. Its geographical location significantly increases the costs of getting its goods to foreign markets. A 1973 study indicated that freight costs, including handling charges in ports, ranged from US$30 to US$80 per metric ton from the major Paraguayan ports to FOB Buenos Aires. The additional cost to a European port would generally fall in the range of US$25 to US$50 per metric ton. Consequently, the Paraguayan farmer is at a competitive disadvantage to producers in countries having lower transport costs to principal markets and would therefore receive a lower price for his products. It should be noted that with relatively large fixed transport costs, a small variation in price at the import location can cause a proportionally larger

change in the price received by farmers. As an example, if the price of soybeans in Rotterdam drops from US$200 per metric ton to US$180-- a 10 percent decrease--and transport costs are US$55 per metric ton, FOB price in Asunción would fall from US$145 to US$125-- a 13.8 percent decrease. This larger percentage change is certainly reflected in farm level prices.

Another problem related to location is the restriction placed upon the types of exports. Low value commodities such as corn and cassava are unlikely to become commercial exports because such a great proportion of their CIF value would be transport costs. This suggests the need to focus on higher value exports and products which can be processed, or partially processed, within the country.

Paraguay's locational disadvantage may also affect the choice of agricultural technology by increasing real costs of agricultural machinery and other imports such as fertilizers and insecticides. With the possible exception of soybeans, the evidence is clear that most of Paraguay's crop related exports are produced by labor-intensive technology without any major degree of mechanization which may reflect the high cost of imported inputs.

The built-in disadvantage in marketing costs incurred by exports and the close relationship between economic and export growth suggests that Paraguay can ill afford inefficiencies in its internal marketing system. Further, the limits of the domestic market require careful organization of production and marketing if local market opportunities are to be fully exploited without creating price fluctuations resulting in disincentives for those farmers producing for internal consumption.

USAID has initiated a study of the price variation of a number of commodities consumed locally in order to determine the cause (i.e. seasonal production, daily variations of supply, or self-reinforcing cycles) and identify the stabilization approach which is most appropriate (i.e. processing, short-term storage, improved market information or quotas). Price data, by month, are reported in Table F-3 for potatoes and lettuce. Widely fluctuating prices such as indicated above represent a disincentive to production among small farmers. Either they are affected directly by these fluctuations, or indirectly through lower prices offered them by intermediaries to compensate for the risk these intermediaries face in the day to day market. Appropriate policies, storage and processing facilities would undoubtedly reduce these fluctuations.

Although they certainly exist, the inefficiencies in the agricultural marketing system in Paraguay are ill-defined to date. Until

TABLE F-3

WHOLESALE PRICES FOR POTATOES AND LETTUCE 1972-1975
Average in Guaranies

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Potatoes:													
1972	19.95	19.80	21.60	27.39	26.05	30.15	35.95	39.48	33.21	30.62	29.57	30.58	28.72
1973	25.55	26.37	23.14	20.85	20.70	19.37	19.18	20.55	28.37	26.24	40.76	26.95	24.88
1974	29.27	41.80	46.10	42.90	39.70	39.05	39.84	26.92	20.95	25.39	21.80	21.80	34.88
1975	35.45	40.61	35.95	37.41	43.78	37.67	53.78	72.00	79.19	78.27	48.80	47.17	51.03
Lettuce:													
1972	55.43	65.70	66.75	63.25	58.24	79.20	98.10	68.95	58.47	44.62	67.57	98.00	68.45
1973	79.82	78.95	93.38	86.89	98.15	91.58	78.55	68.15	53.89	40.81	59.19	86.30	74.10
1974	79.19	112.00	115.15	69.35	90.80	86.28	85.87	104.19	68.67	63.30	65.85	72.00	84.30
1975	117.55	108.17	116.24	111.00	118.33	106.16	90.70	79.94	73.24	64.73	76.52	111.59	97.24

recently much of the analysis of marketing apparently has been addressed to structural questions and their impact upon competition and relative market power. It is popular belief that certain participants in the marketing system are in monopolistic or oligopolistic positions, but there is not data indicating that such marketing power is exercised. Also, meager data seem to be available on the costs of performing various functions in the marketing system, who finances these functions, and who bears the risks. Responsible persons believe that marketing margins are excessive and it is observed that the marketing system cannot cope with overproduction, however small. Thus, it would appear from available information about agricultural marketing that perhaps not enough attention has been given to concepts of market performance and behavior. USAID is presently collaborating with the GOP in a comprehensive study of the marketing system intended to answer these types of questions and to identify inefficiencies that can be attacked by specific programs.

Certain general problems which we are reasonably sure have an impact upon the efficiency of the agricultural marketing system are worth highlighting. Inadequate feeder roads delay shipments, increase transport costs, contribute to spoilage, and affect the kind of products to be produced. Farmers typically lack current market information, especially on prices (although this situation is improving). With the exception of a few products sold in export markets, there is little if any formal grading, and standards have not been developed for domestically consumed products. Moreover, much of agricultural marketing of domestically consumed products is done on a very small scale, with the associated high handling costs per unit. And finally, the lack of adequate on-farm or community storage facilities forces small-scale farmers to sell most of their production during and shortly after harvest.

A second observation regards the logistics of moving agricultural production. Three-quarters of all national merchandise moves by road. Although the road system has expanded substantially in the last decade (from 1,345 miles in 1960 to 4,144 in 1972), only 733 miles are paved all-weather roads. Large areas of the country are still serviced by dirt roads which are closed whenever it rains (40 to 130 days per year), complicating transportation of agricultural products. From July 1973 to November 1975, highway freight rates increased from 50 to 100 percent per ton-kilometer. The following table provides data on cost of truck transport in 1975 with comparisons to 1973 costs. The problem of increasing transport cost suggests the need to establish marketing facilities regionally in order to minimize shipping weights by drying or processing products near their centers of production.

TABLE F-4

FREIGHT RATES BY TRUCK FOR 1975

Cities	Distance (miles)	Tariff per Ton US$	US cents per Ton-Mile	% increase 1973-75
Asunción - Cnel. Oviedo	83	7.22 to 8.65	8.7 to 10.4	100 to 140
Asunción - Pto. Pte. Stroessner	203	14.43	7.1	99
Asunción - Encarnación	230	10.82	4.7	50
Asunción - Concepción	345	28.86	8.4	60

c. Constraints to Increasing Small Farmer Income

The foregoing information provides the basis for examining the constraints to increased small farmer income in the Paraguayan context. Constraints could be divided into two levels: (1) basic resource endowments of the country which impinge upon the selection of an appropriate rural development strategy and (2) those particular constraints which have an impact upon the implementation of a given strategy. The following examines both levels of constraints.

(1) Resource Endowments and Rural Development Strategies

At the most basic level, the land and labor resource endowments of a country dictate the type of rural development strategy that may be employed. In turn, the strategy selected provides the framework within which additional capital can contribute to improving the well-being of the rural community. Depending upon the country's resource endowment, there are perhaps three general approaches to rural development.

(a) Intensification of production on the existing agricultural land base: This strategy applies to situations in which there are opportunities for more intensive use of the land already in farms. Such a strategy implies (i) increasing the use of capital or labor resources in the production of current commodities or (ii) changing to more labor-intensive, higher valued commodities. The limits of this strategy are normally set in the first case by

the availability of appropriate technologies to expand production of current crops and in the second by the size of the market for higher valued commodities.

As will be recalled, our target group consists of two types of small farmers, those with inadequate land resources to effectively utilize family labor and those with inadequate labor resources to take full advantage of their available land. To successfully employ a strategy of intensification of production among the first type--"land short farmers"--implies seeking market opportunities for larger volumes of labor-intensive, high-value commodities and the promotion of their production. In the case of the second type, labor-short farmers, new technology is required to extend the area that can be productively utilized by the farm family. This could be accomplished through intermediate levels of mechanization (small machines or machinery services) which extend the area cultivated with available family labor or yield-increasing technology which increases the productivity (value) of labor permitting the farmer to hire additional workers.

(b) Expansion of land resources available to the small farmer: This strategy may be used in a situation where there are larger numbers of farmers with inadequate land resources and, at the same time, opportunities for securing additional land for such farmers through expropriation of underutilized holdings or colonization of unused land. In Paraguay this strategy largely implies colonization of new areas. The limits of this strategy are imposed by the amount of land that can be productively used by the farm family under available technology, the colonists' access to the market, and the resources available to expand production. It would appear that in Paraguay many colonists do need additional resources, improved access to markets, and alternative technology which would permit them to take full advantage of larger land areas. The ultimate limit of the strategy is, of course, the quantity of good agricultural land available for relocating small farmers. Although there are costs incurred in developing new land, in the aggregate, available land does not appear to pose a problem for this strategy in Paraguay.

(c) Creation of off-farm job opportunities: This approach is useful where opportunities exist for increasing incomes through the stimulation of nonfarm employment. It implies either migration to urban areas to seek employment or agroindustrial development in the rural community. The limits of the strategy depend upon (i) the capacity of the urban sector to provide employment to those migrating to the cities, or (ii) upon the market for agroindustrial products (either farm inputs or processed agricultural products).

The large share of employment provided by the agricultural sector and the relatively slow rate of industrial development clearly suggest that the urban sector is ill-prepared to absorb large

numbers of rural migrants. This implies that any emphasis upon off-farm job creation will depend largely upon agroindustrial development.

A rural development strategy in Paraguay can incorporate elements of each of these strategies and, given its resource endowments, is not restricted to one or another. In the long term there are no insurmountable factors inhibiting the overall expansion of farm size as a means of increasing the incomes of our target groups. Farmers leaving the more highly concentrated areas for colonization fronts would leave room for expansion by remaining farmers. Further, certain farmers will find it advantageous to increase their production of high-value crops, especially those farmers located near urban markets, in response to the development of new market opportunities. Finally, the creation of off-farm jobs can certainly benefit both rural and urban job-seekers, and the agroindustrial area appears to offer the best possibilities for generating new jobs. Until such a time when there is evidence to suggest that emphasis on one approach or another will have greater economic impact, it seems prudent to proceed with some degree of balance betwen programs stimulating movement in each of these directions. A simultaneous effort in all three directions may, in fact, be the most indicated strategy. While encouraging colonization can provide opportunities for farmers to acquire larger land resources, not everyone can move at once. This suggests the need for intensification of production on the farms of those left behind. Intensification of production centered around higher value crops, in turn, is dependent upon expanded market opportunities which could emerge from agroindustrial development. Better utilization of land resources both in existing farm areas and in colonization fronts appears to require the availability of appropriate levels of mechanization. Some machines of this type could be produced locally. Finally, colonization area development will require new marketing infrastructure (both for inputs and products), which presents opportunities for the initiation of rural enterprises.

In short, a rural development strategy in Paraguay does not seem to imply the choice between one or another of the basic approaches, but instead involves the selection of activities which attack certain constraints presently limiting the development of colonization area, intensification of production in the minifundia zones, and agroindustrial development.

(2) Specific Farm Level Constraints

The following is a review of various constraints to increasing income as they apply to the situation of the Paraguayan small farmer. These specific constraints are related to his ability to expand the area of land that he is utilizing and the intensification of production on the land he already has in use.

(a) Technology

Clearly, technology is a constraint to both land-deficient and labor-deficient small farms. The low level of production

per agricultural worker and the unused land on a number of small farms signify the need to extend new technologies to the mass of small farmers. These technologies can be of the type (i) which expand output on land presently utilized or (ii) which permit the farm with unutilized land to expand the area which can be managed with family labor. New technology is also needed in colonization areas which permit the farmer to clear and fully utilize the larger land resources which would become available to him.

(b) Stable and Remunerative Prices: As observed earlier, high-value commodities such as fruit and vegetables exhibit substantial price instability. This increases production risks and serves as a disincentive to small farmers who might otherwise be encouraged to produce larger volumes of these products. There are also indications of large marketing margins in current crops suggesting either the existence of market power or, in the case we believe to be more likely, of opportunities for capturing significant economic benefits by modernizing the marketing system. Finally, marketing infrastructure appears to be very limited for certain commodities and in the colonization area.

