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# A STRUCTURAL APPROACH TO THE DEVELOPMENT OF AGRICULTURE IN TOBAGO

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## INTRODUCTION

This paper presents a review of agriculture in Tobago. Thereafter follows a strategy for the organisational structure of farming which would seem most likely to bring about the rapid development of the agricultural sector. Finally the paper sets out the elements of a programme for the redevelopment of farming in the island.

## GENERAL

Analysis of the agricultural sector of Tobago has suffered from a lack of relevant data. This is particularly the case for data relating to the individual parishes. In addition, Tobago has not benefited from the recent programme of Farming Systems Rapid Reconnaissance Surveys or sondeos that have been conducted in Trinidad. This means that there is not the recent information on farming systems for Tobago as there is for Trinidad.

## TOPOGRAPHY

The main relief feature of the island is a central dorsal ridge of highland from the North-East end of the island extending for 21 kilo-metres South-Westward until it gives way gradually on all sides to lower well-dissected foothills. On the Southern coast, the foothills give way to low flatish plains and in the South-West, there is a pronounced lowland plain.

The highland or Main Ridge reaches a uniform height above sea level of around 550 to 580 metres without any outstanding peaks. This Ridge divides the Northern half of the island asymmetrically into a narrow steeply rising Leeward flank and a broader more varied Windward flank.

To provide a better description of agriculture in the island, Tobago will be divided into

two zones - a South-West Zone (Zone 1) and a North-East Zone (Zone 2) - based primarily on the topography of the island and in line with administrative divisions.

## SOUTH WEST ZONE

The South-West Zone consists of the parishes of St. Patrick and St. Andrew. The main features of this zone is the flatter topography, low rainfall and the coralline nature of the geology which is characteristic of the more southerly area (Figure 1).

### *Land Use*

The land in this zone has been used over the years for the extensive planting of coconuts since the demise of the sugar industry. The planting of coconut has taken place on both small holdings and large estates. The large estates in this zone have remained the only major large estates in active production in Tobago.

In more recent years, the larger estates have adopted a system of production, with the planting of improved pasture species under the coconuts on which are grazed herds of cattle and in some instances sheep.

Along the coast, particularly along the South-West coast, some of the estates have been converted into tourist facilities and recreational areas.

## THE NORTH-EAST ZONE

The North East Zone consists of the parishes of St. George, St. Mary, St. Paul, St. David and St. John. These are the more rural parishes of Tobago and have been characterised by depopulation over the years, especially St. David

(Table 1).

#### *Land Use*

The major features of this zone are the Main Ridge of mountains referred to earlier and higher rainfall. The Main Ridge contains a Forest Reserve of about 4000 ha. of original forest. To this Forest Reserve can be added forest areas of approximately 500 ha. of other state lands and 2000 ha. of private lands, which means that a great deal of this zone is under forest vegetation.

The large estates in this area have largely gone out of active agricultural production. The State since 1964 has undertaken to purchase some 3600 ha. of these estate lands. Plans have been put in place for the development of these lands, but because of severe financial constraints not much progress has been made so far. Thus except for use by squatters, the land on the large estates not in primary forests in this zone has largely reverted to secondary forest.

Apart from forest, the main use of land in this zone has remained agriculture, as tourist development has been limited. Production has been mainly among small farmers on holdings between 2 to 10 ha. producing root crops, pulses (especially pigeon peas), corn, plantain, bananas and cocoa.

#### **REVIEW OF RECENT DATA ON AGRICULTURE IN TOBAGO.**

The 1982 Agricultural Census (1986) provides the source of information for this review. The size distribution of farms in Tobago is highly skewed. There are a large number of very small farms occupying a small percentage of the cultivated land and a small number of large holdings occupying a large percentage of the agricultural land. In particular, 71% of the holdings are less than 2 ha. and occupy only 15.3% of the agricultural land, whereas .46% (or 7) of the holdings are over 100 ha. but occupy 35.36% of the agricultural land.

Table 2 shows that cocoa is still the crop with the most extensive hectareage devoted to its cultivation. Coconuts rank next in importance. Very little coffee or citrus is cultivated in Tobago.

