including natural forests

⑤ Easing poverty in rural areas that include indigenous peoples, by improving productivity and sources of income

3.4 Trends in aid from other countries, international bodies, etc.

Projects under the aegis of the Ministry of Agriculture and Livestock as of the end of June 1996 are shown in Table 3.4.1. Of the 33 projects, two are doubled up, giving a total of 35. These break down into 10 loan projects and 25 technical cooperation projects. The amount per project (excluding portions in local currency) is US$23.7 million for the former and US$3.7 million for the latter. Bilateral cooperation accounts for 18 of the 35 projects (about 55%), taking up 51% of the monetary amounts. The proportion of the total provided by Japan is 40.7% (see ANEXO 3.4).

Apart from this, another noteworthy programme is the Programme for Development and Modernization of Agriculture, Livestock Farming, and Forestry (PR-008) that has been implemented by the Ministry of Agriculture and Livestock since March 1995, with loans from the Inter-American Development Bank (IDB).

This programme has the objectives of ① structural reform, including the reorganization of public bodies at central and regional levels in order to offer efficient and effective support, and ② investment in new systems for planning and implementation, crop diversification, agricultural and livestock farming information, development of technology, transfer of technology, quality and sanitation of agriculture and livestock farming, organization of farmers, and so on. This programme, amounting to a plan for the reorganization of the Ministry of Agriculture and Livestock, is similar to other such programmes being promoted elsewhere in South American. It is a programme for reform that will inevitably happen in Paraguay (for the current organizational chart of the Ministry of Agriculture and Livestock, see ANEXO 3.4).

Table 3.4.1 Projects currently underway

Organization	No. of projects	Proportion of total funding (%)	Amount * (US$1,000)	Duration	Loans	Technical cooperation
FIDA	1	3.7	12,294	1993-1999	1	
IDB	4	17.5	57,463	1989-1998	5	
IBRD	3	16.8	55,658	1992-2000	2	1
FONPLATA (River Plate Fund)	1	0.3	850	1996-1998	1	
HELVETAS	2	0.3	889	1993-1997		2
GTZ	4	7.3	24,204	1987-1997		4
UNDP	1	0.0	45	1994-1996		2
Taiwan	1	2.4	8,100	1989-1998		1
FAO	3	0.9	2,982	1995-2001		3
JICA	6	5.5	18,178	1991-2001		6
UE	2	9.8	32,480	1992-2001		2
OECF	1	33.5	110,990	1989-1996	1	
Spain	1	0.2	800	1996-1998		1
Sweden	1	0.1	450	1993-1997		1
Japan	2	1.7	5,500	1994-1996		2
Total	33	100.0	330,883		10	25

Source: Compiled from Ministry of Agriculture and Livestock data

Note: * Local currency portions not included in amounts

CHAPTER 4 CURRENT STATE OF AGRICULTURE IN THE STUDY AREA

4.1 Farm Structure

4.1.1 Number of farmers according to management scale

The Agriculture and Stock Farming Census of Paraguay classifies farming businesses into four categories according to the management scale: landless farmers, small-scale farmers (less than 20 hectares), medium-scale farmers (20-200 hectares) and large-scale farmers (more that 200 hectares; see Table 4.1.1.1).

Most of the farming businesses in the research area belong to the category of small-scale farms (see Table 4.1.1.2). Within this category, farms of 1-5 ha have the largest share, accounting for 31% of all farms in the area, followed by 5-10 ha farms and 10-20 ha farms, each accounting for 22 percent of the total number (CUADRO A 4.1.1.2).

In the 10 years between 1981 and 1991 farming businesses have increased by 23%, but when viewing by category, medium-scale farming has gradually decreased while the share of small (10-20 hectares) and large-scale (more than 200 ha) farming has grown. This decrease in the medium-scale category is indicative of the polarization due to the increase in scale due to rising trends and the fragmentation due to land division.

Table 4.1.1.1 Changes in the Number of Farm Businesses

Farm scale category		Number of farms in 1981 ①	Share ②	Number of farms in 1991 ③	Share ④	Growth rate ⑤ = ③/① *100
Landless farmers		6,555 farming businesses	2.7%	7,610 farming businesses	2.5%	116%
Small-scale	Less than 1 ha	14,017	5.8	21,872	7.3	156
	1 ~ 5 ha	67,847	27.8	92,392	30.7	136
	5 ~ 10 ha	49,363	20.2	66,364	22.1	134
	10 ~ 20 ha	56,358	23.1	65,932	21.9	117
	Subtotal	187,585	76.9	246,560	82.0	131
Medium-scale (20 ~ 200 ha)		45,922	18.9	41,485	13.8	90
Large-scale (more than 200 ha)		3,843	1.5	4,868	1.7	127
Survey area total		243,905	100.0	300,523	100.0	123
National total		248,930	–	307,221	–	123

Source: Censo Agropecuario Nacional, 1981-1991.

4.1.2 Situation of land tenancy

The farmland used by farming businesses in the survey area is 11,429,000 hectares which covers 72% of the survey area (see Table 4.1.2.1-2).

As for the type of land used for farming, land in the name of the proprietor only accounted for 38% of the farming businesses and 77% of the land area. In addition,

land that is for occupancy only (land for which no tenancy fees are paid) accounts for 24% of farming businesses and 4% of the area of agricultural land.

When viewed by scale, the number of large farmers occupying land solely in the name of proprietor is very high. This is a stable form of ownership. However for small farmers, the property title is often pro tempore.

Table 4.1.2.1 Ratio of Farm Businesses by Type of Management of Land

Farm scale category	Proprietor name	Name other than proprietor	Rented	Occupied	Other	Multiple tenancy
Less than 1 ha	38.5%	9.3%	7.5%	32.3%	4.2%	8.3%
1 ~ 5 ha	24.9	9.9	13.8	32.6	1.6	17.3
5 ~ 10 ha	36.4	19.5	6.1	24.2	1.2	12.6
10 ~ 20 ha	42.5	19.4	3.3	21.1	1.5	12.1
Small-scale subtotal	33.9	16.0	8.3	27.3	1.7	13.9
Medium-scale (20~200 ha)	57.3	9.5	2.1	8.9	1.3	20.9
Large-scale (more than 200 ha)	79.5	1.0	2.1	1.7	1.0	14.7
Avg. for survey area	38.0	14.0	7.3	24.2	1.6	14.9

Source: Censo Agropecuario Nacional, 1991

Table 4.1.2.2 Ratio of Area by Type of Proprietorship of Land

Farm scale category	Ratio of owned area	Proprietor name	Name other than proprietor	Rented	Occupied	Other	Multiple tenancy
Less than 1 ha	0.1%	34.5%	8.9%	8.4%	33.1%	3.3%	11.8%
1 ~ 5 ha	1.9	25.4	10.6	12.9	31.3	1.4	18.4
5 ~ 10 ha	3.8	36.8	19.6	5.8	23.4	1.1	13.3
10 ~ 20 ha	7.0	43.4	18.8	3.2	19.8	1.4	13.4
Small-scale subtotal	12.8	38.7	17.8	5.5	22.6	1.3	14.1
Medium-scale (20-200 ha)	15.4	60.6	6.9	1.9	6.5	1.4	23.3
Large-scale (more than 200 ha)	71.8	88.0	0.8	1.5	0.3	1.1	8.3
Survey area	100.0	77.4	3.9	2.1	4.1	1.1	11.4
Area of survey area (thousands of ha)	11,429	8,830	445	238	486	133	1,297

Source: Censo Agropecuario Nacional 1991

4.1.3 Forms of Management

The management of 99% of the farmland in the surveyed area is by individual management. The remaining 1% is by joint management and corporate management etc. However, the number of farms under joint management and corporate management are tends to be high in the large-scale category (see Table 4.1.3.1)

Table 4.1.3.1 Number of Businesses by Management Type

Farm scale category	Total # of businesses	Individual management	Joint management	Corporate management	Government etc.	Other
Landless	7,610	7,598	7	1	1	3
Small-scale (less than 20 ha)	246,660	246,385	1,037	41	56	41
Medium-scale (20-200 ha)	41,485	40,969	409	50	30	27
Large-scale (more than 200 ha)	4,868	4,150	330	320	25	43
Survey area total	300,523	298,102	1,783	412	112	114
National total	307,221	304,448	1,937	566	131	139

Source: Censo Agropecuario Nacional

4.1.4 Farming population

The members of the individual farming businesses of the survey area (farming population) is approximately 1,577,000 which is 44% of the population of the surveyed area. The average household size is 5.4 persons. Small-scale farmers with 10-20 hectares, in particular, have the largest average household size (5.8) and the number of persons per household tends to decrease as the scale becomes larger. This is especially true of farms of 500 hectares or larger which have an average household size of 4 persons.

As for the make-up of the families, proprietors make up 19% of families, spouses account for 15%, children under 10 for 30%, and relatives etc. for 36%.

4.1.5 Situation of employment in agriculture

The population over 10 years of age and able to work on the farm is approximately 1,105,000 which is 31% of the total population of the surveyed area. Of those who are able to work on the farm, 52% are permanently employed in the field of agriculture, 27% are temporarily employed in agriculture and each household has approximately 3 agricultural workers.

The area per worker is only about 0.8 hectares for small-scale farmers whereas it is 3.7 hectares for medium-scale and 98.0 for large-scale farmers (see Table 4.1.5.1).

Table 4.1.5.1 Population of Agricultural Workers

Farm scale category	Population able to do farm work	Farm workers	Permanently employed	Temporarily employed	Agricultural land area per worker
Landless	25,069	12,393	168	411	0.0 ha
Small-scale (less than 20 ha)	894,771	736,119	41,024	684,962	0.8
Medium-scale (20-200 ha)	172,300	143,131	19,747	214,191	3.7
Large-scale (more than 200 ha)	12,730	9,225	14,905	35,569	98.0
Survey area total	1,104,870	900,868	75,844	935,133	4.4
National total	1,122,830	914,122	81,748	946,040	7.6

Source: Censo Agropecuario Nacional 1991

Note: Population able to do farm work is considered to be the number of persons over 10 years of age living on farming land.

The agricultural land per worker is derived by dividing the total of cultivated lands, fallow land, and pastures on which the farming business holds tenancy by the total number of farm workers and regular employees.

4.2 Agricultural production infrastructure

4.2.1 Irrigation facilities

Irrigation facilities are divided into two major groups. These are wet field irrigation facilities and dry field irrigation facilities. The irrigation facilities are particularly indispensable for the rice paddies. In Paraguay, the plains are generally used for wet fields. In the wet field areas, streams are dammed with simple earthen facilities and irrigation water is led to wet fields in earthen channels. There are no durable irrigation facilities for wet fields such as concrete headers or water pumps. On the other hand, because the construction cost of dry field irrigation facilities is high and dry field irrigation technology has not been developed, such facilities exist in only very few areas although the demand for them by farmers is high. The answers to the questions put to each of the districts in the 14 departments in the survey area (locally commissioned survey) were compiled and are shown in Table 4.2.1.1. It is thought that the Departments with the highest demand for irrigation facilities are Cordillera and Caaguazú.

Table 4.2.1.1 Irrigation Facilities (Results of locally commissioned survey)
In parenthesis by the department name are: (the number of responses from districts/the total number of districts in the department)

Department	①	②	③	④	⑤	⑥	⑦
Concepción (5/7)	1		1	3		5	1
San Pedro (9/17)		1	2	6	2	6	
Cordillera (18/20)	1	1		12			3
Guairá (17/18)			1	9	4	5	
Caaguazú (17/20)			1	14		11	4
Caazapá (10/10)							
Itapúa (28/29)	8	1	4	5		3	1
Misiones (10/10)	3		2	4	2	3	1
Paraguarí (17/17)	1		1	1	1	1	
Alto Paraná (10/19)	1		1	6		2	4
Central (18/19)	2	2	2	4	1	1	2
Ñeembucú (13/16)			1	1		1	
Amambay (3/3)	1						
Canindeyú (7/9)	1		2	2		3	4
Total (182/214)	19	5	18	67	10	41	20

Source: locally commissioned survey, 1996

Note: ①-⑦ are as indicated below.

① Irrigation facilities are set up with no problems.
② There are irrigations facilities, but they are unusable due to age (deterioration).
③ There are irrigation facilities, but they cannot be used due to high operation and maintenance management costs.
④ Installation of irrigation facilities is desired, but they cannot be constructed due to high installment costs.
⑤ Installation of irrigation facilities is desired, but they cannot be constructed because there are no water resources nearby.

⑥ Small-scale farmers do not know how to irrigate so irrigation facilities would not be used even if they were constructed.
⑦ There is sufficient rainfall so irrigation is not necessary.

4.2.2 Drainage facilities

If drainage facilities are constructed on the plains along the banks of the Paraguay River and the Paraná River, conversion of this land to agricultural use will become more effective. However, because the technology to provide drainage for a large plain has not been developed and the investment return is not high enough, there has been little construction of drainage facilities. However, the drain construction taking place in the Departments of Ñeembucú and Pilar with the cooperation of JICA is expected to contribute greatly to the future of drainage technology in Paraguay. The answers to the questions put to each of the districts in the 14 Departments in the survey area (locally commissioned survey) were compiled and are shown in Table 4.2.2.1.

Table 4.2.2.1 Drainage Facilities (results of locally commissioned survey)
In parenthesis by the department name are: (the number of responses from districts/the total number of districts in the department)

Department	①	②	③	④	⑤	⑥	Reference (ha) Area of wetlands
Concepción (5/7)	1				3	3	6,062
San Pedro (9/17)	1			3	2		76,141
Cordillera (18/20)				12		3	26,585
Guairá (17/18)	1		3	7	1		N.A.
Caaguazú (17/20)				9	2	4	1,300
Caazapá (10/10)							17,601
Itapúa (28/29)	3		3	5	3	2	20,677
Misiones (10/10)	2	2	2	5	1	2	147,930
Paraguarí (17/17)			1	1	1		25,714
Alto Paraná (10/19)			1	6	1	1	N.A.
Central (18/19)			3	4		1	52,058
Ñeembucú (13/16)		1	4	2		2	422,810
Amambay (3/3)						1	N.A.
Canindeyú (7/9)	1		1	1	2	5	N.A.
Total (182/214)	9	3	18	55	16	24	795,878

Source: Locally Commissioned Survey, (JALDA/CEPADAS), 1996
Note 1: NA = Not Available
Note 2: ①-⑥ are as indicated below.
① Drainage facilities are set up with no problems.
② There are drainage facilities, but they are unusable due to age (deterioration).
③ There are drainage facilities, but they cannot be used due to high operation and maintenance management costs.
④ Installation of drainage facilities is desired, but they cannot be constructed due to high installment costs.
⑤ There is no drainage problem because the agricultural land is high enough above sea level and the grade is sufficient.
⑥ Drainage is not necessary because rainfall is sufficient.

4.2.3 Farm roads

The 3 types of roads in Paraguay are national roads, departmental roads and city roads and there is no separate category for farm roads. The length and density of paved and unpaved roads are shown by department in Table A 4.2.3.1. In addition, the conditions of roads in each district and the demands on roads as shown in the results of the locally commissioned survey are shown in Table 4.2.3.1. From this table, we can see that many roads have become unusable due to improper maintenance management after rainfalls and damage to bridges.

Table 4.2.3.1 Farm Roads (results of locally commissioned survey)
In parenthesis by the department name are: (the number of responses from districts/the total number of districts in the department)

Department	①	②	③	④	⑤	⑥	Reference (km) Length of roads
Concepción (5/7)	2	3	3	3	2	1	1,144.7
San Pedro (9/17)	2	3	4	5	2	1	3,297.0
Cordillera (18/20)	4	3	7	15	14	2	729.8
Guairá (17/18)	2	12	11	13	11	11	771.5
Caaguazú (17/20)		4	13	12	5	3	1,481.2
Caazapá (10/10)	2	8	7	8	8	7	1,013.6
Itapúa (28/29)	11	4	13	11	4	8	2,684.7
Misiones (10/10)	4	3	3	5	2	1	787.5
Paraguarí (17/17)	2	14	14	12	11	4	1,361.2
Alto Paraná (10/19)	2	1	2	4	2	2	1,130.4
Central (18/19)	4		4	5	2		552.8
Ñeembucú (13/16)	4	1	1	10	2	1	907.5
Amambay (3/3)	1		1				651.1
Canindeyú (7/9)	1	5	7	6	4	3	1,052.2
Total (182/214)	41	61	90	109	69	44	17,465.2

Source: Locally Commissioned Survey, 1996
Note: ①-⑥ are as indicated below.

① Farm roads are present with no problems.
② Operational maintenance is impossible and there are many farm roads which are impassable.
③ There is a high demand for farm roads, but they cannot be constructed due to high construction costs.
④ Roads become muddy and impassable after rains.
⑤ Roads are often submerged and impassable after rains.
⑥ Bridges and other water-crossing constructs are damages and impassable after rains.

4.3 Agricultural production

4.3.1 Cultivation

1) Soil

In the Eastern region surrounding the banks of the Paraná River, there is a strip of very fertile soil called "tierra roja". Many kinds of crops, notably highly mechanized and profitable farming such as soy beans and wheat are grown on this land. When cultivation was first begun, soy beans and other crops could be cultivated profitably without fertilization due to the very high fertility of the soil. However, after 4-7 years of continuous cultivation, the organic content of the soil has decreased, the pH has fallen, the level of replaceable minerals, especially calcium has fallen, and levels of phosphoric acid have fallen, causing a downward trend in productivity.

