APPRAISAL OF VIRGIN ISLANDS AGRICULTURAL PRODUCTION AND MARKETING

ARS 24-1

UNITED STATES DEPARTMENT OF AGRICULTURE

Agricultural Research Service

C O N T E N T S

PREFACE

Public Law 228, 82d Congress, approved October 29, 1951 (26), authorized the Secretary of Agriculture to, "establish and maintain in the Virgin Islands of the United States an Agricultural research and extension service program." The 1953 appropriations for the Department of Agriculture included funds for the establishment of such programs and immediately after approval of this legislation, steps were taken to procure the facilities needed and to make other necessary arrangements.

A review of the problems, needs, and potentialities of the agriculture and related resources of the Islands by appropriate subject matter specialists appeared to be desirable as a preliminary step in the development of a broad program for the agricultural station. This report summarizes the findings and recommendations of two representatives of the Bureau of Agricultural Economics, who in the fall of 1952 spent about 3 months in the Islands studying the agricultural situation.

Although the study pertained to the Virgin Islands as a whole, major emphasis at least in regard to production, was given to conditions in St. Croix, because of the greater agricultural importance of this island. The examination of markets applies more generally to St. Thomas and St. John, as well as to St. Croix.

Principal objectives were to: (1) Identify conditions of an economic character which appear to be impeding full development of agricultural resources; (2) suggest problems related to specific enterprises or more general areas concerning which the physical science research and extension activities of the agricultural station should give particular stress; and (3) indicate general problems or beneficial programs relating to agriculture which are interagency or community-wide matters rather than in the direct sphere of activity of the station.

Various sources were drawn upon for background material, but the lack of regular reporting services, together with the short time available for assembling primary data did not permit, in many instances, the degree of specificity that would be desirable.

Appreciation cannot be extended individually to all of the farmers, businessmen, public officials, and other observers who contributed substantially to the material contained and conclusions reached in this report. However, special acknowledgements go to Kenneth A. Bartlett, then Head, Division of Tropical Agriculture, ARA, and his staff on St. Croix, all of whom assisted in planning and facilitating this work.

SUMMARY

In contrast to most other areas in North America, the economy of the Virgin Islands has declined during most of the last century. The population is much smaller; acres of cropland harvested are only about a fifth as large as formerly; and the shipping and rum industries are well below previous highs.

The principal characteristics of present agricultural operations are:

1. In several respects agricultural production in the Islands is marginal. Consequently, all possible enterprises must be evaluated in planning programs for the use of present resources. In roughly a third of the years, yields are sharply reduced because of inadequate moisture and water shortages are even more frequent in some areas. Emigration has reduced the size of the agricultural labor force. The small acreage in many farms reduces efficiency of production, and because of the small scale of agriculture on the Islands little has been done to learn and put into effect improved methods and practices. Difficulties of transportation and high costs are important obstacles in reaching some of the markets in which sales have been made.

2. Many of those now engaged in agriculture are elderly and show evidences of malnutrition. In many cases, they dislike agricultural employment, partly because of the low incomes it provides. These people have neither the resources nor the information necessary for an efficient agriculture. In general, conditions of poverty still prevail, even though improvement has been accomplished over the past several decades.

3. Income possibilities, for those who have a choice, are generally higher in urban than in farm employment. This has increased the difficulty of attracting younger and better trained individuals to agriculture.

4. Despite these conditions, however, some agricultural producers would use research findings effectively if they were properly presented. It is reported that in some of the other Caribbean Islands more progressive agricultural practices are employed.

5. Stable markets have been developed for only one or two products and, for the most part, adequate processing facilities and other marketing equipment are lacking. Agricultural expansion has been seriously retarded by deficient shipping and docking facilities, both for interisland trade and for commerce with more distant markets, particularly Puerto Rico.

In view of these circumstances, changes in agriculture should aim at increasing per capita incomes by creating conditions providing greater opportunity for individual resourcefulness and initiative. Despite other improvements which may occur some producers will need to acquire more land, if this is to be accomplished. Credit will be generally needed, as will assistance with individual production and marketing problems. Revisions of some Government programs concerning the Islands, including

removal of present inequities in tax policies, would benefit agriculture. Improvements in transportation and marketing services will be necessary components of a successful expansion of agriculture. Finally, general agreement as to the importance of the Islands to the United States from the standpoint of defense and other economic and social objectives will be essential to the development of sound programs for improvement. Discontinuity and lack of clearly formulated objectives have been serious handicaps to some Governmental activities of the past.