With respect to other crops, root crops, pulses and grains occupy substantial hectareages. There are also significant hectareages of banana and plantain. Vegetables are not as important in Tobago as in the rest of the country. There is also virtually no commercial sugar cane cultivation.

Table 2 indicates that with respect to the

country as a whole, there is greater than average production of plantains, pulses (particularly pigeon peas), grains and coconuts in Tobago (Tobago has 4% of the national agricultural hectareage and for each of these, it cultivates more than 9% of the national hectareage of the crop).

With respect to the frequency of the different crops on the holdings in Tobago, it can be clearly seen that root crops, pulses, grains, plantain and banana occur most frequently on the farms on the island. This is no doubt explained by the extensive cultivation of these crops on small holdings and the preponderance of small holdings in the agricultural sector in Tobago.

This situation contrasts with coconuts, which while having an extensive hectareage is less cultivated. This is because of the more extensive cultivation of this crop on larger holdings on the island.

#### *Livestock*

With respect to livestock, in Tobago there are significant numbers of cattle, sheep and pigs. Tobago has about 40% of the sheep in the country and about 9% of the cattle. About half of the cattle in Tobago are on the large holdings in the South Zone of the island. These holdings also have substantial numbers of sheep.

Pig production is typically found on small holdings on the island. Production of pigs has fluctuated over the years as is the typical pattern of this enterprise on small holdings.

Commercial broiler production is limited on the island and there are only medium sized units. Small farmers and other rural households typically have small numbers of birds, which they rear for a household supply of eggs and meat or which on rare occasions may be sold.

#### **FARM POPULATION**

With respect to the land holders themselves (the Census was actually a survey of land holders), the Census reports that 78.7% were male and 21.3% were female.

The Census also reports that in 1982, there were 10,694 persons on private agricultural holdings in Tobago, which represents about 6% of the population on private agricultural holdings in the nation. Of these persons 1340 or 12.53% were engaged in agricultural activity. This compares with a national average of 21.83% of persons on agricultural holdings being engaged in agricultural

activity. This situation illustrates the relatively greater importance of off-farm employment for agricultural households in Tobago.

Further evidence of the greater importance of off-farm employment for Tobago households is given by the fact that in the Census, only 26.5% of the private holders receive 50% and more of their income from agricultural activity. This compares with a national percentage of 36%.

Finally with respect to the use of "improved" inputs the farmers in Tobago show much lower level of usage than the sector as a whole. For example, with respect to fertilizer, use, only 19.3% of the holdings reported using fertilizers, which compares with a national figure of 55.6%. With respect to chemical use, only 1.9% of the holders reported using chemicals (pesticides, fungicides etc), as compared to the national figure of 54.52%. Irrigation usage was also low at 4.3%, compared with a national average of 14.3%

## FARMING SYSTEMS IN TOBAGO

As indicated earlier, Tobago has not had the benefit of the sondeos that have been conducted for Trinidad. The description of farming systems that will be given will be based on secondary data obtained from Pemberton (1972 and 1985) and Seedansingh (1986).

### LARGE ESTATE SYSTEM - SOUTH WEST ZONE

#### *The Farm Family*

The typical farm in this farming system is family owned by corporations. These estates are usually managed by a resident of the island. As is typical of the plantation type structure, there is much less interaction between the farm family and the farm in the large estates.

#### *The Farm*

The typical farm in this farming system has about 200 ha. with about 65% of this land being cultivated. Typically the estates are planted to coconuts. Below the coconuts grazing areas comprise about 60% improved pastures and about 40% unimproved pastures. There is also scrub land on the farms (about 35% of the farm hectare) which animals can browse.

On the pastures, beef animals are grazed. Typically about 350 head of cattle are maintained. On some estates about 100 head of sheep are also

kept.

#### *Labour*

Typically the family only provides managerial input on the large estates. Labour is provided by an average of 20 full time employees. About 16 of these employees are employed on the coconut enterprise. This is a labour intensive enterprise in the collection of the nuts and the extraction of the kernels. The collection of nuts is typically done by males and the extraction of kernels by females. About four employees are employed on the livestock enterprises. This labour is used for the maintenance of pastures and for husbandry of the livestock.