In the central part of the country the soil is of reddish-yellow color and sandstone-based. This area has been farmed for a long time and many crops such as cotton are grown there. There are also many livestock farms in this area. In recent years the declining quality of the soil has become a problem. This is due to the originally nutrient-poor quality of the soil combined with falling pH levels caused by many years of continuous crop cultivation.

There is damp, alluvial soil in the vicinity of the Paraguay River and its tributaries. Many crops are grown in this hilly area and the lowlands form natural grasslands. This is generally sandy, silt soil which has very little acidic organic content. Overall, there is a high potassium content, but there is a notable lack of phosphoric acid.

The soil in the land to the North is generally poor in organic material, nitrogen, and phosphoric acid. Potassium levels tend to be high and most of the soil does not require potassium supplements. The pH necessary for cultivation is from 5.5 to 6.5 and analysis shows that current levels are close to that range. However, some soils with pH under 5 which require correction have been observed. In accordance with the 1991 survey of the Agricultural Coal Sub-program of The National Soil Management Protection Program, it is necessary to use agricultural coal in order to stop the increasing acidity level in the soil, loss of nutrients and damage due to aluminum, manganese, and metals etc.

According to analysis carried out after gathering soil samples from the survey area and model areas mentioned below using simple soil analysis devices, results similar to the results of soil analysis results obtained in the past were obtained (see CUADRO A 4.3.1.1-2). The mineral content was below the detectable density limit of the survey device and soil suffering from salt damage was not within the scope of this survey.

The main types of soils of the departments in the eastern part of the country and their productivity levels are shown in CUADRO A 4.3.1.3-4.

2) Cultivation

(1) Main types of crops

According to the Agricultural Census of 1991, there were 45 principal crops being cultivated in Paraguay. The breakdown of these crops is as follows (see CUADRO A 4.3.1.5).

① There are at 16 annual crops. Among these are Paraguay's main export agricultural products such as soy beans, raw cotton, wheat and corn and self-sufficiency crops such as potatoes, red beans and cassavas.

② There are 14 vegetable crops. Among these, the fruits and vegetables which are most profitable are melons, tomatoes, strawberries, carrots etc.

③ There are 15 perennial crops. Among these are citrus fruits for home consumption or agricultural processing (oranges, mandarins etc.), maté tea which is important to the culture of Paraguay and tung which is used in industry.

(2) Situation of production of main crops

a) Situation of production by management categories

The 5 crops most often produced by small-scale farmers were selected by management class (small-, medium-, and large-scale) and the production conditions of these crops are shown in CUADRO A 4.3.1.6.

① The 5 most common annual crops are cassava, corn, raw cotton, poroto and peanuts. Of these, the crop that uses the most area is raw cotton and the average size of the area cultivated is 1.8 hectares for small-scale farmers, 3.7 hectares for medium-scale farmers and 19.3 hectares for large-scale farmers. When taking a general view of the departments which produce a large amounts of these top 5 crops, the highest production by small-scale farmers is from Caaguazú, Paraguarí and San Pedro which are in the centre of the surveyed area. The largest production by medium and large-scale farmers is by Caaguazú and the departments in the eastern part of the surveyed area near the national border such as Itapúa, Canindeyú and Alto Paraná.

② The top 5 fruit and vegetable crops are watermelons, melons, pumpkins, onions and green peas. Of these, the fruit/vegetable crop that uses the most area is watermelons and the average size of the area cultivated is 1.1 hectares for small-scale farmers, 0.6 hectares for medium-scale farmers and 19.3 hectares for large-scale farmers. When taking a general view of the departments which produce a large amounts of these top 5 fruit and vegetable crops, the largest production at every scale is in the areas closest to metropolitan areas so that the crops may be transported such as Caaguazú, Cordillera, Itapúa, Concepción and

Alto Paraná.

③ The top 5 perennial crops are oranges, mandarins, grapefruits, lemons and bananas. Of these, the perennial crops that use the most area are oranges and bananas and the average size of the area cultivated is 0.06 hectares for oranges and 0.10 hectares for bananas for small-scale farmers, 0.03 hectares for oranges and 0.23 hectares for bananas for medium-scale farmers and 0.26 hectares for oranges and 0.72 hectares for bananas for large-scale farmers. When taking a general view of the departments which produce a large amounts of these top 5 perennial crops, the largest production at every scale is in the areas closest to the capital or the capital itself such as Caaguazú, Cordillera, Central and San Pedro.

b) Trends in the production of main crops

The total of all of the management categories of the surveyed area from the 1991 agricultural year to the 1995 agricultural year (part of the 1994 agricultural year) and the production trends for the small-scale farming category within this total are as shown in Table 4.3.1.1. (See CUADRO A 4.3.1.7-8 for detailed information by department.)

① As for the area and production of annual crops, almost all have tended to increase or have leveled off with the exception of raw cotton. Of these, the crops which have increased the most are sunflowers, soy beans and corn.

② As for the area and production of fruit and vegetable crops, almost all have tended to increase or have leveled off with the exception of garlic. Of these, the crops which have increased the most are onions, green peppers and carrots.

③ The production and amount of land used for perennial crops have mostly tended to remain stable.

c) Crops which small-scale farmers prefer to cultivate

According to an area survey of 501 farming families, (locally commissioned survey) the main crops which farmers prefer to start, continue and stop producing and the main preferred areas are as follows (see CUADRO A 4.3.1.9).

① In Caaguazú, annual crops of which farmers prefer to start and continue cultivation are raw cotton, corn and peanuts. However, soy beans are preferred in Amambay and Alto Paraná. In addition, cassava and poroto are preferred in almost every department. On the other hand, farm families in most departments claim that they would like to stop cultivating raw cotton.

② In Caaguazú, fruit and vegetable crops of which farmers prefer to start and continue cultivation are tomatoes, green peppers, carrots and strawberries. However, onions are preferred in Pararguarí. On the other hand, farm families in Misiones claim that they would like to stop cultivating onions and watermelons.

Table 4.3.1.1 Production Trends of Main Crops

Crop / Management Category		All Management Categories					Small-scale Farm Category Only				
		91	91/92	92/93	93/94	94/95	91	91/92	92/93	93/94	94/95
Annual Crop											
Cassava	Area (ha)	175,389	179,160	179,160	183,609	174,063	132,659	135,501	135,501	138,863	131,644
	Production (tons)	3,226,409	2,594,380	4,025,295	2,500,046	4,047,031	2,440,133	1,962,130	3,044,331	1,890,785	3,060,771
Corn	Area (ha)	242,544	257,280	248,386	217,677	333,211	142,854	151,536	146,298	128,213	196,262
	Production (tons)	400,369	448,670	438,165	460,973	815,317	214,202	264,268	258,080	271,512	480,222
Raw Cotton	Area (ha)	403,850	426,070	227,554	369,886	325,410	293,650	309,797	165,453	268,944	236,606
	Production (tons)	619,446	383,661	409,012	367,637	451,516	450,788	278,960	297,392	267,309	328,297
Poroto	Area (ha)	46,664	47,030	55,518	67,615	71,521	35,206	35,446	41,843	50,963	53,907
	Production (tons)	40,166	40,720	45,756	46,204	64,334	29,961	30,690	34,487	34,824	48,489
Peanuts	Area (ha)	15,249	16,710	17,695	17,491	20,168	36,862	12,941	13,700	13,545	15,617
	Production (tons)	14,750	40,720	16,810	17,787	19,925	11,812	31,529	13,014	13,771	15,428
Sugar Cane	Area (ha)	54,065	54,100	54,124	53,847	54,164	28,031	28,045	28,057	27,914	28,081
	Production (tons)	2,742,169	2,714,090	1,736,960	2,725,928	2,501,200	1,401,701	1,406,985	900,440	1,413,120	1,296,623
Yams	Area (ha)	10,261	10,352	11,605	11,973	9,113	7,387	7,451	8,321	8,587	6,535
	Production (tons)	81,399	81,790	96,269	104,314	69,457	58,369	58,652	69,035	74,805	49,809
Soy Beans	Area (ha)	552,456	594,581	634,993	694,117	735,503	51,164	55,059	58,800	64,277	68,109
	Production (tons)	1,032,312	1,191,679	1,793,544	1,793,544	2,212,109	95,474	110,350	166,082	166,290	204,841
Red Beans	Area (ha)	5,341	5,410	7,539	7,420	5,874	3,648	3,692	5,148	5,066	4,010
	Production (tons)	5,734	5,140	7,973	7,775	6,210	3,915	3,508	5,446	5,310	4,241
Tobacco	Area (ha)	4,360	4,440	4,524	4,536	4,526	3,368	3,426	3,491	3,501	3,492
	Production (tons)	8,208	8,310	8,471	8,520	6,945	6,344	6,415	6,537	6,574	5,360
Dry Rice	Area (ha)	5,822	5,889	5,957	5,348	6,154	2,141	2,166	2,192	1,968	2,263
	Production (tons)	10,055	9,743	9,902	9,627	11,106	3,696	3,582	3,641	3,541	4,086
Mint	Area (ha)	13,731	13,977	13,978	14,009	13,993	5,730	5,833	5,833	5,845	5,839
	Production (tons)	51,391	52,358	52,493	52,545	53,348	20,933	21,850	21,905	21,926	22,262
Wet Rice	Area (ha)	10,710	11,540	18,150	18,134	19,480	847	913	1,432	1,433	1,541
	Production (tons)	33,917	44,190	68,358	72,146	80,146	2,345	3,491	5,400	5,701	6,333
Wheat	Area (ha)	153,581	156,238	182,510	174,786	174,786	2,957	3,017	3,522	3,373	3,373
	Production (tons)	240,141	258,887	327,921	375,679	375,679	4,483	4,997	6,329	7,252	7,252
Potatoes	Area (ha)	249	267	283	289	293	118	108	113	116	117
	Production (tons)	1,244	1,493	1,584	1,716	1,745	590	599	635	688	701
Sunflowers	Area (ha)	252	385	10,878	31,134	29,820	148	226	6,390	18,285	17,512
	Production (tons)	235	476	15,868	40,020	42,455	140	281	9,319	23,504	24,934
Fruits & Vegetables											
Onions	Area (ha)	1,426	1,510	1,515	1,524	1,751	1,046	1,108	1,112	1,118	1,281
	Production (tons)	6,275	8,910	9,108	9,334	12,080	4,715	6,536	6,677	6,845	8,859
Green Peas	Area (ha)	1,666	1,714	1,697	1,704	1,687	1,068	1,099	1,089	1,092	1,080
	Production (tons)	1,495	1,483	1,548	1,558	1,516	959	949	991	998	971
Tomatoes	Area (ha)	1,024	1,037	1,071	1,079	1,139	858	870	898	903	954
	Production (tons)	41,888	42,565	44,023	40,503	41,465	35,130	35,699	36,922	33,970	34,779
Garlic	Area (ha)	600	511	488	485	476	379	323	310	308	302
	Production (tons)	1,688	1,402	1,361	1,283	1,243	1,068	887	862	810	784
Green Pepper	Area (ha)	506	537	705	870	909	409	433	569	704	737
	Production (tons)	3,530	3,723	4,839	6,400	6,606	2,855	3,009	3,914	5,177	5,343
Carrots	Area (ha)	461	494	510	512	715	332	357	366	367	513
	Production (tons)	3,164	5,492	5,641	6,320	8,778	3,715	3,953	4,059	4,549	6,318
Strawberries	Area (ha)	175	178	186	183	181	158	161	168	166	164
	Production (tons)	2,000	2,068	2,140	2,088	2,070	1,795	1,856	1,920	1,874	1,858
Perennial Crops											
Oranges	Area (ha)	10,333	9,989	10,014	10,016	10,022	6,078	5,874	5,889	5,891	5,894
	Production (tons)	180,337	166,678	169,973	177,170	170,055	106,055	98,023	99,961	104,194	100,009
Mandarins	Area (ha)	3,184	3,164	3,179	3,176	3,076	1,832	1,820	1,829	1,827	1,769
	Production (tons)	29,161	33,785	26,032	30,180	26,012	16,772	19,433	14,974	17,358	14,962
Grapefruits	Area (ha)	902	902	905	905	902	483	483	484	484	482
	Production (tons)	59,220	71,082	72,450	63,788	60,720	31,617	37,952	38,679	34,057	32,417
Lemon	Area (ha)	604	604	604	603	568	278	278	279	279	265
	Production (tons)	14,009	11,083	16,190	15,531	12,517	6,429	5,126	7,489	7,184	5,790
Bananas	Area (ha)	8,839	8,839	9,378	9,387	-	5,651	5,650	5,996	6,001	-
	Production (tons)	84,466	83,466	89,710	75,633	-	55,585	53,369	57,361	48,361	-
Bitter Oranges	Area (ha)	10,336	10,333	10,887	10,881	10,678	7,567	7,564	7,937	7,967	7,817
	Production (tons)	180,333	180,337	189,502	189,369	181,635	136,655	132,023	138,734	138,637	132,974
Maté Tea	Area (ha)	26,514	26,514	27,100	27,110	28,466	6,955	6,955	7,107	7,112	7,469
	Production (tons)	62,554	62,552	64,151	63,361	63,864	18,357	16,825	16,620	16,620	16,751
Pineapples	Area (ha)	2,706	2,706	2,842	2,842	2,761	1,710	2,706	2,842	2,842	2,761
	Production (tons)	33,461	33,461	42,949	35,198	30,250	21,141	33,461	42,949	35,198	30,250
Grapes	Area (ha)	1,282	1,282	1,288	1,206	1,307	214	229	231	216	233
	Production (tons)	10,437	10,437	64,151	10,966	11,137	1,660	1,873	11,509	1,969	1,999
Coffee	Area (ha)	4,955	4,955	5,694	6,262	-	2,780	2,779	3,194	3,512	-
	Production (tons)	4,519	4,519	4,950	5,002	-	2,493	2,534	2,777	2,807	-
Tung	Area (ha)	10,912	10,912	11,014	11,001	11,014	4,106	4,106	4,143	4,139	4,143
	Production (tons)	45,889	45,889	46,310	46,241	45,540	17,860	17,262	17,423	17,394	17,132

Source: For 1991, The Agricultural Census (1991); for the agricultural years 91/92, 92/93, 93/94, 94/95, The Statistical Outline of Agricultural Production (1995) (Ministry of Agriculture and Livestock Statistics Division)

Note: Because there were no statistics on the production and area used for bananas and coffee for the agricultural year 94/95, these figures are unclear.

③ In Concepción and San Pedro perennial crops of which farmers prefer to start and continue cultivation are bananas, bitter oranges and mangos. However, Matté tea is preferred in Alto Paraná. On the other hand, there were no farm families which claim that they would like to stop cultivating perennial crops.

(3) Situation of cultivation by small-scale farmers

① Because annual crop cultivation is mainly carried out manually and using livestock, it is impossible to increase the cultivated area of crops which use land by making alterations in labour. In addition, the rate of introduction of effective crop rotation systems is low for medium-scale farmers.

② Because there is little knowledge and technology concerning vegetable cultivation among medium-scale farmers, it is mostly rough open field cultivation. In addition, production periods are limited and year-round cultivation is not done. However, in the area where farmers of Japanese descent are small-scale farmers, cultivation using seedling raising techniques and cheesecloth as well as intensive cultivation methods and some operations have achieved year-round farming.

③ In perennial crop cultivation, the proportion of plants surviving to maturity is low because farmers are not accustomed to management of transplantation and renewal. In addition, because of self-sufficiency production such as in-house consumption and sale of the surplus, it is common for farmers to continue using the same plants without renewal even after the plants are too old to be economically feasible.

(4) Situation of crop damage

a) Pests and parasites

Many types of plant diseases have struck various crops and have caused a drop in production diseases which need special attention are Macrophomia phaseolina and Sclerotium rolfsii which strike untilled soy beans and Cochliobolus sativus which strikes wheat. In addition, tomatoes are stricken by Xanthomonas campestris pv. vesicatoria and Pseudomonas solanacearum which is a soil disease.

Of the many diseases which damage crops, picudo (Anthomonus grandis) which affects raw cotton and tomato moths (Scrobipalpula absoluta) which affects tomatoes are causing the most problems due to crop damage. The first outbreak of picudo was confirmed in Paraguay in 1991 and since its entry into Ñeembucú in 1996, the entire surveyed area has been affected by it. The most important measures to be taken against picudo are early mass seeding, pesticide spraying soon after outbreak and proper handling of damaged crop remains. In order to carry out early mass seeding, it is necessary to distribute good seeds to the farmers. However, due to a shortage of good seeds, it is necessary to create a system to increase seed production. A pamphlet aimed at the promotion of damage due to picudo was made by The

Ministry of Agriculture and Livestock and distributed, but the effectiveness of preventive measures has not improved because the farmers have not followed the recommendations. In addition, tomato moths have spread all over the country and if measures are not taken, it is said that they will destroy 80% of the crop. In 1991, JICA will conduct cooperative research with Paraguay entitled "A Tomato Pest Prevention Plan".

b) Weed damage

Because Paraguay is in the subtropics, there are many tropical and subtropical weeds. In addition, because these weeds can also grow in the winter, there are weeds growing all year long. Due to this, it is necessary to consider cultivation methods such as catch cropping with cover crops and mixed cultivation in addition to spraying pesticides.

c) Bird and animal damage

Birds cause damage during the planting and harvesting seasons and most animal damage is caused after the harvest by rodents that eat crops while they are stored. Because of this it is necessary to implement improvements in the after harvest crop storing system.

d) Meteorological damage

Frost damage to corn and wheat is common in the south of the surveyed area. In addition, prolonged rain can cause delays in harvesting and parasite damage to annual crops such as raw cotton, soy beans, and wheat and fruit and vegetable crops such as tomatoes. In addition, droughts can cause lower yields so development of crops which are resistant to drought, frost and parasites is necessary.

