Federative Republic of Brazil
State of Tocantins
Secretariat of Production (SEPRO -TO)
Secretariat of Planning and Environment (SEPLAN -TO)

Japan International
Cooperation Agency
(JICA)

ANNEX V

CONDITIONS FOR INFRASTRUCTURE

Pacific Consultants International

ANNEX V

CONDITIONS FOR INFRASTRUCTURE

1. Transportation network

In the past, the Area of the Study was in a disadvantageous location, however there are few years ago, the inauguration of the railroad of Carajás and also of the port of Itaqui in Maranhão contributed to improve its strategic location. With the current construction of the railroad North-south to be linked hereafter to the railroad of Carajás, the State is changing little by little of the previous position for one of easier access, in the measure in that it counts today with the means of transportation road, rail and fluvial.

(1) Road network

The highway Belém-Brasília cuts the State of Tocantins, being intercepted by the highway Trans-Amazonian highway to you end-scanned of the Area of the Study, in the municipal district of Aguiarnópolis. The highway Belém-Brasília is all paved as well as the highways that tie the main municipal districts of yours spill in the Area of the Study.

The paving of the highways is in accelerated rhythm, being this of great importance for the transport and for the commercialization of products in other areas. For the Extreme-north of Tocantins, Empress's cities in the State of Maranhão and Marabá in the State of Pará are the main points for the provisioning of the wholesale trading. Hereafter, he/she thinks her that Araguaína, Xambioá, Aguiarnópolis, Araguatins and Axixá come to be the municipal districts with the largest traffic in the highways, with prominence for Aguiarnópolis that will be hereafter in an intersecção point among the highways, the fluvial port and the railroad North-south.

(2) Railway network

The construction of the strong lines i also in accelerated rhythm, and with the connection of the line north-south to the one of Carajás, it will be possible the transport goes the port of Itaqui in the State of Maranhão. Now, it is only built until the municipal district of Strait, in the State of Maranhão, but hereafter it will transit to the river parallel Tocantins, tying like this capitals of the central area of Brazil. On the side of the State of Maranhão, the patio of change of cereals is practically ready, with a part already in activity. For the future, it was planned that it leaves of this patio should be built in the city of Aguiarnópolis, in the State of Tocantins.
Another project is it of the construction of a strong line interconnecting the municipal districts of Aguiarnópolis and Xambioá. This work can become reality once it will be accomplished by the federal government, as one of the projects of transport of the river Araguaia.

With this infrastructure, it will be possible the transport of great loads, especially for the port of Itaqui that is located in the end of this railroad, where great patios are being built for the future movement of the exports to be accomplished for foreign capitals.

(3) Water Transportation Network

Same not having waterways now in construction phase, possibly in the future this will be a means of transportation of cereals to be used between this area and the center-west. It is the federal government's project to have the river hereafter Araguaia as means of transportation of cereals of the State of Mato Grosso: the cereals would be unloaded in Xambioá and immediately transferred for the future strong line (Xambioá-Aguiarnópolis) through where would be taken until the port of Itaqui. In agreement with the movement described above, a port should be projected with embarkment capacity and fluvial and strong disembarkation.

(4) Aerial network

In Araguaína, in the central part of the Area of the Study, there is already an airport that interconnects this area to the main capitals of the Country.

2. Others

(1) Storage Facilities

The State possesses a capacity of storage of 1.600.000 tons, of which a capacity of 13.500 tons is inside of the Area of the Study, although there were not production, distribution and transport of cereals. The main facilities are located in the municipal districts of Araguaína and Tocantinóplis, being however relatively idle as for his/her capacity.

(2) Eletrical system

In the State, the main electric lines of high tension cut the part headquarters vertically they are administered by ELETRONORTE and the secondary lines, by CELTINS.

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ANNEX VI

CONDITIONS FOR LAND UTILIZATION

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CONDITIONS OF LAND UTILIZATION

1. Conditions of land utilization

(1) Area divided by utilization

As for area of this Study Area (about 37,000 km2), the utilization as pasture is the great part. The following is utilization of this Study Area estimated from SEPLAN/ZEE GIS and IBGE data.

Utilization of area in Study Area (km2)

	Water area	Pasture	Cerrado	Forest	Residential	Farm	Total
Area I- ARAGUATINS	149.9	1,892.9	1,345.1	1,401.4	6.2	65.5	4,861.00
Area II- AUGUSTINOPOLIS	45.5	1,224.3	241.9	577.0	9.1	51.2	2,149.00
Area III-TOCANTINOPOLIS	82.1	2,496.1	3,537.8	570.0	11.3	63.7	6,761.00
Area IV- XAMBIOA	82.4	3,620.6	445.0	1,331.5	4.2	36.3	5,520.00
Area V- ARAGUAINA	193	10,517.1	3,692.3	3,162.0	42.8	153.8	17,761.00
Study Area	552.9	19,751.0	9,262.1	7,042.0	73.6	370.4	37,052.00
Percentage of the area(%)	1.49%	53.31%	25.00%	19.01%	0.20%	1.00%	100.00%

(1.1) Utilization of agriculture farm

Mainly utilized for planting cassava then maize, upland rice. The area planted agriculture production becomes 0.63% of the producer possession area.

The planted acreage in Study Area, 1998(ha)

	Upland rice	maize	cassava	Feij･o	Pineapple	sugarcane	total	Use area/land possession
Area I- ARAGUATINS	3,180	2,290	635	410	30	0	6,545	0.66%
Area II- AUGUSTINOPOLIS	1,820	1,745	855	700	0	0	5,120	0.61%
Area III-TOCANTINOPOLIS	3,450	1,690	675	515	4	35	6,369	0.69%
Area IV- XAMBIOA	1,390	1,700	325	165	48	0	3,628	0.62%
Area V- ARAGUAINA	4,985	8,560	1,105	550	168	9	15,377	0.60%
Study Area	14,825	15,985	3,595	2,340	250	44	37,039	0.63%

(1.2) Utilization of livestock farm

When analyzing stock raising subdivision based on the data in 2000, the producer in the area is about 10,000 and is raising cattle mainly.

The number of livestock in Study Area (2000)

	Producer (farm)	Cattle	Buffalo	Swine	Goat	Sheep	Equine	Chicken
Area I- ARAGUATINS	2,670	142,375	24	2,360	117	394	2,152	5,712
Area II- AUGUSTINOPOLIS	2,169	103,219	110	4,044	232	719	4,941	34,458
Area III-TOCANTINOPOLIS	1,970	142,201	208	3,375	494	564	3,262	24,339
Area IV- XAMBIOA	882	365,115	127	1,976	371	1,632	5,662	16,369
Area V- ARAGUAINA	4,069	692,632	409	8,770	1,296	5,050	33,444	183,117
Study Area	11,760	1,445,542	878	20,525	2,510	8,359	49,461	263,995

When seeing livestock farming situation of this Study Area from the number of farmhouses, the number of cattle and pasture area in this investigation area, the breeding number of cattle per producer is 123 and average pasture area becomes 168 hectares. Especially, in the XAIAMBIOA area, intensive livestock farming is popular.

Outline of livestock farming in Study Area (2000)

	No. of Producer (farm)	cattle	pasture (km2)	Average cattle number (cattle/house)	Area of farm (ha/farm)	Area per cattle (ha/cattle)
Area I- ARAGUATINS	2,670	142,375	1,892.90	53	70.9	1.33
Area II- AUGUSTINOPOLIS	2,169	103,219	1,224.30	48	56.4	1.19
Area III-TOCANTINOPOLIS	1,970	142,201	2,496.10	72	126.7	1.76
Area IV- XAMBIOA	882	365,115	3,620.60	414	410.5	0.99
Area V- ARAGUAINA	4,069	692,632	10,517.10	170	258.5	1.52
Study Area	11,760	1,445,542	19,751.00	123	168.0	1.37

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ANNEX VII

PRESENT SITUATION OF THE AGRICULTURAL PRODUCTION

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ANEXO VII

PRESENT SITUATION OF THE AGRICULTURAL PRODUCTION

1. Agricultural Production

Due to predominance of the livestock as the main economical activity, the agricultural activity is still incipient, being characterized by production to supply local demand and of the subsistence, therefore with the use of low technological level and low productivity when you compare with State average.

The economical cultivations of grains and fruits are being slowly introduced in the area with great future perspectives of growth.

Production data according "Levantamento Sistematico da Producao Agricola–março/2000–3a. fase de desenvolvimento" - IBGE

Agricultural production of the Tocantins State (harvest 99/00)

Products Agricultural	Area ha	Production Ton.	Productivity Kg/ha
Rice sequeiro	99.120	164.828	1.661
Irrigated rice	49.433	215.756	4.416
Bean 1st harvest	1.969	755	383
Bean 2nd harvest	2.425	831	343
Watermelon	254	1.886	7.425
Corn sequeiro	56.355	109.109	2.114
Irrigated corn	250	1.200	4.800
Sequeiro soybean	44.689	114.490	2.479
Sorgo granífero	520	859	1.652
Pumpkin	100	220	2.200
Green corn	10	40	4.000
Pineapple	2.222	36.870	22.091
Acerola	25	26	1.040
Banana	5.429	3.062	608
Cane–of–Sugar	3.965	150.237	42.213
Coconut-give-Bahia	305	803	18.674
Orange	278	17.003	68.285
Lemon	12	779	111.286
Cassava	9.626	178.482	14.845
Mango	338	6.221	19.441
Tangerine	25	973	44.227
Guariroba	18		
Passion fruit	26	807	31.038
Cashew nut	190	84	600

Source IBGE–Março 2000

(1) Rice

The rice production in high lands (sequeiro) represents an area of 17.030 ha, representing 17,7% of the area cultivated in Tocantins (99.190 ha), contributing with 21.582 ton. of the 164.828 ton. produced in the State. The average productivity presented in the period was 1.267 Kg/ha which means 30% inferior compared with State average (1.661 Kg/ha).