### COCONUT ENTERPRISE

The coconut enterprises on these farms have declined in importance since the destruction by Hurricane Flora in 1963. After this hurricane, little replanting has been done because of the low prices of copra, high labour costs and disease problems (Red ring). Coconut is gradually losing importance to livestock and tourist related activity.

There is typically the application of about 40 kgs of fertilizer per ha. with yield of around 480 kgs/ha. of copra. This is about half of what can be considered as a reasonable yield. Because of the presence of pasture below the coconut and beef animals, there is little application of pesticides and herbicides to the coconut trees.

The coconut enterprises are highly capitalised with diesel-run drying units, special buildings and adequate road networks on the farms. This means that the operating costs of these estates are quite high.

In 1986, many large estates owners were claiming difficulty to break even. On 200 ha. the enterprise produces about 40,000 kgs of copra annually valued at around \$100,000. Direct labour costs are in the order of \$30,000.

### BEEF ENTERPRISE

In this large estate system, typically there is a beef enterprise. There are about 350 head of cattle kept on 80 ha of improved pastures and 50 ha. of unimproved pastures. There are also about 70 ha. on the farm of scrub vegetation. Usually the improved pastures are fertilized at the rate of around 100 kg per ha.

Improved breeds of cattle are kept including

Red Poll, Charollais, Jamaica Red and Brahman. The farmers have a specific breeding programme for improving the quality of their herds.

In the South West Zone where this farming system is found, the annual rainfall is less than 1500mm per annum. During the dry season from January to June, there is reduced dry matter yield from the pastures, as no irrigation is applied to them. During this period, greater use is made of the unimproved pastures and scrub vegetation to supplement the improved pastures. There is also the use of supplementary concentrate feed at the rate of 25 kg per animal per annum.

Thus on average each animal has .14 ha. improved pasture, .34 ha of other vegetation and 25 kg of supplementary concentrate per annum.

Production of beef is approximately four animals per week yielding about 900 kg of beef.

### **SMALL FARM SYSTEM**

The typical small farming system is found in the North East Zone of Tobago. The size of the farm in this system is about 5 ha. The farm is usually composed of two parcels. The major parcel is usually located on hilly land some distance from the home. Crops are generally grown on the slopes of this parcel. The other parcel is usually located at the family residence where a small plot is maintained for produce mainly for home use and there is provision for the housing of livestock. Ruminants are grazed on the roadside or on other available forage, such as community pastures near to the family residence.

As has been noted, typically root crops are the main crops grown, especially dasheen, sweet potato, cassava, yam, and tannia. These are normally put in at the onset of the wet season in May/June. At the onset of the wet season also, pigeon peas and corn are planted as an intercrop. The farm would also contain plantains and banana as permanent crops. On some farms cocoa, is still produced in commercial quantities and on most farms in this zone, there is also evidence of the cultivation of cocoa in the past.

Typically in this farming system, a small number of cows are kept (2 to 7), sheep (about 10) and about 30 poultry (chickens, ducks etc).

Yields per unit land on these farms are low compared to those obtained nationally, as the farmers in this system use little or no purchased inputs such as fertilizers and pesticides.

In this system, hired labour accounts for only about 10% of the labour used on the farm. The

majority of the labour is put in by the farmer, the spouse and the children. There is also evidence of the existence of a shared labour pattern called "partners", where a farmer is assisted on the holding by a number of partners for a day. These "partners" are usually friends and members of the extended family. The farmer is in turn expected to be available to help the partners when they require his (or her) labour. This cooperative action is used especially when heavy manual work like planting and reaping of roots crops is being done.

Typically on these farms the operations are manual, with very little machinery or equipment on the farms, with the exception of simple hand tools. Cash cost on these farms are very low since there are little purchased inputs.

Annual farm cash income on these farms is low, around \$2000 - \$4000. Even with the low cash costs this supplies insufficient cash for family needs. Hence in this system, farm income accounts for about 10% of household income, with fishing (where done) providing about 30% and jobs such as labourers and public sector employment providing about 60%.

