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THE SMALL FARMER IN THE TRINIDAD SUGAR INDUSTRY

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INTRODUCTION

Production of sugar cane in Trinidad is shared between sugar manufacturers who are also growers of cane and sugar farmers who are not manufacturers of sugar. The latter are referred to as cane farmers. A cane-farmer is defined as "a person who cultivates canes for sale to a manufacturer but does not include a manufacturer who cultivates canes on his own lands" (Trinidad & Tobago Revised Ordinance, 1950, Ch. 23, No. 12, Production of Cane Ordinance). This paper then concerns itself with those growers of cane who do not own milling facilities. While this sector includes a tiny number of relatively large producers, most of the cane farmers have rather small holdings (Table 1).

Cane farming in Trinidad has its origins under the aegis of Sir Neville Lubbock in the 1880's. Initially it covered only the present day area around the Usine Ste. Madeleine in the south of the island. Subsequently, cane-farming as an activity spread over the entire cane belt. Some commentators have said that the cane-farming sector grew out of the need to settle workers in the sugar growing areas to provide labour¹ and others, that it was because farmers would be able to produce canes more cheaply than the estates.² But cane farming created its own demands for labour, possibly contributed to labour shortages on the estates and caused the manufacturers to depend even more on farmers' canes.³ But whatever the reasons for its origin and the consequences of its development, cane farming became an important contributor to the Trinidad sugar industry, such that by the 1920's farmers were producing more than 50% of the canes growing in Trinidad. Subsequently, because of the estates' ability to expand production owing to increasing mechanization of field operations, the estates were able to increase their share of production and in recent times the estates have produced roughly $\frac{2}{3}$ and the farmers the remaining $\frac{1}{3}$ of Trinidad's sugar cane

¹Beachey, R.W., *The British West Indies Sugar Industry in the Late Nineteenth Century*, Basil Blackwell, Oxford, 1957.

²Report of the West India Royal Commission with a subsidiary report by D. Morris H.M.S.O., London, 1897, Cmd. 8655.

³Gilbert, S.M., *Preliminary Report on An Economic Investigation into the Cane Farming Industry of Trinidad, 1932*, as Trinidad Council Paper No. 84, of 1933. Further report on the cane farming industry of Trinidad based on field work carried out in 1933, as Trinidad Council Paper No. 135 of 1933.

(Figure 1). However, in absolute terms, farmers' production of cane has shown a general increase (Figure 2). Indeed, one can say that it is even surprising, considering the constraints which will be outlined shortly, that farmers have been able to maintain their share of total production over the last 20 years or so.

We may now turn to see what changes have taken place in recent years in the internal structure of the cane-farming sector. Statistics for cane farmers are normally issued by the industry and Government by placing farmers in seven size groups or classes, according to deliveries of canes to the manufacturers (Table 1). If we look at the percentages of farmers belonging to these groups separately, and their contribution of sugar cane to total farmer production between 1939 and 1967, we see that there have been fairly great changes in the structure of cane farming (Figure 3). Most important are the decreasing numbers of small farmers and the increasing contribution of farmers in the two categories 51-100 tons and 101-500 tons. The diagram (Figure 3) indicates, therefore, that there has been some rationalisation of production in the farming sector. This has come about without any concerted attempt by any of the interested agencies in the industry to encourage a rationalisation of farmer production. One feels that whatever rationalisation has taken place has come about because of rational economic response. One wonders how much more could have been achieved if open encouragement was given to farmers to rationalise production. The degree of rationalisation is also reflected in the increasing average production per farmer since 1939, from just over 30 tons per farmer in 1939 to about 70 tons per farmer in 1967. However, one does not deny that there are still far too many small producers farming largely uneconomic holdings. Indeed, it is partly the purpose of this paper to show that size of holding is the most important variable affecting farmer production of cane. Nevertheless, in order to get a complete picture, one must note the changes that have been mentioned and acknowledge that the sector has possessed a certain dynamic of its own.

Before any attempt is made to enumerate some of the constraints affecting cane farming, an attempt will be made to explain the organisation of buying procedures for farmers' canes which has some effect on farming. Buying of sugar cane from farmers is organised by the manufacturers in such a way

that there are about 70 purchasing points where farmers can sell their canes. These points are spread out all over the cane belt and at all the sugar mills except one (the Usine Ste. Madeleine). Farmers take their canes to these purchasing points where the canes are weighed and sent to the mills in estate-owned or estate-hired vehicles (either road or rail transport). The estates all have Cane Farming Departments C.F.D.'s which are meant to serve as purchasers of the canes for the estates' mills as well as to perform a myriad other duties ostensibly for the benefit of cane farmers. There are some who would question this system, but I prefer not to consider this aspect in my paper. The fact remains that the C.F.D. is the agent which purchases farmers' canes.

Attention will now be turned to some of the characteristics of the cane-farming sector which is mainly a list of constraints affecting this type of farming. Foremost in this list is the constraint of size of holding.

Size of Holding

From the survey, average farm size is estimated at 6.5 acres for cane farmers. Table 1 shows estimates for the seven different categories.

It is obvious that for most farmers not only are their cane acreages low, but holding acreage also tends to be small. Other relevant estimates that may be cited are that some 60% of cane farmers have holdings of 5 acres or less and 85% have holdings of 10 acres or less. Ninety-seven per cent have holdings of 20 acres or less. Nowadays it is generally agreed that the minimum size of a holding should be in the region of 20 acres in order to approach viability. It seems, therefore, that the vast majority of cane farms are too small to support the farm families at any reasonable level. Generally, then in spite of the rationalisation mentioned above, sugar cane farms are too small. We may note that the 1963 Agricultural Census showed that 93% of all occupiers were on holdings of 24 acres or less. One sees, therefore, that the small size of holdings is a fairly universal problem in Trinidad's agriculture.

Farm Size and Low Tonnage of Cane supplied per Farmer

It is obvious that farm size is the major factor, because of physical reasons, causing the low tonnage of cane delivered by large numbers of farmers. We see that some 60% of farmers supply less than 50 tons of cane each and some 80% supply only about 40% of the cane. Using the figure of 100 tons of cane as being large enough to provide the bare minimum necessities of life for the cane farmer,¹ we see that

¹Girwar, S.N., *The Economics of Trinidad Cane Farming*, paper presented to the Caribbean Cane Farmers' Association's Convention, 1963, appearing in Trinidad Islandwide Cane Farmers' Association, *Annual Reports*, 1963-1965, pp. 129-139.

some 80% of the cane farms cannot support their occupants at even a bare minimum level. When it is considered that roughly $\frac{2}{3}$ of holdings are under sugar cane and that for over 90% of the farmers sugar cane is the main or only commercial agricultural enterprise, it is seen that cane farmers cannot depend entirely on their holdings to support their families. This relates to off-farm employment and part-time farming to which reference will be made again.

Table 1 points to what must be considered one of the most important results of the survey. The relation between farm size and yield seems to be such that the larger the farms the higher the yield per acre. This relationship may not be a direct one in that management may be of some influence. However, when it is considered that part-time farming is generally a result of the inadequacy of farm size and that part-time (or spare-time) farming must affect management, we can see that inadequate farm size, whether directly or indirectly, results in lower yields per acre. The extent of part-time farming may be gauged from Table 3. No obvious explanation was found for the 27.1% of farmers in category 1 who are full-time farmers except that a fairly substantial number in this group grow vegetable crops for commercial purposes.

But part-time farming and management are not the only things that can be cited as affecting yields. Fertilizer usage is also such that farmers in the lower categories use less fertilizer per acre (Table 4). In 1967 some 8% used no fertilizer at all and most of these farmers belonged to the three lowest categories. In terms of fertilizer usage, the recommended amount for use per acre is 4 cwt. Some 52% used less than the recommended amount, 21% used the recommended amount and 19% used more than the recommended amount. Generally, it was felt that size of holding and fertilizer application were related. It may be noted here that credit was available to farmers for purchase of fertilizers to the extent of 2 cwt. for every 10 tons of cane supplied. This had the effect of further restricting yields for the three lowest categories of farmers. An attempt will be made to explain. Table 1 shows that yields for farmers in the first three categories were lower than 20 tons per acre. Therefore, all these farmers (some 60%) could not obtain sufficient fertilizers on credit to apply adequate amounts to their sugar cane acreage. In order to obtain the required 4 cwt. of fertilizers on credit yields must attain a level of 20 tons per acre. This meant that less fertilizers was applied than was required and hence yields could not have been increased. A further difficulty noted was that even though credit was available, in most cases to purchase less than the amount of fertilizer required, farms could not arrange deliveries of fertilizers to apply dressings at the optimum time, so that again yields were affected. The larger producers were not similarly affected because many of them buy their inputs on a cash basis; also, because of their greater resources they cannot only buy adequate amounts of fertilizers but also

apply dressings at the appropriate time. Generally then, small farmers are again the worst off.