Main producing districts

Municipal districts	Area in ha	Production in ton.
Araguatins	2.500	3.750
Esperantina	1.200	1.440
Palmeira do To	700	1.050
Babaçulandia	1.300	1.500
Wanderlandia	1.000	1.200

(2) Corn

The area for the corn (17.820 ha) it represents 31,48% of the cultivation of that cereal in Tocantins (56.605 ha), with production of 23.141 ton., corresponding 20,97% of the obtained in the State production (110.309 ton.). The mainly region of production: Araguatins (1.800 ha and 2.592 ton.) and Araguaina (3.900 há) and 5.400 ton.). The average productivity: 1.300 Kg/ha against 1.900 Kg/ha of the State.

(3) Bean

Initially it is worth to observe that the area cultivated with bean in the State is very low, the same happening with the production and, consequently with the productivity.

However, the Study Area contributes with approximately 60% of the result obtained in Tocantins, the 1st harvest with area of 1.319 ha of the 1.969 ha cultivated in the State and, in the 2nd harvest it participated with 1.355 ha of the total of 2.425 ha in Tocantins. The productions were equivalent to 66,75% and 58,43% of the state result on 1st and 2nd harvests, respectively.

(4) Soybean

That culture has, at the moment, significant expression in the State Pedro Afonso, Formoso de Araguaia Dianópolis and Taguatinga and, more recently Campos Lindos (Central and South region) representing the pole of production of soybeans. In those areas the production reaches averages to 43 bags / ha.

In the north area there are some private initiatives, motivated by the logistical improvement of transportation, mainly for the implantation of the multimodal system (highway, ferrovia and hidrovia) that will provide better competitiveness and, for the need to recover the pastures area, where the soybean production comes as a viable alternative.

(5) Pineapple

The pineapple production in tocantins counts with about 1.669 ha and it is basically developed in the central area of the State and it has been demonstrating good economical results due to the quality of the fruit.

In the north area, that culture, to example of the others no native fruits, it is being introduced in the agricultural section as profitable alternative of production, whose results are expressed in the municipal districts of Araguaína, Piraquê, Araguatins, São Bento do Tocantins and Wanderlândia, among others.

(6) Cassava(Mandioca)

The cassava production, it constitutes product highly consumed by the population of Tocantins state, being cultivated in whole state and usually for family sustenance.

In the north area, the culture of the cassava occupied area of 4.308 ha, equivalent to 35,83% of the area cultivated in the State (12.023 ha), the production of 55.080 ton of the 178.482 tons of the roots produced in Tocantins (about 30,86% of the total production), the average productivity of the area is below obtained in the State (12,78 t/ha and 14,84 t/ha respectively).

Main municipal district of production are: Araguaína (600 ha and 6.600 t), Darcinópolis (250 ha and 2.500 t), Araguatins (240 ha and 3.600 t) and Pineapple (235 ha and 2820 t).

(7) Native fruits

Parallel to the traditional cultures, the Savannahs present typical fruits that have been explored in a quite artesanal way, although in some cases it represents the temporary sustenancy of a lot of families.

RURALTINS (Set. / 99) developed a "Pesquisa de mercado para as frutas nativas e adaptadas do Bico do Papagaio", in order to identificate the potentialities and market restrictions for such products in the North/Extreme-north area of Tocantins, South of the Para and Maranhão, Brasília/Anápolis/Goiânia and Palmas–TO.

Potential consumption of native fruits "in natura"

	Areas South Pará e Maranhão		Area Brasilia Anápolis/Goiania	São Luis (MA)
	Fruits in nature	Pulp	Pulp	Pulp
Cupuaçu	42,0%	37,5%	15,0%	13,0%
Açai	12,5%	12,5%	12,0%	4,8%
Biribá	12,0%	-	-	-
Buriti	7,5%	4,5%	-	-
Cajá	4,5%	17,0%	8,0%	8,0%
Castanha do Pará	2,0%	-	-	-
Murici	2,0%	2,0%	-	4,8%
Bacaba	2,0%	-	-	-
Caju	2,0%	4,5%	4,0%	-
Bacuri	-	8,0%	-	8,0%

Among the problems for commercialization, the aspects of quality / price / volume represents the larger difficulties, following by the punctuality and frequency of the deliveries.

It is added to such species the others adapted in the area, such as banana, acerola, cocoa, guava, coconut, tamarind, mango, pineapple and passion fruit that also have expressive consumption in local and other researched markets. Those fruits could be options of productive development, although has a larger number of competitors regions.

(8) Extrativism

In the Extreme-north of Tocantins great territorial area is covered by babaçu palm and from that tree a lot of families survive, mainly in the collection and breaking activities of the chestnut developed by the women.

The "Associacao Mulheres Quebradeiras de Coco do Bico do Papagaio–ASMUBIP" represents that activity for marketing the chestnut of the babaçú.

RURALTINS, in support to ASMUBIP, in 1999 made a "market Research and of technology for sub-products of the babaçu coconut", having concluded that the activities managed by the association are just remunerating the labor, because the production cost equaled to the commercialization value and, due to the inherent state politics of ICMS, have been having competitive difficulties against companies in the state of Maranhão.

2. Farm Management

The area of land of the extreme northern region and the northern region of Tocantins State are 16,147 km^2 and 21,083 km^2, and the percentage of the area of each region for the area of the whole Tocantins State is 5.8% and 7.6%, respectively. The pasture and the cultivated field, in which is carried on agriculture and animal husbandry, occupy about 45% of the area of the extreme northern region and about 65% of the area of the northern region. The range of the percentage of pasture and cultivated field

for the total land area in each municipal are in 4% to 81% in pasture, and only 0.3% to 5.7% in cultivated field in the extreme northern region. And the range are in 47% to 76% in pasture, and only 0.2% to 2% in cultivated field in the northern region, respectively.

Agricultural Production in Study Area

	Area of Crops				Amount of products				Yield			
Region	Ex.North		North		Ex.North		North		Ex.North	North	State	Brazil
Crops	ha	%	ha	%	ton	%	ton	%	ton/ha	ton/ha	ton/ha	ton/ha
Rice	9,150	5.7	5,675	3.5	10,780	2.5	6,689	1.6	1.18	1.18	2.67	3.08
Maize	6,365	11.2	9,620	16.9	7,440	6.2	12,073	10.1	1.17	1.15	2.10	2.54
Pine Apple	39	2.9	211	15.9	556	1.1	4,611	9.0	14.26	21.85	38.76	47.24
Sugar cane	35	1.1	9	0.3	780	0.6	662	0.5	22.29	73.56	40.96	69.25
Mandioca	2,335	18.7	1,260	10.1	32,330	16.9	13,122	6.9	13.85	10.41	15.27	13.09
Feijao	1,685	40.1	655	15.6	624	44.6	205	14.6	0.37	0.31	0.33	0.67

Data: IBGE

The productions of main crops, such as rice, maize, pineapple, sugar cane, mandioca, feijão, are shown in TABLE 4.5.1-1.The production of feijão in the extreme northern region is higher than that of other regions in the Tocantins State, and the region produces about 40% of the total production of feijão in Tocantins. On the other hand, the productions of other main crops in the extreme northern region and the northern region are very low. It seems that sugarcane is cultivated for fodder and "Pinga (spirits)", because there is no sugar refinery in the region.

The productivity of rice, maize and pine apple, in which crops the adjustment of pH of soil and the application of fertilizer show high effect, is very low, compared with the average yield in whole Tocantins and in Brazil. Following the customary farming methods, by which most of farmers cultivate crops for self- consumption without fertilizer and sale the surplus, causes the low productivity.

In general, at reclamation of barren land to make pasture and renewal of existing pasture, crops for self-consumption are sowed with seed of pasture. After harvest of crops, the field becomes pasture. The method of space use until grasses make sure of their stands, as mentioned above, is called "Barreirão method". However, if the farmers do not follow the instructions on the pH control of soil and fertilization, based on the soil inspection, Barreirão method is not effective on the growth of new pasture.

SEPRO has supplied seeds of vegetables and fertilizer with free of charge to the farmers of the registered associations, and has supplied seeds of cereals and fertilizer under condition of repayment with 10% of farmers' products. However, most of farmers have not used fertilizer. Furthermore, banks have put the pH control of soil and fertilization, based on the soil inspection, under an obligation in various credits, such as renewal of existing pasture, reclamation of barren land to make pasture, cultivation of forage crops for silage. But farmers apply fertilizer only once in the first year.

It is considered that the customary farming methods, by which most of farmers cultivate crops for self-consumption without fertilizer, should be broken off to improve the productivity of agriculture. Therefore, the excellent leaders of associations have made an effort to transfer the technology with demonstration farm at their own expense.

