

## (6) Banana

The culture of the banana has a tradition in Brazil that, in past times, it placed the country as the first among the world exporters of the fruit. Alterations of the market provoked the loss of commercial space as the formation of economic blocks and current impositions of quotas and compensatory tariffs. Uruguay and Argentina represent the main importers of the Brazilian banana. Since 1992, however, the imports of banana of Argentina come decaying, and the Argentinean market comes being conquered by Ecuador, launching the Brazilian product.

The alternative for the Brazilian producers is the improvement of the quality of the product offered, so much in the external market as in the internal. It is calculated that, currently, the production of the banana implies in a waste fullness of 50 to 60% of the fruits, especially in the powder-crop processes. The adoption of technologies, simple and available, that embrace treatments in the crop, in the packing and transport, can increase in up to 35% the prices to the producer. The adoption of the system of "joined house of packing" to the producing areas, it is another available technology.

The adoption of irrigation systems for the production of bananas is an alternative that has been strengthening the banana culture in regions of the Northeast and Southeast, as in it is Vale do São Francisco, in the irrigated perimeters of Janaúba and Jaíba, in Minas Gerais and of the it is Vale do Aço - RN - and Neópolis - SE. The irrigation propitiates won in quality and revenues many superior times to the areas of traditional banana culture as the ones of the it is Vale do Ribeira, for example.

With relation to the internal market, the same observations with relationship to the quality of the product are valid, once it already makes to feel the pressure of the presence of the imported product of Ecuador and Central America, in competition in the markets.

The Brazilian production of banana is of the order of 500 thousand bunches in 1996, occupying area picked total of 473,208ha there is, as it is seen in the Table VII-5.2(20). The areas of larger concentration of the culture are the Northeast and the Southeast. The Northeast is considered as area of expansion of the banana culture, due to the installation of multinational company of industrialization of fruits, in Rio Grande do Norte.

In the state of Tocantins the banana production comes constantly decreasing since 1989/90. The regions that concentrate the production are, mainly, the Center-west and the Central Region, even so the culture is decreasing in whole to areas. The banana production in the state of Tocantins is described in the Table VII-5.2 (21).

In the field research were picked information of three important areas of banana cultivation, described in the Table VII-5.2(22). In Paraíso do Tocantins locates the area with more technique application, with irrigated plantations of the fruit. The most common varieties are the Prata Anã and Pacovan, among another.

Table VII-5.2(20) Brazil Production, harvested area and productivity of banana, 1987-1996

a - Production (1.000 clusters)

Region	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1996/1987		Distribution %	
											%		1987	1996
North	42.220	53.608	83.842	80.795	78.930	81.151	95.307	102.209	107.162	44.416	5,20	8,21	8,31	
Northeast	201.501	204.590	213.882	216.309	211.828	223.742	197.943	210.619	212.607	216.975	7,68	39,17	43,04	
Southeast	165.071	146.746	157.552	153.283	166.802	151.702	156.851	151.680	150.075	149.152	-9,64	32,09	29,59	
South	55.769	56.819	56.239	58.976	54.115	62.171	68.565	70.811	64.757	50.954	-8,63	10,84	10,11	
Center-west	49.895	50.081	38.960	41.198	42.377	42.831	40.001	40.011	33.485	42.584	-14,65	9,70	8,45	
Brazil	514.456	511.844	550.475	550.561	554.052	561.597	558.667	575.330	568.086	504.081	-2,02	100,00	100,00	

b - Harvested Area(ha)

Region	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1996/1987		Distribution %	
											%	1987	1996	
North	39.242	51.200	72.559	70.729	71.174	79.430	89.405	90.665	97.439	51.530	31,31	8,71	10,89	
Northeast	163.694	175.583	180.873	187.096	187.972	201.222	196.587	186.753	190.940	190.298	16,25	56,54	40,21	
Southeast	149.039	145.654	141.898	138.491	139.995	138.503	139.750	143.599	138.658	140.897	-5,46	33,08	29,77	
South	40.522	41.310	42.445	42.861	44.683	45.087	48.423	47.962	47.521	42.369	4,56	9,00	8,95	
Center-west	57.977	57.290	48.066	50.026	49.233	51.373	46.972	48.339	39.520	48.114	-17,01	12,87	10,17	
Brazil	450.474	469.037	485.841	489.203	493.057	515.615	521.117	517.318	514.078	473.208	5,05	100,00	100,00	

c - Productivity (1.000 clusters/ha)

Region	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
North	1,08	1,05	1,16	1,14	1,11	1,02	1,07	1,13	1,10	0,86
Northeast	1,23	1,18	1,18	1,16	1,13	1,11	1,01	1,13	1,11	1,14
Southeast	1,11	1,01	1,11	1,11	1,19	1,10	1,12	1,06	1,08	1,06
South	1,38	1,38	1,32	1,38	1,21	1,38	1,42	1,48	1,36	1,20
Center-wes	0,86	0,87	0,81	0,82	0,86	0,83	0,85	0,83	0,85	0,89
Brazil	1,14	1,09	1,13	1,13	1,12	1,09	1,07	1,11	1,11	1,07

Source: FNP Consultoria & Comércio - Anuário 97 - Anuário da Agricultura Brasileira

Table VII-5.2(21) Harvested Area, Production and income of banana, in the state of the Tocantins, according to the regions, in harvests 1989/90 - 1996/97.

REGION OF PLANNING	1989/90			1990/91			1991/92			1992/93		
	Harvested Area (ha)	Production (t)	Income (Kg/ha)	Harvested Area (ha)	Production (t)	Income (Kg/ha)	Harvested Area (ha)	Production (t)	Income (Kg/ha)	Harvested Area (ha)	Production (t)	Income (Kg/ha)
A-EXTREME NORTH	...	...	...	...	...	...	...	...	...	...	...	...
B-NORTH	434	183	421,66	439	215	489,75	409	249	608,80	390	227	582,05
C-NORTHEAST	180	80	444,44	420	246	585,71	380	260	684,21	610	388	636,07
D-NORTHWEST	1.294	889	687,02	1.042	689	661,23	816	573	702,21	1.278	1.034	809,08
E-EAST	955	790	827,23	760	613	806,58	635	437	688,19	590	335	567,80
F-CENTER-WEST	4.590	3.526	768,19	4.021	3.028	753,05	3.490	1.658	475,07	3.242	1.432	441,70
G-CENTRAL	4.545	5.090	1.119,91	3.890	3.203	823,39	3.440	2.694	783,14	2.930	2.296	783,62
H-SOUTHEAST	892	1.007	1.128,92	950	933	982,11	935	604	645,99	950	866	911,58
I-SOUTHWEST	600	402	670,00	530	349	658,49	475	173	364,21	415	240	578,31
J-SOUTH	560	403	719,64	550	364	661,82	490	185	377,55	545	354	649,54
TOTAL	14.050	12.370	880,43	12.602	9.640	764,96	11.070	6.833	617,25	10.950	7.172	654,98

REGION OF PLANNING	1993/94			1994/95			1995/96			1996/97		
	Harvested Area (ha)	Production (t)	Income (Kg/ha)	Harvested Area (ha)	Production (t)	Income (Kg/ha)	Harvested Area (ha)	Production (t)	Income (Kg/ha)	Harvested Area (ha)	Production (t)	Income (Kg/ha)
A-EXTREME NORTH	...	...	...	...	...	...	...	...	...	...	...	...
B-NORTH	578	366	633,22	398	226	567,84	233	165	708,15	242	202	834,71
C-NORTHEAST	578	366	633,22	258	165	639,53	475	256	538,95	406	237	583,74
D-NORTHWEST	1.168	900	770,55	526	408	775,67	109	74	678,90	85	58	682,35
E-EAST	555	315	567,57	495	286	577,78	185	109	589,19	180	106	588,89
F-CENTER-WEST	3.115	1.395	447,83	2.782	1.252	450,04	433	245	565,82	383	226	590,08
G-CENTRAL	2.245	1.997	889,53	2.188	1.722	787,02	2.200	1.260	572,73	1.961	1.115	568,59
H-SOUTHEAST	950	861	906,32	983	877	892,17	850	571	671,76	802	540	673,32
I-SOUTHWEST	417	252	604,32	416	249	598,56	802	655	816,71	791	648	819,22
J-SOUTH	545	358	656,88	560	360	642,86	378	225	595,24	359	218	607,24
TOTAL	10.151	6.810	670,87	8.606	5.545	644,32	6.185	3.910	632,17	5.749	3.717	646,55

Source: IBGE / Levantamento Sistemático da Produção Agrícola (LSPA)

Table VII-5.2(22) - Characteristic main of the culture of the banana in the searched cities, state of the Tocantins, June 1997

City	Total Area (ha)	Production (t)	Income (t/ha)	Cultivated varieties	Cost of production (R\$/ha)	Price received for the producer (R\$/kg)	Adopted technology
Paraiso do Tocantins	95 Irrigado:20 Sequeiro:75	600	Irrigado:22 Sequeiro:8	Dwarfed silver; Caiana silver; Pioneering land and	Implantation: 2.200,00 Production: 800,00	0,12 (in the cluster)	Ground correction, fertilization of implantation and production, combat the illnesses and plagues, treatments cultural, treatment of moleque, irrigation (in part), harvest and preparation.
Miracema do Tocantins	500 (100 producers)	...	...	Pacovan	...	0,10 (in the cluster)	Are small producing, uses technical traditional.
Dois Irmãos, Miranorte, Miracema, Barrolândia e Paraiso do Tocantins	...	5.700	...	Dwarfed silver	...	0,10 a 0,12 (in the cluster)	...

Source: Research of field.  
...not available information.

## (7) Cattle Bovine

The cattle bovine Brazilian comes demonstrating a reduction in its flock starting from 1992. This is a world tendency verified not only in United States, as well as in another countries of Latin America. This process is explained by the desacceleration of the rhythm of growth of the human population, for the increment of the consumption of alternative meats and for the increase of the productivity in the cattle one.

In Brazil, the flock decreased of 151,007,078 heads in 1991, for 146,110,680 heads in 1996 presenting, therefore, a fall of 3.2% in the period. Still thus, in the world ranking, Brazil is one of the largest producers, being just overcome by India, being followed by China and for United States.

In Brazil, the flock is mainly concentrated in the area Center-west and Southeast that answered, respectively, for 35,22% and 23,05% of the effective cattle, as it is demonstrated in the table below.

The production of bovine meat and milk obtained by the field research are described in the Tables VII-5.2(23) and (24) The production of bovine meat and derivation was researched starting from the discount structure, processing and sale of the product. The slaughterhouses of Colinas and Araguaina, and the butcher shop of Gurupi were researched. All are operating below its installed capacity. The tannery localized in Wanderlândia, that operates with the production of Colinas, Araguaina and Açailândia. Its capacity is of 880 t., and it comes operating 600 ton.

With relation to the milk and its derivations, it is located as complementation to the court cattle or mixed, not pointing for a specialization in the section. They were researched Dairy products in Paraíso do Tocantins, in Gurupi, in Alvorada and in Araguaina, with production of derived of butter and cheeses.

Bovine cattle flock of Brazil -1996

Region	Milk		Cut		Total	
	heads	%	heads	%	heads	%
North	2.177.315	7,90	16.650.914	14,05	18.828.229	12,89
Northeast	6.226.734	22,58	12.712.681	10,72	18.939.415	12,96
Southeast	8.207.349	29,77	25.477.106	21,49	33.684.455	23,05
South	5.203.961	18,87	17.987.988	15,17	23.191.949	15,87
Center-west	5.757.990	20,88	45.708.641	38,56	51.466.631	35,22
Brazil	27.573.349	100,00	118.537.330	100,00	146.110.679	100,00

Source: ANUAL PEC 97

With relation to the specialty, the flock is mainly of court, that represents 81% of the total of the effective. The largest concentration of court flocks also gives him in the regions Center-west and Southeast, withhold 60% of the number of cattle heads.

Brazil exported, in 1996, about 46,656 tons of meat bovine in natura, being this exportation directed mainly for European countries, like Italy, Netherlands and Spain, that together they acquired about 56% of that exported volume. The Brazilian exports of industrialized bovine meat added, in the same period, 85,512 tons. The exportations were directed mainly for United Kingdom and United States, that together they answered for 58% of the exportations.

In the same year Brazil imported 133,682 tons of meat bovine in natura, being Argentina and Uruguay the main suppliers, with 88% of the business volume. The imports of meat industrialized doing a total of 84,800 tons.

The flock of milk represents 19% of the total of the bovine effective. The space distribution of this flock for the states of the federation is more balanced. The largest concentration gives him in the Southeast region, with 29,77% of the flock milkman, proceeded by the Northeast, with 22,58% and the Center-west, with 20,88%.

In productivity terms the largest indexes are verified in the Southeast area as a whole, distinguishing out the state of São Paulo that obtained 7,14 liters/head/day, in the year of 1996. The national average is of 3,83 liters/head/day, considered a very low profitability, evidencing a low medium level of handling of the flock.

The world production of milk in 1996 was of to order of 384,730 thousands of tons of the product, being that milk the flock world located in 133,931 thousands of heads. Brazil participates with 5% of that production, being in sixth place among the world producers of milk, and in second place in number of heads flock milk.

Table VII-5.2(23) - Characteristic main of cattle raising and the production of bovine meat in the searched cities, state of the Tocantins, June 1997

City	Races	Slaughter house / cold storage room	Processing / Technology
Colinas, Arapoema, Guaraí, Marianópolis, Divinópolis do Tocantins and Aragoínas	Nelore	Slaughterhouse in Colinas cap.: 200 animals/day	...
Araguaina, Arapoema, Xambioá, Carmolândia, Muricilândia, Colinas, Santa Fé and Aragoínas	Nelore	Slaughter house in Araguaina cap.: 700 ox / day current: 400 ox / day	...
Pedro Afonso, Bom Jesus and Santa Maria	Nelore	Total Flock : 49.203 heads It sells in foot.	...
Miracema do Tocantins	Nelore	It offers of approximately 2.000 oxen in foot for Slaughter	...
Gurupi, Araguaçu, Alvorada, Aliança, Palmeirópolis, Jaú, Dueré, Formoso, Figueirópolis, Marianópolis, Abreulândia, Arapoema e Divinópolis do Tocantins.	Nelore	Cold storage room in Gurupi Mata, it cools and it sells cap.: 450 ox/day current: 300 ox/day = 72.000 kg/day	Semi-benefited leather and viscera congealed and exported to other states and exterior.
Dianópolis	Nelore and Mista	Flock approximately: 7.000 heads Sale for Slaughter in Barreiras/BA	...
Marianópolis	Nelore	Vaccinated flock: 2.850 heads Production and sale of year-old calves	Vaccination against the aftosa fever, combat to Bot(Arthropoda/Insecta/Diptera), Tick(Arthropoda/Arachnida/Acarina) and fly of horn. Mineralizations, artificial insemination. The vaccine against "brucelose"(Infectious disease of intermittent character, typical of bovine animals) is not common.
Divinópolis do Tocantins	Nelore	Extensive creation for court it sells in foot	Vaccination against the aftosa fever combat to Bot(Arthropoda/Insecta/Diptera), Tick(Arthropoda/Arachnida/Acarina) and fly of horn, application of vermifuge and you leave minerals.

Source: Research of field.  
...not available information.

Table VII-5.2(24) - Producing areas and of milk processing in the State of Tocantins, June 1997

City	Prices / liter received will be the to producer (R\$/liter)	Processing	Derivatives
Paraiso do Tocantins, Divinópolis, Barrolândia, Miranópolis e Cristalândia	Quota: 0.27 Excess: 0.25 not partner: 0.17	Pasteurization, cooling, sacking, in Paraiso do Tocantins. Capacity: 25.000 l / day It receives: 18.000 l / day	Butter: 150 kg/day - (pots of 200 gr. and 500 gr). Cheeses: "mussarela", "provo-lone", "frescal" and "parmesão".
Gurupi, Aliança, Figueirópolis, Sucupira e Peixe	Quota: 0.30 Excess: 0.25	Pasteurized milk type C, in Gurupi. Capacity: 20.000 l / day It receives: 4.500 l / day	Common butter with salt e cheese "mussarela"
Gurupi, Gurupi, Peixe and Duere	0.18 with freight 0.25 in the platform 0.20	3.000 l / d day, em Gurupi	Plant of cheese "mussarela"
Alvorada do Tocantins and neighboring municipal districts		Dairy in Alvorada Capacity: 5.000 l / day It receives: 1.500 l / day of 30 producers	Cheese "mussarela"
Araguaina, Murrelândia, Carmolândia, Aragonimas, Piraquê, Garimpinho and Novo Horizonte	0.24	Dairy in Araguaina 3.000 l / day	Milk: 2.000 liters Cheese "mussarela" and Butter
Nova Olinda, Araguaina, Pó do Morro and Santa Fé	0.24	Dairy in Araguaina Capacity: 50.000 l / day Pasteurize: 4.000 l / day It cools: 10.000 l / day (p / Imperatriz/MA)	-
Araguaina	proper production	Pasteurize: 4.00 l / day	-
Araguaina	proper production	Pasteurize: 4.00 l / day	-

Source: Research of field.



### 5.3 Analysis of the Infrastructure of Official and Private Storage

The storage of agricultural products has as main objective to allow the balance among a regular consumption and a production concentrated on the time, susceptible to current fluctuations of climatic variations, measures of agricultural politics, received prices, among others. The appropriate storage provides, also, the reduction of the quantitative and qualitative losses, besides allowing larger flexibility in the commercialization of the product.

In that direction, the storage of the product increases the power of bargain of the producer, improving its negotiating position, originally fragile and it disperses. The guard of the production will go to make possible the producers the obtaining of bank credits, using the production as guarantee.

In agreement with the register of the Service of Vegetable Classification of the Secretaria do Estado da Agricultura, the static capacity of storage in natural environment, in the state of Tocantins, is of 1,6 million tons, distributed by whole the state [Table VII-5.3(1)].

Same considering the medium production of grains<sup>1</sup> in the last three crops, -1994/95 to 1996/97 -, of approximately 475 thousand tons, and more those products<sup>2</sup> favorable storage to natural environment, it is verified that the capacity of the complex storing is enough, being considered the storage in property level and the rotation of the production.

In the case of the production rotation, the lateness among the entrance of the production (crop of grains potentially storable) and the exits (I consumption, processing and exportation) in the units of the storing complex provide to an increase of the static capacity of storage. The rotation, according to the international standard, is 1.5 times the static capacity. Considering that standard, it is possible to esteem the final capacity of storage, in the State, in 2.4 million tons, approximately five times the production average obtained in the last three crops [Table VII-5.3(2)].

In second place, the production is had stored in spikes with straw in the own units of production<sup>3</sup>. In Brazil it is observed that approximately 60% of the corn are stored and consumed in the property, mainly in the feeding of animals. Considering the same estimate for the state of Tocantins, a reduction of production esteemed storable will be verified of, approximately, in 408 thousand tons.

The storage of part of the production of rice and bean, according to estimates around 30%<sup>4</sup>, contribute, also, for a reduction around 100 thousand tons. Of this volume, part is

<sup>1</sup> Considered grains: "Irrigado" and "Sequeiro" rice, beans, corn and soybea.

<sup>2</sup> Coffe, sugar, fertilizer and those imported grains of other regions of the country.

<sup>3</sup> SANTOS J.P. FERREIRA, J.G. "Recomendações para o combate ao carunho e rato no milho armazenado em paiol". O Ruralista. Belo Horizonte, No.370, p.5-8, Jan. 1989.

<sup>4</sup> REZENDE, J.B. (Coord). "Avaliação das perdas de produtos agrícolas em Minas Gerais. Belo Horizonte, Fundação João Pinheiro, 1992.

destined to the alimentary consumption. The small producers sell, most of the time, the production fractionally, to the measure of the need of financial resources.

That position, it can be considered that the volume of grains to be stored out of the property, or either, in the storing complex state, it is esteemed around 308 thousand tons. Those volumes can be reduced, still more, in case it is considered the losses happened until the storage.

Therefore, it can be affirmed that, of the dynamic capacity of storage - 2,4 million tons - , 13% are just used, or either, the storage capacity is enough to store the equivalent to 7,8 times the volume of grains produced annually in the state of Tocantins.

However, it is necessary to consider, also, other factors that interfere directly in the storage process. Amongst those factors distinguish the ownership of the storing units, the localization in relation to the production areas and the modality of storage.

With relation to the ownership [Table VII-5.3(3)], it is observed that 11% of the storing units are just of government organs, or either, official (CASETINS and CONAB).

In the agents' private storing group (89% of the total), they distinguish the companies of general warehouses, with approximately 790 thousand tons of static capacity. Those companies objectify, by means of remuneration for the given services, the guard and conservation of merchandises and the emission of special titles that represents them.

The private warehouses, with a total participation of 21%, use its units as a middle for another activities as the processing, the industrialization and the commercialization acting, therefore, in accordance with its specific interests.

The cooperatives - that represent 20% of the total capacity of storage - they have the warehouses and warehouses conventional proportionated to assist, with exclusiveness, its associates.

With relation to the modality, or type, of the units it is verified that 54% are grenadiers, adapted for the storage of the grains. The conventional warehouses, 45% of the total, practically allow alone the use of would sack. Therefor , they are just important for the bean storage and small portion of rice. Those warehouses are, in its majority, obsolete and lazy.

Same considering those factors, that compete for the inadequacy and, even, for the not available of some warehouses, it can be affirmed that the installed capacity is enough to shelter the current crops and even an eventual expansion of the production. However, it is stood out that will be necessary to analyze the geographical location of the units.

In the Table VII-5.3(4), almost observed that there is just deficit of capacity storing in the region North Extreme, in the municipal district of Tocantinópolis. In that Region they are just expressive the productions of "Sequeiro" rice and bean. Although, it

leaves of those products it is stored in the properties, it still happens a deficit in the storage capacity.

In the South region - second larger producing of corn and "Sequeiro" rice - it happens the largest superavit. The static capacity is superior in approximately 11 times the volume of storable production. In the Southwest region, - larger producing of "irrigado" rice -, it happens the second largest superavit of the storing capacity, in absolute values.

Just considering the static capacity, it is verified that the production could be enlarged in 3,5 times without the need of increasing the static capacity of storage. In case there is increment of the production of grains, soybean overcoat, there will be need of the transformation of the conventional warehouses in grenadiers and to privilege the construction of units in primary level, that is, in the properties, with a smaller final cost.

