Federative Republic of Brazil
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Japan International
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(JICA)

ANNEX XIX

POTENCIALITIES AND RESTRICTIONS

Pacific Consultants International

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POTENCIALITIES AND RESTRICTIONS

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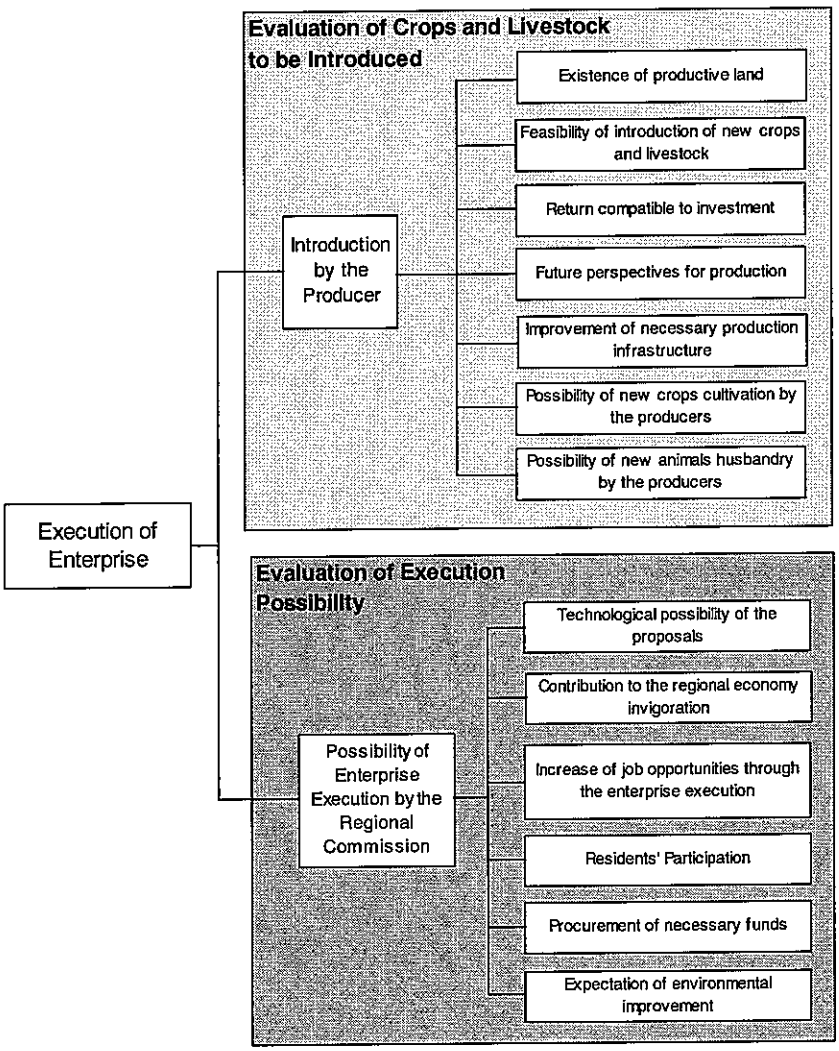
1. Analysis Items and Examination Methods

The potentials and constraints have been analyzed for the purpose of visualizing the possibilities to promote the project proposals, the points of view for its execution, the crops potential and the livestock races to be introduced by the producers. This is to make clear the procedures which shall be taken by the participant farmers.

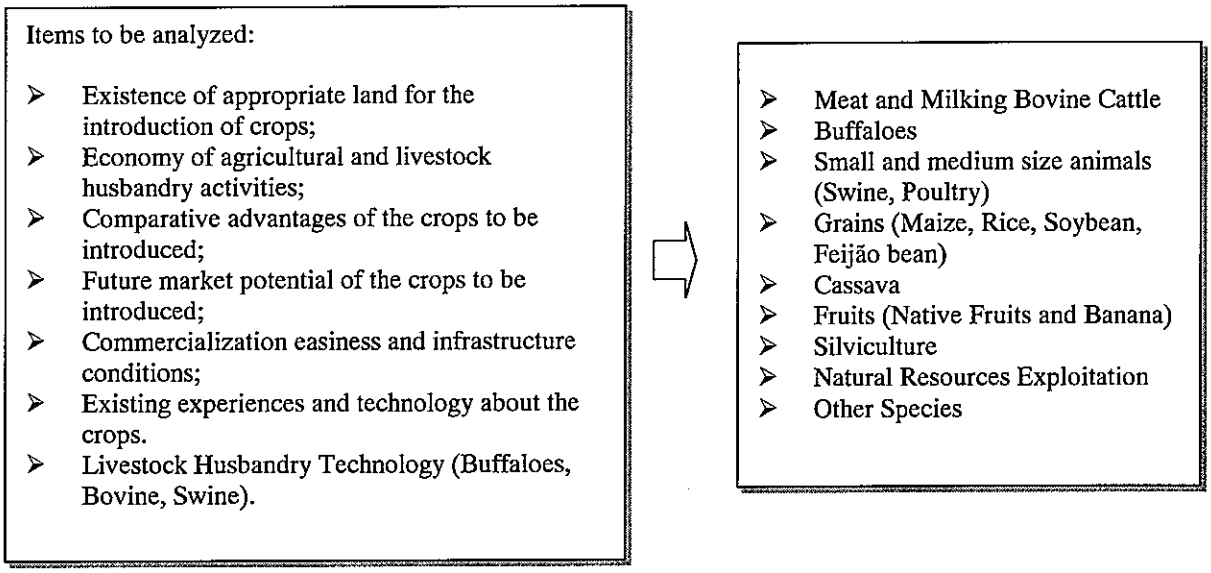
The objectives of the analysis items are as follows;

Items of Analysis	Objectives
Analysis of crops and livestock to be introduced (Producers)	♦ Define the crops to be introduced for the improvement of the Region's people life standards; ♦ Clarify the possibility for improvement of farming management with a defined crop; ♦ Analyze the adaptability of crops and livestock to natural, infrastructure, rural society conditions; ♦ Analyze crops with future potential and propose the recommendable methods.
Possibility of Execution of the Projects (Executing Agency)	♦ Define the measures to be taken by the executing agencies; ♦ Analyze the attainability of the project taking into account economic, technical and social factors.



(1) Potentials and Constraints of Crops and Livestock to be Introduced

Potentials and constraints were analyzed from the viewpoint of producers for the following crops and livestock to be introduced in the Study Area.



Concerning the existence of suitable land for the crops to be introduced, potentials were identified through GIS technique by classifying the land into mechanized cultivation, man-power cultivation and conservation area.

The economic feasibility of farm management was studied from the viewpoint of minimum income level for the producers on the basis of the production cost and the general management scale for each crop.

The comparative advantages of the crops to be introduced were confirmed by comparing to other producing areas on the basis of production and transportation costs.

The future marketability of the crops to be introduced was confirmed by studying the future perspective of each crop based on the international / national forecast of supply and demand within the long term. In addition, the promising crops in the Study Area were studied through investigation on the easiness of marketing and infrastructure conditions.

Concerning the cultivation technique and experience on crops together with raising technique of livestock (buffalo, swine, poultry), the possibility on the participation of local farmers and the necessity of inputs from outside were confirmed.

(2) Possibility of Implementation of Alternatives

The implementation of alternatives depends on the examination of technical and financial possibilities, besides the results from the economic, sociologic and environmental view points. A survey on the producers willingness to participate in the proposed activities is also necessary. The possibility of introducing the alternatives was analyzed through the following items;

- Technological possibility;
- Economic possibility;
- Possibility of creation of jop opportunities;
- Possibility of people's participation;
- Possibility of credit procurement;
- Environmental conservation issues.

As for technical possibility, the producers' experience and possibility of learning new technology shall be examined.

As for economic profitability, the possibility of improving the rural producers rural economy with the introduction of new alternatives shall be examined.

The effects of job opportunities creation were examined aiming at checking the possibility of offering work to those who can not directly participate in the proposed activities. Each activity was analyzed in this aspect.

2. Analysis Results of the Possibility of Introducing New Crops and Livestock Species

(1) Possibilities of Appropriate Land for the Crops to be introduced

The results judged through the classification of suitable land for different crops based on SEPLAN / DZEE information are presented as follows. The difference between crop rotation-1 and 2 is that the area classified to crop rotation-2 needs more agricultural inputs and materials.

Potential Land Use in the Study Area (km^2)

	Crop rotation 1	Crop rotation 2	Intensive	Silviculture	Silvi-pastoral	Hazard area	Conservation area	Others	Total
Study Area	8,946.4	6,967.1	1,333.9	6,085.0	2,316.5	4,111.5	6,713.8	577.8	37,052.00
Percentage of the total area (%)	24.2	18.8	3.6	16.4	6.3	11.1	18.1	1.6	100.00%

The following table shows the present land use in the Study Area.