3. Conditions of Farm Economy

It is said that approximately 70% of the beef meat in the State of Tocantins is produced in the western part of route 153 in the northern region. The main agricultural activity in the Study Area is animal husbandry in which the majority is beef meat production. When considering the animal husbandry into 3 categories that are fattening, calf production and milk production, different trend can be found for each municipality according to each condition of the location. According to the interview survey through Ruraltins, the results can be summarized in the following table and Fig. 452-1. The management level of large, middle and small-scale farmers varies from municipality to municipality. The average land

area for large, middle and small-scale farmers are, however, more than several hundreds ha, between several hundreds and 100 ha, less than 100 ha respectively. The present farm management situation for each farmer is shown below.

Region	No	Municipality	Large scale			Middle scale			Small scale		
			Fat	Calf	Milk	Fat	Calf	Milk	Fat	Calf	Milk
Extreme	1	Aguiarnopolis		○			○				
North	2	Ananas	○			○					○
	3	Angico	○				○			○	
	4	Araguatins	○			○				○	○
	5	Augustinopolis			○			○			○
	6	Axixa do Tocantins									○
	7	Buriti do Tocantins	○				○	○			○
	8	Cachoeirinha	○				○			○	○
	9	Carrasco Bonito			○			○			○
	10	Darcinopolis		○			○			○	○
	11	Esperaqntina	○			○			○		
	12	Itaguatins		○			○				○
	13	Luzinopolis	○				○			○	○
	14	Maurilandia do Tocantins		○			○			○	
	15	Nazare	○				○			○	○
	16	Palmeiras do Tocantins		○			○			○	
	17	Praia Norte			○			○			○
	18	Rischinho	○			○					○
	19	Sampaio			○			○			○
	20	Santa Terezinha do Tocantins					○			○	
	21	Sao Bento do Tocantins					○			○	○
	22	Sao Miguel do Tocantins	○			○		○			○
	23	Sao Sebastiao do Tocantins									
	24	Sitio Novo do Tocantins	○			○		○			○
	25	Tocantinopolis	○				○	○		○	○
North	1	Aragominas	○		○	○		○		○	○
	2	Araguaina	○				○	○			○
	3	Araguana	○			○				○	○
	4	Babaculandia		○			○				○
	5	Carmolandia	○			○		○			○
	6	Filadelfia		○			○			○	
	7	Muricilandia	○			○					○
	8	Nova Olinda		○			○	○		○	○
	9	Palmeirante		○			○			○	
	10	Piraque	○			○				○	○
	11	Santa Fe do Araguaia	○			○		○			○
	12	Wanderlandia					○				○
	13	Xambioa	○			○		○			○

(1) Large Scale Farmers

Large scale farmers basically perform their farm management through beef meat production. Fattening is the major activity of the area where good soils with high clay contents are distributed. Calf production, on the other hand, is major for the area of sandy soils. This is more remarkable in the northern region. Fattening farmers are distributed in the western part of route 153 where the soils are mainly latosol and podzol. Calf production farmers are distributed in the eastern part where the soils are mainly cerrado soils. In case of the

extreme northern region, fattening farmers are mainly distributed in the area with better soil condition such as Nazare, Luzinopolis and Cachoerinha. In Augustinopolis and surrounding municipalities, however, dairy farming is rapidly expanding due mainly to the establishment of milk processing facility with the capacity of 100,000 liter/day 4 years ago. In this area, therefore, even large-scale fattening farmers are converting their farming into milk production.

Some of the large-scale farmers are contributing to the development of the livestock raising in the area through the introduction of technologies from research organization and the extension of promising breed. They are also introducing rotation grazing system and applying necessary lime and phosphate for the degraded area according to the results of soil analysis for the better pasture management. Such farmers are, however, very limited and the general degradation of pasture is in process including the land of large-scale farmers. Since most of the pasture land is managed without proper fertilization and regeneration, those area is rapidly degraded through occurrence of Cigarringa and Babaçu as weed. The area along Estrondo mountain range is topographically erodible and this is accelerating the degradation of pasture.

Although the development of breed is necessary, prominent improvement is not carried out yet. The price of beef meat is also low as 30R$/arroba and many large-scale farmers are feeling their limit on the farming depending only on beef meat production. Syndicate rural of Xambioa, for example, is seriously considering to convert from livestock raising to multiple management and is now applying for fund from federal government in order to start fruit culture project under the help of state governor. The land for fruit culture is already selected and the member of syndicate is ready to tackle the group cultivation of fruit crops.

(2) Middle Scale Farmers

The major agricultural activities of middle-scale farmers are also animal husbandry like large-scale farmers. But middle-scale farmers depend more on calf and milk production than fattening. Only some middle-scale farmers perform fattening in the area with good soil condition. As for milk production, dairy farming is rapidly expanding due to the establishment of milk processing facilities in Augustinopolis in extreme northern region and in Araguaina in northern region. Average production of milk is only 4–5 liter/day/head and the lactation period is about 5–6 months due mainly to the low quality of pasture. Although the price of milk is low as 0.2 R$/liter as farm gate price, many farmers convert from meat to milk production because of stable operation through daily income. Calf and milk production is usually operated under the same management, male is sold as calf (170R$/head for 8-10 months animal) and female is kept for milk production. However, the farmers staying away from market should depend only on calf production.

Some middle-scale farmers are aiming at multiple management from the present livestock raising. At Fazenda São Jose about 20km west of Araguaina, the multiple management is being practiced in the farm of 500ha by combining sheep, pig and poultry raising with meat and milk production. In addition to 1,150 cattle, 970 sheep and some pigs, 12,000 poultry breeding is just started by participating into the project promoted by Agrolandia. Circulation of organic matter is always practiced in this farm. Animal droppings are effectively utilized for crop production such as corn for silage, sugarcane for fodder and cassava for pig feed. Poultry manure is especially important not only as organic fertilizer but also as feed mixture for cattle. Furthermore, crop production is being carried out as regeneration of degraded pasture. This is the real integration of agriculture and animal husbandry and the growth of pasture is excellent. Such a producer should support the future development of agriculture in the area.

Most of middle-scale farmers are also performing cereal production for their own consumption. Main crops are rice, corn and feijão and usually such crops are cultivated on reclaimed land and such land is successively converted to pasture land. In other case, cereal crops are cultivated in a part of degraded pasture land similar to barreirão system for better management of pasture. In both cases, however, fertilizers are not applied for crop production. In this case, the effect of the integration of agriculture and animal husbandry is not satisfactorily expected. Small-Scale Farmers

Small-scale farmers and immigrants of INCRA in the Study Area are carrying out combined agriculture of cereal production for self-consumption and small scale livestock raising. As for the crop production, rice, corn, feijão and cassava are cultivated in the area of few ha by family. Since these crops are cultivated in slash-and-burn area without irrigation, fertilizer and agro-chemicals, the yield from unit area is very limited. Many farmers are also cultivating fruit crops as their home garden. Fruits such as orange, banana, acerola, guava, mango and papaya are generally cultivated and other fruits such as cupuaçu, soursop and star fruits are cultivated in limited location. Especially in the extreme northern region, many farmers are engaged in the collection of natural products. Açai, Bacuri and Cupuaçu are collected in Esperantina and similarly Coco in Carrasco Bonito and Sampio, Babaçu in São Miguel. Such kind of activity is, however, not contributing to the increase of farmers' income.

As for the livestock raising, calf production is common in the outskirts and milk production is common in the suburbs. Small-scale farmers are keeping 10 to 100 heads of animals according to their land area. The land area given to the immigrants varies from 5 to 70 ha with the average about 20 to 40 ha and they are keeping a few to ten and some heads per family. Since the price of milk to the processing facility is extremely cheap, some farmers are directly selling their products to the consumers and some other farmers are producing cheese by themselves for sale. Since small-scale farmers have less capacity of investing for better pasture management than middle and large scale farmers, the degradation of pasture is outstanding. In the area of immigrants, there are several social problems such as environmental degradation of the conservation area along the stream, high rate of uneducated people and bad road condition etc.

There can be found several signs of the future agricultural development for small-scale farmers and immigrants here and there. Triggers for those signs are supporting program of national level for the association of small-scale farmers such as PRONAF and PRORURAL and other financing system of state level such as Bacia Leiteira by PRODIVINO. One of the associations in Araguatins, for example, is jointly utilizing the tractor and seeding equipment for their cereal production and there is a plan of joint operation for the facilities such as cassava milling and fruit processing. Some of the members in this association start to challenge the commercial production of fruits and vegetables. At Itaguatins, as a part of Bacia Leiteira, a group of 35 members received 2 tractors, 1 track, and milk sterilization facility. In Araguaina, one of the associations is going to receive cheese and confectionery processing facilities from PRONAF through the association's active function and cooperation of municipal office. In Nazare and Filadelfia, group cultivation system is functioning. In this system, a group of small-scale farmers borrow a land for their cereal production by utilizing the distributed seeds and fertilizer then return the land after soil preparation for pasture to the landlord. This is the natural integration system of agriculture and animal husbandry and the number of landlord offering their land to this activity is increasing. Chief of group promoting the activity of association in Araguaina and Nazare is also performing the commercial cultivation of watermelon by introducing simple irrigation system as demonstration and such activity is significantly stimulating the other members of the group. Group activities are thus functioning already and this will be expanded rapidly in future provided an appropriate support services are obtained.

4. Conditions of Farm Economy

As a part of investigation on farm management and farm economy in the Study Area, mini-workshop was organized in several places by inviting the members of association of small-scale farmers and syndicate rural of livestock raising farmers. In this mini-workshop, in addition to the general information on labor, income, land ownership, crop production and livestock raising, participants' opinion on integration of agriculture and animal husbandry and group farming were collected. The following table shows the comparison of average figure on general information collected from different group.

