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IV. DEVELOPMENT PLANNING AND POLICY:

A CASE STUDY

The Impact of Agricultural Diversification Policies in Barbados in the Post-war Period[a]

By

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Barbados has had virtually a one-crop agricultural economy for nearly the whole period since active settlement began in the early seventeenth century. Tobacco and cotton were important in the early part of that century but sugar which came in about the middle of the century rapidly increased in importance and became the dominant crop from then up to the present.

In this situation, periods of poor market conditions for the main crop brought home quite forcibly the dangers inherent in such a narrow production structure. Thus the issue of agricultural diversification has been in the air for centuries. However, it was only during and after the second World War that diversification became the main aim of agricultural development policy.

During the war years, limited export and import opportunities made concentration on local food production necessary. And after the war greater efforts to promote economic development, together with an increased awareness of the need to reduce the risks associated with reliance on a narrow economic structure, led to emphasis on agricultural diversification as a means of promoting agricultural development. Democratization of the political order also led to greater official attention to the problems of small farmers and the prevailing view was that these farms were more suited to the growing of food crops (taken here to mean root crops and vegetables) than sugar cane.

It is important to place the efforts to achieve a diversified agriculture in historical perspective, since the impression has been gained that agricultural diversification is generally considered as something new in agricultural policy. In this climate of opinion questions concerning the failure or success of the policy, and the need to reassess priorities and even the whole strategy of agricultural development do not seem to be raised as readily as they should.

[a]This is a substantially abbreviated version of the paper presented at the Conference. The authors wish to thank the following persons with whom discussions were held during the course of preparation of this paper: E. G. B. Gooding and J. C. Hudson of the Barbados Sugar Producers Association; C. Pilgrim, E. Cumberbatch, DeC. Jeffers and D. Medford of the Barbados Ministry of Agriculture.

This paper attempts to examine closely the extent to which progress has been made in agricultural diversification. Relevant statistics are not available beyond 1965 but it will be demonstrated that up to that time no progress had been made. Following that, reasons for this lack of success are advanced and the main difficulties associated with diversifying agriculture in the island are considered. This serves as a background for finally assessing the adequacy of past policy measures.

The Extent of Diversification

No targets were set in terms of acreages or production for sugar and minor crops in any of the post-war Development Plans.[1] It seems that agricultural diversification was expected to be achieved by increases in the production of food crops and livestock products and the stabilization of sugar production. Development of new lines of production especially for export markets was also envisaged but the immediate concern was with food crops and livestock products for import substitution and in a few cases for export. It was felt that import substitution offered better prospects because of the large food import bill.

No new export lines were developed during the period. In fact commercial production of one traditional minor export crop — sea island cotton — ceased in 1955 after a steady decline from the peak production of 1948-49.

In Tables 1-8 production, acreage and other relevant data are brought together to show the extent to which agricultural production has been diversified.

Table 1 shows that the acreage of sugar cane reaped increased from 40,000 in 1948 to 52,000 in 1964. This large expansion in the acreage harvested does not, however, represent a proportional increase in the acreage under cane. During the period under review the average number of ratoons has increased and the practice of fallowing cane lands has become less important. Both of these changes would have resulted in the reaping of a higher proportion of the acreage under cane each year. However, these changes could scarcely have accounted for the whole increase in the acreage reaped so that some expansion in cane acreage must have occurred. Since the arable acreage in the island has not been increasing (both the 1946 and 1961 censuses reported

TABLE 1. Acreage of Sugar Cane Reaped : Four-Year Intervals, 1948-1964

'000 acres

Year	Estates [a]	Small Farms [a]	Total
1948	32.3	7.7	40.0
1952	36.5	8.5	45.0
1956	37.0	10.0	47.0
1960	37.0	12.0	49.0
1964	40.0	12.0	52.0

[a]Estates -- 10 acres and over; Small Farms under 10 acres. This is conventional usage in official statistics in Barbados.

Source: Statistical Service, Barbados, *Annual Abstract of Statistics.*

[1]Up to, and including, the recently concluded 1965-1968 Development Plan.

about 66,000 acres) such expansion would have been at the expense of other crops. Lands permanently under food crops, as well as grasslands and cotton lands, would have been affected.