Table VII-5.3(1)- Capacity static of storage, the state of the Tocantins, in tons, according to the type of warehouse, 1997

Region / City	Conventional		Granary ship		Shed		Total	
	t	%	t	%	t	%	t	%
<b>SOUTH</b>	<b>281.050</b>	<b>100,00</b>	<b>245.974</b>	<b>100,00</b>	<b>0</b>	<b>0,00</b>	<b>527.024</b>	<b>100,00</b>
Alvorada	98.801	35,15	34.679	14,10	0	0,00	133.480	25,33
Gurupi	182.249	64,85	211.295	85,90	0	0,00	393.544	74,67
<b>SOUTHWEST</b>	<b>138.455</b>	<b>100,00</b>	<b>379.162</b>	<b>100,00</b>	<b>0</b>	<b>0,00</b>	<b>517.617</b>	<b>100,00</b>
Lagoa da Confusão	58.513	42,26	75.802	19,99	0	0,00	134.315	25,95
Araguaçu	4.050	2,93	39.780	10,49	0	0,00	43.830	8,47
Cristalândia	5.400	3,90	29.058	7,66	0	0,00	34.458	6,66
Formoso	70.492	50,91	234.522	61,85	0	0,00	305.014	58,93
<b>NORTH</b>	<b>18.410</b>	<b>100,00</b>	<b>3.590</b>	<b>100,00</b>	<b>0</b>	<b>0,00</b>	<b>22.000</b>	<b>100,00</b>
Araguaina	14.710	79,90	3.590	100,00	0	0,00	18.300	83,18
Philadelphia	3.700	20,10	0	0,00	0	0,00	3.700	16,82
<b>EXTREME NORTH</b>	<b>5.950</b>	<b>100,00</b>	<b>0</b>	<b>0,00</b>	<b>0</b>	<b>0,00</b>	<b>5.950</b>	<b>100,00</b>
Tocantinópolis	5.950	100,00	0	0,00	0	0,00	5.950	100,00
<b>SOUTHEAST</b>	<b>1.740</b>	<b>100,00</b>	<b>37.548</b>	<b>100,00</b>	<b>480</b>	<b>100,00</b>	<b>39.768</b>	<b>100,00</b>
Dianópolis	1.740	100,00	33.894	90,27	480	100,00	36.114	90,81
Arraias	0	0,00	3.654	9,73	0	0,00	3.654	9,19
<b>CENTRAL OFFICE</b>	<b>126.165</b>	<b>100,00</b>	<b>71.374</b>	<b>100,00</b>	<b>1.925</b>	<b>100,00</b>	<b>199.464</b>	<b>100,00</b>
Miracema	34.656	27,47	11.551	16,18	720	37,40	46.927	23,53
Porto Nacional	90.215	71,51	51.293	71,87	1.205	62,60	142.713	71,55
Palmas	1.294	1,03	8.530	11,95	0	0,00	9.824	4,93
<b>CENTER WEST</b>	<b>131.529</b>	<b>100,00</b>	<b>47.189</b>	<b>100,00</b>	<b>7.487</b>	<b>100,00</b>	<b>186.205</b>	<b>100,00</b>
Paraiso	131.529	100,00	47.189	100,00	7.487	100,00	186.205	100,00
<b>NORTHEAST</b>	<b>0</b>	<b>0,00</b>	<b>60.000</b>	<b>100,00</b>	<b>0</b>	<b>0,00</b>	<b>60.000</b>	<b>100,00</b>
Pedro Afonso	0	0,00	60.000	100,00	0	0,00	60.000	100,00
<b>NORTHWEST</b>	<b>39.808</b>	<b>100,00</b>	<b>42.365</b>	<b>100,00</b>	<b>1.872</b>	<b>100,00</b>	<b>84.045</b>	<b>100,00</b>
Guarai	21.150	53,13	28.921	68,27	1.872	100,00	51.943	61,80
Colmeia	8.458	21,25	3.750	8,85	0	0,00	12.208	14,53
Colinas	10.200	25,62	9.694	22,88	0	0,00	19.894	23,67
<b>TOTAL</b>	<b>743.107</b>	<b>45,25</b>	<b>887.202</b>	<b>54,03</b>	<b>11.764</b>	<b>0,72</b>	<b>1.642.073</b>	<b>100,00</b>

Source: Secretaria do Estado da Agricultura / Serviço de Classificação Vegetal; Companhia de Promoção Agrícola (CAMPO) PRODECER II

Table VII-5.3(2) Production of grains in the State of Tocantins, storable in natural environment, harvests 1994/95 and 1996/97

Product	Harvests (ton)				Annual average
	1994/95	1995/96	1996/97	Total	
Rice of "Sequeiro"	111.502	95.184	100.735	307.421	102.474
"Irrigado" rice	281.542	215.734	188.390	685.666	228.555
Beans	1.915	1.751	848	4.514	1.505
Corn	89.403	155.198	90.293	334.894	111.631
Soy	36.191	14.030	41.081	91.302	30.434
Total	520.553	481.897	421.347	1.423.797	474.599

Source: IBGE / Levantamento Sistemático da Produção Agrícola (LSPA)

Table VII-5.3(3) - Capacity storage static, in tons, of the state of the Tocantins, in natural environment, second the property, 1997

Region / City	Property										Total	
	Officer					Private						
	CASETINS	CONAB	Total	General warehouses	Cooperatives	Matters	Total	Total				
<b>SOUTH</b>	39.269	0	39.269	356.908	37.650	93.197	487.755	527.024				
Alvorada	16.713	0	16.713	96.492	11.250	9.025	116.767	133.480				
Gurupi	22.556	0	22.556	260.416	26.400	84.172	370.988	393.544				
<b>SOUTHWEST</b>	9.686	48.615	58.301	225.852	150.523	82.941	459.316	517.617				
Lagoa da Confusão	0	0	0	67.035	28.753	38.529	134.315	134.315				
Araguaçu	0	0	0	31.950	7.830	4.050	43.830	43.830				
Cristalândia	3.206	0	3.206	15.552	0	15.700	31.252	34.458				
Formoso do Araguaia	6.480	48.615	55.095	111.317	113.940	24.662	249.919	305.014				
<b>NORTH</b>	8.862	4.298	13.160	8.840	0	0	8.840	22.000				
Araguaina	5.162	4.298	9.460	8.840	0	0	8.840	18.500				
Filadélfia	3.700	0	3.700	0	0	0	0	3.700				
<b>EXTREME NORTH</b>	3.240	0	3.240	0	0	2.710	2.710	5.950				
Tocantinópolis	3.240	0	3.240	0	0	2.710	2.710	5.950				
<b>SOUTHEAST</b>	3.654	6.000	9.654	25.200	500	4.414	30.114	39.768				
Dianópolis	0	6.000	6.000	25.200	500	4.414	30.114	36.114				
Arraias	3.654	0	3.654	0	0	0	0	3.654				
<b>CENTRAL OFFICE</b>	18.044	3.500	21.544	60.183	51.222	66.515	177.920	199.464				
Miracema	0	3.500	3.500	24.493	4.289	14.645	43.427	46.927				
Porto Nacional	18.044	0	18.044	35.690	46.933	42.046	124.669	142.713				
Palmas	0	0	0	0	0	9.824	9.824	9.824				
<b>CENTER WEST</b>	11.025	3.000	14.025	72.057	28.800	71.323	172.180	186.205				
Paraiso	11.025	3.000	14.025	72.057	28.800	71.323	172.180	186.205				
<b>NORTHEAST</b>	0	0	0	0	60.000	0	60.000	60.000				
Pedro Afonso	0	0	0	0	60.000	0	60.000	60.000				
<b>NORTHWEST</b>	16.658	0	16.658	41.224	0	26.163	67.387	84.045				
Guaraí	6.206	0	6.206	22.624	0	25.113	45.737	51.943				
Colméia	3.758	0	3.758	5.400	0	5.050	8.450	12.208				
Colinas	6.694	0	6.694	13.200	0	0	13.200	19.894				
<b>TOTAL</b>	110.438	65.413	175.851	790.264	328.695	347.263	1.466.222	1.642.073				

Source: Secretaria do Estado da Agricultura / Serviço de Classificação Vegetal; Companhia de Promoção Agrícola (CAMPO) PRODECER III

Table VII-5.3(4) - Average production of grains and capacity storage static, according to the regions of state of the Tocantins, harvests 1994/95 the 1996/97.

PLANNING REGION	To be stored production		Availability of warehouses		Deficit / Surplus		Availability / Production
	t	%	t	%	t	t	
A-EXTREME NORTH	22.701	4,69	5.950	0,36	-16.751		0,26
B-NORTH	16.855	3,48	22.000	1,34	5.145		1,31
C-NORTHEAST	27.795	5,74	60.000	3,65	32.205		2,16
D-NORTHWEST	17.993	3,72	84.045	5,12	66.052		4,67
E-EAST	8.108	1,68	0	0,00	-8.108		0,00
F-CENTER WEST	32.164	6,65	186.205	11,34	154.041		5,79
G-CENTRAL OFFICE	27.783	5,74	199.464	12,15	171.681		7,18
H-SOUTHEAST	25.021	5,17	39.768	2,42	14.747		1,59
I-SOUTHWEST	257.427	53,19	517.617	31,52	260.190		2,01
J-SOUTH	48.106	9,94	527.024	32,10	478.918		10,96
TOTAL	483.953	100,00	1.642.073	100,00	1.158.121		3,39

Source: IBGE, Secretaria do Estado da Agricultura / Serviço de Classificação Vegetal; Companhia de Promoção Agrícola (CAMPO) PRODECER III

#### 5.4 Analysis of the Received Prices for the Main Products

The prices received by the rural producers constitute an important referential for the study of the agricultural commercialization. The characteristics of the agricultural products - as the high competition degree and the variations that happen inside of the year (seasonal effect) - they reinforce the importance of that analysis, because, the taking of decision of how much and when it plants, on the part of the agriculturists, it is almost always based on the last prices.

In the Areas of agricultural production, distant of the consuming centers and of production of input, as the state of Tocantins, high production costs and prices almost always received by the producers is verified smaller in relation to the great centers. That fact, with certainty, is due, mainly, at the cost of the transport, predominantly road.

The comparison of the prices received by the rural producers in the state of the Tocantins the those received by the agriculturists in the main producing regions, allows to accompany them you differentiate of the prices.

The choice of the relative data to the state of São Paulo was due, above all, to the readiness of temporary series, to the marketed volume and, also, for constituting in the main agglutinate and delivering center of nutritious products of vegetable and animal origin, " in natura " and processed of the Country. Those characteristics of the São Paulo market allow to consider it as reference for the others.

They were considered the prices received by the agriculture and cattle raising products of the state of Tocantins in the period of January from 1996 to May of 1997, researched monthly by the Secretaria de Estado da Agricultura do Tocantins, Boletim Semanal de Informações do Mercado Agrícola.

For the São Paulo market and the main producing regions, one considered the monthly prices, in Realys, collected by the Instituto de Economia Agrícola (IEA), linked to the Secretaria de Economia Agrícola e Abastecimento do Estado de São Paulo, and the other you would Secretarias Estaduais de Agricultura, just the first six months of 1996, in reason of the readiness of the data.

It was selected the main agriculture and cattle raise products for the economy of Tocantins, presented in the Table VII-5.4(1).

In the Table VII-5.4(2) the comparison of the prices observed received by the agriculturists of the São Paulo is observed and, also, of the main producing regions.

Although the available data embrace only the data of a period of six months (first semester of 1996) it is possible to verify the behavior of the prices.

The rice, main agricultural product destined to the market, presents close prices the those received by the agriculturists from Goiás, São Paulo and Rio Grande do Sul, even



so inferior. That is due, in firstval, at the distance of the production areas to the consumption centers. The most important factor to influence in the differential of prices is the quality of the product. The rice produced in the state of Tocantins is of inferior quality to those originating from of the south of the Country. The comparison, although just visual, it allows to observe the existent difference among the rice beneficiary produced in the State and that imported of Rio Grande do Sul. That elapses of problems in the classification and fiscalization. The classification of the rice, in him Tocantins is made, in its majority, for the own processor (machinist) and for the Secretary de Agricultura.

The service of Classification of Products of the Secretary de Agricultura classified, in the last seven years (1990 - 96), an annual average of 201 thousand tons of rice in peel. The medium annual production, in that same period, is around 335 thousand tons ("Sequeiro" and "Irrigado" rice). However, the fiscalization of the Ministério da Agricultura e do Abastecimento, responsible organ in the State for the activity, is faulty, for specialized technicians' shortage.

Those facts are reflected in the market retailer. While the rice from Rio Grande do Sul, long fine type 2, it is sold to the medium price of R\$ 4,20 the sack of five kilograms, the rice of the same type, produced in the State is commercialized R\$ 3,80/5 kg.

With relation to the prices received by the corn, behavior different from the rice is verified. The products from Tocantins received, in every analyzed month, superior prices the those received by the agriculturists from São Paulo and Góias.

That, probably, elapses of the factor it transports. It parcels out expressive of the corn consumed in the State it is imported above all of the state of Goiás. That product arrives to the State increased of the price of the transport. In that case the local producers can market the corn to close prices to the of the imported product.

The agricultural prices, above all those received by the agriculturists, suffer variations that can be daily, weekly, monthly, annual or even historical.

The accompaniment of those variations requests the existence of temporary series in the wanted periodicity. However, it is possible to identify, through subjective information, the times or months of the year where happen the variations of the prices.

The knowledge of those information, through temporary series, allows the calculation of the variations being used statistical methods. The not existence of series of monthly prices with at least 60 observations (five years) it didn't allow the calculation of the variations you parks of the prices.

In the attempt of identifying the oscillations of the prices without, however, to consider the precision of the statistical methods, subjective information supplied by the agents involved in the process of commercialization of the selected products was used.

The merchants wholesalers and retailers, the transporters, the processors, the cooperatives and the technicians of the public entities and private companies, in reason of its activities, collect and they frequently discuss the prices of the agriculture and cattle raise products in the several levels.

Considering the several opinions was obtained [Table VII-5.4(3)], along the year, the times of higher prices (off season period of local production), prices below the average (characterizing crop period) and the normal considered prices (intermediary period between crop and off season period).

In the general, it can be affirmed that there were not expressive divergences among the agent-informers, with relation to the variations of the prices received by the agriculturists in the state of Tocantins.

The information, as it was waited, they point for a coincidence of the crop periods and off season period with the Center-south regions of Brazil.

Just the soybean, cultivated in the regions of Formoso do Araguaia and Lagoa da Confusão in the off season period of the "irrigado" rice, it is produced in different times. Most of the production is destined for seed, when they are obtained a price up to 100% superior to the of the soybean destined to the agroindustry.

Table VII-5.4(1) Average Prices, in reals, received for the village producers of the state of the Tocantins, period of January 1996 the May of 1997  
(It continues)

Product	Unit	1996												AVERAGE		
		JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE			TO	SP
		TO	SP	TO	SP	TO	SP	TO	SP	TO	SP	TO	SP			
RICE IN LONG RIND	Sack 60 Kg	10,27	13,31	10,65	12,47	10,82	12,34	9,79	11,68	9,56	12,12	10,20	11,98			
RICE IN FINE/LONG RIND	Sack 60 Kg	12,24	13,31	13,08	12,47	12,73	12,34	12,21	11,68	12,40	12,12	12,46	11,98			
COLOR BEANS	Sack 60 Kg	36,50	39,22	41,60	38,02	40,62	37,63	39,97	41,18	41,28	42,50	41,73	42,56			
CORN	Sack 60 Kg	9,51	9,03	9,37	8,28	8,94	7,33	8,55	7,42	8,68	8,05	8,76	7,70			
SOY	Sack 60 Kg	9,46	14,54	11,17	13,72	11,33	12,34	11,70	12,91	11,48	13,94	11,60	13,18			
AVERAGE PINEAPPLE PEARL	unity	0,65	0,72	0,90	0,97	0,90	0,37	0,78	0,62	0,55	0,51	0,60	0,53			
BANANA PACOVAN	Kg	0,19	0,07	0,15	0,06	0,16	0,08	...	0,08	0,16	0,06	0,13	0,06			
OX FAT PERSON FOR TO	Arroba	19,60	22,69	19,85	22,73	19,67	22,31	19,78	22,22	19,64	21,31	19,34	21,38			
SLAUGHTER	Head	184,28	227,93	186,96	231,40	178,34	228,19	180,99	238,38	194,80	247,24	191,81	240,76			
LEAN OX ABOVE OF 2 YEARS	Head	97,34	123,20	99,51	124,36	101,74	129,82	102,97	128,28	104,87	131,66	105,46	132,87			
YEAR-OLD CALF UP TO 1 YEAR	Head	0,20	0,24	0,18	0,23	0,17	0,23	0,17	0,23	0,18	0,25	0,18	0,24			
MILK IN NATURA	Liter															

Product	Unit	1996												AVERAGE		
		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER			TO	SP
		TO	SP	TO	SP	TO	SP	TO	SP	TO	SP	TO	SP			
RICE IN LONG RIND	Sack 60 Kg	10,21	12,30	10,08	12,22	10,61	12,39	10,74	12,72	10,56	13,13	10,68	13,14	10,35	12,48	
RICE IN FINE/LONG RIND	Sack 60 Kg	17,41	12,30	12,45	12,22	12,60	12,39	12,65	12,72	12,62	13,13	12,48	13,14	12,94	12,48	
COLOR BEANS	Sack 60 Kg	36,08	45,57	44,15	43,15	44,90	44,48	48,43	49,62	48,78	50,94	48,44	42,15	42,71	43,09	
CORN	Sack 60 Kg	9,06	7,90	9,06	8,37	9,07	8,21	9,08	8,58	9,35	8,31	9,14	7,67	9,05	8,07	
SOY	Sack 60 Kg	11,92	13,31	11,48	13,60	12,73	16,11	15,55	16,34	15,53	15,97	16,11	16,34	12,50	14,36	
AVERAGE PINEAPPLE PEARL	unity	0,56	...	0,56	...	0,54	...	0,56	...	0,47	...	0,34	...	0,62	0,62	
BANANA PACOVAN	Kg	0,15	0,10	...	0,10	...	0,10	...	0,10	...	0,08	...	0,08	0,16	0,08	
OX FAT PERSON FOR TO	Arroba	19,56	22,73	21,17	23,61	21,16	23,59	22,31	24,62	21,74	23,31	21,97	23,10	20,48	22,80	
SLAUGHTER	Head	187,30	231,79	202,46	235,70	206,25	233,34	203,79	238,92	203,03	230,38	207,47	227,98	193,96	234,33	
LEAN OX ABOVE OF 2 YEARS	Head	106,96	115,41	109,50	114,72	105,99	113,60	106,53	118,62	108,44	112,44	106,25	114,04	104,63	121,59	
YEAR-OLD CALF UP TO 1 YEAR	Head	0,20	0,27	0,22	0,28	0,22	0,28	0,22	0,28	0,21	0,27	0,21	0,26	0,20	0,26	
MILK IN NATURA	Liter															

(Conclusion)

Product	Unit	1997											
		JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE	
		TO	SP	TO	SP	TO	SP	TO	SP	TO	SP	TO	SP
RICE IN RIND LONG	Sack 60 Kg	10,76	13,47	11,02	13,50	10,57	13,29	10,24	13,18	11,50	13,31	10,82	13,35
RICE IN RIND FINE/LONG	Sack 60 Kg	12,67	13,47	12,75	13,50	12,50	13,29	12,41	13,18	13,37	13,31	12,74	13,35
COLOR BEANS	Sack 60 Kg	46,27	39,35	45,25	40,38	43,10	40,53	39,93	40,00	42,51	38,44	43,41	39,74
CORN	Sack 60 Kg	9,24	7,15	8,66	6,74	8,93	6,58	9,00	6,55	9,02	6,67	8,97	6,74
SOY	Sack 60 Kg	16,09	16,01	14,95	14,74	14,93	15,54	14,63	15,93	15,17	16,34	15,15	15,71
AVERAGE PINE/APPLE PEARL	unity	0,48	...	0,66	...	0,70	...	1,86	...	0,55	...	0,85	...
BANANA "PACOVAN"	Kg	...	0,10	...	0,11	...	0,11	...	0,10	...	0,10	...	0,10
OX, FAT PERSON FOR TO	Head	21,14	23,43	21,16	24,06	21,57	24,73	21,73	25,78	21,45	25,21	21,41	24,64
SLAUGHTER	Head	207,79	232,65	202,97	242,46	214,55	257,36	212,12	268,94	199,55	265,35	207,40	253,35
LEAN OX ABOVE OF 2 YEARS	Head	107,71	115,22	114,09	122,27	121,41	132,47	120,06	142,07	119,68	143,74	116,59	131,15
YEAR-OLD CALF UP TO 1 YEAR	Liter	0,20	0,25	0,19	0,25	0,19	0,25	0,20	0,26	0,22	0,27	0,20	0,26
MILK IN NATURA	Liter	...	...	...	...	...	...	...	...	...	...	...	...

Source: Secretaria de Estado de Agricultura - IO / Informações de Mercado Agrícola  
 ...not available information

Table VII-5.4(2) - Prices received for the agriculturists in the state of the Tocantins and main producing regions of Brazil, period of January to June of 1996, in reals  
(It continues)

Product	Unit	1996											
		January			February			March			April		
		TO	SP	Ouros <sup>1</sup>	TO	SP	others	TO	SP	others	TO	SP	Others
RICE IN RIND LONG	Sack 60 Kg	10,27	13,31	10,75	10,65	12,47	10,60	10,82	12,34	11,12	9,79	11,68	10,40
RICE IN RIND FINE/LONG	Sack 60 Kg	12,24	13,31	14,54	13,08	12,47	14,34	12,73	12,34	12,96	12,21	11,68	12,24
COLOR BEANS	Sack 60 Kg	36,50	39,22	-	41,60	38,02	-	40,62	37,63	-	39,97	41,18	-
CORN	Sack 60 Kg	9,51	9,03	7,59	9,37	8,28	7,48	8,94	7,33	6,80	8,55	7,42	6,74
SOY	Sack 60 Kg	9,46	14,54	13,28	11,17	13,72	11,85	11,33	12,34	11,72	11,70	12,91	12,86
AVERAGE PINEAPPLE PEARL	Unit	0,65	0,72	-	0,90	0,97	-	0,90	0,67	-	0,78	0,62	-
BANANA PACOVAN	Kg	0,19	0,12	-	0,15	0,12	-	0,16	0,14	-	-	0,14	-
OX FAT PERSON FOR TO	Arroba <sup>2</sup>	19,60	22,69	21,20	19,85	22,73	21,02	19,67	22,31	20,70	19,78	22,22	20,56
SLAUGHTER	Head	184,28	227,93	209,45	186,96	231,40	215,09	178,34	228,19	202,84	180,99	238,38	207,07
LEAN OX ABOVE OF 2 YEARS	Head	97,34	123,20	112,94	99,51	124,36	113,15	101,74	129,82	108,52	102,97	128,28	108,08
YEAR-OLD CALF UP TO 1 YEAR	Head	0,20	0,24	-	0,18	0,23	-	0,17	0,23	-	0,17	0,23	-
MILK IN NATURA	Liter												

(Conclusion)

Product	Unit	1996											
		May		June		Average		TO		Others		Others	
		TO	SP	TO	SP	TO	SP	TO	SP	TO	SP	TO	SP
RICE IN RIND LONG	Sack 60 Kg	9,56	12,12	10,20	11,98	10,22	12,32	10,78	10,22	12,32	10,76	10,76	10,76
RICE IN RIND FINE/LONG	Sack 60 Kg	12,40	12,12	12,46	11,98	12,52	12,32	12,57	12,52	12,32	13,23	13,23	13,23
COLOR BEANS	Sack 60 Kg	41,28	42,50	41,73	42,56	40,28	40,18	-	40,28	40,18	-	40,18	-
CORN	Sack 60 Kg	8,68	8,05	8,76	7,70	8,97	7,97	6,58	8,97	7,97	7,21	7,21	7,21
SOY	Sack 60 Kg	11,48	13,94	11,60	13,18	11,12	13,44	11,98	11,12	13,44	12,60	12,60	12,60
AVERAGE PINEAPPLE PEARL	Unit	0,55	0,51	0,60	0,53	0,73	0,67	-	0,73	0,67	0,51	0,51	0,51
BANANA PACOVAN	Kg	0,16	0,12	0,13	0,12	0,16	0,13	-	0,16	0,13	0,12	0,12	0,12
OX FAT PERSON FOR TO	Arroba	19,64	21,31	19,34	21,38	19,65	22,11	20,00	19,65	22,11	20,51	20,51	20,51
SLAUGHTER	Head	194,80	247,24	208,04	191,81	240,76	213,79	186,20	235,65	209,38	209,38	209,38	209,38
LEAN OX ABOVE OF 2 YEARS	Head	104,87	131,66	105,46	132,87	101,98	128,37	114,89	101,98	128,37	110,85	110,85	110,85
YEAR-OLD CALF UP TO 1 YEAR	Head	0,18	0,25	0,18	0,25	0,18	0,25	-	0,18	0,25	-	0,25	-
MILK IN NATURA	Liter												

Source: Secretaria de Estado da Agricultura - TO/ Informações de Mercado Agrícola, Fundação Getúlio Vargas/ Conjuntura Econômica

1) The searched prices had been: rice in rind long, beans of color, corn, soy and animals in Goiás; rice in rind fine long in the Rio Grande Do Sul.