Group	Class	Farming Type	No of Family (pers.	Total land (ha)	Pasture land (ha)	No of Animal (head)	Animal for meet (head)	animal For milk (head)	Agr. income (R$/month)
Association, Araguatins	INCRA	Self	6.2	35.0	-	0.0	0.0	0.0	-
Association, Araguatins	small	Crop/milk	5.9	42.7	11.0	14.6	6.0	8.6	150
Association, Augustinopolis	small	Crop/milk	6.4	68.2	41.4	39.8	24.9	14.9	487
Association, Araguaina	mid/small	Crop/milk	4.2	108.8	72.5	54.8	10.9	43.9	625
Association, Itaguatins	mid/small	Crop/milk	5.3	183.3	71.9	119.1	92.3	26.8	541
Syndicate Rural, Araguatins	mid/small	Meet/milk	5.0	237.5	110.3	88.8	58.8	30.0	688
Group, Filadelfia	middle	Meet/milk	5.2	644.0	211.7	208.0	198.0	10.0	625
Syndiacate Rural, Xambioa	Lar/mid	Meet/milk	7.3	2437.5	1790.0	1575.0	1497.5	77.5	13,800

(Source ; The result from investigation at mini work shop)

According to the results of mini-workshop, immigrants of INCRA have no cash income due to no production except self-sufficiency. In order to cover necessary expenses, however, they earn about 300R$/month as a day laborer in the region. Some families of the association in Araguatins are producing vegetables and fruits for marketing and are gaining more than 300R$/month. In case of the association in Augustinopolis, income level is higher because of active introduction of animal husbandry. Both associations in Araguaina and Itaguatins consist of middle to small-scale farmers who own about 100-200 ha of land. Income level is relatively higher in Araguaina where milk production is the major activities than in Itaguatins where calf production is major. In case of middle-scale farmers depending fully on calf production in Filadelfia, income level is not sufficient even they have large land area. Income level of large and middle-scale farmers in Xambioa seems extremely higher than the others, but the net income should be evaluated by taking the number of employees and other necessary expenses into consideration.

Grupos	Classificação	Formas de administração	Nº de famílias	Área total da prop. (há)	Area total de pastagem (há)	Nº de animais (cabeça)	Nº de bovinos de corte (cabeça)	Nº de vacas leiteiras (cabeça)	Lucros pela produção de produtos agrícolas (R$/mês)
Associação, Araguatins	INCRA	Subexistência	6.2	35.0	-	0.0	0.0	0.0	-
Associação, Araguatins	Peqenos produtores	Produção agrícola e leite	5.9	42.7	11.0	14.6	6.0	8.6	150
Associação, Augustinopolis	Peqenos produtores	Prod. agrícola, gado de corte e leite	6.4	68.2	41.4	39.8	24.9	14.9	487
Associação, Araguaina	Pequenos e Médios produtores	Produção agrícola e leite	4.2	108.8	72.5	54.8	10.9	43.9	625
Associação, Itaguatins	Pequenos e Médios produtores	Produção agrícola e leite	5.3	183.3	71.9	119.1	92.3	26.8	541
Sindicato Rural, Araguatins	Pequenos e Médios produtores	Gado de corte e leite	5.0	237.5	110.3	88.8	58.8	30.0	688
Grupo Filadelfia	Médios produtores	Gado de corte e leite	5.2	644.0	211.7	208.0	198.0	10.0	625
Sindicato Rural, Xambioa	Médios e Grandes produtores	Gado de corte e leite	7.3	2437.5	1790.0	1575.0	1497.5	77.5	13,800

Data obtained by the mini work-shops

Federative Republic of Brazil
State of Tocantins
Secretariat of Production (SEPRO -TO)
Secretariat of Planning and Environment (SEPLAN -TO)

Japan International
Cooperation Agency
(JICA)

ANNEX VIII

CURRENT SITUATION OF LIVESTOCK

Pacific Consultants International

ANNEX VIII

CURRENT SITUATION OF LIVESTOCK

1. Livestock Production

(1) Livestock Numbers in the Study Area

The Study Area covers 25 municipalities of Extreme Northern region and 13 municipalities of Northern region with 31.6% of the total population of Tocantins in 13.3% of the total land area. Its agricultural land is quite limited as 1.2 per cent in the Extreme North region while only 1 per cent in a North region. It is considered, as there is many places to be suitable for agriculture cultivation, but most of them are used for livestock production. As almost all the land capable of crop use is not being farmed, and crop production has not reached a saturation level, the bonus now is more on animal husbandry.

According to the latest data from ADAPEC-TO, number of livestock animals in the area is as follows.

Number of livestock animals in the Study Area

	cattle	buffalo	swine	goat	sheep	poultry
Extreme northern	541,519 (9.28%)	342 (3.33%)	10,703 (7.14%)	888 (5.27%)	2,303 (5.20%)	74,291 (7.61%)
Northern	927,991 (15.91%)	536 (5.22%)	9,822 (6.55%)	1,622 (9.63%)	6,056 (13.68%)	193,704 (19.84%)
Total in Tocantins	5,833,522 (100.0%)	10,262 (100.0%)	149,885 ((100.0%)	16,846 (100.0%)	44,277 (100.0%)	976,405 (100.0%)

Source: ADAPEC-TO, 2000.

As shown above, there are largest number of cattle and chickens raised in the Study Area (25% and 27% of the total number in Tocantins, respectively), so it is the largest area of cattle and chicken production in the state.

(2) Cattle Farming

In the Study Area, most of cattle are raised as beef cattle generally under the extensive farming conducted by large-scale farms. Middle and small scale farmers in the region where near the certain consuming area is producing milk. A beef production system includes a feeder cattle production, fattening, and cow-calf production, and the fattening farmers mostly introduce steers from other regions via middlemen and conduct fattening there.

Farming management system of large farm is quite different from that of middle and small scale farmers, as most of large farmers, who reside in their farms, have improved and variety of pasture as well as machinery equipment such as a tractors, etc.. They also generally perform self-production of replacement heifer, AI, and silage production.

Nerole is the largest group, which has been raised in the area, and a crossbred produced by crossing female Nerole with other males such as Holandes, Giloranda, and Pardo Swiso is introduced for milk production. Its bullcalf is sometimes to be utilized for fattening.

Beef cattle is delivered as dressed carcass to North, South, and North-East regions after being processed at private slaughterhouses located in Araguaina, because it is prohibited to transfer live cattle to South states. Live cattle are frequently delivered to North-East regions and sold there via middlemen.

Cost of beef cattle, which is fatten until its live weight becomes 500 to 520 kg at 30 to 35 months old, is about 500 R$ (≒2 R$/kg). Milk is collected to milk plants in various locations and then

cheese is usually produced from it and sold widely in the Study Area. There are several milk plants in Araguaina in order to satisfy the market demand in the region. Since demand for milk is also quite large in a local region, milk-producing farmers living closer to the urban centers sell milk to consumers by themselves.

4 to 8 litters of milk is produced per day from a crossbreed cattle by crossing general-type of female Nerole with Holandes, Giloranda or Pardo Swiso bulls, but it decreased to 4 to 5 litters per day during the dry season. Although the cost of milk differs from area to area, it is generally sold at about 20~25 ¢/ in the North region while it is about 20¢/ in the Extreme North region. When farmers sell milk by themselves, it is about

(3) Buffaloes

Buffaloes were mainly introduced by large farmers in the North region about 30 years ago, but many of them that ran wild by breaking out from farms because most of the farmers were absentee farmers and therefore could not manage their farms appropriately. There is a certain biased view about buffaloes, so only few systematic farms of buffaloes are available.

Buffaloes, however, have recently attracted attention since their meat contains low cholesterol. Mozzarella cheese produced of buffalo's milk is now being sold at high price among consumers living in large cities such as Sao Paulo.

There are other reasons why buffaloes came up: it is possible to raise them in pasture land not well improved as they can be raised with natural grass land that cattle does not eat. It is especially advantageous in the Study Area, Amazonas region, where a utilization of farmland is limited. Buffaloes also eat aestivate of Babasu Palms which is found in the many place of the region even in the dry season as there are many rivers, spring water, and wetland. Babasu Palms usually takes a lot of trouble with farmers.

Average volume of milk yields in the Study Area is 5 to 8 litters/day. There are several buffaloes which volume of milk yields is over 10 litters/day during the rainy season. Its calving rate is quite high (90 to 95%, almost one calf in a year) when comparing to that of cattle (50 to 70%), and its number definitely increases every year.

Main breeds raised in the area are Murrah and Jaffarabadi, dairy breeds of River Type. Middle and small scale farmers raise Murrah for milking while large scale farmers raise Jaffarabadi for beef production.

There is a high demand for buffalo meat in North-East region. The cost of the meat in the region is the same as that of beef cattle. The price of milk produced from buffaloes is the same as that of cattle. Buffalo milk is sold at cost of 40% higher than that of milk from cattle in some area of the region thus increasing middle and small scale farmers' desire to raise buffaloes in that area.

Price of cheese is 4.5 R$/kg for cattle and 5.5 R$/kg for water buffaloes.

Following shows municipalities where buffaloes are raised in the Study Area. However, those data of buffaloes are something unsatisfactory, and suppose that the number of buffaloes raised in the region is much higher than that indicated in the data. Consequently, it is important to obtain more accurate data in order to advance buffaloes farming.