Increasing demand and stabilizing prices for both new and traditional small farm products involves encouraging specific interventions in the marketing system. There is no magic formula; the market pricing situation is different for each product suggesting the need for various kinds of market interventions. Interventions could vary from local capacity to dry and store grains, to short-term storage for perishables (to reduce daily price fluctuations), to processing. Processing can have two impacts--(i) reducing the impact of seasonal production by processing for off-season sales and (ii) reducing the bulk of products which are regionally produced to lessen the unit cost of transportation included in the final product to the consumer.

(c) Labor utilization: Labor appears to be less than efficiently utilized on small farms. Better utilization of labor on land deficient small farms most often implies increased production of labor-intensive, high-value crops. These are typically perishable commodities subject to considerable price fluctuations and their production implies great risks to the farmer. To encourage farmers to allocate more of their resources to the production of these crops implies improving the marketing situation as indicated above. This asserts that a "demand-pull" strategy is more appropriate to increasing the production of labor-intensive crops than a production campaign.

In the aggregate, there does not appear to be a large pool of unemployed labor which may be drawn upon for farm production. Also noted earlier is the low level of productivity of agricultural labor in Paraguay utilizing present technologies. Among small farmers

with inadequate labor availability (a position in which colonists find themselves as well), intermediate technology involving small tillage and harvesting machines would improve utilization of family labor and would increase labor productivity and family income.

(d) Land: Land is available for small farmers to colonize and colonization is already occurring at a fairly rapid rate in Paraguay. Small farmers appear to be migrating from the minfundio zone to areas where they can obtain larger land resources. Unfortunately, they often are limited in the use of greater land resources by the limit of available family labor and the lack of marketing infrastructure (both for products and farm inputs) in the colonization area. As a result, even given larger areas of land, their production patterns change little from those of farmers in the more densely populated areas. It has been observed that some of the most successful cooperatives in Paraguay are those serving marketing and input supply functions in colonization zones.

(e) Capital: Small farmers exhibit low levels of investment per hectare and a low level of cash expenditures as compared to gross income. They will undoubtedly need additional capital to utilize new technologies and take advantage of improved marketing opportunities. The Mission's project with CREDICOOP is one approach to directly addressing this capital constraint. Reduced prices of inputs and improved prices for products, would indirectly influence capitalization by facilitating the accumulation of capital by the farmer himself.

d. Prioritization of Farm Level and Support System Constraints

In order to attempt to identify and prioritize the major problems confronting small farmer development in Paraguay, the USAID/Paraguay staff and officials from the Paraguayan Ministry of Agriculture held several joint workshops. As a result of these workshops and a review of the draft Small Farmer Sub-Sector Assessment, the following constraint areas were identified; they are presented here in approximate order of priority. Chart F-1 was prepared in an attempt to relate farm level constraints system, level constraints, and the constraints faced by public and private sector entities which have a role in alleviating the problems found by small farms. The numbers on the chart represent the Mission's best judgement of the priority of the constraint. It should be noted that the numbers reflect the priority ordering of the problem area in general, inferences should not be drawn regarding a specific project from the chart. For example, the chart indicates lack of credit services as an important problem, and the lack of sound operational concepts as the most critical problem with cooperatives. In general this is believed to be the case, but to infer that CREDICOOP lacks a sound operational concept would be erroneous. Secondly, the numbers on the chart indicates an assessment of the priority of the problem only and are not intended to indicate the ease or difficulty in attacking the problem.

(1) Farm Level Constraints

Since the farm level constraints characteristic of each of the target groups has been discussed in other sections, only a brief summary follows.

Farms in the traditional area with less than five hectares are definitely constrained by the size of their landholding. The alternatives, for long term growth in a farmer's income, are for such a farmer to migrate to one of the colonization zones (where he would face a different set of problems) or to intensify his production on existing land. One approach to intensifying his production is to change to higher value crops. This change will require improvements in the marketing to cope with the small domestic market, its seasonality and price fluctuations. Another approach to intensification would be through multiple cropping systems which maximize output on limited areas. Multiple cropping systems will undoubtedly include non-traditional crops which again present a market problem. For these reasons the first order constraints on this size farms are believed to be his small acreage and the market he confronts. Lack of capital then enters as the second most binding constraint to his economic progress.

Farmers in the traditional area with five to 20 hectares are constrained, in our best judgement, by lack of labor rather than land. Family labor is not adequate to manage more than a portion of their acreage and there does not appear to be an abundant supply of cheap labor. Further, with existing technologies the productivity of labor is low suggesting another reason why farmers do not hire additional labor on the going wage or bid up the wage level to obtain additional labor. The lack of adequate marketing infrastructure is considered a high priority constraint for this category of farmers. Although it is generally agreed that the marketing system is not functioning well, the information required to pinpoint the form that malfunctions take is not presently available. Some participants in the discussions leading to the analysis believe that the problem is the lack of physical facilities--grain storage, dryers, etc.--at the farm and community level. Poor roads are also considered a deterrent to efficient marketing. Others believe that the marketing channels are not efficiently organized or that private marketers need capital for expansion. In summary, it is generally thought that the market system as it is presently operating does not permit farmers to respond to the market opportunities that exist (especially for export products), but the problem requires additional analysis. Once adjustments for these constraints--lack of labor and marketing--are made, it is believed that capital will be limiting.

Farms in the colony areas are roughly equivalent to five to 20 hectare farms in the traditional areas in terms of the constraints

CHART F-1 - RESOURCE, SYSTEM LEVEL, PUBLIC SECTOR AND PRIVATE SECTOR CONSTRAINTS AFFECTING SMALL FARMER INCOME: TENTATIVE ASSESSMENT OF PRIORITIES

Basic Constraints	TARGET GROUP: Traditional Farms 0-5	Traditional Farms 5-20	Colonization Farms 0-20
1. Land	1	--	--
2. Labor	--	1	1
3. Capital	2	2	2
4. Market	1	1	1

Key:
1.= Highest Priority
2 = Second Level Priority
3 = Third Level Priority
-- Not viewed as important

System Level Constraints	Traditional Farms 0-5	Traditional Farms 5-20	Colonization Farms 0-20
Poor Roads	2	2	2
Inefficient Marketing system	3	1	1
Lack of Agro Industry	1	3	3
Restricted Export Market ...	2	--	--
Lack of: Land Saving Techn.	1	3	3
Labor Saving Techn.	--	1	1
Inadequate Credit Services	2	2	2
Lack of Farmer Organization	--	--	3
Lack of Land Titles	3	3	--

PUBLIC SECTOR INSTITUTIONS

System Level Constraints	Research Service	Extension Service	Credit Services	Road Const. Maintenance	Marketing Services	Land Titling
Poor Roads	--	--	--	◆	--	--
Inefficient Marketing system	--	--	◆	--	◆	--
Lack of Agro Industry	--	--	◆	--	◆	--
Restricted Export Market ...	--	--	--	--	◆	--
Lack of: Land Saving Techn.	◆	◆	--	--	--	--
Labor Saving Techn.	◆	◆	--	--	--	--
Inadequate Credit Services	--	◆	◆	--	--	--
Lack of Farmer Organization	--	◆	--	--	--	--
Lack of Land Titles	--	--	--	--	--	◆

Public Sector Constraints	Research Service	Extension Service	Credit Services	Road Const. Maintenance	Marketing Services	Land Titling
Inadequate Budget	1	1	3	1	1	3
Lack of Trained Personnel	2	2	--	--	3	--
Poor Administration	2	2	--	2	--	1
Policy	--	--	1	--	--	--
Inadequate Problem Analysis	--	--	--	--	1	--
Inadequate Operational Concepts	1	1	2	--	--	2
Lack of Operational Unit	--	--	--	1	2	1

Private Sector Constraints	Private Entrepreneurs	Local Communities	Coops/ Association
Lack of Organization	--	2	2
Lack of Administrative capability	--	--	3
Lack of operational concepts	--	1	1
Lack of Technical Assist.	2	--	3
Lack of Credit	1	--	3

◆ Most immediate responsibility

◆ Important contribution

faced. Such farms are characterized by underutilization of land related to the inadequacy of family labor, using present technologies, to handle larger areas. Further, the colony farmer must divide labor between production on cleared land and clearing additional land. Marketing infrastructure is generally lacking in these areas, which is considered a priority constraint. Lack of capital is again considered an important constraint, but of slightly less immediacy.

(2) Systems Level Constraints

(a) Technology: The development and diffusion of appropriate small farmer technologies was ranked "highest priority" among the system level Constraints. Differing technologies must be adapted specifically to the needs of differing target sub-groups, i.e. appropriate labor saving technology must be developed for the labor short farms of more than five hectares and colony areas, and land intensive cropping practices must be developed for the land constrained Central Zone minifundistas. Although research facilities are fairly well developed in Paraguay, yielding information on new varieties, fertilization and cultural practices (see p.409), there exists a need to develop small farm centered-as opposed to crop centered-research. Small farmer cropping options and practices need to be carefully evaluated from an agro-economic, social and whole farm perspective, and suitable recommendations developed.

Closely related to the development of better small farm technologies is their extension. Although the Paraguayan extension programs have expanded considerably over the past few years, they still service only about eight percent of the farmers in the Eastern Region (p. 420). Communication problems apparently exist between researchers and extensionists who tend to differ markedly in educational and cultural background (p. 417). Thus even in those limited instances where appropriate technology is available and locally tested, there are deficiencies in the dissemination system and researchers apparently do not get appropriate feedback.

(b) Marketing: Marketing problems were also ranked among the "highest priority" of constraints facing small farmers. At the systems level, marketing as a category has been broken down into three types of problems: (i) inefficient marketing systems; (ii) lack of agro-industrial development; and (iii) restricted export market. Inefficient "marketing systems" is intended to mean that although this is a functioning marketing channel through which products move from producer to consumer, this channel is relatively high cost on a per unit basis and does not facilitate the expansion of production in response to market demand.

Although inefficient marketing systems are a problem for farmers within the zero to five hectares range, it appears to be most critical to establish the agro-industrial enterprises required to permit these farmers to shift to higher value--in most cases

perishable--products. Improving the efficiency of marketing of traditional crops would appear to provide much less impact upon the incomes of small farmers with limited acreage than the introduction of enterprises which expand and stabilize the market for high-value perishable products. For this reason "highest priority" among marketing problems was assigned to lack of agro-industry for the smallest farmers. Following the same logic "restricted export market" was assigned "second priority". As Agro-industrial capacity expands it may be expected to confront problems associated with the small domestic market. At such point, agro-industries will have to seek export market opportunities to maintain a reasonable rate of growth of the industry. Export markets for perishable products have not been developed to any large sense, but in the sense that they have not been developed to any large degree. An aggressive effort would need to be made to find export market opportunities for products that can be produced by small farmers and organize their production to provide the quantities demanded.

For larger farmers in both the traditional and colony zones, the highest priority constraints appears to be the inefficiency of the marketing system dealing with presently produced crops. Contributing to the inefficiency is the lack of storage and drying facilities in the country-side, low volume operations of assemblers and sub-assemblers, lack of market coordination, and perhaps lack of credit for cooperatives and private marketers. Lack of roads also contributes significantly to high marketing and transport costs.

Access to the export market does not appear to be limited for crops produced on the farms from five to 20 hectares. High marketing and transport costs in placing products in the export market appears to be the critical point in expanding production for export. Thus, high transport costs, high assembly costs, and disproportionate spoilage all cut most directly into small farmer income, and when added to high river shipping and fuel costs, they seriously constraint production options as well as income.

(c) Poor Roads: Across all types of small farms, roads are considered an important constraint. The lack of all-weather roads seriously affects market access-both inputs and products--at critical times during the agricultural year. Given the limited mileage of roads currently existing in the country, this is a constraint which will need to be dealt with continually over a long period of time.

The problem is not simply a matter of constructing all-weather roads, but of maintaining and upgrading secondary access roads. It is the Mission's agreement that much can be gained from upgrading and maintaining access roads such that they are passable by motor vehicle, even though they are not adequate as all-weather roads. Access to farming areas by truck and bus in good weather would vastly improve transport and communications over much of the country.