Present Land Use in the Study Area (km^2)

	Water surface	Pasture land	Cerrado	Forest area	Urban area	Farming area	Total
Study Area	552.9	19,751.0	9,262.1	7,042.0	73.6	370.4	37,052.00
(%)	1.49%	53.31%	25.00%	19.01%	0.20%	1.00%	100.00%

Although the majority of the present land is used as pasture land, in fact the grazing activity is being carried out even in areas not suitable for the livestock raising. The crop production area is only 370 km^2 and this means that the land is not efficiently utilized in the Study Area. Potentials and constraints for agriculture and livestock in terms of land use are presented as follows;

Land and Natural Conditions for Agricultural Use

Potentials	➢ Potential land area for the crop rotation: 8,826km2 ➢ Potential land area for the crop rotation 2 (with more agricultural inputs): 6,956km2 ➢ Potential land area for intensive agriculture: 1,269km2 ➢ Recommended area for Silvi-pastoral activity: 2,264km2 ➢ Recommended area for Silviculture: 5,705km2 ➢ There is the possibility of future expansion of farming activity. ➢ The area is suitable for grain production by rainfed agriculture during rainy season.
Constraints	➢ There is the hazard of veranico. ➢ The area suitable for large-scale mechanized agriculture is limited due to the slightly undulated topography when compared to Balsas area.

Topographic Conditions for Livestock Activity

Potentials	➢ Although there is no hope for area expansion, the pasture improvement through crop rotation is expected. ➢ There is a potential for intensive pasture production by utilizing relatively abundant rainfall even during dry season. ➢ Carrying capacity can be increased through quality and quantity improvement of pasture.
Constraints	➢ Since more than 50% of the agricultural area is utilized as pasture land in the Study Area, there is no hope for future expansion considering the environmental laws. ➢ Measures are needed to fulfill the forestry laws (codes).

(2) Economic Feasibility of Farm Management

The economic feasibility is one of the most important subjects for the introduction of crops into the Study Area. Especially for the newly proposed crops, a thorough study is needed for securing the future life of participating farmers. The following table shows the necessary land area to obtain the minimum wage calculated from the farm gate price of each item within the Study Area.

The necessary land area to obtain the Minimum Wage

Crops	Yield	Farm gate price	Gross income	Production cost	Net income	Necessary area
	kg/ha	R$/kg	R$/ha	R$/ha	R$/ha	ha
Watermelon	40,000	0,20	8,000,00	2,240.00	5,760,00	0,3
Pineapple	30,000	0,40	12,000,00	7,500.00	4,500,00	0,4
Banana	20,000	0,25	5,000,00	3,000.00	2,000,00	1,0
Processed tomato	60,000	0,10	6,000,00	5,100.00	900,00	2,2
Cassava	27,000	0,087	2,349,00	1,107.00	1,242,00	1,6
Cassava	10,000	0,087	870,00	670.00	200,00	10,0
Maize	5,000	0,170	850,00	420.00	430,00	4,6
Maize	1,800	0,170	306,00	282.60	23,40	85,4
Rice	2,400	0,280	672,00	480.00	192,00	10,4
Rice	1,800	0,280	504,00	354.60	149,40	13,4
Soybean	2,400	0,264	633,60	499.20	134,40	14,8
Cow milk	1,825	0,200	365,00	182.50	182,50	11,0
Cattle meat	20	1,866	41,98	5.66	36,32	55,1
Swine						

Source: Calculated based on RURALTINS data and field data. Production costs without soils correction and financial costs are not included. The minimum wage is calculated for 13 months and estimated as R$2,000.

Although the above mentioned figures were roughly estimate, the following conclusions can be drawn:

1. In case of maize, for example, the necessary area depends greatly on the yield. 85.4 ha is needed in case the yield is 1.8 ton/ha, whereas the minimum wage can be obtained only in 5 ha in case the yield is 4.6 ton/ha.

2. In case of fruit production, on the other hand, the minimum wage can be obtained only in 1ha.

3. Since more than 50 ha is needed for fattening cattle, this is not suitable for small-scale farmers.

The fluctuation of prices in the year 1998 – 1999 is shown as follows.

Fluctuation of prices in 1998-1999

Crops	Minimum price	Maximum price	Fluctuation
	(A)	(B)	(B)/(A)
Pineapple	0.30/kg	0.67/kg	2.23
Banana	0.382/dozen	0.466/dozen	1.22
Tomato	0.374/kg	0.583/kg	1.56
Corn	0.167/kg	0.220/kg	1.32
Rice	0.280/kg	0.395/kg	1.41
Soybean	0.239/kg	0.318/kg	1.39
Cow milk	0.290/liter	0.311/liter	1.07
Cattle meat	30.679/arroba	36.010/arroba	1.17

Source: Agroanalysis

The summary of potentials and constraints for the aforementioned crops are presented as follows;

Potentials for Each Crop and Livestock

Fruit cultivation	➢	Income increase of small-scale farmers can be expected because of possible operation in small areas.
Cassava	➢	Although the yield fluctuates, relatively stable management is possible.
	➢	The cultivation is relatively easy.
	➢	This can be carried out as family operation.
Maize	➢	Operation is possible under relatively low investment in case of high yield.
	➢	Large-scale mechanized system can easily be introduced and there is suitable land
Rice	➢	Large-scale mechanized system can easily be introduced and there is suitable land
	➢	Income increase can be expected through large-scale mechanized system.
Soybean	➢	Large-scale mechanized system can easily be introduced and there is suitable land
	➢	Income increase can be expected through large-scale mechanized system.
Milking cow	➢	Relatively stable management is possible due to constant market prices.
Fattening cattle	➢	Relatively stable management is possible due to constant market prices.
	➢	The production cost is low due to small requirement of man-power.
	➢	Operation can be possible under the present conditions in case the area is sufficient.
Buffalo raising	➢	The advantages of buffalo raising are understood by farmers and there are many candidates.
	➢	The advantage of buffalo raising is recently understood from the viewpoint of environmental conservation because new land opening is not needed.
	➢	Buffalo can be raised in a consistent system for milk production and fattening.
	➢	The demand of meat and cheese is increasing specially at the large cities in the southern part of Brazil.
Swine	➢	There is a continuous demand for pig meat and their processed products.
	➢	Price is same as cattle meat and the supply is always insufficient.
	➢	The treatment of excreta is easy due to large waste land.

Constraints for Each Crop and Livestock

Fruit cultivation	➢	Fruit cultivation demands high investment.
	➢	High investment per unit area is needed and financing is indispensable.
	➢	High fluctuation of the price and consequent high risk.
	➢	Newly proposed crops without experiences.
Cassava	➢	Man-power is highly needed and mechanization is difficult
Maize	➢	There is risk, depending on the climatic condition.
	➢	High investment in machinery is necessary.
Rice	➢	High investment in machinery is necessary.
	➢	Milling facilities are needed.
Soybean	➢	High investment in machinery is necessary.
	➢	As export crop, there is exchange rate related risks.
Milking cow	➢	Processing and commercialization facilities are necessary.
Meat cattle	➢	Large area is needed since the yield per unit area is low.
	➢	A great improvement in the management conditions is not expected.
Buffalo raising	➢	There is a wrong idea about buffaloes.
	➢	The marketing flow for meat and milk is not established except for some areas.
	➢	Research on buffalo is far behind compared to cattle.
Swine raising	➢	There is insufficient technical support qualification among technicians in charge.
	➢	Modernized system is not satisfactorily introduced, e.g. AI (Artificial Insemination).
	➢	The marketing system of pork meat is not established.
	➢	The breeding technique is also not well established.

By considering the aforementioned conditions, the suitable producers for each crop are as follows.

Fruit	➢	Mini and small-scale farmers
Cassava	➢	Mini and small-scale farmers
Maize	➢	Small, middle and large-scale farmers
Rice	➢	Small, middle and large-scale farmers
Soybean	➢	Large-scale and middle-scale farmers
Milking cow	➢	Small-scale livestock farmers
Meat cattle	➢	Large-scale and middle-scale livestock farmers
Buffaloes	➢	Mini, small and meddle-scale livestock farmers
Swine	➢	Mini and small-scale livestock farmers

The distribution of farmers according to the land use class in the Study Area is as follows.