Table 2 shows a decline in the area under food crops on estates – from 12,922 acres in 1947/48 to 6,759 in 1963/64. It should be noted, however, that these lands under food crops are mostly "preparation lands", i.e. lands which are being replanted with cane but which are available for food crops between the period of cane harvesting and planting – February/April to November. The decline in food crops acreage is thus related to the smaller amount of replanting which is now done yearly (because of longer ratooning) and is perhaps attributable only to a small extent to an expansion of sugar cane acreage.

TABLE 2. ACREAGE UNDER FOOD CROPS – ESTATES : FOUR-YEAR INTERVALS, 1947/48 - 1963/64

acres

Year	Total	Green Vegetables and Bananas
1947/48	12,922	199
1951/52	10,180	46
1955/56	8,037	20
1959/60	6,972	171
1963/64	6,759	208

Source: Annual Reports of Food Crops Inspector.

While the exact land use situation in food crops cannot be derived from Tables 1 and 2, because of complications deriving from the use of preparation lands, one conclusion which can be made and which is adequate for present purposes is that sugar cane has increased both its absolute and relative positions in the use of the arable acreage of the island.

Production data in Tables 3 and 4 confirm this increased importance of sugar in the agricultural economy and reveal that the acreage situation has not been alleviated by greater increases in the yields of food crops and livestock products relative to sugar. While a marked increase has taken place in sugar production, other crops (with the exception of roots other than yams

TABLE 3. SUGAR PRODUCTION. THREE-YEAR ANNUAL AVERAGES[a] AT EIGHT-YEAR INTERVALS, 1947/49 - 1963/65

'000 tons

Year	Average Annual Production
1947 - 1949	114
1955 - 1957	176
1963 - 1965	182

[a]Three-year averages are used because of wide annual fluctuations resulting mainly from weather conditions.

Source: Barbados Statistical Service, *Annual Abstract of Statistics;* Economic Planning Unit, *Economic Survey 1967.*

and sweet potatoes) have registered small upward or downward movements between the years 1946, 1961 and 1965. In the case of the minor root crops – eddoes, tannias etc. – there has been a substantial decline in production.

Table 4 is incomplete in terms of coverage of the "minor agricultural products". Vegetables and poultry, for example, are omitted because of the ab-

TABLE 4. PRODUCTION ESTIMATES FOR MINOR AGRICULTURAL PRODUCTS, 1946, 1961 AND 1965

'000 lbs.

Minor Products	1946	1961	1965 [a]
Yams	22,700	14,350	19,150
Sweet potatoes	17,770	14,080	15,710
Other root crops	11,260	1,560	1,700
Maize	3,660	3,870	3,500
Cotton (lint)	10	2	—
Milk	14,481	19,879	15,514
Beef and veal	1,558	955	829
Pork	807	1,024	1,495
Mutton	108	83	81

[a]Except for the three meat items, the data in this column are for the period April 1965 to March 1966.

Sources: *Agricultural Censuses* 1946 and 1961 and *Agricultural Survey* 1965/66 except for meat products which were derived from slaughter data at Bridgetown abattoir and estimates of slaughtering in rural areas.

sence of statistical data. The large annual increase in the value of imports of vegetables shown in Table 5 suggests that if any progress has been made in

TABLE 5. VALUE OF IMPORTS OF VEGETABLES[a] AND VEGETABLE PREPARATIONS, 1948-1964

Year	Total Value	% Increase	Average Annual % Increase
	$000		
1948	483	—	—
1952	819	69.7	14.2
1956	1,131	38.1	8.4
1960	1,321	16.8	4.0
1964	1,929	46.1	9.9

[a]SITC 054. Includes potatoes, onions and garlic.

Source: Statistical Service, *Annual Trade Reports*.

this line of production it could not have been significant. Support for this is also given in Table 2 where the acreage under green vegetables and bananas on the estates is shown. Indications are that poultry production has expanded considerably in the 1950's and 1960's.