If these changes can be made, there is reasonable promise for successful expansion of agriculture in the Islands, particularly in St. Croix and possibly in St. John. Production conditions are favorable for cattle and other kinds of livestock, especially those that can be raised principally on forage. Some animals, especially those of the better grades, could be sold locally but Puerto Rico would be the principal market. Sales of breeding stock, particularly of cattle, could be increased, and in occasional years, meat might be sold on the mainland. The outlook for production of milk is about as promising, but at present prices it is not likely that sales can be expanded appreciably in the near future. A substantially larger quantity of poultry and eggs could be sold locally and in Puerto Rico, but expanded commercial production in the near future would have to depend upon imported feeds. Cereals, both for human use and for feed, would find a ready local market, and the production of corn and sorghums offers promise if economical ways to control damage from insects and losses from storage can be found.

Many fruits can be grown in the Islands, and improvement in the varieties of a few, such as limes, papayas, and mangoes, seems justified on the basis of market prospects. Both Puerto Rico and the mainland have provided markets for a few vegetables such as tomatoes, and probably other kinds could be sold, particularly if transportation is improved. Vegetable production has been difficult in some seasons, because of variations in weather and inadequate measures for controlling insects and diseases. Sugarcane is presently the most profitable enterprise for many farmers, and it may continue to be of major importance. Alternative views as to the future position of this crop are summarized in this report. In addition other types of specialty crops might be produced in the Islands, particularly if demand for these crops in mainland markets should increase.

Larger supplies of several products could be produced for the local market. Puerto Rico may be expected to buy most of the increased output of livestock and perhaps some vegetable products. Large quantities of a few vegetables, fruits, and specialty crops may be marketed most successfully in volume in mainland markets.

III

GENERAL RECOMMENDATIONS FOR IMPROVING ISLAND AGRICULTURE

1. Improved Marketing Organization

The major marketing problem of the Virgin Islands is the lack of an adequate market on which to sell much of the output which could be produced. To improve this situation, a marketing organization should be established with sufficient financial support so that a sustained and coordinated effort over a several-year period could be made to provide a marketing mechanism for such products, and to improve the several necessary marketing services. Probably most of the funds required would need to be loans from public sources, and they should be adequate to cover a developmental period which might extend over a few years. Local producers should have broad opportunity to participate in management. Major emphasis should be given to the development of sales of livestock products in Puerto Rico, and fresh vegetables and possibly a few kinds of fruit in Puerto Rico and the mainland. Sales within the Virgin Islands also can be increased. Much of the food used in the Virgin Islands now comes from the mainland or other islands. Major aspects of this program requiring further inquiry are:

A. The market outlook for principal export possibilities, such as peppers and tomatoes, should be further evaluated with emphasis on competition from other areas and obstacles to selling in off-island markets.

B. Operating practices and procedures for the proposed marketing organization should be thoroughly examined, limited attention being given to the reasons for past local failures, and considerable emphasis being placed on the current Government marketing programs in Puerto Rico and in some of the British Islands that export products to the mainland.

C. Possible sources and conditions of financial support should be considered.

D. The most economical ways to provide local marketing services, including credit should be determined. Immediate attention should be given to improving the shipping service among the Islands and to Puerto Rico. The docking and loading facilities in St. Croix are entirely inadequate and the possibility of building a pier should be thoroughly reexamined.

E. A desirable early step would be to have this proposal discussed by producers and others in order to determine the extent of local support and the principal difficulties foreseen by these groups.

2. Evaluation and Planning of Practical Family-sized Units

To provide necessary information and a general plan to aid in the establishment of family farms through the Farmers Home Administration, a

study of the resource requirements and of desirable enterprise combinations for such farms is needed. Variations in physical conditions between different parts of the Island and the fact that proximity to the sugar mill and general accessibility are important conditions determining a suitable location for cane production, make it almost necessary that individual farm plans be developed and that overall community arrangements be considered. A detailed survey of farms ranging in size from 10 (or less) to 100 acres should provide valuable information for the development of such a program.*

3. Balanced Educational, Technical Service, and Fact-Finding Program

Cultural practices used in farming operations on St. Croix are at a generally low level, which suggests that some producers would benefit substantially from an educational and technical-assistance program. It is believed that the overall program of the station should reflect a balance between general educational and service activities, as contrasted with fact-finding or exploratory investigations. Some individuals on the staff may need to devote full attention to one or the other phase of the overall program. But for several years most staff members may find it convenient to divide their time between the two general aspects of the overall program. The needs and opportunities mentioned have received consideration in developing present operating procedures. However, special precaution is needed to avoid neglect of either phase of the program.