(5) Conditions of crop diversification

The purposes of the Ministry of Agriculture and Livestock's recommendation to diversify crops are to insure the stability of the nation's food supply and to increase production of export crops. The necessity of insuring the stability of the nation's food supply is outlined in 3.2.1. In order to increase the production of export crops, it is necessary to strengthen the production system of farms which specialize in cash crops such as raw cotton. In order to strengthen the small-scale farmers' production system, it is necessary to introduce progressive cultivation techniques and capital to purchase agricultural production materials such as good seed and agricultural machinery. However, in order for this to be accepted by small-scale farmers, they must be organized into cooperative unions and the organization rate of farmers is only 11% (1991 Agricultural Census). In addition, there is not sufficient provision of processing facilities to increase the added value of agricultural products, markets and market development to produce profitable sales, and development of basic agriculture, all of which are important conditions for the strengthening of the production system.

Due to these conditions, we see that raw cotton and other cash crops are only a part of the crops grown by small farmers and many crops are grown for home consumption and do not promote crop diversification. For this reason it is necessary to continue to promote the strengthening of the production system and find solutions to these problems.

4.3.2 Livestock farming

Livestock production is an important part of the agricultural sector in Paraguay, accounting for 8% of the GNP and 30% of the agricultural sector.

Beef cattle, which take advantage of Paraguay's rich land resources have played the most important part in making Paraguay a country where stock farming is very prominent. Productivity is low because of poor management using the natural plains, however even when crop agriculture suffers from weather damage, livestock production does not fluctuate very much due to weather conditions and the number of animals, especially cattle being raised has been increasing. According to the 1991 Agricultural Census 7,626,000 cattle (including 517,000 dairy cattle), 320,000 horses, 357,000 sheep, 1,004,000 pigs and 102,000 goats 11,233,000 chickens (including 5,076,000 layers), and 29,000 hives of honey bees were raised as shown in Table 4.3.2.1.

The percentages of the above mentioned livestock raised in the survey area are as follows: cattle 69% (of which dairy cattle are 90%), horses 86%, sheep 76%, pigs 98%, goats 55%, chickens 99% (99% of which are layers) and honey bees 99%. Dairy cattle, horses and pigs are flourishing.

When looking at the structure of cattle farming, it is polarized into a few large farmers and a large number of small-scale farmers. 78% of cattle farms are small, however they account for only 21% of the land area. Looking at the number of cattle per farm, the national average 23.5, but the average number of cattle per small-scale farmer is 6.4. The average number of dairy cattle per operation in the survey area is 3.3 which is not very much more than the average number of dairy cattle on small-scale farmers which is 2.2. This shows that small and medium-scale farmers are the main force in the dairy cattle business. There are many small-scale farmers that use their dairy cattle as working cattle. The breeds used as dairy cattle are not those such as Holsteins which are bred exclusively for dairy purposes. The Criollo which was introduced from Europe and is conventionally a beef breed are very common.

We estimated the feed/demand balance of range fed livestock in the survey area including fallow land and forest land as well as basic feed production. Firstly, as shown in CUADRO A 4.3.2.1, with the total digestible nutrition (TDN) as a base, we calculated the amount of livestock feed necessary to be grown in each department.

Next, we estimated pasture production with the TDN as a base and looked at the demand balance.Including large-scale farms, all departments are over 100% with the exception of Guairá and Central. The average self-sufficiency rate was 194%. (CUADRO A 4.3.2.2). Next, we estimated the feed/demand balance for range-fed livestock on small farms using the same method (see CUADRO A 4.3.2.3-4). The results of this showed that all of the departments with the exception of Paraná, Canindeyú and Amambay were below 100%. The average was 67%. Guáira, Misiones, Paraguarí, Central and Ñeembucú had average rates of below 40%. It is thought that the balance is made up for using grass from riverbanks and roadsides or byproducts of crop cultivation. However when considering the situation of small-scale farms which have limited concentrated feed, it is seen that livestock are raised in very poor conditions.

Problems with the feed production base are as follows:

① The production area of feed crops and improved pastures is approximately 15% of the feed production base and there is a shortage in the total amount due to the low nutrient content and productivity.

② There is a shortage of minerals such as phosphorus, sodium and copper due to the soil constituents of the survey area.

③ Because the main pasture grasses are tropical and subtropical, productivity falls in the winter and the feed production is unbalanced and varies with the seasons.

Because livestock are raised in such a bad environment and there has been no planned improvement of livestock, productivity of both beef and dairy cattle is very low. Paraguay's average cattle management efficiency index is birth mortality rate 50%, shipping rate (shipping rate of herd) 12%, percentage of high priced cuts 50%, shipping age 4 years, shipping weight 350-400 kilograms, breeding age 2.5-3.0 years. The milk production of dairy cattle is 3.5 liters per head per day.

Horses, pigs, chickens and honey bees are also raised. However, even if the number of operations raising horses and pigs increases, the number raised does not increase. Of these, the livestock which is important for self sufficiency and as a source of cash is chickens. However, the productivity is low because there are problems with the state of the pastures and sanitation. As a way to promote poultry farming, a vaccination program which vaccinated 1,000 birds was implemented, but the problem of supplying balanced feeds remains. According to the 1956 Agricultural Census, there were 60,000 poultry farms at that time, however with the invasion of the african bees in 1970, the number decreased to 5,000. However, with the recent technical cooperation from Japan and Switzerland, the number of operations has risen to over 20,000.

In the survey area, the average small farm raises 6.8 hives of honey bees. The

honey bees usually make honey from forest and field plants, weeds and trees. In the study area, legumes and eucalyptus are used. Because the hives are not movable, the production per hive is 4.3-16.7 kilograms and the production varies greatly from department to department. The average production is low at 8.3 kilograms per hive.

One other product which is produced by small farmers in the survey area and deserves mention is silk. At one time silk production was promoted by Japanese aid, but due to the repatriation of the thread production companies due to the changes in the structure of the Japanese silk industry, the market was lost and the industry went into decline. However, a silk thread production factory was established in Alto Paraná by a private joint venture between an Italian company and a Paraguayan company. Production is carried out on a contract basis with 200 mostly small-scale silk farms. The total silk production in 1991 was 50 tons. Since then, production has increased, reaching 350 tons last year. However, there are still problems in the areas of improvement of the species of silkworms and seeds, silk production and silkworm rearing technology.

Table 4.3.2.1 The Situation of Livestock Farming (1)

Department	Cattle						Horses			Sheep		
	Cattle			Dairy Cattle								
	Farms	Head	No. of farm	Farms	Head	No. of farm	Farms	Head	No. of farm	Farms	Head	No. of farm
CONCEPCION	8,878	55,718	6.3	5,024	11,528	2.3	3,012	5,548	1.8	650	4,718	7.3
SAN PEDRO	21,210	133,588	6.3	11,350	23,999	2.1	9,766	22,035	2.3	1,230	7,463	6.1
CORDILLERA	16,307	100,550	6.2	8,606	17,133	2.0	3,168	6,053	1.9	519	2,829	5.5
GUAIRA	13,735	86,488	6.3	6,863	16,741	2.4	5,107	9,018	1.8	677	6,060	9.0
CAAGUAZU	26,423	159,620	6.0	13,607	27,464	2.0	4,615	7,149	1.5	810	5,769	7.1
CAAZAPA	10,893	72,905	6.7	5,610	12,632	2.3	8,517	16,324	1.9	1,979	15,435	7.8
ITAPUA	19,738	109,098	5.5	13,201	28,461	2.2	9,240	16,539	1.8	1,257	7,750	6.2
MISIONES	6,281	49,224	7.8	3,699	9,264	2.5	2,781	6,051	2.2	567	3,139	5.5
PARAGUARI	19,825	134,934	6.8	10,659	23,716	2.2	5,541	10,275	1.9	887	5,781	6.5
ALTO PARANA	8,961	47,839	5.3	7,086	15,719	2.2	1,704	2,509	1.5	163	1,030	6.3
CENTRAL	11,293	65,389	5.8	8,048	15,795	2.0	1,528	3,117	2.0	215	1,206	5.6
NEEMBUCU	4,679	58,116	12.4	3,447	11,872	3.4	3,654	11,300	3.1	629	5,325	8.5
AMAMBAY	817	6,576	8.0	751	2,981	4.0	760	1,511	2.0	109	838	7.7
CANINDEYU	4,540	27,778	6.1	3,511	8,047	2.3	2,171	3,763	1.7	105	540	5.1
Survey area small farm subtotal	173,580	1,107,823	6.4	101,462	225,352	2.2	61,564	121,192	2.0	9,797	67,883	6.9
Survey area total	222,951	5,237,892	23.5	138,944	463,195	3.3	89,771	274,439	3.1	19,213	272,168	14.2
	(97,2%)	(68,7%)		(97,7%)	(89,5%)		(95,7%)	(85,8%)		(92,0%)	(76,2%)	
Western part of survey area subtotal	6,527	2,388,725	366.0	3,309	54,235	16.4	4,075	45,482	11.2	1,669	84,812	50.8
	(2,8%)	(31,3%)		(2,3%)	(10,5%)		(4,3%)	(14,2%)		(8,0%)	(23,8%)	
National total	229,478	7,626,617	33.2	142,253	517,430	3.6	93,846	319,921	3.4	20,882	356,980	17.1
	(100%)	(100%)		(100%)	(100%)		(100%)	(100%)		(100%)	(100%)	
1981 Agricultural Census	167,546	6,457,329	38.5	107,079	425,735	4.0	82,234	309,003	3.8	18,653	355,521	19.1
Rate of increase (%)	137.0	118.1		132.8	121.5		114.1	103.5		111.9	100.4	
1991/1981												

Table 4.3.2.1 The Situation of Livestock Farming (2)

Department	Pigs			Goats			Honey Bees			Silkworms		
	Farms	Head	No. of farm	Farms	Head	No. of farm	Farms	Head	No. of farm	Farms	Head	No. of farm
CONCEPCION	8,828	28,864	3.3	274	2,001	7.3	11,430	154,012	13.5	26	177	6.8
SAN PEDRO	24,006	100,088	4.2	412	2,085	5.1	29,030	397,887	13.7	232	925	4.0
CORDILLERA	13,190	35,570	2.7	168	629	3.7	17,520	274,948	15.7	298	1678	5.6
GUAIRA	11,623	37,772	3.2	146	776	5.3	15,583	214,659	13.8	157	664	4.2
CAAGUAZU	27,493	94,628	3.4	397	2,273	5.7	34,751	480,851	13.8	231	2885	12.5
CAAZAPA	11,574	52,440	4.5	358	2,488	6.9	15,401	211,711	13.7	77	246	3.2
ITAPUA	24,467	125,273	5.1	562	2,423	4.3	28,239	392,590	13.9	394	4004	10.2
MISIONES	5,233	13,675	2.6	80	372	4.7	6,553	78,214	11.9	182	1470	8.1
PARAGUARI	17,665	45,524	2.6	320	1,416	4.4	22,179	295,109	13.3	328	1744	5.3
ALTO PARANA	10,067	60,232	6.0	658	2,129	3.2	13,449	195,798	14.6	177	758	4.3
CENTRAL	6,987	21,704	3.1	199	937	4.7	9,178	417,614	45.5	71	610	8.6
ÑEEMBUCU	2,641	6,737	2.6	185	1,604	8.7	5,001	51,660	10.3	105	359	3.4
AMAMBAY	1,071	5,493	5.1	62	392	6.3	1,583	22,560	14.3	9	89	9.9
CANINDEYU	5,923	36,215	6.1	336	1,404	4.2	7,201	111,948	15.5	35	115	3.3
Survey area small farm subtotal	170,768	664,215	3.9	4,157	20,929	5.0	217,098	3,299,561	15.2	2,322	15,724	6.8
Survey area total	208,474	984,175	4.7	6,998	55,715	8.0	260,911	5,012,248	19.2	3,644	28,623	7.9
	(99,1%)	(98,0%)		(86,2%)	(54,5%)		(98,7%)	(98,7%)		(98,0%)	(98,6%)	
Western part of survey area subtotal	1,939	19,705	10.2	1,117	46,523	41.6	3,493	64,044	18.3	76	411	5.4
	(0,9%)	(2,0%)		(13,8%)	(45,5%)		(1,3%)	(1,3%)		(2,0%)	(1,4%)	
National total	210,413	1,003,880	4.8	8,115	102,238	12.6	264,404	5,076,292	19.2	3,720	29,034	7.8
	(100%)	(100%)		(100%)	(100%)		(100%)	(100%)		(100%)	(100%)	
1981 Agricultural Census	186,008	1,000,709	5.4	7,298	106,529	14.6	215,212	4,299,630	20.0	1,500	10,343	6.9
Rate of increase (%) 1991/1981	113.1	100.3		111.2	96.0		122.9	118.1		248.0	280.7	

Source: 1981 and 1991 Agricultural Census

4.3.3 Farming practice

1) Situation of farming practice by management category

(1) Large-scale farmers

When viewing the situation of land tenancy use for farms (see CUADRO A 4.3.3.1), in the case of large-scale farmers, there are many combined agriculture and livestock farms which concentrate more on livestock than cultivated crops. These large farmers own their own agricultural machinery and agricultural facilities. The agriculture industry permanently employ farm workers with a great deal of farming experience and assign them tasks, distributing the appropriate share of work. The farmers keep track of market trends and concentrate of managing the business. The trend in recent years has been to change from raw cotton to soy beans which are thought to have more potential for the future. Farms have sensitively adjusted to this and there is a trend for farms to move into soy bean cultivation which can be a large source of capital.

(2) Medium-scale farmers

Medium-scale farmers, like large-scale farmers, often raise both cultivated crops and livestock, however the proportion of livestock to cultivation is roughly equal. Most of the farmers of Japanese descent are in this category and they have introduced advanced no-tillage cultivation technology and made soy beans an export crop for Paraguay. They have also made efforts to promote the spread of fruits, vegetables and perennial crops which has widened the selection of crops to be managed and contributed to the diversification of crops. These farms do not have as much land or equipment capital as large-scale farmers, but in many cases, the farm family can perform all of the labour necessary to cultivate their land-based crops.

(3) Small-scale farmers

Excluding landless farmers, small-scale farmers account for 82% of all management categories of farming. However, the percentage of land area under tenancy by small farmers is only 13% of the total. The average land area under tenancy per small-seale farmer is 6 hectares. Of this area, approximately 45% is used for cultivation.

The type of farming practice is not uniform and varies according to the scale of land under tenancy, cultivation and breeding techniques, manpower and access to markets. According to an interview survey of 20 farmers (farmers oral survey) the average small farm raises approximately 10 different kinds of crops including cash crops such as raw cotton, self sufficiency crops such as cassava and poroto, and feed crops used to feed livestock. In addition, they have cattle and horses as well as small and medium-sized livestock such as pigs and chickens and honeybees in the yard, thereby carrying out a combination of crop and livestock farming.

Because small-scale farmers raise too large a number of large livestock to keep on their own land, they pasture their large livestock on the land of large farmers or other people, roadsides and riverbanks or on public pasture land. These cattle and horses are necessary to farming practice as substitutes for machinery or transport vehicles. Dairy farming is dominated by small- and medium-scale farmers. Specialized dairy breeds are raised in the suburbs of major cities and farmers selling their own milk have emerged. However, in rural areas, large stock animals play an important role as working animals or as insurance against crop disasters. Small and medium sized stock animals are raised on casavas, corn or on the byproducts of agricultural crops and products not consumed by the farm family are sold, thus making these animals an important source of income to the farmers even though the management scale is small.

In this way, the livestock of Paraguay's small-scale farmers serves the following objectives: ① provides a supplement to crop agriculture which has unstable production which is dependant upon weather conditions, ② use in crop production and as transportation, and ③ in addition to home consumption milk, pork, eggs, poultry meat and honey are also an important source of income for farm families.

According to the oral farm survey etc., the typical, representative crop for each department is as follows: for Paraguarí, Cordillera and Caaguazú, fruits and vegetables; for Misiones, Ñeembucú and Amambay, annual crops; for Central, Itapúa and San Pedro, annual crops and fruits and vegetables; for Paraguarí, Caazapá and Canindeyú, annual crops and perennial crops; for Alto Paraná and Guáira, annual crops, fruits and vegetables and perennial crops. In each department, self-sufficiency crops and livestock are combined to form mixed management type farms (see CUADRO A 4.3.3.2).

2) Situation of use of materials of agricultural production

CUADRO A 4.3.3.3 shows the situation of use of materials of agricultural production by number per operation according to the 1991 Agricultural Census.