2) Unit of equivalent measure to 15 Kg.

Table VII-5.4(3) - Estimate of the seasonal of the monthly prices, received for the agriculturists, in the state of the Tocantins, June of 1997

Product	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Ago	Set	Out	Nov	Des
"Irrigado" rice	=	=	=	<	<	<	=	=	=	^	^	^
Rice of "Sequeiro"	=	=	=	<	<	=	=	=	=	^	^	=
Soy	..	..	..	..	..	..	..	..	..	..	..	..
Beans	..	..	..	..	..	..	..	..	..	..	..	..
Corn	=	=	=	=	<	<	<	=	=	^	=	^
Pineapple	=	=	=	=	<	<	<	^	^	=	=	^
Banana pacovan and dwarfed silver	<	<	=	=	^	^	^	^	^	^	^	^
Meat	=	=	<	<	<	<	=	=	^	^	^	^
Milk	<	=	=	=	^	^	^	^	=	^	^	^

Source: Research of field

Note > prices above of the annual average; = average prices; < prices below of the annual average.

...not available data.

## 5.5 Identification of Channels and Flux of Commercialization and their Main Routes of Transportation of Agriculture and Cattle Raising Products

An identification of channels and flux of commercialization allows us to have a general view of the system of commercialization, of its organization and its performance. The study of the channels of commercialization is very useful because after studying it we can understand the organization itself much better in its structural aspects.

Public and private institutions technicians, shopkeepers, retailers, wholesalers, tannery and others from the main productive area of the state of Tocantins (at.1) were interviewed to identify the channels, flux and routes.

Fourteen towns were visited to have all those interviews made: Alvorada do Tocantins, Araguaína, Cristalândia, Dianópolis, Divinópolis, Formoso do Araguaia, Gurupí, Lagoa da Confusão, Marianópolis, Miracema do Tocantins, Palmas, Paraíso do Tocantins, Pedro Afonso e Wanderlândia.

The main agriculture and cattle raising products of Tocantins were researched such as rice ("sequeiro" and "irrigado"), soybean, corn, Beans, pineapple, banana, meat and milk with its byproducts.

The results show three kinds of channels: the direct (sales direct from producer to customer), the semi-direct (with just one intermediate person) and the indirect (with more intermediate people).

In Figures VII-5.5(1) to (10), it is shown that the flux of each one of the studied products and in Tables VII-5.5(1) to (10) we can see the main routes of transportation of the selected products are shown.

The soybean which is a product destined mainly to agroindustrialization and international market, shows different channels when talking about its destination and production area.

The destination of PROCEDER III production, in Pedro Afonso is mainly to export. Nowadays companies like Ceval and EXIMCOOP are getting soybean directly from the producers's association and exporting it. The production flow, in the latest crop, was carried out through railroads and highways. Approximately 70% of soybean (17 thousand tons) was transported by trucks from Pedro Afonso to Imperatriz (State of Maranhão). From there to Itaqui Port it was made by train. The cost of railroad transportation, Table VII-5.5(1), about 605 Km away, was approximately R\$10.75/ton (R\$0.02/km/ton), lower than the average price in highways (R\$0.05/km/ton).

According to technicians and shopkeepers from Pedro Afonso, the cost will be reduced much more after the North-South railroad, accomplishment prevision in 1998, gets to the town of Estreito (state of Maranhão) and the Tocantins waterway is concluded. This waterway is going to connect the city of Tocantins to the city of Pedro Afonso.

An amount of about 10% of low quality product is transported to Balsas(MA) through highways where it is mixed with a better quality product of the area (up to 8% of broken grain) and then exported (this process is called "mixagem" by the producers and shopkeepers).

The destination of the surplus (about 20%) is the production of animal feed, mainly produced in the towns of Gurupí, Paraíso e Araguaína in the state of Tocantins.

The destination of the soybean of the off-season period, produced in the areas where "irrigado" rice production is traditional like Formoso do Araguaia and Lagoa da Confusão, is the production areas of Balsas (state of Maranhão), Barreiras (state of Bahia), Tangará da Serra (state of Mato Grosso), Catalão (state of Goiás) and others in the state of Tocantins like Pedro Afonso and Dianópolis.

The surplus (about 40%) of the soybean grown in the region of Formoso do Araguaia and Lagoa da Confusão is exported to the state of Goiás to the smashing process in factories that deal with agriculture products located in Itumbiara and Anápolis.

The soybean grown in the town of Dianópolis is sold to agroindustries located in the town of Mimoso do Oeste, 150 km away, in the state of Bahia near to the branches of Cargill and Ceval and the surplus is sold in Barreiras (state of Bahia). After signing a contract the Ceval agroindustry gives to the agriculturists seed, fertilizer and the agricultural input they might need to grow the crops and afterwards the company buys all the production. All production is transported from the production area directly to the agroindustries. There is no need of going to Dianópolis because there is a shortcut called "Estrada das placas" (road of signs).

The production transportation except the production of Pedro Afonso is carried out through highways, in trucks that carry about 15 tons and, in less quantity, in trucks that carry 30 tons.

According to the people who have been interviewed the transportation of the soybean by water to the outside market and the rice to the North and Northeast market is going to be easier as soon as the road from Lagoa da Confusão to Araguaia river is ready.

The "irrigado" rice is the second production of the state. Corn is the first.

In the last few years, a great amount of rice production is being sold to the Federal Government with the help of the PGPM-"Política de Garantia de Preços Mínimos" (it is a policy to keep prices low) through AGF-"Aquisições do Governo Federal"(Federal Government purchase department). When the market price gets lower than the prices of the guarantee, the producers prefer to give the production to the bank (Banco do Brasil) and pay debts related to the cost of planting.



Great part of the rice production is kept in sacks in silos or in CONABs-Companhia Nacional de Abastecimento (national supply company), mainly in Gurupí. During the crop period the wholesalers's purchase is made directly in the producers's association. When it is not the crop period, the shopkeepers get the product in CONAB's auctions.

The "irrigado" and cultivated rice is mainly from a variety called Metica 1, with an average production about 4,500 kg/ha. However, if we compare our processed rice with the ones grown in Rio Grande do Sul, it is a product of lower quality. Because of that our production is transported to the North and Northeast regions market where we can find less demanding customers. The surplus is consumed by the low class population of the state of Tocantins with a lower purchasing power, because the price is about 20% lower than the price of the better quality rice in the south region of Brazil. The better quality rice is also available in our market but they prefer the cheapest one.

The bran and the sifting, which are by-products taken from the rice, are sold from small producers to bird breeders and to cattle and hog raisers inside the state.

Some producers sell the sifting as rice type 5. The producers's association, with a large production, sell the by-products to bird breeders, hog raisers and feed producers of the state of Goiás.

Producers don't get any help from the bank to deal with the "sequeiro" rice because of the bad climate conditions of the area. Because of that the producers only grow this type of rice to feed their families. There are large areas of woodsy pasture planted with rice and they are called "desbravadora do cerrado" ( woodsy pasture trail blazing). The rice produced in areas where there will be planted soybean is sold in sacks and with no process by producers from Gurupí and Tocantinópolis in the state of Tocantins and from Imperatriz in the state of Maranhão.

The destination of great part of the production transported by trucks is the customers from the state and the surplus is transported to the country of the Northeast states. The producers's association and the wholesalers don't use the train transportation because the overflow cost is considered high and because it takes it too long to get to the destination when comparing with trucks. A small quantity of processed rice (in 30 Kg packages) was transported by train to São Luís and from there it was delivered to retailers of the area in the latest crop.

During the latest crop (1995/96) the rice which was stored in silos of CONAB or in places which belong to the Federal Government was sold in auctions. According to the institution technicians the destination of the product was: 30% to the state of Tocantins; 10% to Belém do Pará; 10% to Imperatriz, Caxias and São Luís (in the state of Maranhão); 40% to Teresina and Picos (state of Piauí) and Fortaleza (state of Ceará); the rest to "baianas" cities Barreiras and Salvador (state of Bahia).

The transportation by ships is used to transport the processed rice to regions where there is no highways like the city of Parintins and other towns in the state of Amazonas.

Corn is the main cultivation in the state, however the whole production is not enough. Small producers grow corn to feed their own families. Small quantity of the product is imported by bird breeders, cattle and hog raisers from the state of Goiás and Mato Grosso.

Flour, rice flour and starch are bought from agroindustries located in the state of Goiás, mainly in the cities of Goiânia and Anápolis.

However a small quantity of corn produced in Lagoa da Confusão and Formoso do Araguaia is sold to some markets of North and Northeast regions of the country. The corn produced in Pedro Afonso and Dianópolis is the result of rotation of the soybean cultivation.

The Dianópolis production is stored and sold directly to Ceval in Mimoso do Oeste, state of Bahia. The Pedro Afonso production is consumed right there. Only a small amount is sold in Araguaína.

Like corn, beans are almost all imported from producers and wholesalers of the state of Goiás.

Almost all production comes from small agriculturists and its destination is mainly the population of the state. The surplus is sold because it is not enough for the demand.

Banana and pineapple are the main fruit produced in the state and its destination is the market of other states.

The destination of pineapple grown in Miracema region, the largest producer area, is to export to other regions of the country and also to be sold in the market of Tocantins.

The destination of the good-looking fruit weighing about 1.5 to 2.0 Kg is the more demanding and high class customers of Southeast and Middle East regions. There was exportation to Argentina, in this crop, still in the gathering phase. The main markets are Brasília, Goiânia, São Paulo and Belo Horizonte where it is sold about 80% of the whole production of the region of Miracema. The transportation is made by 10 ton trucks and about 6,500 pieces of fruit. The fare cost of transporting the production to São Paulo is about R\$0.12/each piece, it means 20% off the current sales price.

The fare cost, about R\$44.00/1.000 Km, is higher than other carriages because the quantity transported by trucks is smaller. There is a reason for that: the space taken by pineapple crowns and loss of smashed fruit.

Small fruit is sold in the market of Tocantins. Some wholesalers buy fruit directly from the producers and sell it to the retailers. In some cities the producers sell their product directly to customers. The product is sold in trucks or small pick-up trucks in the streets where a large number of people can see and buy it, especially in big cities.

The one million fruit production called "Caseara" is sold in the same way as in Miracema. The supermarket called Carrefour in Osasco, next to São Paulo capital city, buys about 40% of the high quality fruit production.

The banana production has many varieties like "Pacovan", "prata anã", "terra" and "pioneira" and its destination is the exportation to other states and inner market.

Banana is bought by wholesalers of the area who transport it in bunches by trucks to the markets of Belém, São Luís, Brasília, Anápolis and Goiânia. These markets buy about 90% of the production. Just few wholesalers sell the product. For example only one wholesaler from Paraíso do Tocantins buys directly from the producers 300tons/month in the crop and 60tons/month during off-season period. In CEASAs wholesale, in the mentioned cities, banana is prepared and packed in boxes of "torito" type. The whole process of transportation, handling and packing make the loss higher so the producers get less.

The fare cost amounts 20% of the price the producers get when the product is sold in Goiânia and Brasília. When the selling is done in São Paulo the fare cost goes up to 40% of the price the producers get (R\$0.12/Kg).

The banana sold in Palmas is mainly produced in Paraíso do Tocantins and processed in acclimatization chambers installed in Taquarauto.

Slaughtercattle is one of the most important economy of Tocantins. The topography, the climate and the fields quality allowed the state to become a great producer and exporter of beef.

There are two production regions in the state and there are three stages in the cattle raising in the Middle South region where we can find the city of Gurupí: breeding/ rebreeding/ fattening.

The oxen and steers slaughters, with meat of high quality is done by the slaughterhouse located in Gurupí. From there, the freezing meat goes to the consumption centres of Middle South region and delivered to Carrefour supermarkets. The freezing visceral organs go to São Paulo. The semi-tanned leather is sold in São Paulo and Rio Grande do Sul.

The meat is transported in refrigerative trucks and the price for this kind of transportation is twice as much as the ordinary trucks.

There are four slaughterhouses in Araguaína, pole city of the Middle South region, and Colinas that slaughter the cattle caught in that area. Traditionally, this region buys the steers and lean oxen from the Middle South region of the state and from some Northeast states.

The destination of great quantity of the meat is customers of the main capitals of the Northeast region of Brazil.

The oxen that go to slaughterhouses, come from Araguaína and small cities and they are mainly sold to the Northeast states. According to Table VII-5.5(11), about 16 thousand heads are monthly sold. The cattle has been vaccinated and there has always been an inspection control.

The transportation of the standing cattle is made by cattle dealer trucks that carry up to 20 oxen. The fare is calculated according to the fuel price: one litre of diesel/ km (the price varies from R\$0.38 up to R\$0.45/litre) depending on the state.

The semi-processed leather of wet-blue<sup>5</sup> type is exported to Europe and to Rio Grande do Sul. The exportation to Italy and Holland is carried out through Belém Port. To Portugal the product has to be transported to Paranaguá Port in the state of Paraná and then boarded.

The agricultural input like the limestone and the fertilizers are transported only by trucks. The limestone production is also exported to Bahia. The high fare cost is the main reason why the input purchasing is limited. The fare cost is twice as much as the input. The limestone bought by the agriculturists of PROCEDER in Pedro Afonso in the plant located in Guaraí costs about R\$6.00/ton and the fare cost is R\$10.00/ton.

The fertilizers are imported from the states of Goiás, Minas Gerais and São Paulo and transported by trucks.

In a general view we could notice that the production flow in the state of Tocantins is mainly made by trucks. However it is known that the roads and highways are not as good as they should be and sometimes during the year it is just impossible to come and go to the production area where the roads are not paved. The number of trucks are not always enough, especially in crop periods, in high production areas like Formoso do Araguaia and Lagoa da Confusão.

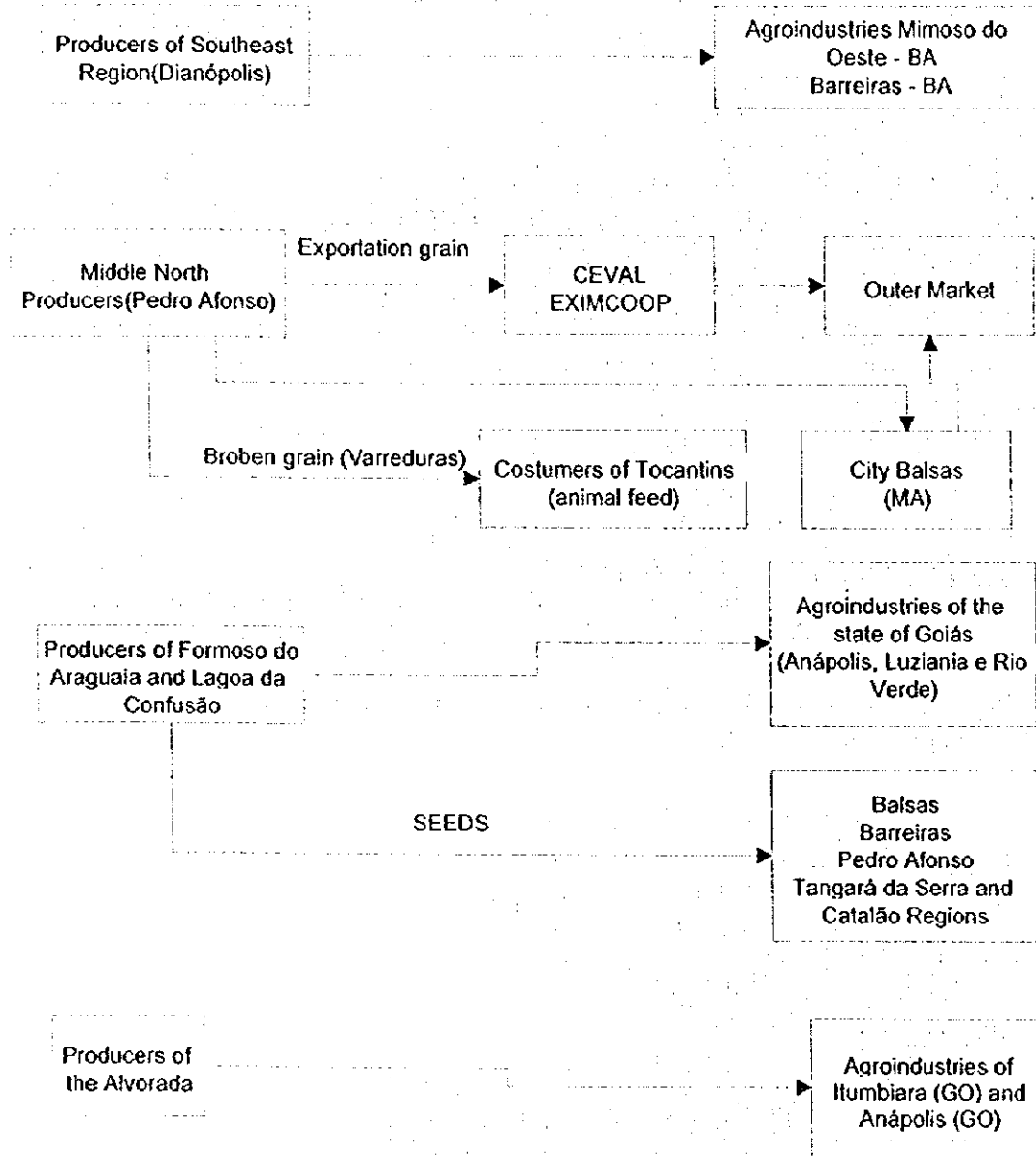
It is believed that only soybean, product that is exported, should be transported through "Corredor de Transporte Multimodal" (Multimode transport corridor: it is a special highway design for heavy traffic and production flow).

The rice producers claim about the overflow difficulties and they say that it takes them too long to get to the destination because the product has to be processed and packed in 30 Kg sacks (each 30-kg sack is made by sewing 5 Kg sacks to form bigger ones). Because of that it gets more difficult and sometimes impossible to make grain transportation. On top of that a great quantity of the products is delivered to cities where there is no railroads.

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<sup>5</sup> First stage after tanning, that turns the leather putrid and without its final finishing characteristics

Figure VII-5.5(1) Soybean commercialization flow chart in the state of Tocantins,



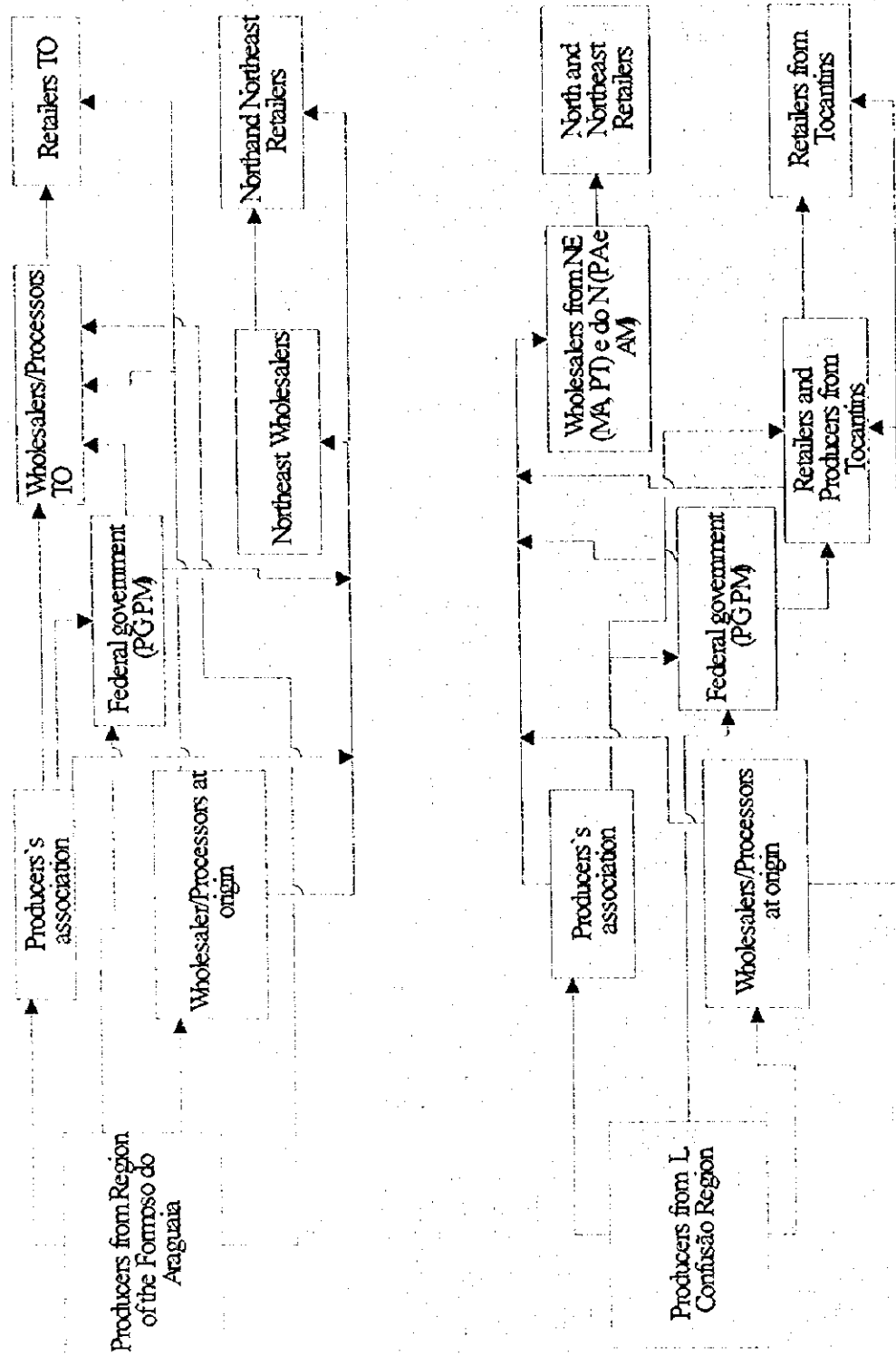
Source: Field Search.