### **ALTERNATIVE ORGANISATIONAL STRUCTURES FOR FARMS IN TOBAGO**

This section reflects on the organisational alternatives for the agricultural sector of Tobago and attempts to evaluate the different organisational forms.

Two major organisational forms now exist in the agricultural sector of Tobago: the large estate as the remnant of the plantation system and the small farm as the descendant of the peasant system that developed from the farming activities of the freed African slaves. Two other forms that may have some relevance to the island are the cooperative as an ally of the small farm structure and the agribusiness or capital intensive "commercial" farm as a variant of the large estate.

Before an evaluation of the forms is given, however, some useful analytical issues are reviewed.

### **ANALYTICAL ISSUES**

A theoretical construct that is relevant to judge the appropriateness of the alternative organisational states is the transactional cost approach to the study of firms. This approach extends the usual study of economising in a production function framework, to include an

examination of the comparative costs of planning, adapting and monitoring task completion under alternative governance structures (Pollak, 1985).

By a governance structure is meant the explicit or implicit contractual framework within which the transaction is located. Associated with the transaction costs are the problems of negotiating, writing, monitoring and enforcing agreements.

Thus the transaction cost approach applied to the firm studies the boundaries, structure and internal organisation of producing units.

According to Pollak, the two behavioural assumptions on which transaction analysis relies are bounded rationality and opportunism. Bounded rationality refers to the fact that all individuals do not consider maximisation as the goal of behaviour or rationality. They would accept as rational that which is less than optimal or maximal. As in satisfying behaviour, they accept bounds or limits on their attainment which may not allow them to attain optimal performance.

Opportunism refers to the practice or policy of adapting one's actions, judgements etc., to circumstances (as in politics) in order to further one's immediate interest without regard for basic principles or eventual consequences. The tendency for opportunism on the part of individuals is a major factor in organisational forms.

As Pollak states, as a consequence of these two assumptions, human agents in firms and markets are less competent in calculations of optimisation and less trustworthy and reliable in action.

In addition to bounded rationality and opportunism there is one other factor that has been considered to influence the choice of an organisational structure for the firm. This factor is technology.

Jackson and Morgan (1978) argue that contrary to earlier views, technology does not directly determine an organisation's structure. However they conclude that technology may have an influence on different variables affecting organisational structure such as configuration, centralisation and control. What is clear, however is that where a firm has a choice of several forms of technology, it may in fact utilise many different forms simultaneously and so it is able, at least theoretically, to tailor its technology to match chosen organizational forms.

## EVALUATION OF ALTERNATIVE FORMS

### *The Large Estate and the "Commercial" Farm*

The large estate in Tobago has been under serious problems for survival since the difficulties of the sugar industry in the nineteenth century. Diversification into other plantation crops such as cocoa and coconuts did give some temporary relief to some estates, but by the 1970s high labour costs had led to the abandonment of the majority of these estates, as has already been noted. The state as has also been noted has moved in and acquired the interests in a majority of these estates.

The issue is whether there is any future in this organisational form or its more recent variant the agribusiness or capital intensive "commercial" farm. The major principle guiding the success of this organisational form is the hierarchial decomposition principle (Pollak) which states that internal organisation should be designed in such a way as to effect quasi-independence between the operation activities and the strategic planning so as to promote local and global effectiveness. This is to prevent agents in the firm from engaging in dysfunctional pursuits of local goals which reflect bounded rationality and opportunism.

It seems clear that it would be difficult to achieve this type of decomposition with the current political and social relations in existence in agriculture on the island.

In particular, the relations that existed when the estates were successful were based on a structure of power in the society by colonial owners backed by the power of the crown. With emancipation and latterly with independence, the ex-slaves and their decedents have sought to break that power domination over their existence, robbing the estates of their assured labour supply. They have also wherever possible sought to undermine the estates by squatting on idle property or failing to honour contractual arrangements. The final straw so to speak was the large scale public works programmes of the 1960s, which offered attractive wages to the estate workers and finally gave them independence from the estates. The estates have never recovered from the effects of this labour withdrawal. We also argue that conditions in the future will dictate against the successful re-emergence of a large estate organisation in agriculture in Tobago.