4. Expanding Off-farm Employment

Present developments within the Islands point to the desirability of increasing off-farm employment, particularly in the service trades. Increases in acreages handled by some operators and improvements in agricultural processing suggest that less labor will be needed in agriculture but that more individuals who can operate and repair mechanical equipment will be needed. Increases in tourism and possibly in other industries, may create greater local opportunities for employment. Full advantage should be taken of these developments.

One step would be to establish a more comprehensive and diversified program of technical training in local high schools and possibly in 4-H Club activities. Opportunities for employment should be reappraised regularly for the information of those in the educational system who will be employed in the Islands later on. In some recent instances semiskilled craftsmen or technicians had to be brought from Puerto Rico or the mainland to fill a local need. Shortages of such personnel have adversely influenced the establishment or expansion of some small industries, such as otherwise might have occurred, for example, in an effort to take advantage of the tariff laws pertaining to the Islands.

* A survey of family-sized farms on St. Croix was conducted in 1953.

Finally, some people now engaged in agriculture will receive little direct benefit from improved agricultural or off-farm employment conditions because they are past the age when they could profit from them. Strengthening old-age assistance programs would help to improve the status of these individuals.

RECOMMENDATIONS AS TO SPECIFIC ENTERPRISES

Sugarcane

The permanent place which the production and marketing of sugar is to have in the economy of the Islands is a question of major importance. On the one hand, adverse factors emphasize the unprofitable nature of this enterprise from certain standpoints. This has prompted the suggestion that abandonment of production may be a desirable longterm objective. On the other hand no alternatives that will provide as much income to as large a group can as yet be pointed out. Therefore, the suggestion that sugar production be abandoned may not be fully justified. As a basis for assessing more fully the merits of these alternatives, special studies of certain aspects of production and marketing will be needed. These include:

(1) The competitive position of the St. Croix sugar industry, emphasizing likely trends in production efficiency in the Island in comparison with similar prospective developments in other domestic areas.

(2) The operational efficiency of the Virgin Islands Corporation in producing and processing sugarcane and in marketing sugar.

(3) The consequences, in terms of producer initiative, income, and costs of production, of shifting a larger part of sugarcane production into private hands, taking account not only of conditions in St. Croix, but also of the experience in other Caribbean islands.

(4) The alternatives to sugarcane, including an examination of the skills, qualifications for other work, and mobility of persons who would be directly involved if production were discontinued.

Until such time as further studies can be made and the desirable permanent position of sugarcane established, production aspects of the sugar enterprise would benefit from research on the improvement of varieties. This would include selection and development of superior varieties from the standpoint of high percentage of germination, uniformity of growth, sucrose content, response to heavy fertilizer treatments, resistance to drought, and ease of harvesting.

Further study of alternative row widths, field layouts, and methods of performing field operations which promise to reduce production and

harvesting costs, should include: (1) An examination of ways to further mechanize planting, fertilizing, spraying, and harvesting operations; and (2) tests of the relative efficiency of various herbicides when applied by different methods, at varying intervals, and under differing conditions of weed growth. Superior methods should be demonstrated by field tests that could be observed by local producers.

Cattle

Research and programs concerning the cattle enterprise might well include:

(1) Tests to determine the adaptability of various pasture grasses to different soils, locations, slopes, moisture conditions, and the like.

(2) Comparison of the costs and relative efficiency of ways of eradicating brush--chemical, mechanical, or combinations of these two.

(3) Measurement of the approximate carrying capacity and production of beef and milk under different programs of pasture rotations and grazing schedules.

(4) Appraisal of alternative crops for use as supplemental feeds (both grains and forage) and the working out of practical methods of preservation and use.

(5) Assessment of the possibility of adding to supplies of feed for beef, dairy cattle, and other ruminants through the use of byproducts from sugar refining (bagasse pith plus molasses) in combination with such products as urea. Byproducts from the abattoir, in case it resumes operation at a more nearly capacity level, represent an additional source of feed for some kinds of livestock.

(6) The finding of ways to improve the breeds of cattle on the Islands, including test of the adaptability and productivity of selected breeds and crossbreeds which have not been investigated sufficiently heretofore and the development of programs to expedite improvement of herds.

(7) A fever-tick eradication program which should be initiated and carried through to successful completion.

Other Livestock

Major attention should be given to: (1) Alternative systems of management for each livestock enterprise, as for example, rotation grazing of sheep versus unrestricted grazing; (2) methods of improving the type and

productivity of animals raised; and (3) determining suitable grain crops required to support these enterprises adequately, and working out feasible methods of harvesting, processing, and storing these crops for later use.