Table VII-5.5(1) Main soybean transportation routes produced in the state of Tocantins, June 1997

Origin of Production	Route	Distance (km)	Price	
			R\$/t	R\$/tkm
Dianópolis	Novo Jardim-TO-040. Bahia BR-242 and BR-020 - <b>Barreiras (BA)</b>	276	9.00	0.03
	Novo Jardim TO-040, In Bahia BR-242 up to Mimoso do Oeste (BA)	184	5.00	0.03
Alvorada	Talismã - BR-153 - Goiânia - <b>Itumbalara (GO)</b>	650	20.00	0.03
	Talismã - BR-153 - Pirenópolis - <b>Anápolis (GO)</b>	523	20.00	0.04
Pedro Afonso	BR- 253 and BR-153 Guarãí - BR-226 - Wanderlândia - BR-010 - Porto Franco up to <b>Imperatriz (MA)</b>	480	20.00	0.04
	Imperatriz - Porto de Itaquí (MA) (railway)	605	10.75	0.02
	BR-153 up to Araguaína TO-222 Carolina BR-230 up to <b>Balsas (BA)</b>	487	38.00	0.08
	BR-153 through Guarãí, Colina, Nova Olinda up to <b>Araguaína</b>	231	15.00	0.06
	BR-235 through Miranorte, Paraíso up to Aliança and BR-153 and BR-242 up to <b>Gurupi (TO)</b>	344	18.00	0.05
Formoso do Araguaia	Talismã - BR-153 .Goiânia - BR-060 .- Jataí and BR-364 through Rondonópolis and Cuiabá, in BR-163 up to <b>Tangará da Serra (MT)</b>	1.713	70.00	0.04
	BR-242 e TO-280 até Gurupi. BR-153 passando por Paraíso do Tocantins - Miranorte and BR-010 up to <b>Pedro Afonso (TO)</b>	413	20.00	0.05
	BR-242 and TO-280 up to Gurupi through Peixe and Porto Alegre do Tocantins in TO-040 Dianópolis up to border Bahia -BR-242 and BR-020 up to <b>Barreiras (BA)</b>	671	20.00	0.03
	BR-242 and TO-280 up to Gurupi. BR-153 through Paraíso do Tocantins - Miranorte - Araguaína -TO-222 - Carolina BR-230 up to <b>Balsas (MA)</b>	810	20.00	0.02
	BR-242 and TO-280 Talismã - BR-153 - Pirenópolis - Anápolis GO-330 - Pires do Rio up to <b>Catalão (GO)</b>	829	20.00	0.02
	TO-255 through Nova Rosalândia -BR-153 up to Araguaína - TO-222 - Carolina BR-230 up to <b>Balsas (MA)</b>	698	20.00	0.03
Lagoa da Confusão	TO-225 through Nova Rosalândia - Miranorte - BR-235 up to <b>Pedro Afonso (TO)</b>	302	9.00	0.02
	TO-255 por Nova Rosalândia - BR-153 até Gurupi - BR-242 and TO-280 up to Almas, TO-040, Dianópolis TO-040 up to border. Bahia BR-242 and BR-020 up to <b>Barreiras (BA)</b>	671	20.00	0.03
	TO-255 por Nova Rosalândia -BR-153 e Gurupi BR-242 Alvorada - Talismã - BR-153 .Goiânia - BR-060 .- Jataí e BR-364 through Rondonópolis up to <b>Cuiabá (MT)</b>	1.673	70.00	0.04

Source: Field research

Figure VII-5.5(2) "Irrigado" Rice commercialization flow chart in the state of Tocantins, June 1997



Source: Field search.

Table VII-5.5(2) Main rice transportation routes produced in the state of Tocantins, June 1997

(It continues)

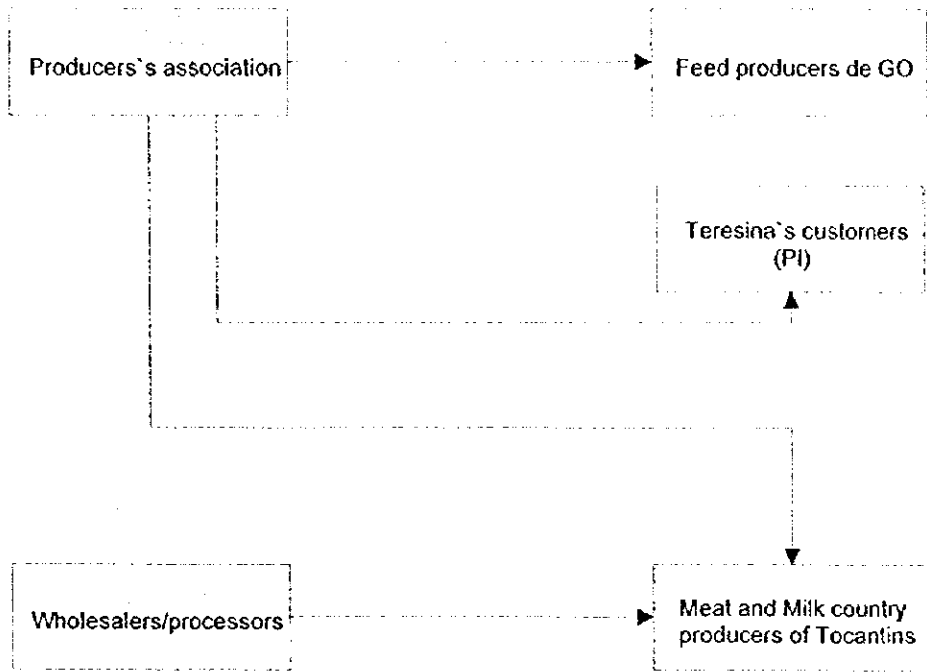
Origin of Production	Route	Distance (km)	Price	
			R\$/t	R\$/tkm
Formoso do Araguaia	BR-242 and TO-280 Gurupi (TO) -BR-153 up to Fátima; TO-255 up to Porto Nacional; TO-050 and TO-070 up to Palmas (TO)	296	9,00	0,03
	BR-242 and TO-280 Gurupi (TO) -BR-153 from Fátima to Wanderlândia; BR-226 up to Estreito, BR-010 up to Imperatriz (MA), BR-222 through Açailândia - Arari up to São Luís (MA)	1.456	58,00	0,04
	BR-242 TO-280 up to Gurupi. Paraíso do Tocantins - Guaraí - BR-226 up to Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia up to Paragominas (PA)	1.108	45,00	0,04
	BR-242 TO-280 up to Gurupi. Paraíso do Tocantins - Guaraí - BR-226 up to Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia BR-222 up to Arari BR 153 Miranda do Norte - Peritoró up to Teresina (PI)	1.650	60,00	0,04
	BR-242 TO-280 up to Gurupi. Paraíso do Tocantins - Guaraí - BR-226 up to Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia BR-222 up to Arari BR 153 Miranda do Norte - Peritoró up to Teresina (PI) BR-343 Capitão Campos - Alto Alegre BR-222. In Ceará , Tinguá - Sobral - Patos and Fortaleza (CE)	2.209	65,00	0,03
	Guaraí - Redenção - Belém - Santarém (PA) (waterway)	1.584	56,00	0,04
	BR-242 TO-080 up to Gurupi -BR-153 Paraíso do Tocantins up to Guaraí -BR-226 up to Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia - Aurora do Pará - Santa Maria do Pará - Castanhal and Belém (PA)	1.389	50,00	0,04
	BR-242 TO-080 up to Gurupi -BR-153 Paraíso do Tocantins up to Guaraí - Colméia - Couto Magalhães - Conceição do Araguaia up to Redenção (PA)	792	20,00	0,08
	Belém (PA) - Parentins (AM) (waterway)	1.766	56,00	0,06
	Lagoa da Confusão	TO-255 Cristalândia - Nova Rosalândia - Fátima up to Gurupi (TO)	215	9,00
TO-255 Cristalândia - Nova Rosalândia - Pug Mill up to Paraíso do Tocantins(TO)- Palmas (TO)		202	9,00	0,04
TO-255 Cristalândia - Paraíso do Tocantins - BR-153 Barrolândia - Guaraí - Colinas do Tocantins up to Araguaína(TO)		467	20,00	0,04



	TO-255 Cristalândia - Fátima - Gurupi - Alvorada BR-153 Talismã - Anápolis (GO)- Goiânia (GO)	744	20,00	0,04
Lagoa da Confusão	TO-255 Cristalândia - Nova Rosalândia T0-050 through Porto Nacional - Natividade - Almas - TO- 040 Dianópolis. In Bahia BR-242 - BR-020 through Barreiras - Javi - Feira de Santana - Entre Rios (SE)- Nossa Senhora do Socorro - Teotonio Vilela - Rio Largo - Xexéu (PE)- Palmares - Recife(PE)	2.448	85,00	0,03
	TO-255 Cristalândia - Nova Rosalândia - BR-242 - TO-280 up to Gurupi - Paraíso do Tocantins - Guaraí - BR-222 up to Wanderlândia - BR-010 Porto Franco - Imperatriz - Açailândia - Arari - BR-153 Miranda do Norte - Peritoró and Teresina (PI)	1.538	56,00	0,04
	TO-255 Cristalândia - Nova Rosalândia - BR-242 - TO-280 up to Gurupi - Paraíso do Tocantins - Guaraí - BR-222 up to Wanderlândia - BR-010 Porto Franco - Imperatriz - Açailândia - Arari - BR-153 Miranda do Norte - Peritoró and Teresina (PI) BR-343 Capitão Campos - Alto Alegre BR-222. In Ceará ,Tinguá - Sobral - Patos and Fortaleza (CE)	2.097	65,00	0,03
	TO-255 Cristalândia Nova Rosalândia BR-242 TO- 280 up to Gurupi - Paraíso do Tocantins - Guaraí - BR-222 up to Wanderlândia BR-010- Porto Franco - Imperatriz up to Açailândia (MA)	767	55,00	0,07
	Açailândia - São Luís (MA) (railway)	605	12,00	0,02
	TO-255 Cristalândia - BR-242- TO-280 Gurupi - Dianópolis TO-040 In Bahia BR-242 and BR-020 up to Barreiras - Ibotirama - Itaberaba - Feira de Santana - Salvador (BA)	1.700	56,00	0,03
	TO-255 Cristalândia - Nova Rosalândia T0-050 through Porto Nacional - Natividade - Almas - TO- 040 Dianópolis. In Bahia BR-242 - BR-020 through Barreiras - Javi - Feira de Santana - Entre Rios (SE)- Nossa Senhora do Socorro - Teotonio Vilela - Rio Largo - Xexéu (PE)- Palmares - Recife(PE) BR--101 up to João Pessoa (PB)	2.785	85,00	0,03
	TO-255 Cristalândia - Nova Rosalândia - BR-242 - TO-280 up to Gurupi - Paraíso do Tocantins - Guaraí - BR-222 up to Wanderlândia - BR-010 Porto Franco - Imperatriz - Açailândia - Arari - BR-153 Miranda do Norte - Peritoró and Teresina (PI) BR-343 Capitão Campos - Alto Alegre BR-222. In Ceará ,Tinguá - Sobral - (CE)	1.859	65,00	0,03

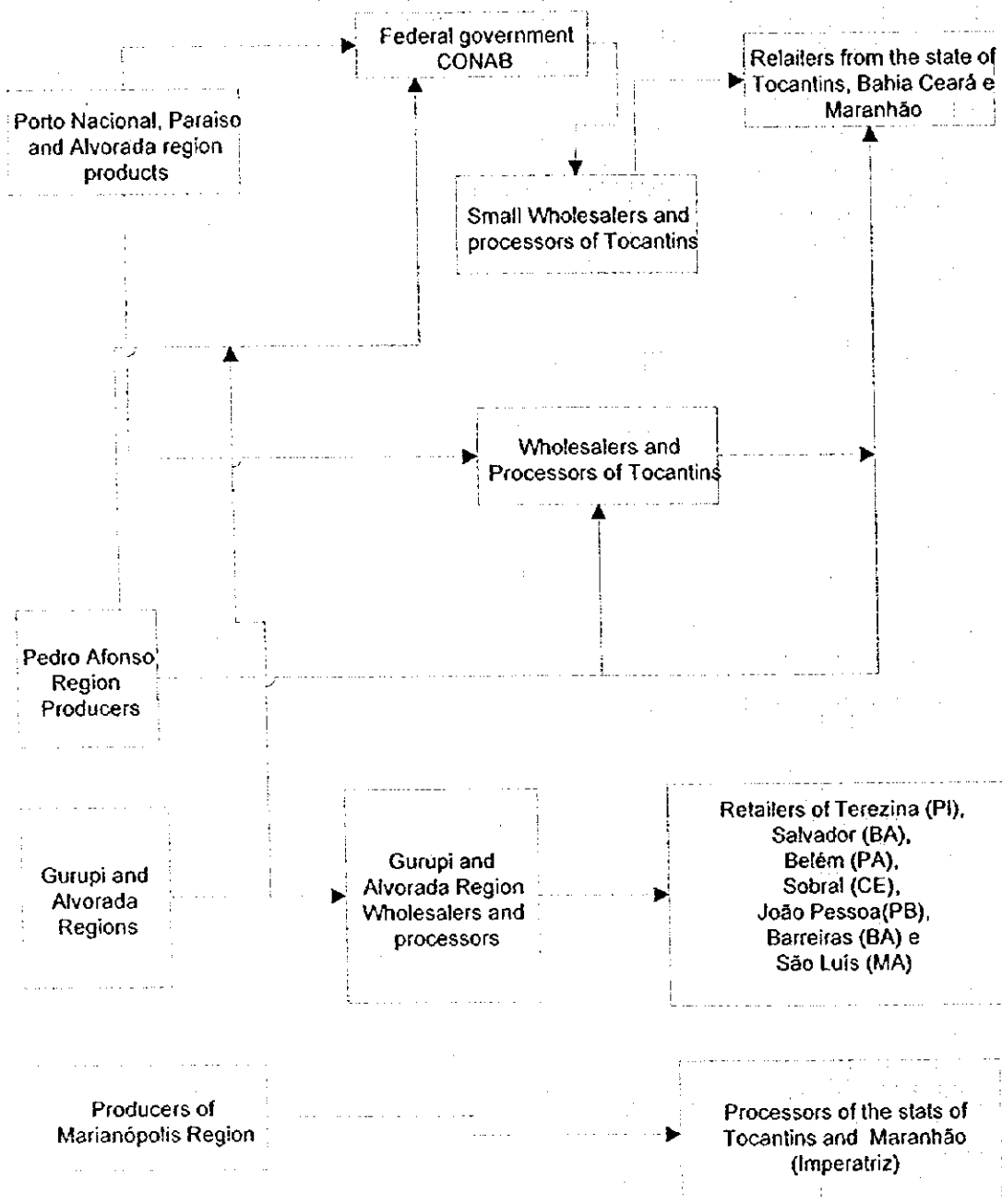
Source: Field research

Figure VII-5.5(3) Rice byproducts (bran and sifting) commercialization flow chart produced and in the state of Tocantins, June 1997



Source: Field

Figure VII-5.5(4) "Sequeiro" rice commercialization flow chart produced and processed in state of Tocantins, June 1997



Source: Field search.

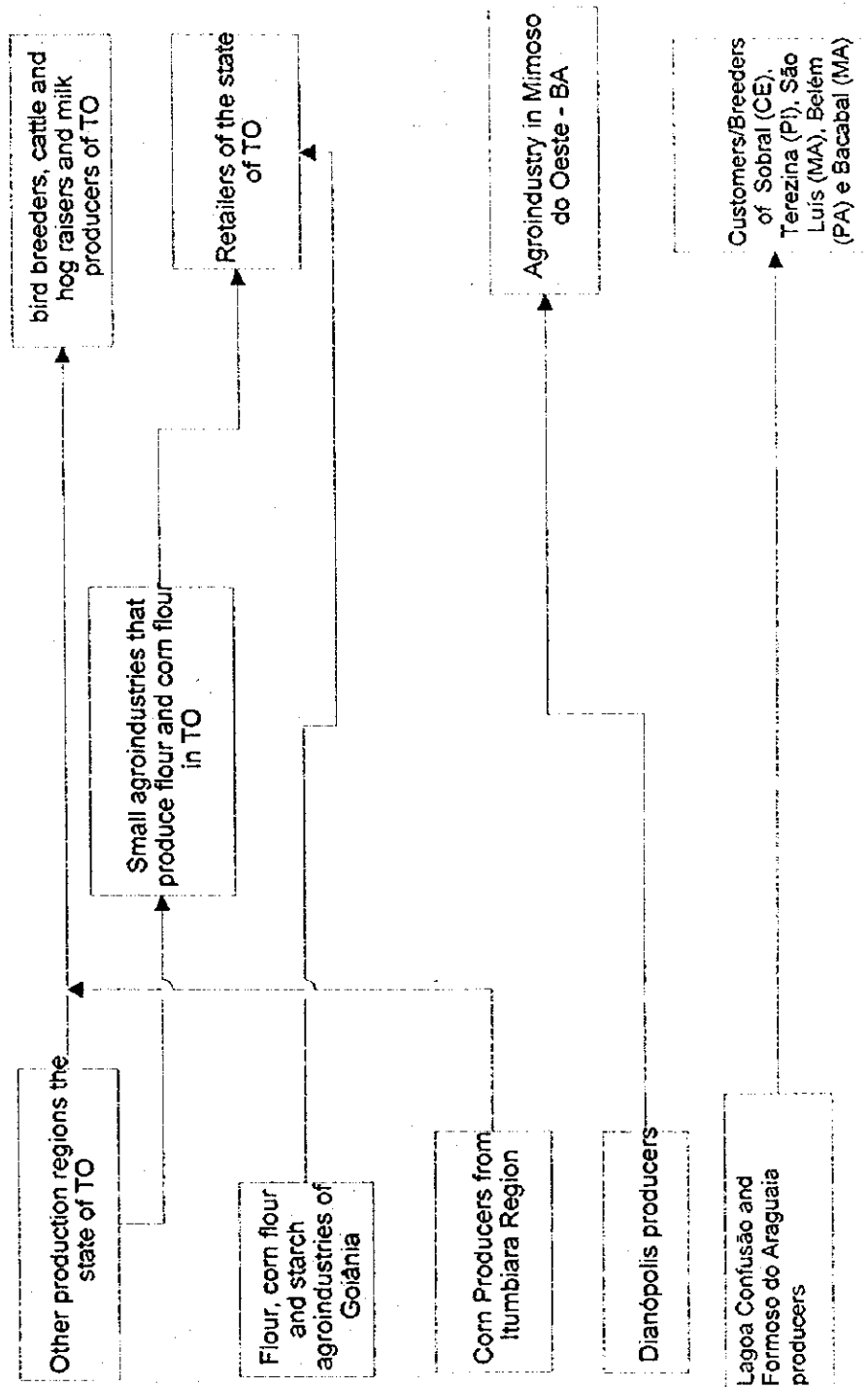
Table VII-5.5(3)- Main "sequeiro" rice transportation routes produced in the state of Tocantins, June 1997

Origin of Production	Route	Distance (km)	Price	
			R\$/t	R\$/t/km
Porto Nacional	TO-050 TO-070 Taquaralto - Palmas (TO)	53	2.00	0.04
	TO-255 -BR-153 - Fátima - Aliança do Tocantins up to Gurupi (TO)	183	7.00	0.04
	TO-050 Silvanópolis - Natividade - Almas - Dianópolis - BA -BR-242 and BR-020 up to Barreiras (BA)	785	20.00	0.03
	BR- 153 Nova Rosalândia - Fátima - Aliança do Tocantins up to Gurupi (TO)	168	7.00	0.04
Paraíso do Tocantins	TO-080 - Palmas (TO)	70	3.00	0.04
	Paraíso do Tocantins - TO-080- Palmas - TO- 070 and TO-050 up to Porto Nacional (TO)	142	7.00	0.05
	Figueirópolis Gurupi (TO)	87	4.00	0.05
Alvorada	Talismã up to Anápolis (GO)	394	10.00	0.03
	BR-253 -BR-153 Guaraí - Colinas do Tocantins - Nova Olinda up to Araguaína (TO)	231	9.00	0.04
Pedro Afonso	BR-253 -BR-153 Guaraí - BR-226 up to Wanderlândia - BR-010 Porto Franco - Imperatriz - Açailândia - Arari - BR-153 Miranda do Norte - Peritoró and Teresina (PI) BR-343 Capitão Campos - Alto Alegre BR-222. In Ceará ,Tinguá - Sobral - Patos e Fortaleza (CE)	1.886	65.00	0.03
	TO-010 Tocantina - Lajeado Grande up to Palmas (TO)	249	9.00	0.04
	Paraíso - Guaraí - BR-226 Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia - BR-222 up to Arari BR-153 Miranda do Norte - Peritoró - Teresina (PI)	1.559	60.00	0.04
Gurupi	Dianópolis - TO-040 Bahia BR-242 and BR-020 up to Barreiras - Ibotirama - Itaberaba - Feira de Santana up to Salvador (BA)	2.176	75.00	0.03
	Guaraí - BR-226 up to Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia - Aurora do Pará - Santa Maria do Pará - Castanhal up to Belém (PA)	1.382	50.00	0.04
	Paraíso do Tocantins - Guaraí - BR-226 - Wanderlândia BR-010 Porto Franco -	1.925	63.00	0.03

	Imperatriz - Açailândia BR-222 Arari BR-153 Miranda do Norte - Peritoró - Teresina- BR-343 up to Capitão Campos - Alto Alegre BR-222 Tinguá up to Sobral (CE)			
	BR-242 -TO-280 Peixe - Natividade - Almas - TO-040 Dianópolis. In Bahia BR-242 and BR-020 through Barreiras - Feira de Santana - Entre Rios (SE) Teotonio Vilela - Xexéu (PE) Recife - BR-101 up to João Pessoa (PB)	2.774	85.00	0.03
	BR-242 and TO-280 Peixe - Natividade - Almas - TO-040 Dianópolis. In Bahia BR-242 and BR-020 up to Barreiras (BA)	602	30.00	0.05
Marianópolis	TO-080 Divinópolis - Campinas up to Paraíso	105	7.00	0.07
	TO-080 Divinópolis - Campinas up to Paraíso - Guaraí BR-226 Wanderlândia BR-010 Porto Franco - Imperatriz (MA).	678	30.00	0.04

Source: Field research

Figure VII-5.5(5) Corn and agroindustrialized products commercialization flow chart Produced and imported by the state of Tocantins, June 1997



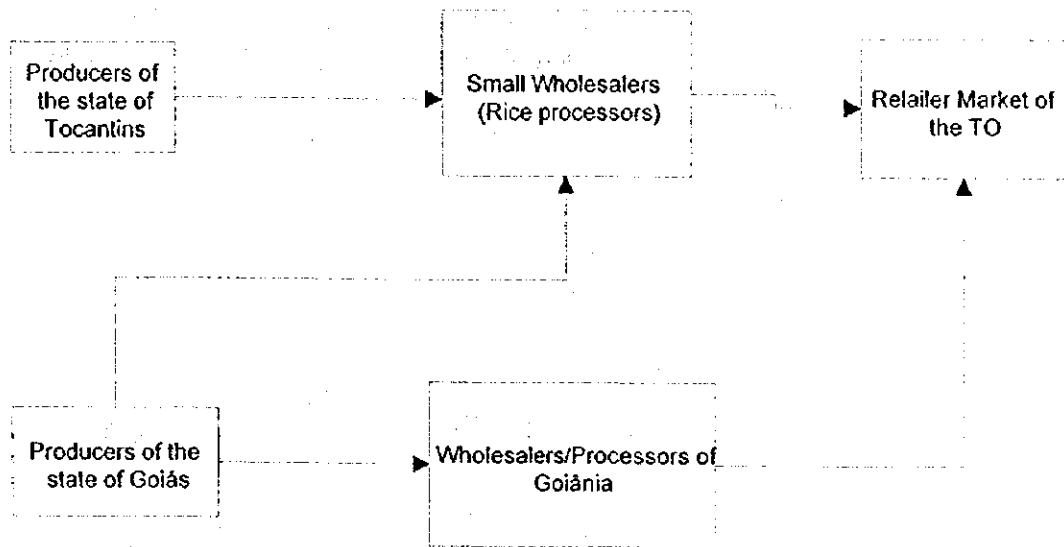
Source: Field search.

