1.1.4 Conditions of agricultural development in Paraguay

The conditions required for agricultural development will be analyzed from the micro perspective of regional agriculture and farming operations that actually support agricultural production rather than from a macro, country-level frame of reference. Firstly, regional agricultural characteristics and development trends will be clarified based on the production trends of major agricultural and livestock products in each department. Secondly, the difficulty of improving production and implementing diversified farming - major issues in agricultural policy - will be examined by discussing the differences in production incentives for cotton and vegetables. In addition, the supporting factor behind soybean production will be analyzed by correlating it to regional agricultural characteristics.

(1) Viewpoint and approach in the analysis of regional agriculture

Paraguay is divided by the Paraguay River between the Oriental (14 departments) and Occidental Regions (3 departments) that runs from north to south. The total national land area (407,000km2) is four to six and 98 % of the farms are dispersed throughout the Oriental Region. The MAG has divided the Oriental Region into 7 zones (north, east, central east, south, and central south, southwest, and central) and together with the Occidental Region, there are eight agricultural zones.

Agricultural development in Paraguay occurred when farms moved from rural to rural in search of fertile land and farming in extensive land areas became an important factor. The two departments of Parana and Itapua which are located in the most fertile east and south zones have developed as soybean production centers, by accepting foreign immigrants and domestic farmers migrating from other regions in the country. It is important to study agricultural development in Paraguay, in order to understand the transitions in regional agriculture. Therefore, the following indicators have been formulated and studied.

a) Land classification according to area in the Oriental Region, the center of agricultural production (Figure 6)
b) Fiscal year transitions in the production volume of major agricultural products according to department (Figure 8)
c) Increase and decrease in the number of farmers and population according to region and department (Table 2)

(2) Land productivity according to region

As shown in Figure 6 high productivity farmland (Class I, II, III) where there is minimal restrictive production factors, is mainly distributed in the south and east zones. The productivity index (IDP: Indice de Productividad) is used as the criteria to determine land categorization. The Nitisoles rodicos land group has the highest IDP at 0.75 and extends through the south zone of Itapua, the east zone of Alto Parana, and the north zone of Canindeyu, stretching south to north through these three departments. The total land area of these three departments is 52 %, 56 %, and 26 %, respectively.

In contrast, the central land zone is comprised of rather inferior Class IV and V farmland and productivity conditions are relatively poor. Nearly 82 percent of the land in Cordillera department located in this area has an IDP under 0.2. Further, many small-scale farms of under 20ha are dispersed throughout this area; and in addition to the petty farming operations, the fertility and topographic conditions of the soil are also deficient. Although it is not shown in Figure 6, ranching is prevalent in the Chaco in Occidental region due to the widespread arid and saline soil in the marshlands. Since cultivating field crops in the Occidental region is difficult, the land is mainly used for grazing activities.

(3) Production trends of major agricultural products according to department

Figure 8 shows the changes in major agricultural products trends according to department in the last six-years. If recent transitions in department agricultural development are analyzed, the following two differing characteristics are seen.

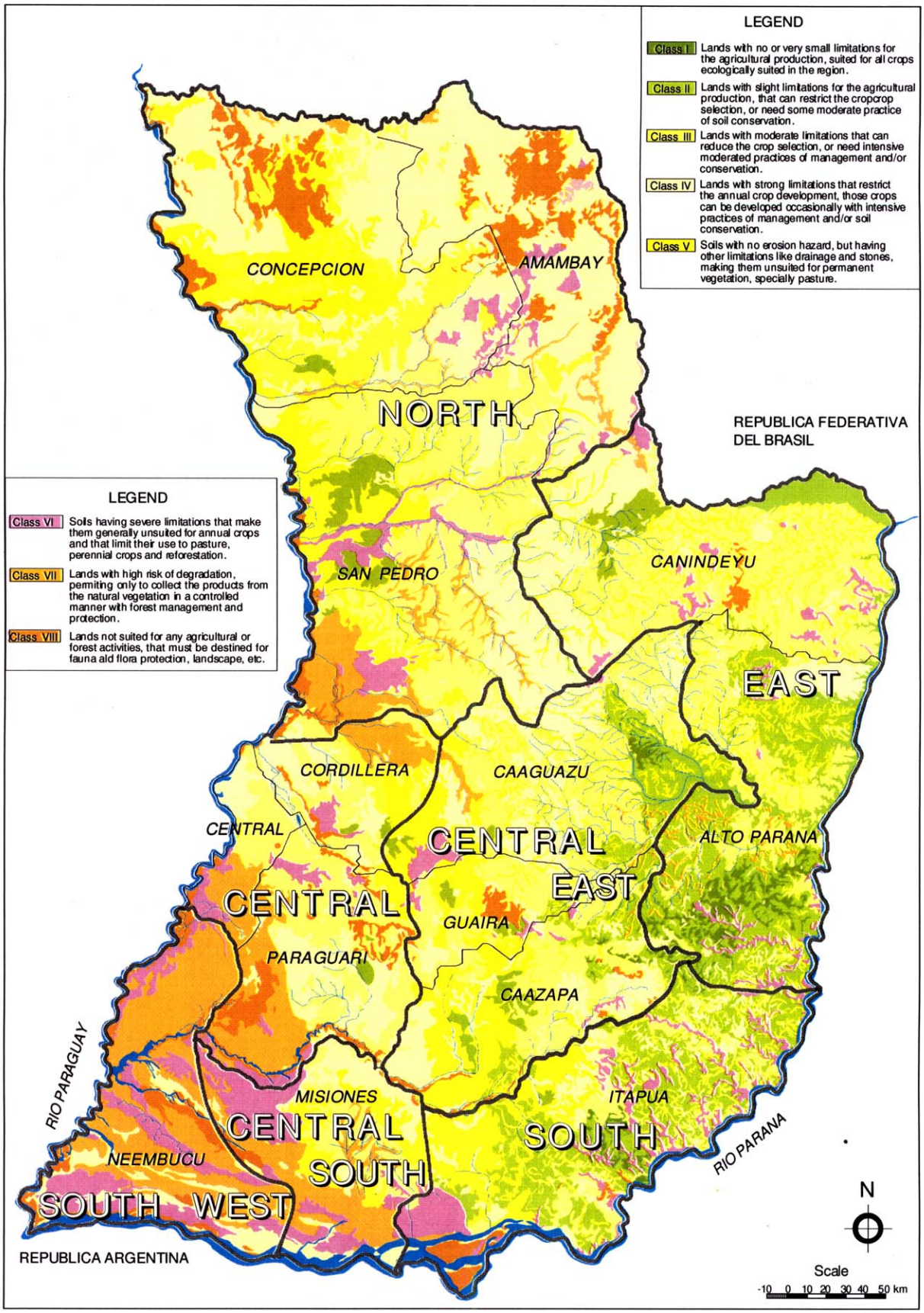
1) Formation, spread, and shift of dynamic soybean production areas from the southern to the northern zones

As can be seen from the production trends of major crops according to department shown in Figure 8, the soybean production area has spread from the south zone of Itapua department to the east zone in Alto Parana department. Furthermore, it has distinctly shifted to the north zone in the Canindeyu and Amambay departments bordering Brazil. The soybean production volume has also increased 1.7 and 3.4 times in both departments in the past six years (1993-1998) and the cropping area has also increased 2.5 times. Although both Itapua and Alto Parana departments are still major soybean production regions, the growth rate in the production volume and cropping area is small in comparison to Canindeyu and Amambay departments.

The tendency for the grain production areas to shift from the south to the north zone along the

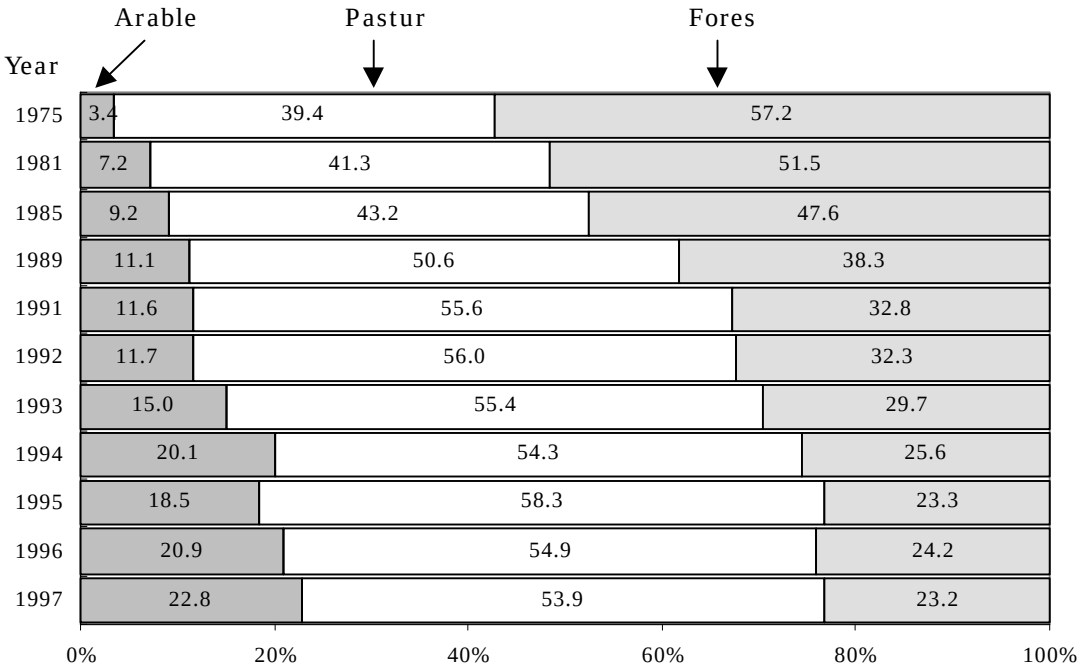
national borders of Brazil is also characteristic for corn production. However, as shown in Figure 7, the spread and shift of the production areas for soybean, corn, and wheat have contributed to the rapid exhaustion of the forestry resources in Itapua department. As a result, this region, which has been traditionally exploited by the lumber and timber processing industries, has developed into an agricultural zone centered on grain production.

Figure 6 **Land Classification Map for Eastern Region**



The underlying factor for this change is the high productivity farmland and its high classification, as shown in Figure 6. The low growth rate in soybean production in Itapua department in recent years is due to the decreasing forestry zone and the shortage of high productivity land resources for new agricultural development. This also signifies limited land expansion for agriculture.

Figure 7 Relation between the Decrease in Forest Area and Increase of Arable Land Area in Eastern Region



Source: Prepared, based on Direccion de Censos y Estadisticas Agropecuarias, MAG, 1981, 1991, 1995, 1997, 1998

2) Limited agricultural development and the continuous outflow of the farmer population in the central zone

In contrast to the dynamic development and shift in the southern and northern areas to a soybean producing region, the annual changes in the production volume of the major crops, cotton, cassava, and corn, have been minimal in the central, central east, and central south zones. Moreover, the paucity of changes is reflected in the transitions in the population growth rate and the number of farm households according to department, as shown in Table 2.

Table 2 Trends in the Number of Farm Households and Population

Agricultural zone	Department	Farm Household			Population (1,000hab.)		
		①1981	②1991	②／①	①1992	②1998	②／①
NORTE	Concepción	13,438	16,119	119	167.2	187.6	112
	San Pedro	25,646	37,767	147	280.3	342.3	122
	Amambay	4,122	3,294	79	99.8	130.2	131
CENTRAL	Cordillera	20,735	22,364	108	198.7	215.6	108
	Central	15,588	15,643	100	866.8	1,225.6	141
	Paraguarí	26,936	27,816	103	208.5	247.5	118
CENT. ESTE	Guairá	16,696	20,086	120	161.9	174.2	108
	Caaguazú	35,937	43,681	122	386.4	448.8	116
	Caazapá	15,661	20,682	131	129.3	142.3	110
SUR	Itapúa	30,177	40,803	135	377.5	466.6	123
CENT. SUR	Misiones	9,156	9,918	108	89.0	99.2	111
SUR. OESTE	Ñeembucú	8,454	8,716	103	69.7	87.4	126
ESTE	Canindeyú	7,652	11,857	155	103.7	137.2	133
	Alto Paraná	13,704	21,772	159	406.5	630.0	155
OCCIDENTAL (CHACO)	Presidente Hayes	2,089	4,215	202	64.4	79.1	123
	Alto Paraguay	710	412	58	12.1	14.1	116
	Boquerón	2,226	2,071	93	29.0	36.2	124
	Total	248,930	307,221	123	4,152.5	5,218.8	125

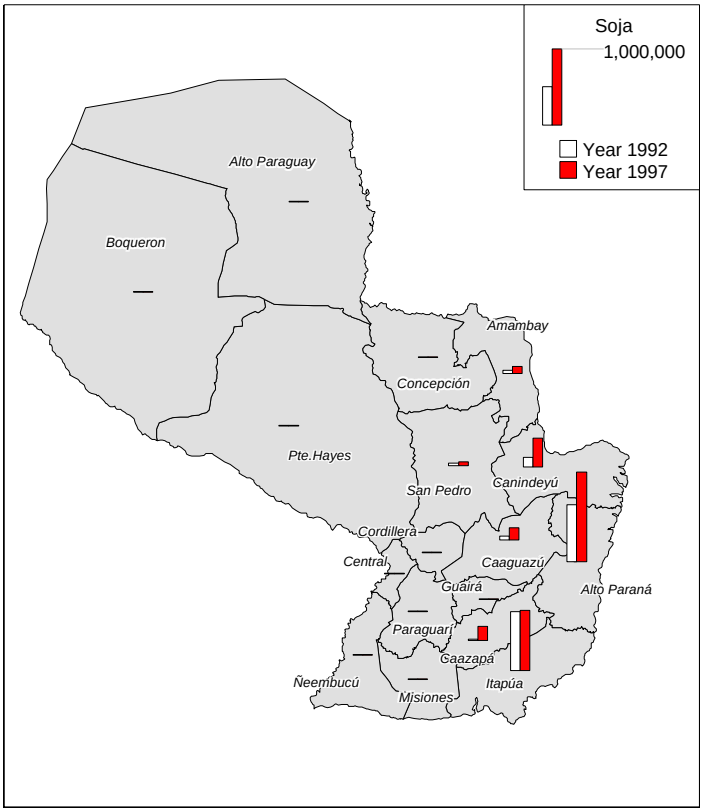
Source: Prepared, based on the following informations:
(1) Censo Agropecuario Nacional, 1981/1991
(2) Secretaria Tecnica de Planificacion. Direccion de Estadisticas Encuestas y Censos, 1999

According to the IBR, the largest increase in the number of farm households occurred in Presidente Hayes department in the Occidental Region (Lower Chaco) dominated by domestic small-scale farmer immigrants from 1981 to 1991. During the same period, the number of farm households also increased 1.6 times in the departments of Canindeyu and Alto Parana where the soybean-producing region has expanded. Furthermore, the population growth rate in both Canindeyu and Alto Parana departments (1992-1998) rose over a seven-year period by 1.3 and 1.6 times, respectively, a high growth rate in comparison to the other departments; and it continues to rise. Another characteristic is the increased population of Amambay department, bordering Brazil, which has also risen 1.3 times due to the increased number of immigrant Brazilian farmers (Brasiguayos).

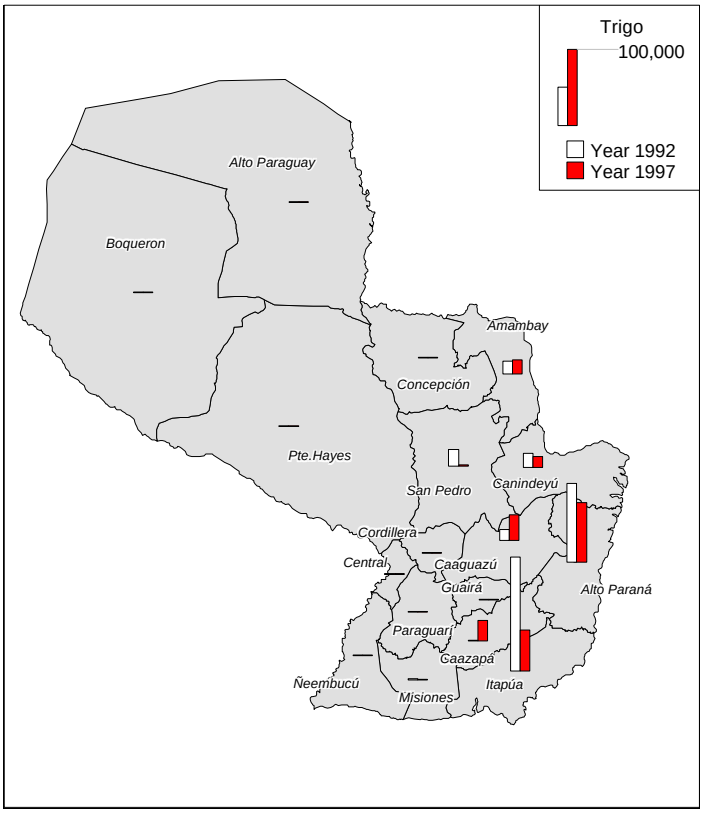
In a detailed analysis of the rise and fall in the number of farm households according to size in the central and the entire northern region, small-scale farms under 5 ha increased twofold from 1981 to 1991, as in the case of San Pedro department. This indicates the rise in small-scale farming operations; and in conjunction with low land productivity, this has been an unstable factor. As a result, the number of farm households and the population growth rate have been low throughout the central region, where the majority of the small-scale farms are dispersed. The farmers in this region have moved to other regions in order to increase the scope of their farming operations; and the outflow of the farmer population has concentrated in the suburbs of Asuncion and other urban areas in Central department.

Figure 8 Changes in Production Trends according to Region (department)

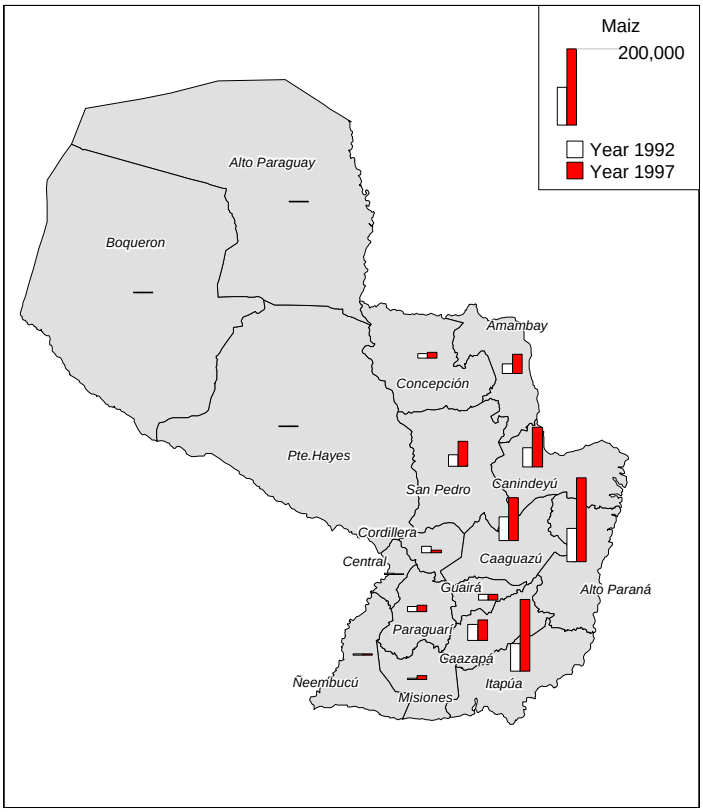
(i) Soybeans



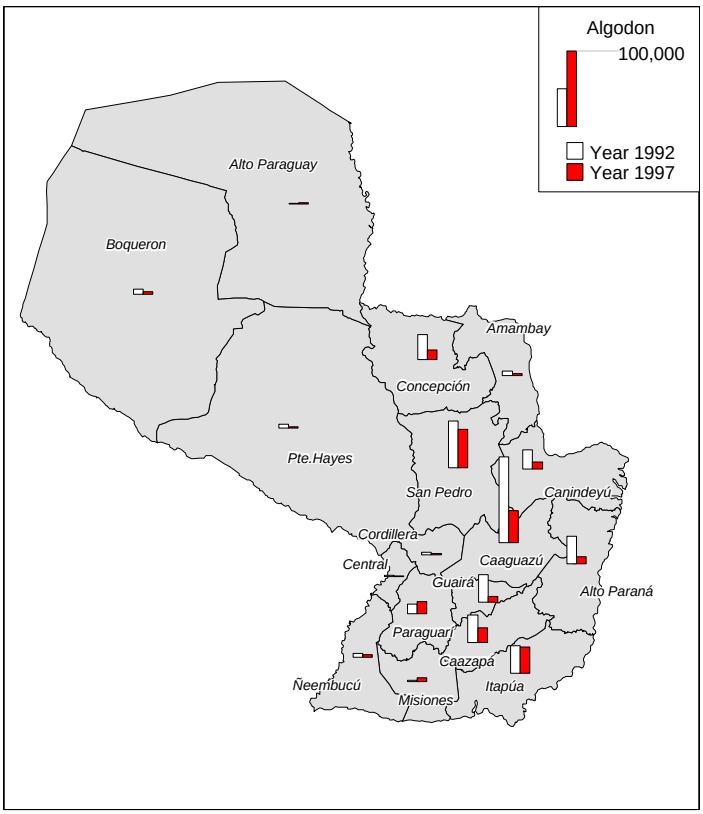
(ii) Wheat



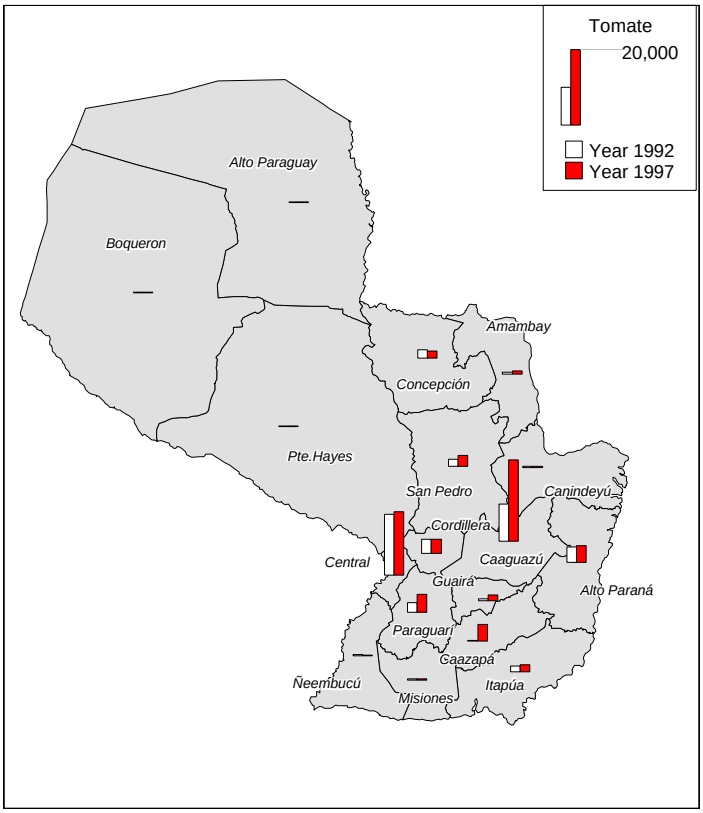
(iii) Corn



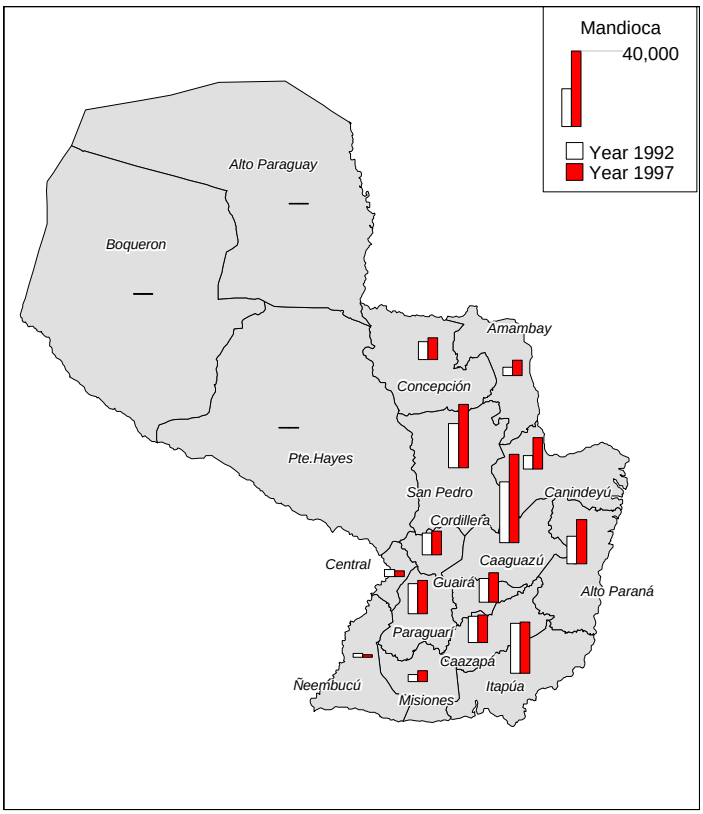
(iv) Cotton



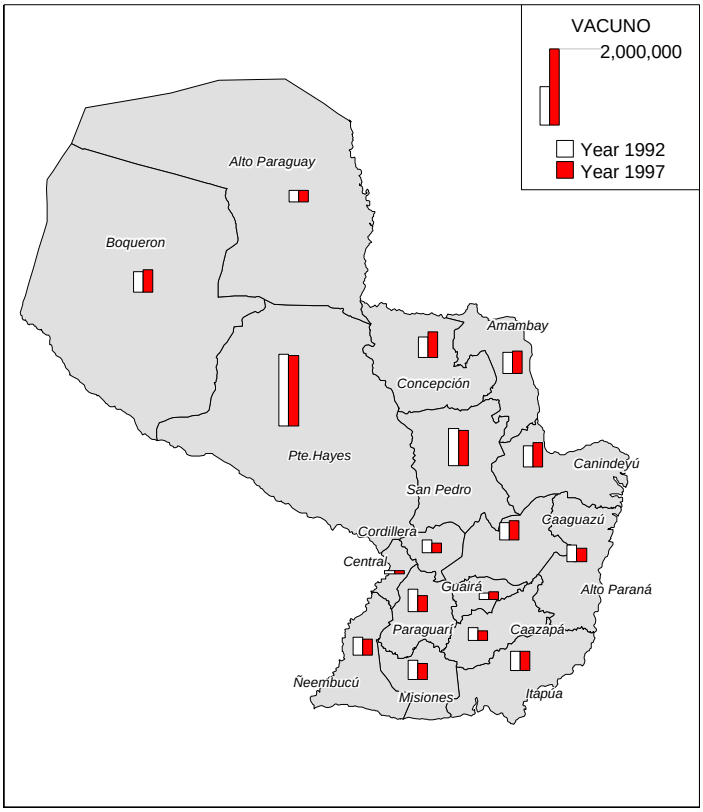
(v) Tomato



(vi) Cassava



(vii) Beef Cattle



Source: Figures 8 (1) to (7) are prepared, based on Direccion de Estadisticas y Censos, MAG, 1992, 1993, 1994, 1995, 1996, 1997, 1998

(4) Conditions in agricultural production -vegetables and cotton-

The crop most representative of the agricultural diversification policy, vegetables, has been used to review the issues that have evolved from this policy. Presently, the domestic consumption volume of major vegetables is 80 % for onions, 70 % for garlic, and 30 % for bell peppers and tomatoes; and all are dependent on imports from mainly Argentina in the MERCOSUR region. In Paraguay, vegetables are mainly cultivated by small-scale farms in the central region where changes in agricultural development have been minimal and land productivity is inferior. In view of these circumstances, productivity issues were reviewed in terms of production costs, market prices, conditions in cultivation (irrigation), and marketing. Tomatoes, a traditionally consumed vegetable in Paraguay with the largest production volume, has been used in the analysis and its productivity has been compared to raw cotton.