Main municipalities of the Study Area where buffaloes are raised

Extreme northern		Northern	
Municipal	No.	Municipal	No.
Darcinopolis	196	Muricilandia	135
Sitio Novo do Tocantins	60	Aragominas	80
Sampaio	28	Piraque	59
Araguatins	24	Santa Fe do Araguaia	56
Augustinopolis	19	Araguaina	55
Tocantinopolis	12	Nova Olinda	50
Carrsco Bonito	3	Araguana	50
		Wanderlandia	31
		Xambioa	18
		Babaculandia	2
Total	342	Total	536

Source: ADAPEC-TO, 2000

(4) Swine Husbandry

Araguiana, North region of the Study Area, is the largest place of swine husbandry, because it has large consumers. It is interesting that there are quite large number of swine in the Extreme North region, Araguitins and Augustinopolis. It is connected that those areas are close to Imperatriz, Maranho, where a large group of consumers exists. There is a number of swine raised in Nova Olinda in the North region, too. It is because it has cheese processing factories where whey is easily utilized.

Piau, a local breed which is raised in the region as a major breed for several reasons: 1) it is good nicking practice with Large White male, 2) it provides high revenue by supplying whey, a byproduct produced at cheese processing plants. Whey also helps cattle to grow rapidly, 3) price of pork is relatively higher than other meat, 4) pork is in short supply, 5) there is a high demand for barbecued pork. Therefore, there is willingness to produce pork among middle and small farmers. Cost of hog is 1.7 to 2.5 R$/kg independently of its live weight or age.

There are, however, several problems in swine husbandry as follows: 1) it is difficult to procure a purebred male such as Large White, 2) technical asistance in FURALTINS or ADAPEC have little knowledge on swine husbandry, 3) there is no sufficient disease control (especially against hog cholera and cistecelcosis, and 4) there is only limited slaughter houses for swine available.

Main municipalities in the Study Area where swine husbandry is conducted

Extreme northern		Northern	
Municipal	No.	Municipal	No.
Araguatins	1,795	Araguaina	1,593
Augustinopolis	1,155	Nova Olinda	1,500
Itaguatins	862	Filadelfia	1,115
Axixa do Tocantins	745	Pakmeirante	1,105
Buriti do Tocantins	737	Wanderlandia	849
Tocantinopolis	699	Muricilandia	779
Ananas	592	Xambioa	650
		Babaculandia	649
		Aragominas	542

Source: ADAPEC-TO, 2000

Consumer retail price of each livestock products is as follows:

Retail price of livestock products
(Araguaina market as of end of June 2000)

Type	Price Unit ; R$/kg
Beef (boneless meat)	4.00
Dried beef	3.50
Pork (with bone)	4.00
Chicken (frozen broiler)	1.50
Egg (one)	0.08
LL milk (1)	1.19

Source: Data from the field study conducted by JICA study team

(5) Poultry Husbandry

A systematic and modern poultry husbandry, which produce eggs and chicken meat, had been limited in urban areas of Tocantins. A leading poultry husbandry company from outside of the state started its deployment of broiler integration in the North region. This deployment provoked other companies in the Extreme North region and one of larger companies is currently seeking its integration in the central region of Tocantins. Consequently, poultry husbandry (broiler production) has became a modern industry all at once.

Agrolandia (headquarter in Castanhal in Para) started its broiler integration with middle and small scale farmers or absentee landowners, who are able to construct poultry houses, in the area for 50 km round from the North region, Araguiana. It has a plan to produce 500,000 chickens/month (or 60 million chickens/year) by year 2001, North region. It has already operated a processing factory in ZPE in Araguaina and produce 7,500 chickens/day (by operating a factory for 8 hours per day).

ASA ALIMENTOS, a leading poultry company with its headquarter in Brasilia, will also start similar integration in six municipalities (Tocantinopolis, Aguiarnopolis, Nazare, Angico, Palmeras do Tocantins, and Luzinopolis) and plans to produce 150,000 chickens/day, 4 million chickens/month or 4.8 million chickens/year by 2004 by utilizing idle facilities (such as grain drying facilities) owned by government agencies.

There are several reasons why those companies are deploying their broiler integration in the Study Area of Tocantins :

1. the area will become convenient to export poultry meat to Europe and Far East as North-South Railway will soon open (the bridge is under construction over Rio Tocantins in Estreito)
2. there is a preferential tax treatment for sales tax in Tocantins
3. there is no severe problems of poultry disease as there has not been experience of poultry husbandry
4. since it has a mild climate during the dry season, it is easy to make production schedule. It also allows low production cost (such as heating)

Integration contractual coverage of each company is almost same as explained separately. (For detailed information of broiler integration, refer to another chapter.)

2. Animal Health

(1) FMD Free Program

Although there is no severe outbreak of disease among livestock animals, the state government has been conducted a drastic FMD Free Program in collaboration with federal government. It has been no FMD outbreak since May 1997 in Tocantins. The table below shows latest record of the disease outbreak in other states.

FMD outbreak in other states

Municipal	Last outbreak
Rio Grande do Sul	Dec. 1993
Santa Catarina	Dec. 1993
Parana	May 1995
DF	May 1995
Matto Groso	Jan.1996
Minas Gerais	May 1996
Sao Paulo	March 1996
Espirito Santo	April 1996
Bahia	March 1997
Rio de Janeiro	March 1997
Sergipe	Sep. 1995
Tocantins	May 1997
Matto Grosso do Sul	Jan.1999

Source : Ministrio da Agricultura, 2000.

FMD is one of the most severe diseases of livestock in the world due to its high virulence. The disease is usually multiply together with livestock animals or livestock products (specifically meat). There are many countries, which implement import restriction in order to prevent the disease from propagating. As it will cause sever damage on international trade of livestock products once the disease becomes a resident. It also propagates with semen, so import and export of frozen semen is also prohibited.

FMD has been frequently found in East Asia (Eastern Russia, China, Korea, Taiwan, North Korea, and Mongolia), it broke out in Miyazaki, Japan in March of this year as the first time since 1992. It was also found in Hokkaido after that. Since the accurate treatment for FMD has been conducted in Japan (e.g., test and slaughter of cattle with disease, and banning transfer of livestock), it is at the beginning of the end. Note that no vaccine inoculation is conducted in Japan.

North America, Central America, and Caribbean countries are known as FMD free countries while Chile, part of Colombia, Argentina and part of Paraguay are FMD free in South America.

In Brazil, two southern states, Rio Grande do Sul and Santa Catarina are given approval as FMD-free regions (that is vaccine inoculation is no longer required) by OIE (Office International des Epizooties, headquarters in Paris). The FMD free program (disease prevention by vaccine inoculation, banning transfer of live farm animals to a specific area, and establishing a buffer zone in a specific area) has been progressed ranging over the whole gamut of the country except for Amazonas region and North-Eastorth region. Parana and Brasilia DF have achieved FMD free in May 1998 as a result of introducing vaccine inoculation.

It is expected that six states, Tocantins, Bahia, Matto Gross do Sul, Rio de Janeiro, Espirito Santo, and Sergipe, are going to achieve FMD free by vaccine inoculation by around May 2001 while other states, including Minas Gerais, Matto Gross, Goias, Sao Paulo, are going to achieve FMD free

in their some parts by May 2001. (Refer to attached Figure 1.)

The FMD vaccine inoculation rate in the Study Area is 83.5% and 94.7% in the Extreme North region and North region, respectively, and total ratio in Tocantins is 93.07%. (FMD vaccine is mainly applied to cattle in the area, but it is applied to buffaloes in some parts.)

FMD vaccine inoculation rate in Tocantins (as of 2000)

Region	vaccine inoculation rate (%)
Araguatins	83.59
Araguaina	94.72
Colinas	94.89
Pedro Afonso	92.76
Paraiso	97.71
Palmas	82.67
Porto Nacional	93.97
Formoso	95.26
Grupi	93.10
Taguatinga	86.96
TOTAL	93.07

Source : ADAPEC-TO, 2000.

FMD vaccine must be inoculated twice a year. It is planned to achieve 100% of vaccine inoculation by edifying local agencies of ADAPEC in each municipalities. ADAPEC-TO contains its local agencies in 130 towns covering all states, and established 22 quarantine station for transferred livestock in order to check whether FMD vaccine has been inoculated in animals delivered from/to other states, or those delivered to other states via Tocantins by inspecting their certification. These stations are expanding their activities for FMD free to be achieved in May 2001.

FMD vaccine, made in Brazil, is a tribalent vaccine with A.O.C. mixed. Its term of validity is two years and it costs 60 ~63¢ (70¢ for those not registered as cattle breeders).

It is limited to transfer livestock animals (mainly cattle) without ADAPEC certification, which is directly brought to a slaughter house in seven municipalities located between the states of Maranhão and Piauí, These municipalities, Palmeilante, Goiatins, Campos Lindos, Recursolandia, Lizarda, Sao Feliz do Tocantins, and Mateiros, are selected as Zona Tampão (specified buffer zone). ADAPEC was established in December 1998 in connection with a reorganization of the agricultural sector of the Tocantins government. It has local agencies in each state. Following table shows number of staff belong to animal health department of ADAPEC.

Veterinarian	Veterinary technician	Clerical officer	Total
84	311	129	524

Source : ADAPEC-TO, May, 2000.