Land Use Class in the Study Area (No. of households as for 1998)

REGION		Small-scale		Middle-scale		Large-scale		
REGION	Mini	productive	Non-productive	productive	Non-productive	productive	Non-productive	No. of producers
REGION I- ARAGUATINS	381	45	257	22	83	7	46	841
REGION II- AUGUSTINÓPOLIS	846	45	229	13	54	1	17	1,205
REGION III-TOCANTINÓPOLIS	729	104	401	31	163	8	72	1,508
REGION IV- XAMBIOÁ	178	25	136	33	73	44	52	541
REGION V- ARAGUAÍNA	981	498	875	260	479	138	333	3,564
Study Area	3,115	717	1,898	359	852	198	520	7,659
Percentage in the Study Area	40.7%	9.4%	24.8%	4.7%	11.1%	2.6%	6.8%	100.0%

If fruit production and cassava production are promoted in the Study Area, there is a possibility that about 75% of the producers can be beneficiaries.

(3) Comparative Advantages of the Crops / Livestock in relation to other Production Regions

The comparative advantages of agricultural production depend mainly on the location of the market and also on the marketing period of the target crop. The expected market price of each crop was studied by assuming that the crops and livestock to be produced under this program are sold in the existing market of the main cities. The prices were compared with the prices of products from other regions on the basis of the C&F prices calculated from production and transportation cost.

Price Comparison of Major Products at the Main Markets

Products	Main market	Main production area		Costs			CIF Price
		Location	Distance	Production	Transport	Export	(Calculated)
Rice	SP/RJ	**ARAGUAÍNA**	1800	200.83	72.00		272.83
		R.G. SUL	1100	240.00	33.00		273.00
		MS	1014	255.00	30.33		285.33
Maize	Fortaleza	**ARAGUAÍNA**	1692	86.33	67.67		154.00
		GO	2482	123.83	86.87		210.70
		MS	3406	128.35	128.28		256.63
	Recife	**ARAGUAÍNA**	2538	86.33	88.83		175.16
		GO	2417	123.83	84.59		208.42
		MS	3332	128.35	116.62		244.97
Feijão bean	Regional	**ARAGUAÍNA**	-	-	-		-
		MG	1690	851.82	59.16		910.98
		GO	850	864.18	30.00		894.18
		PR	2036	718.34	71.17		789.51
Soybean	EUROPE	**ARAGUAÍNA**	800	208.30	26.80	27.00	553.80
		SP – OURINHOS	450	208.30	25.00	30.60	555.60
		PR – CASCAVEL	600	208.30	24.00	30.60	554.60
		MG – UBERABA	700	208.30	34.00	30.60	564.60
		MS – DOURADOS	1100	208.30	41.00	30.60	571.60
		GO – RIO VERDE	1350	208.30	42.00	30.60	572.60
		MT – RONDÔNIA	1600	208.30	65.00	30.60	595.60
Cattle meat	Fortaleza	**ARAGUAÍNA**	1692	50.00	84.60		134.60
		GO	2482		124.10		174.10
		MS	3406		170.30		220.30
		PA- BELÉM	1571		78.55		128.55
Pineapple **	SP/RJ	**ARAGUAÍNA**	1800	250.00	72.00		7572.00
		MG –M. ALEGRE	700	200.00	35.00		6035.00
Banana ***	SP/RJ/MG	**ARAGUAÍNA**	1800	150.00	72.00		3072.00
		MG – JAÍBA	580	150.00	30.00		3030.00

* - Most of the production under the slash-and-burn system / subsistence system

** - Pineapple – Different varieties between Araguaína (Perola) and Monte Alegre (S. Cayenne).

*** - For most of the fruits, the feasibility is when other regions are off-season.

Source : Field Survey / FNP consultant –Agrianual 2000

The crops consumed in the local market were neglected. The marketability of each crop is as follows.

Rice	➢ The main production areas of rice are the States of Rio Grande do Sul and Minas. If the products are marketed to São Paulo or Rio de Janeiro, the market price is competitive to the products from Rio Grande do Sul. ➢ If the products are marketed to North-eastern Brazil, the competitiveness of the price is even better.
Corn	➢ Although maize can be an export item, the analysis was carried out in this study as domestic consuming item. ➢ It was judged that maize is highly competitive because of low production cost and transportation cost in case the major markets are Fortaleza and Recife. ➢ Considering the future integration of agriculture and livestock in this area, a high demand is expected within the area and a high yield variety shall be introduced and consequently the competitiveness of this crop will increase. ➢ Considering the future exportation of this crop, the competitiveness will be increased because of less exportation cost from this area.
Feijão	➢ At present, Feijão is consumed locally and is imported from other States. The Feijão produced in the state of Pará is the most competitive. If the product is produced with a lower production cost to have less CIF price than the products from Pará, it can become competitive.
Soybean	➢ Soybean is for export and the demand is expected to increase in future. ➢ If the target market is in Europe, the advantage of this area is the cheaper transportation cost comparing to other areas in Brazil. ➢ If soybean is produced at the same production cost of other areas, the competitiveness of this area's product is expected to be very high. ➢ Soybean is usually transported in large quantity with limited profitability and consequently the reduction of transportation cost affects greatly the competitiveness.
Cattle meat	➢ The study was carried out by assuming that the main consumption area is Fortaleza. ➢ The products in this area are less competitive than those from Belém, state of Pará. But it is competitive compared to the products from the states of Goiás and Mato Grosso. ➢ The state of Tocantins is expected to be FMD free zone and in case the export of cattle meat becomes possible, the competitiveness is promising based on the low exportation cost.
Pineapple	➢ Since the main markets are the big cities such as São Paulo and Rio, the competitiveness is relatively low. But the competitiveness of the quality is promising. ➢ In case the future market is abroad, the competitiveness will be increased.
Banana	➢ The competitiveness of this crop in the domestic market is low, whereas the same in the international market will be increased. Since this area is rich in water resources, it is possible to be a future strategic area of this crop.

(4) Future Marketability of the Crops and Livestock to be Introduced

The future trend of each crop shall be studied carefully in order to formulate the plan for the introduction of new crops. The future marketability of the crops and livestock to be introduced were studied considering whether each crop can become an international crop or domestic/locally consumed crop.

a. General Conditions

The trade barrier tends to be removed according to the liberalization of WTO in the international trade and this trend is affecting the agricultural products trade. The competitiveness of the country becomes important in the free competition environment of the world market and the Study Area is also exposed to such a movement.

Under the consideration of world food supply and demand balance, there is a transition of world food production area and the Study Area is expected to be an important area from this viewpoint. The following is the future trend of each crop.

b. Rice Market

Most of the countries are producing rice for their own consumption and there is a few countries depending on the trade of rice. The world production level is 590 million ton and one third of the total is produced in China (200 million ton). Out of this amount, only 4% (24 million ton) is commercialized. Most of such trade depends on the products from India and Pakistan and thus the trade of rice is unstable. These countries are expected to be converted from exporting countries to importing countries in the future.

The main rice producing countries such as China, Indonesia and Bangladesh are rice importing countries and the amount of imports is expected to increase. The present exporting countries are expected to have insufficient surplus in the future and thus it is expected that alternative producing areas might be needed in future.

Considering the domestic market in Brazil, rice is imported for the stabilization of the market prices and 630,000 tons of unhulled rice, 190,000 tons of unpolished rice and 380,000 tons of polished rice were imported in 1999. Those were imported from Argentina and Uruguay and sometimes from USA. According to the regional analysis, the products from south and mid-west regions are consumed in north-eastern regions. The important characteristic of rice import in Brazil is that it is rather oriented to market price stabilization than limited due to land use constraints.

The problem of rice production in Brazil is the fluctuation of prices rather than the productivity. This is the different point from the other rice importing countries.

There is a large area with rice production potential in the Study Area and the production shall increase if the market price becomes feasible. From the long term prospect of the world trade, the demand of rice seems to increase rapidly.

c. Maize Market

About 600 million tons of maize are produced in the world. The cultivation area is not increasing but the production increases due to the increase of yield per unit area.

The consumption of maize is increasing year after year according to the increase of animal feed demand based on the increase of income. It is expected that the consumption shall increase at the rate of 1.5% per year.

The major producing countries are USA, China and Brazil, which is the 3rd producer in the world. The major importing countries are Japan, Mexico, Egypt and South Korea and the majority of the trading amount is supplied by USA. Other exporting countries are Argentina, Hungary and China. It is worthy to mention that the production of maize in USA is highly productive with an average yield of about 8.4ton/ha. Considering that the productivity in USA has already reached the maximum level and there is no enough space to expand the production, it can be concluded that the future demand shall have to be covered by other countries. The current maize productivity in China is rather low and there is a possibility to expand the production through improvement of yield per unit area. However, considering that the growth of demand shall be larger than the increase of production, China shall become a maize importing country in the future.