1) High vegetable production costs of inferior farmland distantly located from the market

More than 75 % of the total production volume of tomatoes is produced in the three departments of Caaguazu, Cordillera, and Central in the central zone where the majority of the small-scale

farms are found. Table 3, which is based on the findings of major national agricultural cooperatives, shows the production costs of tomatoes according to region. The national average production cost per hectare is Gs 17,352,981, but it is higher than the national average in the central and central east regions that are adjacent to the country's largest wholesale market, ABASTO. Conversely, it is 15 % lower than the national average in the northern region, which is distantly located from the capital, Asuncion. This disparity is also reflected in the investment volume of fertilizer, pesticides, irrigation facilities, cold storage, soil covering material, and in the wage standard.

However, there is a reversal in this regional disparity if the production cost is added in the per tonnage production cost of harvested tomatoes. The national average production cost per ton is Gs 456,657. The production cost is higher for Concepcion and San Pedro in the north zone at Gs 510,655 and Gs 529,510 respectively, in comparison to the Cooperativa Asuncena Ltda. (hereinafter referred to as Asuncena Cooperative) with a production cost of Gs 3,080,967. In the north zone, the production cost per ton is high, despite the low production costs per hectare, since the yield per unit area is low. Moreover, the members of the Asuncena Cooperative are involved in the combined operations of vegetable cultivation and poultry farms. They utilize chicken manure as organic fertilizer to restore the soil, thereby curtailing manure costs and maintaining soil fertility. Despite the low soil classification of the entire zone, high yields and earnings are generated through soil improvement measures that utilize high level in cultivation techniques.

Table 3 Comparison of Tomato Production Costs according to Area

Production area	Yield (ton/ha)		Production Cost (G/ha)		Production Cost per ton (G/ton)	
	1995	1998	1995	1998	1995	1998
National Average	37.1	38.0	15,705,355	17,352,981	423,324	456,657
Central: Asunción	61.0	68.0	20,555,622	21,009,800	336,977	308,967
Central: Coronel Oviedo	37.0	35.0	15,001,520	12,152,981	405,446	347,228
North: San Pedro	35.1	35.5	—	15,885,300	—	529,510
North: Concepción	35.8	30.0	14,935,612	15,319,668	417,195	510,655

Source: (1) The national average production cost is based on the production costs of the CAH, which provides financing for small-scale farmers nationwide.

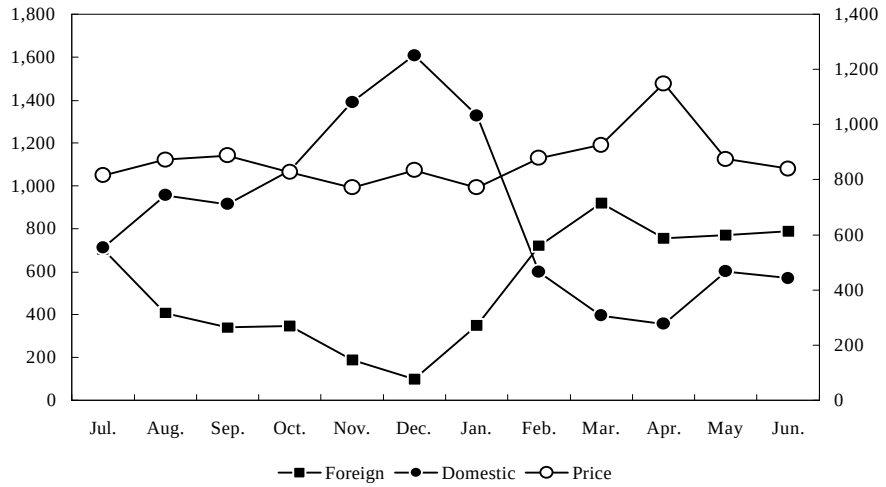
(2) The production cost and yield of each zone are based on the following cooperative's datas; Asuncena Nikkei Agricultural Cooperative in the central zone, Coronel Oviedo Agricultural Cooperative in the central zone, the San Pedro Agricultural Cooperative and the Concepción Agricultural Cooperative in the north zone.

2) Impact of market price fluctuations

Figure 9 is based on an analysis of the data on the changes in the market price of tomatoes and the volume delivered each month to the ABASTO market for the past nine-year period (1991-1999). Tomato cropping is concentrated in the spring and summer seasons following the high temperature and wet months of September and October. They are harvested and shipped to the market during

the months of December and January when the market price drops. The lean season for tomatoes is from April to June when overall market prices rise. During this period, there is relatively little rainfall, as in the fall and winter seasons; and there is a need to invest in irrigation, soil covering material (mulching), and other equipment and materials. The production costs of the tomato-producing farms of the Asuncena Cooperative, that is located in the environs of Asuncion, are high because irrigation and greenhouse facilities are used as countermeasures against the lean period when winter cropping occurs.

Figure 9 Changes in Market Price and Delivery Period of Tomatoes at the ABASTO Market



Source: Prepared, based on Datos sobre la comercializacion de productos extranjeros en el mercado Central de ABASTO de Asuncion, Anos 1994 al 1998,DC, MAG, 1999

The producer price of vegetables in Paraguay is not based on production costs, but are based on ABASTO market trends. Consequently, farms in the north zone where year-around cultivation is difficult and which are distantly located from the ABASTO market, are forced to transact high-production-cost tomatoes at a very low price. Moreover, transport costs are added and the profit of the farmer is reduced. In addition to the impact of climatic changes such as droughts, there is another factor impeding the spread of vegetable cultivation.

3) Cultivation period of vegetables and the benefit and risks of irrigation

Figure 10 shows the cropping calendar for vegetables, mainly tomatoes, for the suburbs of Asuncion and Coronel Oviedo in Caaguazu department, where the topography in domestic production is being formed and vegetable production has risen markedly in recent years. The average area of farmland is 5 ha for members of the core regional agricultural cooperative, Cooperativa de Produccion Agro-Industrial y Servicios Coronel Oviedo Ltda. (henceforth referred to as the Oviedo Cooperative), in the major vegetable production region, Caaguazu department. Of this average, the actual cropping area is about 2 ha. The cultivation of vegetables is dependent

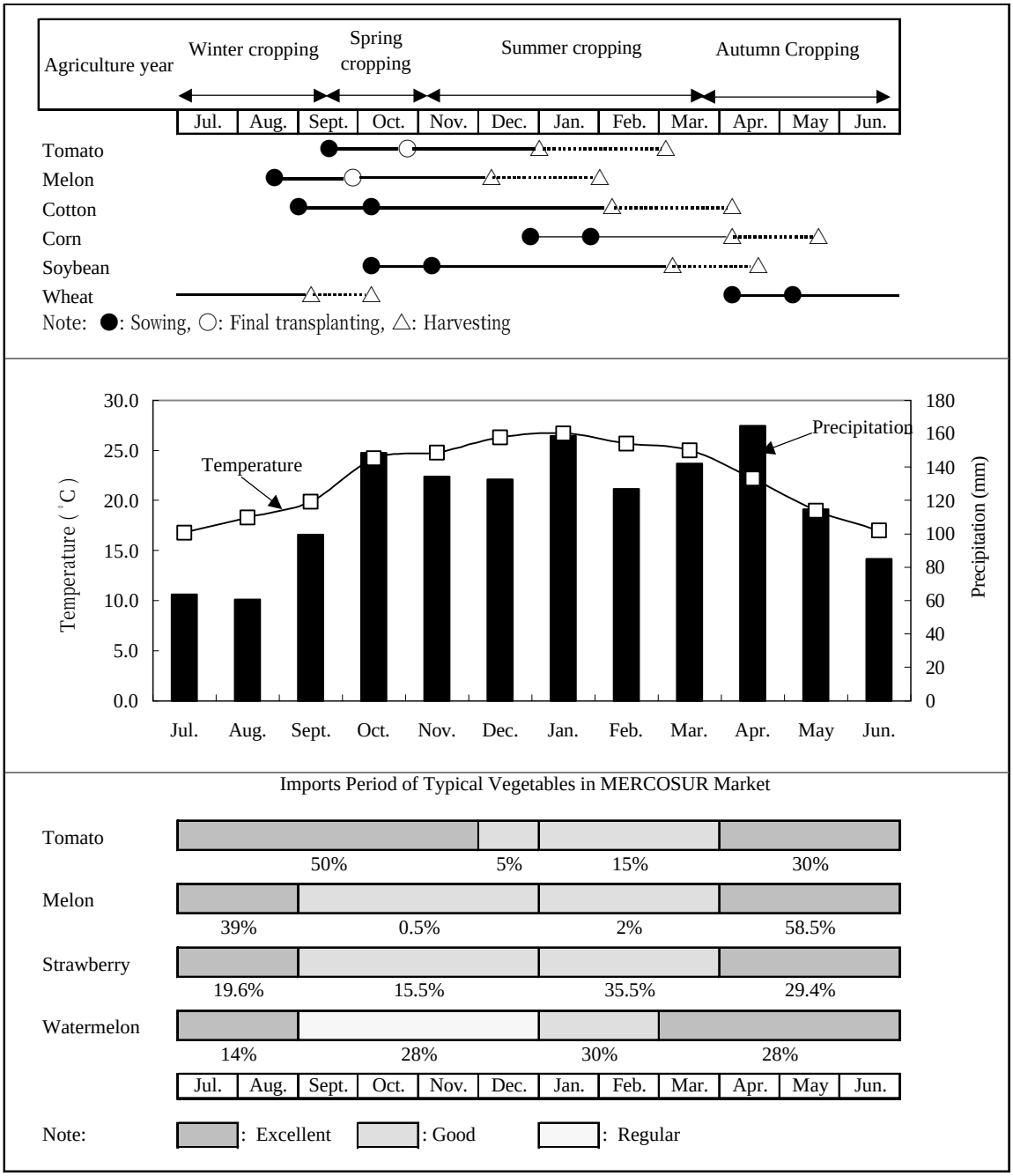
on family labor and the maximum cropping area is 0.25ha. Corn and cassava are also cultivated for self-sustenance. Sowing, in vegetable cultivation in Paraguay, is generally carried out in October at the start of the rainy season. Planting follows this and the crop is harvested from December to March and shipped.

Figure 10, import period of typical vegetables in the MERCOSUR market, shows an analysis of the peak period for imported vegetables by the MERCOSUR countries. As can be seen from this figure, the import volume of vegetables is the highest from April to October. This coincides with the off-season period of vegetable cultivation; and therefore, it is an ideal period for exportation. However, vegetable cultivation in Paraguay is largely rainfall cultivation, which makes it difficult to produce and ship vegetables during these months.

The tomato is the priority crop among the vegetables and it is generally planted in August and September just before the rainy season begins. A small-scale IDB and World Bank irrigation project is under implementation in this zone and irrigation water is utilized from January when the rainfall volume is relatively less. The tomato yield for one hill in irrigated and un-irrigated cultivation is 10kg and 4kg, respectively, and the benefits of irrigation have been recognized due to these yield differences. However, despite the increased yields that are produced due to irrigation, the tomato-producing farms of the Oviedo Cooperative have been cautious about using irrigation facilities for the following reasons.

a) Other production costs such as water usage and maintenance costs are generated when irrigation is used.
b) The cultivation period of the summer crop grown after September is three months (about 90 days) and the temperature and the rainfall volume are high. As a result, production costs also drop.
c) Conversely, the cultivation period of the winter crop, which utilizes irrigation and is the season when disease and pests are reduced, are 120 days and longer than the summer cultivation period. As a result, production costs or mainly labor costs rise.

Figure 10 Cropping Calendar and Vegetable Import Period in the MERCOSUR Market



Source: (1) Cropping calendar is prepared mainly interview and their informations by the following cooperatives: Tomato, Melon, Cotton, Corn :Cooperativa de Producción Agro-Industrial y de Servicios Coronel Oviedo, Cooperativa Asuncena , Soybean, wheat: Cooperativa Yguazú
(2) Meteorogical pattern: Dirección de Censos y Estadisticas Agropecuarios, 1998/99
(3) MERCOSUR market condtions: Programa Nacional de Desarrollo de las Exportaciones de Rubros No Tradicionales, MAG, 1998

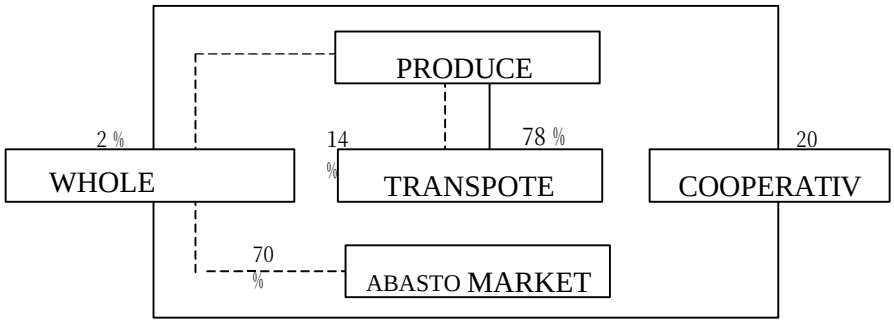
4) Vegetable distribution based on wholesalers

The distribution route for vegetables is shown in Figure 11. The share of vegetable shipments from cooperatives and farmer organizations comprises only 20 % of the distribution volume and

the remaining 80 % is provided by transporters hired by wholesalers. Vegetables in Paraguay are basically sold through a system of consignments controlled by wholesalers. As a result, the producers do not know the final destination and the selling price of their products. Wholesalers purchase the produce as cheaply as possible and sell it to lucrative customers (supermarkets, hospitals, the military, and other customers with large consumption needs); and their commissions comprise 70 % of the marketing costs.

This marketing system has heightened the producers' distrust of the market and it is a major factor that has impeded the growth of vegetable production. Presently, agricultural cooperatives collect an average of 15 to 18 % in commissions for their retail activities. In the case of the Nikkei agricultural cooperative, commissions are a high 23 %. However, the vegetable retail volume of the Nikkei cooperative, which is also a wholesaler at the ABASTO market, has increased annually. The cooperative provides information on market prices and has a transparent retail and accounting system, which has contributed to its increased retail volume. The establishment of a retail system and the practice of providing accurate information on market prices by farmer organizations and agricultural cooperatives are important components to increasing production.

Figure 11 Distribution Route of Vegetables to ABASTO market



Note:-------- margin

Source: SIMA/DC/MAG, 1999

5) Cotton production incentives

Cotton is an established export crop and one of the few cash crops produced by small-scale farms. In 1991, 630,000 tons of cotton was produced, the highest production volume ever achieved in the history of cotton production in Paraguay, which comprised 10 % of the GDP and 40 % of the total export value.

However, the production volume has dropped in recent years and the peak production volume fell to one-fifth of this peak volume in 1996. The underlying cause has been stagnant international market prices which has contributed to a lower producer price, in tandem with the spread of

disease and pests (picudo) and lowered soil fertility due to long years of continuous cropping. In 1991, small-scale farms of less than 1ha comprised 17 % of the total production volume of cotton, average land area of cotton farm is estimated about 2.2ha. This shows that cotton is produced according to a small-scale farm. Table 4 gives a comparison of the earnings for cotton and tomatoes in the Oviedo Cooperative where vegetable production has gradually increased. As shown in this table, the earnings generated by cotton were mere 5.7 %. Despite these conditions, cotton production has continued due to the following incentives.

a) Despite low, unstable prices, the entire crop is purchased by cotton factories.

b) The shippers and transporters of the cotton factories pick up and deliver the cotton crop from the farm and the farmer does not have to be concerned about marketing the crop.

c) Although 98 % of the gross revenue consists of production costs, of which 62 % is labor cost, the cost of fertilizers, pesticides, and other equipment and materials is a low 14 %.

Table 4 Comparison of the Earnings of Tomatoes and Cotton

		Tomato	Cotton
a) Yield	kg/ha	35,000	1,500
b) Retail price	Gs/kg	650	1,000
c) Gross revenue	Gs/ha	22,750,000	1,500,000
d) Production cost	Gs	12,152,981	1,474,691
e) Net income	Gs	10,597,019	25,309
f) Average cost	Gs/kg	303	1,017
g) Earnings	%	87.0	5.7

Source: Prepared, based on Cooperativa de Producción Agro-Industrial y de Servicios Coronel Oviedo Ltda., 2000

In addition to the incentives explained above, the Paraguayan government has provided comprehensive protection measures by expanding the scope of farm loans through the CAH and freely distributing fertilizer, pesticides, and picudo disease resistant seeds. It has also invested in 434 extension personnel since 1997 (Informe annual, DEAG, 1999). Cotton is also listed as a priority crop for CAH and BNF farm loans. In addition to providing assistance for small-scale farming operations, these countermeasures by the Paraguayan government signify the continuing difficulties that the diversification policy on export crops, such as vegetables, must address.

The earnings ratio of tomatoes is 87 %, which is relatively high in comparison to cotton. However, as explained earlier, the earnings and profits that are generated from vegetables are affected by price fluctuations; and there is no compensation for the cost of fertilizers, pesticides, and other equipment and materials that comprise 70 % of the overall production cost. A vegetable, like cotton, is a crop that is produced by small-scale farms. However, the differences in production incentives are a major impeding factor in introducing vegetable cultivation to small-scale farms. Vegetables that are grown in small cultivated areas generate high earnings and income ratio, but as

mentioned earlier, they are at the mercy of market price fluctuations. Introducing and establishing cultivation technology and a production base capable of coping with market fluctuations are an important component in agricultural diversification.

(5) Characteristics in soybean production and future development conditions

1) General description

Soybean production in Paraguay increased rapidly after it became the focus of a national policy to increase grain production in the 1980s, due to the global demand for soybeans in the 1970s. Presently, soybean production comprises 33 % of the GDP and 48 % of the total export value; and it is a major crop that leads the national economy. The notable characteristics of soybean production in Paraguay are the sudden expansion in cropping area, the rise in production volume, and the high yield per hectare. Although its share of the world's production volume according to country is a mere 2 %, the yield per hectare for the past five-year period (1995 to 1999) averaged 2.8 tons, which is the highest recorded value among major soybean producing countries, as shown in Table 5 below.

Table 5 Comparison of Soybean Yields

unit: ton/ha

	1995	1996	1997	1998	* 1999
Paraguay	3.0	2.9	2.8	2.6	3.1
U.S.A	2.4	2.5	2.6	2.6	2.4
Brazil	2.3	2.2	2.2	2.4	2.3
Argentine	2.1	1.8	1.6	2.6	2.2
Bolivia	2.2	2.1	1.9	2.0	2.1

* Yield of 1999 is estimated.
Source: 1) MAG: Dirección Censos y Estadísticas Agropecuarias, 1998/99
2) CAPECO Y J.J. Hinrichsen S.A, Buenos Aires, 1998

However, the growth in yield has dropped in the last five years to about 40 % in comparison to 87 % during the mid-1980s to mid-1990s. Yields appear to have peaked. Moreover, as shown in Figure 7, the production areas have expanded or moved; and the shift in production areas has been attributed to the high dependence on farming equipment. According to an interview survey of soybean producing farms and cooperatives in the major three departments such as Itapua, Alto Parana, Canindeyu, soybean cultivation in these departments has the highest efficiency - with one tractor and one combine capable of cultivating an area of about 350ha. But for farms with an average land area of 150ha, which is characteristic of more than 60 % of the soybean producing farms, the efficiency of farming equipment is poor and the need to expand the area of cultivated land has become a major issue in farming operations. The shift in production areas in recent years is due to farmers seeking to expand the cultivation area for soybeans.

In addition to efficiently utilizing farming machinery to expand the cultivation area as explained

above, there are three factors needed to establish sustainable soybean production. They are a)curtailing production costs, b)internalizing distribution margins (shipping costs), and c)improving quality. Furthermore, the merits and risks of introducing GMO (Genetically Modified) seed, the direct sowing and/or no-tillage cultivation method that is presently promoted in Paraguay, and their mutual correlation must be considered. The following countermeasures based on these three factors are explained below.

2) Development conditions and issues in soybean production

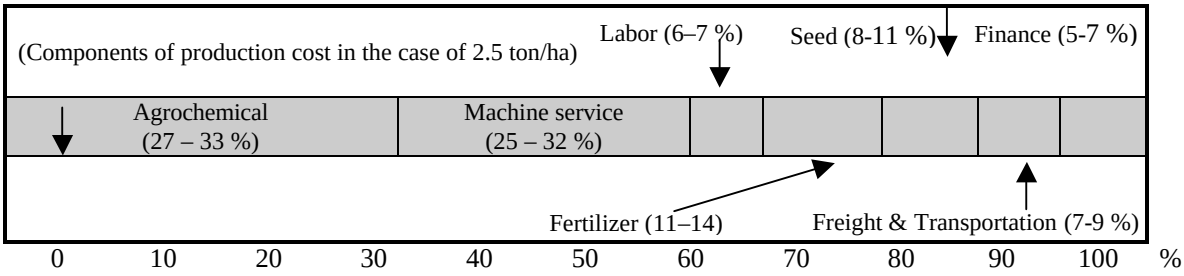
a) Curtailing production costs

i) Structure of soybean production costs

Nearly 70 % of soybean production in the major production areas of the east and the south zone utilize direct sowing. One of the major advantages of direct sowing, as opposed to non-direct sowing, is low production cost. According to the survey on the production costs of nine cooperatives[6] and CAPECO[7] in the grain producing departments of Alto Parana and Itapua, the average production cost per hectare of direct sowing (in the case of a 2.5 ton yield) was US$270. According to MAG, the production cost of non-direct sowing was about US$330; and the production costs of direct sowing was about 18 % less.

The structure of soybean production costs based on the field survey findings, of which 65 % is comprised of pesticides and farming machinery, is shown in Figure 12. Lowered production costs are dependent on curtailing these costs. In addition, these costs are directly related to the management of soybean producing farms and therefore, affect revenue.

Figure 12 Structure of Soybean Production Cost in Direct Sowing



Sources: Prepared, base on informations of following instituion and cooperatives;

[6] Average production cost of soybeans is calculated by field survey of following nine cooperatives such as; CooperativaYguazu, Cooperativa Colonias Unidas, Cooperativa La Paz, Cooperativa Unicoop, Cooperativa Raul Peña, Cooperativa Apere'a, Cooperativa Coipan, Cooperativa Hechapyra, Cooperativa Jakuy.

[7] CAPECO is "Chamber of Paraguayan Cereals and Oleaginous", consists by soybean's producers, exporters and agricultural cooperatives.