The figure below shows vehicles available for epidemic prevention activity of ADAPEC-TO.

Four-wheel automobile	Motorcycle	Total
75	19	94

Source : ADAPEC-TO, May, 2000.

Attached Figure 2 shows organization of ADAPEC.

ADAPEC has been deploying its full-scale activity in order to achieve FMD free in the country, and

it keeps high budget from the state.

Secondary organ of the state government and their budget

Organization	Total budget(state government + federal government) R$
1. FUNJURIS-TO	650,000
2. FUNCESAF	350,000
3. UNITINS EM EXTINCAO	16,372,000
4. FUNDES	6,950,000
5. PRODIVINO	1,290,000
6. AD-TOCANTINS	14,640,000
7. FUNCECT	4,756,700
8. NATURATINS	4,242,748
9. IPETINS	3,101,000
10. DETRAN	8,615,000
11. RURALTINS	12,929,369
12. ITERTINS	3,649,000
13. FUNPEC	500,000
14. ADAPEC	9,210,000
15. JUCETINS	1,062,000
16. PROSPERAF	212,000
17. IPEM-TO	1,396,000
18. DERTINS	218,885,400
19. FEAS	20,007,408

Source : Pagina Suplementodiario Oficial No 872.

Vesicular Stomatitis (VS), which symptom is similar to that of FMD, mainly infects horses (which are not infected by FMD), donkeys, cattle and hog, but not sheep. Though its mortality rate is low, it sometime leads to death by a secondary infection. Therefore, it is necessary to provide a disease inspection facility where VS is discriminated. There are many other diseases such as Brucellosis and Bovine tuberculosis. It is then expected to improve livestock productivity in Tocantins by reliably diagnosing them. ADAPEC staff, who have been assigned to state wide locations, will be able to help aseptic and safety livestock production. There is no disease inspection facility in Tocantins, so it is strongly desired to establish one as soon as possible. The plan for such facility has not been brought to realization yet.

(2) Countermeasures for Hog Cholera - HC, Swine Fever

Hog cholera free is also strongly desired as well as FMD free in order to promote pork exportation. The disease causes high fever to hogs. Although its mortality rate and infection rate is not high, it may cause 100% death once a hog is infected. It only infects hogs and is very influential to swine husbandry's economy.

Hog cholera is called as hog cholera clasica in North and South America, Europe, and Africa so that it is distinguished from African hog cholera (African swine fever - AFS (English): Peste Porcina Africaine (Portuguese). African hog cholera is generally found in wild hogs, but it will give severe damage to general hogs once they are infected as there is no adequate treatment technique/preservative available. It broke out in Cuba and Dominican Republic, and weeded out all hogs in Dominica.

The disease has been exploded in Japan due to vaccine inoculation, and it will achieve fully hog cholera free by suspending vaccine inoculation commencing this year. It is planned in Brazil to achieve hog cholera free by May 2001 in thirteen states (Tocantins, Santa Catarina, Rio Grande do Sul, Parana, Matto Gross, Matto Gross do sul, Goias, Rio de Janeiro, Sao Paulo, Bahia, Sergipe,

Espirito Santo, and Minas Gerai and one special area (Brasilia DF). (Refer to attached Table 3.)

It will take about three to five years to implement full-scale FMD/hog cholera free by obtaining formal authorization of OIE as it has to wait until all immune bodies pass out of existence from animal blood after suspending vaccine inoculation. Once the country is authorized as disease free (with vaccine inoculation), it will expand meat exportation to North American countries, Europe, and Asia (Japan in particular will thus be extended).

Vaccine inoculation for FMD and hog cholera has been performed in limited swine husbandry sites in Tocantins, as there are only few large-scale swine farms and the number of hogs raised there is also limited. However, since there have been no reports of these diseases outbreak in the past, it is expected that hog cholera will be prevented by continuously conducting this control system by ADAPEC.

3. Current Conditions of Pasture

At present, pasture of the extreme northern region and the northern region consist of the cultivated pasture of about 80% and the native pasture of about 20% for the total area of pasture. The variety "Braquiarão" of grass is introduced basically in the cultivated pasture, "Quicuio" of grass in the wet pasture, and "Andropogon" of grass in the sandy soil. However, most of stock farmers do not apply fertilizer to pasture and do not take the soil management for cerrado. Therefore, most of pastures are declined and the capacity of raising livestock becomes very low, e.g. about one head per ha of pasture, as mention later. Almost farmers do not still renew their pasture.

The ratio of cultivated pasture for the total pasture in the extreme northern region and the northern region is about 80% in average, but the ratio differs with the scale of stock farming. For example, in municipal Babaçulandia, the ratio of cultivated pasture and the native pasture for their own total pasture are 90% and 10% in the large-scale stock farmers, 60% and 40% in the middle-scale farmers, 30% and 70% in the small-scale farmers. The ratio of cultivated pasture in total pasture of the stock farmer increases in proportion to the farming scale.

The degree of stagnation and withering in growth of grass in dry season depends on weather and soil. With regard to weather, the period of withering and the degree of withering depend on the length of dry season, precipitation and wind in dry season. On the other hand, in the sandy soil the progress of withering of grass in dry season is more rapid. Withering of grass in dry season in the southeastern part in the northern region and several municipals near Imperatriz in the extreme northern region begins early, because the part has longer length of dry season of five to six months and sandy soil. On the other hand, withering of grass in dry season starts later in the northern part, including Araguatins, of the extreme northern region, because the part has shorter length of dry season of three months, and rainfall sometimes in dry season (TABLE 4.6.3-1, FIG. 4.6.3-1).To solve the problem of shortage of fodder in dry season, silage of maize and sugarcane is supplied to livestock, especially to dairy cattle.

TABLE 463-1 TYPE OF DRY SEASON IN EACH REGION

Type	Dry season			No rain in	Rain sometimes	
	from	to	months	dry season	in dry season	Municipal
I	Apr.	Sept.	6		○	Nova Olinda, Palmeirante
II	May	Oct.	6		○	Ananas, Riachinho
III	May	Sept.	5	○		Babaculandia, Filadelfia
IV	May	Sept.	5		○	Wanderlandia, Araguaina, carmolandia, Aragominas, Municilandia, Santa Fe
V	June	Oct.	5	○		Axixa, Sao Migel, Switio Novo, Esperantina, Itaguatins
VI	June	Sept.	4	○		Maurilandia, Tocantinopolis, Aguianopolis, Palmeiras, Cachoeirinha Darcynopolis, Luzinopolis, Nazare, Santa Terezinha, Angico
VII	July	Nov.	5	○		Xambia, Piraque, Araguana
VIII	July	Sept.	3		○	Sao Sebastiao, Buriri, Carrasco Bonito, Sampaio, Augustinopolis, Pria Norte, Araguatins, Sao Bento

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ANNEX IX

CURRENT CONDITIONS OF AGRO-INDUSTRY AND TRANSPORTATION

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ANNEX IX

CURRENT CONDITIONS OF AGRO-INDUSTRY AND TRANSPORTATION

1. Current situation of the Agro-industry Activity

The mainly economical activity in Tocantins is essentially primary, having in the beef bovine production the largest relative participation in the economy.

In spite of great agricultural potential of the area, characterized by the existence of arable lands, abundance of water resources and climate, the section of agro-industry activity is still incipient in Tocantins State. The main causes of lack of development in this area is attributed, the big distances that separates Tocantins, meanning larger cost of transport of the agricultural production of the area, to the main domestical and external markets. Therefore the "Transports Center-north's Corridor Multimodal" complete implantation, is the most important factor to make possible the regional agricultural competitiveness, and to attract agro-industry investments in the area.

Efforts of the Federal and State Government have been intensifying to conclude the Ferrovia North-south first phase, wich tied the whole north area of Tocantins/Sul Maranhão/Piauí to Ferrovia of Carajás in Açailandia.

With the logistical advantage to the export market, Tocantins is becoming the great option of agro-industry investments, such the the project of poultry integration of the group "Aza Alimentos S/A"– Aguiarnopolis and another of the" Group Brazilian Chicken Alimentos S/A"– in Porto Nacional, both projets expecting to process 150.000 broilers/day. They would need an annual poultry plant, in integrated way of 130 million broilers, food processing plant, incubation unit, etc., those projets estimate the direct demand of 500 people, corn and soybean meat to the food factory plant.

Therefore those projects represents the great impact in social and agricultural development in the regions.

The "Casa da Farinha"– cassava agroindustry plant, represents an important State Projet because of large number of units among the State and in the area object of the study. These plants are used only for small periods during the year, processing the local production. However, they represent the important economical and cultural activity of the area.

Ruraltins demonstrates, according to picture below, that exists 310 units of "Casa da Farinha", where 79% located in the north area of the state.

LOCAL	ACTIVE	INACTIVE	TOTAL
State of Tocantins	261 (84,2%)	49 (15,8%)	310
North area	188 (76,7%)	42 (23,3%)	245

Source: Ruraltins-Diagnosis of the houses of flour of Tocantins, out.99

Matter cousin's lack consists as the main cause of the deactivation of the processing machines, as I diagnose elaborated by RURALTINS. Another program, in development, refers to the installation of 10 processing units of fruits, being foreseen 2 for the north of Tocantins (Augustinopolis and Itaguatins).
Several other projects are planned to introduce in the region: Araguaina (horticulture), in Xambioá (banana), Aguiarnópolis (Group Yamada–banana), Sampaio Projet (fruits), Tocantinópolis (coconut). Majority of those projects have the purpose to suply domestic market, south market (S. Paulo, Rio de Janeiro, Belo Horizonte, Brasília) and adjacent markets like Belém/Maraba (PA), São Luis/Imperatriz (MA). Even to the export market - taking the logistic advantage of the area, in spite of the difficulties to export because of lack of infrastructures (refrigerated transport/port sistem/vessel frequency) and the protectionists barriers to the produces imported from theirs

colonies (European countries for banana).