Table VII-5.5(4)- Main corn transportation routes produced and imported by the state of Tocantins, June 1997

Origin of production	Route	Distance (km)	Price	
			R\$/t	R\$/tkm
Formoso do Araguaia	BR-242 TO-280 up to Gurupi. Paraíso do Tocantins - Guaraí - BR-226 up to Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia BR-222 up to Arari BR 153 Miranda do Norte - Peritoró up to Teresina (PI) BR-343 Capitão Campos - Alto Alegre BR-222 Tinguá up to Sobral (CE)	1.971	63.00	0.03
	BR-242 TO-280 up to Gurupi. Paraíso do Tocantins - Guaraí - BR-226 up to Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia BR-222 up to Arari BR 153 Miranda do Norte - Peritoró up to Teresina (PI)	1.650	53.00	0.04
	BR-242 and TO-280 Gurupi (TO) -BR-153 de Fátima to Wanderlândia; BR-226 up to Estreito, BR-010 up to Imperatriz (MA), BR-222 through Açailândia - Arari up to São Luís (MA)	1.456	53.00	0.04
	TO-080 up to Palmas (TO)	70	3.00	0.04
Goiânia (GO)	Anápolis - Pirenópolis - Uruaçu - Porangatú - Alvorada - Gurupi - Aliança - Paraíso - Palmas (TO)	772	20.00	0.03
	Anápolis - Pirenópolis - Uruaçu - Porangatú - Alvorada - Gurupi (TO)	528	20.00	0.04
	Anápolis - Pirenópolis - Uruaçu - Porangatú - Alvorada - Gurupi - Aliança - Paraíso - Miranorte - Guaraí - Araguaína. (TO)	1.036	45.00	0.04
Itumbiara (GO)	BR-153 Professor Jamil - Goiânia - Anápolis - Pirenópolis - Porangatú - Gurupi up to Palmas (TO)	971	40.00	0.04
	BR-153 Professor Jamil - Goiânia - Anápolis - Pirenópolis - Porangatú - Gurupi (TO)	727	20.00	0.03
	BR-153 Professor Jamil - Goiânia - Anápolis - Pirenópolis - Porangatú - Gurupi - Paraíso - Miranorte - Guaraí - Araguaína. (TO)	1.235	50.00	0.04
Lagoa da Confusão	Paraíso - Guaraí - Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia - Aurora do Pará - Santa Maria do Pará - Castanhal - Belém (PA)	1.284	50.00	0.04
	Paraíso - Guaraí - Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia - Bacabal (MA)	1.487	55.00	0.04

Source: Field research

Figure -5.5(6) Beans commercialization flow chart produced and imported by the state of Tocantins, June 1997



Source: Field search.

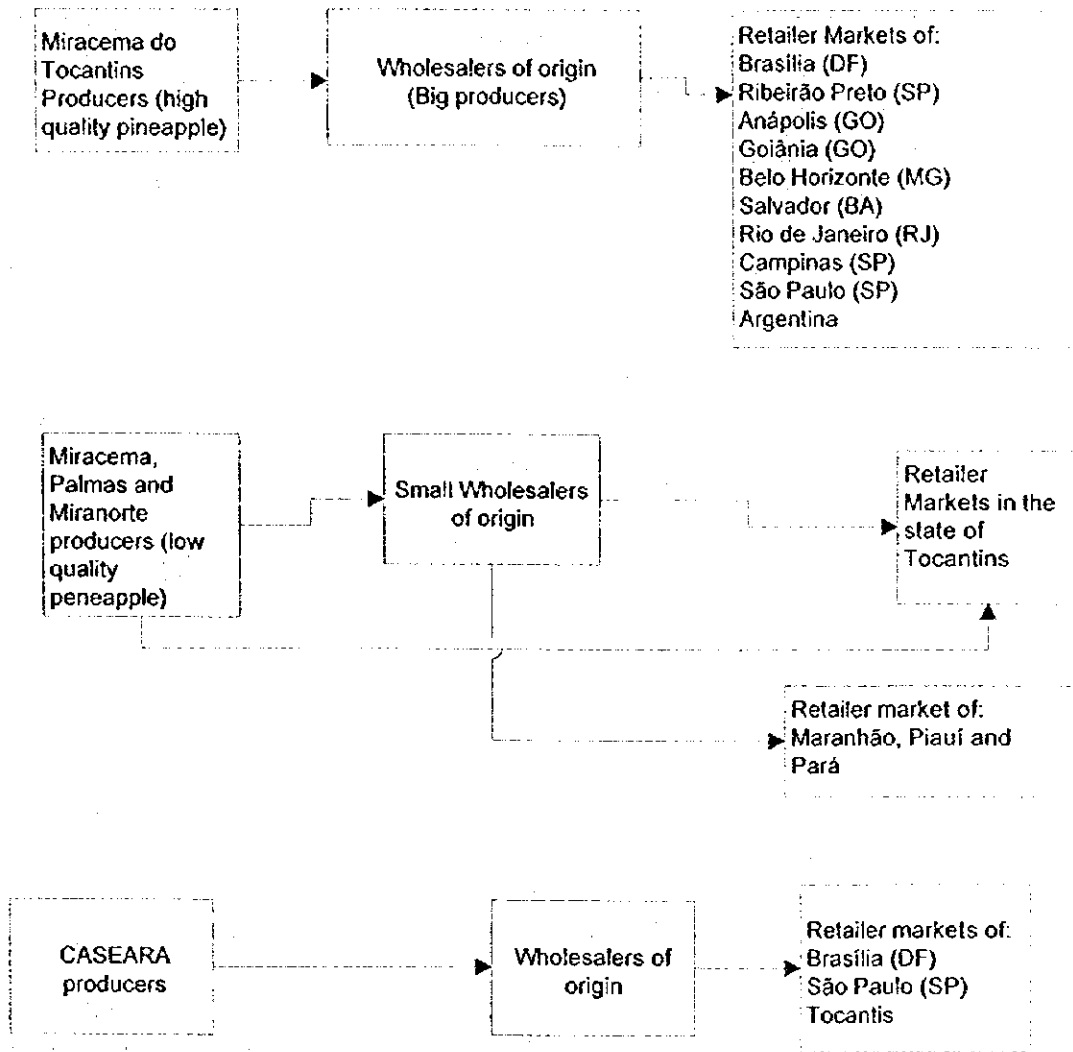


Table VII-5.5(5) Main beans transportation routes produced in the states of Tocantins,  
June 1997

Origin Production	Route	Distance ( km)	Price	
			R\$/t	R\$/t/km
Goiânia	Anápolis - Pirenópolis - Uruaçu - Porangatú - Alvorada - Gurupi - Aliança - Paraíso - <b>Palmas (TO)</b>	772	20.00	0.03
	Anápolis - Pirenópolis - Uruaçu - Porangatú - Alvorada - <b>Gurupi (TO)</b>	528	12.00	0.02
	Anápolis - Pirenópolis - Uruaçu - Porangatú - Alvorada - Gurupi - Aliança - Paraíso - Miranorte - Guaraí - <b>Araguaína. (TO)</b>	1.036	45.00	0.04
	Anápolis - Pirenópolis - Porangatú - Gurupi up to <b>Paraíso do Tocantins (TO)</b>	701	20.00	0.3
Araguaintins	BR-236 São Bento do Tocantins TO-134 Cachoeirinha - Angico - Darcynópolis BR-226 Wanderlândia - <b>Araguaína (TO)</b>	248	9.00	0.04

Source: Field reseach

Figure VII-5.5(7) Pineapple commercialization flow chart produced in the state of Tocantins, June



Source: Field

Table VII-5.5(6)- Main pineapple transportation routes produced in the state of Tocantins, June 1997

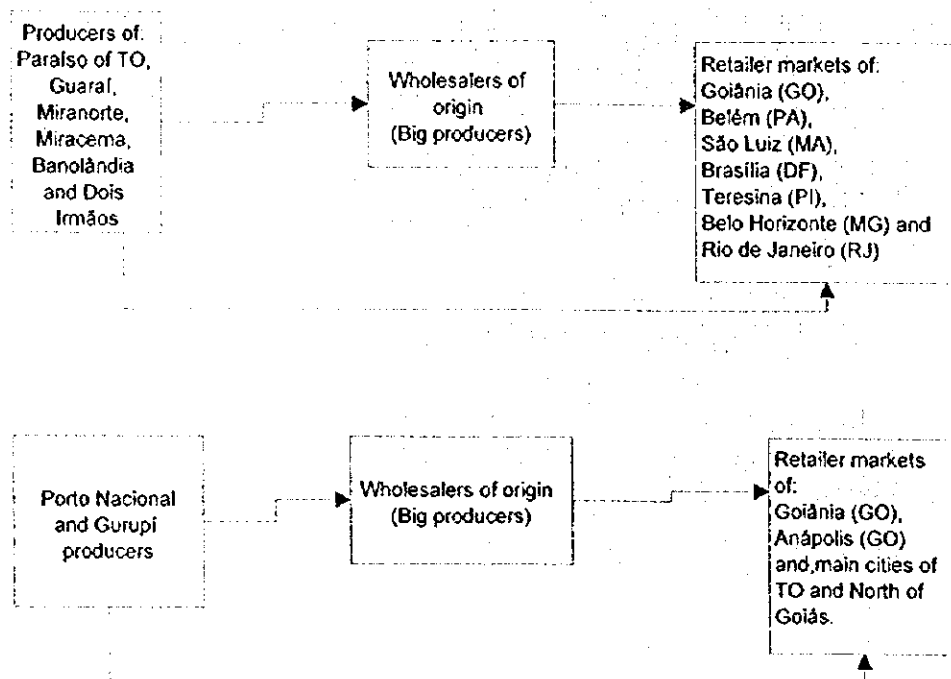
(It continues)

Origin of Production	Route	Distance ( km)	Price	
			R\$/t	R\$/t/km
Miracema do Tocantins	BR-153 Paraíso - Gurupi - Alvorada - Pirenópolis - Anápolis Brasília (DF)	911	40.00	0.05
	BR-153 Paraíso - Gurupi - Alvorada - Pirenópolis - Anápolis Goiânia (GO)	799	32.00	0.04
	BR-153 Paraíso - Gurupi - Alvorada - Pirenópolis - Anápolis Goiânia - Itumbiara - Fronteira - Monte Azul Paulista - Sertãozinho - Ribeirão Preto (SP)	1.414	50.00	0.04
	BR-153 Paraíso - Gurupi - Alvorada - Pirenópolis - Anápolis (GO)	751	30.00	0.04
	BR-153 Paraíso - Gurupi - Alvorada - Pirenópolis - Anápolis BR-040 Luziana Paracatu - João Pinheiro - Três Marias - Sete Lagoas - Belo Horizonte (MG)	1.705	68.00	0.04
	Miranorte BR-153 Barrolândia - Aliança - Gurupi - TO-040 Dianópolis. In Bahia BR-242 and BR-020 up to Barreiras - Ibotirama - Itaberaba - Feira de Santana - Salvador (BA)	1.756	70.00	0.04
	BR-153 Paraíso - Gurupi - Alvorada - Pirenópolis - Anápolis BR-040 Luziana Paracatu - João Pinheiro - Três Marias - Sete Lagoas - Belo Horizonte Conselheiro Lafaiete - Barbacena - Juiz de Fora - Petrópolis - Duque de Caxias Rio Janeiro (RJ)	2.061	82.00	0.04
	BR-153 Paraíso - Gurupi - Alvorada - Pirenópolis - Anápolis Goiânia - Itumbiara - Fronteira - Monte Azul Paulista - Sertãozinho - Ribeirão Preto - Porto Ferreira - Pirassununga - Araras - Americana - Campinas (SP)	1.652	66.00	0.04
	Buenos Aires (Argentina)			0.04
	Tocantína - Lajeado Grande TO-010 up to Palmas(TO)	169	7.00	0.04
	Miranorte - Guaraí - BR-153 Brasilândia do Tocantins - Colinas do Tocantins Nova Olinda - Araguaína(TO)	278	9.00	0.03
	Miranorte - Barrolândia - BR-153 Paraíso do Tocantins - Fátima - Aliança do Tocantins - Gurupi(TO)	271	9.00	0.03
	Miranorte - Guaraí - Nova Olinda - Araguaína - BR-226 Darcynópolis - Estreito BR-010	1165	50.00	0.04

Porto Franco - Imperatriz - BR-222			
Entroncamento - Vitória do Mearim up to São			
<b>Luis (MA)</b>			
Miranorte - Guaraí - Nova Olinda - Araguaína	1.097	45.00	0.04
- BR-226 Darcynópolis - Estreito BR-010			
Porto Franco - Imperatriz - BR-222			
Açailândia - Aurora do Pará - Santa Maria do			
Pará - Castanhal up to <b>Belém (PA)</b>			
Miranorte - Guaraí - Nova Olinda - Araguaína	511	20.00	0.04
- BR-226 Darcynópolis - Estreito BR-010			
Porto Franco - Imperatriz (MA)			
Miranorte - Guaraí - Colméia - Couto	238	9.00	0.04
Magalhães - Conceição do Araguaia up to			
<b>Redenção (PA)</b>			
BR-153 Paraíso - Gurupi - Alvorada -	1.830	80.00	0.04
Pirenópolis - Anápolis Goiânia - Itumbiara -			
Fronteira - Monte Azul Paulista - Sertãozinho -			
Ribeirão Preto - Porto Ferreira - Pirassununga -			
Araras - Americana - Campinas - Jundiá -			
Osasco - <b>São Paulo.(SP)</b>			

Source: Field research

Figure VII-5.5(8) Banana commercialization flow chart produced in the produced in the state of Tocantins, June



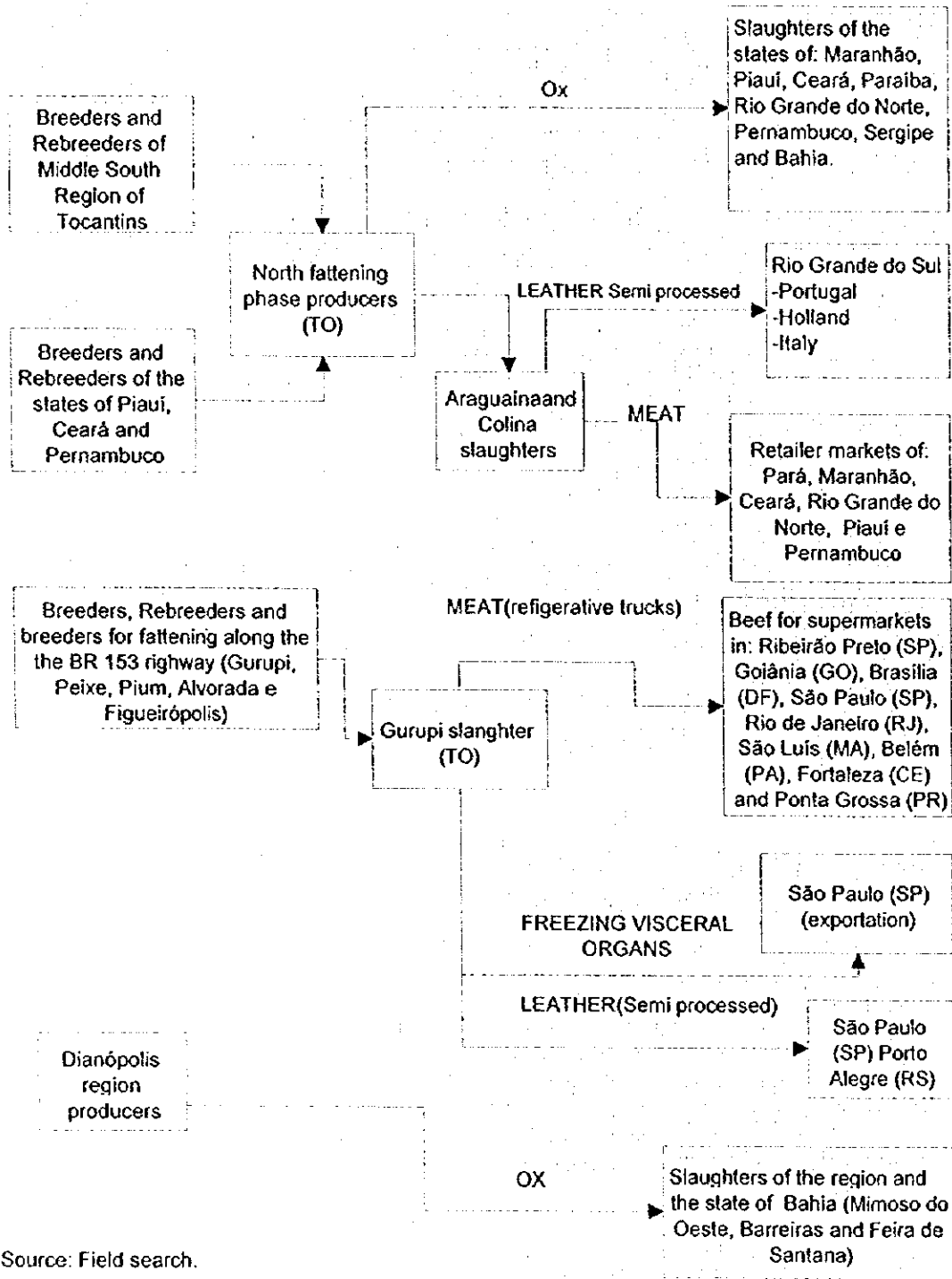
Source: Field

Table VII-5.5(7)- Main banana transportation routes produced in the states of Tocantins,  
June 1997

Origin of Production	Route	Distance (km)	Price		
			R\$/t	R\$/tkm	
Paraíso do Tocantins	Gurupi - Porangatu - Pirenópolis - Anápolis - Goiânia(GO)	701	20.00	0.03	
	Guaraí - BR-226 up to Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia - Aurora do Pará - Santa Maria do Pará - Castanhal - Belém (PA)	1.208	60.00	0.05	
	Guaraí - BR-226 up to Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia - up to São Luís (MA)	1.225	67.00	0.05	
	Gurupi - Porangatu - Pirenópolis - Anápolis - Brasília (DF)	938	40.00	0.04	
	TO-080 - Palmas (TO)	70	3.00	0.04	
	BR-153 Barrolândia - Guaraí - Colinas - Araguaína (TO)	336	10.00	0.03	
	Guaraí BR-226 - Wanderlândia BR-010 - Porto Franco - Imperatriz - Açailândia - BR-222 Arari - BR-153 Miranda do Norte - Peritoró - Teresina (PI)	1395	50.00	0.04	
	BR-153 Gurupi - Alvorada - Pirenópolis - Anápolis BR-040 Luziana Paracatu - João Pinheiro - Três Marias - Sete Lagoas - Belo Horizonte.(MG)	1605	65.00	0.04	
	BR-153 - Gurupi - Alvorada - Pirenópolis - Anápolis BR-040 Luziana Paracatu - João Pinheiro - Três Marias - Sete Lagoas - Belo Horizonte Conselheiro Lafaiete - Barbacena - Juiz de Fora - Petrópolis - Duque de Caxias Rio Janeiro (RJ)	1963	80.00	0.04	
	Gurupi	BR-153 Alvorada - Talismã - Anápolis (GO) - Goiânia (GO)	528	20.00	0.03
		Aliança do Tocantins - Nova Rosalândia - Paraíso - Palmas (TO)	238	9.00	0.04
		BR-153 Aliança do Tocantins - Nova Rosalândia - Miranorte - Guaraí - Colinas - Nova Olinda - Araguaína (TO)	509	12.00	0.02
Alvorada - Talismã - Porangatu (GO)		201	9.00	0.04	
Araguaína	Colinas - Guaraí - Barrolândia - Paraíso - Nova Rosalândia - Fátima - Gurupi - Alvorada - Talismã - Anápolis - Brasília (DF)	1274	23.00	0.02	
	BR-153 Colinas - Guaraí - Barrolândia Paraíso - Gurupi - Alvorada - Pirenópolis - Anápolis Goiânia - Itumbiara - Fronteira - Monte Azul Paulista - Sertãozinho - Ribeirão Preto - Porto Ferreira - Pirassununga - Araras - Americana - Campinas - Jundiaí - Osasco - São Paulo.(SP)	1962	46.00	0.02	
	Colinas - Guaraí - Barrolândia - Paraíso - Nova Rosalândia - Fátima - Gurupi - Alvorada - Talismã - Anápolis - Goiânia (GO)	1037	22.00	0.02	
Porto Nacional	TO-050 e TO-070 Taquaralto up to Palmas (TO)	53	2.00	0.04	

Source: Field research

Figure VII-5.5(9) Ox and beef commercialization flow chart produced in the state Tocantins, June 1997



Source: Field search.