Considering the aforementioned conditions, a growing demand of maize at the international market is expected in the near future. The prices of the international market will be decided upon the production

tendency in Argentina and Brazil. It is thus assumed that the Brazilian production would be competing directly with the Argentinean production.

Concerning the domestic consumption, the demand shall depend on the investments of poultry and swine production. The domestic demands shall grow according to the growth of such activities competitiveness.

There was already an increase of investments by large scale companies in the Study Area due to the implementation of the North-South railway. Similarly, the maize demand shall considerably increase with the implementation of poultry integration companies activities.

d. Feijão Bean Market

The production of feijão bean is estimated in 18 million tons per year and the main producing countries are India, Brazil, Mexico, USA and China. These countries produce 68% of the total world production.

The main importing countries are Brazil, Japan and Mexico. The main exporting countries are Myanmar, China, USA and Argentina. The expansion capacity of feijão bean production is very limited in Myanmar and China.

Brazil is the major importing country of feijão. The reason of import is rather the control of prices than insufficiency in production, similar to rice. It might be difficult to satisfy the demands by the present exporting countries and the future needs shall be covered by the increase of production in other areas.

In Brazil, there is a growing demand and it would be important to produce for the domestic market, especially for the market of the northeastern areas.

e. Soybean Market

The world production of soybean is estimated as 160 million tons and the production amount is continuously increasing. Within a general increasing tendency of the consumption, there was a partial decrease of consumption and consequent fall of prices due to the effect of Asian Economic Crisis. The consumption of this crop is expected to increase depending on the normalization of the world economy.

The main producing countries are USA, Brazil, Argentina and China. These countries produce 88% of the world total production. The Brazilian share has recently increased whereas the share of USA is decreasing. The increase of the Brazilian share is due to the increase of the yield per unit area and the introduction of promising varieties.

The main importing countries are Holland, Japan, China and Mexico. China converted from exporter to importer and imported 3.6 million tons in the year 1998. This is due to the increase of the consumption and this tendency shall continue.

The world demand of soybean tends to increase and the countries that have capacity to increase their production are Brazil, Argentina and Paraguay. There shall be a competition among these countries in the future.

Since the major consuming countries are Asian and European countries together with Mexico, securing the transportation means to those countries is important for strengthening the competitiveness.

Analyzing the amount of domestic production in Brazil, the main producing areas are south and mid-west with a tendency for expansion in the mid-west area.

The domestic consumption is steadily increasing with special growth in the consumption of soybean bran (FARELO) mainly due to the promotion of poultry industry. There are several projects within the Study Area such as poultry integration, oil extraction and feed processing. The future demand shall be thus increasing to a great extent.

Due to the preparation of infrastructure for the export and the increase of domestic consumption as already mentioned, the Study Area is expected to be highly competitive as for soybean production.

f. Cattle Meat, Chicken and Swine

More than 1 billion heads of cattle are grown in the world and the majority (57.5%) of them are in India, Brazil and China. However, regarding to cattle meat production, USA produces 23% of the total world production. On the other hand, as for exports Australia which share is only 2.4% of the total herd in the world exports 17.5% of the total volume of exports.

The main importing countries are USA, Japan, Russia, EU, Canada and Mexico. USA, EU and Canada are also exporting countries and it shows that the meat trade is being carried out within this market. The world trade and production amount tends to stagnate due to various trading regulations and this tendency shall be maintained. There shall be no expansion of cattle meat trading within short and medium terms.

Analyzing the tendencies of consumption in each country, we observe that the poultry consumption is increasing while the consumption of cattle meat and swine meat is decreasing in the USA as well as in the EU. In Japan, the poultry consumption is decreasing, the swine consumption is stable, and the cattle meat consumption is increasing. Regarding the swine meat, there is an overall increase of consumption in the world. In the future, the cattle meat and poultry consumption is expected to increase in Asia, mainly in China.

Per capita Meat Consumption in Each Country-1999 (kg/year)

	Poultry	Cattle	Swine	Total
USA	41.1 (27.7%)	42.8 (Stable)	30.2 (Stable)	116.0
EU	16.4 (15.5%)	20.2 (Stable)	45.7 (15.4%)	82.3
Brazil	25.7 (59.6%)	40.9 (7.6%)	10.1 (38.4%)	76.7
Japan	10.9 (Neg.)	11.5 (42.0%)	18.8 (20.5%)	41.2
China	4.8 (140%)	3.6 (227%)	30.1 (42.6%)	38.5

(Source: Anualpe2000) Note: ( ) shows the increase of consumption during the past 10 years.

According to the demand and supply balance within the country, there is surplus in mid-west areas and the state of Tocantins. On the other hand, there are increasing demands in northeastern areas, and the States of São Paulo and Rio. Also in Brazil, the economic growth shall result in the increase of cattle meat consumption. It is expected that the cattle meat will be insufficient in the year 2010. There will be, thus, a high possibility that cattle meat is produced for the domestic consumption but not for export.

g. Milk and Dairy Products

The world production of milk is about 390 million tons. The main producing countries are USA, India, Russia, Germany, France and Brazil. The international trade of milk is made through the trade of dairy products such as butter, cheese and powder milk. Brazil is an importing country of dairy products and is importing about 380 thousand tons annually from Uruguay and Argentina. Although Brazil is the main producing country of milk, the competitiveness of the product is very low due to low yield.

The main consuming countries are India, USA, Russia and Brazil. Per capita consumption is high in north European countries but their share in the world consumption is low due to their scarce population.

The domestic demand shall increase and the Study Area can be in the future a supplier for the northeastern areas market.

h. Fruits Cultivation

Although Brazil is a fruit producing country, the export of fresh fruits is limited and the major export item of fruit is orange juice. Since the tendency of each fruit is different, pineapple and banana were selected because these will be introduced in the Study Area.

Pineapple

The production of pineapple takes place in the tropics and the largest producing country is Thailand. Brazil is the second producing country in the world. Concerning the exportation, however, Costa Rica is the largest exporting country and is exporting their products to USA.

Banana

Banana is also produced in the tropical areas and the total production reached 34 million tons. The main producing countries are India, Ecuador, Brazil, Costa Rica and Mexico. The main importing countries are EU, EUA, Japan and China. The exports to the European countries are controlled and the amount of exports is allocated to each exporter. The exports to USA are carried out through 3 multinational firms. Since Brazil is attracting the investments of these firms, there is a possibility for Brazil to be an exporting country of banana in the future.

The demand of banana is increasing in Asia, especially in China. Japan is importing banana from Philippines, Ecuador and Taiwan. Asian countries are thus considered as potential countries for banana consumption.

Concerning the domestic market, the total production in Brazil is estimated as 5-6 million tons and the consumption represents about 44% of the production. It is therefore assumed that there is a surplus under the present situation and the price tends to be cheaper.

(5) Easiness of Marketing and Infrastructure Conditions

There is a rapid improvement in the transportation infrastructure within the Study Area through the Federal and State Government's projects. Especially the Federal program of transports on North-South railway and Araguaia-Tocantins waterway shall affect the transport conditions in the Study Area. The existing and planed transportation facilities in the Study Area are presented as follows.

- North-South Railway (Opened already until Estreito)
- Aguiarnópolis-Xambioá Railway (Plan)
- Multimodal Port at Aguiarnópolis (Plan)
- Araguaia River Waterway (Plan)
- Tocantins River Waterway (Plan)
- Belém-Brasília Highway (BR-153, BR-226)
- Trans-Amazon Highway
- State Roads Network (TO-222, TO-164, TO-416, TO-210,TO-134, TO-404, TO-201)

The major investment programs of the private sector that will affect the marketing system in the Study Area are presented as follows:

Major Investment Programs of the Private sector

REGION I- ARAGUATINS	➢ Swine slaughterhouses ➢ Pharmaceutical Complex
REGION II- AUGUSTINÓPOLIS	➢ Dairy products processing facilities ➢ Promotion of natural resources exploitation such as babaçu and honey
REGION III-TOCANTINÓPOLIS	➢ AZANORTE Program, hatchery and chicken processing facilities ➢ Soybean oil extraction facilities ➢ Banana production program, Fruits production program
REGION IV- XAMBIOÁ	➢ Cassava milling facilities ➢ Dairy products processing facilities ➢ Babaçu palm heart processing facilities
REGION V- ARAGUAÍNA	➢ Dairy products processing facilities ➢ Cassava starch production facilities ➢ Babaçu heart processing facilities ➢ Poultry projects ➢ Slaughterhouses

The summary of potentials and constraints of each crop and livestock from the viewpoint of market and commercialization are presented as follows;

Potentials of Each Crop

Fruit	➢ North-south railway can be used as transportation means with minimum damages to the fresh fruits. ➢ In case of the production for export, there is high production potential comparing to the other production areas.
Cassava	➢ Since there are plans for implementing milling and starch production facilities in the Study Area, the producers can supply their products to such facilities.
Grains	➢ Since there is a poultry integration plan in the Study Area, there is a high demand of these products. ➢ In case the world demand increases in future, it is possible to produce grains with high competitiveness. ➢ Efficient transport can be offered with the asphalted highways. ➢ Due to Multimodal Programs of the Federal Government, the infrastructure of transport will be rapidly improved in the Study Area. ➢ The Study Area is adjacent to the Northeastern region which is insufficient in grains production. ➢ The products can be supplied to the Northeastern region until the international demand increases.
Milk	➢ The construction of dairy products processing facilities is going on within the Study Area.
Cattle meat	➢ The Study Area is located adjacent to the Northeastern region where self-sufficiency is not performed yet. ➢ When the exportation becomes possible in future, the Study Area can be a competitive production area for Europe and Asia. ➢ The Study Area is located in the future FMD free zone area.