Poor roads was indicated as a "second level" constraint not because it does not require attention, but because alleviation of this constraint is not necessarily considered as the first step required in a chain of events to improve the well-being of small farmers. It is, indeed, a constraint to expanded production and merits attention over a long period of time.

(d) Inadequate Credit Services: To date the USAID has no definite evidence that the availability of institutional credit is a first priority constraint in Paraguay's small farmer subsector. The USAID is presently studying this question using a new farm level survey which, among other things, will compare the rate of growth income of credit union members versus a control group of non-members for the 1973-76 period. Evidence from previous small farmer surveys did demonstrate that small farms in Paraguay are severely undercapitalized and that average rates of return on farm capital are high. Indications are that additional credit may be needed to intensify land use in the minifundio zone (p.337). It is in the colony zones where credit programs might have an even greater impact. Here capital is sorely needed for land clearing and building construction.

At the present time, however, it appears that there are limited opportunities to invest in new, profitable and small farmer appropriate technology. It is felt that the impact of small farmer credit programs would be much greater if they were a vehicle for technological improvement. CREDICOOP, in fact, has had some successful experience with this approach.

With the exception of AID-financed CREDICOOP, small farmer credit programs in Paraguay have a very mixed history, with high default rates and administrative costs. In addition, there exist certain policy and institutional constraints, discussed in the following section, which miliate against a major new USAID initiative in the production credit area at this time. It is thought, however, that toward the end of the present 3 to 5 year DAP II planning period, if some appropriate technologies and approaches to the small farmer's problems are proven, that the lack of institutional production credit may become a major constraint.

An area of rural finance that is not as severly constrained as the production credit area, is the rural enterprise credit area. It is expected that during the next 3-5 year period the shortage of credit resources in this area will again become a constraint to the development of agro-industrial support activities such as marketing, processing, and input supply. Given Paraguay's limited internal market for primary agricultural produce, and the continuing need to transport high value to weight agricultural products, the agro-industry area will continue to be a key area.

(e) Rural Organization: Rural organization is not perceived by the AID Mission as an end in itself in the Paraguayan

environment. Nevertheless, the relative lack of rural organizations such as cooperatives does limit the options for extending rural development programs, especially in the colony zones. The priority concern at this time in this area should be the identification of agricultural support activities and approaches that organizations can effectively perform for small farmer members.

(3) DAEC Concerns

When the DAEC reviewed the draft Small Farmer Sub-Sector Assessment on March 29, 1976, it made certain suggestions as to what should be treated in the assessment's constraint section; these suggestions were summarized in STATE 091869. Many of these areas have been dealt with in the previous section. "The GOP policies--stated and unstated--in the sector and their impact on small farmer development including planned budget outlays for programs benefitting small farmers" are considered to be so important by the USAID that it merits the special attention given to it in the following section. The others which the USAID does not consider priority problem areas or constraints are dealt with below.

(a) Land Tenure Arrangements: Land tenure, while not presently considered to be a high priority problem may become an increasingly important one. The principal problem centers around the lack of titles among many small farmers. The barriers to receiving titles are administrative and financial. Farmers must go to Asunción or Encarnación to process the papers, and fairly high fees are involved. Title searches and other paper work may often require a lawyer's services which further increases the cost. In general, the entire administration of titling is not well organized, the records are not well kept, and the procedures are little known to the public.

Though not well documented, the following seems to be true:

-- Lack of titles is so widespread among small farmers that it is almost accepted as the norm. If asked, the farmer expresses little concern. Untitled land is bought and sold.
-- In the central minifundio area there appears to be a relatively large number of abandoned farms. It appears that farmers with untitled land are reluctant to improve or build structures on the land. Thus, it is easy to move on when the soil is depleted.

-- Farmers without titles can not get bank credit. This fact does not seem sufficient incentive to get titles. However along the Brazilian border, there have been several cases where Brazilians have bought up the land titles as a way to acquire land. They have then had to try to evict the "occupants", people who also had paid for their land and claimed ownership by virtue of use.

-- Owners who rent their land to other are reluctant to let the renters use any particular parcel for five years. After this period, renters begin to have rights as "occupants." The result is that the renters have no incentive to improve the land under the short-term as "occupants." The result is that the renters have no incentive to improve the land under the short-term arrangement.

Two research projects are now underway which will clarify some of these observations. First, the area frame sampling program is updating 1965 property maps. It will show some of the ownership, rental, and "occupants" changes that have occurred over the 10 year period. Second, the AID property survey program (cadaster program) should show the type of ownership existing (with or without title). Neither of these programs was designed to focus on the tenure problem but they should shed some light on it.

(b) Labor Demand and Utilization: It is estimated that the average Paraguayan family can supply slightly less than the equivalent of two person-years of labor. With family labor alone, it can handle in most crops and given present technology up to 6 hectares of crop land, with a total acreage up to 10 hectares. Farmers holding more than 10 hectares generally hire labor during peak demand periods (p. 213). Small farms in the central minifundio area do not have enough land area to fully absorb available family labor. Some of this excess minifundio labor is absorbed by larger farms which have complementary cropping patterns to small farms, e.g., the labor demands for corn and cassava are complementary to cotton.

In general, small farms with the diversity of crops such as is common in Paraguay are able to a certain degree to spread their labor demand over the year. For example, citrus is harvested in July; peak demands for cotton are February through April; peak demands for corn are May to July; for cassava the peak demand is in August to October. In spite of this relative balance, we have reports but no solid evidence that, at certain peak times of the year agricultural wages may be bid up by a factor of five, which tends to indicate that the available labor pool is a small one. In the colony areas this problem appears to particularly acute. Because in the colony areas there is less of a size mix than in the central minifundio area, peak labor demands in the colony areas necessitates labor inflows from outside of the areas; there is no evidence of a significant migrant stream of agricultural laborers to fill this type of need.

(c) Nutrition: As pointed out on page 28 of the draft Small Farmer Sub-Sector Assessment, deficiencies exist in the intake

of certain vitamins and minerals such as riboflavin and iodine. This is due primarily to the low consumption of vegetable and dairy products. The Nutrition Survey undertaken in Paraguay by the U.S. Public Health Service in 1965 indicated that at that time the outstanding deficiency was iodine; 25% of the population had visible goiter. It is the Mission's understanding that at the present time the sale of non-iodized salt continues in Paraguay and that this significant nutrition problem has yet to be resolved. The study concluded: "average consumption of calories and nutrients was invariably satisfactory. However, among the wide range of values about the means, those households at the low end of the range demonstrate that pockets of under and even malnutrition do exist in many areas. In general, the nutrients least abundant in the Paraguayan diet were riboflavin, vitamin A, and calcium. Although no hard current information exists, there is a body of informed opinion which maintains that because of the increase in meat prices since 1965, the quality of the average Paraguayan diet has suffered some deterioration.

It can be tentatively concluded, however, that such nutrition problems as do exist in Paraguay are not of an aggregate food supply nature, i.e., the average caloric and nutrient intake levels are no doubt adequate. Poor and perhaps even malnutrition may exist among vulnerable population groups, however, at the present time the Ministry of Public Health and Social Welfare is carrying out a nation-wide comprehensive nutrition survey and it is expected that at least preliminary results from this survey will be available within the year. The Mission plans to take these survey results into account during its DAP revision process to determine what AID strategy, if any, in the nutrition field should be formulated.

(d) Colonization and Migration: From 1962-72 there was a movement of population out of the minifundio zone into the new settlement areas (p.27 and p.365). The colonization program is an important part of the GOP's effort to expand the country's agricultural land base as a means of increasing total production. This program is the way in which the GOP is instituting their land reform as well as providing small farmers the opportunity to expand their land holdings. The new survey of small farmers will address the migration question and also include colonists in the sample (who were not included in the previous survey).

(3) Public Sector Institution Constraints

The Mission has also attempted to identify and establish priorities on the constraints faced by public sector institutions which should provide services to the clientele farmers. The following is a brief summary of our conclusions.

(a) Research and Extension: It is believed that the most important constraint facing public sector entities which provide research and extension services is lack of an adequate budget (see budget analysis in the following section and Annex F-1). Ranking also very high among constraints is the lack of adequate operational concept. In terms of research, a research program oriented toward creating new farming systems for small farmers rather than present crop oriented research is believed to be necessary. Secondly the research should be founded upon a thorough knowledge of what practices small farmers are presently using. Innovations developed from this base should be tested for their adaptability to small farmer conditions. For extension, new concepts must be developed to multiply the number of farmers reached by the limited number of extension agents, augment their role as local change agents (as opposed to simply diffusing information), and integrate them more closely with researchers.

Increasing the number of trained personnel and improving the administration of activities are thought to be the second order of magnitude among necessary improvements in research and extension.

(b) Credit Services: The lack of a national policy designed to assure continued credit adequate to the growing needs of small farmers is the highest priority constraint (see Policy section). Second priority is the lack of an operational concept of how to distribute relatively small loans to a large number of farmers at minimal administrative costs and still assure reasonable levels of repayment. The alternative might be to subsidize administrative costs and included a budget item for such a subsidy. Only after these priority problems have been resolved does additional capital, to be channeled through the public sector, become the binding constraint. The Credit Union experience should provide some guidance for developing operational concepts for other lines of credit directed at small farmers.

(c) Road Construction and Maintenance: The major problems associated with this area of public sector activity appear to be limited budget, especially for maintenance and upgrading of secondary access roads. Of equal importance, with respect to feeder roads, is the lack of a centralized operating unit to coordinate maintenance programs. A second level of constraint is assumed to be lack of administrative capability within the Ministry of Public Works sections related to road construction and maintenance. This concern is presently being examined in preparation of the Project Paper for the Mission's proposed Rural Roads Loan.

(d) Marketing Services: To Paraguay's credit, a considerable amount of attention has been given to marketing. The Marketing Department within the Ministry of Agriculture has undertaken various studies of the marketing system which are basic to policy making. Yet,

the work accomplished to date, although of professional quality, is not adequate to provide a comprehensive understanding of the functioning of the marketing system. There is a need for more comprehensive analysis of the marketing system upon which plans for marketing improvements can be based. Too little is known about the costs of performing various marketing functions and what types of economies could be obtained by introducing alternative marketing practices. This is essential information if rational marketing programs are to be developed to assist small farmers. For this reason "inadequate problem analysis" is noted as one of the highest priority constraints to the public sectors' efforts toward improved marketing.

Budget levels for the Marketing Department is also a major constraint. The 1976 budget level, which is up substantially from 1975, is roughly US$103,000 to cover all activities.

Since the expansion of agricultural production in Paraguay is very dependent upon exports (which is equally true of small farmers as large farmers), there is a need for up-to-date market information and reasonable projections for major export commodities. In addition, the size of the domestic market for high-value perishable products suggests that new market opportunities should be sought to provide greater opportunity for expansion of production of these commodities in the minifundio area. The smallest of our target group farmers would benefit from additional demand for products which they could produce using labor intensive methods on their limited land areas. Assisting marketers and processors in locating export markets for these commodities would contribute as well to agro-industrial development. Since the Marketing Department does not have an operating unit to focus upon export questions, this is considered an important constraint to the services it can provide to small farmers.

Finally, expanding the capacity of the Marketing Department to provide the services which would result in improved marketing conditions for large numbers of small farmers will require additional trained personnel.

(e) Land Titling: The lack of clear titles to land is very common in Paraguay. Interestingly enough, the problems appear to be more closely associated with the process of recording titles and the institutions related to title registry rather than with the land reform agency (which focuses on sttlement programs). Although the land titling process is still inadequately understood, poor administration, high cost to the farmer and overcentralization of activities (lack of units which can adequately process titles

within reasonable proximity of small farmer communities) in Asunción and Encarnación appear to be critical constraints. Nor does there seem to exist a reasonable operating concept of how to reach and rapidly process titles for the large number of small farmers who should have them.