Vegetable and fruit Crops

As a basis for better advising farmers as to the feasibility of growing these crops, the areas in which soils are reasonably well suited to commercial production of vegetables and fruits should be defined. Possibilities of providing adequate supplies of water for irrigation purposes in some areas should receive further attention.

Beyond these factors, many problems of production (such as insect control and similar hazards, effects of different quantities and kinds of fertilizer, and further selection and improvement of varieties) will arise and must be reckoned with as they occur. Improvement of varieties will be of particular importance if commercial production of fruit is to be fully developed. The program begun in 1951 by the Virgin Islands Corporation of testing on a commercial scale the feasibility of producing and marketing certain vegetables and specialty crops should be continued.

With the application of quarantine No. 58 to the Islands, formal procedures should be worked out which will allow one inspection of fruits and vegetables by inspectors now stationed on the Islands to suffice for produce moving to or through Puerto Rico. Inspections by both Federal and Puerto Rican officials should not be required. Such an arrangement would help reduce both the time and costs of marketing perishable commodities.

MISCELLANEOUS RELATED RECOMMENDATIONS

1. Major attention has been given in this report to the several products which are currently most important in the Islands. However, the range of enterprises may be somewhat broader than is indicated. A highly desirable and continuing function of the agricultural program should be to collect and evaluate pertinent data with the objective of determining whether or not there are new crops or varieties that should be developed commercially. The work on production would need to come from trials conducted locally, whereas marketing appraisals might be undertaken by other departmental agencies.

2. Assuming that they represent the views of most residents of the Islands, restrictions on land use and commercial developments should be enforced to preserve the conditions and characteristics that appeal to tourists, and to foster better agricultural uses of land.

3. If further public price regulations are undertaken in the Islands, they should be drafted in such a way as not to penalize premium grades of cattle or other products.

4. In instances where municipalities buy food, procedures should be made flexible enough so that to the greatest extent possible, without paying price premiums, necessary purchases will draw upon local production.

5. Home demonstration and related work with farm families should receive greater attention in nutrition and other fields. The ways in which diets can be improved with home-produced foods need to be shown.

6. As several of the services provided to areas served by land-grant institutions are not available in the Islands, the special conditions in the Islands perhaps have not been fully reported, in many instances. This may have been true especially when Government programs or legislation pertaining to agriculture were under consideration. Recent examples are the regulation of prices by the Office of Price Stabilization and the establishment of minimum wage rates by various agencies. The Agricultural Program should plan to conduct or should arrange for the conduct of investigations that would yield objective information in those more important cases in which local agriculture is concerned.

In this connection, it would be desirable to establish a systematic procedure for obtaining the views and counsel of representative producers in the Islands, primarily as an additional way to keep the Agricultural Program fully oriented as to the major problems being encountered by farmers.

7. For the major farm enterprises, summaries should be made of average yields, production rates, and input requirements (labor, materials, and capital invested) per acre or per animal unit, assuming average management techniques. These summaries would be useful in planning and conducting educational and related programs. They would indicate average present accomplishments under normal techniques and would provide a basis for estimating possible benefits from adoption of improved practices that are presently known or that may result from research. Data required for compiling these summaries might be accumulated over a period of 12 to 18 months by staff personnel who, because of the seasonal nature of their work, would have time to devote to such activities. Extension personnel should benefit from the broader contacts and familiarity with agricultural conditions which participation in such a study would provide.

AGRICULTURAL PRODUCTION AND MARKETING IN THE VIRGIN ISLANDS

By Winn F. Finner 1/ and Troy Mullins 2/

INTRODUCTION

After more than 200 years in which the ownership of the Virgin Islands changed several times, they were acquired by Denmark between 1672 and 1733. Except for two short periods at the beginning of the 19th century, the Islands continued under Danish rule until their purchase by this country in 1917 (7, pp. 91-93). 3/

During most of the 18th century the trend in economic activities in the Islands was upward. This growth, however, was based partly on temporary factors. Of significance were the exhaustive uses of both natural and human resources. These practices aroused much criticism, and adjustments soon became necessary. Changes in external factors also affected the Islands. The rapid development commercially of other western areas reduced emphasis on some types of trade which previously were of importance to the Islands. Because of improvements in oceangoing shipping, the Islands declined as a transshipping and ship-receiving port. Production of sugarcane expanded in other areas that were equally or in many cases better suited to its culture, and world supplies of sugar were further enlarged as a result of an increased output of sugar beets. Because of these and other changes the local economy began to decline during the last half of the 19th century.