Foram instalados ou estão em vias de instalação, vários investimentos agroindustriais em Araguaina, entre estes: um abatedouro avícola com capacidade estática para 7.000 cabeças por dia e a fabrica de ração do grupo Agrolândia, fábrica de processamento de tomate/frutas de 12 toneladas por hora da CPV (Cooperativa de Produção Vegetal), fábrica de fécula de mandioca (polvilho) com capacidade estática de processamento de 30 toneladas por dia.

The great problem of the viabilização of these structures is in the lack of financial resources for the verticalização of the operations, mainly in the formulation of efficient estrátegias for the production and matters cousins' supply for yours manufacture.

(1) Cattle section

Beef cattle raising is one of the main economical activity of the region. Araguaina municipality is the biggest producer in north area of the State (248.332 heads of the total of 5.836.320 heads–source ADAPEC, 2000). The cattle rising farmer in the region are considered medium and big producers, being characterized for the practices of extensive cattle producers with use of medium to low technological level.

The great part of the cattle (about 50%) are sold on the practices of trade called "ox in foot–boi em pé" to the Northeast markets.

In Araguaína we find Frinorte with 750 heads/day and Coopercarne 300 heads/day (processing capacity) and 01 slaughterhouse with 100/130 heads/day.

In the area it still exists the tanning industry, where the leather have a initial process of industrialization and it is sold as "West Blue" form to the markets in the Northeast.

The Government of the State, as form of job generation and income to the primary sector, it is developing motivates actions to the agro-industrialization. The "Programa Bacia Leiteira", that besides offering infrastructure of the milk production, it contemplates the state with 25 units of milk processing plants, which 9 are settled in the north area (Buriti de Tocantins, Araguatins, Axixá do Tocantins, Sitio Novo do Tocantins, Tocantinopolis, New Olinda, Philadelphia, Itaguatins and Xambioá).

COMILA–Comercio e Industria de Laticinios Ltda (milk trade company)., is located between municipal districts of Araguatins and Axixá. Processing 100 thousand liters of milk/day for the production of cheeses Prata and mussarela. The milk processed come from Araguatins, Axixa, Sampaio and Buriti.

(2) Extrativism Sector

Babacu palm represents the most commom vegetation in the north region. The collection and breaking their coconut is the main activity practiced by women, or still for men, in the case of the cut and extraction of the palm heart.

In Araguaina there is the "Bruneto" company processing babacu palm heart with total capacity of 8.000 case per month. The product is canned, packed in glass pot and sold to the main markets of the south states with good acceptance.

In Tocantinopolis TOBASA–Tocantins Babacu S/A is one of the babacu processing plant in the

region, with installed capacity of 4.000 tones of babacu/ month (20% of the capacity is used). From the babacu coonut are extracted: oil, babacu meal for the animal food and the activated coal.

Because of low quantity of babacu oil extracted from the coonut (2 to 2,5% of the total weight) the factory is aiming to receive whole fruit for processing, wich make better income to the babacu collectors but growing up the process of elimination of coconut breaking operation, mainly executed by tha woman forces..

The oil of the babacu is sold at R$ 1,50/Kg to the soap campanies, babacu meal at R $0,20/Kg and the coal at R$ 1,00/Kg.

The great difficulty for Tobasa been more active in the region is the finantial problem, very probably due to the very low value outcoming from the babacu coconuts process .

2. Current situation of Trade System

(1) Current conditions of the Infrastructure of Transport

(1.1) Road network and the Belém - Brasília highway (BR153)

The use of the potentialities of Tocantins is conditioned to the existence of a transport system to be capable to integrate, in appropriate conditions of efficiency and cost, the different areas of the State and these with the other Brazilian states.

Now, the system of transport tocantinense practically limits to the road modal, which is being operated in a road network still insufficient in terms of road quantity and, in a general way, precarious concerning the quality conditions .

The principal road is called Belém-Brasília (BR153 and BR 226), that it crosses the whole state from North-south, making it easy to build a transportation network throughout the state.

Road network	Km	%	Jurisdiction			
			Federal	%	State	%
Paved/ paving	2.259	24	927	41	1332	59
No paved	7.193	76	-			
Total	9.452	100	-			

	State of Tocantins	
	Over national net	Particip. Area territor.
Total Highway	3,6%	3,3%
Paved highways	1,2%	-
Paving tax	23,9%	-
Density *	5,35 km	-

Km of highway paved by 1000 Km2 of territorial area. 5,35 km represents 1/3 of the density measured Brazilian. Data of 1997. In December /99, the paved highways arose for 3.714 Km.

In spite of low density, the network of road transport plays an important part in the economy, supporting the economical activity and the mobility of the local population.

The presence of two rivers–Araguaia and Tocantins brings some difficulties for the development because for the Araguaia there is no bridge to cross the river, while, in the river Tocantins, the

bridges are only three–on BR 226, Estreito (Maranhão); in Porto Nacional; on TO 280, Peixe (TO). In other important points for crossing the river Tocantins, ferryboat are used, what elevates the transport costs and time spended for the trip.

Still persist without paving almost 800 Km of federal highways and little more than 6.000 Km of state highways.

Therefore, the state government is making a solid improvement program and paving of road nework. In the end of 1997, 769 Km of highways were in process of paving and 486 Km in implantation (primary covering), corresponding, respectively, to 8,3% of the total extension and 5,1% of the total extension of highways in implantation in Brazil in the same period.

The state road improvement, in a decenal perspective, should pave more than 6.855 Km of highways, allowing to reach, in the year 2008, a paving rate 85% of the road network and a density of 32,7 Km of highways paved by 1.000 Km2 of territorial area, that it is the double of the density on Brazilian average.

(1.2) Transport cost of agricultural production

a) Road freights practiced in Tocantins

Using the existent data base from previous study in 97- "Master Plan", and added with the current conditions of transports and freights practiced in the north area for some goods and output of the system of freight information for agricultural loads–SIFRECA, maintained by the Agrarian Studies Foundation "Luiz of Queiroz"(da ESALQ/USP), it was determined, in first approach, general panorama of the conditions of the freights market, considering the current flows of the agricultural load produced in the north area of Tocantins.

The following indicators were adopted:

- Cost of the trip (R$/trip);
- Cost for weight (R$/ton);
- Moment of transport (R$/ton.Km).

The values presented in the following tables don't include tax and insurance and they correspond the price collected through the transporters for the moviment of the analyzed agricultural loads–grains (soybean and rice), fruits (pineapple, banana, coconut and watermelon), cattle and refrigerated meat and milk in the current conditions of production, commercialization and transport.

a.1) Soybean

The very small quantity of soybean in the north area is marketed and destined to the storage in Pedro Afonso (Cooperative) by truck. From that pole, the soybean is exported, being embarked in the S. Luís (MA) port terminal.

Most of the soybean production has been sent to the port terminals through the road-rail operation: by truck up to Imperador (MA) and then railroad to S. Luiz (MA). With the Ferrovia Norte-Sul railway settled up to Estreito (MA), CVRD- Companhia Vale do Rio Doce, is moving the initial point of this logistics integrated to the rail patio in Porto Franco, where one of their users, Ceval, is building a terminal of integration multimodal of loads with annual operational capacity of 4 million

tons (equipped with grain silos of 50.000 tons). This investment will be fully operated in the harvest 2000/2001.

Producing area: ARAGUAINA COST OF TRANSPORT

Soybean transport	Origin	Araguaina		P. Afonso	Estreito	São Luís
For export	Destiny	P. Afonso	Estreito	Estreito	São Luís	Rotterdam
Extension	Km	265,78	124,95	390,73	740	
Transp. Road	R$/tKm	0,0548	0,0548	0,0548		
.	R$/t	14,56	6,85	21,41		
Transp. Rail	R$/tKm				0,0261	
	R$/t				19,33	
Port cost	R$/t					12,87
Freight marine	R$/t					29,70
Total cost of transport		Direct (R$/t)				68,75
(besides marine)		Throught P. Afonso				97,87

a.2) Rice

The traditional rice production pole : two for irrigated rice – Formoso de Araguaia and Lagoa da Confusao and six for sequeiro – Porto Nacional, Paraiso do Tocantins, Alvorada, Pedro Afonso, Gurupi and Marianópolis. Therefore in the North area it doesn't exist important poles, most of them in family molds and marketed inside of the north region.

Majority of the transport is made by Road within the distances of transports of 135,9 Km, average freight of R$ 8,00/t wich represents average costs of R $0,0589/t.Km.

a.3) Horticulture

Banana, pineapple and coconut are the main fruit cultures of the area. It was identified, a watermelon production in Araguaina area marketed in Imperatriz (MA).

a.4) Pineapple

Producing pole: Araguatins, sending their products by truck to the secundary trader of Miracema city . Load capacity of the truck - 10 tons (6.500 fruit/load).

The transport cost to Miracema (534,7 Km) represents R$ 18,71/t with medium unitary cost of transport of R $0,035/t.Km.