Table VII-5.5(8)- Main ox and meat transportation routes produced in the state of Tocantins, June 1997

Origin of Production	Route	Distance ( km)	Price	
			R\$/t	R\$/tkm
Araguaína	BR-226 Darcynópolis - Estreito - BR-010 Porto Franco - Imperatriz - Açailândia - Aurora do Pará - Santa Maria do Pará - Castanhal - Belém (PA)	835	60.00	0.07
	BR-226 Darcynópolis - Estreito - BR-010 Porto Franco - Imperatriz - Açailândia - BR-222 Arari - BR-153 Miranda do Norte - Peritoró - Teresina BR-343 Capitão Campos - Alto Alegre - BR-222 In Ceará, Tinguá - Sobral - Patos - Fortaleza (CE)	1,655	120.00	0.07
	BR-226 Darcynópolis - Estreito - BR-010 Porto Franco - Imperatriz - Açailândia - BR-222 Arari - BR-153 Miranda do Norte - Peritoró - Teresina BR-343 Capitão Campos - Alto Alegre - BR-222 In Ceará, Tinguá - Sobral - Patos - Fortaleza -CE-084 Aracati - BR-304 - Mossoró - Assú and Natal (RN)	2,192	150.00	0.07
	BR-226 Darcynópolis - Estreito - BR-010 Porto Franco - Imperatriz - Açailândia - BR-222 Arari - BR-153 Miranda do Norte - Peritoró - Teresina (PI)	1,096	80.00	0.07
	Alvorada - Talismã - Porangatú - Pirenópolis - Anápolis - Goiânia (GO) - Brasília (DF)	736	100.00	0.04
Gurupi	Alvorada - Talismã - Porangatú - Pirenópolis - Anápolis - Itumbiara - Fronteira - Monte Azul Paulista - Sertãozinho - Ribeirão Preto (SP)	1,244	100.00	0.08
	BR-242 e TO-280 Peixe - Natividade - Almas - TO-040 Dianópolis. In Bahia BR-242 and BR-020 through Barreiras - Javi - Feira de Santana - Entre Rios (SE) - Teotonio Vilela - Rio Largo - Xexéu - Palmares and Recife (PE)	2,687	170.00	0.06
	Alvorada - Talismã - Porangatú - Pirenópolis - Anápolis - BR-040 Luziana - Paracatu - João Pinheiro - Três Marias - Sete Lagoas - Belo Horizonte (MG)	1,452	100.00	0.07
	Alvorada - Talismã - Porangatú - Pirenópolis - Anápolis - Goiânia - Itumbiara - Fronteira - Monte Azul Paulista - Sertãozinho - Ribeirão Preto - Porto Ferreira - Pirassununga - Araras - Americana - Campinas - Jundiá - Osasco - São Paulo (SP)	1,453	100.00	0.07
	Alvorada - Talismã - Porangatú - Pirenópolis - Anápolis - BR-040 Luziana - Paracatu - João Pinheiro - Três Marias - Sete Lagoas - Belo Horizonte - BR-040 - Conselheiro Lafaiete - Barbacena - Juiz de Fora - Petrópolis - Duque de	1,878	135.00	0.07



	<b>Caxias - Rio de Janeiro (RJ)</b>			
	BR-153 Fátima to Wanderlândia - BR-226 up to Estreito - BR-010 up to Imperatriz - BR-222	1,419	100.00	0.07
	<b>Açailândia - Avari - São Luís (MA)</b>			
Gurupi	BR-153 Fátima to Wanderlândia - BR-226 up to Estreito - BR-010 up to Imperatriz - Açailândia - Aurora do Pará - Santa Maria do Pará - Castanhal - Belém (PA)	1,382	100.00	0.07
	<b>Alvorada - Talismã - Porangatú - Pirenópolis - Anápolis - Goiânia - BR-153 Itumbiara - Fronteira - Icem - São José do Rio Preto - Lins - Marília - PR-092 Wenceslau Brás - Castro - Ponta Grossa (PR)</b>	1,607	135.00	0.08
	<b>Paraíso do Tocantins - Guaraí - BR-226 - Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia BR-222 Arari BR-153 Miranda do Norte - Peritoró - Teresina - BR-343 up to Capitão Campos - Alto Alegre BR-222 Tinguá - Sobral - Patos - Fortaleza (CE)</b>	2,184	170.00	0.08
	<b>Alvorada - Talismã - Porangatú - Pirenópolis - Anápolis - Goiânia - BR-153 Itumbiara - Fronteira - Icem - São José do Rio Preto - Lins - Marília - PR-092 Wenceslau Brás - Castro - Ponta Grossa - Curitiba - BR-116 Areia Branca de Assis - Mafra (SC) - Lages - Vacaria - Caxias do Sul - Novo Hamburgo - São Leopoldo - Canoas - Porto Alegre (RS)</b>	2,476	150.00	0.06
Colinas	Araguaína BR-226 Darcynópolis - Estreito - BR-010 Porto Franco - Imperatriz - Açailândia - BR-222 Arari - BR-153 Miranda do Norte - Peritoró - Teresina BR-343 Capitão Campos - Alto Alegre - BR-222 No Ceará, Tinguá - Sobral - Patos - Fortaleza (CE)	1,752	120.00	0.07
	<b>Araguaína BR-226 Darcynópolis - Estreito - BR-010 Porto Franco - Imperatriz - Açailândia - BR-222 Arari - BR-153 Miranda do Norte - Peritoró - Teresina BR-343 Capitão Campos - Alto Alegre - BR-222 In Ceará, Tinguá - Sobral - Patos - Fortaleza - CE-084 Aracati - BR-304 - Mossoró - Assú e Natal (RN)</b>	2,289	140.00	0.06
	<b>Gurupi - BR-242 and TO-280 Peixe - Natividade - Almas - TO-040 Dianópolis. In Bahia BR-242 and BR-020 through Barreiras - Javi - Feira de Santana - Entre Rios (SE) - Teotonio Vilela - Rio Largo - Xexéu - Palmares and Recife (PE)</b>	3,076	140.00	0.05
	<b>Araguaína BR-226 Darcynópolis - Estreito - BR-010 Porto Franco - Imperatriz - Açailândia -</b>	932	80.00	0.09

	Aurora do Pará - Santa Maria do Pará - Castanhal - <b>Belém (PA)</b>			
	Araguaína BR-226 Darcynópolis - Estreito - BR-010 Porto Franco - Imperatriz - BR-222 Açailândia - Arari - São Luís (MA)	958	110.00	0.11
	Araguaína - BR-226 Darcynópolis - Estreito - BR-010 Porto Franco - Imperatriz - Açailândia - BR-222 Arari - BR-153 Miranda do Norte - Peritoró - <b>Teresina (PI)</b>	1,193	85.00	0.07
Colinas	Gurupi - Alvorada - Talismã - Porangatú - Pirenópolis - Anápolis - Goiânia -BR-153 Itumbiara - Fronteira - Icem - São José do Rio Preto - Lins - Marília - PR-092 Wenceslau Brás - Castro - Ponta Grossa - Curitiba and Paranaguá (PR)	2201	70.00	0.03
Sul do Estado do Piauí	Floriano BR-343 Teresina - Vitoria do Mearim - Santa Inês - Açailândia - Imperatriz - Estreito - <b>Araguaína (TO)</b>	1.426	45.00	0.03
Ceará	Sobral (CE) Tinguá BR-222 Alto Alegre - Capitão Campos - BR- 343 Teresina - Vitoria do Mearim - Santa Inês - Açailândia - Imperatriz - Estreito - <b>Araguaína (TO)</b>	1.739	52.00	0.03
Sertão Pernambucano	Petrolina (PE) BR-407 Picos - Teresina - Vitória do Mearim - Santa Inês - Açailândia - Imperatriz - Estreito - <b>Araguaína (TO)</b>	1.751	52.00	0.03
Peixe	TO-280 and BR-242 - Vila Quixaba <b>Gurupi (TO)</b>	71	2.50	0.03
Pium	TO-354 Pug Mill - Nova Rosalândia - BR-153 Fátima - Aliança do Tocantins - <b>Gurupi (TO)</b>	175	5.00	0.03
Alvorada	BR-242 Figueirópolis - Cariri do Tocantins - <b>Gurupi (TO)</b>	100	3.00	0.03
Figueirópolis	BR-242 Cariri do Tocantins - <b>Gurupi (TO)</b>	49	2.00	0.03

Source: Field research

Figure VII-5.5(10) Milk and cheese commercialization flux produced in the state of Tocantins, June

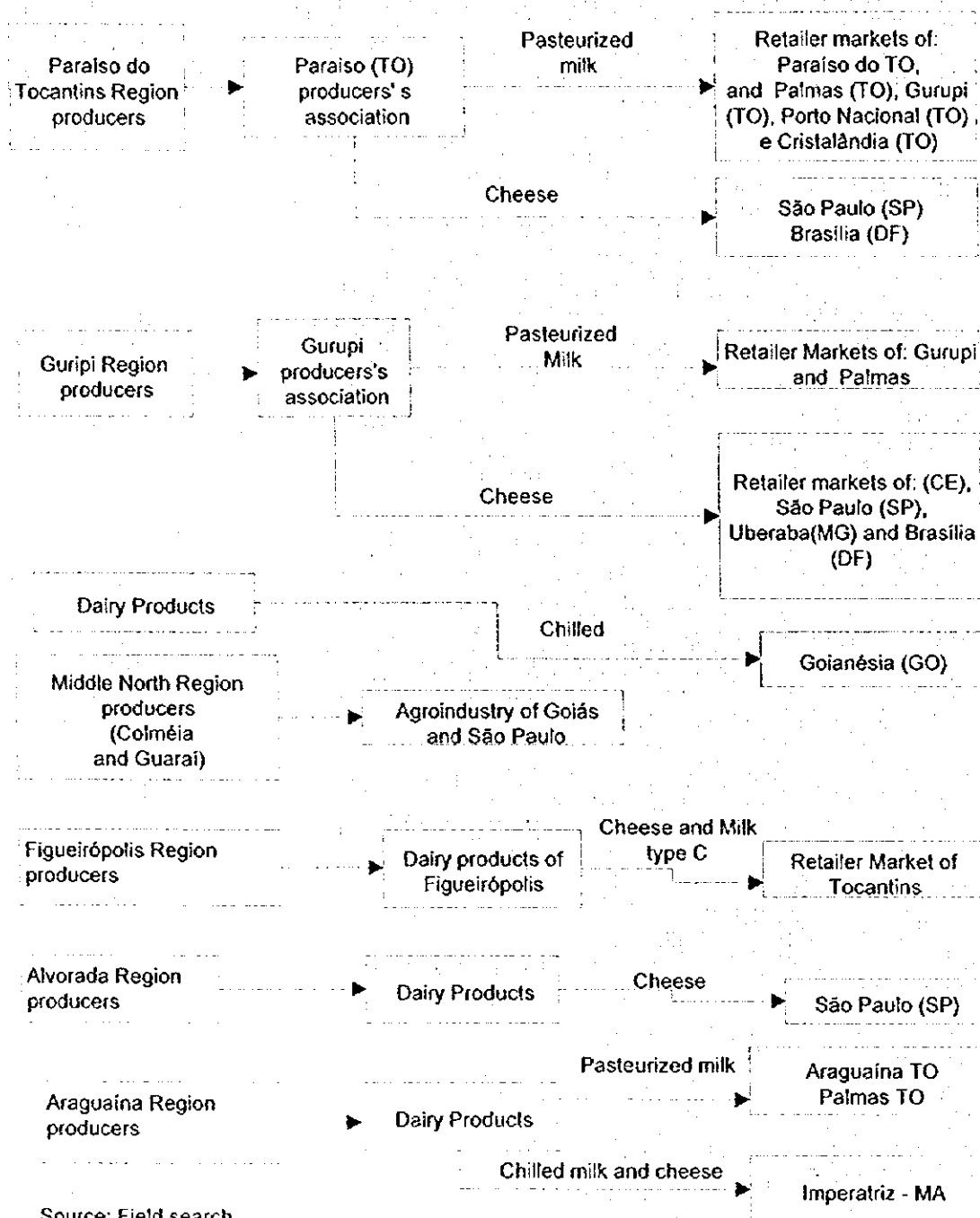


Table VII-5.5(9)- Main milk and cheese transportation routes produced in the state of Tocantins, June 1997

Origin of Production	Route	Distance ( km)	Price	
			R\$/t	R\$/t/km
Paraíso do Tocantins	TO-080 - <b>Palmas (TO)</b>	70	3.00	0.04
	Gurupi - Porangatu - Pirenópolis - Anápolis - <b>Brasília (DF)</b>	938	40.00	0.04
	BR-153 - Gurupi - Alvorada - Pirenópolis - Anápolis Goiânia - Itumbiara - Fronteira - Monte Azul Paulista - Sertãozinho - Ribeirão Preto - Porto Ferreira - Pirassununga - Araras - Americana - Campinas - Jundiá - Osasco - <b>São Paulo (SP)</b>	1,627	80.00	0.05
	TO-255 Nova Rosalândia - Pug Mill <b>Cristalândia (TO)</b>	76	3.00	0.03
	TO-080 Palmas TO-070 and TO-050 up to <b>Porto Nacional (TO)</b>	142	4.00	0.03
	BR-153 Nova Rosalândia - Fátima - Aliança up to <b>Gurupi (TO)</b>	168	4.00	0.02
	Gurupi	Aliança - Nova Rosalândia - Paraíso - <b>Palmas (TO)</b>	238	9.00
Paraíso do Tocantins - Guaraí - BR-226 up to Wanderlândia BR-010 Porto Franco - Imperatriz - Açailândia BR-222 up to Arari BR 153 Miranda do Norte - Peritoró up to Teresina (PI) BR-343 Capitão Campos - Alto Alegre BR-222. In Ceará, Tinguá - Sobral - Patos and <b>Fortaleza (CE)</b>		2,184	100.00	0.05
Alvorada - Talismã - Porangatú - Pirenópolis - Anápolis - <b>Goiânia</b> - Itumbiara - Fronteira - Monte Azul Paulista - Sertãozinho - Ribeirão Preto - Porto Ferreira - Pirassununga - Araras - Americana - Campinas - Jundiá - Osasco - <b>São Paulo (SP)</b>		1,555	80.00	0.05
Alvorada - Talismã - Porangatú - Pirenópolis - Anápolis - BR-153 Catalão - Araguari - <b>Uberlândia - BR-050 up to Uberaba (MG)</b>		991	40.00	0.04
Porangatu - Pirenópolis - Anápolis - <b>Brasília (DF)</b>		736	30.00	0.04
BR-153 - Alvorada - Porangatu - Uruaçu - Ceres - Rialma - Jaraguá - <b>Goianésia (GO)</b>		439	20.00	0.04
Guaraí		Barrolândia - Paraíso - Nova Rosalândia - Fátima - Gurupi - Alvorada - Talismã - <b>Goiânia (GO)</b>	854	40.00

	Barrolândia - Paraíso - Nova Rosalândia - Fátima - Gurupi - Alvorada - Talismã - Goiânia (GO) Itumbiara - Fronteira - Monte Azul Paulista - Sertãozinho - Ribeirão Preto - Pirassununga - Campinas - São Paulo.(SP)	1.780	90.00	0.05
Figueirópolis	Cariri do Tocantins - Gurupi - Aliança - Nova Rosalândia - Paraíso - Palmas (TO)	287	9.00	0.03
	Cariri do Tocantins - Gurupi - Paraíso - Miranorte - Guaraí - Colinas - Nova Olinda - Araguaína (TO)	558	16.00	0.03
	Cariri do Tocantins - Gurupi - Paraíso do Tocantins (TO)	217	9.00	0.04
	Cariri do Tocantins - Gurupi - BR-153 Aliança - Brejinho do Nazaré - TO-070 Porto Nacional (TO)	232	9.00	0.04
Araguaína	BR-153 Nova Olinda - Colina - Guaraí - Miranorte - Paraíso - Palmas (TO).	405	100.00	0.25
	BR-222 Darcynópolis - Estreito - BR-010 Porto Franco - Imperatriz (MA)	249	60.00	0.24
Alvorada	Talismã - Goiânia (GO) Itumbiara - Fronteira -Monte Azul Paulista - Sertãozinho - Ribeirão Preto - Pirassununga - Campinas - São Paulo.(SP)	1.371	55.00	0.04

Source: Field research

Table VII-5.5(10)- Main agricultural input transportation routes used by agriculturists in the state of Tocantins, June 1997

Origin of Production	Route	Distance ( km)	Price	
			R\$/t	R\$/tkm
Dianópolis	TO-476 Rio da Conceição TO-110 up to <b>Mateiros (TO)</b>	142	5.00	0.04
	Novo Jardim TO-040 - BR-242 up to <b>Mimoso do Oeste (BA)</b>	184	5.00	0.03
	Novo Jardim-TO-040. Bahia BR-242 and <b>BR-020 - Barreiras (BA)</b>	276	9.00	0.03
	Novo Jardim TO-040. Bahia BR-242 and <b>BR-020 Barreiras - Ibotirama - Itaberaba - Feira de Santana and Salvador (BA)</b>	1159	45.00	0.04
Guaraí	<b>BR-153 and BR-253 Pedro Afonso (TO)</b>	50	10.00	0.20
Cristalândia	TO-255 Nova Rosalândia - Paraíso - BR-153 <b>Miranorte - Fortaleza do Tabocão - BR-235 - Pedro Afonso (TO)</b>	177	20.00	0.11
Natividade	TO-050 Santa Rosa do Tocantins - <b>Silvanópolis - Porto Nacional - TO-070 Taquaralto - Palmas - TO-010 - Tocantinea - Pedro Afonso (TO)</b>	321	20.00	0.06
Goiânia	Anápolis - Pirenópolis - Uruaçu - Porangatu - <b>Alvorada - Gurupi - Aliança - Paraíso - Palmas (TO)</b>	772	20.00	0.03
	Anápolis - Pirenópolis - Uruaçu - Porangatu - <b>Alvorada - Gurupi (TO)</b>	528	20.00	0.04
	Anápolis - Pirenópolis - Uruaçu - Porangatu - <b>Alvorada - Formoso do Araguaia (TO)</b>	550	20.00	0.04
	Anápolis - Pirenópolis - Uruaçu - Porangatu - <b>Alvorada - Gurupi - Aliança - Paraíso - Miranorte - Rio dos Bois - Pedro Afonso (TO)</b>	871	20.00	0.02
	Anápolis - Pirenópolis - Uruaçu - Porangatu - <b>Alvorada - Gurupi - Aliança - Paraíso - Miranorte - Guarai - Araguaína. (TO)</b>	1036	45.00	0.04
	Osasco - Jundiá - Campinas - Americana - <b>Araras - Pirassununga - Porto Ferreira - Ribeirão Preto - Sertãozinho - Monte Azul Paulista - Fronteira - Itumbiara - Goiânia - Anápolis - Pirenópolis - Alvorada - Gurupi - BR-153 - Paraíso - Palmas (TO)</b>	1694	60.00	0.04
	Osasco - Jundiá - Campinas - Americana - <b>Araras - Pirassununga - Porto Ferreira - Ribeirão Preto - Sertãozinho - Monte Azul</b>	1453	60.00	0.04
São Paulo				

São Paulo

Paulista - Fronteira - Itumbiara - Goiânia -  
Anápolis - Pirenópolis - Alvorada - **Gurupi**  
(TO)

Osasco - Jundiá - Campinas - Americana - 1597 60.00 0.04  
Araras - Pirassununga - Porto Ferreira -  
Ribeirão Preto - Sertãozinho - Monte Azul  
Paulista - Fronteira - Itumbiara - Goiânia -  
Anápolis - Pirenópolis - Uruaçu - Porangatu -  
Alvorada - **Formoso do Araguaia (TO)**

Osasco - Jundiá - Campinas - Americana - 1797 80.00 0.04  
Araras - Pirassununga - Porto Ferreira -  
Ribeirão Preto - Sertãozinho - Monte Azul  
Paulista - Fronteira - Itumbiara - Goiânia -  
Anápolis - Pirenópolis - Uruaçu - Porangatu -  
Alvorada - Gurupi - Aliança - Paraíso -  
Miranorte - Rio dos Bois - **Pedro Afonso**  
(TO)

Osasco - Jundiá - Campinas - Americana - 1962 80.00 0.04  
Araras - Pirassununga - Porto Ferreira -  
Ribeirão Preto - Sertãozinho - Monte Azul  
Paulista - Fronteira - Itumbiara - Goiânia -  
Anápolis - Pirenópolis - Alvorada - Gurupi -  
Aliança - BR-153 - Paraíso - Miranorte -  
Guaraí - **Araguaína(TO)**

Source: Field research

Table VII-5.5(11)- Quantity of standing cattle which came from Araguaína and other cities nearby, sold to slaughter in other states of Brazil, from March to May 1997

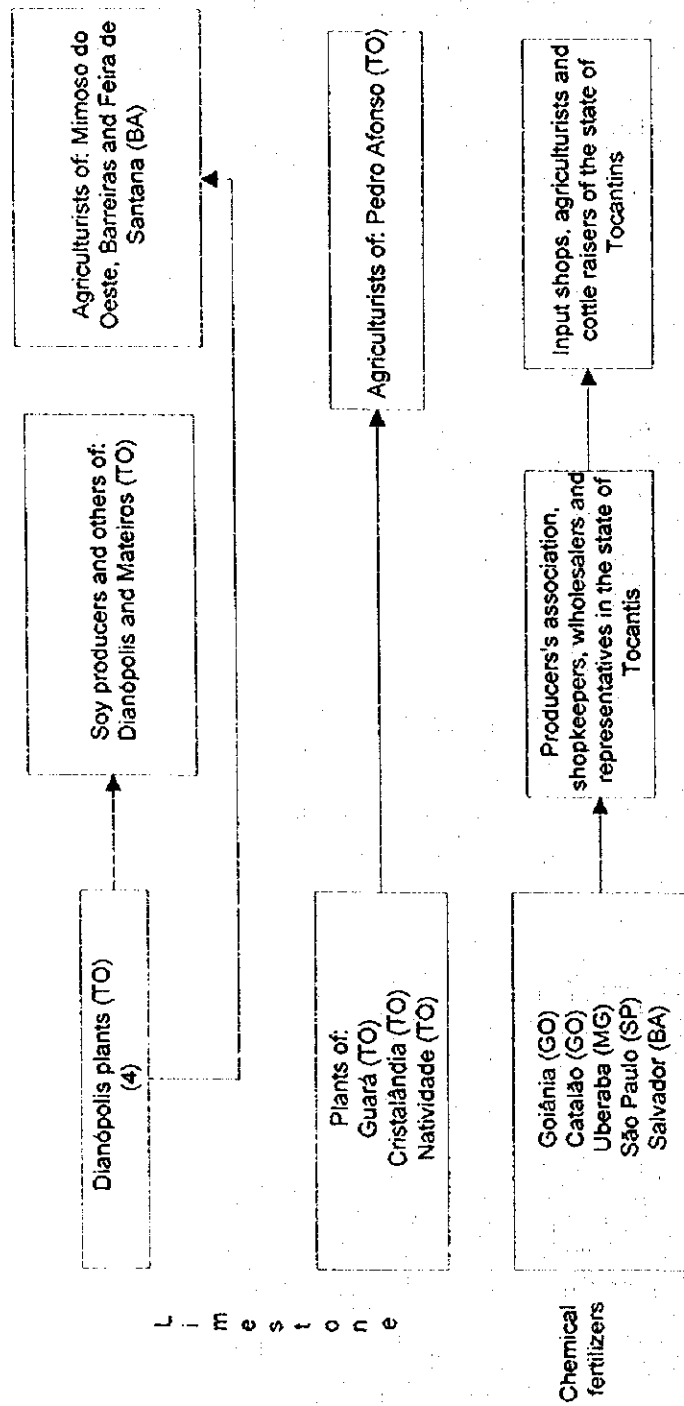
Origin	Destination	March	April	May	Total (no.)	Month Average	
		no. of heads	no. of heads	no. of heads		(no.)	%
Araguaína city	MA	4,055	2,349	365	6,769	2,256	20,75
	PI	197	480	582	1,259	420	3,86
	CE	3,792	4,705	1,926	10,423	3,474	31,96
	SP	820	-	126	946	473	4,35
	PB	2,384	2,346	1,733	6,463	2,154	19,81
	RN	2,595	1,708	781	5,084	1,695	15,59
	PE	285	161	78	524	175	1,61
	SE	99	-	-	99	99	0,91
	BA	61	165	153	379	126	1,16
<b>Total</b>		<b>14,288</b>	<b>11,914</b>	<b>5,744</b>	<b>31,946</b>	<b>10,872</b>	<b>68,44</b>
Region of Araguaína <sup>1</sup>	MA	-	108	391	499	250	4,98
	PI	534	677	317	1,528	509	10,16
	CE	2,583	2,237	1,743	6,563	2,188	43,64
	SP	680	-	-	680	680	13,56
	PB	742	891	308	1,941	647	12,91
	RN	463	563	724	1,750	583	11,64
	PE	43	-	-	43	43	0,86
	SE	40	181	60	281	94	1,87
	BA	20	-	-	20	20	0,40
<b>Total</b>		<b>5,105</b>	<b>4,657</b>	<b>3,543</b>	<b>13,305</b>	<b>5,014</b>	<b>31,56</b>
<b>Total</b>		<b>19,393</b>	<b>16,571</b>	<b>9,287</b>	<b>45,251</b>	<b>15,886</b>	<b>100,00</b>

Source: Ministry of Agriculture and Supplies of the State of Tocantins/ Inspection Department

1) The cities of Xambioá, Filadélfia, Santa Fé, Ananás, Arapoema and Colinas were taken under consideration.