(1)Situación del sector de cereales y oleaginosas, CAPECO、1999
(2)Production costs of CooperativaYguazú, Cooperativa Colonias Unidas, Cooperativa La Paz, Cooperativa Unicoop, Cooperativa Raul Peña, Cooperativa Apere'a, Cooperativa Coipan, Cooperativa Hechapyra, Cooperativa Jakuy

ii) Increased pesticide costs and reduced machinery costs in direct sowing

CETAPAR (JICA) has been the leading agency in Paraguay which has promoted research in direct sowing and its dissemination since the beginning of the 1980s. Based on the CETAPAR study findings on the production costs of direct and non-direct sowing, a comparison of each cultivation method is given in Table 6 below.

Table 6 Comparison of Soybean Production Costs according to Cultivation Method

unit: US$/ha

	plow + harrow	sub-soiler + harrow	heavy harrow + harrow	harrow	direct sowing
Seeds	25.5	25.5	25.5	25.5	25.5
Fertilizers	52.4	52.4	52.4	52.4	52.4
Herbicides	62.2	62.2	62.2	62.2	73.3
Seed coating materials	2.7	2.7	2.7	2.7	2.7
Insecticides	10.6	10.6	10.6	10.6	10.6
Fuels	19.3	22.2	17.7	12.7	8.9
Machines repair	11.7	11.6	11.8	10.5	8.7
Agricultural materials	30.3	31.3	29.7	25.4	21.1
Wages	11.2	12.2	10.4	7.6	5.1
Weeding by hand	32.7	32.7	32.7	32.7	16.4
Depreciation of machine	44.8	44.2	44.8	40.4	35.2
Total	303.4	308.0	300.1	283.5	259.8

Source: CETAPAR, 1998

In direct sowing, the costs of farm machinery used in soil preparation and manual labor for weeding are 20 and 10 %, respectively, and they are low in comparison to costs incurred in non-direct sowing. These are the major cost differences between direct and non-direct sowing. However, weeding is completely dependent on the use of weed killers in the case of direct sowing and as a result, herbicide costs contribute to a 12 % increase. Herbicide application is dependent on farm machinery and reducing the use of herbicides is one means of curtailing farm machinery costs.

The cost of seeds and fertilizers comprises approximately 25 % of the overall production cost and the cost disparity between direct and non-direct sowing is minimal. However, the planting density per hectare for the past three years has risen by an annual ratio of 15 % and the demand for soybean seeds has increased. The sensitivity in terms of planting density is low for soybeans. Since the effect on yield increase is known to be minimal, priority is given to removing weeds.

iii) Cost disparities stemming from the scope of farm management operations

In addition to the disparities in soybean production costs between direct sowing and non-direct

sowing, there is a great disparity among farms of differing scope. Presently, soybean production costs (in the case of 2.5 ton yield/ha) is US$220 for the Cooperativa Yguazu Agricola (hereinafter referred to as Yguazu Cooperative), where the average cropping area is 350ha per household, and US$303 for the Cooperativa La Paz Agricola Limitada (hereinafter referred to as La Paz Cooperative); and the range of production costs vary greatly. The production costs of the Cooperativa Colonias Unidas Agropec. Ind. Ltda. (hereinafter referred to as Colonias Unidas Cooperative), which has an average cropping area of 250ha, is in the mid-range at US$284. The existence of such cost disparities is largely due to the difference in scale merit where the cost of pesticides, fertilizers, farming machinery, etc. has been curtailed. Table 7 shows a comparison of soybean production costs between USA, the largest soybean producing country, and Brazil and the Paraguayan producers of different sized farming operations.

Table 7 Comparison of Soybean Production Costs

(for 2.5 tons/ha)

	Paraguay									
	Cooperativa. Yguazú		Cooperativa Col. Unidas		Cooperativa La Paz		USA		Brazil	
	US$	%	US$	%	US$	%	US$	%	US$	%
Machinery	69	31	106	37	100	33	113	28	119	30
Chemicals	65	29	93	32	101	33	77	19	90	23
Seeds	20	8	23	8	24	8	113	28	36	9
Fertilizer	28	13	33	11	35	12	41	10	79	20
Labor	28	13	15	6	22	7	48	12	49	12
Transport	8	4	14	5	8	3	13	3	25	6
Others (interest, etc.)	5	2	3	1	13	4	—	—	—	—
Total	220	100	284	100	303	100	405	100	398	100

Sources: (1) Cooperativa Yguazú, Colonias Unidas, La Paz Agricola Ltda,1999
(2) USDA Estimates for 1999 Crops
(3) Anuario da Agricultura Brasileira, AGRIANUAL, 1999

The production cost of the largest soybean producer in Paraguay, La Paz Cooperative, is 22 % lower than the production cost in Brazil. The production costs for both the USA and Brazil is the average costs stemming from non-direct sowing. As a result, a comparison of these production costs with those of Paraguay, which stem from direct sowing, may be problematic. However, the production cost of non-direct sowing in Paraguay, as explained earlier, is US$330 which is still 15 % lower.

In USA, the ratio of seed cost is 28 % of the production cost structure, which is extremely high in comparison to Paraguay and Brazil. The widespread use of GMO seeds (50% in 1999) has contributed to the high seed cost; and their use has also reduced herbicide costs (pesticide cost) which accounts for their popularity.

iv) Positive results of the crop rotation system

Paraguay has become self-sufficient in wheat cultivation for the past eight years. Wheat and soybean cultivation is dependent on a two-crop system since they are off-season crops. The crop rotation system is also recommended for corn in terms of maintaining soil fertility and farmland conservation. The continuous practice of crop rotation has reduced fertilizer and pesticide costs over medium and long-term periods in trial research activities conducted by CETAPAR and CRIA. An exemplary case is the Yguazu Cooperative, which has consistently adhered to the crop rotation system in soybean and wheat production; and it should be noted that the cooperative has reduced its production costs due to the multiplied effect of scale merit and crop rotation.

v) Soybean production in the USA and Brazil during a surplus supply in the international market

The international market price for soybeans is often linked to the domestic market price for soybeans in USA. The price of soybeans in USA in 1998/1999 was US$4.3 per bushel, the lowest price ever recorded. The drop in market price signifies an abundant surplus volume. Although this price was nearly half of the maximum price recorded in 1995 and 1996, soybean cropping rose 1 % in 1999/2000 and a 4 % increase in production volume is estimated.

The underlying cause for the increased production, despite declining market prices, is the reformed basic agriculture law of USA, which has allowed liberalized cropping. Farms with efficient, low production costs are believed to have expanded their production activities, despite the stagnant market price. These farms, with an average cultivated land area of 1,000 ha per farm, have actively introduced GMO seeds and implemented scale merit. In the case of Brazil, it is surmised that improved productivity utilizing scale merit has been actively implemented to the same degree as in the United States due to the large areas of undeveloped land, although the use of GMO seeds has been cautiously pursued.

In a comparison of production costs according to country, as shown in Table 7, the average production costs of USA and Brazil are higher than Paraguay. However, as mentioned earlier, a segment of the farms have achieved efficient soybean production through the use of scale merit. In Paraguay, where the area of cultivated land has reached its limit, the adoption of comprehensive direct sowing and crop rotation is an essential factor to Paraguay's competitiveness.

vi) High ratio of harvest loss

Although directly unrelated to production costs, harvest loss can not be overlooked in the cost of improved soybean yields. The harvest loss ratio per hectare of the four major soybean producing departments (with a total production volume of 90 %) of Alto Parana, Itapua, Canindeyu, and Caaguazu, averaged 8.2 %, with the exception of Canindeyu department which recorded a maximum loss of 10.2 %. One of the major causes is depreciated combines and other farming

equipment. CAPECO has pointed out the need to renew their equipment every five to six years in order to alleviate harvest loss. Therefore, it is essential to review countermeasures such as reduced taxes (export tariffs, consumption tax) on farming equipment purchases, as well as a system of financial assistance.

b) Internalized distribution margins (shipping costs)

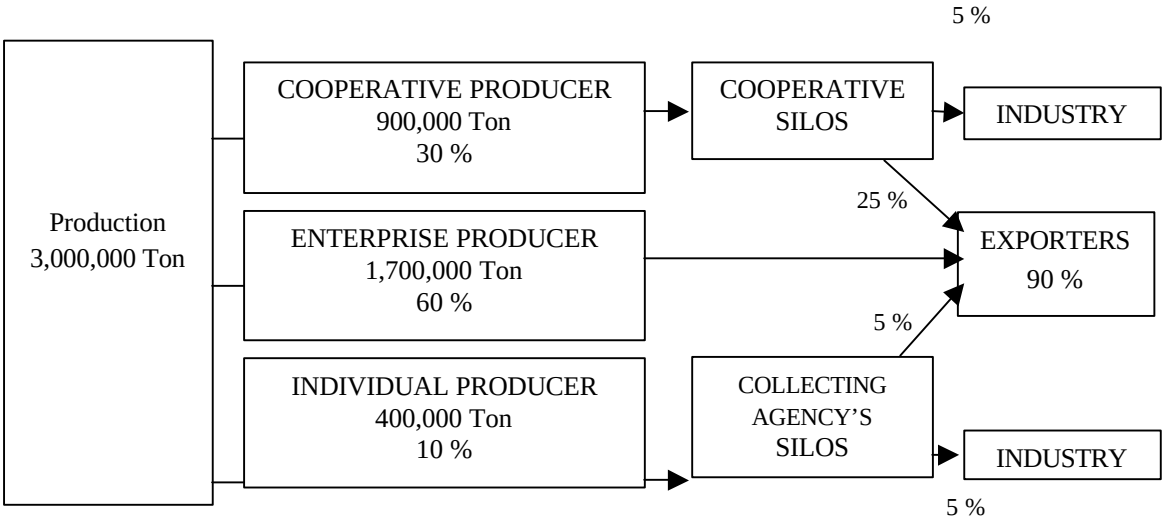
In order for soybean producers to achieve stable operations, they must also actively pursue improvements in distribution as well as in production. Presently, distribution costs for soybeans include transport fees (farm→silo→port), cooperative handling fees, silo storage fees, and others. Although there are some differences in handling fees and transport distance, the overall cost to deliver one ton of soybeans from the farm to the port is shown as follows. In addition, export handling fees, export tariffs, insurance, etc. total approximately US$25 and an extra US$50 is added as shipping cost.

farm → silo: US$ 6, silo storage fee (one month): US$ 5 to 7
silo → port: US$14, total: US$ form 25 to 27

The data shown in Figure 13 on shipping routes and ratios according to producer was obtained from interview surveys at CAPECO and the Yugazu Cooperative and Colonias Unidas Cooperative, which are mainly involved in soybean production and processing. The following conclusions have been deduced from this figure.

i) The shipping costs of producers belonging to agricultural cooperatives that produce 30 % of the production volume have risen due to the added transport cost from silo to port.
ii) Multinational firms, which possess silos and processing factories near the port, have reduced their shipping costs through internalization.

Figure 13 Distribution Ratio according to Soybean Producer



Source: Formulated, based on interviewed from the CAPECO and FECOPROD, 1999

Presently, agricultural cooperatives have been able to provide farm machinery, pesticides, fertilizers, and seeds at low prices to their producers due to joint purchasing and retail activities, which have been reflected in their production costs. If they utilize their own silos and processing factories in future, it will enable them to internalize their shipping costs. Such measures will improve their distribution margins and enable them to make adjustments in their export activities based on market information, which will in turn, prove advantageous in their marketing activities. However, in conjunction with such measures, preferred measures in financing and taxation are needed since business risks will increase in conjunction with investment in facilities.

c) Improved quality

The ultimate factor that will determine the competitive viability of Paraguay's soybeans is quality. The findings of a CETAPAR analysis on soybean composition has reported that beef cattle increased their weight to 60kg, 67kg, and 90 kg in a three-month period, resulting in improved meat quality when fed soybean husk as mixed feed in combination with hay in 10, 30, and 50 % ratios. This is indicative of high quality soybeans as a mixed feed. However, as mentioned earlier, direct sowing has contributed to a rise in production costs due to increased herbicide costs. As shown in Table 8, the use of GMO seeds has risen since 1998 and presently, they are used in more than 27 percent of cropping activities. The greatest advantage to using GMO seeds is decreased pesticide costs and improved productivity. However, its safety as a food product is presently widely debated in the EU and USA.

Table 8 Present Situation of GMO Soybean in USA

	1966	1997	1998	1999
1)Production (million ton)	64.8	73.2	75.0	-
2)Export (million ton)	7.5	7.5	23.3	-
3)Ratio of GMO cultivated area	-	15%	27%	* 50%
4) 1)x3) (million ton)	-	11.0	20.3	-
5) 2)x3) (million ton)	-	1.1	6.3	-

*Estimated
Source: U.S. Agricultural Outlook, USDA, 1999

In order to promote differences in quality between GMO soybeans produced in the United States and Argentina, Paraguay should continue to cultivate non-GMO soybeans. However, the use of increased pesticides produces the potential problem of pesticide residue. The pesticide residue issue has been included in the WTO agricultural negotiations by USA and food safety standards will be announced in 2003 by CODEX.

In view of these circumstances, quality improvement policies in Paraguay should prioritize soybean seed breeding activities. A combined theme, which includes crop rotation and easy cultivation of corn and wheat and development of weed-resistant varieties, should also be included, in addition to breeding activities, which leads to improved yields. Pursuing these elements are expected to reduce labor and machinery costs, as well as to improve yield and quality.

(6) Livestock -diversified agricultural products through new livestock production-

1) Livestock policy

The livestock sector is a major industry, which comprises 7.5 % of the GDP and about 25 % of the total production earnings of the agricultural sector (BCP, average in 1990-1998). As explained in section 1.1.1 (3), one of the major reasons for the drop in Paraguay's overall export growth rate is the lowered competitive viability of beef from the early 1990s. As a result, livestock policies have prioritized measures to eradicate the foot-and-mouth disease, which has restricted beef exports; and in 1997, Paraguay was approved as a free zone due to a vaccination program against this disease given by an international organization. Paraguay resumed its export activities to the international market and the total export volume of beef cattle in 1998 was 27,000 head, up 10 % from the previous year.

These accomplishments are due to the participation of producer organizations such as the Paraguay Rural Association (Asociacion Rural del Paraguay) and the formation of an animal hygiene committee, which carried out comprehensive livestock disease prevention measures. Presently, livestock policies have prioritized efforts to eradicate poultry and pig diseases based on

the successful eradication program of the foot-and-mouth disease.

2) Promising unconventional livestock production

The transitions in the number of livestock animals are shown in Table 9. The livestock industry in Paraguay is mainly centered on beef cattle production by large-scale farms with a land area greater than 200ha. If the quality of the meat improves with Paraguay's recognition as a free zone area for foot-and-mouth disease, the strengthened competitiveness of Paraguay beef in the export market is expected. In addition to the traditional production of beef cattle, the newer forms of livestock production, poultry and pigs, have enabled small to medium-scale farms to enter the meat production industry, in conjunction with a policy to improve sanitary conditions. It is estimated that the reason why the poultry in 1991 decreases compared with previous years depends on the influence of the New Castle diseases.

Table 9 Trends in Number of Livestock Animals

unit: 1,000 head

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Cow	8,254	8,740	8,966	9,861	9,779	9,788	9,764	9,793	9,104
Poultry	17,000	11,000	11,973	11,681	13,253	13,253	14,016	14,835	14,997
Pig	2,444	1,004	1,122	1,262	1,420	1,420	1,724	1,788	1,746

Source: Producción Agropecuario, 1994/95, 1996/97, 1998/99, Direccion de Censos y Estadisticas Agropecuarias, MAG

a) Consumer trends in new livestock products

The annual per capita consumption volume of beef, chicken and pork according to MAG statistics (Estadistica Ganadera, MAG, 1998) is estimated at 45kg, 17kg and 27kg, respectively. Table 10 shows the consumption trends in chicken and pork for the total domestic population based on these figures. The per capita consumption volume of chicken in the United States, Canada, and Spain is 32kg, 23kg, and 20kg, respectively; and the per capita consumption volume in Paraguay is expected to rise in future.

Table 10 Demand for Beef, Poultry and Pork

unit: 1,000 kg

	1993	1994	1995	1996	1997	1998	1999	＊2003
Beef	192,750	201,118	210,156	211,267	217,817	224,769	231,530	261,603
Chicken	72,802	74,556	76,366	79,812	80,660	84,192	86,882	98,076
Pork	98,065	110,000	115,008	126,760	130,690	134,741	138,918	156,962

Note: Estimates for 2003 were based on the predicted population index
Sources: (1)Boletin de la Dirección de Comercialización, MAG, 1998
(2)Datos de FAOSAT del Cuadro No.10, 1999

b) Buying price and supply conditions

The poultry processing industry is comprised of processing companies that are located mainly in the suburbs of Asuncion, but the two most well-known brands, Pechugon and K-ZERO, are produced by Granja avicola La Granja Company and POLPAR Company, respectively, which produce 85 % of poultry meat in Paraguay. POLPAR has the capacity to process 40,000 birds per day, but due to the shortage of raw materials, the plant is currently operating at 10 % capacity.

The largest pork processing company, OSCI, is located in the suburbs of Asuncion, but with the increased demand in pork, STUDENKO recently entered the industry in the Encarnacion region. OSCI produces 80 % of the pork in Paraguay, whereas STUDENKO's annual production volume has grown from 546,000kg in 1997 to 780,000kg in 1998, increasing their monthly processing capacity from 315 head/month to 580 head/month.

In the processed meat industry, the buying price of poultry was set at 1,950G/kg and 2,500G/kg for pig (as of November 1999). Table 11 below shows the domestic average retail price of beef during the first half of the year according to month; and the average price of beef was 1,800G per kg. In a comparison of the price of chicken and pork with beef, it was found that it was the same or even higher for chicken and pork.

Table 11 Commercial Price of Beef

(Jan. - May, 1999)

	Average Weight (G/kg)	Average Price (G/kg)
January	384	2,087
February	384	1,884
March	388	1,804
April	395	1,772
May	472	1,541
Total average	404	1,800

Source: Subsecetaría de Estado de Ganaderia, MAG,1999

3) Production issues of new livestock products

As mentioned above, the demand for new livestock products is anticipated to grow and the following characteristics have been noted. i) Both chicken and pork have a high turnover rate which makes processing possible, ii) Labor is available uniformly throughout the year and recruiting full-time labor is easy, iii) Meat processing does not require large areas of land, iv) Corn, soybeans, wheat, and other grains can be used as mixed feed, enabling combined operations of crop and livestock production to be carried out.

However, the management efficiency index of livestock is a 50 % birth rate for beef cattle, 12 %

shipping ratio (herd shipping ratio), 50 % weight rate of dressed carcass to livestock, shipping age of cattle, 4 years, 350-400kg shipping weight, and breeding age 3 years. The milk production volume of dairy cows is 3.5L/day. However, the amount of milking of the commercial farms are produced 15 L/day (it is estimated 4,500 L/year). This low management efficiency rate largely appears to be affected by the amount of feed that is given. With the exception of large-scale beef production farms in Guaira and Central departments, the feed supply ratio is greater than 100 %.

In contrast, the estimated balance in the supply and demand of dairy and beef cattle feed of small-scale farms is lower than 100 %, averaging 67 % for all departments, with the exception of Alto Parana Canindeyu, and Amambay departments. Since the majority of the small-scale farms does not use concentrated feed, beef cattle are raised in an extremely inferior environment. This is true for other livestock animals such as poultry and pig as well. The following issues pertaining to feed production have been pointed out in the small-scale farm project implemented by JICA in 1997 (Estudio de plan Maestro para el Programa Grobal de Cooperacion al Pequeno Productor in la Region Occidental).

a) The land area for forage crops and improved pasturage is about 15 % of the feed production base.
b) There is a shortage of absolute volume, which is the cause of low nutritive value and productivity.
c) There is lowered productivity in the winter season since tropical and subtropical pasturage is the main forage crop. This has produced a seasonal imbalance in feed production.

A stable supply of mixed feed is essential to expanding production that reflects the characteristics of new livestock products as explained above.

Box-1: Case Example of New Livestock Production Activities in a Grain Producing Area

-Itapua Department; Combined regional management of livestock and mixed feed production by the La Paz Cooperative-

■ Regional agricultural conditions

Itapua department has developed as the nation's focal soybean production area due the national grain production plan that was started in the 19870s. Agricultural development in soybean production progressed with the influx of a growing number of German, Japanese, and Brazilian immigrants. Itapua department accounts for 28 %, 22 %, 23 %, and 22 %, of the gross domestic production of the soybeans, corn, wheat, and sorghum, respectively (1998).

However, the cooperative farms with an average cropping area of 90ha near the vicinity of the cooperative have been unable to expand their farmland in conjunction with reduced forest areas; and their profitability has markedly dropped due to rising production costs stemming mainly from farm machinery costs. Farm management has been sustained due to expanded operations centered on soybean production stemming from scale merit. However, this has become difficult.

Due to these conditions, new farming activities centered on raising pig and poultry have been pursued while carrying out mixed feed production, which has become possible due to abundant grain production.

■ Production plan

Objective

1) Improve production through a system of crop rotation for soybeans, wheat, and corn.
2) Sustain soil fertility and improve productivity by securing and using livestock manure.
3) Diversify farm management by introducing livestock.

Content

1) Sign a contract with the POLPAR poultry company in Itapua department and raise poultry (chicken meat) for 45 days and ship 100,000 to 110,000 birds per month
2) Sell piglets to swine raising farms in Itapua department. Raise piglets for 65 days until they average 25kg. Ship 600 piglets per month.
3) Intensive rearing of beef cattle. Produce calves. Raise 100 cows and three bulls. Produce 85 calves in one year.
4) Produce and sell mixed feed.
   Produce 8,500 tons of mixed feed per year by purchasing grains independently or from neighboring farms.

■ Significance and spread of new livestock production activities in a grain producing area

The La Paz Cooperative, which owes its development mainly on soybean production, has targeted combined farming operations in the past due to the unstable international market for soybeans and the limitations to expanding the scope of their soybean production. Incorporating poultry and pig production has diversified and stabilized the management base of the cooperative and its members and the following impact is expected.

- Strengthened competitiveness in the market for the chicken and pork industry in the region
- Introduction of model, small-scale livestock production
- Assistance for small-scale farms due to the purchase of formula feed using corn, sorghum, etc. by small-scale farmers dispersed throughout the region
- Mobilization of regional farming due to combined farming operations and effective use of regional resources

Box-2: Case Example of Overcoming Factors Impeding Exportation by Improving the Meat Inspection System

-Case example of promoting livestock exports through technical assistance-

■ **Content of the technical assistance**

As pointed out earlier in section 1.1.3, the zero growth rate of livestock products has lowered the export growth rate of all agricultural products in Paraguay since the country's advent into MERCOSUR. The cause has been attributed to a lowered export volume due to the foot-and-mouth disease explained earlier and to USA, the largest importing nation, that restricted its import of beef from Paraguay due to its lack of an adequate meat inspection system.

As a result, the Paraguay government implemented a project to analyze substances harmful to meat with technical assistance from the Japanese government (JICA) from 1990 to 1992; and an independent inspection system for exported meat was established. A post-evaluation of the project was jointly carried out by the Paraguayan and Japanese governments in 1996 and the following benefits have been reported.

■ **Impact of the project**

1) Export of Paraguay's meat products to both USA and EC countries, which had been restricted due to an inadequate inspection system for exported meat products was resumed in 1995. As a result, the number of countries that was targeted for export rose from 21 in 1991 to 40 in 1995.
   This has contributed to diversification in countries targeted for export and it has stabilized the meat export industry.

2) The project has contributed to improving meat freshness and quality and it has greatly reduced the meat inspection period since it has enabled this activity, which had hitherto carried out in Argentina, to be conducted in Paraguay.

■ Issues to be addressed

In addition to the benefits derived above, the following issues have also been pinpointed.

1) The meat inspection system, which currently targets only beef, is inadequate in meeting the rising demand in new livestock products such as pork and chicken.

2) The inspection standards of each country as well as the inspection items have become more complex and highly technical since Paraguay's advent into MERCOSUR and the creation of the EU. As a result, improvements to the system have lagged.

In view of the benefits derived from the technical assistance program to improve the meat inspection system, it is vital that Paraguay's agricultural export products are diversified to include new livestock products, in addition to beef.

1.1.5 Development by farmers' organizations and agricultural cooperatives

(1) General description

As explained in section 1.1.4, agricultural cooperatives (hereinafter referred to as cooperatives), which support farmers in processing and retailing their crops, exist in regions with marked agricultural development. The cooperatives provide fertilizers, pesticides, and other farming materials as well as financial assistance for farm management from their credit business. The technical staff members of the larger cooperatives conduct soil analyses and provide supervision in

cultivation management with the aim of improving quality and production volume. Many of the leading production regions have cooperatives that are actively engaged in the area and conversely, regions with a low level of farm management have cooperatives with a low level of activity. Based on the findings of the field survey study on the activities of agricultural cooperatives, the issue of agricultural development focused on cooperatives has been examined.

(2) Farmer organizations

1) Scope of farms and potential farmer population

A characteristic of agriculture in Paraguay, as shown in the table 12, is that 1.7 % of the farming households are large farms (more than 200 ha of farmland) that own 72 % of the cultivated land area, whereas 82 % of the farming households, which are comprised of small-scale farms, own a mere 12.8 % of the cultivated land area. In particular, a high 31 % of the small-farms are comprised of 1 to 5 ha of land. In addition, 81 % of the potential farm worker population is found on small-scale farms. A large issue confronting the agricultural sector is how this population or source of agricultural economic activity can be absorbed.