It is our contention that to try to re-establish an estate type relationship via "commercial" agribusiness firms would not be successful in Tobago. It may be argued that such firms have the advantages of the ability to generate and mobilise marketable surpluses to afford innovations and technological progress. However we believe that the

factors of bounded rationality and opportunism would prevent the successful operation of such firms. This would particularly be the case if the firms involve in any manner the participation of the state.

In sum therefore, the contention is that the transaction costs involved in monitoring and enforcing agreements necessary to the successful operation of large scale commercial farms in Tobago will be phenomenally high and will more or less ensure that the net returns to the firms would be insufficient for successful operation.

### *Small Family Farms*

It is our contention that the small family owned and operated farm is the appropriate organisational form for the redevelopment of agriculture in Tobago. There are two major positive features of the small family farm - family governance and greater resource efficiency.

There are four main advantages of the family business organisation (Pollak): the incentive of ownership and of working for and with kin, altruism, loyalty and the monitoring that the family imposes in both the need to conform and the penalties for non-conformance. One disadvantage is the fact that conflict in some other aspect of the family may spill over into the business relationship.

The advantages of family governance mean that there is usually much lower transaction costs in family business especially with respect to opportunism. Also, the close-knit solidarity of the family means that bounded rationality is minimised. This means that the small family farm can generate higher net farm incomes per unit basket of resources employed and is a more stable form of organisation than the "commercial" farm.

The greater efficiency in resource use that the small family farm organisation allows deserves greater discussion. The rationality of the small farmer in the use of resources is widely misunderstood. It is often not borne in mind that the small farmer maximises returns to the resource that is in limited supply. Hence on these farms the productivity of hired labour is much higher than family labour as the farmer attempts to maximise the average product of the family labour and the marginal product of hired labour. Where land is not scarce, as in this case of "family land" or unrestricted squatting, the farmer will adopt systems of production which maximise the returns to the hired labour or the capital input (as the scarce resource) and utilise as much land as required. Thus, indiscriminate use of measures such as yield/

ha. or returns to management (with imputed family labour costs subtracted from net cash income) will always give misleading indications of resource productivity on small farms.

A third reason for the preference for the small family farm is greater social benefit that this form can generate by providing a more equitable distribution of income in society (Chakrabarti). In addition, the small family farm can help to stem the pervasive out-migration from rural areas by providing the opportunity and continuity in the rural areas for employment both in primary production as well as the associated processing and marketing activities.

### *The Cooperative*

An ideal cooperative would seem to possess the desirable features of the small family farm and the commercial farm. Specifically, the cooperative should be able to realise the low transaction costs of family farms as well as to exploit any benefits that may accrue from the generation of surpluses for investment in technological improvements.

The fact is however, that the transaction costs of cooperatives despite their lofty principles are very high. Cooperatives suffer badly from opportunism and their longevity in most cases is suspect. In addition, production cooperatives have the problem of the division of the returns from cooperative activity, because of the differential contribution of effort by members to the final output, and the difficulty of measurement of that effort.

In sum therefore, cooperatives have not had great success in the Caribbean (Tobago being no exception), and while they may appear to be suitable to rural communities who appear to hold similar cooperative values, they fail to generate the advantages of family governance described above.

### **CONCLUSIONS**

The paper has attempted to review the agricultural sector of Tobago, and, based on this review, it has attempted to evaluate the different organisational forms that may be suitable for the island's farms and which may be used as a basis for a redevelopment strategy for the island's agriculture.

Largely on theoretical ground, the small family farm was indicated as the preferred organisation structure. Before proposing a unimodal strategy of small farms however, the issue of the

desirability of a bimodal strategy will be resolved.

A bimodal strategy may call for the development of a small family farm subsector, along with perhaps a commercial agribusiness type subsector. It is the contention here, that such a strategy will be counter-productive to the emergence of a strong family farm sector. Resources that are devoted to the commercial sub-sector could be better spent to develop the small farm sector. As Johnston and Clark state: "...to a large extent the two alternatives are mutually exclusive: promoting the emergence of a large highly commercialised sub-sector tends to preclude the possibility of pursuing a unimodal strategy".