Figure VII-5.5(11) Main agricultural input flow chart consumed by the agriculturists of the state of Tocantins, June 1997



Source: Field search.

## 5.6 Transportation Infrastructure

In this section detailed information about the "Corredor Centro-Norte" (middle-north corridor) will be given. We have decided to do so because of the intention of including the state of Tocantins in the national main agricultural route. Efficient transportation infrastructure is extremely necessary to transport the production to the market destination.

The Ministry of Transportation has shown several papers about the identification and characteristics of these national especial highways and they can be used when contracting studies in the future. The main purpose is to qualify and check the demand for new investments in the area and see if there is economical feasibility for the presented proposals.

Studies that show only the state of Tocantins is not suitable because Tocantins is an inner state, it depends on other states to export its production and because it competes with other production regional areas.

If the intended agricultural growth increases in the regions where the "Corredor" will pass by, there will be many problems because the number of trucks will be bigger than they are nowadays and, of course, the drivers are going to choose a new road instead of the old ones we have today and still are not enough.

Discussions have been held about the feasibility of the North-South Railway, the Araguaia-Tocantins Waterway, the linking roads for the definition of a more competitive transportation system.

### 5.6.1 Corridor Purpose

A study done by the Ministry of Transportation about the Middle North Corridor<sup>6</sup> has as general purpose develop and provide, in a public private partnership, competitiveness in the transportation system between the North and the South regions of the country. To do so, there are three steps to be taken: a) the new system has to be cheaper for long journeys; b) there should be an exportation option through the North Atlantic; and c) the enterprise has to be able to integrate the woodsy pasture region with the rest of the economy. According to this there are some specific goals:

- Continue with modernization politics about national transportation, decreasing the cost of it between North-South regions.
- Make the necessary institutional changes in different levels like management and performance and be sure that the cost of agricultural grain transportation and cargo in general decreases.

<sup>6</sup> MT/VALEC. Desenvolvimento do Corredor Multimodal de Transportes Centro Norte. Sumário Executivo, maio 1996.

Development of Multimodal Corridor of Middle North Transportation. Executive Summary, May 1996

- In the short term encourage the participation of the private sector in the exploitation of different transportation modes.

### 5.6.2 Area of Influence of the Corridor

The area of influence of the Middle North Corridor includes the states of Maranhão, Goiás and Tocantins; northeast of Mato Grosso, southeast of Piauí and belts around BR-153, of Carajás Project and of Tocantins river, from the border with Mato Grosso to Belém in Pará.

The Middle North Corridor channels the cargo flux to exportation through Ponta da Madeira (MA) Port and to supply the inner market of this and other regions of the country.

The Tocantins and Araguaia river valley takes up a large area of Brazilian Planalto Central (central plateau) and in its low level it takes up an area of Amazônia Oriental (eastern Amazonia). According to studies, the region of the Araguaia-Tocantins waterway is an area of influence with 850.000 Km<sup>2</sup>, spreading through seven Brazilian states: Goiás, Pará, Mato Grosso, Tocantins, Mato Grosso do Sul, Maranhão and Piauí. Great part of the area can be considered a new agricultural border zone and it is spreading up. The grain production especially soybean is easily grown in this area because of soil condition, its location and high productive potential characteristics.

The new border which is being consolidated has a potential to become one of the greatest soybean production areas of the world. There is plantation all over Maranhão, Piauí, Tocantins and Mato Grosso and the Middle North Corridor soybean producers are beginning to plant in south and southeast regions of Pará. According to CAMPO information - Companhia de Produção Agrícola (agricultural production company which encourages the soybean plantation) there are three millions hectares ready to be planted.

It is in Maranhão that we can find 90% of the soybean Corridor. Since the 91/92 crop this area started to bring out as a pole, when exportation started to be carried out through trains in Estrada de Ferro Carajás (Carajás Railways). Nowadays the exportation reaches 270 thousand tons and an average productivity of 2.200 Kg/hectare. Polagri - Pólo Agro-industrial do Sul Maranhense (agroindustrial pole of the south of Maranhão) units more than 200 soybean producers today. In 1986 rice producers from Rio Grande do Sul who have settled in Balsas since the 70s, started to plant soybean because rice wasn't good anymore. The EMBRAPA has named 14 different kinds of soybean in the area and it is going to name five more for the 97/98 crop. The average productivity in Balsas is from 2.100 and 2.200Kg/hectare, but in some areas it reaches 4.500 Kg/hectare.

There is a tendency to monocultivation in the region encouraged by low prices but Embrapa recommends to the south region of Maranhão the rotation of soybean with other commodities like corn, broomcorn, cotton, sunflower.

The soybean international market price and the end of ICMS (a government tax) over exportation are encouraging the plantation in the woodsy pasture areas in the southeast region of Piauí. In 96/97 crop period there were 25,000 hectares of planted area with a 165% growth comparing with the latest crop.

The state of Pará has a great potential for growing grain, especially soybean - 800.000 hectares of woodsy pastures and worn-out pasture in 25 towns and the exportation transportation is made through Carajás Railways.

There is another pole in Pará. It is located in the west region of the state, nearby Santarém. There is a port where we have plenty conditions of dealing with big granary ships.

In 96/97 crop the state of Tocantins started as a soybean producer and exporter in the Corridor with PROCEDER III - Woodsy Pasture III Development Program located in the city of Pedro Afonso where the confluence of rivers Tocantins and Rio do Sono meet. The occupied area of this project is 40.000 hectares and they are well divided in 40 lots. Everything has been planned: planting financing, implantation of settlement infrastructure, storage and flow and a construction of a granary in Tocantins river.

Soybean will be transported through Tocantins river to the city of Estreito (MA), from there to Imperatriz by truck and then to Itaquí port by train.

When compared with the fare cost, this course reduces US\$29/ton if the product were transported to Santos or Paranaguá.

The Araguaia-Tocantins waterway building site is not concluded yet but its usage is already being done with the Northeast of Mato Grosso crop flow through Da Morte river to Araguaia river and of PROCEDER III that flows through Tocantins. The channel river signaling are ready and the granary terminals are already working.

The main granary in Araguaia river is located in Xambioá which is a border city of the state of Tocantins and the state of Pará. From there the soybean is transported by trucks to Estreito (MA) where the PROCEDER crop had already been carried.

After the transportation system effectiveness improvement there will be new markets to Tocantins production beyond the external one that is the Northeast region market (frequently with crop problems) and North of the country.

The agricultural border of the states of Maranhão, Piauí and Tocantins is finishing the 96/97 crop gathering 50% increased. The soybean planted area (its main product) was beyond 150.000 hectares and an estimated production of 330.000 tons.

Nowadays the Corridor has a transportation system including highways, railways, waterways and ports to comply with the products distribution.

### 5.6.3 Modal Infrastructure

#### (1) Highway Mode

The highway routes in the Middle North Corridor are basically used to supply the participant states.

There are several deteriorated rolling surface intervals in the highways and a traffic support that is up to its limit. The solution to these problems is a better maintenance of the highways and a vehicles weight control. Besides the pavement of the rest of BR-158 that links Barra do Garças (MT) to Belém(PA) the Belém-Brasília highway needs total tack coating. The finishing of some linking intervals in all region is also necessary.

The intervals considered essential by the Ministry of Transportation are named in Table VII-5.6(1).

Table VII-5.6(1) Main highways intervals of Middle North Corridor

highway no.	Interval	Distance
010	Estreito(MA)-Border MA/PA (Itinga)	251
010	Border MA/PA (Itinga)-Entr.BR-316/010 (PA)	348
010	Entr.BR-316/010-(PA) - Belém (PA)	118
153	Goiânia (GO) - Border GO/TO	481
153	Border GO/TO - Araguaína (TO)	664
153	Araguaína (TO) - Estreito (MA)	122
Total		1.984

Source: GEIPOT/DNER

#### (2) Railway Mode

The Carajás Railway is the most important one in the area of interest. It was built and it is operated by Companhia Vale do Rio Doce (CVRD) and an extension of North South Railway.

The interval of Carajás Railway used to transport grain is of 514 km between Ponta da Madeira and Açailândia where the North South railway begins.

The Açailândia Imperatriz interval belongs to the North South railway extension with 120 kms ready and it is being operated by Superintendência da Estrada de Ferro Carajás (Carajás railway superintendence).

### (3) Port subsystem

#### 1) Itaquí Port

The Itaquí port is operated by CODOMAR - Companhia Docas do Maranhão (state of Maranhão docks company) and it is located in São Marcos Bay 9 kms far in the southeast direction from the city of São Luís. Its influence area is all the state of Maranhão, the southeast region of the state of Pará and the state of Tocantins.

The used highway is the BR-153 which links the port to national highways and the railway is the SR-12 of RFFSA, metric gauge - for lighter trains, extension Piçarra-Itaquí which is linked to São Luís-Teresina line.

The access channel through the sea to the port is 27m deep and about 1.8km wide. There are four places for mooring used by long course shipping and coastwise navigation. Part of the whole pier is used just for grain and containers but it is not used the way it should be and it takes 480m from the total area of the pier which is 710m.

There are three silos in the port. Two of them are vertical and the other is horizontal just for grain and its static capacity is 28.000 tons. The port equipments are: four portico cranes with 3.2 ton capacity each and two grain suckers with a capacity that goes from 100t/h to 200t/h respectively.

In 1995 the Itaquí port pier dealt with about 8.2 millions of tons: 65,000 of wheat and 14,000 of corn.

The main problems of Itaquí port are:

- taxes still depend on tax port new values according to the bill of costs;
- deterioration and obsolescence of port equipment;
- there is no exclusive part for grain boarding;

The Ministry of Transportation tells us that to find solutions for those problems we have to follow these steps:

- Once the new tax structure had already been approved by CAP, port taxes values have to be established;
- Provide port equipment especially when dealing with grain;
- Use the pier north arbor and the rest of grain pier arbor<sup>7</sup>

#### 2) Ponta da Madeira<sup>8</sup> Terminal

<sup>7</sup> 280m of the Itaquí port grain pier is already leased from CODOMAR by CVRD.

<sup>8</sup> GEIPOT/MT. Transportation Corridors - proposal procedures to adapt the infrastructure and to rationalize the agricultural grain transportation. Updating report, Brasília, April 1997

The Ponta da Madeira Terminal belongs to Companhia Vale do Rio Doce CVRD; it is in front of Itaqui port and its purpose is the iron ore exportation. Its area of influence is the same as the Itaqui port's.

The used highway is BR-153 which links the port with BRS222 and 316 and railway is the Carajás large gauge - for heavier trains.

The access channel through the sea is 1,5 km wide and about 3,5 km long. The maneuver bay is from 26m to 38m deep and the pier is 23m deep so ships up to 280.000 TPB and 340m long can moor there.

The port area was equipped with a 750t/h capacity silo for unloading, a 22.000 ton store capacity metal silo and a 1,550t/h nominal boarding ramp to deal with grain.

Carajás railway project made the agricultural products transportation possible and in 1992 the first 26,000 soybean tons started to be exported increasing to 86,000 tons in 1993, 140,000 tons in 1994, 160,000 tons in 1995 and 207,000 tons in 1996 including Maranhão, Piauí and Tocantins's productions.

#### **(4) Waterway Mode**

The current waterways of Middle North Corridor is formed by navigable intervals of Araguaia, Tocantins and Das Mortes rivers. The Araguaia-Tocantins waterway<sup>9</sup> takes 1,516 km of Araguaia river between Aruanã(GO) and Marabá(PA) and 1,230 km of Tocantins river between Palmas (TO) and Pará (PA) river. The characteristics and the navigability of the main intervals of the waterway are the following:

##### **• Araguaia River**

- Aruanã/Conceição do Araguaia interval: it is 950 km long and has a whole year navigability with 2,5m draft and from July to November it has a 2,5m draft;
- Conceição do Araguaia/Xambioá interval: it is 280 km long with some navigability from July to November (draft period) and during the rest of the year it has a 2,5m draft;
- Xambioá/Marabá interval: it is 286 km long and presents some danger to navigation during flood period because of speed waters and, during draft period, there are several rapids and two waterfalls (Santa Izabel and São Miguel) which are 60m high each;

##### **• Tocantins River**

The Tocantins river navigability shows some problems like rapids, draft, waterfalls and radius of curvature. The basic characteristics of these intervals are listed in the GEIPOP/MT report:

<sup>9</sup> GEIPOP/MT - Transportation Corridor - proposal procedures to adapt the infrastructure and to rationalize the agricultural grain transportation. Brasília, July 1995.

- Miracema do Tocantins (Palmas)/ Estreito interval: it is 420m long, the navigability is fine during the whole year with 0.9 draft from July to November and a 2.5m draft in the other months.
- Estreito/Imperatriz interval: it is 100 km long and it is the most crucial long distance of the waterway especially from July to November when navigation is ceased because of Santo Antônio waterfall and Imperatriz food.
- Imperatriz/Marabá interval: it is 280 km long, navigable the whole year with 1,0m draft from July to November and a 2,5m during rain period.
- Marabá/Tucuruí interval: 280 km long, navigable the whole year with 1,0m draft from July to November and 2,5m draft in the other months of the year presenting a irregular navigation in Tucuruí dam;
- Tucuruí/Pará river interval: it is 250m long, navigable the whole year with 1,2m draft during draft period and 2,5m during rain period;

For the Araguaia/Tocantins waterway be efficient for commercial navigation, some investments have to be made in signaling, marking, dikes, dredging to make it deeper and demolition of some parts.

Nowadays the Araguaia/Tocantins waterway navigation is only regional with small boats going only through some isolated long distance intervals of the rivers. However, there is a link to highways of Xambioá and Estreito; from there we can reach Imperatriz from North South railway and then Itaquí and Ponta da Madeira ports. To do it so Carajás railway is used too.

The Waterway Department of Ministry of Transportation gives the idea of building intermode terminals in Xambioá, São Félix do Araguaia and Conceição do Araguaia in the Araguaia river and in Miracema do Tocantins and Imperatriz in the Tocantins river as soon as the linking of long distance intervals is ready.

#### **5.6.4 Necessary Investments in the Middle North Corridor**

Since the infrastructure is so precarious in the area of influence of the Corridor, there are some necessary constructions to be done to make the corridor efficient and competitive.

Studies show the necessity of increasing the navigability of Araguaia river interval between Aruanã and Xambioá (1,200 Km) allowing an overflow from there to the highway mode through 283 km to Imperatriz and then reach Itaquí and Ponta da Madeira ports in São Luís (MA), with Carajás and North South railways being used.

Some buildings will be necessary to adapt the Xambioá/Marabá interval of the Araguaia river including the Santa Izabel rapid position changing, the completion of Tucuruí dikes and the necessary buildings in the interval that goes from Tucuruí to Tocantins river mouth.



Marking, demolition, dikes and signaling are necessary in Tocantins river between Marabá and Miracema do Tocantins otherwise this interval can not be used.

When talking about Das Mortes river and Araguaia river interval that goes from Barra do Garças to Aruanã and which economical feasibility and navigability studies are ready, the AHITAR- (Tocantins waterway administration) considers that the required investments are fair according to the benefits that it will bring to the region and to the producers.

The waterway is managed by AHITAR, today linked to CDP- (dock company of Pará) and it is an information, inspection, performance and representation sub department of the Waterways Department of Water Transportation Secretary of Ministry of Transportation.

It is believed by government technicians that the Tocantins-Araguaia waterway is going to allow the utilization of the best potential area for grain production (Goiás, Mato Grosso, Tocantins and part of Pará and of Maranhão) and there will be 20 million people in the area. A 3.8 km long channel through the sea will be necessary in the two rivers's bay in this non-existent waterway to wipe out sand and stones and ports and silos construction.

The Government investment of about R\$150 millions in a ten year period in this waterway added to private investors will sum up R\$350 millions to gather with the production area more than 800,000 hectares<sup>10</sup>.

The waterway project is divided in two parts:

1st) - for 2 thousand ton convoys: the changing position of Santa Izabel rapid between São Geraldo and Marabá (dredging, deepening and demolition of the main channel) budgeted US\$37 millions and US\$12 millions more for the changing position of Tucuruí using belt conveyor system.

2nd) for 8,000 ton convoy in a totally navigable way: the building of a big decked channel in Santa Izabel, budgeted US\$280 million and decks in Tucuruí budgeted US\$300 millions.

The project goal is to link the Middle and North regions to South and Southeast regions making the access to Mercosul market possible.

To North, Belém and São Luís ports are strategically located and the distance to the north hemisphere is shorter. It gives the production more competitiveness in the international market, the fare cost cheaper and the term in the agricultural input and other products reduced.

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<sup>10</sup> CNT Magazine, year 1, no. 7, November 1995

There are some links connecting rail with highways already installed in the region. The Carajás Railway, part of North South Railway and Belém-Brasília highway in spite of its terrible maintenance.

The whole system will be ready after link stations between rail and highways, strategically located, are working and also after the port updating. The number of comes and goes will rise when the system is completed<sup>11</sup>.

Beside the Araguaia- Tocantins waterway there are other options: Madeira river (northwest), São Francisco river (east) and Tietê-Paraná waterway (south).

The Ministry of Transportation includes these four waterways of the Middle North region in a program called Brazil in Action: group of 42 priority constructions of the Federal Government. The waterways are cheaper to be built and to be maintained and besides that they cause less environment impact<sup>12</sup>.

Each highway kilometer costs from R\$400 thousand to R\$1 million depending on the trace and topography; each railway kilometer costs R\$800 thousand; Madeira waterway will cost only R\$24 thousand each kilometer according to Ministry of Transportation recent evaluation.

When ready, the four waterways will be 7,057 kms navigable all year and according to the government's expectations there will be 47,000 cargo tons transported a year (against 8,200 tons/year today).

#### **5.6.5 Middle North Corridor: a preliminary evaluation**

The proposals made by the Ministry of Transportation are included in the program called Brazil in Action but further economical and viability studies have to be done. Because of that the BNDES<sup>13</sup> published a selling/bidding at auction for these studies with the goal of identifying the public/private investments opportunities in the National Integration Routes and Development.

The available study in the Ministry of Transportation in which the Corridor is analysed, was presented by VALEC<sup>14</sup>.

It is said in the studies that the Middle North Corridor is possible only if it is integrated with a general integration program among several transportation service renderers that make the transportation from/to interested areas.

<sup>11</sup> Words of the Minister of Mine and Energy about the dalles of Tucuruí, said in a meeting with Pará congressmen on January 30th, 1997.

<sup>12</sup> The discussion about the waterway environment impact started because the Araguaia river channel varies up to 15 km a year in its trace and because of the impact that may be caused in nine indian communities of the region. The Ministry of Transportation argues that the waterway construction will imply only in the deepening of the river channel and no dalles nor dams will be built.

<sup>13</sup> BNDES. Brazil in Action Program. National integration routes and development. Selling or bidding at auction no. PBA/CN - 01/97

<sup>14</sup> note no. 5

The coastwise navigation is cheaper but it is threatened by double port movement, added to movements destined to different ports.

Once the multimodal integration is guaranteed the waterway option only becomes interesting for grain flux gathered along the rivers.

On the other hand the railway mode has, on the south, an access system to all the states of Southeast and South regions and on the north the access is through Itaquí port.

So, the project has to have a multimodal necessary arrangements: main agricultural cargo produced in the area will be transported through the waterway and the other cargo will be transported through railways.

The work presents traffic intensity previews to the Multimodal Corridor and the intensity rising of other transportation subsystems with yearly values in millions of tons, as it is shown in Table VII-5.6(2).

Table VII-5.6(2) - Density previews of Middle North Corridor, in millions of tons

Interval	2000	2005	2010
<b>Railway intervals</b>			
Belém - Açailândia (EFNS)	3	5	6
Açailândia - Itaquí (EFNS-EFC)	3	4	6
Açailândia - Porangatu (EFNS)	8	10	13
Porangatu - Goiânia - (EFNS)	15	18	22
Goiânia - São Paulo (RFFSA, FEP)	8	9	10
Goiânia - Rio (RFFSA)	2	3	4
Goiânia - MG, ES (RFFSA, EFVM)	5	6	7
<b>Waterway intervals</b>			
Araguaia	1,5	2	3
Tocantins	0,5	1	1,5

Source: Ministry of Transportation/VALEC

The transportation production and income linked to the intensity previews are shown in Table VII-5.6(3).

Table VII-5.6(3): Transportation production and income on the Middle North Corridor

Unit/Mode	2000	2005	2010
<b>Production (billions of t/km)</b>			
Railways	41	51	62
North South	25	31	38
Others	14	17	20
Waterways	2	3	4
<b>Income (US\$ millions)</b>			
Railways	891	1113	1359
North South	559	680	828
Others	302	367	447
Waterways	30	66	84

Source: Ministry of Transportation/VALEC

The balance of the foreseen operational results for these ways and according to the same categories shows the following values [Table VII-5.6(4)].

Table VII-5.6(4) Foreseen operational results for the Middle North Corridor

Unit/Mode	2000	2005	2010
Operation Expenditure (\$ millions)	486	603	732
Railways			
North South	300	372	456
Others	168	204	240
Waterways	18	27	36
Gross operational balance (\$millions)	405	500	627
Railways			
North South	259	308	372
Others	134	163	207
Waterways	12	29	48

Source: Ministry of Transportation/VALEC

The total investments linked to the project sums up US\$1.936 millions, including parallel investments required to adapt extra systems to the Corridor (railways:infra and superstructure only). These numbers are shown in Table VII-5.6(5).

Table VII-5.6(5) Total investments for the Middle North Corridor

Discrimination	1996 to 1998	1999 to 2000	2001 to 2005
Railways			
North South	500	800	556
Waterway System			
Fluvial works	50		
Fluvial Ports	25		
Fleet	5		
Total	580	800	556

Source: Ministry of Transportation/VALEC

The economical feasibility studies presented for the North South railway have some important details such as its linking between regions characteristics and the development effect caused to the region in its area of influence.

Because of that the transportation study related to Middle North Corridor which includes twelve "between regions" flux groups in both directions was analysed:

a) North-Southeast/South; b) Area of Influence-North; c) Area of Influence-Southeast/South; d) Area of Influence- Northeast; e) Northeast-Middle West; f) North-Middle West.

These twelve flux groups make 75 millions of tons and 197 billions of tons/km in 2000. The results in this mode imply a 56 million/ton flux carried out through highways. It means 76% of the market with an average transportation distance of about 2.600 km.

Making railways possible - it means having a fair dispute with highways in terms of fare and mainly in service level - VALEC thinks that this mode will take away from the roads about 15 millions of tons and nothing will change in the waterway mode. Approximately 90% of the flux are divided in three origin/destination pairs: from North to Southeast/South (61%), from area of influence to Southeast/South (16%) and from Southeast/South to North (13%). Southeast/South regions stand out as receivers of about 80% of transportation flux and because of that they will be highly favored by the Middle North Corridor Project.