(4) Private Sector Entity Constraints

Private businessmen and cooperatives can contribute to the alleviation of a number of constraints facing the small farmer (see Rural Enterprise Loan paper). Among the private businessmen the major constraint seems to be credit. The study leading to the Rural Enterprise Loan identified a number of entrepreneurs who were willing to undertake a wide range of agro-industrial activities. The task appears to be one of directing credit programs toward those activities which most benefit small farmers. Next to the lack of credit, the lack of technical assistance may be the most important constraint facing individual businessmen.

With respect to cooperatives, especially those consisting of small farmers, the constraints take a somewhat different form. Most observations of cooperative programs suggest that the successful experiences are related to one or more factors, such as a clear definition of the problem the cooperative will address, strong leadership, and adequate scale of operations so that capitalization can occur at an acceptable pace. The failures seem to be related to cooperative projects which focus too much upon the theory of cooperativism and have not addressed an adequately understood set of problems, have not functioned in a business-like manner (ignoring costs, pricing services to members too low to capitalize themselves, and depended too much upon donations and subsidies), and have been too small to be able to overcome short-term economic setbacks. To the best of our information, a firm body of knowledge and concepts to guide cooperative development is still to be developed. Developing sound operational concepts appears to be the first order of business in creating strong cooperatives.

A second level constraint is the lack of organization of cooperatives in such a way as to obtain the scale of operations which permit efficient functioning and capitalization at an acceptable pace. It appears doubtful that small individual cooperatives with limited membership and capital can be a useful source of services to farmers over the long term.

Once these very general levels of constraints have been resolved, more traditional types of constraints such as lack of credit, technical assistance, and administrative capability become important concerns.

Finally, a column was included in Chart F-1 termed "local community". It is assumed that rural development efforts will function better if the community is organized to respond to the services being offered by the public sector. Further, development efforts at the local level will be more effective if the community can mobilize some part of the human and capital resources required.

2. GOP Sectoral Plans, Objectives, Policies, and Programs and their Relationship to the Identified Constraints

A. GOP Sectoral Plans and Objectives

According to official GOP planning documents such as the 1971-1975 National Economic and Social Development Plan, agricultural and agro-industrial development are considered by the GOP to constitute the basis for the future economic development of Paraguay. Although the new GOP development plan is still in the process of being elaborated, it is not expected that there will be major shifts in basic GOP sectoral strategy or objectives. Present GOP plans are discussed in detail on p. 338-340 of this Assessment. The GOP sectoral objectives, problems addressed, and means to reach the objectives are presented in chart which is included as Annex E-1.

Although the final objective of the Plan is identified as the "well-being of the producer", an articulated small farmer strategy, as such, is not its principal thrust. In spite of this lack of articulation, the Plan gives emphasis to such small farmer concerns as agrarian reform, marketing, and credit. The Plan also emphasizes the importance of extending essential services to small farmers by means of cooperatives and other specialized small farmer entities, as well as the need to reform the agricultural credit system to assure the wider participation of the private sector.

B. Sectoral Policies

The overall strategy behind GOP policy in the sector has been sectoral growth based on encouraging exports and development of new lands. This is a general policy framework which the Mission finds to be rational given Paraguay's small internal market for agricultural products and its relatively abundant land resources.

Although GOP policy generally supports this strategy, certain policies may be in partial contradiction to the overall strategy. Some possible disincentive policies that the Mission has been able to identify are fiscal, regulatory, land title related, and credit related.

1) Fiscal Disincentives

There may exist in Paraguay fiscal disincentives to growth in the agricultural sector. There are export taxes, for example, which in 1976 are running about 10 percent of total revenues. This includes export taxes, monetary transaction taxes, stamp taxes on export contracts and possibly other similar charges. It is not felt

that the tax is an important production disincentive. On soybeans, for example, the rate is low and a large proportion of the crop is exported tax free by exempt cooperatives. In the case of meat, the rates are quite high. In all cases, the impact is softened by the large proportion of products that are exported illegally; anywhere from 35-50 percent, depending on relative prices in neighboring countries.

While difficult to substantiate, there is a general feeling that the burden of export taxes falls most heavily on the small farmer. There are two reasons for this. First, small farmers are large producers of exports, principally cotton and tobacco. Second, small producers have less opportunity to export illegally. Large producers, using their own trucks, or through arrangements with truckers, have more control over the channels by which their products leave the country. Thus, they appear to have a better chance for tax avoidance.

2) Price Regulation

Two types of government price regulations affecting agriculture exist in Paraguay, one is the imposition of maximum prices retailers can charge for selected products and the other attempts to set minimum prices paid to farmers. Essentially they are intended by the GOP to control marketing and processing margins in areas where the free market is suspected to be an inadequate mechanism.

Certain basic food products have GOP set maximum retail prices. There is no evidence, however, to suggest that these maximum prices serve as production disincentives as shortages do not regularly occur in the regulated commodities. The only recent shortage has been in sugar during the recent world shortage. This shortage resulted from excessive exports which were based upon poor crop forecasting.

The GOP has also attempted to set price minimums to producers especially in cotton and soybeans. Because these prices are basically determined on the world market, the GOP could not force marketers to purchase when the world market prices dipped. The result was disorder in markets and many illegal sales made by farmers who were anxious to dispose of their products.

The GOP sets both these maximum and minimum prices by fiat. It has not had commodity purchase programs or buffer stocks to effectively regulate farm level prices. It is our best understanding that for the present at least the minimum price program has been scrapped because of ineffectiveness. The maximum price policies seem more effective but prices are apparently set at a level which approaches a competitive market equilibrium.

All in all, available evidence indicates that GOP price policies, even if they were to be made effective, would notconstitute serious disincentives to production nor adversely affect small farmer income.

3) Land Titles

As stated previously, the cost and difficulty of obtaining land titles is a serious policy problem area. The lack of titles seems to inhibit capitalization and efforts at land improvement. At the present time the lack of generally satisfactory titling is a barrier to an expanded agricultural lending program through the private banking system in which colateral based lending is the norm. The problem is so general in the noncolony areas as to constitute the general norm. With movement out of the minifundia area into the colonies, many farms in the central zone are being abandoned - these are often farms whose titles are obscure. To date, there has been no concerted GOP effort to minimize the obstacles which exist to obtaining titles. Also, the cost of paying back taxes to cleer up titles maybe is a major disincentive.

4) Credit Policy

As discussed on p.253-273, the institutional credit going to small farmers is very limited in Paraguay. Almost all institutional credit for agriculture goes through "official" channels. As noted on p.255, commercial banks held only about 13% of the outstanding agricultural credit portfolio in 1973. The balance came from the Fondo Ganadero, and the Banco National de Fomento. Average loan sizes from these programs indicate that they are not serving the target group. Among small farmers, those having less than five hectares in crops, only 15.5% used any credit at all and over 80 percent of this credit came from "local businessmen". The only "official"small farmer credit program which truely reaches small farmers is that of Crédito Agrícola de Habilitación (CAH) which has an extremely limited clientele (about 4000 farmers). All indications are that a large unmet credit demand exists on the part of small farmers.

There exist, however, serious credit policy constraints which limit the expansion of small farmer credit. First, conservative Central Bank rediscount policy coupled with conservative commercial bank collateral practices (both of which are discussed at length in the Mission's Rural Enterprise PP) channels commercial bank lending mainly to large farmers. As a result, large farmers dominate the "official" credit sources.

Second , interest rate limitations at 12 percent are too low to cover lending and capital costs. While administrative fees are added on,there have been problems of capital erosion. This

was very serious in the 1972-74 period when inflation averaged around 25 percent*. In 1975 and the first part of 1976, it was down to around 12 percent but capital erosion is still occurring.

Third, collection policies and practices have in the past been poor, further complicating the decapitalization problem. In fact, the combination of factors has been sufficient to put the BNF into a severe liquidity situation.** As a result, it is now undergoing a major management and financial reorganization. The decapitalization problem of CAH, the small farmer specialized credit institution, has been even more acute. It has had even lower loan recuperations and interest rates than the BNF. As a result of these administration problems CAH has been reluctant to expand its line of credit. Funds apparently have been available from the central bank. In fact, at the present time, the only bright spots in the rural finance area seem to be the CREDICOOP Program.

It is clear that the current GOP credit policy poses serious obstacles to the expansion of much needed small farmer credit services. This Assessment indicates that low levels of small farmer capitalization are a significant problem in Paraguay. Well conceived small farmer credit programs coupled with the dissemination of appropriate technologies could have significant positive impacts. Clearly, a fundamental reassessment of agricultural credit policy should be a GOP priority concern over the next several years.

C. GOP Programs in Constraints Areas

1) Roads

Even though Paraguay's road mileage more than doubled between 1960 and 1968, from 2,166 Kms. to 6,168 Kms., new construction has leveled off significantly. From 1968 to 1974 total road mileage (including paved, gravel, and dirt) increased by only 513 Kms.-- an increase of about 8%. Most of this addition was in dirt roads.

In the 1971-1975 National Economic and Social Development Plan the GOP committed itself to promote the construction of access roads to agricultural and forestry areas, especially to existing and future colonies. Progress toward achieving this objective appears to have been slight. The major road projects now being developed (see p.35) are primarily the paving and enlarging of major highways and the Trans-Chaco highway. Feeder roads in the small farm areas have not been emphasized.

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* Based on Wholesale Price Index, Table G-5

** It was reported in ABC, July 29, 1976, that the World Bank is withholding further loans to BNF until their collection of cereal production loans improves.

Feeder roads provide access by motorized transport closer to the small farmers. This does not necessarily eliminate transport by ox cart. It does reduce long hauls by ox cart which tie up men and equipment during peak demand periods.

An important barrier to the GOP improving feeder roads is the lack of effective centralized coordination within the Ministry of Public Works and Communication (MOPC) for feeder road maintenance. Within the MOPC is the General Directorate of Road Committees (GDRC). The GDRC supervises local committees of elected officials who are responsbile for maintaining rural and nonnational roads. The local committees have the power to conscript seven days labor or ₲400 (around $3.50) from each male resident of the community. Although only a small number of residents contribute labor most of the others pay the ₲400 charge. Income from this charge in 1976 is estimated at about $250,000 in addition to whatever labor is actually conscripted. In 1976 resources going to the GDRC are approximately $95,000, of which approximately $33,500 is salaries and $32,600 is for office equipment. The rest presumably went into maintenance works.

The National Office for the Coordination and Integral Planning of Transport is in charge of transport policy and responsibility for the formulation of a National Transport Plan. However, little attention has been focussed in a systematic way of the selection, construction and maintenance of agricultural feeder roads.

2) Technology

Although some progress has been made by the GOP in the agricultural crop research area, funds for research were only slightly more than $250,000 in 1976. Resources destined to the agricultural crop extension area are also relatively meager, totalling about $552,674. In general, it can be said that neither MAG's research or extension activities have a small farmer focus. There also exists within MAG a cotton and tobacco unit whose primary functions are quality control and promotion. It carries out some research and extension work in cotton and tobacco which are the two most important cash crops for Paraguay's small farmers. The budget of this program totaled $84,000 in 1976.

3) Finance

The GOP's credit programs and their problems were discussed in detail in the previous section under credit policy. It is sufficient to state here that the vast majority of agricultural credit does not go to small farmers and that significant policy and institutional changes will be required to build a viable institutional credit system in Paraguay with more than token coverage.

4) Organization

Aside from CAM and CREDICOOP affiliated groups, both of which have limited target group coverage at the present time, almost no small farmer organizations exist. There does exist a Department of Cooperatives in the MAG, whose ostensible purpose includes the development of cooperative institutions in the agricultural sector. It has some cooperative legalization and regulatory functions. The Department of Cooperatives only has 15 employees and a 1976 budget of approximately $27,000 of which approximately $24,000 is for salary costs. Clearly with these limited resources its ability to carry out its functions, especially in the promotion area is very limited.

One important institution in Paraguay's rural areas is the local municipality. Often, it is the only source of public services to the rural populace. It has the advantage of bringing the governmental institution closer to the rural populace and has some degree of taxing power and governmental authority. Generally speaking, the potential of using local governments as development agents and as suppliers of services to the rural population is only gradually being understood in Paraguay. Unfortunately, the resources and administrative skills at this level of government tend to be meager. It is never-the-less a traditional local rural institution whose potential has often been over-looked in the past.