Why have there been so many small Farmers?

It must be noted that the development of cane-farming in Trinidad as in other parts of the Caribbean, was never planned, except for contingency planning during the Great Depression and during World War II. The farmers have always depended on the estates to process their cane, as they still do. In the early stages of development also, the estates did not only require the farmers' cane, but also his labour. It was this double requirement of the estates which affected not only the growth of the sector as a whole but also farm size, especially because most farmers were tenants of the estates.

It is also said that during periods of depression the farmers were encouraged to grow more canes¹ but during periods of prosperity their labour was required on the estates. It would benefit the estates to encourage the small part-time farmer who could supply his labour to the estate when it was required, rather than the larger farmer who would compete with the estates for labour. Unplanned growth, the requirements of the estates and the meagre resources of the farmers, have been responsible for the small size of cane farms. Today, most people, including the estates, wish that there were more large cane farms and fewer small ones.

Monoculture and Intercropping:

Tied in with the problem of farm size is the existence of a great degree of specialised production or monoculture and the practice of intercropping i. e., the planting of food crops in between rows of plant canes. The extent of the monoculture has already been alluded to above when it was said that on average $\frac{2}{3}$ of all holdings are in sugar cane and part of the remaining $\frac{1}{3}$ is used for living purposes. The holdings are so small that there is little room for planting any other crops except through the practice of intercropping. Further, if the farmer did plant a variety of crops on his farm, the effect of inadequate farm size would be to ensure that all enterprises would be uneconomic, though he would also spread the risk and possibly have a more balanced labour requirement (probably still under-employed) over the year. A further measure of the extent of monoculture, is that some 42% of all farmers have either no acreage at all or less than $\frac{1}{2}$ acre in crops other than sugar cane (Table 5). It is only in certain localized areas where special environmental conditions offer opportunities, or marketing prospects are better, that some farmers who have more than one commercial agricultural enterprise are to be found. Within the sugar belt these areas may be cited as the fringes of the northern urbanised zone near to Orange Grove, Bejucal-

Charlieville, Debe-Penal and McBean. Otherwise, the distribution of small part-time farmers dependent only on one agricultural enterprise, sugar cane, is such that they are distributed all over the cane-farming lands. For these, diversification is virtually impossible except at the expense of sugar-cane acreage and this only if marketing of non-sugar cane crops can be properly organized (*vide infra*).

There is some degree of diversified production on farmers' holdings, but this may be only for subsistence purposes. Many of the farmers practice intercropping on their plot of plant canes. This practice is thought to be beneficial, in that if properly managed it can provide the household with some food, a little of which may be sold, and makes for very intensive use of the land, while not necessarily reducing sugar-cane yields. It will be noted (Table 6) that a greater proportion of small farmers adopt this practice. This could be due to their greater need to utilize their lands intensively. The greater resources of the larger farmers permit them to purchase most of their food requirements.

Agricultural Practices: The agricultural practices adopted on cane farms are not very dissimilar for all cane farmers except possibly in the extent of ratooning, fertilizer application and weeding practices. Fertilizer application has been discussed above and the effects of size noted. With ratooning practice it was found that the price paid to farmers in the previous year and the price prospects for the next year affected the smallest producers in such a way that their cane would be ratooned for a number of years until prospects seem to warrant replanting. For the larger farmers, although a similar response was still apparent, most tended to replant a proportion of their canes each year. It is acknowledged though that ratooning practices are also influenced by soil type and cane variety. Weeding practices varied according to categories of farmers in such a way that the smaller farmers used only manual methods, while the larger farmers used a combination of chemical and manual methods (Table 7). The effect of size and under capitalisation were again apparent.

Froghopper Control: Froghopper, (*aneolania varia saccharina*) affects mainly ratoon crops of sugar cane. The control of the froghopper is subsidised by Government to the extent of half the cost of control and there is also some arrangement for farmers' lands in certain areas to be aerially sprayed. It was evident from the survey results that a considerable number of farmers were unaware of the subsidy, but generally those who had holding in areas that were prone to infestation were aware of the subsidy. It was found that roughly one-third of those farmers who had infected acreages applied control measures and these tended to be the larger farmers (Table 8). It would appear that, although it is claimed that control measures can result in increased yields of up

¹Girwar, *Op. cit.*

to 12 tons per acre, the smaller producers, who obtain low yields whether their crops are froghopper infested or not, consider that the risks of applying more capital to the crop are too great when returns are generally low.

Livestock: The distribution of livestock units according to size groups (Table 9) shows that units owned are very low and that the average number of units increases with size of holdings or increased production size. An estimated 42% of the farmers do not have any livestock (possibly only poultry). One-third of the farmers have only one livestock unit, and only an estimated 4% have more than 5 units (for composition of Livestock unit see Table 21). The average for all the production categories combined is 1.2 livestock units per holding.

The type of livestock owned is usually for draught purposes or for providing milk for the household. Water buffaloes, oxen, mules, horses and donkeys are the animals generally used for draught purposes. Few cattle are reared specifically for beef production. For religious reasons, most Hindus, who form the bulk of the cane-farming population, do not raise cattle for slaughter. Moreover, there is little good pasture in the sugar producing areas. This, added to the fact that there are so many small, part-time or spare-time farmers present difficulties in the way of livestock production. The small size of holdings and their fragmented state result in the animals having to be stall-fed. Feed supplements are at the moment expensive and lack of capital prevents such investment. Moreover, the size of capital investment required for livestock production is too great to be met from the farmers' resources and the length of the production cycle also acts as a restraint. The Government has acknowledged the existence of these limitations, but so far effort has been concentrated on the Crown Land Projects. For the cane farmers, livestock production can be regarded as another side-line, except when the farmer owns animals for draught purposes. Another constraint is that livestock needs constant attention, which precludes expansion in the context of non-full-time farming, though this problem is partly offset by the availability of household labour, which is in fact used for these purposes. Lack of adequate knowledge of animal husbandry is a further constraint. One other aspect as regards the ownership of draught animals is that this does not only lower the harvesting (transport) costs for the farmer, but also provides him with a means of earning extra income by transporting cane for other farmers or providing in-field transport for the estates. Generally, though, the paucity of livestock units is another expression of the constraint of farm size and under capitalisation.

Location and quality of farmers' lands: Generally, it appears that farmers occupy relatively poor land. The estates also have considerable acreages of relatively poor soils, but their formidable resources

make the problem for them a less serious one. Thus from the point of view of improving their holdings the estates are far better off compared to farmers and, within the cane-farming sector, the larger holdings are better circumstanced.

From the point of view of accessibility, the location of farmers' holdings is generally peripheral. Historically, the farmers were the last claimants to the land. After the estates had been set up, much of the remaining land was marginal, both in terms of topography and accessibility. The fact that farmers also had a low competitive ability for possession of the land ensured the peripheral location. There are some areas of farmer-occupied lands that are relatively near to the mills. One explanation is that some of these farmers are tenants on estate-owned lands. The general peripheral location of holdings on topographically marginal lands, occupied by farmers who cannot practice the best cultivation techniques, either owing to lack of knowledge or lack of machinery and capital, further degraded some farmer-occupied lands. In a few cases insecure tenure also had deleterious results.

The location and access characteristics also affect returns to all cane farmers. Farmers have to pay for (or use their own) transport in order to get their canes to the outside purchasing points, where the canes are transferred to estate-hired or estate-owned transport for haulage to the mills. However, the entire cost of moving the canes from the holdings to the mills are borne by the farmers, in the first instance individually (from the holding to the purchasing point) and in the second instance co-operatively (from the purchasing point to the mill). The transport costs for the second leg are pooled and applied to all farmers through the operation of the cane-price formula. This item of costs, through the formula, is applied even to the returns of those farmers who deliver all their canes directly to the mills. This has the effect that the farmers who are better located subsidise the farmers who are worse located.

The longer distances also have a time component so that a great deal of time is wasted in travel between holdings and purchasing points, especially with a considerable amount of the transport being by draught animals. The time and distance components combined result in some cases of farmers paying more than half of their gross returns for cutting, loading and transporting their canes. The large number of small farmers and their animal transport also create delays at the purchasing points. One may note that the progressive centralisation of the milling sector into six units has further lengthened distances between the farmers' holdings and the mills, thereby creating more problems for the cane-farming sector. It should be stressed that the bulky nature of the crop and the fact that cane must be milled within a relatively short-time after being cut, makes for high harvesting and transport costs.