Table 12 Farm Scale and its Owned Land Area in Eastern Region

Farm scale		Number of farms		Owned land	Labor force		
		Numbers	(%)	area ratio (%)	Population	(%)	Per farm
Landless		7,610	2.5	-	25,069	2.1	3.3
Small scale	1 ha >	21,872	7.3	0.1	-	-	-
	1–5 ha	92,392	30.7	1.9	-	-	-
	5-10 ha	66,364	22.1	3.8	-	-	-
	10-20 ha	65,932	21.9	7.0	-	-	-
Subtotal		246,560	82.0	12.8	894,771	81.0	3.6
Middle scale	(20-200 ha)	41,485	13.8	15.4	172,300	15.6	4.2
Large farm	(> 200 ha)	4,868	1.7	71.8	12,730	1.2	2.6
Total		300,523	100.0	100.0	1,104,870	100.0	3.7

Note: Labor force is more than 10 years old
Source: Censo Agropecuario Nacional, MAG, 1991

Irrespective of the scope of the farm, the average number of farm workers per farm is three to four people. Moreover, it has become difficult for farms of all scopes to engage in agricultural cultivation dependent only on family labor without the use of hired labor and farming machinery such as tractors.

2) Use of agricultural land

Excluding small-scale farms of less than 1 ha of land, generally farms in Paraguay are engaged in multiple farming i.e. crop cultivation with cattle raising, irrespective of their size (Table 13). As the scope of the farm increases, there is a high ratio of farms engaged in multiple farming with a

large share dedicated to cattle rising.

Table 13 Average Land Ownership Area by Farm Scale

unit：ha

Farm scale	Area	Crops			Livestock			Fallow (a)		Forest & others (b)		a)+(b)
	(ha)	Total	Annual	Perennial	Total	* G.R	Natural	ha	%	ha	%	%
0-1 ha	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	50.0	50.0
1-5 ha	2.4	1.7	1.6	0.1	0.2	0.0	0.1	0.2	8.3	0.4	16.7	25.0
5-10 ha	6.5	3.6	3.4	0.2	0.8	0.3	0.5	0.8	12.3	1.2	18.5	30.8
10-20 ha	12.2	5.1	4.8	0.3	2.3	0.8	1.5	1.7	13.9	3.0	24.6	38.5
Small-scale	5.9	3.0	2.8	0.2	0.9	0.3	0.6	0.7	11.9	1.3	22.0	33.9
Middle-scale	42.4	12.9	12.2	0.7	16.8	4.8	12.0	3.8	9.0	8.9	21.0	30.0
Large-scale	1,686.0	71.1	68.1	3.1	1,098.6	245.3	853.3	31.5	1.9	484.8	28.8	30.6
Per farm	39.0	5.5	5.2	0.3	21.4	5.0	16.4	1.7	4.4	10.4	26.7	31.0

Note: G.R means grassland reclamation
Source: Censo Agropecuario Nacional, 1991

Excluding the small-scale farms, about 10 % of the land of medium and large farms is fallow land and 20 to 30 % is forests, which are not used for agricultural activities. The remaining land area is fully cultivated with very little fallow land, due to labor shortages and the need to generate revenue.

3) Farm management

As shown in Table 14, the small-scale farms, mainly engaged in crop cultivation, produce peanuts, the poroto (field beans), cabbage, cotton, corn, 70 to 80 % of sugar cane, more than 60 % of all vegetables, 70 % of tomatoes, melons, 90 % of strawberries, 6 % of mate tea (perennial crop), and 50 to 70 % of all perennial crops. The large-scale farms cultivate soybeans, wheat, corn, and sugar cane.

Table 14 Main Crops Cultivated by Small-scale Farms and its Ratio

Crops	Cultivated area		Ratio
	Total farms	Small scale farms	Small scale farms /total farms
	(ha)	(ha)	(%)
Annual crops			
Soybean	552,456	51,164	9.3
Cotton	403,850	293,650	72.7
Corn	242,544	142,854	58.9
Cassava	175,389	132,659	75.6
Wheat	153,581	2,957	1.9
Sugar cane	54,065	28,031	51.8
Poroto (Field beans)	46,664	35,206	75.4
Peanut	15,249	11,813	77.5
Vegetables			
Water melon	9,165	6,575	71.7
Melon	3,518	2,422	68.8
Pumpkin	2,610	1,732	66.4
Green peas	1,666	1,068	64.1
Onion	1,426	1,046	73.4
Strawberry	175	158	90.3
Permanent crops			
Mate	26,514	6,955	26.2
Bitter orange	10,336	7,567	73.2
Orange	10,333	6,078	58.8
Banana	8,839	5,651	63.9
Mandarin orange	3,184	1,832	57.5
Pineapple	2,706	1,710	63.2
Grape fruits	902	483	53.5
Lemon	604	278	46.0

Source: Censo Agropecuario Nacional, 1991

In other words, the small-scale farms cultivate crops that are consumed on a daily basis, in addition to large value-added vegetables for retail due to intensive labor. In contrast, the large-scale farms cultivate crops that benefit from scale merit due to mechanized farming.

4) Cropping system

Plough

As shown in Table 15 the majority of the farming implements used in Paraguay are expensive, large machinery used to cultivate a land area exceeding 100 ha. As a result, the ratio of implements owned by small-scale farms is 0.6 % and 3 % for leased machinery. These figures appear to reflect the system of farm management of small-scale farms engaged mainly in crop cultivation.

Table 15 Plough Situation by Farm Scale (ratio to each farm scale, %)

Farm scale	Plough by cattle			Tractor		
	Own	Leased	Total	Own	Leased	Total
0-1 ha	4.0	9.4	13.4	0.1	0.2	0.3
1-5 ha	20.4	22.1	42.5	0.2	1.5	1.6
5-10 ha	39.6	13.6	53.2	0.5	3.3	3.8
10-20 ha	46.8	7.6	54.4	1.4	4.8	6.1
Small scale	31.2	14.8	46.0	0.6	2.7	3.3
Middle scale	53.1	3.6	56.7	14.8	7.1	21.9
Large scale	28.1	0.9	28.9	45.5	2.5	48.0

Source: Censo Agropecuario Nacional, 1991

In contrast, the ratio of small-scale farms that own drought animals for plough is 30 % and the ratio of leased animals is 15 %. About one-half of the small-scale farms engaged in field husbandry on 1 ha to 5 ha of land are dependent on manual labor. Manually operated farming equipment are the machete (machete that is used in weeding, planting, and for a variety of uses) and the azadon (hoe), and manual sprayer.

Seed

As shown in Table 16, the use of superior seeds by small and medium-scale farms is higher than large-scale farms, which are predominantly engaged in livestock rearing. Those farms engaged in cultivating cotton use the seeds recommended by MAG and vegetable seeds imported from USA. Cabbage, poroto (field beans), and other traditional crops are grown using home raised seeds and fruits are grown from indigenous seedlings. Recently, strawberry cultivation by small-scale farms has increased and virus free seedlings are being disseminated by technical DEAG and NGO extension workers.

Table 16 Agricultural Materials Input Situation by Farm Scale

(ratio to each farm scale, %)

Farm scale	Agricultural materials		
	Superior seeds	Chemical fertilizer	Agricultural chemicals
0-1 ha	6.3	3.6	6.9
1-5 ha	46.0	21.0	56.2
5-10 ha	61.2	30.5	77.1
10-20 ha	63.0	31.2	79.0
Small scale	51.1	24.8	63.6
Middle scale	60.9	37.2	72.9
Large scale	40.2	28.7	38.3

Source: Censo Agropecuario Nacional, 1991

Fertilizers/agricultural chemicals

Fertilizers and agricultural chemicals are used only in the cultivation of cash crops such as cotton and compost is used for growing vegetables and crops for home consumption.

5) Distribution of farm products

According to the 1991 census of the agriculture and livestock industry, 88 % of the farms sell their agricultural products to traders, 6.7 % sell their products through cooperatives and 5.3 % are engaged in direct retail activities. The large ratio of small-scale farms that sell their products to traders signifies the lack of farmer organizations and transport vehicles. Additionally, small-scale farms do not have access to market information and they are forced to accept the traders' purchase price and delivery period.

(3) Current conditions in cooperative activities

Farmer organizations in Paraguay began in 1942 with the official enactment of the Cooperative Association Law. In 1972 a law to establish cooperatives was enacted in order to build the foundations for sound agricultural development by recognizing the activities of multi-purpose agricultural cooperative associations engaged in activities such as production, sales, purchase, mutual insurance, and the import and export of farm produce.

A segment of the law to establish cooperative associations was revised in 1994 (Law 438/94) and the auditing, advisory management committee and the educational section were strengthened; and regional committees were made responsible for promoting regional agriculture through educational supervision. Based on this law, the government placed the INCOOP in charge and with the cooperation of the DEAG and CAH, measures have been pursued to organize small-scale farms. The INCOOP will be in charge of auditing the agricultural production, the livelihood, and the credit cooperative associations.

The number of cooperatives and members increased during the seven-year period of 1989 to 1995, and particularly notable was the rise in the number of financial and credit cooperatives. As shown at Table 17, the agricultural cooperatives increased from 84 to 220, a growth of 2.6 times. A major factor in the rapid rise in the number of agricultural cooperatives is the ease with which they can be established. According to the current law on cooperatives, a cooperative can be created with 20 or more members, a registration fee of Gs 5,000 to 10,000 (about US$ 5), and subscription fees and contributed capital of US$200 (INCOOP, 1998). Some of the benefits derived from a cooperative are tax exemptions when purchasing fertilizer, pesticides, farming equipment and increased opportunities to receive financial assistance from financial institutions.

However, this system has encouraged farmers to establish cooperatives simply for the purpose of taking advantage of these benefits without setting up a proper management plan or hiring personnel to run the association; and due to the misuse of the tax exemption benefit, this advantage

has been eliminated at present. As a result, it has become difficult to sustain the purchasing, retail, credit, and other economic activities of the cooperatives.

The FDC (Development Found for Farmers) has leased farming equipment to agricultural cooperatives with stable management operations, under a five-year payment plan with a 20 % interest rate and a two-year term of deferment (the interest rate is 30 to 35 % for ordinary banks). As a result, the weaker cooperatives are facing economic difficulties due to their dependence on loans from financial institutions and their payment has been in arrears. The number of members at financial and credit cooperatives or service cooperatives has been rising, but the number of members at agricultural production cooperatives has only slightly increased; and the number has decreased at consumption and retail cooperatives.

Table 17 Changes in Number of Cooperatives and its Partners

Type of cooperative	1989			1995			1995/1989		
	Coop.	Partner	Partner/ Coop.	Coop.	Partner	Partner/ Coop.	Coop.	Partner	Partner/ Coop.
Agriculture	84	23,059	275	220	63,991	291	2.6	2.8	1.1
Finance & Credit	51	43,042	844	160	175,000	1,094	3.1	4.1	1.3
Consumer & sale	13	13,089	1,007	46	16,171	352	3.5	1.2	0.3
Services	10	869	87	41	4,707	115	4.1	5.4	1.3
Large multi-purpose	3	75	25	12	153	13	4.0	2.0	0.5
Total	161	80,134	498	479	260,022	543	3.0	3.2	1.1

Source: INCOOP, 1995

There is a high demand for cooperatives engaged in financial and credit activities, but due to the weak organizational strength of cooperatives involved in improving agricultural productivity and conducting retail activities of harvested crops, they have been greatly affected by the success or failure of the latter activity. Cooperatives, which have been unsuccessful at securing customers, have stagnated and there has been an exodus of members.

Table 18 shows the joining ratio to agricultural producer group by farm scale. The ratio of farms that have joined cooperatives, including farm and livestock production associations is 11.6 % in the case of small-scale farms and as the scope of farm management, including small-scale farms, increases, this ratio tends to rise as well. However, the ratio of large-scale farms is only 32 %. Although organizing small-scale farms is an effective means of helping such farms to become self-sustaining, the endeavor has come to a standstill for the very small farms.

Table 18 Joining Ratio to Agricultural Producer Group by Farm Scale

Farm scale	Joining ratio (%)
< 5 ha	6.8
5-10 ha	13.6
10-20 ha	17.7
Small scale	11.6
Middle scale	23.2
Large scale	32.1

Source: Censo Agropecuario Nacional, 1991

(4) NGO and agricultural cooperative activities and its management

In order to clarify the contributions to farm management reforms by NGOs and agricultural cooperatives, the following case examples have been summarized below.

1) Case examples of NGOs

a) El Centro de Estudio y Formacion para el Desarrollo ALTER VIDA

The NGO was established in 1985 and began guidance activities in making handicrafts aimed at improving the lives of farmwomen. With financial assistance from Canada, the EC countries, and the ICCO of the Netherlands, it has engaged in setting up committees, vegetable cultivation and retail activities by small-scale farm groups, and other means of raising the living standards of the rural community. ALTER VIDA has gained the trust of the community by providing information on production, sales, etc. to all of its staff members. In addition, it has given product value to farm produce and introduced organic farming with the aim of cornering new buyers. Presently, it exports about 5,000 tons of sugar cane that was grown using farmyard compost, to the United States.

b) Consorcio Sur-Alfa

In 1997, MAG began a project to assist small-scale farms by utilizing UTP (Private Technical Unit), a private group of technical experts. UTP activities include securing buyers of farm products, creating committees to supervise cultivation techniques, and incorporation. They have aimed to improve the volume and quality of agricultural products to meet market demand and to raise their profit margins by selling directly to the market and circumventing traders. They have also incorporated in order to facilitate its application for farm management loans. Consorcio Sur-Alfa has approximately 1,400 members in the suburbs of Concepcion City and Belen and Horqueta districts.

The focus of the NGO activities is not to strengthen the organization by fostering supervisors, but to raise farmers' volition towards farm management by providing them with cultivation techniques and disseminating market and buyer information equally to all its members. The target of the NGO is to encourage self-reliance by enabling farmers to participate in the overall process, from production to retail activities.

2) Case examples of agricultural cooperative

a) Central open plains region (Central, Paraguari, Cordillera, Caaguazu, Guaira)

i) Cooperativa de Produccion, Agro-industria y de Servicios Coronel Oviedo Ltda.

1.Location and established	Coronel Oviedo, Caaguazú, 1971
2.Number of members	9,913 total member, of which 21% or 2,033 households are engaged in agricultural production (urban-rural cooperative).
3.Land area of members' farms	Nearly 90% are small-scale farmers and the average land area of the farms is 7 ha, of which 3.0 ha to 3.5 ha are utilized for cropping.
4.Major agricultural products	Cotton, tobacco, citrus fruits, bananas, sugar cane are the crops that have been traditionally grown, but cultivation of cotton and tobacco has declined and it has shifted to fruit trees and vegetables.
5.Major facilities	Milk gathering facility, facility for raising seedlings, school (400 students), clinic, drugstore, meeting room facility
6.Retail of agricultural products	About 90% of the fresh produce grown by the cooperative is consumed domestically and 5% is exported. There are plans to install storage and cold storage facilities (PAR-0084: MAG/BID). Retail of the produce is consigned to the Nikkei Central Association in ABASTO market in Asunción
7.Relative importance of agricultural production activities	- Originally developed as a credit cooperative, the cooperative is presently involved in utilizing hospitals and other social facilities, providing guidance in farming technology, produce marketing and other activities of a comprehensive cooperative association. Nearly 80 % of the cooperative profits stem from credit activities and 20 % from agricultural production. - The cooperative has agreed to participate in a JICA marketing project which has opened up new development possibilities in retail and group activities. In the past, the farmers accompanied their products to the market and participated in the retail activities. Presently, under the new system, members are responsible for sorting and packing the produce for transport, but the retail activities have become the responsibility the cooperative, thus allowing the farmers to concentrate on production activities. - A plan was implemented 5 years ago to divide the region according to the type of crops that are cultivated. For example, sugar cane is cultivated near refining factories and milk and dairy products are produced near urban areas.
8.Techinical instruction for small-scale farms	- Specialized groups according to the types of vegetable and livestock that are produced have been created and specialized production technology is provided to group members in order to improve quality and to compete effectively in the MERCOSUR market. Currently, 52 groups have been created and each group is comprised of 7 to 10 members as in the case of the committees explained above. - A farm of 3 to 4 ha was created, which is worked jointly by group members using shared, advanced production technology. In order to unify the group, members who absent themselves needlessly from the shared production work are excluded from the produce marketing activity of the cooperative.
9.Issues	There are an increasing number of members who are defaulting on their loans and the cooperative started a three-month collection plan for bad loans. It is also introducing jobs for its members. The farmers also sell their produce directly and the cooperative offers a 5 % reduction on the loan repayments of members who utilize the cooperative to market their produce.

ii) Cooperativa de Produccion Horti-Fruticola Petei Chapa Ltda.

1.Location and established	Colonia Mbruruy, Caaguazú, 1992
2.Number of members	137 farms (all small-scale farms)
3.Land area of members' farms	Maximum 6 ha, minimum 0.5 ha, 1.0-1.5 ha dedicated to cropping on farmland averaging 4 ha
4.Major agricultural products	Tomatoes, bell peppers, cabbage, melons, strawberries
5.Major facilities	Tomato processing plant (canned for sauce, 500kg/day, 70% financial assistance from the WB:World Bank), storage (5m x 5m), primary school building
6.Retail of agricultural products:	- Tomatoes for export to Argentina are cultivated by eight members on a 4 ha plantation with irrigation facilities provided under a WB grant aid program. The cultivated tomatoes are shipped and exported conjointly with the Coronel Oviedo Cooperative. - The cooperative was in deficit in the fiscal year 1999 due to damages sustained from a drought.
7.Relative importance of agricultural production activities	Although agricultural production is the major activity of the cooperative, due to the small scope of its activities, its products are marketed conjointly with the Coronel Oviedo Cooperative.
8.Techinical instruction for small-scale farms	The cooperative receives assistance and supervision from FIDA (Agricultural Development International Fund) since it is unable to recruit technical experts using its own capital.
9.Issues	As the association is mainly a vegetable production cooperative, the supervision of cropping, harvesting, and retail activities enables the organization and its members to generate revenue. Therefore, the management of the cooperative is an extremely important factor and a manager with superior managing skills is needed. However, there is no qualified personnel within the organization and the cooperative does not have the financial means of employing such a manager at present.

iii) Cooperativa de Produccion y Servicio Horti-Fruticola de Blas Garay

1.Location and established	Colonia Blas Garay, Caaguazú, 1991
2.Number of members	137 farms (all small-scale farms)
3.Land area of members' farms	373 farms (of which 54 farms are represented by women) Maximum 41 ha, minimum 1.0 ha, 3.0 ha dedicated to vegetable cropping on farmland averaging 7 ha
4.Major agricultural products	90% is dedicated to cultivating tomatoes and cabbage. Other vegetables are bell peppers and cucumbers. 75% of the production volume is sold and 25% is for self-consumption.
5.Major facilities	Cooperative office, seedbed
6.Retail of agricultural products:	Approximately 90 % of the cooperative's retail activities are carried out at the Mercado Central (central market) in Asuncion. It is difficult to guarantee prices due to the volatile price fluctuations.
7.Relative importance of agricultural production activities	- The major activity is agricultural production, but the scope is small. Due to the lack of a transport vehicle, the cooperative is dependent on transporting their products by sharing a tractor owned by Coronel Oviedo. All members are responsible for obtaining information about the ABASTO Market from retailers and transporters, preparing a production and transport plan, carrying out joint delivery, packing, and transport of products to the market. - A vinyl covered reservoir 6m x 7m x 1.5m was installed with

	WB and IDB assistance for use by a 1 ha drip irrigation system and sprinkler irrigation.
8.Techinical instruction for small-scale farms	The cooperative supervises 23 committees comprised of 15 small-scale farmers who are involved in selling their agricultural products through the cooperative's marketing network.
9.Issues	Nearly 80 % of the farmers must borrow credit in order to operate their farms. Irrigation facilities are essential for vegetable cultivation, but the installation costs range from US$12,000 to US$20,000 per ha. Although the cooperative can borrow Gs 3 million from the FDC(Rural Development Fund), the initial investment is too high in view of the risk taken by the farms; and the potential spread of irrigation facilities is low. There is a shortage of supervisors at the cooperative.

b) Eastern mountain region (Alto Parana, Itapua)

i) Cooperativa Colonia Unidas Agropecuaria Industrial Ltda.

1.Location and established	- Obligado, Itapúa and five branches in Itapúa, Alto Paraná: - The cooperatives, Hoenau (1900), Obligado (1916), and Bella Vista (1918), merged in 1953
2.Number of members	3,500 farms, of which 2,500 are engaged in agricultural production and the remaining are employed at the cooperative headquarters, supermarkets, and other facilities
3.Land area of members' farms	The land area owned by the cooperative is 120,000 ha and average land area is 40 ha. The average cultivated land area per farm is 85 to 90 ha and is jointly managed by members. Some farms also grow soybeans. The large-scale farms are 500 ha to 1,000 ha.
4.Major agricultural products	Soybeans, wheat, sunflower, yerba mate (mate tea), corn, tung
5.Major facilities	Soybean oil (7,000 tons/year), tung oil (1,500 tons/year), processed dairy products (15,000 L/day), yerba mate leaves (5,000 tons/year), compound feed factory (800 tons/month), silo (total 15,000 tons, used for soybeans and wheat)
6.Retail of agricultural products:	A distribution center has been set up in Encarción and Ciudad del Este cities and a store directly managed by the cooperative exists in Asunción. The cooperative produces and sells the best quality mate tea in Paraguay under its own brand. Oil is also sold.
7.Relative importance of agricultural production activities	-The members operate large-scale farms and their work in diversified farm management, production, and sales support cooperative activities. - Information on markets is exchanged between the cooperative and the MERCOSUR countries. - A plan to plant Tung on 5,000 ha is underway (in increments of 800 ha for a five-year period). - During the harvest in the peak season,1,200 workers are employed. -The cooperative envisions constructing harbor facilities jointly with the neighboring Nikkei cooperative, in order to effectively develop the export of soybeans to Japan and Europe. There is a German school and supermarket near the agricultural processing factory in Obligado where the cooperative headquarters is located. The cooperative also provides a health insurance system and an agricultural scholarship, using the association's capital, for its members and their children as a means of fostering human resources for the cooperative (repayment is

	exempted if the recipient works for the cooperative for more than three years after graduation).
8.Techinical instruction for small-scale farms	Supervision in tung cultivation is provided, in addition to some guidance in dairy farming.
9.Issues	Long-term, low interest rate loans needed to construct agricultural processing facilities can not be obtained. Dairy product processing is unstable due to seasonal fluctuations in the milk supply volume. Due to unpaved roads, marketing losses are incurred during the rainy season when the roads become impassable.

ii) Cooperativa La Paz Agricola Ltda.

1.Location and established	Nikkei immigrants, La Paz, Itapúa, 1970
2.Number of members	106 farms
3.Land area of members' farms	Average land hold area per farm is 60 - 70 ha.
4.Major agricultural products	Soybeans, wheat, corn rice, fruit trees, yerba mate
5.Major facilities	Silo (15,800 tons), seed silo (1,600 tons), storage (1,200m^2)
6.Retail of agricultural products:	- The cooperative does not conduct processing activities. - The cooperative is reviewing the possibility of exporting non-genetically altered soybeans to Japan.
7.Relative importance of agricultural production activities	The activities of the cooperative are mainly centered on multiple farming, followed by purchasing, sales, and credit business. Its economic base is weak due to its small size.
8.Techinical instruction for small-scale farms	The neighboring Paraguayan and German immigrant farms would like to benefit from the cooperative's credit, sales, and purchasing activities, but the cooperative's meetings are all conducted in Japanese and quasi-membership status for potential non-Nikkei members is presently under consideration. Enabling such farms to join will help increase the volume of agricultural products handled by the cooperative and it anticipates its activities to be strengthened.
9.Issues	The cooperative would like to foster technical experts within the association, but due to the lack of human resources and capital, it has been unable to accomplish this goal.

iii) Cooperativa Yguazu Agricola Ltda.

1.Location and established	Nikkei immigrants, Yguazú, Alto Paraná, 1965
2.Number of members	82 farms. However, there are presently 180 Nikkei families that have immigrated to the region.
3.Land area of members' farms	Soybean cultivation on 250-300 ha of land (46 farms)
4.Major agricultural products	Soybeans, wheat, corn, sunflower, vegetables (tomatoes, melons), fruit trees (macadamia nuts)
5.Major facilities	Milling factory (wheat), 60 tons/day, corn silo (35,500 tons), seed silo (3,000 tons), rapeseed silo (3,000 tons), equipment warehouse, gasoline station, supermarket, laboratory
6.Retail of agricultural products:	- A milling factory with a processing capacity of 100 tons/day was constructed in 1998. It presently produces 40 tons/day. There is a large demand for milling wheat, but the cooperative provides only 40 % of the demand, due to a shortage of wheat, and the remaining 60 % is imported from Argentina and Brazil. -The cooperative is planning to build a formula feed factory using wheat bran, which is a by-product of the milling factory. In addition to wheat bran, other raw ingredients produced by the cooperative, which will be used by the formula feed factory, are corn, low-grade soybeans, and elephant grass.