A positive factor that is beginning to animate these market towns is the Municipal Development Institute. This institution, which provides credit and technical assistance to the 165 market towns, was created in late 1972 and provided seed capital by an AID loan.

Since its creation it has provided 100 training courses to 1,500 municipal leaders from 160 market towns. MDI has also approved 87 loans for projects such as development of tourism, street paving and construction of slaughterhouses and public markets. Since almost all of these projects are self-liquidatory and much of the training given has emphasized improved tax collection and budgeting methods. The leaders of many of these towns are beginning to think in economic terms and run their towns like a business.

In the future MDI plans to provide assistance to these towns in employment generation. It will help towns determine what industries could exploit successfully the various locations and assist the towns to finance the infrastructure needed by a firm that is willing to establish itself in the town.

Low levels of funding for almost all GOP efforts which affect the critical sectoral constraints are perhaps the single

biggest obstacles to relieving the constraints. In 1976 the budget of the various public sector institutions directly related to agriculture was 3.6% of the national budget. This is down from 1971 when agricultural sector related public expenditures was 7.3% of the national budget. The 1971 through 1976 budgets in constant terms are presented in Table F-5. In Table F-6 these agricultural sector budgetary figures are related to other important Paraguayan budgetary and economic indicators. It would seem from analyzing these data that the sector which produces 35% of the GNP and which accounts for over 95% of exports should receive more than 3.6% of the national budget. Furthermore in 1971-1976 period the total national budget grew at a rate that was almost five times as fast as that of agricultural sector related institutions.

Even though the general budgetary situation has improved somewhat in the sector over its 1974 levels, the lack of operating funds for travel, supplies, etc. seriously inhibit GOP activities in the sector. Further, it is the Missions experience that public agriculture sector entities are unable to retain trained personnel due to salary problems. This situation seems to apply to almost all of the units in the sector with the possible exception of CAH (Small farmer credit). The result is that even when GOP institutions have sufficient funds to maintain a staff of reasonably capable personnel, there are insufficient additional resources to permit them to carry out their jobs. It is absolutely essential for the proper functioning of GOP programs in the sector that this budgetary problem be dealt with. Further breakdown and analysis of the budgetary situation is found in Annex E-5 of this Assessment.

TABLE F-5

Budgets of Various Entities Working in Relation to Agriculture, in Dollar Equivalent of Constant 1970 Guaranies

(000 dollars)[a]

Year	1971	1972	1973	1974	1975	1976
Wholesale Price Index	112.9	133.8	167.0	221.0	249.7	254.3[b]
Budget of MINAG	1,956	5,060	3,092	2,279	2,324	2,476
Budget of IBR	1,275	1,024	797	723	941	1,015
Budget of CAH	306	372	525	410	650	856
Budget of BNF Agric. Development	1,867	402	1,434	1,528	1,888	2,303
TOTAL	5,405	6,858	5,848	4,940	5,804	6,650

a/ A constant exchange rate of 126 guaranies per US dollar is used.

b/ As of June 1976

Source: Government Budget for 1971 to 1976

TABLE F-6

Comparison Between the Different Parameters in Dollar Equivalent

of 1970 Guaranies

(000 dollars)

	Year						Average Annual Rate of Growth
	1971	1972	1973	1974	1975	1976	
MINAG Budget	1,956	5,060	3,092	2,279	2,324	2,476	4.8
Budget of Various Institution in Agric.	5,405	6,858	5,848	4,940	5,804	6,650	4.2
National Budget	73,968	77,226	63,374	133,059	156,569	184,682	20.1
Value of Ag. Production	195,420	198,090	224,750	212,970	NA	NA	2.9
Value of Ag. Exports	58,902	64,416	76,647	78,723	NA	NA	10.2
GNP	588,640	574,770	596,130	603,380	NA	NA	0.8

3. Mission Intervention Strategy

There are perhaps three basic types of programs in which capital infusions directed at alleviating the constraints facing small farmers might be made. For the purposes at hand these types of programs will be called (1) institution building programs, (2) infrastructure programs, (3) economic expansion activities. Institution building types of programs will be defined as those which build the institutional capacity to provide critical services--new technology research and extension, marketing analysis and services, and improved seed multiplication and dissemination are examples. The approach to institution building programs the Mission intends to undertake is to focus upon building an institutional capacity to deliver specific services (which can be measured), not to build institutions as an end in itself as measured against abstract goals of how a "modern" institution appears. Infrastructure programs have as an end product a durable public good--the best example being roads--or durable privately owned facility that provides a certain service to the community at large--such as grain drying/storage facilities. Economic expansion programs are those which provide funding for individuals (on a national or area basis) to expand the level of their economic activities and increase private incomes--farm credit programs are a classic example. Clearly, some programs may represent a mixture of such activities depending upon the constraints seen as most limiting in reaching the objective. The choice of program emphasis and timing becomes a matter of informal judgement regarding (1) the importance of the various constraints to be addressed and (2) an assessment of the ease or difficulty of attacking the constraints. Leaving aside for the moment the second consideration, the ordering of the Mission's programs is an important part of its intervention strategy. If adequate services and infrastructure currently exist to permit individuals to expand their economic activities, and thus increase their incomes, then major emphasis should be placed upon broad-scale programs of economic expansion. If on the contrary, economic expansion is limited by inadequate services and infrastructure, programs should be sequenced in such a way as to assure ourselves that later economic expansion efforts will be effective.

The Mission's present assessment is that ordering of programs should provide for institution building efforts--to assure the capacity to provide needed services--and infrastructure development ahead of major additional programs directed toward expansion of economic activity at the farm and community level. The following sections will develop more fully the proposed interventions and their sequencing.

In addition, our general approach will be to use grant projects on a pilot scale as an intermediate step in preparation for later economic expansion activities. These pilot projects would be directed toward gaining field experience and developing workable concepts and mechanisms at the farm and community levels as a means of assuring the effective implementation of economic expansion activities. The basic contention is that there is a lack of generally accepted concepts of rural development which can serve as guidelines to secure the local response necessary for successful project implementation.

a. Development Opportunities

Development opportunities should relate to priority constraints as long as no intractable problems are associated with addressing such constraints, or AID would not be duplicating other institutions efforts.

Developing new technologies for small farmers, and, in the process institutionalizing the capacity to continue developing new technologies represents a very promising way to address priority constraints of all these types of small farmers. New approaches to small farmer research, the development of small machinery prototypes, experience with multiple cropping schemes elsewhere, and the proximity of international research centers (CIP, CYMMYT, CIAT) all suggest that properly organized research could produce innovations useable by small farmers in Paraguay in a reasonably short time. Present Mission grant projects can provide some basic groundwork for an expanded research program in the future. The Farm Management Project can identify present priorities and, based on this information, indicate certain areas where research would have a high pay-off. The Small Farmer Livestock Project can assist in initiating the type of research which would appear to be most indicated for producing useable results for small farmers and assist in testing new extension concepts to diffuse new practices. The major concern in whether the GOP will provide sufficient additional funding to develop and maintain the level of research and extension services required by small farmers.

Colonization appears to be an attractive alternative to minifundia farmers. Typically settlement schemes have been very costly and spontaneous colonization is surely lacking in adequate infrastructure. Devising less costly approaches to solving the problems typically found by colonists appears to be very challenging developmental opportunity. Both technical and institutional innovations seem to be required. A pilot effort

in a colony zone -- which would examine a range of technical and institutional options -- followed by a loan program based upon the field experience gained would appear to be a reasonable approach. Since cooperatives have been a successful vehicle for providing services to farmers in the foreign colonies which have reached a rather advanced level of development, it seems reasonable to explore the capacity of cooperatives to promote area development in frontier zones populated by Paraguayan small farmers.

Improvements in marketing efficiency are believed to offer possibilities for a significant impact upon small farmers; yet exactly what form these improvements should take is still unclear. Better information is required to formulate the content of a broad-scale marketing project, but it would appear that credit for local marketing infrastructure will likely be an important part of such activity. In the meantime efforts to build the public sector's capacity to (1) analyze market problems, (2) identify export market opportunities and (3) provide technical assistance to marketing firms would appear to be in order in preparation for larger scale activities to improve the market system.

As new technologies are evolved, experience with the Rural Enterprise Loan is gained, and additional marketing information is developed, the time will be propitious to examine the opportunity for economic expansion programs directed at minifundia communities. Again, a pilot grant project might precede a full-scale loan effort to gain field level experience in implementing projects designed to improve the well-being of this group of clientele. While colonization is an alternative for this group, not everyone can or should leave for the colonization fronts in a short period of time. Those left behind will require attention to permit them to take advantage of the Asuncion and export markets through intensification of their production.

At some point in the future, an opportunity to capitalize on improved technology and public sector services with an expansion of small farmer credit should be forthcoming. Such a credit program should be used to stimulate the installation of a credit policy which provides for continued expansion of credit availability in line with the credit needs of small farmers.

Still further into the future, Paraguay may reach the point where project efforts to identify a market opportunity and organize the production and marketing of particular commodities would be a suseful development approach.

Two additional opportunities have been identified as

meriting consideration. First, in the near term, a project to improve the administration within the Ministry of Agriculture could have a useful impact. Secondly, a small technical assistance project to assist in maximizing the benefit to be derived from the country's vocational agriculture schools could make a significant contribution.

b. Tentatively Proposed Projects and Investment Schedule.

The following is a tentative list of projects and an investment schedule in line with the discussion above. 1/

i.) Agricultural Sector Loan (FY '78)

This loan attempts to address the technological and marketing constraints faced by small farmers and, at the same time, attack the major constraints of inadequate budgetary resources confronting the Ministry of Agriculture. The financing scheme is designed to increase the Ministry's budget by approximately $2.0 million dollars by the end of the project, or an increase of roughly one-third of the current budget. The bulk of the additional funding will be directed toward the creation of a Small Farmer Research Institute, an agricultural engineering unit to develop small-scale machinery suitable to small farms, and the expansion of the Ministry's capability to provide marketing services. Funds are also included in the PID for a budget item to be established for training and increased funding for the Planning Office.

ii.) Cooperative Based Area Development (FY '78)

This is a pilot grant project with the objective of developing a replicable approach to area development using agricultural cooperatives as the basic institutional building block. The site selected is considered a colony in a "frontier" zone, but has some unique features which seem to make it ideally suited for a pilot project. There is a mixture of small farms producing traditional crops and small farms focusing on soybeans and wheat. It is also a mixture of some long term residents with recent colonists. Horse drawn and tractor technology (including mechanization services to small farmers) exist side-by-side.

1/ Present loans:

a) Credit Unions (FY 75) -- Provides funds to CREDICOOP to relend to member credit unions who in turn, provide credit to small farmer members.

b) Rural Enterprises (FY 76) -- Provides for rediscounting through the Central Bank of commercial bank loans for agro-industrial firms.

c) Rural Roads (FY 77) -- Provides for an estimated 160 km of all weather and 1,000 secondary access roads.