Fragmentation and Tenure: Fragmentation is widespread and 5 to 8 fragments per holding are not unusual. Table 10 shows that relatively few of the smallest farmers have more than one parcel of land. Because of the small size of these holdings this is as to be expected. As farm size increases the number of fragments also increase. Fragmentation is of considerable importance in restraining development through its effects on the type of farming. Food crops cannot be grown for fear of praedial larceny. This is especially so because many farmers live in the villages away from any of the parcels of land. Further, there is inefficient use of time, machinery, and one of the generally accepted benefits small-farming, that of close supervision, is lost on a fragmented holding. That there is need for consolidation of holdings is obvious, but any consolidation must be accompanied by greater fire precautions. This aspect is of serious concern to farmers for they feel some security in having sugar cane on several separate plots of land, because the risk of all the farmers' cane being destroyed by fire at one time is thereby lessened.

In terms of land tenure it was found that an estimated 15% of the farmers owned their entire holdings (Table 11). Most of these were in the two highest and two lowest categories. About 30% were estate tenants, 46% tenants of other landlords and 10% tenants of both estates and other landlords. Some of the farmers with these three types of tenure may or may not also own parts of their holdings. Generally, though, it was found that tenancies were of fairly long duration, though there have also been instances of short tenancies followed by evictions. There were some farmers who rented plots for planting rice on an annual basis and this arrangement tended to be of short term duration.

Labour, Transport and Other Equipment: Because of the nature of the crop it was found that most farmers had to hire labour for the harvest. Table 12 shows the use of hired labour according to operations and classes of farmers. It seems obvious, therefore, that while size of holding or size of sugar cane production affects the use of paid labour, even some farmers in the lowest classes are forced to employ paid labour. This is in spite of the fact that many who use a high content of paid labour also belong to large households. Generally, though, it was found that farmers with large households were able to use more unpaid labour.

Table 13 shows the percentages of farmers owning various types of equipment and Table 14 the type and ownership of transport used. For almost all types of equipment the farmers in the higher categories are better placed. The same holds good for both type of transport and use of hired and owned transport. Most of the farmers in the lower categories use slower animal transport, while most of those in the higher categories use either mechanical transport alone or both mechanised and animal

transport, the latter mainly for in-field transport. As regards ownership of transport, it is again seen that larger holdings are better placed with generally more than 50% of farmers using some owned transport. Some use both hired and owned transport. The most significant point though is that most of the farmers in the three lowest categories, i. e. those selling less than 50 tons of cane were forced to use hired transport. Therefore, those who have the lowest production found themselves paying a large percentage of their gross returns transport.

Age Structure and Illiteracy: Generally, cane farmers can be regarded as being relatively aged workers. An estimated 71% of all farmers are over 40 years old. This in turn shows some relation to illiteracy rates and, although no figures will be ventured, it is safe to say that a relatively high proportion of cane farmers are illiterate. This is evident from the large numbers who have to use their thumb prints instead of signatures in their dealings with the estates. This undoubtedly will have some effects on the development of farming and acts as a further constraint. One does not deny, however, that illiterate farmers can be good farmers.

Institutional Constraints: I now turn briefly to what can be termed institutional constraints. Advisory and extension services are supposedly performed by the Cane Farming Departments of the estates, the Cane Farmers' Association and the Government's agricultural extension service. The survey showed, however, that all of these agencies failed to have any great impact especially as regards agronomic advice. Table 15 shows percentages of farmers who received advice on fertilizer usage and all other agricultural activities. Again, it is apparent that farmers in the higher categories are better serviced. The reasons for failure of the above-mentioned agencies in the fulfilment of their claimed responsibilities will not be discussed here. The important point is that relatively few of the farmers claim that they benefit from advice or receive any advice at all. The problems of illiteracy mentioned above put greater strain on extension efforts. It is worth mentioning, that the demonstration effect of proximity to the estates is of some benefit to farmers.

Marketing of crops other than sugar cane: It has been said by farmers and noted by observers that although returns from sugar cane for small holdings might be low, the one advantage of growing the crop is that it can be sold.¹ The same cannot be said for crops other than sugar cane. The problems of size of holding and diversification have been noted already, but it is widely known that these farmers who do diversify production find great difficulty in disposing of their crops. The establishment of the Central Marketing Agency in Trinidad

¹Rampersad, F. & Alcantara, J.A., *Problems of Capital Accumulation in Trinidad, Proceedings of the 1st West Indies Agricultural Economics Conference, U.W.I., 1966.*

has not yet made any great impact on marketing problems for the cane farmers.

Such then are some of the constraints that were noted in the survey. The list is not exhaustive by any means owing partly in order to restrict the paper to reasonable length and partly to lack of more comprehensive data.

Factor Analysis of the Data:¹

So far, the major characteristics of the cane-farming sector have been discussed, but no systematic statistical analysis has been attempted. Certain of the variables seemed to be closely related and, intuitively, connections were suggested. Here, the most important aspects of cane farming, for which suitable data were obtained, are treated with the multivariate statistical technique of factor analysis. Through this it is hoped to test the hypothesis that size is the most important factor influencing the character of cane farming. It will be noted that in some cases loadings that are relatively low are also listed. It must be made clear that it is realized that any implications drawn from these appear to be reasonable explanations and do not rest on the strength of the loadings.

Interpretation of the factors:

Factor I	Variables with	
	Positive loadings	Negative loadings
Sugar cane acreage	0.886	Intercropping - 0.223
Total acreage	0.874	
Tons of sugar cane sold, 1967	0.847	
Ownership of tractor	0.821	
Ownership of cultivating equipment	0.756	
Ownership of plough	0.682	
Man-months of paid labour employed	0.523	

This factor can be regarded as a *size factor* because it is associated with a number of primary variables that are related to size. This size factor accounts for 14% of the total variation. Sugar cane acreage, total acreage and amount of sugar cane sold are the variables related to size and these have the highest loadings. This factor also shows, as

¹For techniques of factor analysis see:

Harman, *Modern Factor Analysis*, Chicago University Press, Chicago, 1960.

Rummel, J.R., *Understanding Factor Analysis*, in the *Journal of Conflict Resolution*, Vol. XI, No. 4.

Fruchter, B., *Introduction to Factor Analysis*, Van Nostrand, New York, 1954.

would be expected, a direct relationship between size of farm and the ownership of mechanized equipment, as well as the man-months of paid labour employed. An inverse relationship exists between the variables related to size and the practice of intercropping. This variable shows the highest negative loading, although it is still quite low. The practice of intercropping by small farmers has been noted above and leads one to conclude that the larger the holding, the less likely it is for the farmer to adopt this practice.

Factor II	Variables with	
	Positive loadings	Negative loadings
Months spent on farm	0.874	Main occupation - 0.635
Months spent on sugar cane	0.797	
Full-time farmer	0.758	
Ownership of transport	0.358	

This factor can be called an *occupation factor* and it accounts for 9% of the total variation. The variable with the highest loading is that of months spent working on the farm. There is also a high loading on the time spent on sugar cane which shows that this crop is the most important one. Main occupation is shown inversely related because the variable was coded on a binary scale, in such a way that 0 was regarded as agricultural and 1 as non-agricultural occupation. Thus agricultural occupation has a high loading and, consequently, so too does the variable relating to whether a holder claimed to be a full-time or part-time farmer. Ownership of transport has a low, but still possibly significant positive loading on this factor. It was shown that, although more full-time farmers owned transport, many still have to use hired transport, and this probably accounts for the relatively low loading.

Factor III	Variables with		
	Positive loadings	Negative loadings	
Sugar cane main crop	0.684	Months spent on other crops	-0.753
		Growing other commercial crops	-0.691
		Acreage of non-tree crops	-0.616

This factor accounts for 6% of the total variation and can be regarded as a *cropping factor*, because the variables loading highly are all related to sugar cane and other crops grown commercially. The highest loading, a negative one, comes from the length of time spent on crops other than sugar cane. The

other variables with negative loadings are the growing of other crops commercially and the acreage under crops other than tree crops and sugar cane. The only variable with a high positive loading on this factor is that denoting whether or not sugar cane is the main crop. As seen under Factors I and II in which sugar cane acreage and time spent on sugar cane had high loadings respectively, here too, it is seen that sugar cane dominates the agriculture.