	-There are also plans to make noodles using the wheat flour produced by the milling factory and to cultivate non-genetically altered soybeans for export to Japan and Western Europe. - Six farms are cultivating melons which are exported to the Buenos Aires market. -Nearly half of the revenue generated by the cooperative stem from credit business activities (the loan interest rate is around 22% and the savings interest rate is 2 % lower than central city banks and the profit is generated from the interest rate differential). - As part of the 1994 plan to carry out multiple farming, cultivation of macadamia nuts was started and 24,456 trees were planted on 122 ha; and there are ongoing plans to increase the number of trees.
7.Relative importance of agricultural production activities	Agricultural production is the main activity. However, the cooperative is attempting to diversify its activities by operating a milling factory and cultivating macadamia nuts.
8.Techinical instruction for small-scale farms	The cooperative has supported non-member Nikkei farmers and small-scale farms in the area. It purchases wheat for the milling factory and corn produced by small farms for the feed factory. The factories are anticipated to provide employment for the small farms, contributing to mutual coexistence.
9.Issues	Sales negotiations of soybeans is conducted according to official Chicago market quotations, but due to the weak currency of Paraguay (Gs), the loss stemming from exchange rates is large.

c) Northern plateau region (Concepcion, Amambay, San Pedro, Canindeyu)

i) Cooperativa de Ahorro y Credito y Servicios del Norte Ltda.

1.Location and established	Concepción, Concepción, 1972
2.Number of members	3,863 members, of which 325 farms are engaged in production (urban-rural cooperative)
3.Land area of members' farms	Farms of less than 12 ha
4.Major agricultural products	Corn, beans, vegetables (watermelons, pineapples, pumpkins, cucumbers), sugar cane, raw cotton, sesame seeds, cassava
5.Major facilities	Shipping facilities (built under a Canadian project (US$500,000), molasses factory
6.Retail of agricultural products:	- Pumpkins (Calabacita, zucchini) are exported to Buenos Aires and Rosario and there are plans to export watermelons and cucumbers. In November 1998 and in January 1999, the cooperative exported pineapples produced by members and non-members to Uruguay. Activities to encourage non-members to join the cooperative were carried out at this time. -The Plant Inspection Agency of MAG, in cooperation with the NGO, Consorcio Sur-Alfa, has created insect pest controls for melon and cucumber crops which have been prohibited for export by the plant inspection rules established by MERCOSUR. Due to pest damage, the export of watermelons, pumpkins, and cucumbers was temporarily banned.
7.Relative importance of agricultural production activities	The cooperative was originally established as a credit and savings association when three organizations merged. Its focus has been on promoting regional agricultural production.
8.Techinical instruction for small-scale farms	Those farms which want to join the cooperative are encouraged to form committees comprised of 10 members and presently, the cooperative has about 20 committees.

9.Issues	There are only four technical supervisors in the cooperative and there is a need to foster technical personnel. In order to increase the operation ratio of the shipping facility, the cooperative would like to cultivate a second crop of pumpkins annually.

(5) Issues in organizing farmers and cooperative activities

Based on the study of the cooperatives listed above, the issues which cooperatives face and the contributions made by cooperatives in organizing small-scale farms is explained below.

a) The agricultural cooperatives in Paraguay are largely divided between cooperatives, which depend on the interest rate differential of their credit business to generate revenue and cooperatives, which depend on the profits generated from the sale of agricultural products. Coronel Oviedo is an example of the former and Colonia Unidas is an example of the latter.

b) Colonia Unidas, which is representative of cooperatives comprised of medium to large-scale farms, is supported by the large-scale, diversified management, production, and retail activities of its members. As a result, they also exchange market information with the agricultural cooperatives in other MERCOSUR countries, as well as supervise the cultivation of crops by members and small-scale farms in order to raise the operating ratio of their processing factories. They do not appear to have any outstanding problems.

c) In contrast, Coronel Oviedo utilizes the large revenue generated from its credit business for production activities and strives to improve the cultivation technology of its members and the quality of the crop in its attempt to compete with the MERCOSUR market. Presently, it collects and sells the agricultural products of small, neighboring farms at the ABASTO Market in Asuncion and has established an advantage there. In the past, the farmer accompanied the products to the market and directly participated in the sales activities, but under the present system, members are responsible for sorting and packing the products and sales are managed by the cooperative allowing the farmers to concentrate on production. The objective is to achieve efficient distribution.

d) Petei Chapa and Blas Garay cooperatives, which specialize in vegetable and fruit production, greatly rely on revenue generated from sales of their produce; and their focus is on securing new customers. However, the volume of produce handled by these cooperatives is not as large as the Coronel Oviedo Cooperative and they also have no means of transporting their products to the market. As a result, it is dependent on the Coronel Oviedo Cooperative to transport their products. A mutually complementary relationship between cooperatives that wish to effectively negotiate price, by increasing the volume of produce at the market, and the

unorganized small-scale farms which depend on the marketing network of the cooperative is in the process of evolving. Small-scale farms are forming committees under the supervision of the cooperatives.

e) Cooperatives with less than one-twentieth of the number of members at Colonias Unidas cooperative are under pressure to strengthen their economic base. Cooperatives with a small economic base aim to increase their scope by adopting a quasi-membership system or establishing small farm groups, in order to increase the operation ratio of processing factories, that were built to strengthen the cooperative through diversified raw materials for the factories or increasing the volume of farm products that are handled.

(6) Potential agricultural development by farmer organizations and cooperatives

The data obtained from the survey on small-scale farms that comprise 81 percent of employed workers in the rural area in Paraguay and the NGOs that support the cooperatives and small-scale farmer organizations are listed below.

a) Conditions of small-scale farms

i) The average cultivated land area of small-scale farms is 1 ha to 5 ha.
ii) Manual labor by family members per farm is three people.
iii) The majority of the farms are dependent on manual labor and livestock to plow their fields.
iv) Vegetable cultivation is popular as a cash crop, but due to limited financial resources to buy seeds, fertilizer, pesticides, etc., good quality vegetables can not be cultivated.
v) Small-scale farms do not have access to market information and they are forced to accept the conditions set by traders on time of delivery and purchase price.
vi)Small-scale farms are unorganized and are unable to negotiate prices because there is no cooperative activity in production and sales.

b) Conditions of organizations

i) Cooperatives are aware that countermeasures aimed at coping with a liberalized market due to MERCOSUR will strengthen the foundation of their organizations.
ii) In order to strengthen their organizational base, cooperatives are organizing the neighboring small farms into groups or committees that aim to improve the volume and quality of farm products and thereby increase its handling volume.

c) NGO activities

The objectives of NGO activities are to provide information on cultivation techniques and market and sales information equally to all its members, in order to encourage them to become self-reliant

in all aspects of farm management, from cultivation to sales, and it is not to strengthen the organization by fostering supervisors. Based on the information obtained from the activities of the three groups listed above, the agricultural development potential of Paraguay is sufficiently adequate, if a policy to assist the organic interdependence among these three groups is implemented.

1.1.6 Direction and issues of government agricultural development policy

Paraguay's agricultural development has relied on technical assistance and financial cooperation from donor countries and international organizations that is Official Development Assistance (ODA), as exemplified in the case of soybean and cotton development. ODA is an essential component in considering the future of agricultural development in Paraguay. In reviewing ODA trends in the agricultural sector, the direction which agricultural development policy will take can be foreseen.

Furthermore, strategic issues, which need to be addressed in multilateral negotiations with MERCOSUR and WTO members since Paraguay's participation in these organizations, have been pinpointed based on transitions in the external conditions surrounding agriculture in Paraguay.

(1) Direction of agricultural development policy based on ODA programs and projects in the agricultural sector

Diversified technical assistance has been carried out in Paraguay by international assistance organizations and donor countries in the agricultural sector. As of 1998, 29 technical programs and projects have been implemented, amounting to a total of US$142 million (DGP, MAG, 1998). In addition, eight major financial cooperation projects are currently in implementation by the World Bank, IDB, JBIC and other development banks. Of these projects, the following two major development projects are introduced below.

1) Project to strengthen rural immigration

This project targets poverty-stricken, small-scale farms in the rural areas and aims to raise the value-added of agricultural products through IDB financing, to generate employment, and to construct an agricultural processing plant. There have been requests to implement the project in 370 areas and 226 mini-projects have been formulated. The project has provided assistance to communities in 30 districts in mainly Coronel Oviedo, Mbruruy, Concepcion, and Pedro Juan Caballero in the form of access roads, farm roads, schools, water facilities, and other infrastructure.

2) Project to second strengthen the agricultural sector

This is a Japanese government loan project totaling about 15 billion yen. The competitiveness of medium-scale farms (especially in the livestock industry) has been strengthened through financial assistance. In addition, agricultural technical assistance, organization, and financial assistance for small-scale farms with low productivity have also been included. In reviewing the content of the technical assistance programs and projects currently in implementation, they have been classified into the following seven categories.

- Assistance to strengthen farmer organizations/cooperatives.
- Activate productivity of the livestock industry.
- Improve the cultivation system according to region.
- Improve productivity.
- Improve the production base.
- Promote marketing and exportation.
- Provide financial assistance for agriculture and rural communities.

These seven categories indicate the direction of agricultural development by the Paraguayan government at the present time; and they also reflect the policy aimed at achieving competitive viability of the country's agricultural products through improved productivity, as explained in section 1.1.1. Further, the direction of agricultural development in each region can be ascertained by defining agricultural regions according to each of these categories as shown in Table 19.

In addition to the programs and projects currently underway, the Paraguay government will be implementing the following two projects that address the important issues contained in its agricultural development policy.

a) Plan to promote exports of new products;
   - The aim of this IDB assistance project is to promote produce exports in accordance with the policy on agricultural diversification.
   - This project will target the export of new agricultural products, specifically fresh produce and processed products to the markets in MERCOSUR, USA, Canada, and EU.
   - The agricultural cooperatives that have an established track record in production will be implementing the project.

b) Program to modernize agriculture and forestry development (Programa de modernizacion para el desarrollo agropecuario y forestal: PROMODAF);
   - This is a MAG structural reform program that will be implemented based on administrative reform and regional decentralization trends.

- Under IDB assistance, the program will create a framework for a trial farm and a rational agricultural extension system.

It should be noted that the program and projects mentioned above would fundamentally be managed and implemented by the project beneficiaries and regional governments. This is a major point that should be considered in formulating future agricultural development projects.

Table 19 Review of the Technical Assistance Programs and Projects in Each Region

Region/ Department / Program/Project	North	CENTRAL	Central-East	East	South	Central-South	South-West
	Amambay Concepción San Pedro	Central Cordillera Paraguarí	Caaguazú Guairá Caazapáa	Canindeyú Alto Paranáa	Itapúa	Misiones	Neembucú
1.Support of farmers' organization and strengthen of existing cooperatives	-Pyt.Pr-0084 (MAG-BID) -FDC-UEP -FISP	-Pyt.Pr-0084 (MAG-BID) (Nikkei,Ypacarai, Quindy) -FDC -FISP	-Pyt.Pr-0084 (MAG-BID) (Corl.Oviedo, Blass Garay) -FDC -FISP	-FDC -FISP	-FDC -FISP	-Pyt.Pr-0084 (MAG-BID) (Santa Rosa) -FDC -FISP	-Pyt.Pr-0084 (MAG-BID) (Pilar) -FDC -FISP
2.Strengthening of farm household administration	-Reactivation of cotton -PRODESAL -PCCR-UTTS (MAG-BID	-Strengthen vegetable (MAG-JICA) -PAERA(Rep. China) -FLORES (Rep. China)	-Reactivation of cotton -PRODESAL -Pig product (Rep. China) -PCCR-UTTS (MAG-BID)	-Reactivation of cotton -PRODESAL -Strengthen Vegetable (MAG-JICA)	-Reactivation of cotton -PRODESAL	-Reactivation of cotton	-Reactivation of cotton -PRODESAL -DERMASUR
3.Improvement of cultivation system	-Extension of direct sowing (MAG-GTZ-JICA) -Strengthen of horticulture (Rep. China)	-Extension of direct sowing (MAG-GTZ-JICA) -Strengthen of horticulture (Rep. China)	-Extension of direct sowing (MAG-GTZ-JICA) -Strengthen of horticulture (Rep. China)	-Extension of direct sowing (MAG-GTZ-JICA)	-Extension of direct sowing (MAG-GTZ-JICA) -Strengthen of horticulture (Rep. China)	-Strengthen of horticulture (Rep. China)	-
4.Improvement of productivity/ and rural development	-PCCR-UTTS (MAG-BID)	-	-PCCR-UTTS (MAG-BID)	-	-	-	-
5.Plan of irrigation and collect/ shipment of products	-FISP (MAG-BID-BIRF) -Post harvest (MAG-HELVEAS)	-FISP (MAG-BID-BIRF) -Coop.La Colman (MAG-JICA) -Post harvest (MAG-HELVEAS	-FISP (MAG-BID-BIRF) -Coop. Corl. Oviedo/Blass garay (MAG-JICA) -Post harvest (MAG-HELVEAS	-	-	-	-
6.Improving marketing and strengthen of agricultural export products	-PCCR-UTTS (MAG-BID)	-PAERA (MAG-Rep,China))	-PCCR-UTTS (MAG-BID)	-Production of vegetables (Conl.Oviedo/ Blass Garay) (MAG-JICA)	-	-	-
7.Agricultural finance	-UEP-FDC	-USAT-FDC	-USAT-FDC	-USAT-FDC	-USAT-FDC	-USAT-FDC	-USAT-FDC

Note: (1)Pyto. PR-0084: Program of agricultural diversification
(2)FDC: Rural Development Fund
(3)UEP: Project Implementation Unit (Fund of MAG)
(4)FISP: Social Productivity Investment Fund (Fund of BID and BIRF)
(5)PCCR: Rural Colonial Consolidation Program
(6)UTT: Pilot Project Tercerizada Technical Unit
(7)PRODESAL: Development Program for Cotton Farms
(8)PAERA: Export Promotion for Fruit, Vegetable, Flower and minor Livestock animal
(9)USAT-FDC: Project of FDC, part of PNUD

(2) Issues in multilateral negotiations

1) Impact of Paraguayan agriculture in MERCOSUR agricultural negotiations

Paraguay's position in MERCOSUR agricultural negotiations and rule-making is more easily apprehended through a comparison with the rules of the WTO. From this angle, we attempt to understand Paraguay's position in negotiations for the development of an internationally competitive agriculture, and examine the strategy that Paraguay should take in MERCOSUR agricultural negotiations, together with basic related issues.

The GATT Uruguay Round international negotiations had two significant effects on domestic agricultural policy. The first was that they encouraged de-coupling (the abolition or large-scale reduction of domestic agricultural produce subsidies and export subsidies) in the industrialized countries, led by USA. The second was that they encouraged the change from a policy of maintaining the price line to a policy of maintaining income levels. Paraguay has for the most part favored liberalization, with the exception of part of the agricultural sector and one period in the 1980s, and has not implemented an alternative import strategy.[8]

Further, in the Uruguay Round agricultural negotiations, Paraguay basically positioned itself as an agricultural produce exporter country in favor of liberalization, in line with the Cairns Group.[9] Consequently, since the fundamental nature of its agricultural policy was not one of maintaining the price line (although, of course, such a policy exists to be put into effect in the short-term if necessary), the effect of the Uruguay Round negotiations on domestic agricultural policy was minimal. The same applies essentially to negotiations with MERCOSUR. For example, the Common External Tariff (CET) on cotton produced by small-scale farms, which represent the majority of farms, was set at 6 %, the lowest tariff rate of the 9 commodities, and Paraguay has accepted this. (Other tariff rates were, milk: 12-14 % beef, rice, wheat: 10 %; soybeans, corn, sorghum, sunflowers: 8 % [Alberto Valdes, 1996].)

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[8] At the time of the 1999 local survey, Paraguay was meeting most of its domestic demand through domestic production, owing to an increase in the production of wheat for which it had always been dependent on imports, which was attributed by some to an alternative import strategy. However, increased wheat production was not made possible by policy guidance from public institutions. Rather, wheat happened to have been used as an interim crop for soybean production. As farms had been expanding their soybean cultivation areas, increased production and supply of wheat also became possible.

[9] Paraguay's 1994 average tariff rate (maximum tariff limit) for 18 items of agricultural production (soybeans, tomato, wheat, cotton, beef, corn, milk, etc.) reported to the WTO was 35%, the second lowest of the MERCOSUR countries after Argentina (31.5 %). (Brazil's was 43.3 %, and Uruguay's was 39.3 %). Alberto Valdes (1996): "Surveillance of Agricultural Price and Trade Policy in Latin America during Major Policy Reforms," World Bank Working Paper no. 349.

2) Need to improve the system regarding customs

Paraguay is considered to share many MERCOSUR negotiating strategies in common with Argentina and Uruguay, but its position differs from that of Brazil. As a result, disputes in MERCOSUR agricultural negotiations have occurred between Brazil, an importer country of agricultural produce with comparatively numerous import regulations, and Paraguay, Argentina, and Uruguay, exporter countries with few export regulations.[10] Disputes between Brazil and Argentina are particularly frequent, accounting for almost all the 17 disputes at the early 1998 MERCOSUR Trade Commission meeting (INTAL, MERCOSUR Report, IDB, No. 4, January-June, 1998, p. 22). Only 3 out of the 17 disputes settled involved Paraguay, with Paraguay filing a suit against the opposing country in all 3 cases.

The fact that no country filed a suit against Paraguay demonstrates that its market is relatively open. Vis-a-vis customs clearance, however, numerous problems exist which require systematic improvement (customs clearance alone amounts to 10 % of export value, and more than 50 % of exporters practice customs clearance evasion: Klaus Esser), and unless efficient procedures are established, the informal sector will remain and income from customs clearance will continue to suffer.

3) Issues to be addressed in WTO agricultural negotiations

The WTO Agreement on Agriculture consists of three main elements: market access, domestic support (domestic subsidies), and export subsidies. Vis-a-vis domestic support and export subsidies, de-coupling by USA and EU mentioned earlier led to a substantial decrease in world surpluses of grain, and particularly dairy products, (Maria Beatriz Nofal, John Wilkinson, 1999, p.2). As Nofal and Wilkinson observe, whereas this provides an opportunity for MERCOSUR exporter countries such as Argentina and Uruguay to obtain an entry into world markets, the Chortizer Komitee farmers' co-op (Meno Farmers' Co-op) of the Chaco region, a producer of dairy products in Paraguay and the main domestic supplier of fresh milk, will be forced by pressure from the competition of multi-national corporations to undergo reform.

The field survey of the Chortizer Komitee farmers' co-op (Menonita) revealed that it has begun to expand its production range from fresh milk to include long-life milk, in response to the challenge of the multi-national corporations (and to produce fodder crops for beef cattle in order to enhance added value). Therefore, unless Paraguay streamlines and modernizes its livestock industry

[10] For data on Brazil's exports and imports of agricultural produce to MERCOSUR member countries, see: Inter-American Bank (1999): Integration and Trade in the Americas, Special Report, Feb., Table 18-Table 27 (pp. 38-47).

through reorganization and structural reform of the grazing industry of other areas that utilize the aforementioned land inefficiently, problems in this industry will become aggravated. Furthermore, grains such as soybeans have seen renewed expansion as a result of de-coupling. In order to strengthen such exports on the world market, it would be worthwhile to convert for use pasture lands through extensive grazing.

In comparison to these three main elements of WTO agricultural negotiations, the rules of MERCOSUR are still in the development stages, and there are still many areas for improvement. Nevertheless, since its key members are exporter countries of agricultural produce, these rules are oriented more toward liberalization than are the WTO rules. However, in the lead-up to the year 2000 WTO negotiations, MERCOSUR, including Paraguay, will have to confront one issue: rule-making vis-a-vis plant quarantine measures and quality issues. USA's stringent rules vis-a-vis processing levels, HACCP (Hazard Analysis and Critical Control Point), are already being introduced into many industrialized countries, as well as into developing countries such as those of Southeast Asia. There is no denying the possibility that a "new international order" will come into existence, in which the application of these strict rules of hygiene will replace, the existing three elements of agricultural negotiations.[11] Therefore, MERCOSUR's processing and distribution sectors will have to take account of the WTO's ISO series. Failure to do so will mean that MERCOSUR countries will lose the advantage of openness they currently enjoy in WTO agricultural negotiations. Unless Paraguay too endeavors to introduce this technology, its exports will fail to become more competitive on the world market.

[11] Such a view can be found on the following internet web-site: http://lanic.utexas.edu/sela/engdocs/spdredi22-984.htm (1999) “Implementation of the Uruguay Round Agreement on Agriculture: Issues for Latin America and Caribbean, 4. Implementation Issues for Agriculture,” Feb. 27, pp. 1-4.

1.2 AGRICULTURAL DEVELOPMENT CONCEPT

The issues in agricultural development have been clarified based on the basic theme, "what will happen to agriculture if it continues the traditional pattern of development?" The issues will be reviewed according to the three themes of "what will happen to the competitiveness of exported agricultural products?" "What will happen to soybean and wheat production which are dependent on extended expansion of farmland?" and "what impact will multilateral agricultural negotiations have?"

This will be followed by the estimated number of farming households, farmer population, and production of major agricultural and livestock products by 2010, which will be used to clarify the development framework. The future scenario of the agricultural development concept will be formed based on these development issues and future perspectives.

1.2.1 The future based on past development patterns:
"What will occur to Paraguay agriculture if the past development patterns are continued?"

(1) What will happen to the competitiveness of exported agricultural products?

a) <u>The growth of exported agricultural products will stagnate due to its reliance on export countries and minimal export products</u>

The export growth rate of Paraguay's agricultural products since its participation into MERCOSUR has been low and unstable. One of the major reasons underlying the stagnant export of agricultural products is the minimal amount of exported products and Paraguay's dependence on exports from other countries.

The four commodities of soybeans, cotton, livestock, and lumber comprised on the average 90 percent of all exported agricultural products from 1995 to 1998, and an exclusive ratio of 80 percent, if manufactured goods are included. The recent decline in forestry resources has become a factor in restricting the export of lumber and forestry products; and a further decrease in the number of exported goods is anticipated.

The following table, based on the major crop cultivation areas, calculates the current amount of undeveloped land resources (agricultural land resources). 'Agriculture land' is used here to refer to arable land for upland field crops (like soybean and cotton). 'Pastureland' refers to natural grassland. They both constitute farmland. As the table shows, as arable land and natural grassland increase, there is a marked decrease in forestry area. In other words, the expansion of agricultural

land resources is accompanied by a reduction in forestry resources.

The ratio of arable land use, calculated on the basis of cultivated area against arable land area, has recently dropped from 65 percent in the 1981s to around 34 percent in 1995. The existing land resource utilization ratio is extremely low, with the ratio of cultivated area to agricultural land resource area at around 10 percent. The natural grasslands in Paraguay are used for pastureland or under utilized, but it is possible to utilize them as arable land for grain and fruit, and so forth, under certain conditions. This shows that by raising the utilization ratio of pasture land resources, increased grain production is quite possible.

Table 20 Land Resource and Utilization Ratio

	1981	1985	1989	1991	1995
(1) Agriculture land (1,000ha)	2,767	3,821	4,392	4,551	6,185
(2) Pasture land (1,000ha)	15,800	17,995	20,000	21,844	19,517
(3) Forestry (1,000ha)	19,700	17,838	15,153	12,890	7,800
(4) (1)+(2)+(3) (1,000ha)	38,267	39,654	39,545	39,285	33,502
(5) Cultivated area (1,000ha)	1,816	2,289	2,784	1,964	2,150
(6) Land resource utilization ratio					
(5) / (1)	65%	60%	63%	43%	34%
(5) / (1)+(2)	10%	10%	11%	7%	8%

Source: 1)Prepared by DCEA, MAG, 1985, 1990, 1996、 2)Land Use Map, MAG, 1996
3)Land Capability Map, MAG,1996

According to an FAO report, land resources in Paraguay with undeveloped potential for crop production are estimated at approximately 22 million ha (World Agriculture: Toward 2010, An FAO Study, 1006). This estimation almost corresponds to the area of natural grassland shown in the above table, demonstrating that the utilization of grassland is an important issue for future increase in agricultural production.

b) <u>Diminished comparative advantage index due to lowered per capita productivity has contributed to a decline in competitive viability</u>

According to the RCA Index estimated for 10 typical export commodities of Paraguay and the other MERCOSUR member countries. Only one of the 10 commodities for which Paraguay has a comparative advantage over the other three countries is soybeans, productivity of which is being increased through the introduction of new technology, such as non-tillage cultivation method.

In cotton, Paraguay's performance is close to the world average, but that advantage is showing signs of decreasing. In addition to cotton, another commodity exists for which the RCA Index shows a downward tendency.

That commodity is Paraguay's traditional vegetable, the tomato. The decrease in RCA Index,

however, may be attributed to the fact that in the period 1993-1995, productivity by hectare showed a tendency to stagnate, and that per capita productivity fell over the long-term. These export products is expected to continue declining. In addition, the failure to secure economization of scale (lack of development of middle-scale farms), problems vis-à-vis strategic marketing know-how and systems (lack of agricultural organizations) and problems vis-à-vis access to export markets (lack of hard and soft distribution channels) are possible factors for the decrease in comparative advantage index.

c) Potential agricultural development in the comparative advantage of soybeans

The other two primary processed soybean commodities (soybean oil and soybean ground) are increasing that comparative advantage index, which is encouraging trend for Paraguay's export competitiveness. Paraguay should cast off the label of "exporter of primary agricultural produce" which it has traditionally promoted, and aim to foster production centered on an agro-industry, enhance added value, and increase employment opportunities agricultural sector.