From Miracema to main capitals of the Southeast and Center-west market are R$ 56,56/t (1.414 km), what produces a moment of transport of R $0,04/t.Km.

a.5) Banana Prata

Production is concentrated in the pole of Araguaina and Xambioa and destined to the other States market. The half of the regional production sold through CEASA of Belém and São Luís and the remaining quantity are sent to Rio de Janeiro, Belo Horizonte and Brasília market.

- Average travel distance–1.479 Km
- Cost of Freight –R$ 71,00/t
- Medium moment–R$ 0,058/t.Km

a.6) Coconut(Coco Anão)

Small production in the poles of Araguaina and Tocantinopolis. Marketed at the local markets and in Palmas, and outside of the state in Goiânia. Transport in bulk..

- Average travel distance – 578 Km
- Cost of Freight – R$ 22,15/t
- Medium moment–R$ 0,0383/t.Km.

a.7) Watermelon

Small production in Araguaina and marketed in Imperatriz (MA). Truck with 8 ton load capacity is used.

- Average travel distance – 250 Km
- Cost of freight–R$ 18,74
- Midium moment–R$ 0,0751

3. Current conditions of ditribution of stock farm products

(1) Bovine cattle and Refrigerated Meat

The catle meat production is the most important economical activities of Tocantins. In the North area, that activity generates two main categories of transport flow:

- cattle in foot (gado em pe), from the production areas to the slaughterhouse, located in Araguaina and Colinas do Tocantins, or from the creative areas to the recreatives area and fattening.
- Frozen or refrigerated meat, from those centers to the consuming areas– like the Northeastern capitals, Rio de Janeiro and São Paulo market.

The cattle transport in foot is made by the road, in special trucks with capacity of transport of 20 oxen or 30 to 40 calves, what means 6 tons for vehicle.

	Distance Km	Freight medium R$/t	Medium moment R$/Km
Calf in foot	270	76,48	0,0283
Ox in foot (local)	275	45,78	0,3333
Ox in foot (northeast)	1236	329,50	0,2666

markets: Local (Araguaina/Colinas), northeast (Fortaleza, Sobral, S. Luís, Recife and Belém)

The meat would originate from the slaughterhouses of Araguaina is destined to the Northeast (85%) and markets of S. Paulo and Rio de Janeiro (15%), transport in refrigerated trucks, traveling average extension of 1.868 Km.

Type truck	Cap. cargo	Freight medium	Medium moment
Trucado	12 t	R$ 167,48/T	R$ 0,0896/T.KM
Refrigerated truck "carreta"	24 t	R$ 134,64/T	R$ 0,0721/T.KM

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ANNEX X

ENVIRONMENTAL CONDITIONS

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ANNEX X

ENVIRONMENT CONDITIONS

1 Current situations of environment preservation area in Study Area

This Study Area, half of the area in tropical rain wood vegetation and rest of it covered with cerrado vegetation. However, the great part of the area is influenced by indiscriminate development in the 1970s. And there is few area where original vegetation is left.

According to current map of land utilization by SEPLAN, this Study Area divide as river 1.4%, pasture 54.4%, cerrado 24.8%, forest 19.1%, residential 0.2%, farm 0.1%. In Carmolándia municipal, 78% of land is utilized as pasture. The table below shows the rate of pasture in the Study Area.

Repartition which is divided by pasture area rate in each municipal

Rate of pasture	No. of Municipal	Name of Municipal
70% over	3	"06-Augustinópolis"、"25-Araguanã"、"32-Carmolándia"
60%~70%	12	"36-Palmeirante"、"21-Palmeiras do Tocantins"、"28-Xambioá"、"37-Santa Fé do Araguaia"、"08-Buriti do Tocantins"、"24-Ananás"、"13-Sítio Novo do Tocantins"、"27-Riachinho"、"30-Araguaína"、"35-Nova Olinda"、"34-Muricilándia"、"26-Piraquí"
50%~60%	8	"12-São Miguel do Tocantins"、"14-Aguiarnópolis"、"10-Praia Norte"、"11-Sampaio"、"22-Santa Terezinha do Tocantins"、"09-Carrasco Bonito"、"07-Axixá do Tocantins"、"29-Aragominas"
40%~50%	9	"16-Darcinópolis"、"17-Itaguatins"、"20-Nazaré"、"03-Esperantina"、"38-Wanderlándia"、"01-Araguatins"、"33-Filadélfia"、"15-Angico"、"31-Babaçulándia"
25%~40%	3	"04-São Bento do Tocantins"、"05-São Sebastião do Tocantins"、"18-Luzinópolis
Less than 25%	3	"19-Maurilándia do Tocantins"、"02-Cachoeirinha"、"23-Tocantinápolis"

When dividing each municipal from the rate of green area in this Study Area, green area is comparatively remained at northern part. There are 11 very low municipals at the rate of green area. The rate of green area of this Study Area is 19.1%.

Repartition which is divided by green area rate in each municipal

Percentage of green area	No. of Minicipal	Name of Municipal
50%over	1	"05-São Sebastião do Tocantins"
40%~50%	1	"03-Esperantina"
30%~40%	8	"09-Carrasco Bonito"、"29-Aragominas"、"11-Sampaio"、"01-Araguatins"、"12-São Miguel do Tocantins"、"37-Santa Fé do Araguaia"、"28-Xambioá"、"08-Buriti do Tocantins"
20%~30%	9	"34-Muricilándia"、"27-Riachinho"、"06-Augustinópolis"、"30-Araguaína"、"25-Araguaná"、"26-Piraquí"、"17-Itaguatins"、"32-Carmolándia"、"10-Praia Norte"
10%~20%	8	"22-Santa Terezinha do Tocantins"、"15-Angico"、"24-Ananãs"、"20-Nazaré"、"38-Wanderlándia"、"13-Sítio Novo do Tocantins"、"35-Nova Olinda"、"36-Palmeirante"
Less than 10%	11	"04-São Bento do Tocantins"、"07-Axixá do Tocantins"、"16-Darcinópolis"、"23-Tocantinópolis"、"33-Filadelfia"、"31-Babaçulándia"、"19-Maurilándia do Tocantins"、"02-Cachoeirinha"、"21-Palmeiras do Tocantins"、"14-Aguiarnópolis"、"18-Luzinópolis"

Vegetation of cerrado area which accounts about 1/4 of this Study Area, with the repeated burned off its field, the rate of the environment preservation becomes a low situation.

When judging from this situation, this Study Area belongs to the Amazon legal preservation area and about half of the area divided tropical rain vegetation. However the environment preservation degrees become a very low situation.

2. Environment reserve area

There are Indio reserve area and APA plan area in this Study Area as protection of environment resources. The present conditions of each area is as the following.

(1) Apinae Indio reserve area

This reserve area is located between Tocantins river and trans-Amazon road. It has about 140,000-hectare and 714 people are living at the 7 residence ward according to census in 1995. Vegetation in the reserve area divided as cerrado and consists of sand soil.

(2) Xamboia Indio reserve area

The Xamboiá Indio reserve area has 3.300 hectares located on the Araguaia river's right bank. According to the census in 1995, 1 colony exists and 176 people are living.

(3) APA plan area

As the APA plan area, the area crossing the Araguaia river and the Tocantins river, Aragominas and Muricilandia minicipal are planned. The vegetation in both planned areas are divided as tropical forest.

3. Gathering industry

The following are examples of gathering industry in this Study Area.

(1) Babaçu Palm

Babaçu grow wildly in this state. The extrativismo practiced in the area of the study is done by women's groups. They collect the babassu coconuts for the industry of babaçu palm oil in Tocantinópolis. There are the ASMUBIP (Women's Association of the "Bico do Papagaio") that have a drawing oil factory in São Miguel do Tocantins, it have influency to 10 municipal districts of Extreme North Region and have 330 members associated. The price of the purchase of the chestnut is of R$ 0.2 for kg, and the coconuts, of R$ 24.00 for ton. The chestnut is picked by men, transported by horses until the highways, and stored in the margins of the own highways. The industry passes a week with the car 2 times to collect. The medium amount picked per person it is of 0.5 ton a day, resulting in a medium earnings of R$ 4.00.

(2) Tocantinopolis Babaçu oil Factory (TO-BASA)

This oil manufacturing factory was established in 1973 utilizing the formula of SUDAM. They also produce activated charcoal and soap from babaçu. for the material purchase. The industry processes the babassu, the peels use as raw material of vegetable coal and the oil is extracted of the chestnuts. The administação of the company thinks that, in the future, the vegetable coal will be a more marketable product than the oil. The capacity of processing of the industry is of 4000 ton a month, but the amount industrialized now is of 1/8 (about 500 ton a month). The reason, conform the company, is the budget lack to buy more fruits.

(3) Axixa ABIPA (Honey Producters Association of "Bico do Papagaio")

The headquarters in AXIXA and the activities extends over 9 municipals. The number of members is about 200 and 20% of the members plows housewifives. It carries the product to Palmas, Maraba and Empress city in addition to sell products attn their own shop and sells them the wholesale.

In case of member of NAZARE, one family is managing 2-8 boxes (1 box = 35R$) and 25-30 kg of honey can be gathered per annual from 1 box. Because the sales price is 10.00 R$ / 1.4 kg, it gains 1000R$ with 5 boxes annually. Because demand for honey is higher than supply, bee raising farm is increasing rapidly and ABIPA works well.