Factor IV	Variables with	
	Positive loadings	Negative loadings
Ownership of cart	0.235	Transport by animals mechanised transport -0.714
		Cost of cut-load-transport/ton -0.655
		Distance of main sugar cane plot from purchasing point -0.562
		Man-months of paid labour employed -0.290

The fourth factor can be regarded as a *transport factor* because it has the highest loadings from distance, type of transport and cost of transport variables. This transport factor accounts for 5% of the total variation. The variable with the highest loading is that of type of transport showing the importance of animal transport for the majority of farmers. Also with a negative loading is the variable cost of cutting, loading and transporting the cane over shorter distances. The highest positive loading is from the primary variable, ownership of animal drawn carts. This shows, therefore, that ownership of carts is related inversely to the cost of transporting the cane. A low, but possibly still significant negative loading, is shown by man-months of paid labour employed. All the variables with high loadings on this factor indicate that the farmers who own carts have lower expenses for cutting and transporting their cane.

Factor V	Variables with	
	Positive loadings	Negative loadings
Frog hopper infected acreage	0.685	Nil
Frog hopper subsidy awareness	0.651	
Weeding practices	0.557	
Number of fragments	0.493	
Man-months of paid labour	0.382	
Hundredweight of fertilizer per acre	0.361	
Acreage of plant cane	0.345	

The fifth factor accounts for 6% of the total variation and may be identified as a *Cultivation factor*. The two primary variables with the highest

loadings on this factor are the incidence of frog-hopper damage and the awareness by farmers that control of such damage is subsidized. These indicate that the farmers with acreages infested with frog hopper are more likely to know about the availability of the subsidy. However, because weeding practices and fragmentation also have high loadings on this factor and it is known that the larger farmers have more fragments of land and use a combination of chemical and manual methods of weed control, it seems that awareness of this subsidy is greater among the farmers with large holdings. Other primary variables with high loadings on this factor are man-months of paid labour employed, fertilizer application and acreage of canes planted in 1967. All these variables are indicative of larger holdings.

Factor VI	Variables with	
	Positive loadings	Negative loadings
Size of household	0.769	Cost of cut-load-transport per ton -0.192
Agricultural workers in household	0.691	
Number of fragments	0.308	

This factor can be called a *household factor*. It accounts for 4% of the variation and is characterized by high loadings from the primary variables, size of household and the number of agricultural workers within a household. Generally, most of the agricultural workers within a household contributing labour to the holding belong to that household, but there are some who are agricultural workers on the estates and others who perform tasks for farmers. Number of fragments also seem to be related to size of household, but not very strongly. The variable with the highest inverse relationship is the cost of cutting, loading and transporting cane. That there is an inverse relationship indicates that costs for such farmers, with large households, are lower, because of the amount of unpaid labour used. However, the loading is not very high, which possibly shows that the labour pool provided by the large households is not fully used or, that, because of the nature of the harvest, when cane has to be sold relatively quickly, there is also the need for paid labour or for hired transport.

Factor VII	Variables with	
	Positive loadings	Negative loadings
	Nil	Ownership of animal cart -0.855
		Transport hired or owned -0.598
		Livestock units -0.460

This factor, a *livestock factor*, accounts for 5% of the total variation. Ownership of a cart has the highest negative loading on this factor and this

is related to the use of hired transport by farmers who do not own carts. That both variables, carts and ownership of transport, are not each loaded exactly as highly as the other, is accounted for by the fact that larger farmers own mechanical transport and they may also have to hire transport. Livestock units are directly related to the ownership of carts and use of hired or owned transport.

Factor VIII	Variables with	
	Positive loadings	Negative loadings
Main occupation	0.233	Fertilizer advice -0.623
		Intercropping -0.508
		Agricultural credit -0.378
		Froghopper subsidy awareness -0.287

This factor accounts for 3% of the total variation and can be labelled a *services factor*. The variable with the highest loading on this factor is the receipt or non-receipt of advice on the use of fertilizers. This variable has a high negative loading of -0.623. Two other primary variables related to the provision of facilities have high loadings here. The availability and use of credit and awareness of the froghopper subsidy both show negative loadings. Intercropping also has a high negative loading while the highest positive loading, of only 0.233, comes from non-agricultural occupation. This possibly indicates that farmers who are mainly in non-agricultural occupations, who are generally smaller producers, are not likely to obtain agricultural credit, advice or information and are also less likely to practice intercropping owing, possibly, to lack of time or the little time spent on the holding.

Factor IX	Variables with	
	Positive loadings	Negative loadings
	Nil	Average yield per acre 1967 -0.785
		Hundredweight of fertilizer per acre -0.648
		Agricultural credit -0.236
		Tons of sugar cane sold, 1967 -0.232

This factor accounts for 4% of the total variation and can be named a *yield factor*. All the variables loading highly on this factor do so negatively, with the highest loading from the variable, average yield per acre in 1967. The variable that is closely and directly related to average yields per acre is the application of fertilizers. It was noted earlier that smaller producers were less likely to obtain fertilizers on credit, and this is perhaps further indicated in this factor by negative loadings from agri-

cultural credit and tonnage of sugar cane sold. The major feature, therefore, is that the smaller producers do not obtain fertilizers on credit, apply less fertilizers per acre and consequently obtain lower yields.

Factor X	Variables with	
	Positive loadings	Negative loadings
Ownership of lorries and trucks	0.552	Age -0.699
Distance of main sugar cane plot from purchasing point	0.368	

This factor accounts for 3% of the total variation and is the only factor in which the variable age has a high loading, a negative one of -0.699. It may be coincidental that this should be related to ownership of lorries and trucks, but the pattern emerges of the younger farmers with reasonable sized holdings owning such mechanized means of transport. This may indicate that the younger farmers would prefer these forms of transportation and are likely to move away from the more traditional forms of transport, so that this can perhaps be regarded as a *progressiveness factor*. The other primary variable with a high positive loading is a distance variable and is directly related to the use of mechanized transport.

Factor XI	Variables with	
	Positive loadings	Negative loadings
Tenure	0.717	Road conditions -0.649
		Livestock units -0.228

This factor accounts for 3% of the variation and can be regarded as a *tenure factor*. Complete ownership of the land is inversely related to road conditions. However, although road conditions are shown with a negative loading, this is only due to the coding applied to road conditions, with 0 being regarded as good. Thus, it is apparent that those farmers who have the best tenure are also favoured by road conditions. The farmers with the best tenure rights are usually the larger farmers. Possibly, one can infer that farmers with smaller holdings usually have worse tenancies and are serviced by poorer roads. The variable, livestock units, shows a negative loading here, possibly accounted for by the larger farmers using better roads being likely to own mechanical transport and have few livestock units. This feature refers only to those larger farmers whose holdings are located near the better roads and hence near dense settlement. These tend to rent carts from other farmers for in-field transport or use tractors for such work. Other large producers generally keep livestock, for it was noted that the mean livestock units owned by farmers increases with size of production.

It is worth commenting briefly on the correspondence between this section of the paper and the earlier sections. In general there appeared a fairly close correspondence between both parts. The one point that seems most conspicuous is the absence of the variable, yield per acre, from Factor I. It appears under Factor IX where a direct relationship is shown between yield and fertiliser usage. An explanation for its absence under Factor I is difficult to find, but one can suggest that it is either because the fertilizer-yield relationship is stronger than the size-yield relationship or because the data was not comprehensive enough. One may also note that in the factor analysis section only brief suggestions were made about relationships, but it is hoped that the data in the earlier section would provide some of the missing links.

SUMMARY AND CONCLUSION

The brief historical outline indicated that some of the present problems of the cane-farming sector of the Trinidad sugar industry had their origins in the past. Size of holding, location and accessibility seemed to be of vital importance. These in turn, especially size of holding or production size of sugar cane, were seen to affect farming in various ways. Their effects were seen to be evident in the extent of non full-time farming, in cultivation practices such as fertilizer usage, intercropping, weeding practices, and acreages under other crops. Size was also seen to affect ownership of equipment, type of transport and use of hired labour. Institutional limitations were shown to affect smaller farmers more than those with larger holdings.

The factor analysis also emphasised the importance of the size factor in Trinidad cane farming. This factor was not only the most strongly identified but also accounted for more of the total variation than any other factor. It would seem, therefore, that size of holding is the most important factor influencing cane farming and that this type of agriculture would benefit most from an increase in the size of farms. It is worth noting that whereas fragmentation is shown to be a strongly identified factor in a similar study done in Barbados it is not so dominant in Trinidad.¹ It is noticeable, too, that the last six factors are not strongly identified, showing only two loadings of ± 0.5 and over. This may be owing to their small relative importance as compared to size, or because all aspects of the subject have not been adequately covered. One such aspect is management which is difficult to quantify. Moreover, reservations must be held as regards the subjective element in factor analysis. Generally though, the correspondence between the impressions gained from the tabular data and from the factor analysis indicate that the results obtained may not be far from the actual conditions.