An analysis of the growth rate of major exported agricultural and livestock products for the past ten years in the ASEAN, NAFTA, and EU markets is shown in Table 21. This table shows the a high potential import ratio for Paraguay's new export products, vegetables, fruits, pork, and chicken, in these three markets is given. The ASEAN market, in particular, is expected to increase its import of agricultural and livestock products due to the high population and economic growth rate of that region. The issue that confronts Paraguay is to diversify it's exported agricultural and livestock products as well as to transform itself from an export nation of minimum to numerous export commodities.

Table 21 Growth Rate of Imported Agricultural and Livestock Products according to Market (%) (average 1983/85-1993/95)

Commodities	ASEAN	NAFTA	EU
1.Total import growth rate of agricultural/livestock products	7.8	5.3	6.9
2. Import growth rate of processed agricultural products	3.3	6.3	10.6
3. Traditionally exported products	3.4	2.3	1.5
Soybeans	2.8	3.1	0.5
Cotton	4.4	12.5	1.1
Sugarcane	9.3	15.5	6.3
4. New agricultural products			
Fresh vegetables	9.7	7.9	9.1
Fresh fruits	7.5	5.9	7.4
Processed vegetables	10.9	8.9	9.2
Processed fruits	13.4	7.0	9.8
Juice	21.5	0.4	10.2
5. Livestock products	10.2	4.8	7.2
Beef	15.1	5.2	7.6
Pork	15.1	4.5	8.3
Chicken	19.5	22.0	16.0

Source: Asia, The Emerging Market, IICA, 1997

d) Need for a strategy on product differentiation as seen in the expanding intra-industry trade

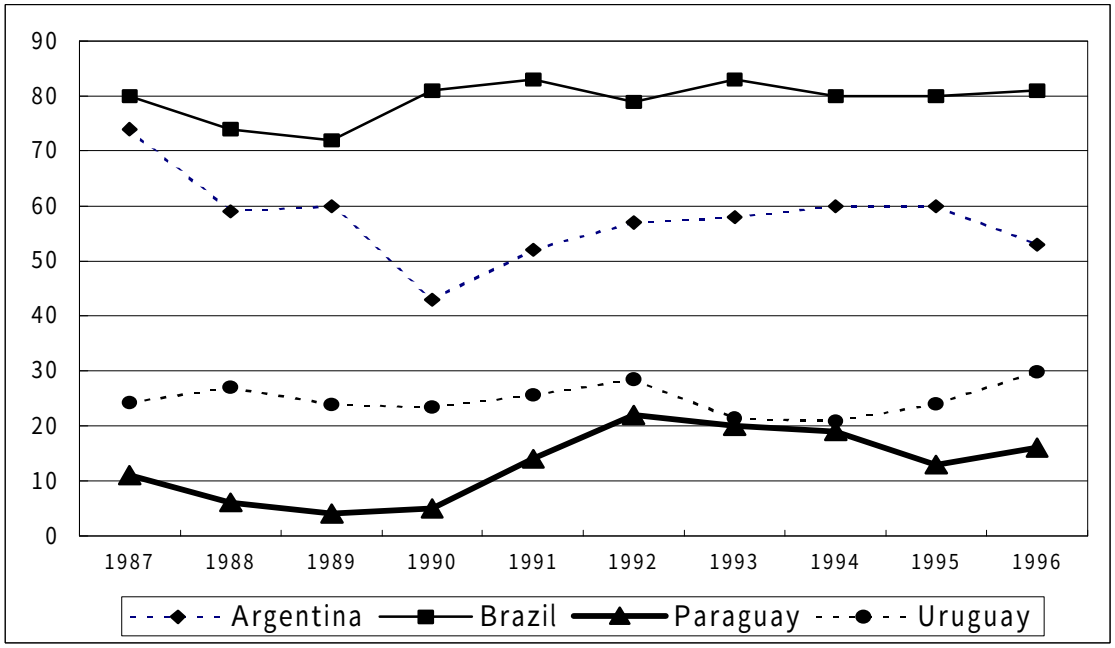
Figure 14 expresses the industrial trade index as the Gruebel-Lloyd Index (total of the 7 items, such as soybean, cotton, coffee, tobacco, yerba mate, meat, hides). In comparison to the late 1980s, Paraguay's industrial trade in the 1990s has increased. Changes in the Gruebel-Lloyd Index for Argentina and Paraguay show a similar pattern. Although restricted to these 7 items, it may be surmised that, while the scale of the two countries differs, their agricultural produce trade sectors share similar structural characteristics.

In the future, when Paraguay reforms the structure of its agricultural produce export sector to become more competitive, of all the MERCOSUR members Argentina will in all likelihood become its main competitor. Investigations which focus on industrialized countries normally cite the following as factor the expansion of intra-industrial trade: rise in income, diversification of demand, economic scale, product discrimination owing to the influx of multi-national corporations and an oligopolistic market, and the reduction and abolition of trade barriers as a result of negotiations among multiple nations (GATT Uruguay Round). The diversification of demand owing to rises in income and urbanization in particular is a phenomenon that is apparent not only in industrialized countries, but also in developing countries.

The meaning of intra-industrial trade expansion that relates to the competitiveness of exports, as a result of the kind of overseas competition within a single industry seen in the "theory of

comparative advantage," is not a matter of forcing the same domestic industry to choose between the two alternatives of whether to decline or survive, but of encouraging this same domestic industry to compete overseas through the segregation of niche by product discrimination. Therefore, in the similar industries of Paraguay and Argentina, which were discussed earlier, product differentiation is an important strategy.

Figure 14 Gruebel-Lloyd Index of Selected Commodities



Source: JICA-EDEP estimated based on The DATAINTAL Database from the IDB;
OCIT Data Compiled form Customs (Paraguay)

(2) What will happen if the traditional development pattern based on extended expansion of farmland is continued?

a) <u>The production of soybeans, wheat, and corn that have depended on the extended expansion of farmland has reached its limits</u>

The forest resources of the central eastern region, where land productivity is high, have decreased by 160,000ha yearly. The rapid decline of these resources signifies that new agricultural development of the major granary area of the entire eastern region has reached its limits. The profitability of soybean has relied on the scale merit of extended expansion of farmland based on the cutting of forests; and this pattern of development has reached its limits.

The future profitability of soybeans is dependent on curtailing production costs. In order to achieve this, it is essential to disseminate and expand direct sowing and the practice of crop rotation, mainly of wheat and corn. Furthermore, the use of soybean as mixed feed and other

processed raw materials with high protein content are also important. In addition, the decreased cropping area of soybeans due to disintegrating profitability, affects wheat and corn production, the second crop food grains. Hence ensuring the profitability of soybeans is also an important issue in terms of securing a stable food supply.

b) The quandary of absorbing a rising rural population

The productivity of cotton, the cash crop of small-scale farms, has been marked. Hence improving the productivity of this crop is important in order to sustain small-scale farming operations. Simultaneously, introducing new cash crops is also essential for these farming operations. Vegetables, which can be cultivated in a small area of land, usually generate high profitability and it is anticipated to become a dominant substitute crop for cotton. However, the farms are highly cautious about growing vegetables due to the difficult cultivation techniques and the unstable prices stemming from fluctuating market prices. Therefore, the means by which a stable market is secured will be an important incentive in accelerating vegetable cultivation.

In future, a large population increase in the small-scale farming sector has been estimated, but reforms in the land ownership system have not progressed. Therefore, absorbing the overall population increase in this sector is difficult and utilizing the surplus labor to create new industries such as agricultural processing is recommended. The rising income of small-scale farms, which comprise more than 80 percent of the total number of farm households, is a vital source of purchasing power that will create effective demand; and it is equally important for the socioeconomic.

(3) What impact will the WTO multilateral negotiations have on agriculture in Paraguay?

a) Need for rule-making vis-à-vis plant quarantine measures and quality issues

The WTO agreement on Agriculture consists of three main elements: market access, domestic support (domestic subsidies), and export subsidies. In comparison to these three main elements of WTO agricultural negotiations, the rules of MERCOSUR are still in the development stages, and there are still many areas for improvement. Nevertheless, since its key members are exporter countries of agricultural produce, these rules are oriented more toward liberalization than are the WTO rules. However, in the lead-up to the year 2000 WTO negotiations, MERCOSUR, including Paraguay, will have to confront one issue: rule-making vis-à-vis plant quarantine measures and quality issues.

The USA's stringent rules vis-à-vis processing levels, HACCP, are already being introduced into

many industrialized countries, as well as into developing countries such as those of Southeast Asia. There is no denying the possibility that a "new international order" will come into existence, in which the application of these strict rules of hygiene will replace the existing three elements of agricultural negotiations. Therefore, MERCOSUR's processing and distribution sectors will have to take account of the WTO's ISO series. Failure to do so will mean that MERCOSUR countries will lose the advantage of openness they currently enjoy in WTO agricultural negotiations. Unless Paraguay too endeavors to introduce this technology, its exports will fail to become more competitive on the world market.

b) <u>Strengthening competitive viability through WTO exempt measures</u>

The WTO agricultural agreement advocates curtailing and eliminating the system of subsidies and other measures mentioned above that distort free trade. However, the agreement does recognize the need to implement exempt measures to prevent reduced trial research and development activities, national food security, environmental conservation, structural reforms, and regional agricultural assistance. Exempt measures should be actively adopted in order to strengthen the competitive viability of agricultural products; and it is important to quickly create the foundations needed to achieve competitive viability based on improved productivity.

1.2.2 Future framework

A wide perspective of future agricultural development policies that will affect socioeconomic factors has been taken, based on the number of farm households, farmer population, agricultural production and balance of supply-demand of agricultural products. Existing government data has been utilized whenever possible and the study team provided its own estimated statistics when data was not available.

(1) Estimated number of farm households and farmer population

The number of farm households increased about 23 % in the ten-year period from 1981 to 1991. The estimated number of farm households according to the department and the farmer population in 2017 is shown in Table 22 based on past trends on increased farm households. The limit to expanding farmlands has been reached in terms of environmental conservation because of the declining area of forest and settlement land in Paraguay. In addition, a marked population outflow from rural to urban areas is anticipated. Two cases showing the maximum and minimum statistics were estimated based on these conditions.

Based on past trends, the number of farm households at present will increase by 180,000 by 2017. Even when minimally estimated, a growth of 90,000 households is anticipated and the total

number of farm households will reach 400,000. Simultaneously, the farmer population will rise from 1,600,000 at present, to a maximum of 2,800,000 or a minimum of 2,200,000 farmers. The number of farm households and farmer population are expected to increase markedly in departments with high land productivity such as the east region in Alto Paraná department, a major grain producing area of soybeans, corn, and wheat, and in the central to northern regions of San Pedro and Caazapá departments where large number of small-scale farms are dispersed.

Table 22 Estimate for Number of Farm Household and Agricultural Population

Department		1981	1991	2017			
				Case 1	%(+,-)	Case 2	%(+,-)
Concepción	Farm household	13,438	16,119	24,500	0.019	20300	0.009
	Population	72,529	95,345	173,333	0.031	134,339	0.015
San Pedro	Farm household	24,646	37,767	84,200	0.047	61,000	0.023
	Population	137,458	207,781	484,163	0.051	345,339	0.025
Cordillera	Farm household	20,735	22,364	26,900	0.007	24,600	0.003
	Population	104,169	110,121	126,470	0.005	118,310	0.002
Guairá	Farm household	16,696	28,086	30,700	0.020	25,400	0.010
	Population	84,947	100,237	147,148	0.018	123,692	0.009
Caaguazú	Farm household	35,937	43,681	68,200	0.021	55,900	0.010
	Population	201,821	244,680	379,802	0.021	312,241	0.010
Caazapá	Farm household	15,661	20,682	37,900	0.032	29,300	0.016
	Population	77,490	106,954	212,680	0.038	159,817	0.019
Itapúa	Farm household	30,177	40,808	78,200	0.035	59,500	0.017
	Population	145,699	220,343	513,835	0.051	367,118	0.025
Misiones	Farm household	9,156	9,918	12,100	0.008	11,000	0.004
	Population	43,138	47,880	61561	0.010	54,727	0.005
Paraguarí	Farm household	26,939	27,816	30,200	0.003	29,000	0.001
	Population	125,560	139,216	178,597	0.010	158,907	0.005
Alto Paraná	Farm household	13,704	21,772	55,100	0.058	38,400	0.029
	Population	71,054	113751	291,469	0.060	202,625	0.030
Central	Farm household	15,588	15,643	15,800	0.000	15,700	0.000
	Population	67,688	75,565	98,434	0.011	86,999	0.005
Ñeembucú	Farm household	8,454	8,716	9,400	0.003	9,100	0.001
	Population	37,356	37,479	37,801	0.000	37,645	0.000
Amambay	Farm household	4,122	3,294	1,600	-0.020	2,400	-0.010
	Population	12,702	16,408	28,856	0.029	22,632	0.014
Canindeyú	Farm household	7,652	11,857	28,800	0.054	20,300	0.027
	Population	37,099	61,011	163,247	0.064	112,137	0.032
Reg. Oriental	Farm household	243,905	300,523	481,900	0.023	391,200	0.011
	Population	1,218,710	1,576,500	2,781,235	0.029	2,179,003	0.014
Reg. Occidental	Farm household	5,025	6,698	12,400	0.038	9,600	0.020
	Population	17,286	21,900	37,475	0.010	29,922	0.000
Total	Farm household	248,930	307,221	494,300	0.023	400,800	0.011
	Population	1,235,996	1,598,400	2,818,710	0.029	2,208,925	0.014

Source: Estudio del Plan Maestro para el Programa Global de Cooperación al Pequeño Productor en la Región Oriental de la República del Paraguay, JICA,1997

(2) Estimated agricultural production

The study team compiled estimations on the production of major exported agricultural and livestock products and food crops up to 2010 according to department; and the results are shown in

Table 23 and 24. In 1990, the Ministry of Public Works and Communications (MOPC) and MAG compiled similar estimations up to the years 2000 and 2010. These estimations were very ambitious for 1990; and achieving these goals has been difficult, with the exception of soybeans. As a result, the study team compiled their own estimations based on recent trends in regional agriculture. The estimated statistics on production have been summarized and are shown as follows.

a) The production volume of soybeans is estimated to increase 1.3 times over current levels in 2010. Alto Paraná and Itapúa departments, the present soybean producing areas, have increased their production volume by only 1.0 to 1.2 times per annum. However, the northern departments of Canindeyú and San Pedro are anticipated to increase their production volume by 1.5 to 1.6 times.

b) Wheat is the winter crop and the production volume adequately meets the domestic consumption demand. As a result, wheat is not produced in some years depending on the conditions of the soybean harvest. Due to such an unstable system of cultivation, and also change of an international market price the production volume of wheat is anticipated to drop greatly.

c) The drop in the production volume of cotton is expected to continue and it is anticipated that improving the income of small-scale farms will be difficult. Vegetables, as exemplified by tomatoes, is anticipated to become the substitute crop for cotton by small-scale farms and the production volume is expected to increase. This is particularly true to for San Pedro, Amambay, and Paragurí departments, where the growing number of small-scale farms are dispersed.

Table 23 Estimated Production Volume of Major Agriculture and Livestock Products

		1997	2005	2010	2010/1997
Agriculture Products (1,000ton)	Soybeans	2,856	3,466	3,724	1.30
	Wheat	229	188	196	0.85
	Corn	873	941	1,001	1.14
	Sorghum	21	23	24	1.14
	Rice	100	157	170	1.70
	Cotton	222	182	183	0.82
	Cassava	237	264	275	1.16
	Sugarcane	3,127	2,918	2,948	0.94
Livestock Products (1,000heads)	Beef cattle	9,022	8,940	8,930	0.99
	Dairy cattle	690	710	723	1.05
	Pig	1,746	1,873	1,925	1.10
	Chicken	14,997	15,611	15,900	1.06

Source: JICA-EDEP

Table 24 Estimated Production Volume of Major Agriculture and Livestock Products according to Department (1)

unit: 1,000 ton

Department	Soybean			Wheat			Corn			Cotton		
	1997	2005	2010	1997	2005	2010	1997	2005	2010	1997	2005	2010
Concepción	0.5	0.2	0.2	0	0	0	15.1	16.7	16.7	12.8	7.3	6.5
San Pedro	57.6	82.3	87.9	2.7	1.9	1.6	66.5	87.4	96.0	51.3	37.4	36.1
Cordillera	0	0	0	0	0	0	8,589	5,566	5,176	1650	724	617
Guairá	0.7	0.6	0.6	0	0	0	16.0	20.5	21.1	7.5	3.2	2.7
Caaguazú	157.0	225.5	254.2	35.3	38.1	40.0	112..5	70.4	69.9	41.4	37.3	34.4
Caazapá	180.0	293.7	372.8	27.0	41.5	56.9	54.0	70.4	73.8	20.7	11.9	10.8
Itapúa	794.5	1,005.9	1,032.2	54.1	33.6	29.3	189.9	191.1	203.4	33.8	21.5	20.0
Misiones	0.7	0.6	0.6	0	0	0	12.5	11.3	11.5	5.2	4.9	4.9
Paraguarí	0	0	0	0	0	0	17.8	18.0	18.4	16.6	8.5	8.1
Alto Paraná	1,180.4	1,190.2	1,227.2	77.6	52.2	48.2	221.6	253.3	273.6	9.5	20.9	19.6
Central	0	0	0	0	0	0	1.1	1.1	1.0	0.6	0.6	0.6
Ñeembucú	0	0	0	0	0	0	22.6	4.2	4.2	3.0	4.4	4.3
Amambay	99.0	119.7	132.3	17.5	9.9	9.7	50.3	46.4	49.1	2.5	0.9	0.8
Canindeyú	385.4	546.8	615.7	15.0	11.0	10.8	104.2	143.2	156.2	8.9	6.5	5.7
Pte.Hayes	0	0	0	0	0	0	0.4	0.4	0.4	1.0	0.8	0.7
Alto Paraguay	0	0	0	0	0	0	0.05	0.04	0.04	2.0	10.9	22.9
Boquerón	0	0	0	0	0	1.0	0.6	0.8	0.8	3.6	4.6	4.3
Total	2,855.7	3,465.7	3,723.8	229.2	188.4	196.2	873.9	940.8	1,001.4	222.0	182.3	182.9

Source: JICA-EDEP

Table 25 Estimated Production Volume of Major Agriculture and Livestock Products according to Department (2)

Department	Cassava (1,000ton)			Beef cattle (1,000head)			Pig (1,000head)			Chicken		
	1997	2005	2010	1997	2005	2010	1997	2005	2010	1997	2005	2010
Concepción	11.9	9.2	9.1	678.4	697.0	704.4	76.6	83.9	87.1	675.4	693.6	703.2
San Pedro	33.5	46.7	49.4	938.5	939.7	939.7	234.2	254.1	262.3	1,421.4	1,457.4	1,477.2
Cordillera	12.4	12.2	12.3	242.8	227.3	221.7	73.8	79.4	81.9	679.9	687.1	691.2
Guairá	15.2	13.5	13.7	206.4	205.2	205.2	84.6	89.5	92.1	878.0	904.6	916.9
Caaguazú	46.6	50.1	51.9	490.4	484.8	482.8	201.4	216.4	222.3	1,801.0	1,885.0	1,918.1
Caazapá	14.8	24.6	25.8	250.7	234.6	227.3	123.5	132.3	135.7	906.5	918.7	927.1
Itapúa	26.7	27.1	27.1	530.5	532.0	533.4	331.0	354.0	362.7	2,116.2	2,215.2	2,262.2
Misiones	5.6	5.0	5.0	414.3	400.4	393.3	37.5	40.9	42.3	319.7	328.3	332.2
Paraguarí	17.7	14.4	14.5	443.4	422.1	412.9	103.3	111.8	115.4	1,292.3	1,391.3	1,435.8
Alto Paraná	23.3	24.9	26.0	326.3	318.7	316.1	230.0	242.5	246.9	1,275.8	1,335.8	1,361.1
Central	2.7	1.3	1.2	89.1	92.2	94.1	52.1	56.5	58.7	2,392.4	2,516.0	2,574.7
Ñeembucú	1.3	0.9	0.8	416.0	404.2	400.7	23.4	25.1	25.9	205.6	206.9	208.6
Amambay	8.1	6.7	6.9	594.4	599.9	601.8	37.9	43.2	45.9	237.1	248.9	253.6
Caindeyú	16.6	27.8	30.9	625.7	656.8	672.2	105.7	108.1	109.4	652.9	681.9	694.5
Pte.Hayes	0.2	0.1	0.1	1,888.6	1,836.2	1,830.8	21.6	22.9	23.5	87.1	88.7	89.3
Alto Paraguay	0.01	0.01	0.01	294.3	294.9	29.5	5.6	5.8	6.0	4.5	-	-
Boquerón	0.05	0.04	0.04	591.9	593.7	59.6	6.0	6.8	7.2	51.0	51.8	52.2
Total	236.7	264.4	274.8	9,021.9	8,939.9	8,927.0	1,763.6	1,873.2	1,925..3	14,997.0	15,611.4	15,898.2

Source: JICA-EDEP

(3) Estimated supply and demand of major food crops

The estimated supply and demand in increased consumption trends in recent years for major food crops such as wheat, corn, and root crops are shown in Table 26. The characteristics are summarized as follows.

a) A surplus supply of corn is expected in all departments in future, excluding Chaco in the occidental region.
b) The supply capacity of wheat will lower in the major wheat producing areas of Alto Paraná and Itapúa departments and the cities of Este and Encarnación due to increased population. In addition, the population increase in the capital, Asunción, will be marked and there will be a supply shortage.
c) The demand of vegetable (tomato, onion, carrot) are anticipated to increase about from 1.6 to 2.0 times in each of the departments of Central and Alto Paraná which have major cities.
d) Based on the estimated balance in supply and demand, Caazapá department which is located between the southern region with fertile soil conditions and the central region with poor soil conditions is the only department that will be able to achieve self-sufficiency in food.
e) This suggests that supplementary production of food crops is vital between departments. There is the possibility that the disparity in food shortages between regions in future will become acute, unless a system of supplementary production and marketing is established in each department.
f) In addition, the number and dispersal of small, medium, and large-scale farms is relatively well-balanced in this department. This is indicative of the importance of having a combination of various agricultural systems in the department.