This situation happens because the Southeast region is the greatest raw material importer and the greatest handmade products exporter. These Southeast exportations would be favored by the Project when talking about flux being transported to North region because of the long distance involved and the railway mode competitiveness for long journeys.

All the private profitability of the Middle North Corridor is estimated from freight incomes received inside the Corridor including incomes obtained from services outside the highway mode. This procedure was done because there is no justification in the project itself when disconnected from the rest of the railway mode of the country. Because of that the North South railway is a link of subsystems making the total potential traffic increase.

The following parameters were used to calculate the private and the social inner taxes:

- Transportation volume in the opening year: 15 million of tons.
- Transportation production raising tax: 4% a year
- Period of construction time: 3 years
- Operational average cost: US\$15/1000 ton/km
- Operational average income: US\$ 22/1000 ton/km
- Unit average cost of infra and superstructure: US\$ 909 thousand/km
- Belém -São Paulo highway construction distance: 2200 km
- Economical cost of transportation through highways: US\$ 38/1000 t/km

The inner private return tax showed considerable profit when basic parameters of the project were used. In a strict sense potential profit has been taken under consideration in the specific Corridor line and in an enlarged sense extra profit levied in the other railway lines because the Project was taken under consideration. The results are affected by the implantation cost, operational cost and the inter-regional transportation demand (volume and fare) parameters.

The private initiative participation in the project when talking about railway operation and sharing infra and superstructure costs were also studied. Sharing costs in these matters mean 50% and 30% respectively and the private return taxes are 10% and 27% (taken under consideration the income only inside the Project's lines).

The social benefits (the return tax for the investment is about 30%) were analysed and they showed that the most favored regions by the investment are the North and Southeast/South followed by the area of direct influence (Goiás, Tocantins, Maranhão and Piauí).

It must be said that a possible cost reduction with the Project means a freight cost reduction in other subsystems.

The found results take us to the conclusion that there are stable structural elements that make the Middle North Corridor feasible. From the private point of view the enterprise shows considerable positive return taxes to a railway enterprise of about 10%.

Besides that, these taxes would attract private investments that would totally assure the financial necessities of the project. On the other hand a very attractive social return tax is guaranteed by the Railway social benefits evaluated in a very conservative way according to the freight economy. It shows that private and public sectors can work together with the same goal: to make the project implantation feasible.

The conclusion we can get to is that the Railway Project shows plausible feasibility in a traditional benefit-cost analysis or in a macroeconomic point of view.

Another important conclusion is that the macroeconomical feasibility of the project is related to the feasibility of the whole transportation system of the country. The transportation system capacity of receiving inter regional flux mainly from Southeast and North regions is vital to the economical feasibility of the Project. This latest conclusion makes us think deeply about inserting the Project in the national transportation system.

#### **5.6.6 Economical Importance of the Middle North Corridor**

The main hindrance of the grain cultivation development is the lack of transportation infrastructure. The Maranhão and Piauí producers claim for a bridge over Parnaíba river which is a natural border between both states. For them it is cheaper to carry out the Piauí soya production transportation through Maranhão parts of the North South railway and Carajás railway operated by CVRD. According to the company the fare cost between southwest of Piauí and Ponta da Madeira Port is about R\$30/ton through railways and through highways it costs 25% more, at least R\$40/ton

Because of transportation slowness through "balsas" (it is a kind of ferryboat) that go across the Parnaíba river, almost half of the exported soya needed to be transported through highways to São Luis.

The cost of soya transportation from Balsas region (south of Maranhão) to Rotterdam port is US\$37.30/ton; Diamantino region (MT) and Cascavel (PR) goes up to US\$70 and US\$41 respectively [Table VII-5.6(6)] data from a study about the competitiveness of Brazilian soya in the international market, done by Confederação Nacional da Agricultura (national agricultural confederation)<sup>15</sup>

Table VII-5.6(6) Costs of soyabean transportation from several regions to Rotterdam port

Discrimination	unit: US dollars			
	Diamantino (MT) 2,015 km from Santos (SP)	Balsas (MA) 1,000 km from Ponta da Madeira (MA)	Paragominas (PA) 870 km from Ponta da Madeira (MA)	Cascavel (PR) 600 km from Paranaguá (PR)
Highways	42.00	10.75	4.56	15.00
Railways	-	8.15	9.50	-
Port Expenditure	11.00	4.40	4.40	9.00
Subtotal	53.00	23.30	18.46	24.00
Waterway	17.00	14.00	14.00	17.00
Total	70.00	37.30	32.46	41.00

Source: Confederação Nacional da Agricultura (national agricultural confederation)

Other studies about grain exportation cost through Araguaia-Tocantins waterway also present many advantages when compared with the exportation done through Santos port (SP) and from there to Rotterdam [Table VII-5.6(7)]<sup>16</sup>

Table VII-5.6(7) Comparative costs of soyabean exportation (in US dollars)

Intervals	km	Mode	Cost/price			
			today	short term	Medium term	Long term
1-Option Santos	1.500	highway	55	55	55	55
Nova Xavantina-Santos	-	waterway	19	19	19	19
Santos Rotterdam						
Port expenditure Santos			13	13	13	10
Total	-	-	87	87	87	84
2-Option Ponta da Madeira		mult				
a- Nova Xavantina-Xambioá	1250	waterway	24	20	15	12
Xambioá-Imperatriz	280	highway	15	15	-	-
Imperatriz- P.da Madeira	600	railway	9	9	9	9
b- Xambioá - Estreito	150	highway	-	-	12	-
Estreito - P. da Madeira	720	railway	-	-	11	11

<sup>15</sup> Manchete Rural magazine

<sup>16</sup> Revista de Política Agrícola magazine, year V, no. 2, April-May-June 1996

c- Xambioá - Marabá	200	high+ water	-	-	-	11
Marabá - P.da Madeira	700	railway.	-	-	-	11
d- Miracema - Estreito (R.Toc.)	420	waterway	8	7	6	5
Estreito - P.da Madeira	720	railway	-	-	11	11
P. da Madeira-Rotterdam	-	sea	17	17	15	15
Port Expenditure.P. da Madeira			6	6	6	6
Total via 2'			71	67	-	-
Total via 2b			-	-	59	-
Total via 2c			-	-	-	55
Total via 2d			-	-	38	37

Source: AIHTAR/MT, 1996

Elaboration: DEPLAN/SPA/MAARA

**Summary:** It is obvious that in different points of view the finding of the best option for a decreasing transportation cost is important so they can fairly compete between them. Taking the highway mode importance for the state of Tocantins into consideration it is shown an analysis of highway freights based on field research.

#### 5.6.7 Highway Transportation Analysis in the state of Tocantins

The information knowledge related to fare cost and distance to be traversed allows among other things, the plan of transportation and the help of involved agents in the transportation market (being transported or boarded).

To get the information some transportation companies, producers's associations, freelance transportation companies, country producers and highway transportation users like wholesalers and retailers were searched. 152 data was examed - they are in Table VII-5.5(1) up to (10) - referring to solid grain (soya, corn and pre-processed rice), pineapple, milk, chilled meat and agricultural input.

The groups were divided mainly according to their characteristics of each kind of transported product.

Pineapple, because of its characteristics including the crown, the cargo has to be lower than the vehicle capacity. The cost/ton/km is 30% higher than solid grain, kinds of most important products, in transported volume.

It is necessary to transport chilled meat in refrigerative trucks and because of that the cost is the most expensive one so it was studied apart.

Table VII-5.6(8) shows the regression equations, according to linear model, referring to several types of transported products. The total number of products was analised.

The ajustment results can be considered good since the Coeficientes de Determinação  $r^2$  (determination coefficients) were higher than 50%. The freight for solid grain, main transported volume, presented  $r^2$  higher than 90%. The coefficients, in four executed



adjustments, are  $\alpha=0.01$  of probability. It means that there is a positive correlation between the traversed distance and the fare cost (higher the distance higher the price), according to 6.1 up to 6.4 graphs.

Because of the linear relation between fare cost and distance and using the regression equation we can also use the same calculation to similar routes that involve similar cargo.

Therefore the data is a reference of the agricultural cargo market however the tables are not official.

Table VII-5.6(8) Regression Equations related to freight, according to type of transported product in the state of Tocantins, June 1997

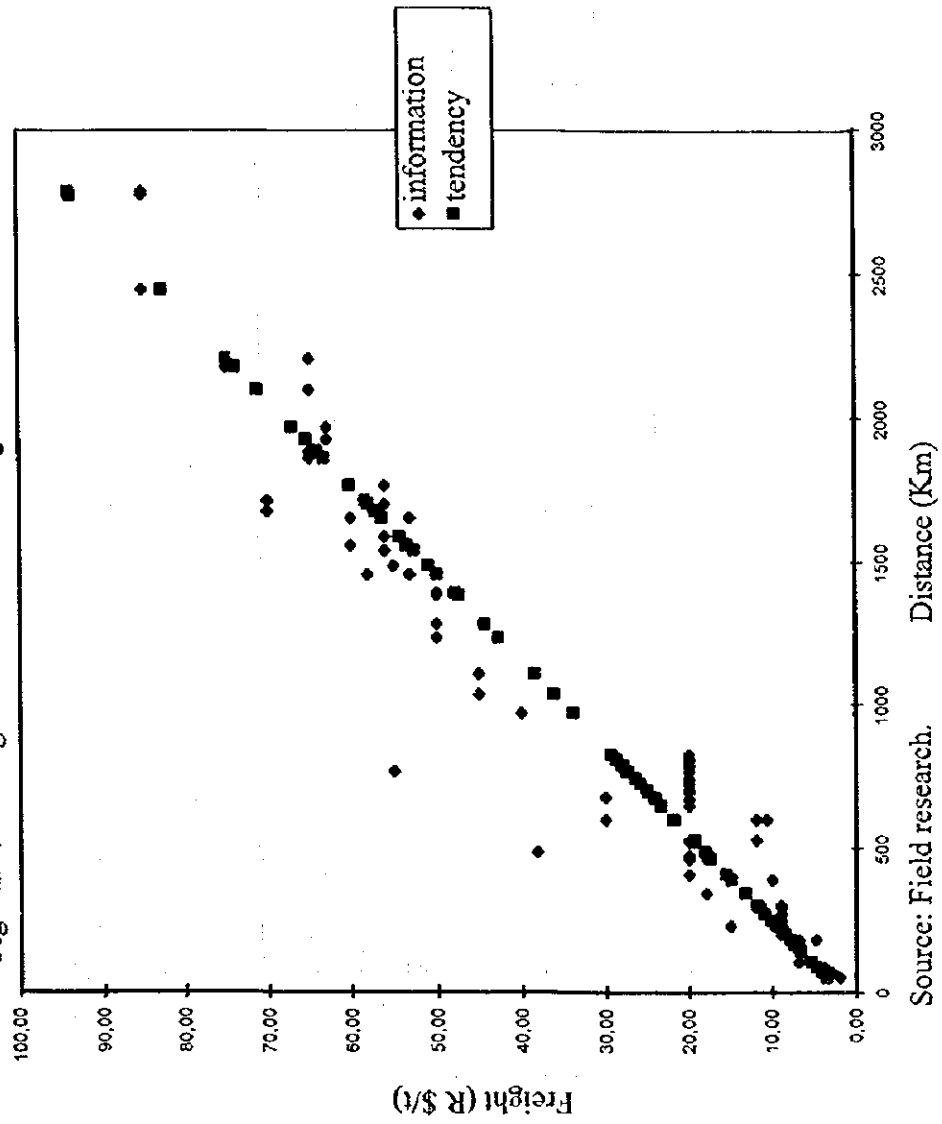
Type of Product	Regression Equation	$r^2$	F
Solid Grain <sup>1</sup>	$y = 2.0027 + 0.0330x$ (29.6907)*	0.9225	881.5380*
Pineapple	$y = - 0.7791 + 0.0409x$ (35.0109)*	0.9887	1,225.7672*
Chilled meat	$y = 54.5156 + 0.0358x$ (4.8216)*	0.5375	23.2485*
Milk	$y = 7.3705 + 0.0427x$ (5.6798)*	0.6293	32.2596*

Source: Basic Data : Field research

\* Important to probability level of 1% ( $\alpha = 0,01$ ). The numbers in parenthesis are referring to "t" test of Student.

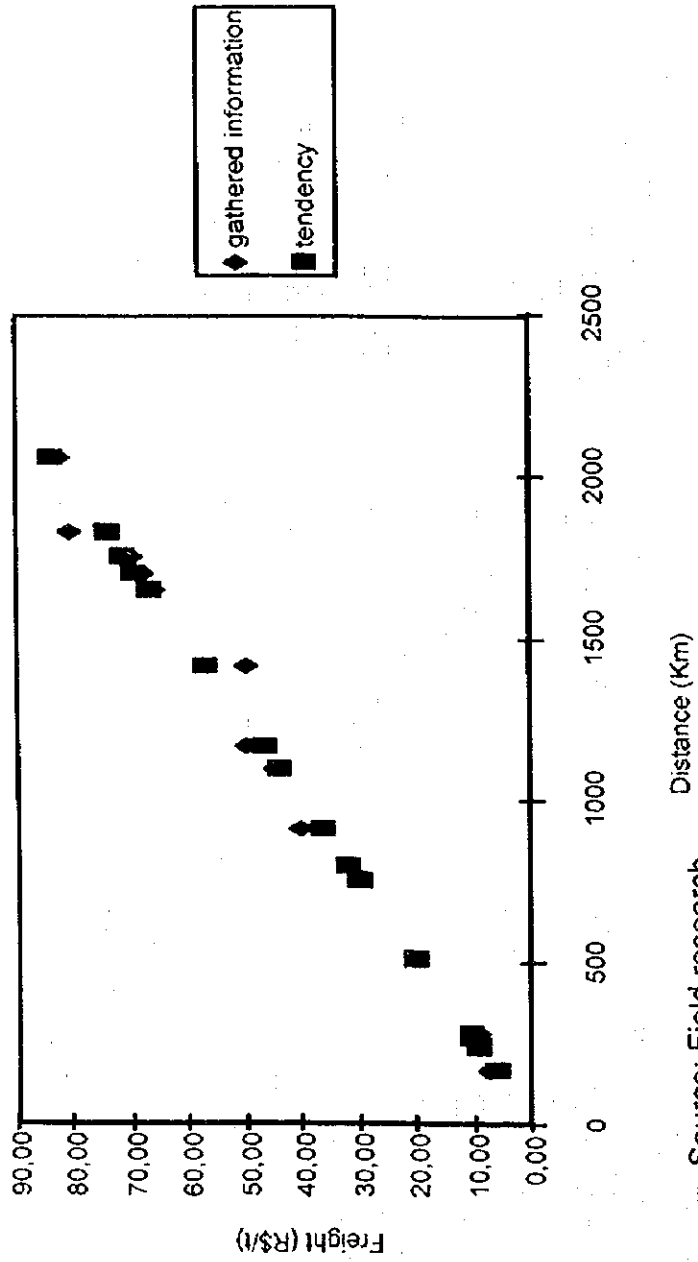
1) Referring to products like soya, corn and pre-processed rice.

Fig VII- 6.1: Freight estimative for solid grain in the state of Tocantins



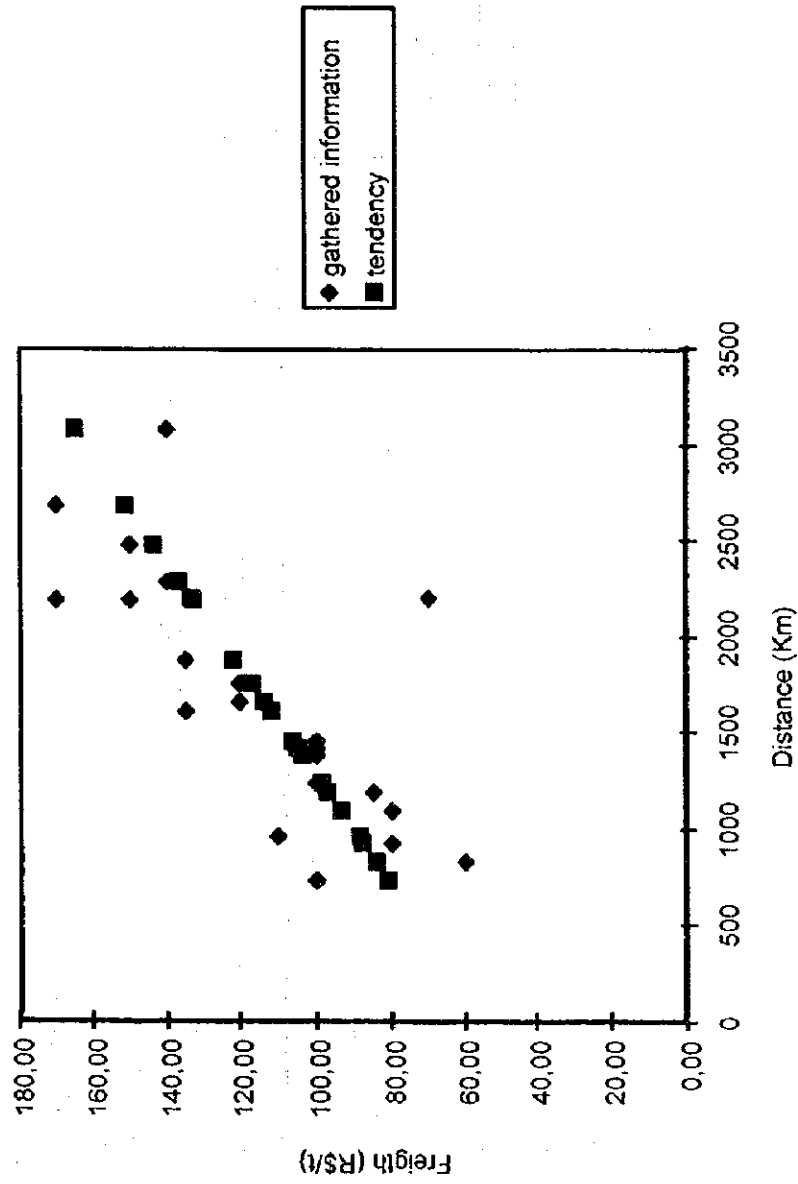
Source: Field research.

Fig VII- 6.2: Freight estimate for pineapple, state of Tocantins, June 1997



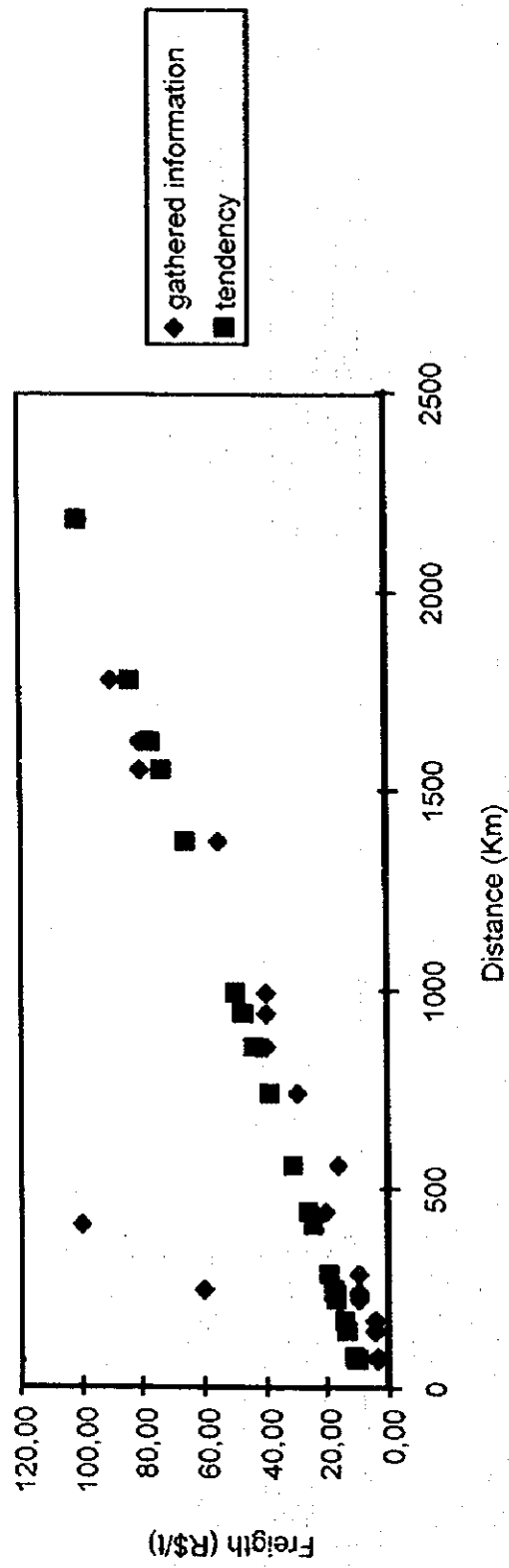
Source: Field research.

Fig VII- 6.3: Freight estimate for chilled meat, state of Tocantins, June 1997



Source: Field research.

Fig VII- 6.4: Freight estimate for "nature" milk, state of Tocantins, June 1997



Source: Field research.

## 5.7 Conclusions

We can get to some conclusions when talking about international and national markets of selected products. Rice find a stable market and the consumption of this product doesn't trend to increase.

Corn, on the contrary, shows a national and worldwide increasing capacity because its byproducts are bought by bird breeders and hog raisers in a direct proportion of their income.

Soya market, stable in the analised period, has its competitiveness according to transportation costs.

Beans which main characteristic is to be internally produced and consumed has presented some changes in production technology through irrigation system that make a better quality product to more demanding costumers.

Fruit like pineapple and banana show good perspective. Pineapple is well sold "in natura" in both inner and outer markets and banana gets profitability through 'after gathering' technology which involves packing and fruit transportation to costumers.

Studies done with silos show that there is enough number but some of them are not totally adequate - conventional and no granary. As a suggestion, primary activities of silos should be done in a farm level, smaller course and more efficient.

In relation to prices paid to producers different situations were found depending on the product. In relation to corn Tocantins producers get higher price than other states producers because Tocantins is corn importer and the product arrives there more expensive because of freight cost, arousing an inflation in the local prices. Rice, on the contrary, has a lower price than rice from other states because the rice from Tocantins has a lower quality and it is sold in markets where the population has lower purchasing power. In relation to soya the Tocantins producers are privileged especially those from Formoso do Araguaia and Lagoa da Confusão because their main seed production is cultivated during the "irrigado" rice off season period and it is led to farming in the state of Tocantins and neighbor states.

Talking about slaughtercattle especially in Gurupí region, the producers obtain high quality steer meat, high competitiveness in price and directed to inner and outer more demanding markets.

The main used mean of transportation for these products are trucks carrying out the production through highways but there have been waterway transportaion for rice and railway for exported soya through Itaquí port.

First we can note that the transportation through railways is only interesting for a great production amount of exporting products. The inner market trends to be served through

highway transportation mode because of precarious infrastructure of other modes and that means problems to commercialization agents.

On the other hand if we analysed with a view to a increasing commercialization flux willing new markets, the existing highways have a lot of problems too but the most important one is the lack of link between national and local highways.

The Middle North Corridor proposals that are being analysis to exam its feasibility and implementation has a main goal: rationalize the routes for a cost reduction. The investment has to be high and the “dream come true” will take a long time to become real so the state of Tocantins will have to deal with nowadays production commercialization problems.