It is necessary to re-iterate what has been said before, that in spite of all the constraints to farming that were shown, this sector has contributed handsomely to the industry as a whole, to the Trinidad economy and to Trinidad society. It has maintained its share of production over the last two decades and also increased absolute production. One hopes that some of the problems affecting this type of agriculture will be solved for the benefit and eventual expansion and rationalisation of cane farming.

¹Henshall, J.D., *The Demographic Factor in the Structure of agriculture in Barbados*, in *Transaction and Papers of the Institute of British Geographers*, 1966, Publication No. 38.

TABLE 1. MEAN FARM SIZE, SUGAR CANE ACREAGE AND AVERAGE YIELDS
BY CLASSES OF FARMERS

	Classes of Farmers		Mean Farm Size (acres)	Sugar Cane Acreage	Average Yields (tons)
(1)	0 - 5	tons	3.48	1.36	5.23
(2)	6 - 20	"	4.07	1.87	11.79
(3)	21 - 50	"	4.45	2.75	16.72
(4)	51 - 100	"	5.97	4.35	19.64
(5)	101 - 500	"	12.42	9.50	23.43
(6)	501 - 1,000	"	45.03	28.45	24.66
(7)	Over 1,000	"	117.80	84.91	22.58
Population Estimates			63,700 acres	42,100 acres	17 tons (Mean for all classes)

TABLE 2. 1967 - FARMERS' PRODUCTION OF SUGAR CANE BY CLASSES

Classes of Farmers	No. of Farmers	Percentage of Total Number	Tonnage Delivered	Percentage of Total Tonnage	Average Tonnage Per Farmer
1	625	6.33	3,275	0.48	5.24
2	2,421	24.53	32,444	4.79	13.40
3	3,039	30.79	103,257	15.24	33.98
4	1,943	19.69	138,636	20.46	71.35
5	1,766	17.89	323,491	47.73	183.18
6	59	0.60	37,417	5.52	634.19
7	17	0.17	39,191	5.78	2,305.35
Totals	9,870	100.00	677,711	100.00	68.66 (Mean for all classes)

Source: Sugar Manufacturers' Association, Trinidad.

TABLE 3. FULL-TIME AND NON-FULL-TIME FARMERS BY CLASSES

Classes of Farmers	% of Full-time Agriculture	% Self-employed and in Agriculture	Total Non-full-time Farmers
1	27.1	12.5	72.9
2	5.9	23.1	94.1
3	8.9	34.1	91.1
4	10.8	43.9	89.2
5	17.6	65.0	82.4
6	42.4	45.4	57.6
7	63.6	36.4	36.4

TABLE 4. FERTILISER USAGE BY FARMERS ACCORDING TO CLASSES (PERCENTAGES)

Classes of Farmers	None Used	1 cwt. per acre	2 cwt. per acre	3 cwt. per acre	4 cwt. per acre	Over 4 cwt. per acre
1	39.6	6.3	10.4	10.4	20.8	12.5
2	13.2	3.3	25.6	20.7	25.6	11.6
3	6.7	6.2	27.3	24.2	19.1	16.5
4	0.7	5.0	28.8	21.6	19.4	24.4
5	2.5	2.5	19.2	23.6	21.2	31.0
6	—	—	9.1	33.3	15.2	42.4
7	9.1	—	—	9.1	36.4	45.5
Population Estimates	8%	5%	25%	22%	21%	19%

TABLE 5. ACREAGE UNDER 'OTHER CROPS' OR NON-TREE CROPS,
NOT INCLUDING SUGAR CANE, BY CLASSES OF FARMERS (PERCENTAGES)

Classes of Farmers	0-0.4	0.5-1.4	1.5-2.4	2.5-3.4	3.5-4.4	4.5-5.4	5.5 and over	Means
1	56.3	22.9	12.5	4.2	2.1	—	2.1	0.75
2	42.1	33.1	17.4	3.3	2.5	—	1.6	1.02
3	43.8	34.0	11.9	6.7	0.5	1.5	1.5	0.89
4	39.6	32.4	18.7	4.3	3.6	0.7	0.7	0.99
5	39.4	27.6	13.8	8.9	3.0	1.5	5.9	1.32
6	30.3	27.3	21.2	9.1	—	6.1	6.0	2.20
7	63.6	18.2	18.2	—	—	—	—	0.54
Population Estimates	42%	32%	15%	6%	2%	1%	2%	

TABLE 6. PRACTICE OF INTERCROPPING BY CLASSES OF FARMERS (PERCENTAGES)

Classes of Farmers	% of Farmers Who Intercrop
1	85.4
2	82.6
3	78.9
4	84.9
5	74.4
6	39.4
7	9.1
Population estimate	80%

TABLE 7. WEEDING PRACTICES BY CLASSES OF FARMERS (PERCENTAGES).

Classes of Farmers	Manual Weeding Only (1)	Chemicals Only (2)	Combination of (1) and (2)
1	93.8	0.0	6.2
2	92.6	0.0	7.4
3	88.1	0.0	11.9
4	86.3	0.0	13.7
5	62.6	1.0	36.5
6	33.3	0.0	66.7
7	45.5	0.0	54.5
Population Estimates	84%	Negligible	16%

TABLE 8. PERCENTAGES OF FARMERS WHO ATTEMPTED TO CONTROL THE FROGHOPPER ACCORDING TO CLASSES OF FARMERS (PERCENTAGES)

Classes of Farmers	% Whose Cane Was Not Affected	% of Whose Cane Was Affected	
		No control methods used	Used control methods
1	64.6	31.3	4.2
2	65.3	30.6	4.2
3	68.0	22.7	9.3
4	54.7	30.2	15.1
5	51.2	27.6	21.2
6	69.7	12.1	18.2
7	90.9	0.0	9.1
Population Estimates	61%	27%	12%

TABLE 9. DISTRIBUTION OF LIVESTOCK UNITS ACCORDING TO CLASSES OF FARMERS (PERCENTAGES)

Classes of Farmers	Livestock Units								Means (units)
	None	0.1-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-10.0	Over 10.0	
1	58.3	25.0	10.4	—	4.2	—	2.1	—	0.75
2	47.9	33.9	7.4	6.6	0.8	0.8	1.7	0.8	0.99
3	46.9	29.9	9.8	6.7	2.6	1.5	1.5	1.0	1.14
4	32.4	41.0	14.4	7.2	2.2	—	2.9	—	1.23
5	31.0	32.5	14.8	5.9	6.9	2.5	5.4	1.0	1.66
6	39.4	18.2	24.2	6.1	—	—	9.1	3.0	2.51
7	36.4	18.2	9.1	18.2	—	—	—	18.2	4.55
Population Estimates	42%	33%	11%	6%	3%	1%	3%	1%	

TABLE 10. NUMBER OF FRAGMENTS AND MEAN SIZE OF FRAGMENTS BY CLASSES OF FARMERS

Classes of Farmers	Number of Fragments							Mean Size of Fragments (acres)
	1	2	3	4	5	6	7 & over	
1	62.5	29.2	4.2	4.2	—	—	—	2.38
2	43.0	37.2	14.9	3.3	1.7	—	—	2.19
3	32.5	36.6	19.6	8.2	1.0	0.5	1.5	2.05
4	20.1	33.1	28.8	10.8	4.3	0.7	2.1	2.30
5	9.9	22.7	22.7	17.2	8.9	12.3	6.4	3.49
6	6.1	3.0	12.1	18.2	21.2	6.1	33.4	8.64
7	9.1	9.1	18.2	18.2	9.1	18.2	18.2	24.90

TABLE 11. TENURE OF FARMERS' HOLDINGS BY CLASSES OF FARMS (PERCENTAGES)

Classes of Farmers	Farmers			
	% Estates' Tenants	% Tenants of Other Landlords	% Tenants of Both Estates Landlords	% Who Own Entire Holding
1	22.9	52.1	4.2	20.8
2	28.9	44.6	5.8	20.7
3	30.4	46.9	9.8	12.9
4	30.9	44.6	12.2	12.2
5	30.0	42.4	14.8	12.8
6	3.0	45.5	33.3	18.2
7	9.1	45.5	—	45.5
Population Estimates	29%	46%	10%	15%

TABLE 12. UTILISATION OF PAID LABOUR BY CLASSES OF FARMERS (PERCENTAGES)

Classes of Farmers	Percentages who used paid labour for various tasks				
	Planting	Cultivation	Harvesting	On Other Crops	Overall % Who Used Paid Labour
1	20.8	25.0	52.1	6.3	52.1
2	31.4	35.5	57.0	11.6	59.5
3	44.3	47.4	68.0	17.5	69.6
4	59.0	60.4	74.8	23.0	75.5
5	79.2	82.8	92.1	41.9	93.1
6	100.0	100.0	100.0	57.6	100.0
7	90.9	100.0	100.0	45.5	100.0
Population Estimates	49%	52%	70%	21%	76%