Finally, there are immigrant cooperatives, Paraguayan small farmer cooperatives, and more traditional credit and marketing institutions functioning in close proximity. This wide range of technology and institutional arrangements provides an excellent laboratory to examine alternative production practices and alternative institutional arrangements for delivering services to small farmers. The task of the project is to explore alternative technological and institutional innovations, implement the most promising innovations, and evaluate the results in order to develop a worable approach to area development through cooperative institutions.

iii.) Agricultural Sector Management (FY 78)

This grant activity is a companion to the Agricultural Sector Loan Project. As the Ministry's budget increases, administrative capacity may well become a critical constraint to improved performance. The project is designed to provide the Ministry with assistance in systematically analyzing the management of various departments and units in order to determine managerial bottlenecks to their performance and to develop and implement improved practices to eliminate these bottlenecks.

iv.) Pilot Minifundio Crop Intensification (FY 79)

Project will focus on the agricultural development of a minifundio zone in which crop intensification is the indicated strategy for increasing income. Based upon the need to increase production per hectare and value of production per hectare, the project will experiment with approaches to introducing higher value crops and multiple cropping systems within the community. The project will deal with such concerns as adapting technology to local conditions, organizing farmers to implement new cropping systems, developing local marketing facilities to meet the needs of changing cropping patterns, and facilitating the supply of credit and inputs. The intended output is the development of principles of implementing agricultural development in the minifundio zone which can be generalized to larger scale projects.

v.) Vocational Training Schools (FY 79)

Paraguay has five vocational agriculture training centers. The Project would involve technical assistance from agricultural education specialists to assist in developing curricula, teaching materials, programs and in-service training for teachers in the vocational schools. The task would be to develop programs in the five facilities to optimize their use as training centers for both youth and adults members of the surrounding rural communities.

vi.) Cooperative Based Colony Development (FY 79)

This loan would provide funding for infrastructe and agricultural development programs in newly settled areas. Focus will be upon providing the minimum needs in these areas to assure that settlers from minifundio areas can rapidly take advantage of larger land resources per family. Emphasis will be on marketing, input and credit service infrastructe provided through cooperative institutions. Attention will also be given to local programs to promote appropriate new technologies among the settlers.

vii.) Local Marketing Infrastructure (FY 79)

The intention of this project is to provide supervised credit to local marketing firms to improve their efficiency in handling the production of small farmers. The underlying principle is that modernizing both the facilities and practices of local marketing firms will be needed if the marketing system is to become more efficient. The FY 78 Agricultural Sector Loan provides funding for an extension function within the Ministry which will provide technical assistance to local marketers. The proposed loan will provide credit for expansion and modernization of facilities supplied in conjunction with MAG's technical assistance program. Together, these efforts amount to a supervised credit program for local marketers.

viii.) Pilot Community Technology Development (FY 80)

Project would identify three or four commodities with a promising market which can be produced by small farmers. Technical assistance would be directed toward developing the technologies (production and processing) and market organization required to link the small farm producer to the market opportunity (probably export market). The output of the project could be the technical and organizational plans for an integrated commodity system from producer to consumer, for each of the selected commodities. Each plan would become the basis for a bankable project.

ix.) Credit Expansion (FY 80)

This loan is timed to lag two years behind an AID program to improve agricultural technology and one year behind the initiation of the program for improvement of local market infrastructure. It will expand credit available to small farmers to capitalize upon the benefits available to them from new technologies and improved marketing. The loan is also intended to provide the stimulus to initiate an agricultural credit policy involving rediscounting of loans to small farmers through the central bank and streamlining of the administration of small farmer credit. The loan is

not only concerned with expanding loan funds for small farmers, but also installing a mechanism to assure the continued expansion can occur in line with the capacity of small farmer clientele to productively utilize addition loan capital.

x.) CREDICOOP II (FY 1980)

This loan would be a follow-on to further expand the credit that could be delivered to small farmers through the credit union system. At this point in time CREDICOOP will have completed three years of operations under the present loan. Further, as new technologies and machinery emerge, additional loan funds will be demanded to introduce these innovations among credit union members.

FY 1981 and FY 1982 loans are shown on the investment schedule as indicative of the direction AID's program might take at that point.

c. Recommended In-Depth Studies

i.) Marketing Systems Study

A thorough documentation of the functioning of the marketing system, costs and returns at various steps in the marketing channel, and the behaviour of market participants is not presently available. While there is general agreement that marketing represents a critical constraint to small farmers' incomes, there is insufficient evidence to pinpoint the problem.

Such information is needed for the development of the marketing services section of the proposed FY 1978 Agricultural Sector Loan project and is even more critical to the Local Marketing Infrastructure loan proposed for FY 1979.

This study has been initiated with the assistance of Kansas State University and is intended to focus assistance from various sources during 1976 and early 1977.

ii.) Credit

It is apparent that for a major long term expansion of credit to meet small farmer needs in Paraguay, a more progressive agricultural credit policy is required, and new approaches to reaching large numbers of farmers at a minimum administrative costs will need to be developed. As a basis for resolving these problems, an outline of a comprehensive study of credit should be developed and assistance located to undertake the study.

Such information will be useful in preparation for the tentatively programmed Credit Expansion and CREDICOOP follow-up loans for FY 1980.

iii.) Analysis of Colonization

This study would be to examine various colonization areas to identify particular problems faced in their development and isolate factors related to the success of some of the more affluent colonies. This information would complement the experience gained in the proposed Cooperative Based Area Development project (FY '78) for the preparation of a Colony Development Loan proposed for late FY 1979. Until recently, insufficient attention has been given to colony development given its potential as an alternative for land-short farmers in the Central Zone.

CHART F-2 - INVESTMENT SCHEDULE OF TENTATIVELY PROPOSED PROJECTS

	FY 76	FY 77	FY 78	FY 79	FY 80	FY 81	FY 82		
Farm Management (G)			$ 492						
Small Farmer Livestock (G)			$ 503						
Agr. Planning & Statis. (G)			$ 377						
Credit Unions (G/L)						$1,301 (G:69-77), $458 (G:78-80)		$3,000 (L)	
Mktg. Service Coops (G)			$ 751						
Coop Based Area Development (G)						$ 800			
Rural Enterprises (L)					$2,500				
Rural Roads (L)						$4,400			
Agr. Sector Loan						$3,500			
Agr. Administration Grant						$ 400			
Pilot Minifundia Crop Intensification (G)							$ 600		
Vocational Training Schools (G)							$ 450		
Coop Based Colony Dev. (L)								$4,500	
Local Marketing Infrastructure (L)								$2,500	
Credit Expansion - Farmers (L)									$ 5,000
CREDICOOP II (L)									$ 5,000
Pilot Commodity Tech. Development (G)									$ 600
Minifundia Crop Intensification (L)									$2,500
Commodity Tech. Development (L)									
Agric. Research Extension (L)									$ 3,000
Rural Roads II (L)									$ 5,000

ANNEX F-1

ANALYSIS OF THE AGRICULTURAL BUDGET IN PARAGUAY

1. Agriculture in the National Budget

The relative importance that the Government assigns the agricultural sector should be reflected in its budget allocations to the various entities working in relation to agriculture. Table I presents a summary of such data. In the case of the BNF, only the funds allocated to agricultural development have been included. Also, other institutions involved mainly with large scale livestock production such as the Fondo Ganadero have not been included on the grounds that they are not directed towards the small farmers.

The data in Table I, as well as in all subsequent tables, have been turned into constant 1970 guaranies by using the wholesale price index calculated by the Central Bank. To make the figures meaningful to a person not familiar with the local currency, it has been presented in dollar equivalents by applying a constant exchange rate of 126 guaranies per US dollar.

As shown in Table I, agriculture related budgets were $6.6 million in 1976. While the MINAG was the largest single recipient of funds, its budget was only 37 percent of the total.

Table II gives a breakdown of the MINAG budget showing that significant contributions of PIDAP in 1972 caused a large increment in the MINAG budget. Such an increment was only a temporary phenomenon, and in the following years the budget was drastically reduced to former levels although the GOP share increased more than proportionately.

Table III indicates that most of the increment in funds of 1972 was used for capital expenditures.

From Tables II and III it is observed that the National Budget in constant guaranies increased at an average annual rate of 20.1 percent between 1971 and 1976. The same parameter equals 4.8 percent for the MINAG budget and 4.2 percent for the institutions listed in Table I. The MINAG budget in 1976 equals 1.3 percent of the National Budget, significantly below the 2.6 percent figure for 1971. If all the institutions of Table I are considered the figures are 3.6 percent of the National Budget in 1976, and 7.3 percent in 1971.

2. Value of Agricultural Production, and Exports of Agricultural Products.

Table IV shows the value of agricultural production in comparison with the GNP. The data indicate a trend towards a greater portion of

the GNP deriving from the agricultural sector. Between 1971 and 1974, the GNP in constant guaranies increased at an average annual rate of 0.8 percent while the value of agricultural production increased at a rate of 2.9 percent. About 33.2 percent of the GNP came from agriculture in 1971; by 1974, this figure had increased slightly to 35.3 percent.

Total exports, most of which are agricultural related, show a 10.2 percent average rate of increase per year between 1971 and 1974. This is significantly above the rate of growth of value of agricultural production (2.9 percent), and GNP (0.8 percent).

The difference in the rates of growth are caused by (a) the relatively high value of the portion of agricultural products exported, and (b) the difference between the value of production at the farm level (basis for calculating value of production) and the export price.

Table VI shows that real prices for non-export crops did not decrease during the 1971-75 period. Therefore, the relatively low rate of increase in the value of agricultural products (in constant guaranies) has not been caused by a drop in real prices. Table VII demonstrates that the volume of production increased between 1970 and 1974 for most products with the exception of the non-export commodities of cassava, corn, sugar cane, and wheat. This throws some light on the question of why the value of agricultural production has not increased as rapidly as the value of exports.

Table VIII summarizes the data of Table II to show the changes in the allocation of funds within the MINAG between 1971 and 1975. The major areas receiving increased support are research, extension and marketing.

Table IX presents a summary of all the parameters examined and their rates of growth.

3. <u>1976 Salary Levels at the Ministry of Agriculture</u>

There is one difficulty in trying to establish what the average Ministry of Agriculture technician earns and that is the existence of a second salary paid in addition to the one set up in the regular government budget. This extra salary apparently is computed as a part of the total salary for only a portion of the Ministry's personnel.

The additional salary is paid solely for work performed during the afternoon hours. Those who work only in the mornings are paid the sum which appears in the regular budget, whereas personnel who stay to work in the afternoon hours receive the additional salary.

However, there is no assurance of being paid this special salary since it is funded from the Ministry's own income. When funds are not sufficient, auxiliary salary payments are postponed indefinitely.

Because payment of the supplemental salaries can be so irregular, some employees do not even mention them when questioned about their salary. (One of the technicians interviewed, for instance, indicated that he had not received the additional salary since the last months of 1974.)

Certain sections within the Ministry, like the Proyecto de Desarrollo Ganadero, and the Cotton and Tobacco Control Office (OFAT), and the Artificial Insemination Center and Barrerito Ranch generate their own income at a level that is sufficient to cover the special salaries of all their employees. Any residual income is transferred to the Administrative Directorate of the Ministry of Agriculture.

Two salary levels are quoted below, one with the additional salary and the other without, since the probability of receiving the special salary, as we have noted, may depend on where one is located within the Ministry.

A visual inspection of the personnel salaries listed by the Ministry of Agriculture has resulted in an arbitrary stratification of positions into five different categories as shown in Table X. The figures constitute only rough approximations of the average salaries paid within those general categories.

TABLE X

Monthly Salary Levels of Personnel in the Ministry of Agriculture With and Without the Special Salary 1/
(In Guaranies)

	With	Without
Director de Programa	75,000 (600)	45,000 (360)
Director de Departamento	50,000 (400)	35,000 (280)
Ingeniero Agrónomo 2/	45,000 (360)	30,000 (240)
Agrónomo	30,000 (240)	20,000 (160)
Auxiliar, Secretaria, etc.	15,000 (120)	10,000 (80)

1/ These figures constitute only rough estimates. The figures in parentheses are US dollars, at a rate of ₲ 126 = US$ 1

2/ With relatively good standing. Usually with a M.S. degree

While we do not have comparable data for salaries in the private sector, our best estimates indicate these rates to be very low.

TABLE I

Budgets* of Various Entities Working in Agriculture, in Dollar Equivalent of Constant 1970 Guaranies

	Year					
	1971	1972	1973	1974	1975	1976
			(000 dollars)a/			
Wholesale Price Index	112.9	133.8	167.0	221.0	249.7	254.3b/
Budget of MINAG	1,956	5,060	3,092	2,279	2,324	2,476
Budget of IBR	1,275	1,024	797	723	941	1,015
Budget of CAH	306	372	525	410	650	856
Budget of BNF Agricultural Development	1,867	402	1,434	1,528	1,888	2,303
Total	5,405	6,858	5,848	4,940	5,804	6,650

a/ A constant exchange rate of 126 guaranies per U.S. dollar is used.

b/ As of June 1976

Source: Government Budgets for 1971 to 1976

* Budget includes funding from other donors.