(1) Situation of use of high quality seed

The percentage of farms which use high quality seed is 40% for large-scale farmers, 60% for medium-scale farmers and 50% for small-scale farmers. In addition, according to the oral farm survey, small-scale farmers usually, with the exception of raw cotton, gather existing seed available from their farms and use seeds which are obtained through crossbreeding with each other's seeds. It is thought that this is done for the following reasons:

① Most small-scale farmers cultivate raw cotton which the Paraguayan government has been recommending for their cash crop. Other crops are

cultivated for home consumption. Because of this, many crops are seeded with local seeds.

② High-quality seeds which produce disease resistant plants with high yields are sold at the Seed Department (DISE) and some companies. However, because most of the high-quality seed is imported from the U.S., neighbouring countries or Japan, they are usually expensive and difficult for small-scale farmers with low incomes to purchase.

③ Domestically produced seed is limited to a few annual crops such as raw cotton etc., a few fruits and vegetables such as melons and pumpkins etc. and a few perrenials such as satsumas. This domestic seed production has been increasing, but due to a lack of propagation facilities and technology, production is less than the amount of seeds imported and the quality is still low. Therefore, there has been no strong upward trend in use of these domestic seeds.

(2) Situation of use of fertilizer

The rate of use of chemical fertilizers is 30% for large-scale farmers, 40% for medium-scale farmers and 25% for small-scale farmers. In addition, according to the oral agricultural census, small-scale farmers only use chemical fertilizers on cash crops such as raw cotton and some fruits and vegetables but not on crops for home consumption. When small-scale farms fertilize, they usually use organic fertilizers such as cow manure or green manure. Therefore, the rate of use of highly effective chemical fertilizer by small-scale farmers is low. It is thought that the reasons for this are as follows:

① In the eastern part of the survey area near the national border, "tierra roja" soil is spread over a large area. This soil is fertile and due to the fact that a satisfactory level of production can be attained using the nutrients in the soil alone, small-scale farmers do not feel that it is necessary to fertilize crops which are cultivated for home consumption.

② In order to increase quality and yield, chemical fertilizers including phosphoric acid and nitrogen which are lacking in the soil in the survey area are necessary materials of production. Because all chemical fertilizers including these (excluding the lime used to improve the soil quality) are imported from neighbouring countries, and because of their high cost, it is difficult for small-scale farmers with low income to purchase such fertilizers.

(3) Situation of use of agricultural chemicals

The rate of use of agricultural chemicals is 40% for large-scale farmers, 70% for medium-scale farmers and 60% for small-scale farmers. In addition, according to the oral agricultural census, the situation of use of agricultural chemicals on small-scale farmers is the same as the use of high-quality seeds in that they are used only for

cash crops and their rate of use for crops for home consumption is low. Further, when small-scale farms use agricultural chemicals, their choice of chemicals, period of use and methods of dilution and spreading are not always correct. It is thought that the reasons for this are as follows:

① Agricultural chemicals such as herbicides, pesticides, and fungicides are all imported from neighbouring countries or Europe and the U.S. and because of their high cost, it is difficult for small-scale farmers with low income to purchase such agricultural chemical.

② Agricultural chemicals are sold in many forms and quantities depending on the purpose (such as the eradication of parasites) and small-scale farmers lack the knowledge to correctly select and use them.

3) Methods of labour by small-scale farmers

Tractors and other power machinery for farm use are all imported from neighbouring countries, Europe or the U.S. Most of this farm machinery is high priced and designed for farmers with an area of at least 100 hectares. For this reason the percent of small-scale farmers who own tractors is only 0.6% and the rental rate is below 3% (see CUADRO A 4.3.3.4). Furthermore, the operation methods of power machinery for farm use by small-scale farmers are unskilled, it is rare for farmers to operate the machinery themselves when they rent it and many of them hire local small- and medium-scale operators to do their cultivation and soil preparation.

Approximately 70% of small-scale farmers raise cattle and the average number of cattle raised per small-scale farmer is approximately 4 (mature cattle) and they are used as dairy cattle, beef cattle and working animals. However, the percentage of small-scale farmers owning farm equipment for use with working animals such as plows is approximately 30% and the percentage renting such equipment is approximately 15%. Therefore, the percentage of small-scale farms utilizing cattle as working animals is estimated to be less than 45%. Therefore, over 50% of small-scale farms use human labour.

The types of farm equipment owned by small-scale farmers are handoperated sprayers and hatchets, hoes and weed hoes only. Capital for facilities such as farm machinery, storehouses or labour for storage which are essential for modern farming is not available.

The number of year-round farm workers per small-scale farmer is approximately 3 persons per household in addition to approximately 10 temporary workers. The above workers work approximately 247 days per year on their farms.

The most labour intensive work is harvesting and during this period, in addition to temporarily hiring workers to meet the demand for labour, small-scale farmers

use younger members of the family to assist with part of the work, thus making a total family labour system. Especially in the case of small-scale farmers specializing in raw cotton or fruits and vegetables, young people work long hours for long periods and this is o hindrance to their schooling.

4) Production costs for main cash crops

Production costs for main cash crops are as shown in Table 4.3.3.1.

Table 4.3.3.1 Production costs for main cash crops

Unit: Gs, %

Item \ Crop	Raw Cotton	Soy Beans	Melons	Strawberries	Tomatoes	Oranges	Bananas
A Gross income	1,353,000	733,400	4,722,300	43,890,000	37,116,750	6,335,000	2,695,000
B Material Cost	221,465	311,075	706,250	5,140,156	8,091,050	180,972	379,957
C working Power Cost	42,500	40,000	22,500	52,800	75,000	30,000	20,000
D Water Cost	0	0	72,500	72,500	72,500	0	0
E Production Materials Cost	178,965	271,075	611,250	5,014,856	7,943,550	150,972	359,957
F Labor Cost	825,000	225,000	2,362,500	3,687,500	4,337,500	443,750	493,750
G Family Labor Cost	262,500	125,000	962,500	1,137,500	1,612,500	193,750	156,250
H Hired Labor Cost	562,500	100,000	1,400,000	2,550,000	2,725,000	250,000	337,500
I Land Cost	135,800	73,340	472,230	225,000	225,000	633,500	269,500
J Interest on Capital	62,653	31,355	176,077	645,357	907,618	33,882	58,935
K Production Cost	1,244,418	640,770	3,717,057	9,698,013	13,561,168	1,292,104	1,202,142
L Net Profit	108,582	92,630	1,005,243	34,191,987	23,555,582	5,042,896	1,492,858
M Income	669,035	322,325	2,616,050	36,199,844	26,300,700	5,904,028	1,977,543
N Net Profit Rate	8.0	12.6	21.3	77.9	63.5	79.6	55.4
O Income Rate	42.1	43.9	55.4	82.5	70.9	93.2	73.4

Source: Costo Estimativo de Varios Productos Tradicionales, 1995, MAG etc.
Note: Calculation of the items is as follows: K=B+F+I+J, L=A-K, M=L+G+I+J, N=L/A x 100, O=M/A x 100

(1) Annual crops

① For raw cotton, the seeds recommended by REBA P 279 and other seeds are bought and agricultural chemicals to exterminate picudo are applied twice. The labour is done using working animals or manpower and for harvesting work which is the most demanding, temporary employees are also hired as appropriate. Gross income is 92% of the production cost. The cost of labour is a large part of the production cost (66%) but materials of production is only a small part (14%). Moreover, because the family labour cost is high, the income rate is raised to 42%.

② For soy beans, seeds obtained through trading and gathering from one's own farm and purchased seeds are used and ploughing and preparing the land is done with working animals or by family labour. The production cost of this is 87% of the gross income and materials of production make up 42% of the production cost. The income rate is 44%.

(2) Vegetables

Vegetables usually have a higher materials cost and cost of labour however, depending on the season, there is a great variation in the price.

① Melons: Melons are a crop which requires manual labour such as crawling on the

ground, raising seeds and planting as well as continuous labour such as irrigation. In addition, cultivation, management and harvest also often require the hiring of temporary labourers. The production cost is 79% of the gross income and the cost of labour is 64% of the production cost. The income rate is high at 55%.

② Strawberries: Because disease occurs often in strawberries,the cost of materials of production such as virus-free seeds and agricultural chemicals is high. In addition, because of the concentrated labour, it is necessary to hire a large amount of labour for cultivation management, harvesting and shipping preparation work. However, because the sale price is high, the cost of production is only 22% of the gross income and the income rate is very high at 83%.

③ Tomatoes, like strawberries are one of the crops with the highest cost of materials of production and labour. Because the sale price is high, the cost of production is only 36% of the gross income and the income rate is very high at 71%.

(3) Perennial crops

Perennial crops require a raising cost until the orchard is mature.

① Orange orchards require 6 years to reach maturity, but due to the very rough management and the long life of the orchards, the orchard raising cost is low. The items which take up large portions of the production cost are the cost of land which accounts for 49% of the production cost and labour which accounts for 34%. Production cost is 20% of the gross income and the income rate is very high at 93%.

② Bananas can be harvested after 2 years, but orchard raising costs are high due to the short life of the trees. Labour costs account for 41% of production costs and is mainly used for intertillage, weeding and harvesting. The production cost is 45% of the gross income and the income rate is very high at 73%.

5) Income of small-scale farmers

According to the IFAD (International Fund for Agricultural Development), Paraguay's absolute povertization level is below US $2,000 (approximately Gs 4.4 million) and the extreme poverty line is less than US $1,000 (approximately Gs 2.2 million).

According to the FAO (Food and Agricultural Organization) of the U.N., the average yearly income per family of Paraguay's GNP is approximately Gs 7.5 million. The average yearly income per family in the capital is approximately Gs 12 million and the average yearly income per family in cities is approximately Gs 8 million. The average yearly income per family in rural areas is approximately Gs 4 million.

When applying IFAD standards to the results of the FAO survey, the average

yearly income per family in Paraguay is just above the absolute poverty line.

However, according to a study conducted by a local consultant the average yearly income per small-scale farmer's family is approximately Gs 2.5 million which is much lower than the yearly income in rural areas according to the results of the FAO survey. When applying this breakdown to the IFAD standards, the extreme poverty rate is approximately 56% and the absolute poverty rate is 28% and the percentage above the absolute poverty line is 16%. This tends to be the same when viewed by department or by scale of area.

In addition, according to the oral agricultural survey, the yearly cost of living for small-scale farming families is approximately Gs 1.5 million to 3.5 million. Because this figure for the cost of living does not include agricultural production costs, there is hardly any household economic surplus and households which are especially cash poor become impoverished at the beginning and end of the year when there are many cultural events. The level of income at which responses said that it is possible to make a living (desired amount) for small-scale farmers averages approximately Gs 5 million.

Therefore, considering the above factors, it is necessary for the desired income of small-scale farmers to exceed Gs 4 million to 5 million.

4.4 Distribution of farm produce

4.4.1 Distribution of farm produce

1) Characteristics of production zones of farm produce

(1) Collection and distribution

a) Classification and packaging

There are no official standards for classification and packaging of harvested products. Only some organizations such as cooperatives of ethnic Japanese farmers carry out classification of products. Most farms only have distribution containers which hold 20 or 30 kilograms. Wooden boxes and polyurathene bags are used in packaging. This packaging is inferior compared with imported products.

b) Methods and destinations of shipping

According to the 1991 Agricultural Census, 88% of farms which sell agricultural products ship to a middle man and 6.7% of farmers ship through some sort of organization. This is because organization of farmers is not widespread and farmers, particularly small-scale farmers do not usually own their own transportation vehicles.

The most common destination for raw cotton which is the largest cash crop for small-scale farmers is spinning factories. The farmers either ship the harvest themselves or it is collected and shipped by a middle man or the factory itself. Fruit and vegetables are shipped through a middle man to Asunción, Encarnación, Ciudad del Este, Pedro Juan Caballero, etc. or to public markets of other rural cities, nearby cities or retail sellers in cities. Bitter oranges and medicinal grasses are collected and distributed by cooperatives and middle men and exported to foreign countries. Milk is either collected and shipped by a milk collecting agent or sold by the producer. Soy beans, which are mainly produced by medium-scale or large-scale farmers are either shipped to a soybean oil factory after collection by a storage facility such as a farmer's cooperative or are shipped to an export company, and is mostly exported to non MERCOSUR (Southern Cone Common Market) countries.

c) Collection and shipping organizations

Collection and shipping organizations include cooperatives of ethnic Japanese farmers and some other cooperatives however, there are almost no collection and shipping organizations made up of small-scale farmers. Because small-scale farmers do not have market information, they act on the instructions of middle men who manage the circulation of agricultural products.

(2) Quality control of agricultural products

a) Loss of fruit and vegetables

The percentage of fruit lost after harvest is approximately 20%, the same as other Latin American countries.

50 tons of bad fruit and vegetables are discarded every day at the central wholesale market in Asunción. The main causes of this waste are the long time necessary for harvest and damage due to poor wrapping and packaging methods.

b) Quality control

There are no official quality control standards in Paraguay. The city of Asunción manages its central wholesale market (other cities do the same), but because the city does not have the jurisdiction to force the shippers to adopt quality control standards, there has not been a sufficiently efficient market circulation system established. In the fruit circulation project aimed at central wholesale markets carried out for 7 years starting in 1981, the Central Council of Ethnic Japanese Farm Cooperatives produced and attempted to promote its "Handbook on Quality Control Standards and Shipping of Fruit" but it was not accepted by the shippers. At that time, it was not necessary for buyers to buy rejected fruit. Buyers would select the fruit put up for sale themselves before they bought it. Now, with the emergence of supermarkets, etc., a demand has arisen for products which have been selected using quality control standards.

c) Preservation of fruit and vegetables

The sub-tropical climate, the long period of time it takes to ship the products to the consumption area and the lack of refrigerated transportation etc. makes the preservation of fruit and vegetables difficult.

2) Circulation system

(1) Consumption of agricultural products

Recently, when looking at fruit consumption, supermarkets have become more common, but it cannot be said that small stores have become organized. Most sales are through small stands and street vendors who are not associated with large wholesalers. It is said that the number of supermarkets in medium sized and large cities is increasing.

(2) Balance of supply and demand

Although it is possible to produce almost all types of fruits in Paraguay due to its natural conditions, due to the fact that the country has an oval shape and does not have great variation in altitude, it is impossible to take advantage of differences in temperature between highlands and lowlands when cultivating. Therefore production is concentrated into one period. For this reason there are more imports than exports during the seasons when there is no production in Paraguay. These imported agricultural products include over 20 crops such as potatoes which can only be produced for a short period of time due to climatical conditions.

(3) Circulation routes

Intranational transport is conducted by roads. Transport for export is either by way of the 7 ports on the Paraguay and Paraná rivers or by trucks using roads. Transport by ship is slow and expensive and therefore not used very often except with export products such as cotton thread and soy beans. Fruit is transported in special trucks.

Transportation routes include: ① overland from Ciudad del Este to the port of Paranaguá in Brazil, ② overland from Encarnación to the port of Montevideo in Uruguay, ③ down the Paraguay or Paraná rivers to the port of Buenos Aires in Argentina by way of the Plata River. It is through these ports that Paraguayan products are exported to countries which are not in MERCOSUR.

(4) Pricing system

The price that the cotton spinning factory of raw cotton is decided by the factory and based on this, the middle men collect raw cotton from the small-scale farmers and ship it. Because the cotton spinning factory wants to be able to collect a stable supply of cotton, many of these factories attempt to maintain a relationship with the small-scale farmers, providing them with financial and technical assistance. The price of bitter oranges and medicinal grasses is decided by the foreign customer and their purchasing agents base their collection from cooperatives and middle men and shipping on this price. This is the most stable type of buying system for the small farmers.

The price of fruit and vegetables including cassavas is decided by the buyers who then put them in circulation by collecting and shipping them. These buyers prices are usually lower than those of the shippers in the cooperatives.

There are 110 wholesalers in the Asunción central wholesale market and all of them practice relative buying.

The exporters make a tentative price contract with the farmers for tomatoes and green peppers intended for export and then collect, ship and export the produce, but the price is calculated afterwards. The price of beef is under the exclusive control of the meat packers.

3) Organization of circulation of agricultural products and legal system

The Circulation Department of the Ministry of Agriculture and Livestock is in charge of the administration of circulation, however the public markets are established under the regulations of the regional cities. SIMA (Market Information Service for Agricultural Producers) obtains the prices of 3 large wholesale markets in Paraguay by telephone and provides this information to all of the markets and broadcasts it by radio.

4) Facilities connected to the circulation of agricultural products

In addition to the 3 major public markets in Asunción, Encarnación and Ciudad del Este, there are other market circulation facilities in other regional cities. In addition, there is a market for each area. In accordance with the "Plan for the Improvement of the Circulation of Fruit and Vegetables" which is supported by Japan, collection and shipping facilities in 2 production areas and a whole sale market in a consumption area have been set up. There is a serious lack of collection and shipping centres and milk collection centres because they only exist in some cooperatives. There are 5 public livestock markets in Central and Asunción and only one in the other 7 departments.

5) Plant quarantine and control of toxic residue

Since the beginning of MERCOSUR, Paraguay is under the obligation to present information concerning the situation of plant disease and parasites and present certificates of quarantine and control of toxic residues of agricultural chemicals.

Plant quarantine is controlled by the Plant Quarantine Office of the Plant Quarantine Section of the Department of Plant Defense and its regional offices (including branch offices; see CUADRO A 4.4.1.1). The main work of these offices includes the prevention of introduction of infected plants which become plant quarantine and plant epidemic issues and measures taken to prevent epidemics (see CUADRO A 4.4.1.1). However, lack of facilities and personnel is a hindrance to the carrying out of these duties.