TABLE 13. OWNERSHIP OF AGRICULTURAL EQUIPMENT BY CLASSES OF FARMERS (PERCENTAGES)

Classes of Farmers	Percentages of farmers owning equipment					
	Ploughs	Other cultivating machinery	Lorries	Carts	Tractors	Spraying & dusting equipment
1	2.1	2.1	—	18.7	6.2	2.1
2	2.5	—	—	27.3	6.6	5.8
3	5.2	0.5	1.0	40.7	5.7	5.2
4	5.0	2.2	0.7	48.9	12.9	10.1
5	21.2	6.4	5.9	47.3	37.4	27.6
6	48.5	27.3	21.2	27.3	78.8	66.7
7	81.8	63.6	27.3	45.5	100.0	81.8
Population Estimates	8%	2%	1%	39%	14%	10%

TABLE 14. TYPE OF OWNERSHIP OF TRANSPORT BY CLASSES OF FARMERS (PERCENTAGES)

Classes of Farmers	Type of Transport			Ownership of Transport		
	Animal (1)	Mechanical (2)	Both (1) & (2)	Hired (3)	Owned (4)	Both (3) & (4)
1	62.5	27.1	10.4	79.2	20.8	—
2	62.8	28.1	9.1	70.2	25.6	4.1
3	58.8	20.6	20.6	54.6	36.6	8.8
4	61.2	26.6	12.2	39.6	50.4	10.1
5	43.8	39.9	16.3	15.8	57.1	27.1
6	3.0	57.6	39.4	—	63.6	36.4
7	—	18.2	81.8	9.1	27.3	63.6
Population estimates	57%	28%	15%	50%	39%	11%

TABLE 15. PERCENTAGES OF FARMERS WHO CLAIMED THAT THEY WERE ADVISED ON FERTILIZER USAGE AND WERE GIVEN OTHER AGRICULTURAL ADVICE BY CLASSES OF FARMERS

Classes of Farmers	Received Advice on Fertilizer Usage	Received Advice on Other Agricultural Activities
1	6.4	2.1
2	8.3	8.3
3	12.9	6.7
4	14.4	11.5
5	20.3	15.3
6	33.3	21.2
7	54.5	54.5
Population estimates	13%	9%

TABLE 16. COMPARISON OF FARMERS' PRODUCTION OF SUGAR CANE FOR 1963-67 AND 1967 BY CLASSES OF FARMERS

Classes of Farmers	Five-year Mean 1963-67	1967 Mean
1	3.43 tons	5.24 tons
2	13.40 "	13.40 "
3	33.73 "	33.98 "
4	73.54 "	71.35 "
5	185.82 "	183.18 "
6	663.54 "	634.19 "
7	2,345.92 "	2,305.35 "
Average for all farmers	72.57 "	68.66 "

Source: Compiled from data supplied by SMA.

TABLE 17. STRATIFICATION OF FARMERS, SAMPLE SIZE AND SAMPLING FRACTION

Strata	Total population	Sample size	Sampling fraction
1	625	48	7.7%
2	2,421	121	5.0%
3	3,039	194	6.4%
4	1,943	139	7.2%
5	1,766	203	11.5%
6	59	33	55.9%
7	17	11	64.7%

TABLE 18

Variable	
	1. Age of holder
"	2. Main occupation of holder
"	3. Tenure of holding
"	4. Number of individuals in household
"	5. Number of agricultural workers in household
"	6. Whether or not sugar cane is the main crop on the holding
"	7. When did the holder first grow sugar cane
"	8. Whether or not intercropping is practiced on the holding
"	9. Whether or not another commercial crop is produced on the holding
"	10. Number of months per year that holder spends on holding
"	11. Number of months per year that holder spends on sugar cane
"	12. Number of months per year that holder spends on the crops
"	13. Whether or not farmer is full-time farmer
"	14. Man-months of paid labour employed
"	15. Amount of fertiliser applied per acre, 1967 (cwt.)
"	16. Whether or not advice is received on fertiliser usage
"	17. Weeding practices used on holdings – whether manual or chemical or a combination
"	18. Acreage of sugar cane affected by froghopper damage
"	19. Whether or not a holder is aware of the froghopper subsidy
"	20. Whether or not a plough is owned
"	21. Whether or not any other cultivating equipment is owned
"	22. Whether or not lorry is owned
"	23. Whether or not cart is owned
"	24. Whether or not a tractor is owned
"	25. Distance of main sugar cane plot from nearest purchasing scale
"	26. Road conditions between holding and purchasing scale – whether good, mediocre or bad
"	27. Whether holder employs animal or mechanical transport, or a combination
"	28. Whether holder employs hired or owned transport, or a combination
"	29. Cost per ton of cutting, loading and transporting cane
"	30. Whether or not holder receives agricultural credit
"	31. Number of fragments that make up holding
"	32. Acreage of sugar cane on holding
"	33. Acreage of non-tree crops other than sugar cane on holding
"	34. Total acreage of holding
"	35. Cane production on holding for 1967
"	36. Sugar cane – average yield per acre in 1967
"	37. Number of livestock units owned

The computer program used for the factor analysis was the Miami Biomedical program 'Factor'. It was adapted by Mr. Roy Middleton of the Edinburgh Regional Computing centre. The factor analysis was run on the Univac 1108 computer of the National Engineering Laboratory at East Killbride, Scotland.

20.26

TABLE 20. ALL CLASSES OF FARMERS COMBINED

	VARIMAX ROTATION										
	1	2	3	4	5	6	7	8	9	10	11
	PERCENT OF VARIANCE										
	13.738	8.613	5.913	4.802	6.158	4.253	4.592	3.332	3.870	3.292	3.444
	ROTATED FACTOR LOADINGS										
AGE	.100	.139	-.002	-.041	-.013	.134	-.047	-.030	.177	-.699	.007
OCCUPN	-.032	-.635	-.019	-.051	.063	.111	.038	.233	.025	-.085	.042
TENANT	.134	-.037	-.069	-.102	.062	.056	.013	.115	-.003	.144	.717
HOUSLD	.048	-.111	-.043	.038	.087	.769	-.024	.081	-.129	.037	-.096
AGRWRK	.017	.163	.006	.053	-.084	.691	-.089	-.161	.082	-.103	.056
SCMNCP	-.005	.164	.684	-.035	.153	.044	.020	-.174	.002	.110	.018
PLNTSC	.421	.166	.055	-.096	.345	.200	-.009	.113	.052	.135	-.087
INTERC	-.223	.070	-.092	.136	-.043	.008	.162	-.508	.232	-.079	.099
OTHCRP	-.003	.017	-.691	-.125	.053	-.010	.031	-.209	.046	.034	.081
MUFARM	.101	.879	-.160	.014	.090	.074	-.128	-.015	-.058	-.040	-.072
MUCANE	.173	.797	.248	.016	.193	.130	-.142	.079	-.070	-.035	-.110
MUCROP	-.097	.340	-.753	.022	-.098	-.078	.029	-.116	.041	-.032	.061
FULLYR	.164	.750	-.150	-.011	.138	.035	-.091	.166	-.106	-.109	-.027
MANMTH	.523	.262	.053	-.289	.382	.039	-.006	.191	-.210	.064	.031
FERCWT	.044	.073	.054	.214	.361	.051	.037	.046	-.648	.038	.124
FERADV	.210	-.111	-.100	-.225	.125	.033	-.203	-.623	-.184	-.032	-.074
DEEDPR	.167	.026	.018	-.127	.557	.073	-.169	-.036	-.083	.156	-.098
FHPACK	.099	.140	.003	.106	.685	-.024	.100	.073	.039	-.142	.120
FHPSUB	.136	-.001	-.017	.078	.651	-.130	-.156	-.287	-.074	-.052	.054
OWNPLO	.682	.095	-.064	-.000	.187	.149	.125	-.073	.000	.042	.109
OWNCUL	.756	-.025	-.053	.090	.014	.049	-.046	-.201	.102	.115	.037
OWNLTR	.319	.066	.020	-.122	-.032	.123	-.099	.006	.095	.552	.091
OWNCRT	-.048	.195	.055	.235	.027	.053	-.855	-.025	-.020	-.027	.007
OWNTRA	.821	.102	-.020	-.070	.172	.042	.112	-.012	-.055	.021	.051
DISTSC	.109	.187	-.056	-.562	-.056	-.021	.070	.032	.082	.368	-.138
ROADCO	.056	.145	.084	-.148	.026	.121	.022	.095	.012	.101	-.649
TRANAM	.241	-.017	-.059	-.714	.117	.064	.033	-.023	.029	.061	.154
TRANHO	.203	.358	.046	-.186	.215	.185	-.598	.019	-.106	-.045	.176
COSTSC	.003	-.234	-.018	-.655	-.099	-.192	.143	-.049	-.068	-.206	-.136
AGRICK	.041	.285	.075	.016	.086	.273	.053	-.378	-.236	.099	-.172
FRAGMT	.288	.183	-.149	-.195	.493	.306	-.244	.063	-.047	.007	-.145
SCACRE	.886	.079	.085	-.125	.066	-.052	-.148	.059	-.037	-.061	-.037
NONTRE	.097	-.020	-.616	-.044	.272	.239	-.052	.025	.039	.106	.075
TUTACK	.874	.057	-.068	-.087	.003	-.081	-.129	.049	-.002	-.017	-.019
SCTONS	.847	.101	.092	-.164	.118	-.005	-.182	.082	-.232	.014	-.042
AVYILD	.066	.155	.053	-.101	-.102	.020	-.061	-.065	-.785	.046	-.048
LSUNIT	.265	.002	-.271	.132	.268	-.027	-.460	-.010	.086	.202	-.228