The value of total food imports in relation to that of total food consumption is shown in Table 7 in order to indicate the changing importance of local food production. Food imports (c.i.f. value) were a slightly higher proportion of the total food bill in 1963-64 than in 1950-51. This is an indication that imported supplies have increased in importance in total food consumption. The very fast *rate* of increase in the value of food imports is also some

TABLE 6. EXPORTS OF AGRICULTURAL PRODUCTS, 1948 - 1964

Year	Sugar and Molasses	Minor Products	Total
	$000	$000	$000
1948	10,821	86	10,907
1952	33,208	94	33,302
1956	28,383	64	28,447
1960	29,694	117	29,811
1964	36,035	152	36,187

Source: Statistical Service, *Annual Trade Reports*.

evidence of this. But firm conclusions on the importance of local food production in total food consumption (in terms of value) would require data on the value of locally produced and imported foods at retail level. In terms of volume, price indices of each of these classes of foods at retail level would also be required; but such data are not available.

TABLE 7. CONTRIBUTION OF FOOD IMPORTS TO TOTAL FOOD CONSUMPTION, 1950-1951 TO 1963-1964

Year [a]	Average Food Expenditure [b]	% Increase	Average Retained Imports [b]	% Increase	Retained Imports as % of Food Expenditure
	$m.		$m.		
1950-51	26.6	—	12.3	—	46.2
1955-56	33.9	27.4	17.1	39.0	50.4
1960-61	48.2	42.2	21.9	28.1	45.4
1963-64	54.7[c]	13.5	25.6	25.6	50.3

[a]Two-year periods at four-year intervals except for 1963-1964 which is two years from 1960-61. 1964 is the last year for which data are available.

[b]These are average annual figures for two-year periods. Annual figures were not used because of fluctuations in the import figures due to stock changes.

[c]Provisional.

Sources: N. Siffleet, "National Income and National Accounts," *Social and Economic Studies*, Vol. 1, No. 3; R. Bonnett, "The National Income and National Accounts of Barbados," *Social and Economic Studies*, Vol. 5, No. 3; J. Bethel, "A National Accounts Study of the Economy of Barbados," *Social and Economic Studies*, Vol. 9, No. 2; Statistical Service, *National Income and Product 1960-1962 with Provisional Estimates for 1963 and 1964.*; Statistical Service, *Annual Trade Reports*.

Table 8 shows the changing contribution of sugar and other agriculture to G.D.P. It should be noted that estimates of local food production, food consumption and G.D.P. contributions are not made independently. Production data would for instance be used to build up consumption data or vice versa and production data are also used to calculate G.D.P. contributions. Hence these estimates are of limited additional use in assessing the food crops

TABLE 8. CONTRIBUTION OF AGRICULTURE TO G.D.P., 1952-1964[a]

		1952	1956	1960	1964
Sugar and molasses	$m.	31.0[b]	22.0	25.5	29.7
Other agriculture and fisheries	$m.	8.8[b]	10.2	8.1	8.2
Total G.D.P. at factor cost	$m.	64.0	74.1	119.8	147.3
	Percentages of Total				
Sugar and molasses		—	29.7	21.3	20.2
Other agriculture and fisheries		—	13.7	6.8	5.6

[a]Estimates are not available for 1948. Note that 1964 figures are provisional.

[b]These are gross output figures rather than G.D.P. figures as deductions were not made for imported raw materials — fertilizers, animal feeds etc. Hence for comparative purposes it is safe not to calculate percentages for 1952.

Sources: N. Sifleet, *op. cit.* R. Bonnett, *op. cit.*; J. Bethel, *op. cit.*; Statistical Service, *National Income and Product 1960-1962*.

situation. However, the G.D.P. contribution is derived from the net output contribution of the individual products of "other agriculture". It thus provides an over-all estimate of the trend in the contribution of "other agriculture". It also provides a better approximation than production data of the real contribution of the sector to the economy since inputs from other sectors and from abroad are deducted.

The G.D.P. contribution of "other agriculture" decreased from $10.2m. in 1956 to $8.2m. in 1964. These estimates include the fisheries contribution and

since this has been rising, the decline in agriculture itself has been larger than shown. In volume terms the decline has been even larger since prices have increased over the period.

With sugar increasing its contribution to the economy and with other agriculture doing just the opposite, it seems safe to conclude that little or no diversification of agriculture was actually achieved in spite of the efforts made. The reasons for this are explored in the next section.

Economic and Agronomic Problems of Diversification

In considering the general problems of diversification it is worth mentioning at the outset that diversification is not an end in itself and must be assessed according to its contribution to the economic development of the island. This contribution should, of course, take into account direct and indirect effects as well as short-term and long-term considerations. For example, the risks attached to returns from the traditional and new enterprises must be discounted.