Constraints of Each Crop

Fruit production	➢ The marketing plan might depend on the operation plan of North-South Railway. ➢ The Study Area is located far from the consumption centers except regarding the products for export.
Cassava	➢ The market will be restricted to certain processing facilities.
Grains	➢ Local storage facilities will be needed.
Milk	➢ The amount of local consumption is limited and there is little expansion possibilities.
Cattle meat	➢ Even when the Study Area becomes FMD free zone, there still risk of contamination considering that the neighboring States are not free zone.

(6) Cultivation Technique and Experience on Proposed Crops

Potentials of Each Crop

Fruits	◆ Fruits can be cultivated at land conditions (sandy and slope area) not suitable for the cultivation of grains and vegetables. ◆ There is a specialized company of banana production in the Study Area and this company can support the technology transfer and seedling distribution, among others. ◆ Since cashew is originated from Brazil, the climatic conditions are quite suitable for the cultivation of this crop. ◆ Cashew and coconut show good adaptability in the sandy soil conditions and these fruits are being already introduced in the Study Area by some progressive farmers. ◆ The cultivation techniques are already developed for cashew and coconut to obtain their maximum yield within 3-4 years after planting. ◆ It is possible to develop the combined management with agro-forestry and beekeeping.
Cassava	◆ The majority of the producers have experience of cassava cultivation although in small scale. ◆ The average yield of cassava in the State is higher than the national average. ◆ There are plans for cassava milling facilities construction by the associations. ◆ It is planed to construct the starch factory at the industrial complex in Araguaína and the technical transfer and the introduction of promising varieties are expected in addition to the increase of the demand. ◆ The by-products of cassava can be used as animal feed.
Maize	◆ The producers have knowledge on the cultivation of maize although in small scale areas. ◆ Maize is an important rotation crop together with feijão and soybean and is also used as animal feed. ◆ Since the yield of this crop is greatly affected by the cultivation technique, the high yield can be expected by an appropriate management. ◆ The production cost can be reduced by selecting an appropriate location for the cultivation.
Rice	◆ The producers have experience on the cultivation of rice although in small scale areas. ◆ Since the Study Area locates between two rivers, there are abundant water resources. ◆ It is possible to apply the research data of EMBRAPA in order to avoid the damage by veranico. ◆ The existence of appropriate varieties for this area makes possible the high productivity.
Soybean	◆ There are many candidate areas for crop rotation in order to improve the degraded pasture land. ◆ There are relatively plain lands suitable for the introduction of mechanized agriculture. ◆ Concerning the selection of variety and cultivation method, various already accumulated know-how can be effectively utilized. ◆ It is possible to apply the research data of EMBRAPA in order to avoid the damage by veranico.

Constraints of Each Crop

Fruit	◆ The local producers have small experience on the commercial production. ◆ Although the introduction of the irrigation system is needed for better quality, it is difficult to get a satisfactory technical support. ◆ There is insufficient information on marketing of the products and the marketing system is not satisfactorily functioning.
Cassava	◆ Since cassava was cultivated for self-consumption so far, the introduction of the promising varieties and the improvement of quality were not yet carried out. ◆ Considering the supply of cassava to the starch processing facilities, the products shall be supplied to the facilities within 24 hours after harvest.
Maize	◆ The yield of maize in the Study Area is lower than the national average and also than the average of the State. ◆ Since maize was cultivated for self-consumption so far, the introduction of the promising varieties and the improvement of quality were not yet carried out. ◆ The cultivation technique easily affects this crop yield. ◆ Maize is mainly produced for the domestic market and there is a high fluctuation in prices.
Rice	◆ The yield of rice in the Study Area is lower than the national average and also than the average of the State. ◆ Since rice was cultivated for self-consumption so far, there are no activities on the introduction of the promising varieties and the improvement of quality. ◆ The growth of this crop is negatively affected by the high temperature during flowering. ◆ The damage by veranico is expected especially in the sandy soil condition.
Soybean	◆ The local producers have small experience on the cultivation of this crop especially large-scale mechanized cultivation. ◆ Considering the crop rotation, it is difficult for the livestock farmers to cultivate grains due to unavailability of necessary machinery and facilities.

	◆ The land with an appropriate soil quality tends to have slope which is not suitable for mechanized agriculture. ◆ The damage by veranico is expected especially in the sandy soils although the land is flat. ◆ The road condition of the area shall be improved for the transportation of machinery, inputs and products. ◆ The storage and drying facilities are not available in the Study Area.

(7) Raising Technique of Proposed Livestock (Buffalo, Swine, Poultry)

Potentials

Buffaloes Raising	◆ Buffalo was introduced in large farms in the past. Currently, good results are being obtained in small and middle-scale farms. ◆ Temperature is always high and the water resources are abundant even in dry season in the Study Area. ◆ No special technique for buffalo raising is needed and readily available facilities can be utilized. ◆ Buffaloes are rough and adaptable animals, besides they have long life and high reproduction capacity. ◆ The facilities for water bathing are not necessary and only shading trees are needed. ◆ Buffalo can be utilized as draft animal for plowing and transport. ◆ Many farmers showed the intention to introduce the buffalo at the Workshops
Swine	◆ The raising technique is rather simple and the local varieties are raised in many places. ◆ There are enough feed supply sources such as cassava, rice bran, waste fruits and etc. ◆ Only small space is needed and aged people and children can be involved in the operation.

Constraints

Buffalo	◆ Farmers, consumers and researcher have a wrong idea about buffalo. ◆ Buffalo doesn't have resistance against direct sun shine. ◆ The modern technologies such as AI were not yet introduced. ◆ The acquisition of the promising variety is not easy.
Swine	◆ The general knowledge of swine production is rather low. ◆ There is no enough organization for technical services. ◆ Slaughterhouse for swine is not enough in the Study Area. ◆ The acquisition of the promising variety is not easy.

(8) Summary of the Alternative Crops and Livestock

Regarding the alternative proposed crops, the land potential consideration is essential to define the priority areas for cultivation. According to these conditions, the expansion of cultivated area is possible, even under the current natural conditions, from the approximate 370 km^2 to 17,000 km^2. Considering the areas currently used for pastures that covers more than 50% of the Study Area, the expansion of new pasture areas shall be difficult. For the invigoration of the agriculture and cattle husbandry activities, the cattle husbandry productivity shall be increased by the introduction of grains/pasture rotation system, stimulating the agricultural integration in the current area.

Regarding to farming management conditions, for mini and small-scale farmers it is difficult to obtain a family income through grains cultivation considering the currently produced amounts. This shall be possible though with the increase of productivity. As for horticulture, an income of about 1 minimum wage is possible in 1 ha, although high investments needed for the production. As for meat cattle husbandry, a minimum area of 50 ha is necessary, thus the activity is not feasible for mini and small-scale producers. There is a large number of large-scale producers in the Study Area, and thus the planning of alternatives for them is necessary. One alternative is the shift for milking cattle husbandry, and the introduction of buffaloes for this purpose is suggested. As for agriculture, the introduction of highly profitable crops is necessary. Analyzing the current production technology level in the Study Area, the conclusion is for the need of introducing intensive production of cassava, grains, and livestock. For this, the increase of productivity and the improvement of commercialization routes are necessary, and for so the formation of producers' associations is very important.

The advantages of introducing crops already cultivated in other areas in the Study Area shall appear with the conclusion, in the following years, of the transportation infrastructure and of the commercialization channels. As a consequence, the Study Area location becomes advantageous for the production of grains, exportable products and other products consumed in the Country, confirming the adequacy of grains and livestock production.