Because the Ministry of Agriculture and Livestock does not have the personnel and facilities for analysis of toxic residue, such analysis work is entrusted to INTIN (the National Institute of Technology and Standards) and to the departments of Pharmacology and Veterinary Science of the University of Ascunción. Because many types of agricultural chemicals are used in Paraguay (see CUADRO A 4.4.1.2), it is necessary to have high-quality analysis equipment.

In order to make Paraguay's agricultural trade smoother, it is necessary to strengthen the import/export plant quarantine system, upgrade the equipment for analysis of agricultural chemical toxic residue and to train the personnel who do this work.

4.4.2 Processing of farm produce

1) Processing and handling of agricultural products

(1) Industrial processing and handling

Agricultural products for export in Paraguay are exported either in their raw

form or after only basic processing. High level value-added processing has not been developed. The major handling and processing plants for agricultural products are shown in Figure 4.4.2.1. In production areas, export products such as soy beans, wheat and corn are produced mostly by medium and large-scale farmers and there are storage and oil extraction facilities in such areas. However, there are not enough collection and shipping facilities or storage facilities for fruits and vegetables which are produced by small-scale farmers. In recent years, in response to the trends of MERCOSUR, there has been an increasing trend for investors to establish fruit and vegetables processing plants in production areas and in the suburbs of the capital.

① In Itapúa industrial agricultural fruit production system which centres on citrus fruits, fruit selection and packing facilities and a citrus juice factory with a production capacity of 200,000 tons are being constructed.

② As for raw cotton which is dominated by small farmers, there are over 40 cotton spinning factories owned by corporations, but recently cotton production has fallen and the factory operation rate has fallen. There are also some factories which have halted production. There have also been examples of oil extraction factories built for dual production of cottonseed and coconut palm oils. Such factories are having serious difficulties in obtaining materials.

③ There are 7 sugar production factories in Guáira, Central, Paraguarí and Cordillera with the capacity to handle 100 million tons of sugar cane. However, in recent years due to the drop in sugar prices due to falling demand, 1 factory halted production in 1995 and sugar production rates are falling. There are also small-scale sugar production plants in production areas, but their operation rate is low.

④ Paraguay's first raw silk production factory started production in 1995. Silk has been produced in the past, but this was for the export of dry cocoons and perhaps the operation of silk thread production factories in order to increase the added value will stimulate small farmers to increase production.

(2) Cottage industry handling and processing

Small farms produce mainly for home consumption and process the following agriculture products as a source of cash. However, most of these are cottage industry type operations using family labour and simple tools and there is very little processing by production organizations or cooperative labour such as collection and shipping. The situation of processing of agricultural products by cottage industry is shown in CUADRO A 4.4.2.1.

a) Processing of agricultural products for home consumption

Processing of agricultural products which is done mainly for home consumption purposes includes ① making sugar, unrefined sugar and juice from sugar cane, ② making starch from cassavas, ③ making jam and juice from mainly

citrus and perennial crops, ④ making pickles from cucumbers and other vegetables, ⑤ making cooking oil, soap and sausage from beef and pork, ⑥ making cheese and yogurt from milk and ⑦ the making of honey by farmers who have hives. Most of this production is carried out for home consumption, but some is sold at the local market for income.

b) Processing of agricultural products for cash income

Petit grain which is made from bitter oranges is an essence which is unique to Paraguay is used as a gel in perfumes and scents and much is exported to Europe and America. In order to extract petit grain, it is necessary to use facilities called "alambique" but export of petit grain is a stable business and it seems that there is hope to increase production among small farmers. However, because they are individually managed, it is rare for these small farmers to be organized into production organizations for extraction and sales.

The essence made from lemon grass is used for scent in soap, detergents. It is extracted in much the same way as petit grass, but it's market price is falling. Others such as mint and eucalyptus have shown good results, but the market is now saturated.

2) Handling and processing of livestock products

Facilities for the processing and handling of main livestock products are shown in Figure 4.4.2.2.

There are two types of beef handling centres. There are 9 packers which meet international sanitary standards and handle export meats (there are 3 others which only have freezers) and freeze and keep meat in cold storage. The larger scale operations can handle 120,000 head a year. These large-scale slaughterhouses are concentrated in the suburbs of Asunción.

On the other hand, there are 22 registered slaughterhouses catering to domestic consumption. There are also many unregistered slaughterhouses. There are 61 ham and sausage processing plants in Paraguay. Recently milk consumption has risen and the number of milk processors has increased. The 27 corporate processing plants are concentrated in Asunción and Ciudad del Este which are large consumption areas and they do approximately 30 percent of the milk handling and processing. In Paraguay, the milk production of the Mennonites*1 in the El Chaco*2 area has increased and the small farmers in the survey area have also been stimulated to increase production by increasing demand.

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*1 The Mennonites are a Protestant sect founded in Switzerland by Menno Simones (1496-1561) in the 16th century. They first migrated to Paraguay in 1926. There are 3 Mennonite colonies in El Chaco. Their total area is 110 hectares and their total population is 12,000.

*2 Paraguay is divided into eastern and western regions by the Paraguay River. The western part is called the Chaco region and makes up 60% of the total land area.

Figure 4.4.2.1 Current Location of Agricultural Product Handling and Processing Facilities

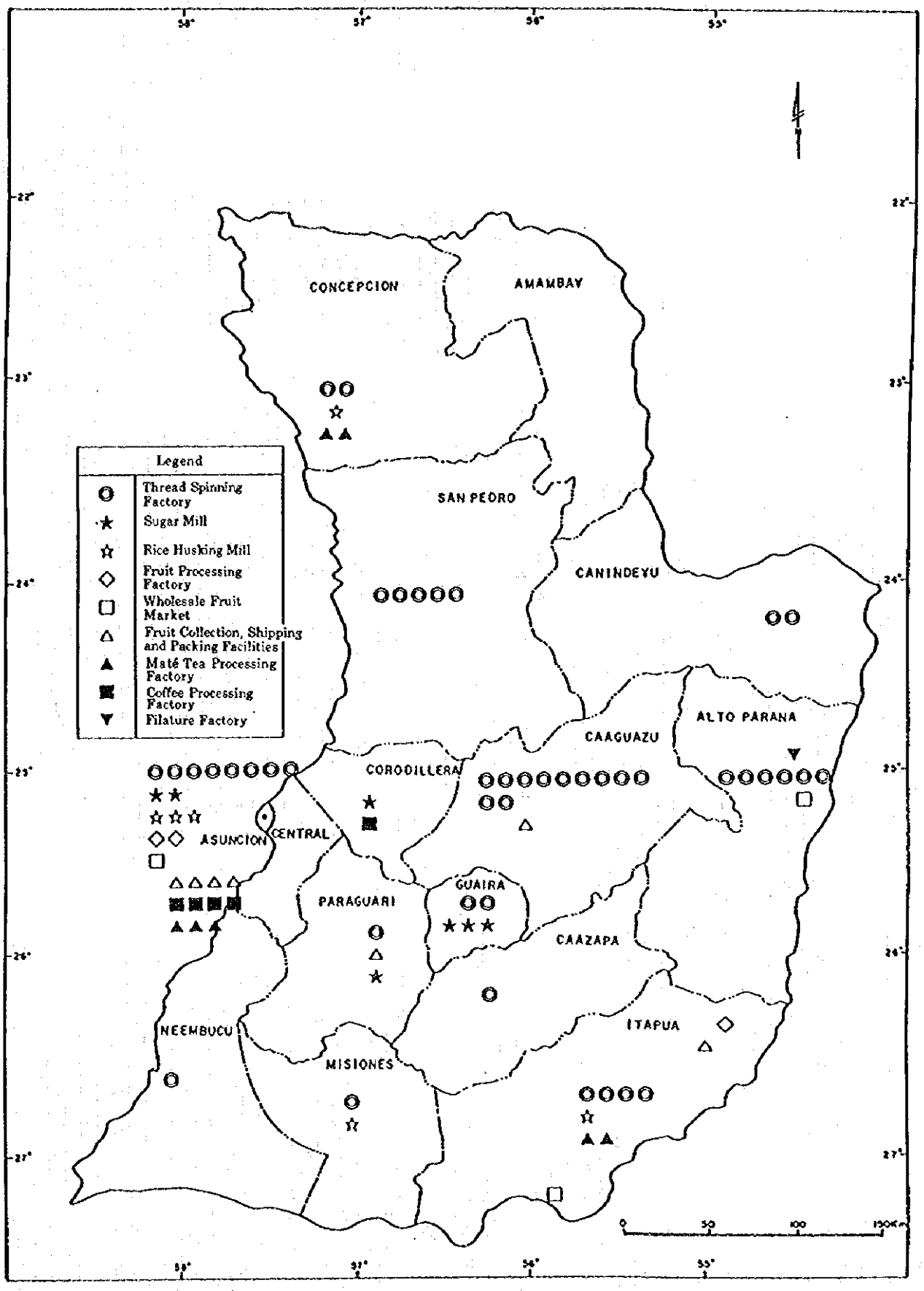
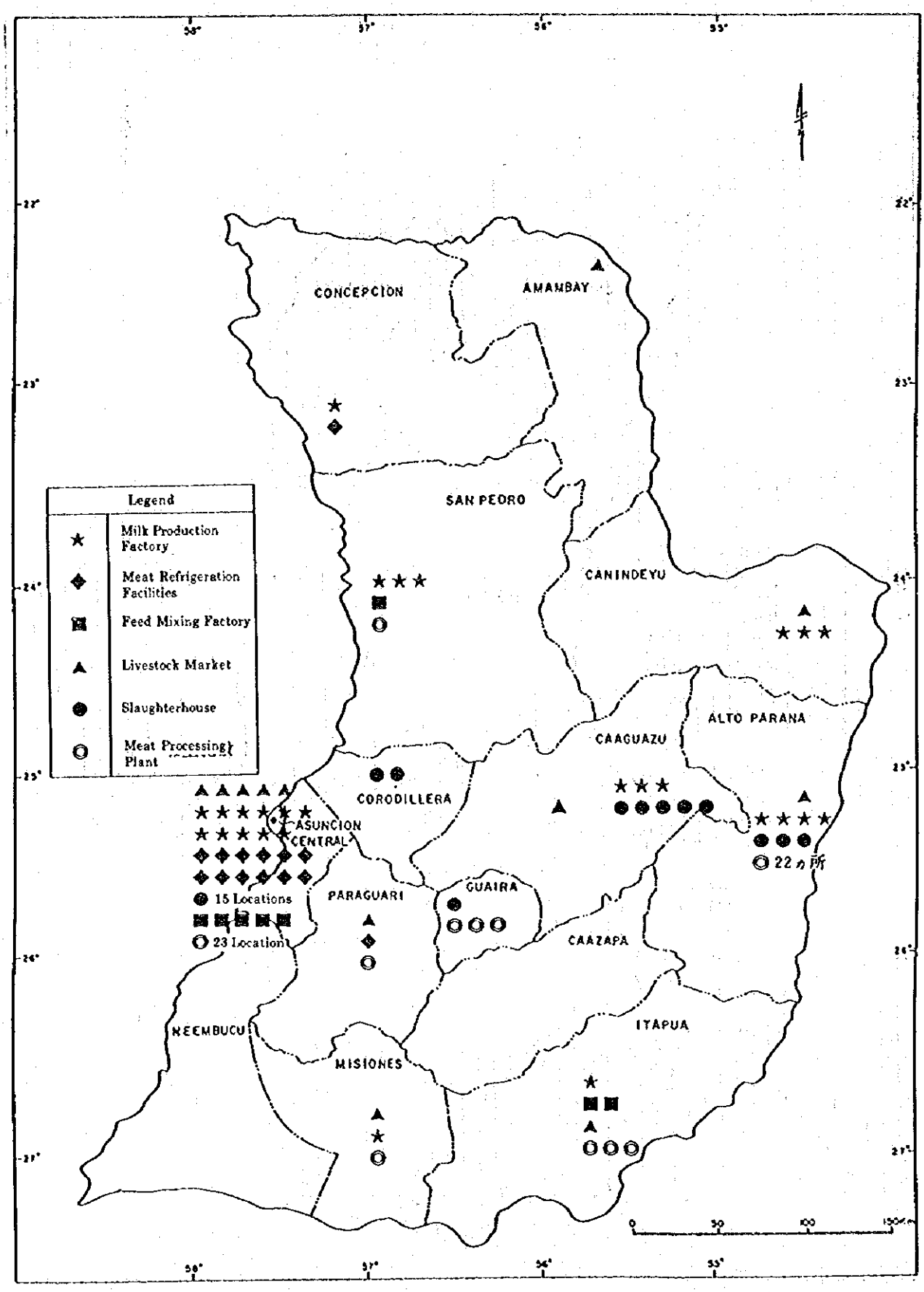


Figure 4.4.2.2 Current Location of Agricultural Product Handling and Processing Facilities



4.5 Rural Society

4.5.1 Improving rural infrastructure

1) Facilities for Drinking Water

Waterworks in Paraguay for metropolitan areas and areas with a population of 4,000 or more are constructed and maintained by CORPOSANA (the Corporation for Sanitary Works of the Ministry of the Interior. On the other hand, in rural areas and areas with a population of less than 4,000 people, SENASA (the Bureau of Environmental Sanitation of the Ministry of Health) constructs the facilities and maintenance is, in principle, done by a cooperative of those using the facilities.

30% of the survey area is equipped with waterworks facilities and in Corposana and Senasa there are waterworks facilities in the large and regional cities, but they are almost nonexistent in rural areas. In rural areas, farms use wells, rainwater, rivers, lakes and marshes for their water supply. But such water resources are not located nearby every farm. In addition, in periods of low rainfall, water resources are sometimes exhausted. Because of this, many areas with water shortages must transport water from areas with abundant water resources. The transportation of this drinking water is very difficult for the women and children who have to do it. There are also many water resources which are not drinkable and the incidence of disease caused by this water is high in rural communities.

According to the locally commissioned survey 121 Districts (66%) are requesting construction of drinking water facilities and the need for waterworks is great (see Table 4.5.1.1).

Table 4.5.1.1 Potable Water Facilities (Results of Locally Commissioned Survey)

In parenthesis by the department name are: (the number of responses from districts/the total number of districts in the department)

Department	①	②	③	④	⑤
Concepción (5/7)			3		1
San Pedro (9/17)	2	1	6	1	1
Cordillera (18/20)	4		12	1	1
Guairá (17/18)	2	2	14		
Caaguazú (17/20)		1	16		
Caazapá (10/10)			9	1	
Itapúa (28/29)	11		15	2	3
Misiones (10/10)	4		8		1
Paraguarí (17/17)	2	2	16	2	6
Alto Paraná (10/19)	3		6	1	
Central (18/19)	8		6		
Ñeembucú (13/16)			4		1
Amambay (3/3)	2		1		
Canindeyú (7/9)	2	1	5		
Total (182/214)	40	7	121	8	14

Source: Locally Commissioned Survey, (JALDA/CEPADAS), 1996

Notes: ① to ⑤ are as follows:

① Drinking water facilities are present with no problems
② Drinking water facilities are present but they are damaged and cannot be used
③ There is a high demand for drinking water facilities, but they cannot be constructed due to high construction costs
④ Drinking water facilities cannot be constructed due to lack of water resources
⑤ There are enough funds to construct the facilities, but they cannot be constructed due to a lack of technology

2) Electricity

Construction and maintenance related to electric energy infrastructure is managed by ANDE (the National Electric Company) which is part of MOPC (Ministry of Public Works and Communications). Due to the plentiful water resources, 99.9% of the energy produced is generated by the Itapúa Dam (see CUADRO A 4.5.1.2).

When looking at the number of houses which have electrical power in the survey area, it is 70.4% of the total. On the other hand, only 2,013 houses in rural areas have electrical power (see CUADRO A 4.5.1.3). It is thought that this number is so small because the definition of a "rural area" as determined by ANDE is very narrow. Due to the cooperation of ANDE, the number of power lines in rural areas has greatly increased, but it is still not sufficient and there are still many areas without electric power.

ANDE recommends local participatory construction of electrical infrastructure whereby the local populace provides the labour and telephone poles etc. When using this method, ANDE bears 60% of the expense and the beneficiaries of the infrastructure bear the remaining 40% and this is a positive step in cost reduction. However, even when utilizing this method, the average cost per house is Gs 226,000 which is a heavy burden for small-scale farmers. According to the locally

commissioned survey, 58 districts (32%) responded that "Electrical power facilities cannot be constructed due to high construction costs (see Table 4.5.1.2)."