TABLE II

MINISTRY OF AGRICULTURE BUDGET BY CALENDAR YEARS DEFLATED BY THE WHOLESALE PRICE INDEX
(In 1970 Guaranies x 1,000)

	1971	1972	1973	1974	1975	1976
Minister and Staff Offices	8,136	7,809	5,969	4,814	4,911	4,732
Support Services *	25,410	25,531	21,398	14,071	12,463	19,924
Regular Budget	14,781	12,896	10,195	14,071	12,463	
P.L. 480	10,629	12,635	11,204	-	-	
Directorate of Agricultural Education	12,708	116,921	76,087	44,479	12,420	16,401
Regular Budget	10,936	8,898	7,037	7,795	8,380	
P.L. 480	1,771	2,990	880	-	-	
PIDAP	-	105,034	68,169	36,684	4,039	
Directorate of Agricultural Research & Extension	50,971	177,220	122,789	71,962	64,491	61,034
Regular Budget	35,559	33,685	26,604	47,107	59,848	
P.L. 480	15,412	31,190	28,636	-	-	
PIDAP	-	112,345	67,549	24,854	4,642	
Directorate of Marketing & Agricultural Economics	2,826	139,009	61,049	7,905	3,915	5,109
Regular Budget	1,498	1,332	1,330	7,905	3,915	
P.L. 480	1,329	18,081	7,025	-	-	
PIDAP	-	119,596	52,695	-	-	
Directorate of Agricultural Standards & Controls	16,636	14,945	11,971	8,213	8,456	9,790
Recursos Naturales Renovables						6,185

* Support Services comprise the Administrative Directorate, Secretariat for Technical Coordination, Department of Agricultural Census and Statistics, and the Gabinete Técnico (Technical Unit).

1/ As of Oct. 31, 1975

TABLE II (Continued)

	1971	1972	1973	1974	1975	1976
Directorate of Cooperatives	2,448	3,522	2,766	1,461	1,121	1,392
Regular Budget	1,562	1,320	1,000	807	1,121	
P.L. 480	886	2,202	1,766	654	—	
Cotton and Tobacco Control Office (OFAT) 1/	22,221	19,201	29,727	35,669	50,050.	43,539
Inspection Service Fees 1/	18,309	14,431	11,034	10,190	13,825	13,456
Artificial Insemination Center & Barrerito Ranch 1/	8,851	8,185	8,068	8,406	11,616	14,359
Frigorífico Nacional 1/	—	13,898	10,669	9,668	8,559	7,597
Contributions to Related Entities	94,712	90,082	73,563	75,199	61,614	71,552
Regular Budget 2/	47,414	49,723	41,347	31,896	20,028	
Special Law Revenues 3/	47,298	38,117	30,838	43,077	41,586	
P.L. 480 4/	—	2,242	1,377	226	—	
Debt Servicing	964	793	615	1,100	960	1,013
Regular Budget	174	127	81	696	602	
Special Law Revenues	789	666	534	403	357	
Acquisitions and Construction 5/	531	448	2,351	1,776	9,918	35,767
TOTAL	268,646	635,402	447,286	297,015	269,497	311,941

Notes: 1/ Generate their own income.
2/ Funds are channeled from the Ministry of Finance via the Ministry of Agriculture to the following: FAO; Embassy of Israel (since 1975); CAH; IBR; Schools: Ypacaraí, Carlos Pfannl, Paraguarí; CREDICOOP; UNIPACO; COPACAR (Until 1974).
3/ To SENAIFA; IBR; and National Forestry Service (since 1975).
4/ To UNIPACO and CREDICOOP.
5/ Building reparations and construction of regional SEAG offices in Ybycuí, Acahay, and La Colmena (1975).

TABLE III

National and Ministry of Agriculture
Budgets in Dollar Equivalent to Constant 1970 Guaranies (000^8 x dollars)

	1971	1972	1973	1974	1975	1976
Ministry of Agriculture	1,956	5,060	3,092	2,279	2,324	2,476
Operating Expenditures	1,860	2,230	1,989	1,842	1,955	2,192
Capital Expenditures	96	2,829	1,103	437	369	284
National Budget	73,968	77,226	63,374	133,059	156,569	184,682
Operating Expenditures	56,948	53,756	45,576	65,898	77,583	88,352
Capital Expenditures	17,020	23,469	17,798	67,161	78,986	96,329

TABLE IV

Value of Agricultural Production and Gross National Product in Dollar Equivalent to Constant 1970 Guaranies
(Millions of Dollars)

	YEAR			
	1971	1972	1973	1974
Crops	108.17	100.96	122.81	118.02
Livestock	62.09	73.43	78.14	70.30
Forestry	24.74	23.29	23.34	24.20
Hunting and Fishing	0.42	0.40	0.45	0.45
Total Ag. Production	195.42	198.09	224.75	212.97
GNP	588.64	574.77	596.13	603.38

Note: GNP increasing at an average annual rate of 0.8%

Value of Agricultural Products increasing at an average annual rate of 2.9%

Source: Cuentas Nacionales, Banco Central del Paraguay, Julio 1975.

TABLE V

Commodity Exports by Sector of Origin

in Dollar Equivalent to Constant 1970 Guaranies (000 x dollars)

	Year			
	1971	1972	1973	1974
Forestry Related Exports	11,465	9,102	8,674	11,983
Livestock Related Exports	20,010	25,347	26,882	18,111
Crop Related Exports	19,084	23,786	36,187	41,834
Portland Cement	422	200	75	468
Other	6,772	5,981	4,187	4,440
Other n.i.e.	1,148	---	643	1,886
Total	58,902	64,416	76,647	78,723

Note: Total exports are basically agricultural exports and increased at an average annual rate of 10.2%

Source: Cuentas Nacionales, Banco Central del Paraguay, Julio 1975.

TABLE VI

Farmgate Level Prices of Agricultural Products*
in Constant 1970 Guaranies

Crop	Year				
	1971	1972	1973	1974	1975
Cotton	15.0	15.6	13.1	16.2	10.8
Rice	7.0	8.2	8.9	9.9	8.0
Sweet Potatoes	2.6	2.9	2.6	2.7	3.2
Coffee	53.1	39.6	56.2	47.5	50.8
Sugar Cane	558.0	482.8	492.8	502.2	542.2
Beans (Round)	10.6	11.2	11.3	14.0	10.8
Corn	4.4	3.2	7.1	6.7	5.2
Cassava	2.6	2.6	2.3	2.7	2.8
Peanuts	9.7	11.2	10.7	11.3	11.2
Potatoes	8.8	13.4	14.3	12.6	15.2
Tobacco	23.0	3.44	40.7	25.3	27.2
Soybeans	7.5	8.2	13.1	9.0	7.2
Castor Oil	7.5	12.7	19.7	9.0	5.6
Wheat	8.8	7.2	7.1	9.0	10.0
Yerba Mate	5.7	4.8	5.9	8.5	6.8

* All prices are stated per kilo, except sugar cane which is stated per metric ton.

TABLE VII

Relative change in Production, Area Harvested and Yields of Selected Crops for 1973/74 Crop Year Based on 1969/70 Index

Crop	1973/1974		
	Vol.	Area	Yield
Soybeans	336	348	97
Cotton	229	214	107
Rice	99	97	101
Beans (Round)	98	80	123
Tobacco	188	183	102
Wheat	74	72	103
Sugar Cane	81	104	78
Corn	94	156	60
Cassava	76	87	87
Coffee	198	176	112
Peanuts	118	111	107
Peas	160	149	108
Sweet Potatoes	66	94	69
Alfalfa	144	138	104
Strawberries	116	-	-
Coconut	131	-	-
Tung Nuts	142	108	132
Castor Beans	168	165	102
Yerba Mate	94	90	104
Sorghum	127	135	94
Onions	125	125	100
Potatoes	141	188	75

Source: Based on Table C-4, Small Farmer Assessment.

TABLE VIII

Ministry of Agriculture Budget by Calendar Years
Indexed

	1971	1975
Minister and Staff Offices	100.0	60.4
Support Services	100.0	49.1
Regular Budget	100.0	84.4
P.L. 480	(10,629)	——
Directorate of Agricultural Education	100.0	97.7
Regular Budget	100.0	76.6
P.L. 480	(1,771.0)	——
PIDAP *	——	(4,039)
Directorate of Agricultural Research & Extension	100.0	126.5
Regular Budget	100.0	168.3
P.L. 480	(15,412.0)	——
PIDAP *	——	(4,642.0)
Directorate of Marketing & Agricultural Economics	100.0	138.5
Regular Budget	100.0	261.3
P.L. 480	(1,329.0)	——
PIDAP *		
Directorate of Agricultural Standards & Controls	100.0	50.8
Directorate of Cooperatives	100.0	45.8
Regular Budget	100.0	71.8
P.L. 480	(886.0)	——
Cotton and Tobacco Control Office (OFAT)	100.0	225.2
Inspection Service Fees	100.0	75.5
Artificial Insemination Center & Barrerito Ranch	100.0	131.2
Frigorífico Nacional	——	(8,559.0)
Contributions to Related Entities	100.0	65.1
Regular Budget	100.0	42.2
Special Law Revenues	100.0	87.9
P.L. 480		
Debt Servicing	100.0	99.6
Regular Budget	100.0	346.0
Special Law Revenues	100.0	45.2
Acquisitions and Construction	100.0	1,867.8
TOTAL	100.0	100.3

Note: The quantities in parenthesis are thousands of 1970 guaranies. All calculations were obtained from Table II.

* PIDAP: Inter-American Development Bank Loan.

TABLE IX

Comparison Between the Different Parameters in Dollar Equivalents

of 1970 Guaranies

(000/dollars)

	Year						Average Annual Rate of Growth
	1971	1972	1973	1974	1975	1976	
MINAG Budget	1,956	5,060	3,092	2,279	2,324	2,476	4.8
Budget of Various Institution in Agric.	5,405	6,858	5,848	4,940	5,804	6,650	4.2
National Budget	73,968	77,226	63,374	133,059	156,569	184,682	20.1
Value of Ag. Production	195,420	198,090	224,750	212,970	NA	NA	2.9
Value of Ag. Exports	58,902	64,416	76,647	78,723	NA	NA	10.2
GNP	588,640	574,770	596,130	603,380	NA	NA	0.8

ANNEX G-1

THE ROLE OF WOMEN IN PARAGUAYAN AGRICULTURE

Sufficient information is not yet available on the extent to which women are involved in Paraguayan agriculture. Most of the work done to date or in process on the subject has been sponsored by AID and is summarized as follows:

In October 1974, a preliminary report on the status and role of rural women in Paraguay, which included some rudimentary time-budget and decision-making data, was prepared by a female Foreign Service Officer now on the staff of USAID/Paraguay; the study was prepared in conjunction with A Seven Country Survey on the Roles of Women in Rural Development by Development Alternatives, Inc., under an AID/W contract. Some additional work on defining the roles and functions of the country's rural female population is being undertaken by an anthropologist hired by the Mission in early 1976 to assist in social soundness analysis.

During the last half of 1976, a follow-on Small Farmer Survey will gather some general data on the extent and nature of female involvement in livestock raising and related activities such as the production of milk, cheese, butter, eggs, wool, bacon, and ham in Paraguay's Eastern (more populous) region. The survey will be administered in August and September with the release of preliminary data scheduled for February-March 1977, followed by full-scale analysis.

Aside from these three studies, none of which focuses principally on women's agricultural role, the literature on rural women - in fact, on Paraguayan women, in general - is so scarce as to be practically non-existent. For this reason, the Mission, in conjunction with a proposed FY 1978 project to provide agricultural skills training to women, has requested funds to undertake some basic research on women in Paraguayan agriculture. As presently envisaged, the research would be done in two stages: first, a series of 12-18 case studies in three sections of the country to gather in-depth data to enable the Mission to (a) develop region-specific profiles of rural women and (b) frame hypotheses about women's roles in Paraguayan agriculture; and, second, a modest (300) sample survey to test the hypotheses.