A second aspect of the bimodal argument that has to be resolved is the issue of technology. A bimodal strategy is often promoted, because of the assumption of the technical "superiority" of "modern input" and the requirement of large scale farm units for their economically efficient use. This argument has already been refuted to some extent earlier on economic grounds. However on purely technological grounds there is little evidence in tropical agriculture that highly capitalised farms can in a sustained sense yield consistently high average products for all resources than those obtained on small family farm.

The conclusion is thus for the unimodal strategy of small family farms as the path for the redevelopment of agriculture in Tobago. The process to the development of the sub-sector is not an easy one, given the historical neglect of the sector and the lack of confidence within the small farming community of the long term success of their efforts.

The redevelopment process, must thus start with the resuscitation of the family in farming. Agriculture must be seen as a family activity with all members of the family playing an active role. What is perhaps more important also is that the farm must be seen as family heritage, to be taken up in succession by the following generations to provide employment and a decent standard of living in the rural community.

To help to achieve this mission, there must be a channelling of the development efforts to the small farm sub-sector which must become recognised as the leading sub-sector in Tobago's agriculture. A first step in this regard must be the holding of rapid reconnaissance survey or sondeos in each parish of the island. These will allow an accurate description of the farming systems in the island's agriculture as well as the problems within these systems. Also a start can be made to

the formulation of the solution to problems for the benefit of the farm community.

The result of the sondeos will allow the formulation of an effective extension programme for the State to place its resources behind a programme for the rapid development of the island's small farms. An essential ingredient of such an extension programme should be the promotion of a close working business relationship between the farm and the home, with home base business making a real contribution to farm family welfare.

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**TABLE 1. POPULATION OF TOBAGO BY PARISH, 1946-1980,  
AND PERCENT CHANGES FROM THE PREVIOUS CENSUS.**

PARISH	1946		1960		1970		1980	
	NOS.	%	NOS.	%	NOS.	%	NOS.	%
St. George	2700	9.8	4300	13.0	4168	10.8	4467	11.3
St. Mary	1700	6.2	2000	6.1	2404	6.2	2292	5.8
St. Andrew	6700	24.5	7600	22.8	10,330	26.7	10,956	27.6
St. Patrick	4100	15.0	5300	15.9	6154	15.9	7923	20.0
St. Paul	3700	13.7	4700	14.0	5028	13.0	4658	11.8
St. David	5300	19.6	6100	18.2	7496	19.3	6557	16.5
St. John	3000	11.1	3300	10.0	3174	8.2	2787	7.0
TOBAGO	27,200		33,300		38,754		39,640	

Source: Central Statistical Office: Population Census Reports.

**TABLE 2. CROPS ON HOLDINGS IN TOBAGO, 1982 CENSUS.**

Crop	No. of Holdings	% of Holdings	No. of Hectares	% of Hectares Tobago	% of Hectares of crop. T & T
Cocoa	475	24.16	971.9	27.81	4.64
Coffee	2	.1	.9	.03	.0001
Coconuts	179	9.1	593.4	16.98	9.04
Citrus	127	6.5	43.2	1.24	1.2
Banana Plantain	]				
	]		133.4	3.82	5.71
	] 740	37.64			
Other Permanent Crops	]				
	]		43.5	1.25	6.71
	]				
Root Crops	1399	71.16	251.0	7.18	5.05
Pulses and Grains	934	47.51	200.1	5.73	11.50
Sugar Cane	2.0	.10	4.2	.12	.02
Vegetables	819	41.66	102.6	2.94	2.91

Source: Central Statistical Office.