Table 4.5.1.2 Electrical Power Facilities (Results of Locally Commissioned Survey)
In parenthesis by the department name are: (the number of responses from districts/the total number of districts in the department)

Department	①	②	③	④	⑤	⑥	⑦	Reference % with electric power
Concepción (5/7)	4	4		3				37.5
San Pedro (9/17)	5	2	1	2	1		1	44.6
Cordillera (18/20)	10	2	2	2	1		5	81.3
Guáirá (17/18)	9	4	4	6		2	1	45.8
Caaguazú (17/20)	2	3		11	1		6	58.7
Caazapá (10/10)	2	4	3	6			2	34.7
Itapúa (28/29)	15	3	5	6			1	57.1
Misiones (10/10)	5	5	3	2	2	1		79.6
Paraguarí (17/17)	5	13	11	11			1	57.2
Alto Paraná (10/19)	7	1	2	1			2	66.6
Central (18/19)	14	3	4	1			1	97.6
Ñeembucú (13/16)	6	3	2				6	52.2
Amambay (3/3)		1		2				53.5
Canindeyú (7/9)	2	3	2	5	1			31.2
Total (182/214)	86	51	39	58	6	3	26	70.4

Source: Locally Commissioned Survey, (JALDA/CEPADAS), 1996
Notes: ① to ⑦ are as follows:
① Electrical power facilities (electric power infrastructure) are present with no problems
② There is a demand for electrical power facilities (electric power infrastructure) are present but since the demand is too high, they cannot be constructed
③ There is not sufficient economic base for small-scale farmers to pay the cost of electricity
④ Construction of electrical power facilities is difficult due to high costs
⑤ No demand for electrical power facilities has arisen from the small-scale farmers
⑥ Electrical power facilities were constructed, but electricity was cut off because electric bills were not paid
⑦ Electrical power facilities were constructed, but they were destroyed by a natural disaster and they have not been repaired since

3) Telecommunications Infrastructure

ANTELCO (the National Telecommunications Company) which is under the administration of MOPC conducts the construction and management of the telecommunications system and directs and issues permits for television and radio etc.

There are 2 television stations in the capital registered with ANTELCO and there are 15 stations in other regions. There are 2 short-wave radio stations, 41 medium-wave stations and 41 FM stations. Most farmers usually speak the Guaraní language so radio and television programs aimed at rural audiences and local radio stations usually use Guaraní. There are very few telephones installed in rural areas (see CUADRO A 4.5.1.4). In addition, the road network is also inadequate and due to

the fact that there are not sufficient means of transportation, transmission of communications between residents and of administrative information is difficult. Due to this situation, local radio broadcasts play an important role in the distribution and exchange of information between residents.

There are many districts which have a demand for telecommunications infrastructure (telephones etc.), but they point out the fact that the cost of establishing such infrastructures is high (see Table 4.5.1.3).

Table 4.5.1.3 Telecommunications Infrastructure (Results of Locally Commissioned Survey)

In parenthesis by the department name are: (the number of responses from districts/the total number of districts in the department)

Department	①	②	③	④	⑤	⑥	Reference % with electric power
Concepción (6/7)	1		2	2	3	2	5.5
San Pedro (9/17)	1	1	6	3	2	2	3.1
Cordillera (18/20)	1	1	18	4	1		7.3
Guairá (17/18)	1	11	11	10	2	3	6.7
Caaguazú (17/20)		1	12	12		3	5.2
Caazapá (10/10)		6	9	8	1	1	2.8
Itapúa (28/29)	9	5	12	16	5		7.2
Misiones (10/10)	4	1	5	7	3		10.1
Paraguarí (17/17)	2	6	15	16	8	2	4.8
Alto Paraná (10/19)	4		3	4	1	1	14.0
Central (18/19)	2		15	2			39.1
Ñeembucú (13/16)	1			1	1	4	7.5
Amambay (3/3)	1		1		1	1	13.5
Canindeyú (7/9)		3	6	5		1	1.8
Total (182/214)	27	35	115	90	28	20	18.2

Source: Locally Commissioned Survey, (JALDA/CEPADAS), 1996

Notes: ① to ⑥ are as follows:

① Telecommunication infrastructure (power lines, telephones) are present with no problems

② Telecommunication infrastructure was constructed, but it was damaged and not repaired

③ There are not enough facilities considering the population and land area

④ Installation of telecommunications equipment is difficult due to high costs

⑤ No demand for telecommunications equipment has arisen from the small-scale farmers

⑥ There is no electricity, so installation of telecommunications equipment is impossible

4.5.2 Education

After the change in government in 1989, the Paraguayan government has made health and education top priority. There are 5,180 public and private primary schools. The number of students per school is 155 and there are 24 students per teacher. The average figures for the survey area are approximately the same as the national figures (see Table 4.5.2.1). Primary education is uniform throughout the country and the curriculum does not adjust according to each area's socio-economic situation or needs. In addition, because there is a grade-promotion examination system, due to the poverty of farm families, children must often be absent from school for long periods of time during the harvest season and many times are not promoted. As a result, there are many students who quit school even though there is a mandatory education system and this has a great effect on the total school attendance rate which is falling. This trend is especially conspicuous in areas with many small-scale farmers. In addition, the idea that education is not necessary for rural women is common and the school attendance rate for girls is lower than that for boys. The department with the highest rural school attendance rates for both boys and girls is Central and the department with the lowest rates is Amambay. 60,000 primary school students a year fail grades every year in Paraguay. A fact which cannot be overlooked is that 60% of these students are from rural areas. However, with regard to the number of schools, in the past 10 years, the number of students per school has stabilized at approximately 150, it is assumed that new schools are being built to compensate for the increase in population. Moreover, from 1994 mandatory education was extended to the third year of middle school.

Table 4.5.2.1 Primary Education in the Survey Area

Department	Number of Schools	Number of Teachers	Number of Students in School		
			Boys	Girls	Total
(Asunción)	210	2,718	39,440	40,219	79,659
Concepción	288	1,733	19,940	18,508	38,448
San Pedro	554	3,085	31,646	28,321	59,967
Cordillera	257	1,963	22,070	20,391	42,461
Guairá	245	1,555	17,984	16,429	34,413
Caaguazú	564	3,874	46,008	41,871	87,879
Caazapá	281	1,545	16,853	15,036	31,889
Itapúa	657	3,872	44,730	41,448	86,178
Misiones	122	892	11,109	10,180	21,289
Paraguarí	321	2,050	22,101	19,836	41,937
Alto Paraná	570	3,429	43,782	40,528	84,310
Central	484	4,729	78,585	77,250	155,835
Ñeembucú	150	767	6,781	6,323	13,104
Amambay	111	625	7,823	7,796	15,619
Canindeyú	240	1,042	11,136	9,871	21,007
Total	5,054	33,879	419,988	394,007	813,995

Source: Anuario Estadistico 1994, STP
Note: *Ascunción is only for reference purposes.

4.5.3 Health and medicare

In the rural parts of the survey area, there are often outbreaks of pediatric illnesses such as diarrhea, pneumonia, bronchitis, anemia and parasitic infection. In addition, in San Pedro cases of endemics such as leishmaniasis have been recorded and in some regions such as Central there have been sicknesses due to lack of iodine. As for nutrient intake, there is an imbalance in that the calorie base is high. Illnesses due to deficiencies in vitamin A, calcium and iodine also appear in children.

According to the 1992 national census, the average life expectancy in Paraguay is 67.2 years. As for public medicare facilities, hospitals such as the Central National Hospital, the Central Welfare Insurance Hospital, the National University Hospital, the Contagious Tropical Disease Hospital, the National Cancer Hospital and the Military Hospital are concentrated in and around Asunción. In addition, in major cities such as Encarnación and Ciudad del Este there are central regional hospitals. There are health centres and treatment clinics in each district. However, there are discrepancies in the regional distribution of these facilities and because most doctors are concentrated in Asunción and its surrounding areas, there is a shortage of doctors in rural areas and in remote areas, there are many villages with no doctors. Therefore the Ministry of Health is working to implement primary health care. In addition, treatment clinics where volunteer workers give immunization injections are emphasized. Table A 4.5.3.1 shows an overview of medicare in the survey area.

4.5.4 Indigenous peoples

In Paraguay there are 17 tribal groups of indigenous peoples who speak 5 languages. their population is 49,486 and most of them live in villages and hamlets. 6.1% live in cities and the rest live in rural areas and make a living hunting, fishing and farming. 20,327 indigenous persons (41.9%) live in the eastern part and they form 4 tribes but all speak the same language (Tupíguaraní; 1992 National Census).

In article 64 of the new constitution of 1992 and law 904/81 the existence of indigenous populations before the formation of the country was officially recognized and the government established the following political guidelines for indigenous peoples.

① The right of indigenous peoples to preserve and develop their ethnic identity in their original habitat is recognized.

② The freedom of cultural systems such as social and economic organizations and the right to participate in the national government in traditional ways are

recognized.

③ The importance of the preservation of the traditional society and culture of the tribes is recognized.

④ In accordance with the recognition of the importance of the preservation of their original way of life, land suitable for development will be provided free of charge.

⑤ Services such as medicare and technical assistance will be provided free of charge.

There are 4 government institutions, including INDI (National Institute of Indigenous Peoples) which offer consultation and aid to indigenous persons. Among the programs run by the offering assistance in the field of agriculture are ① technical assistance through producers and committees, ② financing through CAH (Smallholder Credit Agency) and cooperatives, ③ education at child-rearing centres and ④ basic food aid for new settlement centres.

In addition, there are 28 non-governmental and private organizations such as churches, religious groups and NGOs which mainly conduct the following types of aid: ① assistance for social and economic activities of indigenous peoples, ② establishment of land for agricultural settlements, ③ improvement of education, medicare and sanitation, ④ provision of basic needs for settlements and training etc.

However, like indigenous populations in other Latin American countries, the indigenous persons in Paraguay are living in impoverished conditions such as ① low levels of education, ② high levels of disease and ③ a production system that is not organized. It is thought that the following conditions have contributed to the worsening of the living environment and the inability of the indigenous population to live using traditional hunting methods: ① expansion of land for agricultural use, ② commercial immigration, ③ rapid development of forest land, ④ rapid deforestation due to land speculation.

4.6 Agricultural system

4.6.1 Agrarian system and small-scale farmer

A characteristic of the structure of land tenancy in Paraguay is that although there are few large-scale farmers (8,268 farmers, 2.7% of the total number of farms), they occupy 87.2% of the farmland area (the average land area per large-scale farmer is 2,470 hectares). Of these large-scale farmers, very large-scale farmers with 1,000 hectares or more account for 1.1% of all farmers (3,240 farms) but occupy 77.1% of the total farmland area (the average area per very large-scale farmer is 5,666 hectares). This is the highest rate of land accumulation in the hands of very large-scale farmers in Latin America. At the same time in the survey area there are 240,000 small-scale farmers holding tenancy on an average of 6 hectares. These conditions limit the potential of small-scale farmers' development (see 2.1).

The agricultural land system has a history of many changes (see Table 2.1). However, with the development of a currency-based economy and the increase in population, there have been many incidents of illegal occupation of rented land, public land and private land and this has become a social problem. The government has passed the following laws as measures to cope with this problem.

① In 1904, migration was systemized and a concrete migration policy was developed.

② In 1940, the Estatuto Agrario (Rural Land Law) was established in order to organize the land laws into one body. This law limited inheritance rights for large properties and divided and redistributed large pieces of land to small farmers. However, due to the complicated application process, it was not very effective.

③ In 1960, the Large Farm Reapportionment Law was established and as a result, those with tenancy of land with an area of 10,000 hectares or more were required to sell 10% or more of their land to those benefiting from agricultural land reform.

④ In 1963, a new agricultural land law was established and the IBR (Institute of Rural Welfare) was created as an organization to carry out agricultural land reform. This law was called "the alliance for progress" and the concept of agricultural welfare was introduced with this law. It was also established that an area of 20-100 hectares was necessary for a family to live peacefully without economic problems in accordance with the Paraguayan philosophy of Mboriajhú ryguatá.

With the implementation of these 4 agricultural land laws, the concept of moving small-scale farmers in the central region to the eastern part of Paraguay near the national border where there is abundant virgin land which had been an idea which was under debate was enacted. Most of the farmers migrating to this area were once farmers of 20-100 hectares, but they could not farm profitably in a market with an environment characterized by expanding foreign farmers and foreign corporate operated farms which were producing cash crops. These farmers were then bought out by medium- and large-scale farmers possessing technology and capital, and became either landless or small-scale farmers.

Due to the lack of governmental assistance such as farm credit and technical assistance in order for the migrating small-scale farmers to maintain the proper farm management scale and also because the agricultural land reform (sale of land in lots) was carried out based on the commercial base, the settling managed by IBR was more for the benefit of medium- and large-scale farmers than small-scale farmers.

4.6.2 Agricultural research

Paraguay's medium- and large-scale farmers are mainly those who use large amounts of land such as soy beans, wheat and livestock (pasture fed). On the other hand, small-scale farmers conduct single crop production with cash crops focusing on raw cotton. Due to this single-crop agricultural structure, the production technology for vegetables and orchards of the small-scale farmers is noticeably outdated which hinders sustainable development of a complete agricultural system.

In recent years with the upward trend in the income of small-scale farmers, the importance of the development of agricultural technology in order to achieve fiscal stability has been stressed. Especially with the year-round demand for fruits and vegetables, research for the development of year-round production technology and increasing the quality of crops has been directed at the fruits and vegetables for which Paraguay's self sufficiency rate is low. As a result of this research, cotton ("REBA PL 279") and corn ("Carape pyta") have been distributed for farm use.

There are several problems with the implementation system of the research organizations. The problems are as follows:

① The results of the central studies do not reach the outlying areas and the needs of the outlying areas are not communicated well enough.
② There is not enough budget to for experiments.
③ Lack of applied research with the object of diversifying research and diversifying agricultural product production.

④ Lack of a coordination system between research and distribution and lack of a system to transfer technology to distributors and producers.

⑤ Monopolization of data and research results by individual researchers and the lagging of mutual research.

In this research environment, the agricultural research system as part of the Ministry of Agriculture and Livestock's "The Agriculture and Forestry Development and Modernization Program" (PR-008) is trying to improve its functionality by improving the organization of agricultural research organizations. The principle that "each research organization should have laboratories which are appropriate to their region" will be adopted and CRIA (Regional Agricultural Test Centre) will be reorganized as a grain and oil crop laboratory for large-scale mechanized farming. The IAN (National Institute of Agriculture) was reorganized as a vegetable and orchard laboratory. In addition the treatment of researchers was improved and a plan was put in place to hire and train good researchers and 10 laboratories were opened to conduct experiments and research as shown in GRAFICO A 4.6.2.1.

4.6.3 Agricultural diffusion

The DEAG (Department of Agricultural Extension) of the Ministry of Agriculture and Livestock manages 8 regional branch offices in various departments, 7 supervisory offices at the departmental level and 140 local extension offices (137 in the survey area). It has 641 employees organization-wide, 402 of whom are diffusion agents working on diffusion activities in local areas (see GRAFICO A 4.6.3.1).

According to the 1991 Agricultural Census, the number of farms which introduced agricultural technology was less than 40,000 (13% of all farms). When viewing the breakdown of the new technology, 48% was introduced by DEAG and the remaining technology was introduced by cooperatives and other organizations. When viewing the introduction rate by diffusion organization, DEAG's introduced more new technology to small-scale farmers and cooperatives introduced more technology to medium-scale farmers. This trend shows that due to the lack of organization of small-scale farmers, they are not suitable for cooperative activities.

When looking at the characteristics of diffusion agents, farmers in developing countries need diffusion agents who have knowledge of a wide variety of crops, even if that knowledge is not very detailed. In practice, many of them have technical knowledge, but insufficient practical knowledge. In addition, they must do work which is outside of their specialty such as farm credit work and sometimes they must neglect their main duties.

Ideally, agriculture diffusion should closely cooperate with the development

of experimental agricultural research and should understand and diffuse the results of research, however this cooperation system is inadequate.

The purpose of agricultural diffusion is to increase the income of farmers through the improvement of technology from agricultural production to sale of the agricultural product. At present, the agricultural diffusion which has been conducted has provided very little technology which is actually used to increase the production of small-scale farming. Most Paraguayan small-scale farmers are not good at reading or calculation. It is easily to imagine the difficulties faced in teaching these farmers how to use agricultural chemicals and fertilizers. Because of this, the distribution of production technology which is the first step of technical diffusion only reaches a limited number of farmers.

As for production technology, it usually becomes established when products produced using the technology are first evaluated on the market. However, there has not yet been a successful example of this among products destined for the national market. This is because the national market has not developed enough to encourage production technology. For example with the problem of measures against picudo in raw cotton, success has been achieved on one large operation of 500 hectares(in Brazil) but on 1-2 hectare fields in the survey area, the farmers do not follow the instructions in the manual. As long as the farmers acceptance of technology is incomplete and there is no prevention system, (grouping cultivation areas, early planting and early picking) these efforts will not succeed.

An outline of the reorganization plan of the diffusion organizations according to "The Agriculture and Forestry Development and Modernization Program" (PR-008) is shown in ANEXO 4.6.3.

4.6.4 Farmers' organizations

Organization of farmers in Paraguay began with the Cooperative Law of 1942. In 1972, the Law for Establishment of Cooperatives was promulgated. With this law, organization of farmers was based on the recognition that organization was the basis of sound agricultural development and this became an important part of Paraguay's agricultural policy. In addition, general cooperatives which engage in production, marketing, purchasing, credit, mutual aid and export etc. were also permitted under this law.

The establishment of the INCOOP (National Institute of Cooperative Unions) under the management of the Ministry of Agriculture and Livestock is shown in DRAFICO A 4.6.4.1 and the organization of cooperatives is shown in GRAFICO A 4.6.4.2.

In 1994, part of the Law for Establishment of Cooperatives was revised. With this revision, powers of supervision, management inquiry committee and education

were strengthened and the regional committees* were given the power to direct education and promote regional agriculture. In this way, the government, mainly through INCOOP, cooperated with DEAG and CAH (Smallholder Credit Agency) to promote the organization of small-scale farmers.