The results of this research will be incorporated eventually into the Small Farmer Sub-Sector Assessment. At the present time, however, we will simply record some preliminary observations about campesino women in Paraguay as a first step in our effort to gain a better understanding of their role and status in this predominantly rural nation.

Based on some preliminary research in the area performed between 1974 and the present, it would appear that women are involved to a quite considerable degree in Paraguayan agriculture. This involvement ranges from tending small-farm livestock and planting vegetable gardens to participation in ploughing, sowing, harvesting, and marketing activities; women also engage in on-farm processing of agricultural goods. The extent to which women are involved in agriculture, however, appears to vary significantly from one location to another. Possible causes for such variations include the socio-economic character of the region, the economic status of the family, and the presence or absence of a male head-of-household.

A high incidence of female heads-of-household in Paraguay's rural areas is suggested by the extant literature (figures range from 30% to 70%, depending on the district). It is this group of women which now registers the highest level of economic activity in rural areas and which, presumably, could be motivated to increase that level appreciably, given the requisite training, materials, and incentive.

In contrast to the education and health sectors, women are not active at mid-and upper-level management levels in Paraguayan agriculture. There are a few women on the teaching and laboratory staffs of the Faculties of Agronomy and Veterinary Science at National University, and a woman heads the Home Economics Division of the Extension Service which has a headquarters and field staff composed entirely of women. Although the women's division is charged with improving rural living standards by upgrading the knowledge and skills of rural women, the GOP commits practically no resources to it with the result that its programs - encompassing nutrition and food preparation, home improvement (well, latrine, and furniture construction), manual arts including sewing and dressmaking, and poultry raising and family vegetable gardens - barely hobble along from year to year. (In this connection, it should be noted that the entire Extension Service, not just the women's division, is badly underfinanced).

On the more positive side, there is an increasing involvement of women in the credit union movement. The President of the Board of Directors of the USAID-assisted credit union central, CREDICOOP, is a respected Paraguayan woman Senator, and three other women serve either on the central's Board or on its supervisory committee. Four CREDICOOP-affiliated credit unions have female presidents while 33 women serve on local boards or supervisory committees. One rural credit union has a woman manager, and one of CREDICOOP's three field agents is a female, in charge

of supervising credit union activities in a geographic zone. Credit is available to both sexes under the program, and several affiliates are actively seeking female member/borrowers; however, few women have become actual borrowers and users of credit. Women, perhaps 35 or 80 a year, participate in in-service training programs for credit union officers, staff, and members in cooperative organization, management, and related subjects.

In terms of the campesina herself, it is possible to make the following general observations bearing in mind, once again, their preliminary nature.

1. Health: this is almost entirely the woman's responsibility unless a major doctor or hospital expense is contemplated.

2. Nutrition: the woman prepares all food and pays little attention to nutrition as a health program. In fact, there is some evidence of a nutritional decline in the countryside.

3. Child-bearing: little thought is given to the number and timing of children, and birth control is not practiced widely by either rural men or women. Taking as the norm a woman between 20 and 35 with five children, 33.9% of all women bearing children in the rural areas are either under 20 or over 35 and 28.8% have more than five children. (This compares with 27.2% exceeding the age norm in Asuncion and 8.3% exceeding the number of children borne).*

Too much child bearing, particularly by women under 20 or over 35 when combined with substandard nutrition and health care, cannot help but have adverse effects on female productivity.

4. Education: while the man may set the groundrules, it is the woman who follows through on children's schooling. The vast majority of teachers in the nation's interior are women, and they hold a highly respected place in the community.

5. Economic decision-making: In functioning marriages, women usually play an important part in household financial decision-making. If the woman raises pigs or chickens, she will also have a role in deciding what crops the family will

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* Proyecto de Extensión de Servicios de Salud Familiar - Materno Infantil y Portección Familiar en el Paraguay, 1974.

plant. When it comes to cash crops, however, women as a general rule are not active decision-makers although they may help male family members decide whether or not to borrow money. But it is the male who will decide to what use the credit will be put, what crops to plant, whether or not to use modern inputs, and how to market his crops.

6. Volunteer or community work: The idea of participating in a cooperative effort beyond the family or kinship group is not part of the culture. Rural women, further, are not joiners. They stay close to home and generally associate only with family members. Some will join in community projects when the activity involves their home - such as latrine construction, milkdistribution, and vaccination. But these are short-term projects and don't involve much of a commitment away from the home.

7. Rural Enterprises: Little that is definitive can be said. Women tend to have greater influence over the sale of traditional crops such as corn and mandioca. In one area they are active in selling vegetables (tomatoes and carrots) which they purchase in Asuncion. In the same area, a small-scale female vegetable producer who hires all her labor produces tomatoes for sale to restaurants and to townspeople who come to her to purchase for family consumption. Three women in this town of 3,000 grow lettuce, selling it door-to-door. They are of the lowest socio-economic groups which may suggest (a) a low profit margin for their business and (b) that it is the poorer strata of rural women who are the most economically active in rural areas of Paraguay.

Women, according to present information, are actively involved in small-scale animal husbandry which is a major household sideline throughout most of Paraguay. By selling chickens or a pig, cash is obtained for emergency use - often to cover expenses arising from a sickness or death - or for a special event such as a girl's fifteenth birthday. In the small town in Central Paraguay referred to in the preceding paragraph, there are two commercial swine producers, both running roughly one animal per week. Women raise the pigs and market primarily the grease; the meat is available for sale but more often than not is either consumed by the family or sent to neighbors (sharing perishable food items with neighbors is a common custom in rural areas). From time to time, the women may take the meat to a large market town nearby for sale but usually only when money is badly needed.

In areas where rural women are involved in handicraft

production, they tend to be directly involved in the marketing of these products although they are often at the mercy of exploitative acopiadores who transport the lace, embroidery work, pottery, and other handicraft items to the capital city or other tourist centers for highly profitable resale.

Women figure prominently in many rural small town businesses. Although the businesses - common ones include almacenes (small groceries), pharmacies, bakeries, shoe stores - may be nominally run by men, it is the women who do most of the selling, managing, and record keeping.

The distribution of men and women by economic activity, drawn from 1972 census data, is shown below:

Economic Activity	1972 Male %	1972 Female %
Agriculture, ranching, forestry, hunting and fishing	60.7	13.4
Mining and quarrying	0.2	-
Manufacturing	10.6	28.5
Construction	4.7	0.1
Electricity, water and sanitation	0.3	0.1
Commerce	6.1	14.8
Transportation and communication	3.5	0.7
Hotels and restaurants	0.1	0.5
Finance, insurance, and real property	0.9	0.6
Services	10.3	39.5
Others	2.6	1.8
	100.0	100.0

	Male	Female	Total
Total Number	593,290 (78.6%)	161,420 (21.4%)	754,710 (100.0)

It can be seen that women play a dominant role in manufacturing, the service industries, and commerce whereas men by far dominate agriculture. The data on female participation in agriculture refer to heads-of-household and commercial producers whereas the actual number of women involved in agriculture is thought to be higher if one were to look at the on-farm male/female division of agricultural labor. It is this question, among others, that the Mission intends to address in the course of its research over the next year.

The following is excerpted from an essay on rural women written in the early 1970's by a Paraguayan woman whose work involves her with both urban and rural women:

Besides child care, the woman's role in the home includes many varied and time-consuming tasks such as feeding the family; fetching wood and water, often from great distances; grinding grains; laying up provisions; preparing and serving food; cleaning house. The woman prepares rice for storage; is constantly crushing something in wooden mortars - manioc, rice, corn, etc.; washes clothes; crochets and weaves. It is also expected that the woman involve herself with the crops which provide food for her family. The woman is also responsible for raising chickens and taking care of the vegetable garden - planting and caring for plants, vegetables, and roots for her family's consumption.. Further, she often helps in the masculine task /italics added/ of preparing the ground for sowing commercial crops and she often plows. Her contribution to agriculture is considerable: she sows, plants, weeds, and harvests.... The rural woman probably spends 14 to 16 hours on her daily activities.

ANNEX G-2

METHODOLOGY USED IN THE SAMPLING SURVEYS

A. Introduction

Throughout the analysis references are made to three surveys of small farms in Paraguay which were carried out by the Centro Paraguayo de Estudios Sociológicos (CPES) under AID contracts. CPES was responsible for the design of the questionnaire, selection of sampling procedures, and data processing but received some technical assistance from consultants hired by AID. Consultants included Mssrs. Elliot R. Morss, John K. Hatch, Donald R. Mickelwait, and Charles F. Sweet from Development Alternatives Inc., and Mr. William H. Rusch from the American Technical Assistance Corporation. The data in these surveys are based on the 1972-73 crop year, and the interviews were made from November 1973 to March 1974.

What follows is a short description of the three surveys and their basic characteristics.

B. Survey One

The first survey used a questionnaire in which the small farmers interviewed were asked to provide information related to economic and social characteristics. A total of 1004 interviews were conducted in six districts of Eastern Paraguay as shown in Table I. The number of questionnaires processed and analyzed came down to 999 because errors and inconsistencies were found in 5 of them.

TABLE I

Number of Farmers Interviewed in Survey One

District	Member	Non-Member	Total
CUNA Cooperative			
Loreto	20	89	179
Itacurubí	52	82	134
Coronel Oviedo	91	82	173
UNIPACO COOPERATIVE			
Villarrica	77	89	166
Pto. Pte. Stroessner	90	91	181
San José	47	94	171
TOTAL	477	527	1,004

The farmers in this survey wer not selected on a random basis. First, the sample was forced to include approximately the same number of cooperative members and non-members. Since the number of members is clearly below 50 percent of the universe of farms in all districts, that portion of the universe had a relatively higher proportion of interviews in the sample. Secondly, the farms were stratified by farm size into 5 strata as follows: less than 5 hectares: 5 to 9 hectares: 10 to 19 hectares; 20 to 29 hectares; and 30 hectares and over. The rationale for this stratification is that farm characteristics are strongly correlated to farm size. Third, the districts were not selected at random. All of the six districts are in areas serviced by a cooperative: CREDICOOP cooperatives exist in three of the districts while UNIPACO cooperatives are present in the others. Other characteristics that were considered in selecting the districts included geographical locations, minifundio conditions, and areas of new settlements. Since it was desired that the districts selected in the sample were capable of illustrating the effect of the above characteristics, it was better to hand pick them looking for a cross-sectional type of sample rather than select them on a purely random basis..

Fourth, within each district lists of all cooperative members were available so that they could easily be stratified by farm size and then selected at random from the list covering the entire district. Not so for the rest of the universe. Since the existing lists of farmers were outdated in most cases the selection procedure was to sub-sample a number of compañias within the districts, and then of farmers within the compañia in the following manner.

First, a rough description of each of the compañias was made in terms of the predominant farm sizes that existed. Second, since a stratified sample was desired (stratified, that is, by farm size) the compañias to be sampled were selected so that a sufficient number of farms in each stratum would be available in the sampled compañias. In other words, if a compañía made up mostly of small farms was selected, then another one with a higher proportion of large farms would also be selected to compensate for the previous one, and so on. The third stage was to select an informer within each of the sampled compañías and with his assistance arbitrarily decide which farms in each size strate would be visited. In order to minimize any bias introduced by this arbitrary selection, it was specified that no immediate neighbors or close relatives would be interviewed.

C. Survey Two

The first survey had covered only areas serviced by cooperatives; it was decided, therefore, that the second survey would be applied to three additional districts which do not have cooperative: Itá,

Santa Rosa, and Quiindy. The questionnaire was the same as in the previous survey except some questions regarding sociological parameters which were ommitted. The selection procedure was the same as the one used in the first survey for the non-members of cooperatives as outlined in the preceeding section.

D. Survey Three

The third survey was limited to data on costs of production, and the same farmers interviewed in survey two were included (See Table II). In addition, since no cost data would have been produced from areas with cooperatives, 38 interviews of cooperative members were made in Itacurubí. (The total number of cooperatives members in Itacurubí is placed at 72)

TABLE II

NUMBER OF FARMERS INTERVIEWED IN SURVEY TWO AND THREE

District	Number
Santa Rosa	89
Itacurubí	38
Itá	91
Quiindy	90
TOTAL	308