The future commercial conditions of the proposed crops were analyzed based on the conditions and production estimates and on the demand of domestic and international markets. The conclusion is as follows: soybean has commercial conditions for exporting at the short term; at the medium term, the domestic and international demand of grains, specially rice and maize, shall increase; and at the long term, livestock shall show an improvement of commercialization conditions. Considering these commercial conditions, the conclusion is that the Study Area is appropriate for the production of grains and livestock. The forecast for each product is presented as follows;

- Grains production aiming at the northeastern market (Rice, Maize, Feijão bean);
- Livestock products aiming at the northeastern market;
- Production of exporting products (Short term: soybean. Medium term: soybean, maize, rice and fruits. Long term: medium term products plus livestock products);
- Production of raw material for supplying the Study Area factories (cassava and maize);
- Specific products for the Study Area (by-products of buffalo, babaçu palm heart);
- Wood.

Within the next few years, the transportation cost shall be smaller due to the conclusion of the North-South railway, opening the way to the large commercialization centers. With the private sector investments, the demand for agriculture and livestock products increased. In order to develop the commercialization of grains, the construction of storage infrastructure is necessary so that the locational advantages of the Study Area can be fully utilized.

There are already some cultivation and livestock husbandry experiences regarding to the proposed products, except for fruits cultivation. The introduction of fruits cultivation is not so difficult, however the reasons for the current low productivity have to be evaluated in order to elaborate a method to increase it.

In the Study Area, there are already producers raising buffaloes, swine and poultry. These producers know management techniques and have experience, and thus these animals can be introduced without major problems. However, some of them have a wrong idea about buffaloes raising, thus this idea has to be clarified and improved. As for swine raising, the management techniques have to be improved, as well as the diseases control method which is not updated.

Considerations from the Point of View of the Large-Scale Producers

	Meat Cattle	Buffaloes	Grains	Silviculture	Small and Medium size Animals	Vegetables	Fruits
Possibility of expansion of production areas	Saturated	Yes	Yes	Yes	-	-	-
Economic possibility of the activity sustainability	Yes	Yes	Need of capital	Need of capital	-	-	-
Comparative advantages	Yes	Yes	Promising	Promising	-	-	-
Future Commercial Possibilities	Yes	Yes	Promising International Market	Promising International Market	-	-	-
Convenience of Infrastructure	Yes	Yes	Promising	-	-	-	-
Existence of production techniques	Yes	No problems	No	No	-	-	-
Possibilities of learning the management techniques			Possible	Possible			

Agricultural Integration through the Introduction of Grains Production

Considerations from the Point of View of the Small-Scale Producers

	Meat Cattle	Buffaloes	Grains	Silviculture	Small and Medium size Animals	Vegetables	Fruits
Possibility of expansion of production areas	Saturated	No	Yes	Partial	Yes	Yes	Yes
Economic possibility of the activity sustainability	No	Need of capital	Yes	Need of capital	Yes	Yes	Yes
Comparative advantages	No	Subsistence	Yes	No	Yes	-	-
Future Commercial Possibilities	Yes	Yes	Yes	Yes	Domestic Market	Regional Market	Domestic Market
Convenience of Infrastructure	No	No	Yes	-	Yes	-	-
Existence of production techniques	Yes	Yes	No Problems	No	Small	Yes	No
Possibilities of learning the management techniques				Possible	Possible	Possible	Possible

Improvement of farm management due to the introduction of Intensive Farming, Buffaloes, Small and Medium size Animals, Vegetables, and Fruits.

3. Possibilities of the Alternatives Implementation

(1) Agricultural Integration / Integrated System of Agriculture and Livestock (Individual level)

For cattle husbandry, crops rotation is extremely important for the recovery of pastures. The current meat production productivity is about 75 kg/ha. With the introduction of this technique, the productivity can reach as much as 10 times the present value, from 750 to 1,000 kg/ha, and the fattening period can be reduced from the current 4 years to 1.8 to 2 years. The main characteristics of this new method are to offer to the livestock better quality pastures besides feed and silage throughout the year. The general potentials of this technique are presented as follows;

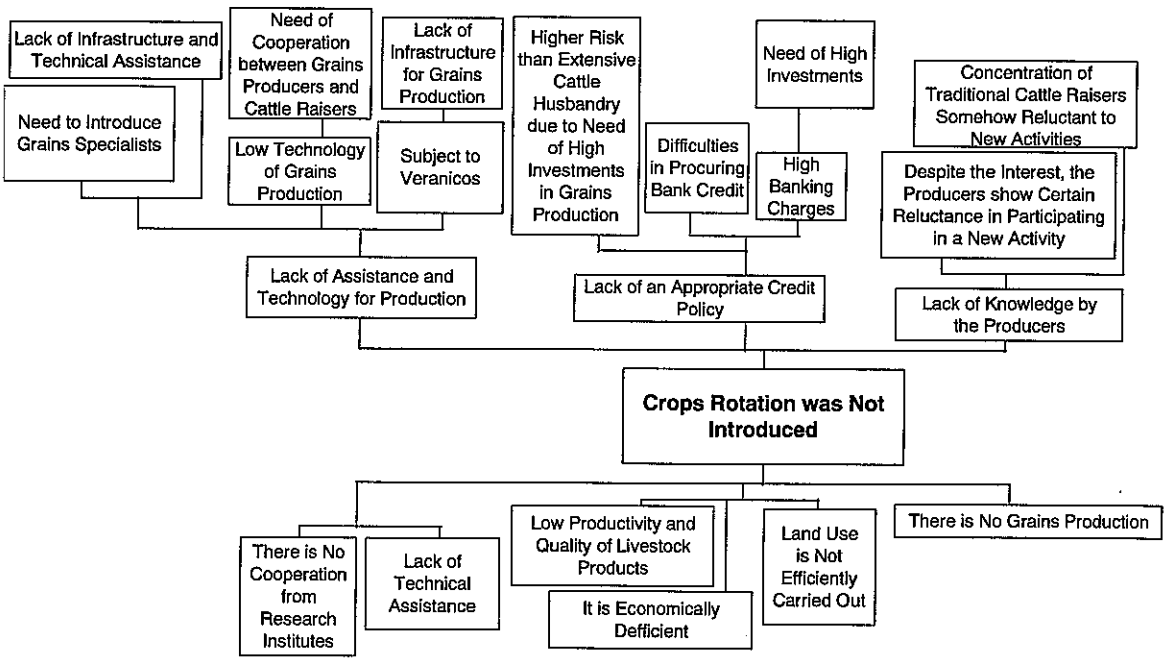
Potentials of Agricultural Integration (Individual Level)

Technical Possibilities	➢ Technologies are readily available, the example of progressive areas can be applied. ➢ Intensive livestock raising will be possible through introduction of grains production. ➢ Grains cultivation and intensive fattening technologies are already available. ➢ There are appropriate lands for grains production. ➢ The technical cooperation from EMBRAPA can be expected. ➢ There are various alternative grains such as rice and maize in addition to soybean.
Economic Possibilities	➢ Improvement of farm economy through progress in productivity and quality of cattle ➢ Rapid expansion of farm income and effective use of land through grain production ➢ Impact to the regional economy through fertilizer and machinery purchasing ➢ High competitiveness of the local products due to low transportation cost
Creation of Job Opportunities	➢ The direct employment is expected through grains production. ➢ Creation of job opportunity is expected through the activation of regional economy.
Participation of Producers	➢ There are many livestock farmers who are interested in grains production. ➢ Many producers are interested in grains production due to recent investment in poultry integration projects.
Availability of Funds	➢ The involvement of the private sector is expected due to comparative advantages gained with the transportation system.
Environmental Conservation	➢ The land that is not suitable for farming can be conserved through a land utilization plan. ➢ The forest conservation law will be easily applied due to the economic improvement of producers. ➢ The silviculture activities will be activated due to the economic improvement of producers.

Constraints of Agricultural Integration (Individual Level)

Technological Problems	➢ Most of the producers have no experience of grains production nor the necessary machinery for the activity. ➢ The livestock farmers should depend on other farmers for grains production. ➢ There will be the need to introduce grains production experts from other areas. ➢ There is the risk of veranico due to sandy characteristic of the soil with less water holding capacity. ➢ There is insufficient infrastructure for grains production. ➢ Some slope areas are not suitable for mechanized agriculture. ➢ The support services such as soil analysis, selection of variety and technical transfer are not satisfactory.
Economic Problems	➢ There is a high risk for grains production due to the high investment needed.
Problems regarding to Jobs Creation	➢ There will be less job opportunities due to the application of mechanized agriculture.
Problems for the Participation of Producers	➢ The producers are rather reluctant to participate in new activities. ➢ The traditional livestock farmers are rather reluctant to participate in new activities.
Problems regarding to Funds Procurement	➢ Since the activity is new, it is rather difficult to get financial support from banks. ➢ It needs rather high investment. ➢ The cost of banking credit is too high. ➢ The producers do not have necessary assets to offer as mortgage to the banks.
Environmental Problems	➢ Some farmers may not obey the forest conservation laws at the places where the land potential is high. ➢ Some farmers may utilize areas with low land potential.