The above are all of the measures for the organization of farmers, due to the fact that under the Stroessner regime the organization of farmers was limited and there was a shortage of labour and capital, as a result of which the organization of farmers did not take place. However, in the Japanese and German immigrant areas, independent production organizations were formed at a relatively early stage. In addition, organization of raw cotton producers was promoted by cotton spinning factories.

The contents of the 1995 INCOOP survey are shown in Table 4.6.4.1 and comparing 1989 with 1995, the total number of organizations has risen from 161 to 479 and the number of cooperative members has approximately tripled, rising from 80,134 to 260,022. Non-agricultural workers and non-agricultural cooperatives are included in these cooperative member and cooperative organization figures. For example, in the Coronel Oviedo cooperative, 6,400 (80%) of the 8,000 members are non-agricultural workers.

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* "Comités" (committees) were established by Article 118 of the civil code of Paraguay (as registered organizations with limited powers). Their conditions of establishment are ① that they present registered, written, public articles of establishment as outlined in article 104 and ② that the organizations, by registering, have their powers regulated, however there are few cases in which official application is carried out. The committees are groups consisting of an unspecified number of persons and created for a specified purpose.

Table 4.6.4.1 Changes in the Number of Cooperatives and Cooperative Members

Item / Type	1989		1995		Number increased		Percent increase	
	No. of co-operatives ①	Number of members ②	No. of coopera-tives ③	Number of members ④	⑤ = ③ − ①	⑥ = ④ − ②	③/ ①	④/ ②
Production Cooperatives	84	23,059	220	63,991	136	40,932	262	278
Financial, Credit Cooperatives	51	43,042	160	175,000	109	131,958	314	407
Consumption, Marketing Cooperatives	13	13,089	46	16,171	33	3,082	354	124
Service Cooperatives	10	869	41	4,707	31	3,838	410	542
Large General Cooperatives	3	75	12	153	9	78	400	204
Total	161	80,134	479	260,022	318	179,888	298	324

Source: INCOOP

In addition, along with the locally commissioned survey, a survey of cooperatives (response rate 86%) was conducted. The results are shown in CUADRO A 4.6.4.1 and 35,723 (45%) of the 79,108 members were farmers and of the farmers, 16,290 (20.1%) were crop farmers. The tendency was that the more urban the cooperative, the more non-farmers members it had.

When analyzing the situation of farms which are members of agricultural production groups according to the 1991 agricultural census by management scale, we see the following. Less than 11.6% of small-scale farmers are members. The rate of membership by scale is: less than 5 hectares, 6.8%; 5-10 hectares, 13.6%; and 10-20 hectares, 17.7%. 23.2% of medium-scale farmers are members and 32.1% of large-scale farmers are members. This data shows the proportion of the scale of management organization by size.

The smaller the management scale of the organization, the more self-sufficient they are. These small-scale farmers are mostly egocentric and selfish with very little desire to assist outsiders or associate themselves with others. As long as they use consumer materials that are purchased on the market, they will always be under the sway of the current economic market. For small-scale farmers to interact with the economic market, there seems to be no other way except to change and organize their economic activities to resist market forces.

Recently, due to the promotion of democratic policies, various groups have been organized as shown in Table 4.6.4.2. Even in rural communities, many organizations such as local clubs have emerged. Of these committees, very few are well organized and some have disbanded, but they provide an important opportunity for farmers to learn the basics of organization.

These committee activities are very important from the point of view of mutual aid, the improvement of the quality of life and as a place to gather information. In addition, many women tend to participate in activities such as flower gardening and handicrafts.

Table 4.6.4.2 Contents of producers' organization

Department	Committee		4-H Clubs						Women's Groups		Other Committees	
			Boys		Girls		Co-ed clubs					
	No. of members	No. of clubs	No. of members	No. of clubs	No. of members	No. of clubs	No. of members	No. of clubs	No. of members	No. of clubs	No. of members	No. of clubs
Concepción	1,753	129	243	13							228	4
San Pedro	3,757	214	106	9					643	42	397	8
Cordillera	1,889	111	15	1	27	2	164	5	831	38	93	2
Guairá	464	43			88	5			34	2	370	3
Caaguazú	3,150	207			213	9			720	36	1,258	18
Caazapá	541	48							98	2	2,096	20
Itapúa	4,166	296			161	7	25	1	359	21	889	21
Misiones	502	66					70	5				
Paraguarí	2,162	123			326	13			1,491	79	464	10
Central	770	41					119	4	161	14	255	5
Alto Paraná	2,005	175										
Ñeembucú	1,816	168							367	30		
Canindeyú	996	68									32	2
Total for each committee	23,971	1,689	364	23	815	36	378	15	4,704	264	6,082	93

Source: DEAG, 1994, members and committees are shown

4.6.5 Agricultural credit

Paraguay's agriculture credit organizations are divided into public and private sectors. The public agricultural credit organizations include the BNF (National Development Bank), CAH (Smallholder Credit Agency), the FDC (Rural Development Fund) and the FG (Cattle Fund). Of these agricultural credit organizations, the 3 outlined below offer credit to small-scale farmers. See Table 4.6.5.1 for the establishment, aims, functions, organization, collateral, lending requirements, loans from international organizations, etc.

The demand for this capital is high and the current rate of lending is not meeting even 20% of the demand.

1) BNF

The National Development Bank was established on March 14, 1961 by Article 281 as a governmental financial organization under the management of Ministry of Finance . Its 4 departments are Agriculture, Livestock, Industry and Commerce. In 1994, these departments accounted for 63%, 6%, 11% and 20% respectively of the financing of the BNF. The main target crops and financing rate of the BNF Agricultural Diversification Program are: corn (25.7%), sugar cane (22.8%), rice (22.7%), sunflowers (18.6%) and fruit (3.2%). These make up 93% of the total. In the area of livestock, small stock and dairy cattle account for approximately 95% of the total. In addition, when looking at the rate of increase of the amount of financing, the total is 8.8 times bigger than it was (when comparing 1985 figures with 1994 figures) and it is worthy of note that while crop financing grew to 8.1 times what is was in 1985, livestock financing is 30.6 times as much as it was in 1985.

The funds provided through OECF's Agriculture Strengthening Plan (PG-P8) were Gs 131.4 billion and the beneficiaries were 13,000 farms and 42 farmers' cooperatives. The breakdown of this is as follows: crops, 307,062 hectares; creation of agricultural land, 22,437 hectares; buildings such as storage and other facilities, 3,304, agricultural machinery, 9,060; working cattle, 5,604; contour line dike readjustment, 1,972 kilometres and fencing, 2,934 kilometres. PG-P8 ended August 26, 1996, but it is currently being used as a revolving fund.

2) CAH

The Smallholder Credit Agency was established in 1943 by Article 1991 as a governmental financial organization under the management of the Ministry of Agriculture and Livestock. This fund's objective is to give technical and organizational aid and to fulfill the collateral requirements and give financing to small-scale farmers who are members of AUCA (Association of Agricultural Credit

Users) and are capable of becoming independent, other than those eligible to receive rural development financing from the National Development Bank (BNF) which is explained hereafter.

In 1995, the financing was broken down as follows: agriculture (88.0%), livestock (5.1%), handicrafts (4.0%) and small-scale processing (2.7%). When looking at the financial base of the agricultural crops in order of size, they are as follows: raw cotton (67.5%), soy beans (12.3%), sugar cane (3.3%), cassava (3.0%), corn (2.8%) and tomatoes (1.9%). These make up 90.8% of the total. The rate of increase of financing (when comparing 1995 to 1994 figures) is 1.59 times. The amount of financing provided in 1995 was Gs 137.2 billion.

3) FDC

The Rural Development Fund was established in 1991 by Article 128 as a governmental financial organization under the management of the Ministry of Agriculture and Livestock. This fund's objective is to provide financing to intermediate financial organizations. (IFI, a newly established agricultural organization was registered in accordance with civil law and provides consulting concerning accounting and management and, in its 2nd year began to provide financing.) FDC directly finances IFI, but IFI provides technical assistance through the mediation of the UCAT (Technical Support Committee) which was established within FDC. Provision of technical assistance to the beneficiaries is conducted by an organization which has a contract with IFI.

The FDC supervisors make rounds to instruct the IFI, and always keep appraised of the progress of the financial and technical aid and give the proper guidance.

This fund receives capital from IFAD (International Fund for Agricultural Development), IDB (Inter-American Development Bank) and the Organization of Petroleum Exporting Countries etc.

Table 4.6.5.1 Financial Institutions for the Agricultural Sector

Item	BNF (National Development Bank)	CAH (Smallholder Credit Agency)	FDC (Rural Development Fund)
Establishment	Established by Article 281 in 1961 (March 14, 1961) Under management of the Ministry of Finance	Established by Article 1991 in 1943 (Revised under Article 551/75) Under management of the Ministry of Agriculture and Livestock	Established by Article 128 in 1991 (January 1, 1961) Under management of the Ministry of Agriculture and Livestock
Purpose	Promote and finance projects related to agriculture, livestock, forestry, manufacturing industries and promotion of the circulation of domestic products	Provide financial, technical and organizational aid to low-income farmers (with preference to those who are organization into a cooperative but do not qualify for aid from another financial organization).	To carry out the national agricultural development plan and to plan and carry out financing for IFIs
Functions	Only within the agricultural sector 1. Development (promotion of agriculture, livestock,forestry and manufacturing industries) Provision of short, medium and long-term financing to individuals and individually run businesses. 2. Circulation, savings and financing 3. Agricultural financing (small-scale farms, dairy farms, orchard production, forestry, vegetable production, small-scale manufacturing industries)	Financing low-income producers	1. Support for establishment, strengthening and modernization of agricultural organizations 2. Determine financing for IFIs (Intermediary Financial Institutions) and make the business of IFIs go smoother 3. Expand financing for diversification (Management capital is US $900, investment in fixed properties is US $1,900) 4. Financing for small-scale manufacturing industries (US $3,500) 5. Promote the establishment of small-scale manufacturing industries (producer's industries only) in order to increase value-added agricultural products 6. Venture capital financing for manufacturing industries with the potential for future financing (US $5,000)
Organization	President, Board of Directors, Development Department, Circulation Department, Savings and Financing Department, Administrative Department (54 branches, 925 employees)	64 offices (1 head office, 23 branches and 40 district offices) 501 employees (176 at the head office and 325 others)	Board of Directors, Administrative Department, Executive Department (Management Section, Evaluation Section, Education Section) (Total Employees: 19)
Collateral	Material, personal, mortgaged (real estate) Non-collateral materials (non-divisible mutual property, existing mortgage, attached materials)	Individual Material (Material, mechanical, harvest etc.) Mortgaged, real estate etc.	Individual (joint), material (transportable, real estate)

Item	BNF (National Development Bank)	CAH (Smallholder Credit Agency)	FDC (Rural Development Fund)
Lending conditions	Beneficiaries: Individuals, cooperatives, committees etc. Application: Investment plans (including refunding) [Agricultural Field] Management Capital: (1 year period) 24-28% yearly interest due at end of term Fixed Capital Investment: (7 year period, 1 year deferrable) 24-28% yearly interest due at end of term Rural settlement land: (5 years) 21% yearly interest due at end of term Livestock Field Management Capital: (1 year period) 28% yearly interest due at end of term Fixed Capital Investment: (5 year period) 28% yearly interest due at end of term	Interest rate: (23% yearly of the total), extension rate is 3% 1. For production expenses (seeds, fertilizer, agricultural chemicals, posticides, herbicides, spreading of agricultural chemicals etc.) and hiring expenses: short term 2. Circulation (for purchases of containers and attachments, transportation, hiring expenses, storage and marketing for produced goods): short term 3. Fixed capital (Agricultural machinery tools, storehouses, livestock, cattle, plants, perennial crops, pasture): long term 4. Agricultural handicrafts: (Financing depends on collateral) ① Short term: Less than 1 year (for management capital and circulation expenses) ② Medium term: More than 1 year but less than 3 years (may vary depending on type of capital, life of loan and use) ③ Long term: More than 3 years but less than 7 years	Interest rate: 21% for IFIs and 23% at end of term 1. Management capital: (Employment, production materials, tools, mixed feeds) 2. Fixed capital: (Development, perennial crops, storehouses, pasture, etc.) 3. Service and corporate investment: (Maintenance of IFIs, employment of technicians, corporate planning) Short term: (less than 1 year) aimed at production and circulation, 100% for purchasing and 50% for employment Medium term: (More than 1 year but less than 3 years) Loans with a life of less than 3 years,services etc. Long term: (More than 3 years but less than 6 years) perennial crops, agricultural processing, facilities etc.
Borrowing from International Organizations	1. IDB (3 loans, US $21 million) 2. IBRD (3 loans, US $54 million) 3. KfW (1 loan, DM 17 million) 4. OECF (1 loan, ¥7.32 billion)	1. KfW (DM 4 million) 2. IDB (US $1.08 million)	1. IFAD (US $12 million) 2. OPEC (US $2.2 million) 3. IDB (US $10 million) 4. OPEC (US $2 million)

4.7 Environmental conservation

4.7.1 Environmental conservation

Developing countries have many environmental problems, but the biggest environmental problem facing Paraguay is rapid deforestation. It is not too much to say that forest land is Paraguay's only land-based resource. Because Paraguay has developed as an agricultural country, in order to continue to increase the amount of agricultural land, it was necessary to destroy forest land. It is due to the fact that the socio-economic system allowed the extensive use of woodland resources that this problem has arisen. In other words, it is thought that the reason for this problem is that in the past, the environmental cost of economic development was not taken into consideration.

With the recent increase in interest in global economic problems, in the new constitution of Paraguay the importance of "maintenance of the quality of the environment and establishing sustainable development" is emphasized and many laws concerning the environment have been promulgated and revised.

In the small-scale farmers' promotion plan, Paraguay is aiming at "an approach which prioritizes environmental problems and ensures progressive development."

Based on the points above, in order to understand the items which must be considered in environmental policies and the items which are necessary for policy making, a survey of the situation of the environment and of the national environment protection policies and their results was conducted in the survey area. The content of the survey was as follows:

1) National environmental protection policy

The government agency in Paraguay with jurisdiction over the environment is SSERNMA (Secretariat for Natural Resources and the Environment). In 1992, SSERNMA's environmental protection policies were as follows:

(1) Environmental protection strategy

① Legal strategy

- Conduct legal action to renew and replenish natural resources
- Conduct legal action to direct and control the use of natural resources so that they are used more effectively

② Strategy of implementation organizations

- Strengthening and elevation of the status of organizations related to natural resource and environment policy
- Achieve environmental protection by taking environmental strategy into consideration along with socio-economic development strategy

- Establishment and implementation of projects and programs which enable the renewal and protection of renewable natural resources
- Coordination between the government and citizens concerning socio-economic and cultural development

③ Operation strategies

- Conduct zoning taking environmental and natural resource issues into consideration
- Conduct environmental impact assessment for projects
- Take steps to encourage activities that result in environmental recovery and improvement and discourage activities that result in environmental destruction
- Develop the technical means to include environmental protection policies in social, economic, educational and health programs at the national and regional level
- Establish environment protection areas without regard to whether the land is state or privately owned
- Register those who develop, process, use for industry, transport or circulate environment resources and issue permits and licenses to them
- Make agreements with related organizations, including foreign organizations in order to implement and manage the above strategic plans

(2) Environmental action plan

The environment action plan has 10 components on the program level. They are as follows:

① Strengthening of organization, ② establishment of laws, ③ protection of wildlife, ④ protection of natural resources, ⑤ production of forests, ⑥ environmental impact assessment, ⑦ direction and control, ⑧ education and diffusion, ⑨ surveys and research, ⑩ cooperation and coordination with international and related organizations

2) Environmental policy and results

(1) The office of the President announced that the following parts of the Environmental Action Plan were achieved in the 2 years beginning August, 1993: (Numbers are commensurate with those of the Environmental Action Plan.)

① (no action)

② (6 laws were promulgated and they are named in each component)

③ Promulgation of the wildlife protection area law, promotion of SINASIP (National System of Protected Wildlife Areas)

④ Establishment of national parks for the protection of natural forests, MAG/GTZ strategy project for natural resource protection, implementation of IBRD project for management of the natural resources in northern Itapúa and all of Alto

Paraná.

⑤ Promulgation of the transplanting and forestation law

⑥ Promulgation of the Environmental Impact Assessment Law and revision of same

⑦ Direction and reinforcement for registration and control of agricultural chemicals

⑧ (no action)

⑨ Designation of 701,681 hectares of forest land for planning survey use of actual forests and land

⑩ Introduction of environmental items to the development plan, agreement on biological diversity and approval of the ramsale treaty with domestic and foreign aid

(2) In addition to the above, the following were also achieved:

① Now implementing the land use and agriculture land rationalization project (IBRD)

② Now implementing rural resettlement reinforcement project mainly in Cnel. Oviedo-Mbutuy and Concepción-Pedro Juan Caballero (IDB)

③ Now implementing agricultural resettlement project in San Pedro and Caaguazú (EU)

④ Paraguay has ratified the World Treasure Treaty, The Washington Treaty and The Bonn Treaty

⑤ Signed the following treaties: Declaration on the Genetic Resources of Fauna (FAO), Standard International Procedure for Use and Sale of Agricultural Chemicals (FAO), International Treaty on Maritime Law (UNESCO)

3) Outline of Environment of the Survey Area

(1) Forest Resources

Because the survey area has a climate, precipitation and soil environment which is well suited for growing trees, there are many semi-tropical broad-leaved trees growing there. However, according to the Paraguay Forestry Report (1993) of the SFN (National Forestry Bureau) in the 46 years since 1945, a total of 6,402,000 hectares has been destroyed (an average of 140,000 hectares a year) and there are currently only 2,403,000 hectares (15%) left. In the 6 years since 1986 the destruction has been especially great with an average of over 250,000 hectares a year being destroyed. Over 50% of the destroyed area lies in the 4 departments (Caaguazú, Itapúa, Alto Paraná and Canindeyú) near the Brazilian border (see CUADRO A 4.7.1.1).