TABLE 3. All holdings by size group, hectarage and Location

Holding size (hectares)	Trinidad and Tobago	St. George	Caroni <sup>I</sup>	Nariva/ Mayaro	St. Andrew/ St. David	Victoria	St. Patrick	Tobago
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Under 0.5								
No. of holdings ...	6 968	1 393	1 210	187	292	1 141	2 032	713
No. of hectares ...	1 576.8	348.1	275.4	50.7	72.2	309.3	360.5	160.6
0.5 < 1								
No. of holdings ...	3 769	662	698	156	289	953	702	309
No. of hectares ...	2 779.1	483.1	518.4	118.2	210.8	702.0	517.4	229.2
1 < 2								
No. of holdings ...	5 295	725	1 024	313	389	1 547	924	373
No. of hectares ...	7 201.2	945.4	1 396.9	441.8	536.6	2 118.5	1 252.4	509.6
2 < 5								
No. of holdings ...	10 217	962	1 509	1 403	1 615	2 421	1 863	444
No. of hectares ...	30 225.2	2 669.0	4 539.0	4 141.5	4 873.4	7 246.3	5 468.0	1 288.0
5 < 10								
No. of holdings ...	2 930	332	431	344	600	694	452	77
No. of hectares ...	20 274.4	2 383.1	3 022.0	2 388.6	4 206.5	4 688.6	3 053.6	532.0
10 < 50								
No. of holdings ...	1 238	177	165	158	294	249	161	34
No. of hectares ...	21 749.7	3 670.1	2 908.9	2 722.1	5 461.2	3 863.3	2 543.6	580.3
50 < 100								
No. of holdings ...	69	14	8	5	21	6	8	7
No. of hectares ...	4 682.5	1 015.0	559.7	310.3	1 365.5	413.9	522.3	495.7
100 < 200								
No. of holdings ...	48	9	10	7	12	4	-	6
No. of hectares ...	6 687.7	1 172.5	1 430.3	1 041.6	1 510.9	593.2	-	939.2
200 < 500								
No. of holdings ...	27	6	-	4	7	1	7	2
No. of hectares ...	7 673.1	1 704.1	-	1 129.1	1 939.2	214.7	2 110.9	575.1
500 and over								
No. of holdings ...	5	1	1	-	-	-	2	1
No. of hectares ...	28 722.2	1 146.2	23 888.9	-	-	-	3 125.0	562.1
Total all sizes								
No. of holdings ...	30 566	4 281	5 056	2 577	3 519	7 016	6 151	1 966
No. of hectares ...	131 572.0	15 536.6	38 539.5	12 343.9	20 176.3	20 149.8	18 953.9	5 872.0

Source: Central Statistical Office

TABLE 4: Livestock and poultry inventory on Holdings of Government and State enterprises by Type and Location as at May 31, 1982

Type of livestock	Trinidad and Tobago	St. George	Caroni <sup>1</sup>	Nariva/ Mayaro	St. Andrew/ St. David	Victoria	St. Patrick	Tobago
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Cattle and Calves</b>								
Cows - dairy ... ..	1 085	534	394	-	-	-	98	59
Cows - beef ... ..	159	77	-	-	-	-	50	32
Heifer calves ... ..	1 295	346	438	-	317	-	113	81
Bulls - breeding ... ..	80	53	19	-	-	-	3	5
Bulls - beef ... ..	302	69	219	-	-	-	14	-
Bull calves ... ..	349	123	185	-	-	-	18	23
<b>Total Cattle and Calves</b>	<b>3 270</b>	<b>1 202</b>	<b>1 255</b>	<b>-</b>	<b>317</b>	<b>-</b>	<b>296</b>	<b>200</b>
<b>Buffaloes</b>								
Cows ... ..	353	47	306	-	-	-	-	-
Heifer calves ... ..	34	20	14	-	-	-	-	-
Bulls ... ..	12	2	10	-	-	-	-	-
Bull calves ... ..	31	3	28	-	-	-	-	-
<b>Total Buffaloes ... ..</b>	<b>430</b>	<b>72</b>	<b>358</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Pigs</b>								
Sows ... ..	356	48	105	34	40	-	44	85
Boars ... ..	89	20	23	6	7	-	6	27
Gilts ... ..	75	11	24	6	14	-	-	20
Fatteners ... ..	187	152	-	26	9	-	-	-
Weaners ... ..	674	92	279	35	260	-	8	-
Piglets ... ..	879	98	312	50	69	-	91	259
<b>Total Pigs ... ..</b>	<b>2 260</b>	<b>421</b>	<b>743</b>	<b>157</b>	<b>399</b>	<b>-</b>	<b>149</b>	<b>391</b>
<b>Poultry</b>								
Broilers ... ..	70 550	69 200	1 350	-	-	-	-	-
Layers ... ..	2 664	880	506	-	-	-	-	1 278
Ducks ... ..	84	2	-	-	82	-	-	-
Turkeys ... ..	-	-	-	-	-	-	-	-
All other poultry ... ..	-	-	-	-	-	-	-	-
<b>Total Poultry ... ..</b>	<b>73 298</b>	<b>70 082</b>	<b>1 856</b>	<b>-</b>	<b>82</b>	<b>-</b>	<b>-</b>	<b>1 278</b>
<b>All Other Livestock</b>								
Goats ... ..	214	161	8	-	4	-	5	36
Sheep ... ..	932	7	62	46	-	-	-	817
Horses ... ..	4	2	-	-	-	-	-	2
Mules ... ..	1	-	-	-	-	-	-	1
Donkeys ... ..	-	-	-	-	-	-	-	-
Beehives ... ..	266	193	30	9	13	-	-	21