Restrains of Agricultural Integration



(2) Introduction of Intensive Agriculture through Organized Groups

There are already 82 farmers' associations in the Study Area with about 5,000 members. The number of farmers acknowledging the importance of the introduction of intensive agriculture through associations is gradually increasing, and so is the number of members of these associations. This fact can be considered a great potential for the activity. The occurrence of various problems within the associations can be considered as constraint for the activity. It is therefore important to take necessary measures for the training of leaders and the education of members. The summary of potentials and constraints for the promotion of intensive agriculture through associations is presented as follows;

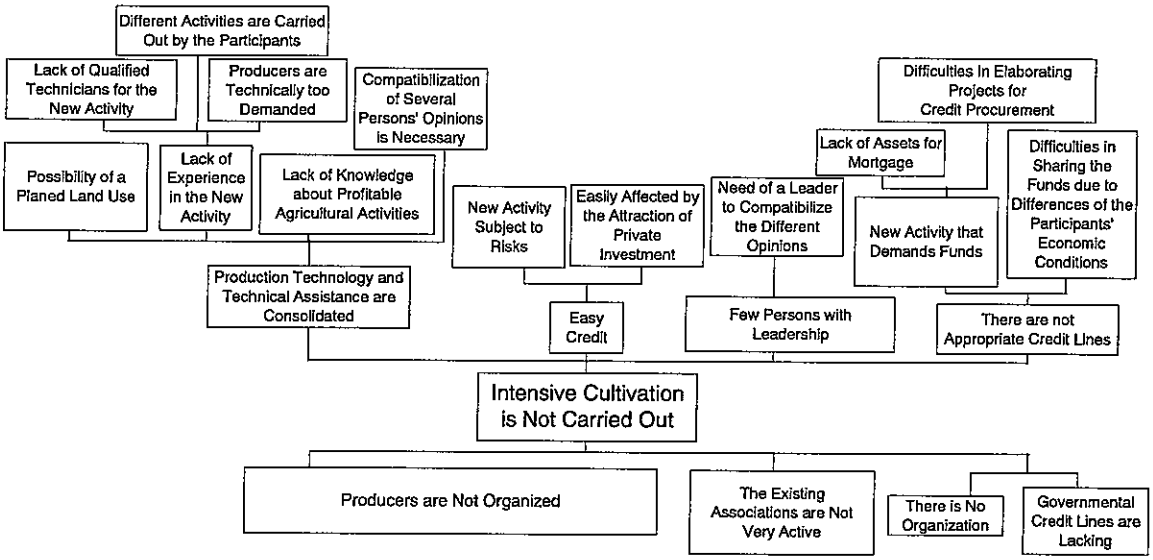
Potentials

Technical Possibilities	➢ Technology transfer to the association members. ➢ Acquisition of precise information. ➢ Technical support from various organizations. ➢ Availability of RURALTINS / NATURATINS offices in the area. ➢ Introduction of marketable crops facilitates the operation of associations. ➢ The farming system based on the regional advantages can be introduced.
Economic Possibilities	➢ Crops and livestock that can enjoy the regional advantages are available in the region. ➢ Specialized cultivation such as buffalo and banana is possible based on the regional advantages. ➢ The group production of special products such as buffalo milk cheese can be promoted. ➢ There is a general trend of investment by private sector in the area. ➢ The local producers can supply the materials to the manufacturers established in the area. ➢ Minimization of production cost through collective purchasing. ➢ Maximization of selling price through collective marketing of the products. ➢ Minimization of production cost through cooperative use of land, machinery and facility. ➢ Stabilization of farm management through the improvement of productivity. ➢ Association can apply for the various distribution systems supported by the Government. ➢ Stabilization of farm income through combined management (circulation of organic matter, effective utilization of natural resources)
Creation of Job Opportunities	➢ The promotion of intensive agriculture can at least absorb the family manpower. ➢ High efficiency for the creation of direct job opportunities. ➢ The indirect creation of job opportunities can be expected through regional activation.
Participation of Producers	➢ There is high participation will. ➢ There is high incentive because of the decision making possibility by the participants.
Availability of Funds	➢ Association can apply for the various financing systems supported by the Government. ➢ Various financing systems operated by the Government can be applied to the associations consisting of mini and small-scale farmers. ➢ It is possible to participate in the integration promoted by the private sector. ➢ The association can obtain financial support with smaller financial burden because the activity is considered as environmental project.
Environmental Conservation	➢ It is possible to promote collective environmental activities such silviculture.

Constraints

Technological Problems	➢ The local producers have less experience on the new type of agriculture. ➢ There are insufficient technicians who have enough knowledge on new type of agriculture. ➢ It is necessary to accept various opinions for the proper operation of associations. ➢ There might be a difference in the activities among participants. ➢ The producers should be diligent for introducing combined and intensive agriculture.
Economic Problems	➢ There is an investment risk because of new activity. ➢ This activity is highly influenced by the investment trend of the private sector.
Problems regarding to Jobs Creation	➢ The equal relation so far established can be changed with the introduction of the relationship between employer and employee. ➢ A migratory flow into the region can be created.
Problems for the Participation of Producers	➢ The leadership capacity might be needed for the mutual agreement.
Problems regarding to Funds Procurement	➢ Fund is needed for tackling new activities. ➢ There is no enough security for providing enough funds. ➢ It is sometimes difficult for producers to prepare reports necessary for the procurement of financial support due to insufficient education. ➢ It is sometimes difficult to distribute the funds due to economic gap among participants.
Environmental Problems	➢ There is the possibility of not following the indications of proper land use plan.

Restrictions to the Production Nucleuses



(3) Promotion of the Environmental Conservation

According to the law on conservation of forests, the farmable area corresponds to 50% of the total area. However, in the Study Area, 23 out of the 38 municipal districts surpasses this percentage, thus the expansion of environmental conservation area becomes necessary through the utilization of new techniques.

Although the Study Area is basically oriented to livestock husbandry, there are some areas which are not appropriate for pastures, resulting in land degradation and precarious utilization of natural resources. As a consequence, the producers' economic conditions are also precarious although they own large land extensions. It is extremely important to improve their economy promoting the efficient land use through the education on land conservation practices. The introduction of appropriate crops to the land conditions is thus necessary. The potentials and restrictions of Environmental Conservation Activities are presented as follows;

Potentialities of the Incentive of the Environmental Conservation

Technical Possibilities	➢ There is large extension of land in which conservation activities can be carried out. ➢ Without the need of a high technology, anyone can participate in this activity. ➢ There is abundant resources and the climate is appropriate for the reforestation activities.
Economic Possibilities	➢ A potential of current and future Market of wood exists. ➢ This activity can represent future savings. ➢ This activity can turn into an economic activity. ➢ The wood prices can improve in the future. ➢ These environment activities can reduce in the future the social costs.
Creation of Job Opportunities	➢ Direct jobs are created for reforestation activities.
Participation of Producers	➢ Most of the producers are highly aware about environmental conservation issues. ➢ EMBRAPA has a Program against Forest Fires.
Availability of Funds	➢ The financial burden can be lower since it is an environmental conservation activity. ➢ The participation of NGOs can be requested. ➢ Projects aiming at the exchange of CO_2 can be negotiated. ➢ Credit is not difficult to be obtained.
Environmental Conservation	➢ Need exists of recovering the forests, because they were already deforested. ➢ He/she has levels effect on improvement of the environment. ➢ He/she has possibilities to respect the environmental codes.

Restrictions of the Environmental Conservation Activities

Technological Problems	➢ Lack of research that assures the start of activities. ➢ Lack of basic information. ➢ Lack of information on agronomic technologies.
Economic Problems	➢ High initial investment is requested, and the investment return only takes place at the long term. ➢ The public sector does not have enough capital to carry out the activity.
Problems regarding to Jobs Creation	➢ After the planting, no more fixed labor force is necessary but only temporary one.
Problems for the Participation of Producers	➢ The creation of conservation areas only represents the increase of costs, thus very few are interested in this. ➢ Conservation activities such as silviculture demands a long investment return period, thus very few are interested in this. ➢ The producers do not have financial capacity for this activity.
Problems regarding to Funds Procurement	➢ Long period necessary for investment return (e.g. Silviculture) ➢ Lack of fiscal incentives. ➢ High investments are demanded.
Environmental Problems	➢ The activity can become a monoculture (e.g. Silviculture) which is not appropriate for the environment.