Barbados has one of the highest population densities in the world – 1,495 persons per square mile. In this situation, unlike most other Commonwealth Caribbean countries, almost all the cultivable land in the island is being used and the requirement is for a very intensive use of land, which is here a scarce resource. In the absence of idle lands, diversification will succeed only if alternatives to sugar cane can yield competitive returns.

The average yield of cane per acre reaped is about 30 tons and with an almost generally accepted ratooning system of four crops before replanting, the yield per acre utilized for cane (as against harvested acreage) is about 24 tons. At the present price of about $17.00 per ton, gross output per acre of cane land is $408.00. It should be noted that the value added in processing would be about $200.000 thus giving a gross return of about $608.00. A further addition is necessary for the one-fifth of cane acreage which is replanted yearly and which allows food crops to be grown on the land between harvesting and planting.

Another contribution of sugar cane which must be taken into account in comparison with other crops, is the fact that it does not waste soil resources. Sugar cane maintains the structure of the soil and prevents soil erosion especially under the present prevalent system of cane-hole planting. This is an important consideration especially because of the shallowness of the soils of the island. The waste that will be involved with other crops, especially food crops, must be included as a cost element when comparisons are made.

From the agronomic standpoint the risks attached to the growing of sugar cane is low. Long association with large-scale growing of the crop has led to the establishment of research facilities which have enabled the development of suitable varieties even for narrow ecological conditions. Pests and disease problems are also under control. Because of the long tradition of sugar-cane growing and research, a body of knowledge is now available

which has considerably improved cultivation and management. Beside technological improvements, the suitability of the crop to local climatic and soil conditions and its hardy nature are also risk reducing factors. Crop failures are unknown and the annual variation in yields is small relative to most other crops.

Market risks have now increased greatly because of the uncertainty surrounding the future of the Commonwealth Sugar Agreement. However, this has been a recent development and could not have affected the relative attractiveness of sugar in comparison with other crops over most of the study period. It should be pointed out that even in this new situation the market risks facing the sugar industry are probably not higher than those facing other traditional Caribbean export crops such as bananas, citrus and cocoa. It should be noted, too, that the production of food crops involves high market as well as agronomic risks.

The strong competitive position of sugar in Barbados is due to the high prices received under the Commonwealth Sugar Agreement. Therefore, prospects for other crops depend on the quotas secured and the proportion of the arable land in the island which is required to meet these quotas. Under the Agreement, Barbados has been selling about 133,000 tons of sugar at the negotiated price which presently varies between £45 and £47.10 per ton. According to the Agreement prices which are negotiated annually are to be at "levels reasonably remunerative to efficient producers". The original Agreement guaranteed a market for quotas for an eight-year forward period but provision was made for the year-to-year extensions at the annual negotiations. The eight-year period was kept intact until last year when for the first time the one-year extension was not made.

The Negotiated Price Quota under the Commonwealth Sugar Agreement, together with a small quota under the U.S. Sugar Act and sales of about 12,000 tons in the local market, allows Barbados to sell about 155,000 tons of sugar at prices which are considerably higher than the current world free market price. This amount represents a large proportion of present sugar production which varies between 170,000 to 200,000 tons and the continuation of a guaranteed market at relatively high prices for this large proportion of Barbados sugar would most likely greatly restrict the scope of diversification.

The competitive position of sugar could be seen in better perspective if we look at the alternatives to which attention has been directed – food crops and livestock products. The large food import bill and prospective returns based on yields obtained under experimental conditions or in other countries had led to expectations which were too optimistic to be achieved under local farming conditions. Certain problems inherent in the Barbadian situation have not been fully appreciated and consequently they have received inadequate attention. Some of the main problems involved in food crops and livestock production are outlined in what follows:

(1) The nature of these enterprises is demanding of agricultural know-

ledge, skills and management and because of inadequate research and experimentation and the lack of a strong tradition in this kind of farming there is an acute shortage of these requirements. These considerations apply especially to vegetable growing and dairying. In the case of food crops there is the problem of finding suitable varieties and, in the case of livestock, breeds. Vegetables are very sensitive to changes in weather conditions and very susceptible to attacks by pests and diseases. Planting, harvesting and other operations must be carefully timed. Weeding requirements and other cultivation techniques are exacting. Unlike sugar cane and tree crops, close supervision and daily attention are required. On the question of the lack of strong tradition, it should be noted that a significant proportion of the food crops and livestock products are produced by small farmers and the diversification programme has in fact been aimed at these farmers. However, small-scale farming developed much later in Barbados than in other Commonwealth Caribbean countries because of the shortage of land for land settlement programmes. Many of the small farms were started in the present century by Barbadians who worked abroad in Panama, Aruba and Venezuela and who used their savings on returning home to buy land. Many of these people were craftsmen and other skilled and semi-skilled workers and were without a farming background. They tended to continue their occupation while undertaking farming on a part-time basis. Hence they took to sugar cane growing which was more suited to part-time farming and thus never developed a tradition of commercial food-crop growing.

(2) Like cultivation, the marketing of food crops poses special problems. They are perishable and seasonal and because of the small internal market, gluts develop easily. Careful handling is required at the farm level and central marketing organizations are usually required to attend to such problems as the co-ordination of production with market requirements, grading, packing, storage and the finding of export outlets. Such organizations have been established in Barbados and in other Commonwealth Caribbean countries but lack of success in nearly all cases is evidence of the difficult nature of the problems they have to solve.

(3) The farming structure has to be suitable for the carrying out of these enterprises. The tradition of part-time farming which has developed because of the background of the small farmers has already been mentioned. Other reasons for this tradition are inadequate acreages and the availability of job opportunities in urban areas to rural residents because of short distances and good communications. An island-wide random sample survey of 213 small farms in 1963 revealed that only 14 per cent were full-time farmers.[2] Part-time farming means that one of the main advantages of these farms for food crop and livestock enterprises - the close supervision

[2] J. D. Henshall, "The Spatial Structure of Barbados Peasant Agriculture" (M.A. thesis, McGill University, unpublished).

and attention they should receive – is lost to them. Perhaps in this situation where acreages are inadequate a farmer is making better use of his time by utilizing his land for sugar cane growing while carrying another full-time job. Fragmentation is another problem which contributes to the suitability of sugar cane growing for small farms. The incidence of praedial larceny is reported to be high in the island and any plot which is some distance from the homestead is therefore more suitable for growing sugar cane which is much less vulnerable. The 1961 survey showed that the average number of parcels per holding in the small farms (below 10 acres) was 1.2.

(4) Small farms also seem unsuitable for the promotion of diversification because of their tendency to be in drier areas and areas with poorer soils. Most small farms are in the coastal areas where the rainfall is low - 44"-50" with a long dry season - four to five months. These areas also have heavy alkaline soils which are difficult to manage. There are many peasant holdings in the Scotland District and although this is an area of heavy rainfall, the soils of parts of it suffer from instability and the presence of oil and salt.

Henshall's survey found that 55 per cent of the 213 small farms studied had soils which were considered too shallow for successful plant growth while 33 per cent of these had land which was excessively stony or had large areas of rock out-crop. In addition, two-thirds of the holdings were in the low rainfall areas.

(5) The shortage of underground water in many parts of the island and the irrigation needs of food crops and dairying restrict the development of these enterprises. Even where water is available, the overall shortage of water for domestic, industrial and agricultural purposes gives it a high cost and leads to considerations about its proper allocation between these different uses and even between different crops.

Besides the problems of expanding food crop and livestock production, some difficulties involved in developing new export lines should be noted. The rainfall of the island (average 60" per year) is low for many of the traditional export crops of Caribbean countries such as citrus, bananas, cocoa and coffee. The lack of sheltered areas and the prevalence of soils which are shallow, heavy, poorly drained and with an alkaline reaction further restrict the range of choice of crops.

Some General Considerations

The situation in the sugar industry, where protection faces great uncertainty, justifies efforts to diversify the agricultural structure. The alternative and supplemental crops must, however, be viable ones. Food crops and livestock products offer scope for playing a significant role in the agriculture of the island but the technical, educational, economic and structural problems involved in their development must be attended to more vigorously. It should

be pointed out that the requirement is not necessarily for the new crops to give higher returns than sugar. It depends, of course, on the quality of land used. Even where sugar lands are involved, the lower risks to the economy or to a farm resulting from diversified production may compensate for the lower returns. It should be mentioned here, too, that even where the alternatives offer lower returns in the short-run, these may be compensated for by the lower long-term risks involved in the increase in the number of crops grown.