The main reasons for the deforestation are: ① due to the maintenance of and laying of roads, expansion of agricultural land and settlements has become easier, ② depletion of natural forests due to use of firewood and charcoal, ③ destruction of

forests due to land clearing, ④ apathy of people about environment protection and lack of enforcement and thoroughness of laws, ⑤ Lack of policies concerning land use, ⑥ the agricultural credit policy has encouraged the expansion of agricultural lands and the cutting of forests that goes with such expansion of land use, ⑦ agricultural improvement based on the idea that forest land is not productive land, ⑧ lack of an effective policy to renew and protect natural forests.

Paraguay's Forestry Law was promulgated in October of 1973 and was revised in 1995 to become the Forest Resources Law (Law 542) wherein all privately owned rural land must include 25% natural forest land. In cases where this is impossible, tenants of up to 100 hectares of land must reforest 5% of their land and tenants of over 100 hectares must reforest 10% of their land. In addition, according to Article 59 of the Forest Resources Law, in the eastern part of the country, when clearing 100 hectares or more of forest land, an environmental impact assessment must be submitted according to article 294/93 and a plan for use of the entire cleared area must be submitted and approved.

(2) Environmental protection and preservation areas

In the survey area there are the following 4 types of legally designated environment protection and preservation areas: ① Areas managed by DPNVS (Department of National Parks and Wildlife) of SSERNMA (7 locations, 264,538 hectares), ② areas managed by the special management system (7 locations, 46,489 hectares), ③ privately managed areas (5 locations, 110,413 hectares), ④ areas managed by the Itapúa public corporation (4 locations, 33,110 hectares). The grand total of all types is 23 locations and 436,550 hectares.

There are also the following 7 categories: ① national parks (10 locations), ② state protected land (1 location), ③ wildlife sanctuary areas (3 locations), ④ wildlife refuge (2 areas), ⑤ natural monuments (1 location), ⑥ scientific monuments (1 location), animal and plant preservation areas (2 locations) and ⑧ privately protected land (3 locations). In addition, there are 6 locations (172,000 hectares) which are being considered as national parks and protected areas. Including these, there are a total of 29 locations and 608,550 hectares which are designated as environmentally protected and/or preserved land (see CUADRO A 4.7.1.3 and GRAFICO A 4.7.1.1).

There are 13 locations which are established as buffer zones where mostly small-scale farmers have settled. They are as follows: ① national parks (9 locations), ② state protected land (1 location), ③ wildlife sanctuary areas (1 location), ④ natural monuments (1 location) and ⑤ scientific monuments (1 location).

(3) Historical/cultural heritage protection districts

The following 3 types of historical/cultural heritage protection districts have been designated: ① Ruins of religious colonies (8 locations), Ruins from the colonial

period (2 locations), and ruins from the War of the Triple Alliance (3 locations) (see CUADRO A 4.7.1.3).

(4) Protected species of flora and fauna

In the SSERNMA newsletter of August 16, 1996 (DPNVS No. 701/96) a list of endangered species of flora and fauna was listed and designated 41 species of fauna and 31 species of flora to be protected (see CUADRO A 4.7.1.5).

4) Environmental impact assessment

Paraguay promulgated the environmental impact assessment law (Article 294) on December 31, 1993. After that, on April 1, 1994, article 5 of the same law was revised and "environmental impact report" was changed to "environmental impact assessment." The items which must be considered for this survey plan are: ① Development of agriculture, ② irrigation works, ③ road construction, ④ construction, earthen works, excavation, ⑤ introduction of new species, development of native species of trees and use of wild flora and fauna, ⑥ construction and other activities which may affect the environment.

5) Environmental approach

The environmental laws which Paraguay has promulgated in recent years have become stronger since the new constitution and environmental strategies have been created and implemented.

However, an approach that prioritizes environmental problems and ensures progressive development is needed in order to implement efficient environmental measures under constraints on human and financial resources. The most urgent problems in the agricultural field are how to renew and prevent the further destruction of valuable forest resources and increase land productivity. For this reason it is important to raise the consciousness of the farmers relative to the protection of forest resources and agriculture land.

4.7.2 Farm land conservation

Most of the survey area is made up of sandy soils and has a maximum precipitation rate of 55 millimetres per hour (data obtained from the Yacyreta observatory). Due to this high intensity rainfall, damage from soil erosion is very common. In order to promote sustainable agriculture in Paraguay, emergency soil erosion prevention measures are necessary. The state of agricultural land protection measures according to the 1991 Agricultural Census is shown in Table 4.7.2.1 and an outline of that is as follows.

(1) Crop rotation systems are effective in agricultural land preservation, but in the survey area we see no clear crop rotation system in place. In addition, forage fields

are included under fallow land.

(2) The number of operations which have implemented agriculture land protection measures is 137,097 which is 46.8% of the total, but 45.8% of small-scale farmers have implemented such measures. This is below the total average.

(3) In order of frequency of use, the methods of agricultural land protection (including multiple replies) are as follows: crop rotation system (64.5%), fallow land (20.2%), cultivation of green manure (5.9%), high-density cultivation (1.6%). In this case, operations using 2 or more measures accounted for 14.6% of the total.

(4) When looking at small-scale farmers, approximately 46% implement some sort of agricultural land protection measures. Of those farms implementing measures, the following measures, in order of frequency of use are implemented: crop rotation system (65.9%), fallow land (21.1%), cultivation of green manure (5.5%), high-density cultivation (1.3%). This is approximately the same tendency as above. In this case, operations using 2 or more measures accounted for 12.9% of the total, which is lower than for all farms. Because in order for fallow land, high-density cultivation and cultivation of green manure to increase in the future, it will be necessary to make a large investment in farm equipment, it would be best to create a mutual use program based on agricultural cooperatives.

(5) When looking at the number of operations implementing agricultural land protection measures by department, Caazapá, Concepción and Caaguazú have the highest rates of implementation. The soil in these areas is mostly sandy and there is high motivation to implement agricultural land protection measures.

In the survey area, GTZ in San Pedro, NGOs and 3 farms recognized by the Ministry of Agriculture and Livestock in Caazapá and 2 test farms for progressive agricultural land preservation in Itapúa have realized the importance of agricultural land protection measures and according to the explanation of the supervisor of the Department of Agricultural Diffusion, the country has recognized the importance of implementing "agricultural land protection measures for the sustainable development of agriculture."

In addition, from March 3 to 15, 1996, "The Second Latin American Conference on Direct Planting and Land Fallowing for Small-scale Farmers" was held in Itapúa and the President of Paraguay participated. The event was very successful. Due to actions like these, the interest in agricultural land protection and soil preservation is growing and large returns are expected from a small investment, but the technology and capital which are necessary for agricultural land protection are still lacking.

Table 4.7.2.1 Situation of Implementation of Farm Land Conservation Measures

Unit: Number of Operations, [%], (%)

Farm Area	Total # of Operations *1	Protected Agricultural Land *2	Breakdown of Columns on the Left [*2 Agricultural Land Protection (including multiple responses)]						Total of Breakdown of Columns to Left *3
			Perennial Crops	High-density Cultivation	Cultivation of Green Manure	Crop Rotation System	Fallowing Fields	Others	
Small-scale farms	21,872	2,704	66	47	306	1,432	861	357	3,069
less than 1 ha		[12.4]	(2.1)	(1.5)	(10.0)	(46.7)	(28.1)	(11.6)	(100)
1～5ha	92,392	40,645	1,124	671	2,719	29,576	9,879	1,731	45,700
		[44.0]	(2.5)	(1.5)	(5.9)	(64.7)	(21.6)	(3.8)	(100)
5～10ha	66,364	34,903	1,222	534	2,018	26,581	8,051	1,056	39,462
		[52.6]	(3.1)	(1.3)	(5.1)	(67.3)	(22.5)	(2.7)	(100)
Less than 10-20 ha	65,932	34,750	1,356	408	1,991	26,567	8,045	957	39,324
		[52.7]	(3.4)	(1.0)	(5.1)	(67.6)	(20.5)	(2.4)	(100)
	246,560	113,002	3,768	1,660	7,034	84,156	26,836	4,101	127,555
Subtotal		[45.8]	(3.0)	(1.3)	(5.5)	(65.9)	(21.1)	(3.2)	(100)
Medium-scale farms	41,485	22,223	2,823	609	1,954	15,991	4,564	819	26,760
20-200 ha		[53.6]	(10.5)	(2.3)	(7.3)	(59.7)	(17.1)	(3.1)	(100)
Large-scale farms	4,868	1,872	711	183	331	1,012	416	181	2,834
200+ ha		[38.4]	(25.1)	(6.4)	(11.7)	(35.7)	(14.7)	(6.4)	(100)
Total	292,913	137,097	7,302	2,452	9,319	101,159	31,816	5,101	157,149
		[46.8]	(4.6)	(1.6)	(5.9)	(64.5)	(20.2)	(3.2)	(100)

Source: Censo Estadistico Agropecuario 1991

Note: The area of protected agricultural land (*2) and the Breakdown of Columns to the left (*3) are overlapping figures and therefore are not equal.
[%]=(*2/*1)x100
The rate of overlapping small-scale farms=12.9% ... [(127,555-113,002)/113,002]x100

4.8 Development and Women (WID)

According to the 1992 national census, the number of women active in the Paraguayan economy is 323,000. Of these women, only 3% have agriculture as their main employment (see CUADRO A 4.8.1). However, in addition to helping with agricultural work, rural women do housework, child rearing and various other types of work. In this way, they contribute greatly to the household economy in ways that are often not sufficiently understood or appreciated by men.

Since the International Conference on Women in Nairobi in 1985, there has been a movement in Paraguay to reevaluate the status of women in accordance with international trends and the social status of women has risen. To begin with, the SDM, (Secretariat for Women's Issues) was established in 1992 as a governmental department with jurisdiction over women's issues. The purpose of SDM is to eliminate the social gap between men and women. In November of 1995, arrangements were made in order to cooperate with the Ministry of Agriculture and Livestock wherein agricultural programs which take women into consideration are promoted. In addition, through cooperation with the Ministry of Education and Culture, a system to promote the education of women was made and counseling for women and education and counseling related to WID through jointly sponsored symposiums and seminars. Also, at the 1995 International Conference on Women in Beijing in 1995, the situation of women in Paraguay was announced and the conditions of rural women also became clear and the role of women was recognized again. With the rural decentralization movement based on the new constitution, some of the departments have made sections in their governments to handle women's issues.

On the other hand, in rural areas, employees of DEAG offices which are placed in agricultural diffusion offices of the Ministry of Agriculture and Livestock have concentrated of improvement of quality of life with information diffusion and technical consulting in areas such as introduction of vegetable gardens and improvement of the living environment through improvement of kitchens and lavatories and improvement of nutrition through cooking study groups.

In general, women play many roles. However, the greatest burden of a housewife must bear is childbirth and child rearing. For this reason, through cooperation with UNFPA (United Nations Fund for Population Development) family planning was introduced by the Ministry of Health and DEAG is handling the diffusion and introduction of this program in remote rural areas. However, because the budget of DEAG is not sufficient and mobility is limited, counseling in remote areas is difficult.

In addition, in Cordillera and Paraguarí, etc., household-scale production of

laying hens and honey is increasing and this helps to improve household nutrition and allows housewives a source of income. Also, in remote areas such as Paraguarí etc. where transportation is inconvenient, groups of several tens of farm wives are conducting group purchases and sales of daily goods and sundries and this has been successful. They have become central in the formation of a weekly turn system and buying and selling are conducted in turns. Due to these activities, it has become possible for them to purchase daily goods at a low price and due to the time and labour saved, it has helped ease the daily workload of women.

In addition, in one area of Cordillera, a women's comité under consultation of JICA's peace corps has started making embroidery and stuffed animals and selling them communally for income. Although it is still in the beginning stages, the movement for women to earn income has begun to be organized by women's comités.

Women's participation in socio-economic activities is still low and the number of women in government, cooperatives, local development organizations and farmers' organizations is also low. There are exceptional organizations such as the Ycua Bolaños cooperative in Caazapá where women are active in management. Other than the Director, most of the officers of this cooperative are women and they are organizing active development of women's committees in Caazapá city and the surrounding areas. Their main activities include savings, credit, beekeeping, and poultry farming, cottage industries, and handicrafts. They sell honey and other products communally and this gives farm wives an opportunity to earn cash. Many of the women in the cooperative are former teachers and they are very concerned with education and they promote women's education through committee.s Because the overall level of women's education is low in Caazapá, even when compared to the rest of the country, the education, training and production assistance activities implemented by this cooperative are very effective and make a large contribution to the improvement of human resources and the economic activity of this rural area.

CHAPTER 5 FACTORS HINDERING DEVELOPMENT AND FUTURE EXPECTATIONS

5.1 Factors hindering development

Factors hindering the development of the Study Area are listed in ANEXO 5.1. These are general hindering factors to consider when agriculture, livestock, forestry and fisheries are highlighted. Many of the factors hindering growth can be eliminated by development. Factors that impede the development of small-scale farming will be selected from those inhibiting factors and studied from various angles in order to formulate this support programme for small-scale farmers. In addition, department-level requests (14 governors) and the results of locally commissioned studies will also be thoroughly examined.

"Inhibiting factors" and "countermeasures" are classified as follows and summarized below, based on ANEXO 5.1. As for indigenous peoples, a wide variety of factors are involved, and therefore they will be considered in the planning and implementation stages. Policy-related matters such as "policies and administrative fields" and "environmental fields" are discussed in Chapter 10 "Recommendations."

Inhibiting factors	Countermeasures
1) Policies and administrative field	
• Lack of long-term agricultural policy	- Development of agricultural law - Formulation of long-term agricultural promotion plan
• Insufficient budget allocation to the Ministry of Agriculture and Livestock	- Promotion of devolution - Appropriation of agricultural development budget
• Inappropriate settlement policy	- Development of settlement criteria, improvement of infrastructure, low-interest finance, and promotion of permanent settlement
• Extensive use of land	- Issue of land certificates - Promotion of effective use of farm land
2) Social field	
• Lack of adequate education system	- Introduction of schooling system

• Shortage of job opportunities	- Creation of employment opportunities
3) Economic field	
• Lack of strategy for MERCOSUR	- Promotion of regional production of strategic crops
• Lack of standards and criteria	- Education of engineers and farmers on standards and quality
• Structure that lays undue stress on primary industries	- Development of secondary industries based mainly in agricultural product processing
• Small domestic consumer market	- Substitution of imports and promotion of exports
• Shortage of loan funds	- Procurement of funds at home and abroad
4) Production field	
(1) Cultivation and farming	
• Inappropriate management of cultivation	
• Expensive production materials	- Distribution of manual for each crop
• Damage from picudo cotton pest	
• Nutritional imbalance	- Joint purchase of production materials through formation of organizations
• Small incomes	- Measures against picudo
	- Crop diversification (increase in planted crop varieties)
(2) Livestock	
• Slow livestock improvement	- Crop diversification (increase in the number of cash crops)
• Low productivity of grass	- Introduction of superior livestock, establishment of artificial insemination centres
(3) Distribution	
• Instability in means of shipment and buyers	- Improvement of grass
• Lack of adequate storage, processing and distribution facilities	- Maintenance of roads, creation of production centres, collective shipments
	- Construction of storage, processing and distribution facilities
(4) Agricultural support	
• Lack of adequate agricultural	- Training of superior staff in charge of

diffusion system	diffusion
• Low motivation to produce crops	- Training of farmers' leaders, organization of farmers
• Lack of cooperation between diffusion and testing/research	- Greater cooperation between extension and testing/research
(5) Agricultural and rural infrastructure	
• Lack of irrigation facilities	- Construction of irrigation facilities
• Lack of adequate farm roads	- Improvement and construction of farm roads
• Lack of rural infrastructure	- Improvement of living conditions through development of rural infrastructure
5) Environmental field	- Formulation and implementation of
• Unplanned land use	rational land use projects
• Difference in values regarding the environment	- Education at lowest level and introduction of monitoring system
• Difficulty in sustaining agriculture	- Introduction of engineering and farming methods for farm land conservation
6) Measures for WID	- Modernization of rural areas
• Lack of awareness of women in rural areas	- Reduction of housework via improved living conditions
• Lack of adequate organizations	- Strengthening of education and organizations
• Small incomes	- Promotion of vegetable cultivation, home industry-type processing, bee-keeping, etc.
• Expensive daily necessities	- Establishment of collective purchasing centres
• Lack of the concept of domestic sanitation	- Establishment of classes for mothers

The above measures are complex and cover a wide range of fields, but