APPROXIMATE  
MEAN ANNUAL RAINFALL TOBAGO  
(INCHES)

(After Wright 1961)

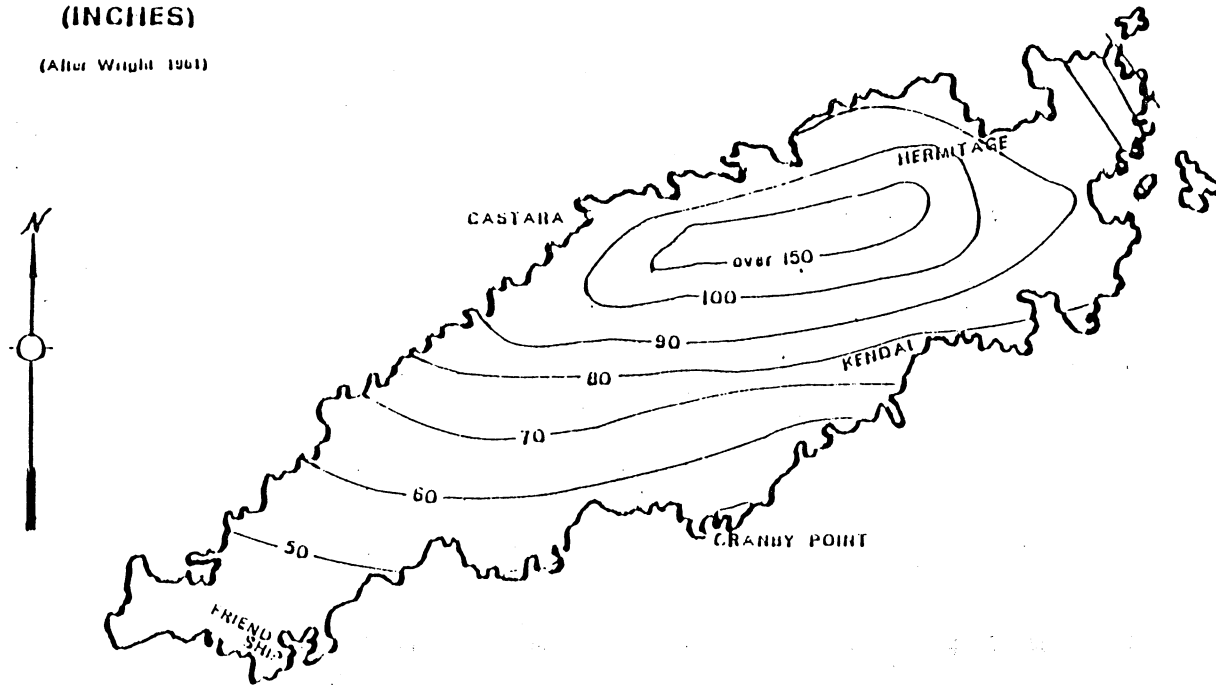


Figure 1

**FIGURE 2: GEOLOGY OF TOBAGO**

After Maxwell (1910)