Table 26 Estimated Supply and Demand of Major Food Crops by Departments (unit:ton)

Department	Produce	1998			2005			2,010		
Population		Supply	Demand	Difference	Supply	Demand	Difference	Supply	Demand	Difference
Concepción	Wheat	0	7,507	-7,507	0	8,045	-8,045	0	8,334	-8,334
1998: 187,674	Corn	16,275	3,753	12,522	16,686	4,022	12,664	16,670	4,167	12,503
2000: 201,121	Rice	208	1,877	-1,669	199	2,011	-1,812	192	2,084	-1,892
2010: 208,350	Vegetables	3,177	4,955	-1,778	2,955	5,310	-2,355	2,814	5,500	-2,687
	Root vegetables	13,800	18,767	-4,967	13,766	19,106	-5,341	13,610	18,752	-5,142
San Pedro	Wheat	2,688	13,719	-11,031	1,886	16,465	-14,579	1,588	18,498	-16,910
1998: 342,979	Corn	71,400	6,860	64,540	87,404	8,232	79,172	96,039	9,249	86,790
2005: 411,619	Rice	0	3,430	-3,430	0	4,116	-4,116	0	4,624	-4,624
2010: 462,441	Vegetables	11,880	9,055	2,825	13,710	10,867	2,844	15,303	12,208	3,095
	Root vegetables	64,500	34,298	30,202	70,005	39,104	30,901	74,069	41,620	32,449
Cordillera	Wheat	0	8,628	-8,628	0	8,527	-8,527	0	8,341	-8,341
1998: 215,688	Corn	6,250	4,314	1,936	5,566	4,263	1,303	5,176	4,170	1,006
2005: 213,173	Rice	2,759	2,157	602	2,665	2,132	533	2,582	2,085	497
2010: 208,514	Vegetables	7,095	5,694	1,401	7,051	5,628	1,423	6,996	5,505	1,491
	Root vegetables	18,000	21,569	-3,569	18,246	20,251	-2,005	18,446	18,766	-321
Guairá	Wheat	0	6,968	-6,968	0	7,032	-7,032	0	6,983	-6,983
1998: 174,211	Corn	19,500	3,484	16,016	20,462	3,516	16,946	21,073	3,491	17,582
2005: 175,811	Rice	210	1,742	-1,532	196	1,758	-1,562	186	1,746	-1,560
2010: 174,572	Vegetables	836	4,599	-3,763	1,036	4,641	-3,605	1,131	4,609	-3,478
	Root vegetables	19,500	17,421	2,079	20,220	16,702	3,518	20,424	15,711	4,713

Caaguazú		Wheat	32,880	17,952	14,928	38,075	19,670	18,405	39,990	20,686	19,304
1998:	448,811	Corn	67,986	8,976	59,010	70,419	9,835	60,584	69,905	10,343	59,562
2005:	491,740	Rice	1,242	4,488	-3,246	1,274	4,917	-3,643	1,260	5,172	-3,912
2010:	517,156	Vegetables	43,586	11,849	31,738	49,896	12,982	36,914	53,770	13,653	40,117
		Root vegetables	69,900	44,881	25,019	75,171	46,715	28,456	77,829	46,544	31,285
Caazapá		Wheat	23,000	5,695	17,305	41,495	5,856	35,639	56,855	5,895	50,960
1998:	142,380	Corn	66,107	2,848	63,259	70,426	2,928	67,498	73,770	2,948	70,822
2005:	146,412	Rice	37,606	1,424	36,182	44,937	1,464	43,473	52,771	1,474	51,297
2010:	147,376	Vegetables	22,308	3,759	18,549	44,981	3,865	41,116	71,630	3,891	67,739
		Root vegetables	34,988	14,238	20,750	36,878	13,909	22,968	38,666	13,264	25,402
Itapúa		Wheat	42,000	18,667	23,333	33,661	22,116	11,545	27,061	24,637	2,424
1998:	466,681	Corn	162,500	9,334	153,166	191,057	11,058	179,999	203,336	12,319	191,017
2005:	552,908	Rice	35,445	4,667	30,778	34,801	5,529	29,272	34,694	6,159	28,535
2010:	615,929	Vegetables	4,730	12,320	-7,590	5,053	14,597	-9,543	5,287	16,261	-10,974
		Root vegetables	40,500	46,668	-6,168	40,586	52,526	-11,941	40,592	55,434	-14,842
Misiones		Wheat	0	3,969	-3,969	0	4,095	-4,095	0	4,133	-4,133
1998:	99,230	Corn	10,800	1,985	8,815	11,261	2,048	9,213	11,513	2,067	9,446
2005:	102,387	Rice	45,077	992	44,085	53,527	1,024	52,503	58,983	1,033	57,950
2010:	103,329	Vegetables	1,232	2,620	-1,388	1,243	2,703	-1,460	1,258	2,728	-1,469
		Root vegetables	7,176	9,923	-2,747	7,538	9,727	-2,189	7,721	9,300	-1,579
Paraguarí		Wheat	0	9,904	-9,904	0	9,694	-9,694	0	9,349	-9,349
1998:	247,594	Corn	17,871	4,952	12,919	18,055	4,847	13,208	18,443	4,675	13,768
2005:	242,355	Rice	5,900	2,476	3,424	6,264	2,424	3,840	6,702	2,337	4,365
2010:	233,736	Vegetables	12,540	6,536	6,004	14,298	6,398	7,900	15,642	6,171	9,471
		Root vegetables	21,000	24,759	-3,759	21,596	23,024	-1,428	21,683	21,036	646
Alto Paraná		Wheat	57,420	25,203	32,217	52,219	36,704	15,515	48,231	46,826	1,405
1998:	630,065	Corn	211,500	12,601	198,899	253,264	18,352	234,912	273,641	23,413	250,228
2005:	917,609	Rice	4,308	6,301	-1,993	4,870	9,176	-4,306	5,134	11,707	-6,573
2010:	1,170,650	Vegetables	8,470	16,634	-8,164	8,545	24,225	-15,680	8,540	30,905	-22,365
		Root vegetables	34,500	63,007	-28,507	37,371	87,173	-49,802	39,054	105,359	-66,305
Central		Wheat	0	49,024	-49,024	0	64,955	-64,955	0	77,761	-77,761
1998:	1,225,612	Corn	1,318	24,512	-23,194	1,112	32,478	-31,366	1,042	38,881	-37,839
2005:	1,623,886	Rice	875	12,256	-11,381	614	16,239	-15,625	515	19,440	-18,925
2010:	1,944,035	Vegetables	24,420	32,356	-7,936	23,822	42,871	-19,049	23,184	51,323	-28,139
		Root vegetables	2,250	122,561	-120,311	1,935	154,269	-152,334	1,748	174,963	-173,216
Ñeembucú		Wheat	0	3,497	-3,497	0	3,561	-3,561	0	3,527	-3,527
1998:	87,433	Corn	4,125	1,749	2,376	4,201	1,780	2,421	4,193	1,764	2,429
2005:	89,021	Rice	0	874	-874	0	890	-890	0	882	-882
2010:	88,183	Vegetables	1,584	2,308	-724	1,822	2,350	-529	2,090	2,328	-238
		Root vegetables	1,500	8,743	-7,243	1,344	8,457	-7,113	1,245	7,936	-6,691
Amambay		Wheat	10,500	5,211	5,289	9,989	6,095	3,894	9,674	6,663	3,011
1998:	130,273	Corn	40,500	2,605	37,895	46,421	3,047	43,374	49,116	3,332	45,784
2005:	152,366	Rice	2,680	1,303	1,377	1,800	1,524	276	1,449	1,666	-217
2010:	166,583	Vegetables	1,925	3,439	-1,514	2,196	4,022	-1,827	2,391	4,398	-2,006
		Root vegetables	9,000	13,027	-4,027	9,986	14,475	-4,489	10,419	14,992	-4,573
Canindeyú		Wheat	11,600	5,490	6,110	11,030	6,673	4,357	10,602	7,489	3,113
1998:	137,248	Corn	120,000	2,745	117,255	143,249	3,337	139,912	156,237	3,744	152,493
2005:	166,837	Rice	4,850	1,372	3,478	5,481	1,668	3,813	5,813	1,872	3,941
2010:	187,214	Vegetables	669	3,623	-2,955	667	4,404	-3,738	667	4,942	-4,276
		Root vegetables	34,701	13,725	20,976	41,657	15,850	25,807	46,385	16,849	29,535
Pte. Hayes		Wheat	0	3,166	-3,166	0	3,703	-3,703	0	4,043	-4,043
1998:	79,138	Corn	390	1,583	-1,193	392	1,852	-1,460	395	2,022	-1,627
2005:	92,583	Rice	0	791	-791	0	926	-926	0	1,011	-1,011
2010:	101,075	Vegetables	0	2,089	-2,089	0	2,444	-2,444	0	2,668	-2,668
		Root vegetables	227	7,914	-7,687	224	8,795	-8,572	222	9,097	-8,875
Alto Paraguay		Wheat	0	564	-564	0	634	-634	0	669	-669
1998:	14,110	Corn	53	282	-229	41	317	-276	37	335	-298
2005:	15,843	Rice	0	141	-141	0	158	-158	0	167	-167
2010:	16,725	Vegetables	0	373	-373	0	418	-418	0	442	-442
		Root vegetables	17	1,411	-1,395	17	1,505	-1,489	17	1,505	-1,489
Boquerón		Wheat	0	1,452	-1,452	0	1,742	-1,742	0	1,929	-1,929
1998:	36,291	Corn	658	726	-68	774	871	-97	836	964	-128
2005:	43,545	Rice	0	363	-363	0	435	-435	0	482	-482
2010:	48,224	Vegetables	0	958	-958	0	1,150	-1,150	0	1,273	-1,273
		Root vegetables	62	3,629	-3,568	65	4,137	-4,072	66	4,340	-4,274
Total		**Wheat**	**180,088**	**186,617**	**-6,529**	**188,355**	**225,569**	**-37,214**	**194,001**	**255,764**	**-61,763**
1998:	**4,417,824**	**Corn**	**817,233**	**93,308**	**723,925**	**940,790**	**112,784**	**828,006**	**1,001,422**	**127,882**	**873,540**
2005:	**5,396,861**	**Rice**	**141,160**	**46,654**	**94,506**	**156,628**	**56,392**	**100,236**	**170,281**	**63,941**	**106,340**
2010:	**6,160,356**	**Vegetables**	**144,452**	**123,167**	**21,285**	**177,274**	**148,875**	**28,398**	**210,703**	**168,804**	**41,899**
		Root vegetables	**371,619**	**466,542**	**-94,923**	**396,600**	**535,726**	**-139,126**	**412,191**	**575,468**	**-163,277**

Note: Annual average per capita consumption volume are as follows: Corn: 40 kg, Rice: 10 kg, Vegetables: 26 kg,
Root vegetables: 100 kg in 1998, 95 kg in 2005, 90 kg in 2010.
Source: JICA-EDEP

1.2.3 Development concept:
"So what to do?"

(1) Development objectives

Based on the discussion above, the following development objectives are proposed in order to achieve sustainable agricultural development in Paraguay.

a) Promote diverse agricultural commodities for export and eliminate Paraguay's image as an exporter of primary agricultural products.
b) Strengthen the competitiveness in both the domestic and export markets by improving agricultural productivity and quality (additional value).

These combined development objectives, which are based on the characteristics of the agricultural sector, reflect the future status of Paraguay's economy and agricultural sector and the role and demand they will be anticipated to fulfill when resolving development issues.

(2) Basic development concept

In order to realize a substantial achievement of these development objectives, the following two concept are proposed.

Basic concept 1

Promote the formation of a production system that incorporates regional agricultural characteristics, improve agricultural productivity, and strengthen competitive viability in both the domestic and export markets.

Basic concept 2

Promote agriculture and rural development that is based on agricultural processing, aim for diversified agricultural export products, and change the image of the country as an exporter of primary agricultural products.

The significance of the development concept given above is summarized below.

a) As explained earlier, agricultural development objectives to achieve its goals through agricultural processing. In order to improve Paraguay's competitiveness in the MERCOSUR countries and in other regions, this objective is a dynamic means of securing an advantage in the market utilizing the agricultural processing industry and ending the traditional

dependence on the export and production of primary products.

b) Apart from distribution and sales, the success or failure of the agricultural processing industry is dependent on the supply of raw materials. The small, medium, and large-scale farms produce and supply the materials for the processing industry. In such cases, regional agriculture that adequately reflects different regional land productivity and agricultural conditions will be targeted.

c) Incorporating small-scale farms with low productivity and competitiveness, which comprise the basic stratum of the rural community, will contribute to an improved and stable rural economy. When seen in this light, promoting the agricultural processing industry will serve as a positive force in mobilizing the rural community.

d) A multiplying effect, beginning with the production of primary ingredients to secondary and third products of each industry, is anticipated if a structure of agricultural development based on processing is created.

e) In an overall review of the above, firstly, agricultural processing adds to the competitiveness of the agricultural sector, but secondly, it is also a strategy that can be altered and expanded to help reorganize regional agriculture and maintain a sound rural community. This raises the strategic value of this structure of agricultural development even further.

1.3 AGRICULTURAL DEVELOPMENT STRATEGY

1.3.1 Strategy to achieve agricultural development objectives

(1) Relation between development concept and development strategy

Development strategies based on assistance for agricultural and livestock production, agricultural financial assistance, assistance to support exports, and strengthening producer organizations and agricultural cooperatives that are needed to fulfil the two basic development concept explained in the previous section 1.2.3, are proposed in this chapter. The following development strategies are aimed at achieving the two development concepts. However, the development strategies will not accomplish their objectives without the combined effort of other sectors.

Basic concept 1: Promote the formation of a production system that incorporates regional agricultural characteristics, improve agricultural productivity, and strengthen competitiveness in both the domestic and export markets.

Strategy (1-1) Promote a production region that aims to decrease production cost and improvement of productivity.

Strategy (1-2) Promote effective agricultural financing

Basic concept 2: Promote agriculture and rural development that is based on agricultural processing, aim for diversified agricultural export products, and change the image of the country as an exporter of primary agricultural products.

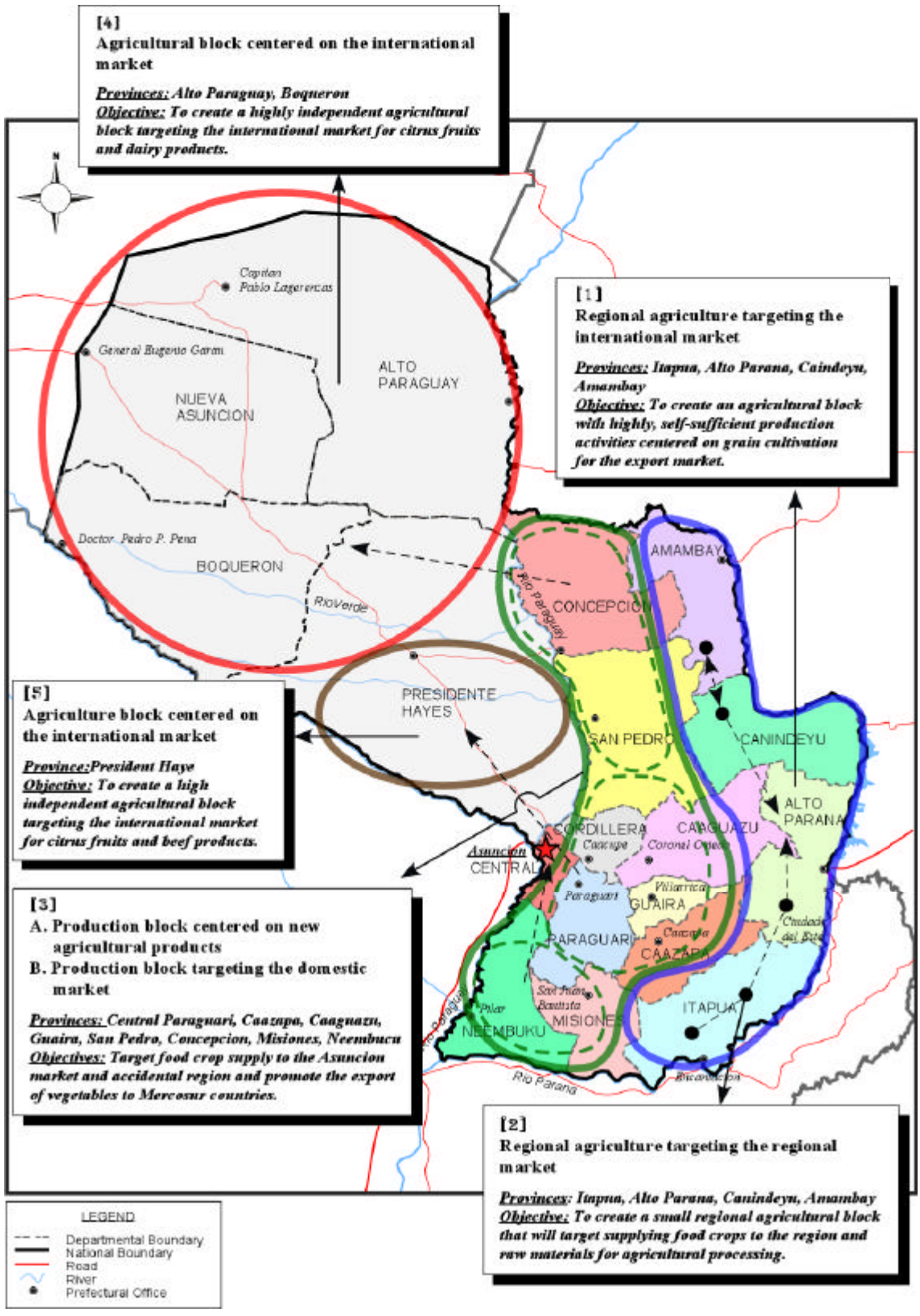
Strategy (2-1) Promote the export of agricultural and animal products by implementing a plant and animal inspection system.

Strategy (2-2) Diversify agricultural products and promote the agricultural processing industry by supporting producer organizations and agricultural cooperatives.

(2) Focal concept of agricultural development strategies -agricultural production blocks according to region-

The focal concept underlying agricultural development strategy is zoning the agricultural production in blocks according to region as shown in Figure 15. The agricultural production blocks according to region will be based on regional farming characteristics, recent crop production, and production trends. According to this concept, increased production of agricultural and livestock products with high productivity will be targeted. The region will be divided into 5 blocks with different production trends or different production goals.

Figure 15 Agricultural Production Blocks according to Region



1.3.2 Development strategy program

The objectives of each development strategy program and the projects that comprise the program are discussed below. The development strategy program and projects have been considered in conjunction with the development structure of clusters explained in Volume 5.

(1) Assisting regional production program

The program objective to promote regional production by incorporating regional characteristics such as different regional land productivity, agricultural conditions, scope of the farms (small, medium, large-scale), and the type of farm management that is practiced, to improve productivity, and strengthen the competitiveness of exported products. In addition, in view of the deterioration anticipated in the balance of food supply and demand in each region in future, the program will help increase the production of food crops in the region. Improving the production system in the region, will promote competition between production areas and the anticipated benefits are lowered costs and improved quality. Based on the objectives mentioned above, the following support projects are proposed.

(1.1) Increase production of major grains
(1.2) Assist cotton production
(1.3) Increase production of new exports products (horticulture)
(1.4) Assist production of new livestock products
(1.5) Assist production of useful trees and shrubs in the eastern region
(1.6) Establish a regional market in order to create a produce-producing region
(1.7) Integrate, systematize, and utilize the research findings of research institutions and MAG agricultural experiment

(2) Assisting the export of agricultural and livestock products program

One of the factors impeding the export of Paraguayan agricultural and livestock products is the lack of an inspection system for such export products; and this has become a non-tariff barrier in the trade with MERCOSUR countries. In addition, the Hazard Analysis and Critical Control Point (HACCP) has been adopted by the WTO, resulting in stringent hygiene inspection controls. Therefore, despite improved productivity and strengthened competitiveness in the export market, increased exportation of Paraguayan products in the MERCOSUR and global market can not be expected if a hygiene inspection control system for exported agricultural and animal products is not implemented. Moreover, the lack of a hygiene inspection system for primary products will also impact the export of processed agricultural products. Therefore, an immediate

countermeasure is needed. The following project is suggested based on the conditions described above.

(2.1) Plant disease prevention project

(2.2) Hygiene management project for livestock products

(2.3) Analyze harmful substances in meat

(3) Strengthening agricultural producers and cooperatives program

The cooperative is fulfilling a leading role in regional agriculture in the leading soybean and vegetable producing areas. They purchase farming equipment in one sum payments and resell it to their members at a reduced cost, thereby contributing to lowered production costs of their members. Presently, it has become difficult for small-scale farms, which comprise 80 % of the total number of farms in Paraguay, to achieve stable farm management operations due to the lack of capital. As a result, cooperatives and farmer organizations provide easily accessible capital for production and technical support and they have contributed to expanding the operations of the farms. In addition, cooperatives are a stable source of raw materials, an essential element in realizing the proposed cluster strategy. In view of the benefits that are derived from cooperatives and farmer organizations and in order for them to play a role in the development strategies mentioned above, the following projects are proposed.

(3.1) Support agricultural cooperatives

(3.2) Promote small-scale farm participation in agriculture processing

(4) Agricultural financing program

The selection criteria of agricultural producers in Paraguay is not based on yield or high productivity levels, but natural disasters (unusual climate) and the compensation for production risks stemming from unstable market prices. This tendency is especially prevalent among small-scale farmers. The Paraguayan government normally does not provide assistance measures for farms suffering financial losses due to disease, pest, or drought. Producers hesitate to diversify their crops out of fear for a poor crop and this has been an impediment which has slowed the movement toward diversification. The production of soybeans which is a competitively viable export product for Paraguay is mainly carried out by cooperatives and its member farms. Financing the farm management capital for cooperatives is an important means of sustaining the development of competitiveness. The following agricultural financing plan based on the conditions described above is shown below. The objective is to achieve agricultural diversification. This program has been included in the development strategy outlined in Volume 2 on the Institutional finance.

(4.1) Crop specific financial
(4.2) Financial assistant for agricultural cooperative
(4.3) Crop insurance

1.3.3 Priority of agricultural programs/projects

(1) Evaluation criteria of priority programs/projects

There are 4 programs and 15 projects, which have been proposed as agricultural development strategy programs/projects. Of these programs and projects, which have been proposed, those, which meet the following criteria, will be designated as priority programs.

a) Those programs and projects that are currently being implemented and which contribute greatly to MAG agricultural policies will be assisted to enable both to function effectively.
b) Programs and projects that greatly strengthen the competitiveness of export produce with relatively low investment and where the effects have been corroborated in past studies will be given priority.
c) Programs and projects which have been evaluated as important to coping with the changes in the external conditions of multilateral agricultural negotiations will be given priority.
d) Programs and projects which are in line with the cluster development structure that is the focus of the economic development objectives of this study and which will play a strategic role in future investments economic development will be given priority.

(2) Proposed priority programs/projects

The programs and projects which meet the evaluation criteria listed above and which will be given priority in 2006 will be proposed in a short list.

Strengthening the competitiveness of exported agricultural products, despite short-term measures, it is extremely important that the proposed programs are well-balanced and integrated and not implemented as separate, individual projects/programs. In order to achieve this, it is important to focus on the following categories of: forming a production region, promoting agricultural and livestock products for export, and supporting farmer organizations and cooperatives. The Figure 16 shows the priority programs/projects for action plan are proposed based on the integration of these categories. These priority programs are the basic package that implements the development strategies described earlier and it is comprised of ten priority projects. The agricultural financing program is based on the development strategy explained in Volume 2 on Institutional Finance.

Figure 16 Proposed Priority Programs/Projects

Program／Project	Phase 1	Phase 2	Phase 3	Phase 4	Implementation Agency
	2001-3	2004-6	2007-10	>2011	
1. Assisting regional production program					
1.1 Increase production of major grains					DGP-CRIA
1.2 Assist cotton production					DGP-DEAG
1.3 Increase production of new export products (horticulture)					DGP-DC-DEAG
1.4 Assist production of new livestock products					DGP-S.S.E.G
1.5 Assist production of useful trees and shrubs in the eastern region					DGP-S.E.R.E.N
1.6 Establish a regional market in order to create a produce-producing region					DGP-DC
1.7 Integrate, systematize, and utilize the research findings of MAG agricultural experiment					DGP-DIA-CRIA-IAN
2. Assisting the export agricultural and livestock products program					
2.1 Plant disease prevention					DGP-DDV
2.2 Hygiene management for livestock products					DGP-SENACSA
2.3 Analyze harmful substances in meat					DGP-S.S.E.G
3. Strengthening agricultural producers and cooperatives					
3.1 Support agricultural cooperatives					DGP-INCOOP
3.2 Promote small-scale farm participation in agriculture processing					DEAG-INCOOP
4. Agricultural financing program					
4.1 Crop specific finance					DGP-DDV
4.2 Financial assistant for agricultural cooperatives					DGP-SENACSA
4.3 Crop insurance					DGP-S.S.E.G

Note: CRIA: Centro de Investigación Agrícola, DGP: Dirección General de Planificación,
DC: Dirección de Comercio, DDV: Dirección de Defensa Vegetal, DEAG: Dirección de Extensión Agricola
DIA:Dirección de Investigación Agrícola, SENACSA: Servicio Nacional de Salud Animal,
S.S.E.G: Sub Secretaria de Ganadería, SEREN: Secretaria de Recursos Natural
INCOOP: Instituto Nacional de Cooperativa

1.3.4 Outline of priority projects

(1) Assisting regional production program

(1.1) Increase production of major grains

[Rationale]

The major grains, soybeans, wheat, and corn, are land utilization crops that are mainly produced by medium-scale farms. With the exception of corn, the soybean and wheat producing areas are restricted to the southern, eastern, and northern regions of Paraguay. Soybean is the country's largest export product, which is competitively viable in the international market due to high productivity. Therefore, increased soybean production is a focal issue in terms of national economic development.

In contrast, the production of wheat, which achieved self-supportive levels in the mid-1980s, peaked at 540,000 tons in 1996 and the production volume has since gradually declined yearly due to the rotation cropping system. If this trend continues, the production volume is estimated to drop to 190,000 tons by 2010 and the national economy is expected to be affected by an increased import volume of wheat due to a large shortage in wheat supply. Corn, which is mainly produced by small-scale farms, is also a major food crop. In addition, in conjunction with an increased demand in new animal products such as pork and chicken, the demand for corn is anticipated to rise as a livestock feed crop. In view of these circumstances, the project to increase production of major grains is essential to the sustained development of exported soybean as well as to the increased food crop supply.

[Proposed project]

The objectives of the Project are as follows.

- To establish and disseminate a rotation cropping system that reflect the regional rural characteristics of the combined production of soybeans, wheat, and corn.
- To achieve effective farmland use and reduce grain production costs by promoting a rotation cropping system.

Based on the findings of the field survey study, it was ascertained that the CRIA experimental farm in Itapúa department had contributed greatly to the development and dissemination of cultivation technology and high-yield seeds in the production of major grain crops. The following basic activities, which will be implemented mainly by the CRIA experimental farm, are proposed in the project.

a) Plan to improve the soybean cultivation system according to region

Trial research in establishing and disseminating an appropriate cultivation system and seed-crossing and selection of varieties suited to the agricultural production conditions in the departments of Itapúa, Alto Paraná, Canindeyú, and Amambay will be pursued. The following has been proposed as the major output.

- Establish MAG agricultural extension or experimental farms (of about 1ha) in each department.
- Experimental seed crossing materials
- Experimental research materials (fertilizer, pesticides, farm machinery, etc.)

b) Plan to improve the wheat cultivation system according to region

Trial research in establishing and disseminating an appropriate cultivation system, guaranteed seed production, and cross-fertilization and selection of varieties suited to the agricultural production conditions in the four soybean producing departments mentioned above will be carried out on an experimental basis to establish a rotation cropping system for wheat.

The following has been proposed as the major output.

- Establish MAG agricultural extension or experimental farms (of about 1ha) in each department.
- Experimental seed crossing materials
- Experimental research materials (fertilizer, pesticides, farm machinery, etc.)

c) Plan to improve the corn cultivation system according to region

Trial research in establishing and disseminating an appropriate cultivation system, cross-fertilization and selection, original seed production, dissemination and promotion of hybrid varieties suited to the agricultural production conditions in the four soybean producing departments mentioned above, as well as in the Caazapá, San Pedro, Misiones departments will be carried out.