Potentialities of the Incentive to the Natural Resources Exploitation Activities

Technical Possibilities	➢ The activity is quite simple and anyone can take part in it.
Economic Possibilities	➢ The activity can improve the familiar economy. ➢ Existence of a factory in Tocantinópolis, TOBASA. ➢ Persons discriminated in other activities can get income from these activities.
Creation of Job Opportunities	➢ These activities can be the source of income to women without jop opportunities in the rural zone.
Participation of Producers	➢ With the possibility of improving the family income, several rural workers become interested in these activities.
Availability of Funds	➢ Since these are environmental activities, the support of NGOs is possible. ➢ For the same reason, funds can be obtained at lower financial costs.
Environmental Conservation	➢ The effect over the environmental conditions improvement is great. ➢ These activities contribute to settle down the family in the rural environment.

Restrictions to the Natural Resources Exploitation Activities

Technological Problems	➢ Capital is requested to improve the activity.
Economic Problems	➢ The products are cheap and thus a significant improvement in the economic conditions can not be expected. It is necessary to aggregate value to the products. ➢ Enough research has not being carried out yet. ➢ As external factor, the influence of big companies is very strong. ➢ The products are primitive and thus there are not many markets for their commercialization.
Problems regarding to Jobs Creation	➢ Since the generated income is low, if there is the opportunity for a better occupation, the producers can easily change to this last activity. ➢ If the production increases and becomes profitable, the original workers can be expelled from the activity.
Problems for the Participation of Producers	➢ The consensus of opinions is requested since the activity is carried out in a collective way. ➢ There is the risk of interruption of the activity.
Problems regarding to Funds Procurement	➢ The access to credit lines is not easy. ➢ There are difficulties in the elaboration of plans for the procurement of funds.
Environmental Problems	➢ The benefits are exclusive for the associates.

(4) Conclusion about the Possibilities of Introduction of the Proposed Activities

As for technological possibilities, the technological level of producers, their possibilities of learning new techniques, and the types of crops to be introduced were analyzed. As for the economic possibilities, they were analyzed from the view point of how the agricultural economy would become after the introduction of the proposed activities, as well as from the view point of development, economic and administrative stability of the producer. In terms of work opportunities promotion, it

was observed that several classes of farmers do not have good administrative conditions as well as executing conditions for certain types of works. Therefore, the efficacy in promoting work opportunities has to be confirmed, taking due care to avoid the generation of more social problems. In terms of participants participation, the actual and routine participation in the promotion of ideas and in the costumes of the region were analyzed, also in terms of the participation of new persons. In terms of funds procurement possibilities, the possibility of using current governmental financing systems were analyzed, as well as the need of procuring other sources. As for the environmental conservation activities, the future influence of the proposed activities were analyzed in terms of their impact on the environment and the environment degree of tolerance. The results of the proposals are presented as follows.

As for the constraints and potentials of the agriculture and livestock husbandry integration systems, the conclusion is that there are great possibilities of economic improvement, production increase and improvement of livestock husbandry productivity. Therefore, the promotion of new job opportunities can be expected with the increase of land utilization. On the other hand, the cattle raisers do not have experience in grains cultivation and thus they depend on the help of grains producers from the region or from experienced producers from outside the region. Funds procurement was considered a problem. Considering that this is a new type of agriculture management and the grains' prices is forecasted to raise in the future, the cultivation in improper areas is a possibility creating a chaotic development. Therefore, from now on the planning of land use based on future expectations shall be carried out.

Analyzing the potentials and constrains of intensive production through associations (groups), the conclusion is that there are crops and animals that can be introduced in the Study Area taking into consideration the regional superiority in this aspect. The introduction of more economic models is a possibility through the collective production, also with good results in the creation of job opportunities. On the other hand, the support of institutions shall be highly demanded considering the farmers' lack of experience and the novelty in terms of agriculture administration. The restrains in funds procurement are several, and measures are necessary to compensate the lack of mortgage assets by mini and small-scale producers.

As for the potentials of Natural Resources Exploitation promotion, in the Study Area there are acting cooperatives performing the extraction of babaçu coconut and honey. The Study Area is rich in natural resources. Thus, a planning of partial improvements for the effective use of these natural resources is possible. However, the economic effectiveness is low, and thus the government economic burden shall be high if only partial measures are taken. The best solution is to support the existing groups (cooperatives), making possible their strengthening.

As for the promotion of environmental conservation, in the Study Area there are some portions of land which are used for extensive cattle husbandry although without being proper for this purpose, resulting in land degradation and precarious utilization of natural resources. The conclusion is that the crops shall be compatible with the land aptitude, with due respect to the environmental conservation laws. Considering that the wood demand may increase in the future, similar measures could be adopted for silviculture activities. However, since these activities demand high investments, financial incentives are necessary as well as appropriate technologies.

Promotion of agricultural management for integration and collective activities.

- Priority in the production of specific crops for the region;
- Introduction of management techniques highly profitable through groups (collective activities);
- Introduction of intensive agriculture of high productivity;
- Procurement of funds;
- Improvement of financing systems.

- Stability in agricultural management;
- Increase of income;
- End of subsistence agriculture and increase of participation in productive activities;
- Promotion of work opportunities.

4. Items to be considered in the elaboration of measures

The items to be considered are as follows;

Items	Necessary Measures
Land Use	➢ In the past, the location of the Study Area was disadvantageous. However, with the fast infrastructure development, currently its location became advantageous, and this advantage can be used.
	➢ The productive capacity of the current pastures shall be increased, together with the introduction of agriculture and livestock husbandry integration through the introduction of grains.
	➢ The land potential is high. The currently farmable area can be increased from approximately 370 km^2 to 17,000 km^2.
Agriculture and Cattle Husbandry Integration	➢ Introduction of Intensive Agriculture utilizing the natural conditions.
	➢ In terms of Agriculture and Cattle Husbandry Integration, the cooperation between the cattle raiser and experienced grains producers shall take place, with the establishment of grains production techniques and Agriculture and Cattle Husbandry Integration plans.
	➢ Introduction of crops with future perspectives: soybean for short term; maize, rice and soybean again for medium term; and the medium term crops plus cattle husbandry for long term. Besides that, the introduction of products which can become specific for the region such as Buffaloes and wood.
	➢ Utilization of the region's advantages in terms of location for the production of grains. Specially for the producers with large areas, these advantages and possible results shall be demonstrated for that they can introduce these management methods.
Intensive Agricultural Management through Associations	➢ The number of mini and small-scale producers involved in livestock husbandry is high. However, since the meat cattle husbandry is not appropriate for them, other ways of production shall be researched in order to replace this activity.
	➢ For grains production, methods to increase the production shall be introduced.
	➢ Introduction of intensive agriculture which includes cassava, grains and cattle husbandry.
	➢ Meat cattle shall be replaced by milking cattle. In order to increase the income, the buffaloes shall be used for milk production due to the high commercial value of the product.
	➢ The formation of associations shall be stirred up, also stimulating the search for collective commercialization ways.
	➢ The participation of subsistence producers in the economic development shall be stimulated through associations or communal farms. In parallel, support shall be given to natural resources exploitation activities aiming at the strengthening of associations.
	➢ The lack of knowledge on techniques and experience on proposed crops production are constraints for production. The development of methods to improve the agricultural management shall be carried out aiming at the increase of productivity.
	➢ As for the introduction of new animals (Buffaloes, Swine, Poultry), the farmers shall be adapted to this new type of creation. As for swine raising, the animal health survaillance shall be improved.
Environmental Conservation Activities	➢ There is a trend of the environmental conservation laws to become more strict. It is necessary to introduce methods to adjust the production to this new situation.
	➢ As for the expansion of livestock husbandry, this is difficult considering that more than 50% of the region is already utilized as pasture, and for the future the conversion of extensive use areas into intensive use areas shall be carried out. As alternative, sustainable agriculture and livestock husbandry manners shall be introduced.
	➢ Analyse the Silvi-pastoral and Agro-forestry activities as alternatives of sustainable activity.
	➢ Conversion of hazard areas which are not appropriate for cultivation into environmental conservation areas.
	➢ Effective utilization of land through the utilization of crops compatible to soils, together with the conservation of natural resources and the introduction of reforestation activities, aiming at a sustainable economic development project.

As the result of this analysis, the possibilities of economic regional strengthening were confirmed through the effective use of natural resources (land). For this, the State Government shall supply information concerning to effective land use, taking measures to create a monitoring system in order to allow a fast appraisal and solution to any new modification in this land use.