TABLE 21. COMPOSITION OF LIVESTOCK UNITS

Type of Animals	Livestock Units
Cattle – Dairy	1.0
Beef	1.0
Draught	1.0
Horses	1.0
Mules	1.0
Donkeys	1.0
Pigs	0.1
Goats	0.1
Sheep	0.1

- (a) The young of all animals were counted at one-half the value of the full-grown animal
- (b) Poultry were not taken into account in computing livestock units.

100 PERCENTAGE OF CANES PRODUCED BY FARMERS AND ESTATES 1900-1967

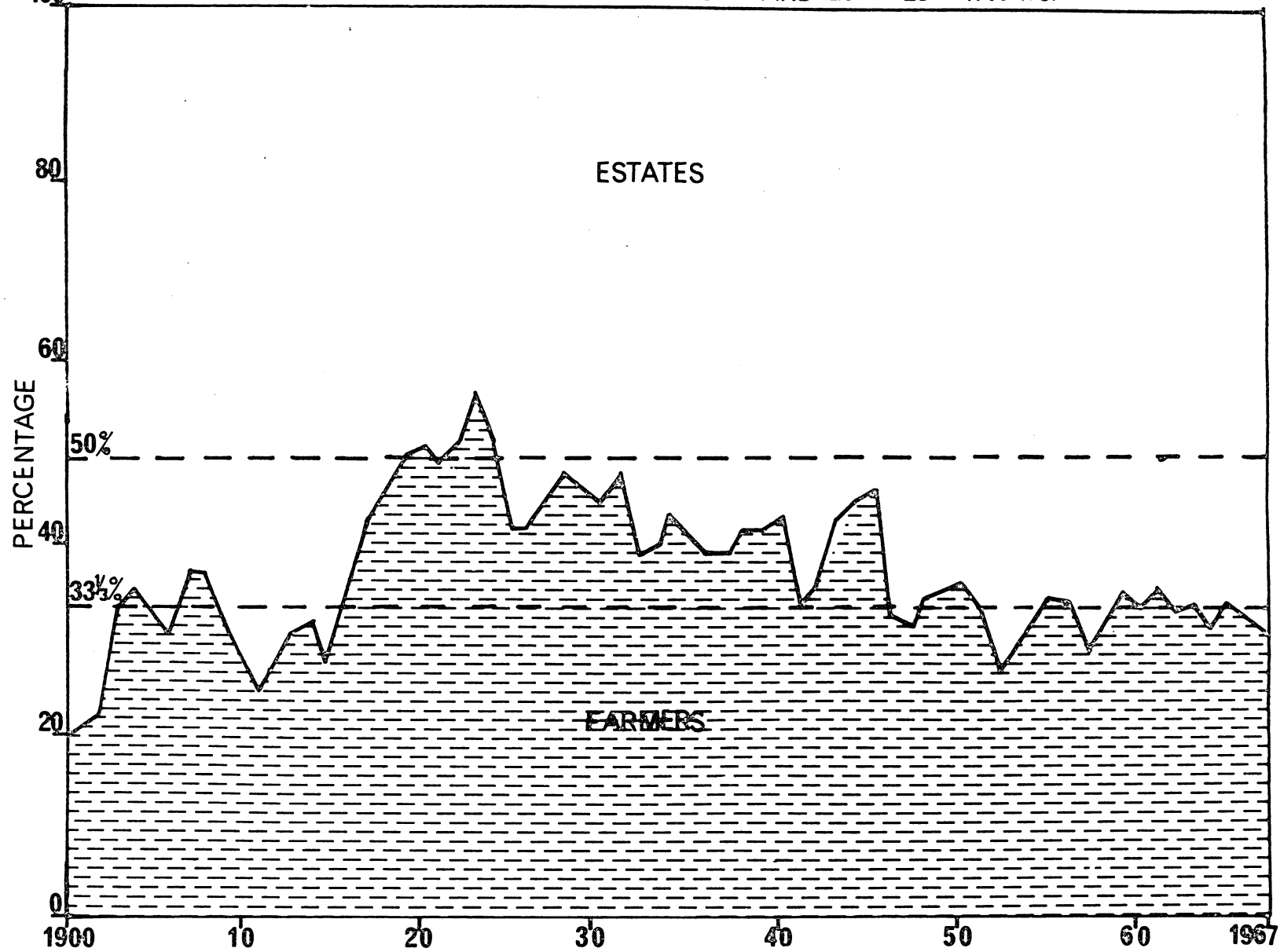


FIGURE 1

TRINIDAD: Farmers' Production of Sugar Cane 1939 - 1967

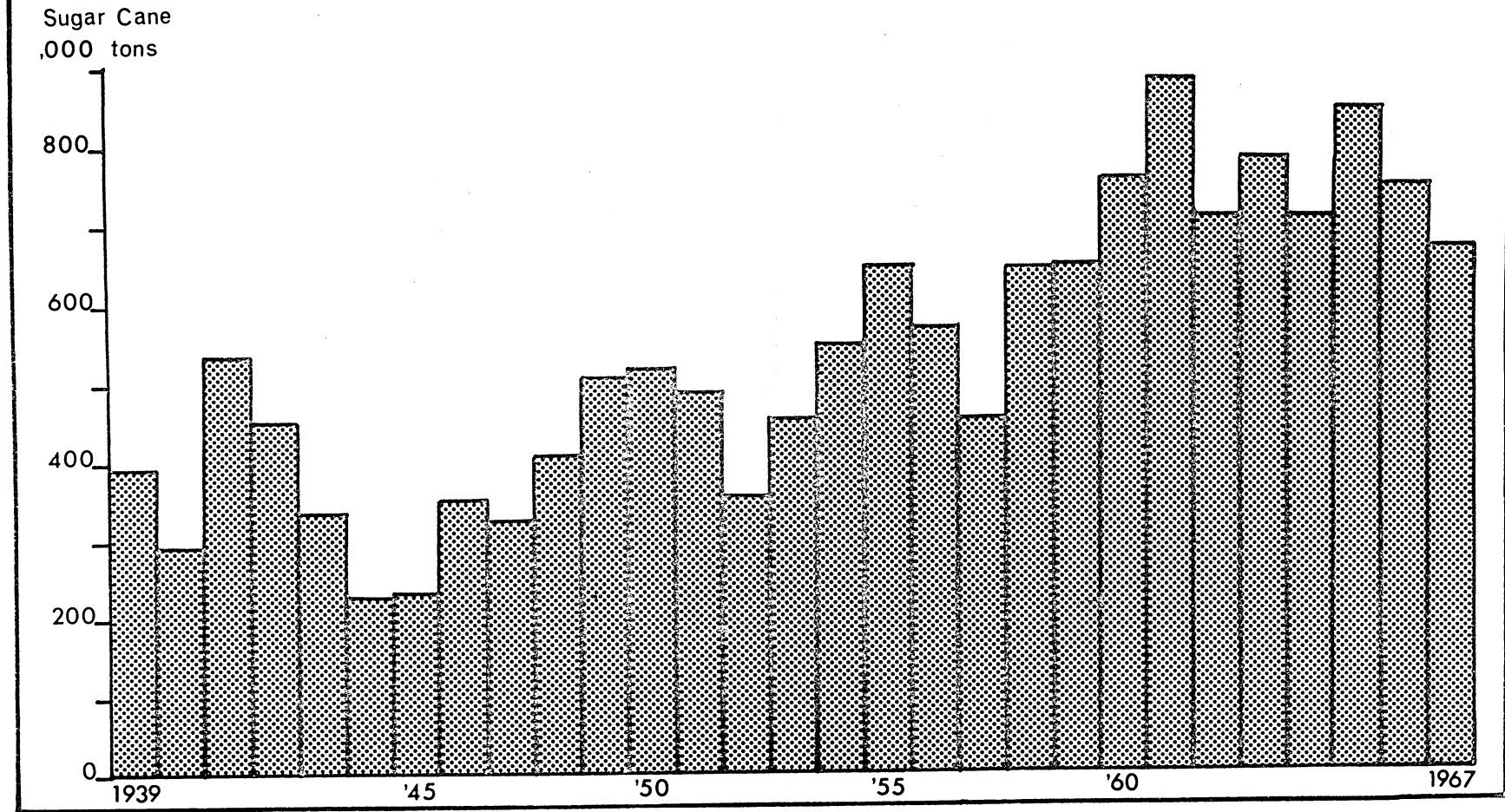


FIGURE 2

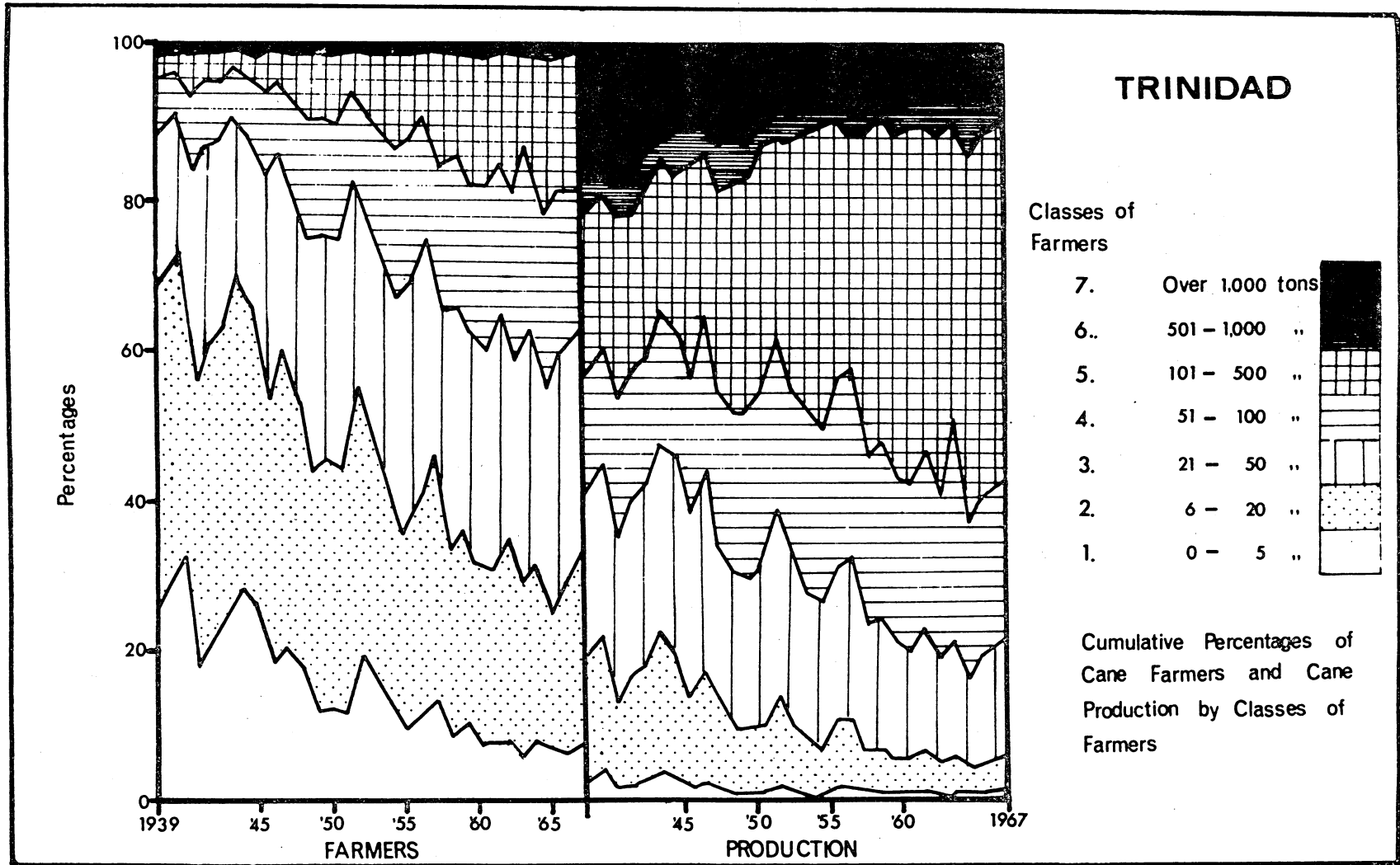


FIGURE 3

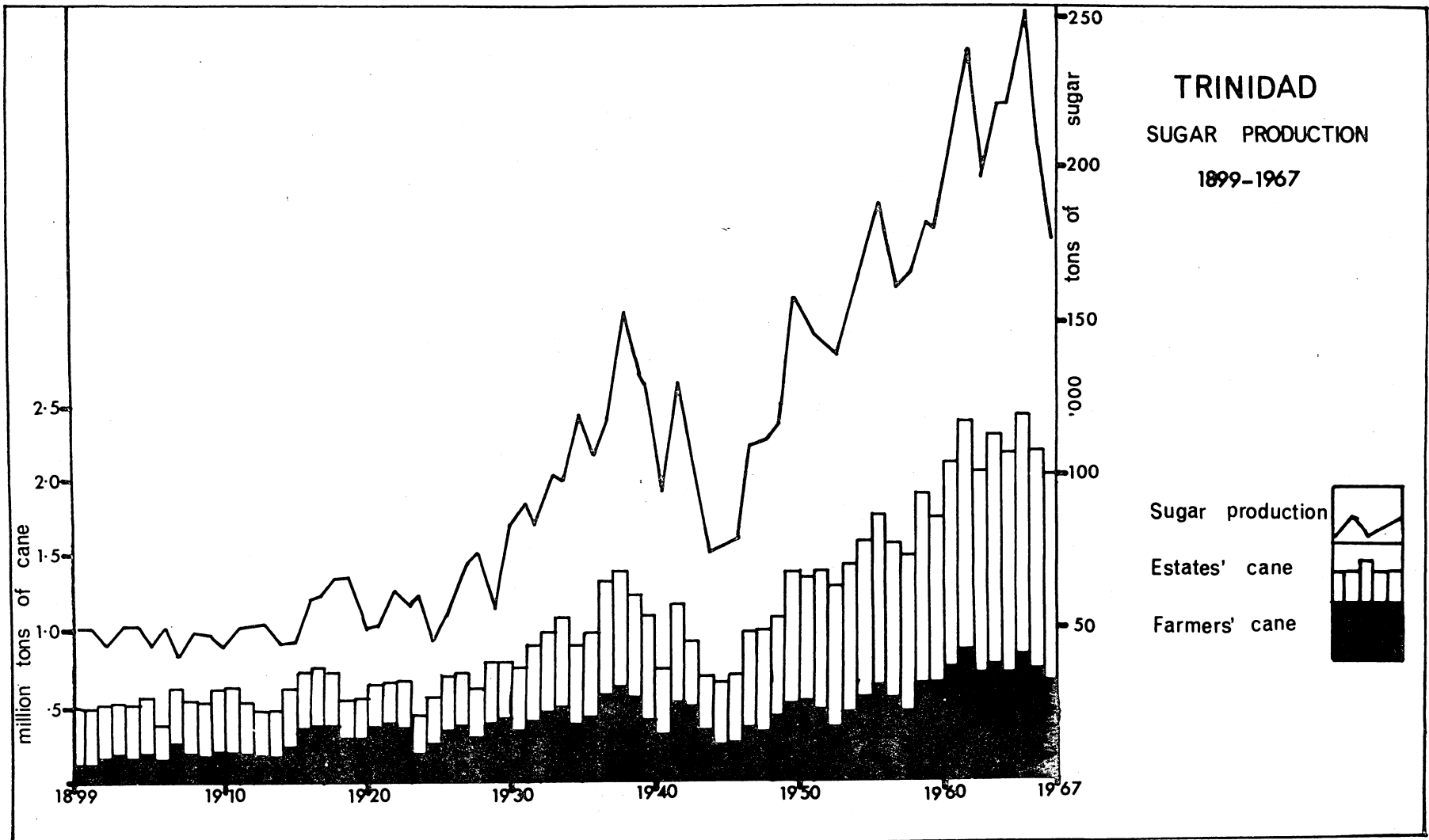


FIGURE 4