In the case of food crops and livestock products also, if they are expanded without adversely affecting sugar production they could improve the balance-of-trade position by reducing imports. Additionally, if such expansion results in lower prices for these products there would be an overall beneficial effect to the whole economy. Lower food prices would also assist the tourist industry, and larger local food consumption in the tourist trade would increase the contribution of this industry to the economy.

Having agreed that diversification efforts are warranted, we now look at the actual policies which have been followed to see whether they have come to grips with some of the underlying problems.

First of all, it is worth noting that the level of past effort may have been too small. This is reflected in the low level of development spending on agriculture. With the exception of the first Plan, 1946-1956, which was superseded by a new plan in 1952, the agricultural allocation (excluding fisheries and markets) never reached 10 per cent of total development expenditure; and in fact was only about 2 per cent in two of the Plans - 1952-1957 and 1955-1960.[3] These proportions for agriculture are much lower than those in other Commonwealth Caribbean countries and can be compared also with the GDP contribution of agriculture which, as shown in Table 8, is about 25 per cent of total GDP.

There is, of course, the special situation in Barbados of the predominant position of sugar and the dominance of estates in its cultivation. Since the estates finance a large part of their research and development work on sugar, this leaves "other agriculture", the small farmer cane cultivation, and a small part of the estate cane cultivation problems, for attention by the Department of Agriculture. These considerations put a different light on the picture but still they do not seem to justify the low level of development spending. What is important is not only the present contribution of the sector but also the part it is expected to play in the future development of the island. In the context of the limited opportunities for a high rate of growth in the industrial sector, the fast growth of tourism and its linkages with agriculture, the beneficial contribution agriculture can make to the cost of living, and the increas-

[3]The share of development expenditure allocated to agriculture in each of the post-war development plans was as follows: 1946-56 – 12.0 per cent; 1952-57 – 2.8 per cent; 1955-60 – 1.9 per cent; 1960-65 – 6.8 per cent; 1962-65 – 4.4 per cent; 1965-68 – 8.7 per cent. These percentages would be on average 2-3 percentage points higher if we include expenditures for fisheries and marketing.

ing uncertainty of the market for sugar, it would seem that agriculture has an important role to play in the future economic progress of the island.

Inadequate planning is also revealed in the diversification programme itself. No attempt has been made to work out a strategy for the programme, with priorities based on a close study of the problems to be overcome in achieving a diversified agriculture. The result is that the programme lacks direction and a co-ordinated approach. No targets have been set and the policies adopted have not matched in a satisfactory way the problems to be faced.

Some of the basic problems with which policy must be concerned are:

(1) The production of sugar that should be aimed at in the light of market conditions. This would assist the setting of acreage targets for sugar and other agriculture.

(2) Areas suitable for the enterprises which are to be encouraged, taking into account both economic and agronomic considerations. The diversification programme is thought of too much in terms of the utilization of *marginal* sugar lands. Cotton and peanuts may be suitable for some of these lands but vegetables and dairying may be competitive with cane on good cane lands and a proper disposition of the land resources on some farms may require the new crops to replace cane on some of these lands while cane is maintained on poorer lands.

(3) The acreage needed for individual food crops or other crops in the light of home demand and export prospects.

(4) Farming systems that should be adopted and such questions as the extent to which diversification should take place at the farm level, taking into account on the one hand the risks attached to concentration on one or a few crops, and on the other the need for special knowledge.

(5) The economics of water utilization on the new crops in view of the shortage of water and its need for domestic and other purposes.

(6) The suitability of large farms and small farms for the encouragement of the new lines, taking into account some of the unsuitable characteristics of the small farms already mentioned.

(7) The availability of labour.

(8) The marketing problems associated with perishable commodities and the technology of food processing.

Adequate attention to these problems would no doubt have led to policies which were more effective. For example, the market situation for sugar, especially in recent years, would seem to justify measures to stabilize sugar production. If this is considered a reasonable objective, an appropriate policy may be to establish a system of sugar-cane pricing which reflects back to the farmer the low price received for sugar sold in the free market. This would require a two-part pricing system, with quotas determined for each farmer according to the amounts sold under different prices for the whole island. If, for instance, Barbados can sell 160,000 tons of sugar at high