The following has been proposed as the major output.

- Establish MAG agricultural extension or experimental farms (of about 1ha) in each department.
- Drying area
- Experimental seed crossing materials
- Experimental research materials (fertilizer, pesticides, farm machinery, etc.)

[Project implementation]

a) Donor input

The cost of the entire project is estimated at about US$1,500,000. Much of the project is comprised of basic research such as establishing a rotation cropping system and production of a variety of seeds for cultivation. As a result, the project must be funded and managed basically by the MAG and relevant departmental governments. However, the impact of the project will be greatly enhanced if donor assistance is procured in the following areas.

- Establish experimental farms in each region.
- Develop original seed and appropriate varieties.

b) Project linkage

JICA assistance has been provided in improving cultivation technology and soybean and wheat seed development in the past. In addition, CIMMYT cooperation has assisted basic research in corn cultivation. The evaluation and utilization of the results of these past research activities are important. Furthermore, it is vital that experimental research in each region is coordinated with the DEAG of MAG.

(1. 2) Assist cotton production

[Rationale]

Cotton, in conjunction with soybeans, is one of Paraguay's limited export products and it is a traditional cash crop for small-scale farms. However, the production volume has declined in the past ten year period following a peak production volume of 540,000 tons in 1990 and it is estimated to decline further to 180,000 tons by 2010. The recovery of the declining production volume in cotton is a vital issue in achieving stable small-scale farm management and for the national economy. In addition, many of the cotton factories throughout the country have closed down due to a shortage of raw materials, which has in turn, lowered the export volume of cotton products and contributed to unemployment.

[Proposed project]

According to the findings of the field survey study, the major factors that have contributed to the declining production volume of cotton are the advent of the picudo pest and the long years of continuous cropping which has lowered soil fertility. Although the picudo pest ravaged the entire eastern region of the country, the cotton producing departments of San Pedro, Paraguarí, and Caaguazú were particularly hard hit. The picudo pest was effectively countered by having farmers sow the cottonseed simultaneously early in the season in this region. The introduction of the appropriate variety of seed and their dissemination was required for this countermeasure to succeed. In addition, establishing a rotation cropping system by combining the cultivation of cotton with other crops is essential in order to improve soil fertility. In view of these circumstances, the following projects are proposed to help increase the production volume of cotton.

a) Controlling cotton disease and pest damage and establishing a monitoring system

The conditions pertaining to the onset of crop damage due to disease and pests will be estimated based on natural conditions such as temperature, rainfall, humidity, etc. and information will be disseminated throughout the production region. The season for simultaneous planting activities will be decided based on this information.

Targeted departments: San Pedro, Paraguarí, Caaguazú, and Itapúa, the production departments

Content: - Set up a picudo prevention network in of all the targeted departments to observe and forecast the possible development of disease and pests.

- Create a data collection system at the regional MAG dissemination offices.

b) Fertility management in cotton cultivation and dissemination of technology to maintain land fertility

Due to long-term continuous cropping, the land is becoming infertile and measures such as deep plowing, green-manure crop cultivation, and plow in are being implemented to recover fertility.

Targeted departments: San Pedro, Paraguarí, Caaguazú, and Itapúa, the production departments

Content: Provide equipment to improve land fertility, trial cultivation, trial input of production materials (fertilizers, pesticides)

c) Establish a system to develop appropriate varieties of cotton seeds, increase production, and distribution according to region

Simultaneous planting activities and disease and pest resistance measures will be promoted due to the development and dissemination of cottonseeds that are suited to the regional cultivation conditions.

Targeted departments: San Pedro, Paraguarí, Caaguazú, and Itapúa, the production departments

Content: Seed crossing and selection of appropriate varieties of seed, testing system of distributed high yield seeds, create seed multiplication farms

[Project implementation]

a) Donor input

The total project cost is estimated at about US$3,500,000. Approximately 80 percent of MAG's agricultural extension personnel are presently engaged in supervising cotton cultivation. Therefore, it is anticipated that securing personnel to implement the project will be comparatively easy. In order to implement the project, a donor who will provide the capital and the technology in developing and distributing the appropriate varieties of seed is needed.

b) Project linkage

Presently, a program to promote agricultural financing for cotton cultivation on a nationwide level (Programa de Apoyo al Desarrollo de las Pequeños Fincas Algodoneras) is under review by MAG and coordination will be required.

(1.3) Increase production of new export products (horticulture)

[Rationale]

The findings on the anticipated supply and demand of major food crops show that only five departments out of the total 17 departments will be capable of supplying vegetables in 2010. The remaining 12 departments, including Central, Itapúa, and Alto Paraná that contain major cities, are located in the Occidental region where implementing cultivation activities is difficult. In contrast, the Caaguazú, Caazapá, and Paraguarí departments located in the central region of the country have a surplus production in vegetables. As a result, a surplus production of more than 40,000 tons is expected in the demand and supply balance of vegetables for the entire country.

Due to the limited scope of the domestic market, a surplus production volume is anticipated to continue in the future. Subsequently, the export of vegetables will be promoted in future, but there is a disparity in the quality of the products grown in Chile and Argentina and vegetables produced in Paraguay. This disparity is anticipated to contribute to a rise in the volume of imported vegetables. Countermeasures such as improving the quality of domestically grown vegetables, securing a stable market for processed vegetables, increasing the yield through improved post harvest activities and conducting year-around cultivation are important in order to expand exportation. In addition, vegetables are a priority crop targeted by MAG in its efforts to promote the diversification of crops grown by small-scale farms.

[Proposed project]

The major objectives of the project are: i) developing and disseminating technology on post harvesting, processing, storage, quality control, and year-round cultivation of targeted citrus fruits and vegetables such as tomatoes, melons, and bell peppers of major vegetable-producing departments, and ii) developing and increasing the production of seeds for processed vegetables. The implementation of this project is expected to establish a shipping system that will cope with the trends in supply and demand, improve productivity, and promote exportation. Based on these objectives, the following project is proposed.

a) Post harvest of vegetables and establishing a system of quality control

Presently, a total post harvest loss of 25 %, 10 % loss at the vegetable farm and during the shipment stage and a 15 % loss during the marketing stage, is seen. The objective of the project is to improve the post harvest loss and to develop and disseminate quality control technology in both the Central and Caaguazú departments targeted by the project.

b) Assist produce production

In order to establish year-around cultivation technology targeting tomatoes, melons, and carrots,

model irrigation facilities will be set up. In addition, seeds for processed vegetables will be developed and their production increased. As a countermeasure to combat Cancro diseases that have impeded citrus fruit production in Itapúa department and the Occidental region, some experiments on raising the seedling will be carried out.

[Project implementation]

The total project cost is estimated at about US$6,600,000. Projects to increase vegetable production include the JICA projects to improve vegetable production technology of small-scale farms in Paraguay to improve the marketing system. The achievements of these projects are expected to be applied in future. However, full-scale assistance has never been implemented in the area of post harvest technology and processing and donor assistance is needed. In addition, an IDB project to promote new crop exports (vegetables and fruits) is planned and this project must be coordinated with this project.

(1.4) Assist production of new livestock products

[Rationale]

The nationwide demand for pork and chicken, new animal products, is expected to rise by 25 and 80 %, respectively, by 2003, in comparison to 1993 levels. This trend will be compounded by a low 10 % growth rate in the demand for beef during this same period, in tandem with stagnant prices for traditional animal products. Therefore, the demand for new livestock products is anticipated to increase.

The characteristics of pork and chick production are: i) the growth period and turnover rate is faster than beef, ii) large areas of farmland are not needed, iii) production may be tied into the agricultural processing industry, iv) consistent labor throughout the year, and v) the leftover corn and grain products can be utilized and crop cultivation and livestock rearing can be combined. The nationwide production surplus in corn can be utilized as livestock feed, which will in turn lower production costs and increase exports. Increased production of new livestock products also serves to diversify exported products from Paraguay.

[Proposed project]

The issues in increased pork and chicken production are the eradication of livestock diseases and establishing a feed crop supply. If these measures are not established, exportation is difficult due to the lack of competitive viability in terms product quality and lowered production costs. In view of these circumstances, the following project is proposed in order to increase chicken and pork production.

a) Assisting pork production

The following project is proposed targeting the pork industry in Itapúa, Paraguarí, and Central departments.

- Establish a model pig raising facilities
- Disseminate pig-raising technology
- Utilization of mixed feed
- Establish a breeding production and supply of pigs.

Establishing a pig raising exhibition facility and a breeding farm in the departments mentioned above are vital in implementing the project.

b) Assisting poultry production

The following project is proposed in the Itapúa, Cordillera, Central, and Concepción departments where poultry farming is prevalent.

- Rearing, increased production, and marketing of poultry
- Establish and disseminate a system of poultry raising technology targeting small-scale farms
- Utilizing mixed feed

Establishing a poultry raising exhibition facility and disseminating poultry raising technology in the departments mentioned above will be carried out as part of the project.

c) Countermeasures targeting infectious livestock diseases

A survey on livestock disease management and increasing related equipment as a countermeasure against Newcastle disease that decimates poultry as well as pest and cholera that affect pigs will be conducted.

[Project implementation]

The total project cost is estimated at about US$2,000,000. A national project targeting the poultry and pig raising industry has never been implemented. The pig raising project of the Taiwanese government that has been implemented in Paraguarí department was formulated based on domestic demand and it is a project which aims to improve the pig raising activities of small-scale farms is needed to provide capital and technology centered on implementing infectious disease countermeasures.

(1.7) Integrated, systematize, and utilize the research findings of the MAG agricultural experiment

[Rationale]

There are presently 35 MAG agricultural development projects as of 1997. Of the 35 projects, 10 are loan and 25 are technical cooperation projects. They amount to US$24,000,000 and US$3,700,000, respectively. Bilateral cooperation comprises about 51 % of this amount and Japanese and German government assistance comprise 75 % of this monetary base.

The agricultural sector is the main industry of the country, subsequently, numerous cooperation projects are carried out in this sector. In particular, the government of Japan has actively provided assistance in the development and extension of soybean direct sowing method and high quality seeds, which has enabled the country to achieve the world's largest standard in yield per unit of land area.

Japan has become Paraguay's largest donor country since 1976 and the achievements of Japanese aid in the area of technical cooperation as represented by soybean cultivation technology is enormous. Technical development under IAN and CRIA, and other major agricultural experimental research institutions under the jurisdiction of MAG has also included technical extension activities and the fostering of extension personnel for DEAG, forestry and agricultural mechanization extension activities for CEMA, CEDEFO, a project to improve livestock breeding in SENACSA and Asunción University, the project to improve the distribution system of the ABASTO market in Asunción, and others. Presently, technical cooperation and experimental research that address issues related to strengthening the competitiveness of Paraguay's exports have been implemented.

Integrating and reevaluating the findings of useful development work that the Japanese government and other donor countries have achieved is an effective means of improving competitiveness through productivity, the basic goal of this project.

[Proposed Project]

It is important that the technical development office (DGP) of the MAG conducts a monitoring survey and a reevaluation of past technical cooperation projects in the implementation of this project. Based on the findings of this survey, creating a system to develop effective technical extension activities aimed at raising the competitiveness of agricultural products is important in achieving sustainable agricultural development.

[Implementation of the Project]

Technical experts sent by the Japanese government, the top donor, is an effective means of implementing the project.

(2) Assisting the export of agricultural and livestock products program

(2.1) Plant disease prevention project

[Rationale]

The issue of plant and hygiene inspection and quality control measures are not limited to Paraguay alone, but must be addressed by all the MERCOSUR countries. It is an issue that must be confronted in multilateral agreements regarding the export of agricultural products. The WTO is presently reviewing a "new international order" based on the stringent hygiene rules of the HACCP, in lieu of subsidies for domestic production and export activities and cost countermeasures - the three main issues in past agricultural agreements. The Comité de Sanidad Vegetal del Cono-Sur (COSAVE) of the MERCOSUR Group 8 is reviewing the possibility of creating a plant and disease inspection system in the region.

Numerous disputes have risen between Brazil and Argentina in the MERCOSUR agricultural agreements. Of the 17 issues disputed by the MERCOSUR Trade Commission meeting in 1998, there were three cases that involved Paraguay and the MERCOSUR countries (INTAL,MERCOSUR Report, IDB, No.4, January-June,1998, p.22). Only 3 out of the 17 disputes settled involved Paraguay, with Paraguay filing a suit against the opposing country in all 3 cases. However, if plant and disease inspection and quarantine regulations were officially established, an increase in the number of claims against Paraguay is anticipated which will affect the country's export of agricultural products.

The creation of a plant and disease inspection and quarantine system should be considered as a precondition to strengthening Paraguay's competitiveness in the international market and not only as a countermeasure against the impediments to tariff exemptions within the MERCOSUR region.

[Proposed project]

The major objectives of the project are: i) Create a quarantine system for imported and exported produce (inspection equipment, personnel, and inspection system), b) strengthen the system to prevent the inflow of plant disease and pests, and c) strengthen the food safety management system against residual pesticides, etc. The following projects are proposed.

a) Establish an inspection and quarantine system for plant disease and pest prevention

- Set up a quarantine surveillance system
- Establish facilities for an inspection and quarantine system for plant disease and pest prevention (MAG, DDV facilities)
- Establish inspection and quarantine facilities at the border (Pto. Falcon, Encarnación, C. del Este, P.J. Caballero)

- Foster inspection and quarantine personnel

b) Analysis of harmful plant substances

- Monitor major plant diseases and pests and create a management survey system of harmful substances
- Establish harmful substance testing facilities
- Create a test registration system
- Foster personnel for chemical analysis

c) Establish a system of quality control of production materials

- Create an inspection system for imported production materials (fertilizer, pesticides, etc.)
- Establish experimental testing facilities
- Foster inspectors

[Implementation of the project]

The total project cost is estimated at about US$2,200,000. These projects should be planned and funded by the MAG and organizations that promote exportation such as PROPARAGUAY. But faced with the rapid development of a free market, it has been difficult to cope with the situation due to the lack of accumulated technical expertise and experience. Moreover, the inspection and testing standards change yearly, therefore, donor assistance is essential in creating basic inspection facilities and fostering inspection personnel.

(2.2) Hygiene management for livestock products

[Rationale]

Due to the development of the foot-and-mouth disease in 1989, the volume of beef exports declined, bottoming out with a minus growth rate from 1994 to 1996. However, Paraguay was designated as a free zone for the foot-and-mouth disease in 1997 and the export growth rate grew by 5 % in 1998. Presently, the eradication of cholera for pigs and the Newcastle disease for poultry is the priority issue for the Paraguayan government and the livestock hygiene management project, like the plant inspection and quarantine project, is a priority condition to strengthening competitiveness for the international market.

[Proposed project]

The following projects are proposed.

a) Strengthening the livestock management system

Establish livestock/animal hygiene management facilities of the Servicio Nacional de Salud

Animal (SENACSA).

b) Extension activities in animal hygiene management education

- Assist the organization of small-scale livestock farms
- Establish an animal hygiene management network
- Provide extension materials

c) Establish a nationwide network in animal hygiene management

- Surveillance of animal diseases
- Establish animal hygiene management facilities at the national borders.
- Foster inspectors

[Project implementation]

The total project cost is estimated at about US$1,900,000. These projects should be planned and funded by the MAG and organizations that promote exportation such as PROPARAGUAY. But faced with the rapid development of a free market, it has been difficult to cope with the situation due to the lack of accumulated technical expertise and experience. Moreover, the inspection and testing standards change yearly, therefore, donor assistance is essential in creating basic inspection facilities and fostering inspection personnel.

(2.3) Analyze harmful substances in meat

[Rationale]

As mentioned earlier, the volume of exported meat from Paraguay dropped in 1989 due to the onset of the foot-and-mouth disease and a minus growth rate was recorded from 1994 to 1996. The major exporting country, the USA, restricted the beef imports from Paraguay in the latter half of the 1980s due to the lack of a meat inspection system in Paraguay. In order to resolve this problem, the Paraguayan government requested the technical cooperation of JICA; and the Project to Analyze Harmful Meat Substances was implemented from 1990 to 1992. The objective of this project was to establish a meat inspection system in Paraguay. As a result, the export of meat from Paraguay to USA and the EC was recommenced from 1996. The establishment of a meat inspection system in other countries has increased the number of exporting countries from 21 in 1991 to 40 at the present time. This has led to diversification and the recovery of Paraguay's export industry.

[Proposed Project]

The project is based on the findings collected from the “Analysis Center for Harmful Substances in Meat” and the following is proposed.

- Strengthen the testing system of the Center (located in Asunción University)

The objective of the project is to improve the inspection system to enable it to meet the rising demand for inspection services of exported meat products, to cope with the changes in international standards and increased test items as well as to retrain inspection personnel.

[Project implementation]

The total project cost is estimated at about US$600,000. In order to cope with international inspection and test standards and to renew a segment of the equipment, inspection/testing fees will be collected. However, measures to cope with increasingly complex advanced hygiene standards will require full-scale expansion of a portion of the equipment and facilities. In addition, technical supervision is required for the new equipment and donor assistance is anticipated in this area.

(3) Strengthening agricultural producer and agricultural cooperatives

(3.1) Support agricultural cooperatives

[Rationale]

The major agricultural cooperatives in Paraguay are attempting to abandon the common practice of expanding farmland by pursuing single grain production and to support the combined agricultural operations of livestock rearing and farming. The agricultural cooperative, Chortitzer Komitee Ltd., has established an integrated system of production, processing, and marketing. The cooperative owns a dairy processing factory in the Occidental region and their operations include rearing dairy cows, cultivating their own feed crops of corn, sorghum, and soybeans, and producing the final end dairy product. By combining differing agricultural activities under one framework, integration of various economic activities is achieved; and it is an example of how vertical integration of agricultural activities that target the international market is possible.

[Proposed project]

The objective of the project is to assist model agricultural cooperatives aimed at promoting the agricultural processing industry. The targeted cooperatives are the La Paz and Coronias Unidas, and other cooperatives, which located in the granary belt of Itapúa and Alto Paraná department. The activities of both of these cooperatives are mainly centered on soybean, corn, and wheat production and a segment of their grain crop is used as feed for their pig and poultry raising activities aimed at promoting the livestock processing industry. These activities are anticipated to strengthen the competitiveness of new exported animal products and increase new export items.

[Project implementation]

The content of the project is to establish animal rearing facilities, provide equipment for animal

rearing activities and hygiene control testing equipment, and to establish a formula feed factory. The total estimated cost of the project is US$1,600,000. Although in principle, the agricultural cooperative, as a private enterprise, should procure the funds to implement this project, the capital to establish major facilities is anticipated from donor assistance since it will affect cooperative members and the surrounding region (the purchase of raw materials from neighboring farms).

(3.2) Promote agriculture through small-scale farm participation in agricultural processing

[Rationale]

The number of farms is estimated to increase from the present 310,000 farming households to 490,000 by 2017 and the minimum number of farms is anticipated to increase to 400,000. Of this figure, more than 80 % is expected to be comprised of the group of competitively weak, small-scale farms. The objective of the project is to create a model agricultural development plan that will introduce farmer organizations, mechanized farming, irrigation, and shipment activities, etc. within the four departments containing a large number of small-scale farms and thereby, enabling a development policy for small-scale farms according to region to be formulated. This project will also improve the accuracy of preliminary studies such as F/S when the agricultural development plan and cluster development is implemented in the region in future.

[Proposed project]

1) Participants

The participants of the project are the farmers who will actually organize and manage the farmer organizations in the targeted areas, the MAG-DEAG and INCOOP which will support these farmers, and the experts from the donor side (consultants, dispatched experts, NGO, etc.).

2) Approach

a) Targeted area:

The project will cover the northern, southern, central, and Occidental regions. A breakdown is shown as follows.

i) Northern region: San Pedro department, Ycuamandiyu district
ii) Southern region: Itapúa department, Obligado district
iii) Central region: Caaguazú department, Bras Galay district
iv) Occidental region: Bajo chaco district

These regions were selected based on the following four criteria.

- Regions containing large groups of farmland cultivated by small-scale farms

- Much of the major land area is utilized as farmland.
- An area with relatively good road access, in order to serve as a model exhibition area
- An area containing farmer groups held together by farmland

b) Means of promoting farmer participation

The DEAG and INCOOP that are in charge of overseeing farmer organizations and cooperatives within the MAG and the experts from the donor side will be directly involved in organizing the farmers in the targeted areas by visiting the leaders and major farms in each area and explaining discussing the advantages of creating an organization and its functions with the farmers of the area. The organization will be formed following these explanations and discussions and the roles of the participating farmers will be decided. The DEAG and INCOOP staff members who will be participating in these activities will be mainly staff members from the local regional office.

c) Securing the actual project site

The project will require an average of 5 ha of land, which will be allocated for collective use in each area.

d) Implementation schedule

The project will be implemented in three phases.

Phase 1: Organizing the project

Formulating the project agenda by the farmers, MAG (DEAG-INCOOP), and experts, forming farmer organizations, review the use of farming capital, clarify roles.

Phase 2: MAG supervision

Detailed supervision of the farms by the MAG and experts. The actual implementation of the project

Phase 3: Supervision of the farmer organization

Providing advice and guidance to farmers implementing the project by the MAG and experts

3) Content of the proposed project

The project will be comprised of four plans, the plan to organize the farmers, farm management and cropping plans, the irrigation review plan, and crop transport plan. The following has been proposed in conjunction with these plans.

a) Plan to organize the farmers

- Organize farmers to cope with intensive farming aimed at improving productivity.
- Activities to organize the farmers will be carried out by the farmers, MAG (DEAG, INCOOP) and experts. The regional characteristics that face the small-scale farms in the area will be reviewed and a plan will be formulated and implemented based on an analysis of the initiatives

proposed by the farmers themselves.

b) Farm management and cropping plan

The following crops will be introduced in view of the cluster strategy, the environmental conditions that surround agriculture in Paraguay, and the farming operations of the small-scale farms.

- Cotton

  It has been designated as a priority crop for small farms by MAG since it is a lucrative cash crop. In addition, DEAG and the farms have experience in cotton cultivation and accumulated technology exists.

- Corn

  Although it is one of the food crops, it is also a highly profitable cash crop. Increased demand as a formula feed crop is also anticipated when the cluster strategy is implemented.

- Vegetables

There is a high interest in vegetable cultivation by small farms since vegetable cluster workshops will be conducted. A stable market and increased demand have become possible through strengthened ties with the processing industry as promoted by the vegetable cluster strategy. In addition, the dissemination of vegetable cultivation technology differs from the corn and cotton cultivation technology and its application to other advanced crop cultivation activities is anticipated. The cultivation activities of these crops, plowing, planting conditions, sowing, weeding, fertilizing, the usage of pesticides, drying of the harvested crop, transport, etc., will be reviewed against such factors as the application of accumulated power, mechanized farming, and labor.

c) Irrigation plan

With the exception of the La Colmena region in Paraguarí department, large scale irrigation by small-scale farms have not been carried out in Paraguay. IDB is presently implementing a group irrigation project by small farms in regions with a large number of small-scale farms, but a precondition to implementing the project is the existence of farmer organizations. Furthermore, the water source in regions with a high number of small-scale farms is underground water table. As a result, trial operations under the project will utilize drip irrigation in a collective land area of 1 ha and 100 % irrigation is planned during the dry season and partial irrigation is planned for the rainy season.

d) Crop transport plan

Collective measures to transport agricultural products will contribute to the value added price of the product (integrated collective sorting and packing activities). However, since cash and the agricultural products will be directly handled by the cooperative or farmer organization, the

organization's impartiality and the individual trust of the farms for the organization are vital factors. Since this is vitally important to implementing the project, collective delivery activities to the market will be based on market price trends and the delivery period of vegetables will be adjusted accordingly.

4) Monitoring plan

The project will be implemented for approximately one year based on the agricultural year (July) and regional marketing patterns. In addition, in order to grasp the degree to which the objectives are met and the problems that are encountered, monitoring activities will be carried out in conjunction with the operating plan for each phase of the project.

A PDM form containing the items such as the degree to which goals are met, achievements, activities, etc. which will be monitored, will be prepared by the relevant parties in order to ensure uniformity.

[Project implementation]

The total cost of the project is estimated at US$2,400,000. This project has never been implemented in Paraguay and due to the lack of accumulated expertise, donor assistance in providing supervision in the PCM method targeting development based on participation and the preparing the PCM form is essential. In addition, excluding the provision of a farm, a model project for the project by donor assistance is expected.

NGO participation is also a possibility in organizing farmers and providing technical supervision. Although structural reforms and decentralization are targeted by the regional governments, they lack the budget and human resources to effectively pursue such measures. Therefore, the participation of the NGOs is vital to effectively organize farmers.

The characteristics of the NGO are i) to strengthen the farmer organization and to foster leaders, ii) to provide cultivation technology for crops farmers are interested in, to provide market information and marketability of crops to all members, iii) to encourage the organization to become self-sustaining in all areas – from cultivation to marketing. In other words, a characteristic of the NGO is to promote the organization of small-farms by providing information pertaining to management to all members and avoid concentrating authority in any one individual or group of individuals, and to eliminate the traditional image of organizational leaders who profit by taking advantage of the organization. The MAG and donor are expected to provide assistance and support of these NGO activities.