The effects of these changes upon local agriculture and the rural economy are documented in the records of the sugar industry. From a peak of more than 30,000 harvested acres devoted to this crop at the beginning of the 19th century, a marked decline occurred. By the close of the century the area harvested had been reduced to 16,000 acres. By 1930 only 10,000 and by 1952 less than 5,000 acres were harvested. Much of the land taken out of sugarcane is now used for pasture although a considerable acreage of the less desirable slopes has been practically abandoned and now supports a heavy growth of "bush." Since 1930, the acreage of all crops harvested has ranged from 5,000 to 7,000 acres and in 1949 it was about 6,000 acres.

1/ Concerned primarily with marketing, processing, and related phases of the study. Prepared sections dealing with these subjects, general sections on population characteristics, labor and wage rates, and demand, and appendix A.

2/ Concerned mainly with production problems and opportunities. Prepared the enterprise statements evaluating production possibilities, the sections on local tax policies, land ownership and tenure, power and equipment problems, and the Virgin Islands Corporation, and appendix B.

3/ The Islands were under British rule from April 1, 1801 to February 22, 1802, and from December 22, 1807 to April 15, 1815.

GENERAL FACTORS THAT INFLUENCE AGRICULTURAL POSSIBILITIES

Agricultural Resources

A high percentage of the resources of the Virgin Islands that are adapted to agricultural uses is on the island of St. Croix. This is the largest of the three major islands; and has an area of about 52,500 acres. It varies from level to moderately rolling valleys and coves to irregular hills and ridges which range up to 1,200 feet above sea level. The island is some 22 miles long from east to west, and at its maximum point the north-south width is roughly a third of its length. Approximately a third of the land, mainly that in the central and southwestern sections, is suitable 4/ for cultivated crops. The rural population is located largely in these sections.

Rainfall averages about 45 inches annually, although it varies widely from year to year. Severe droughts occur in from 2 to 4 years of each 10. The rainfall is unevenly distributed among seasons and over the land area. Generally from May through November rainfall is heavier. The western and northwestern sections which have higher elevations receive the greater share; the eastern end generally receives little more than half the average for the island. Prevailing winds are northeasterly in winter and spring, shifting to southeasterly in summer and fall. They cause excessive evaporation rates, particularly along the coastlines and other unprotected areas.

In the last several years the possibility of irrigation has received attention, but the prospects are not promising. Around 40 farm ponds have been built on St. Croix in recent years, and it is estimated that there are approximately 100 additional suitable sites. But in most instances the supplies of water that would be impounded, at best would permit only limited supplemental irrigation over small areas adjacent to the reservoirs. Most ponds have been built to help recharge the ground-water tables and to provide water for livestock. Field surveys indicate that larger quantities of water could be impounded in only a few locations. Construction of catchments is apparently too costly to make them significant for irrigation. Other field investigations have indicated that there is little prospect of obtaining a significant quantity of water from wells for irrigation purposes. Even if the most optimistic estimates of potential supplies for irrigation from these several sources are realized, the quantity of water obtained probably would be sufficient for only a few hundred acres.

4/ According to the Soil Conservation Service about 17,000 acres are included in capability classes I, II, and III. With varying degrees of conservation treatment all of such land can be safely cultivated.

A little more than 80 percent of the land of St. Croix was included in the 508 farms reported in the 1950 Agricultural Census (Appendix table 15). A substantial number of the enumerated farms are in reality subsistence home-sites and can hardly be classed as farms. Numbers of farms have declined by 16 percent since 1940. Of the total land in farms, 60 percent was classified as pastureland, which in 1950 supported about 8,300 head of cattle kept mainly for production of beef. Other grazing animals reported in the 1950 census include about 1,100 horses and mules, 1,900 sheep, 1,400 goats, and 700 hogs.

Sugarcane is the principal crop grown; it occupies about 90 percent of the land from which crops are harvested. A little more than 4,000 acres of cane were harvested in 1949, about the same as for 1939. In 1952 (according to reports of the Virgin Islands Corporation) almost 5,000 acres were harvested. About 400 acres of miscellaneous truck crops were reported for 1949, compared with less than 200 acres in 1939. Tropical fruits, such as avocados, limes, mangos, bananas, and grapefruit are grown. The scattered production of these fruits is largely for home use, and sales are incidental.

About 40 miles north of St. Croix lie the islands of St. Thomas and St. John, which in total area comprise 20,000 and 12,000 acres respectively. Compared with St. Croix the topography of these islands is much less suitable for intensive agriculture. Only about 2,000 acres on St. Thomas are reasonably level to rolling, and on St. John a smaller area is equally suited to intensive agriculture. Most of the land is in timber and bush, with only the more desirable areas being utilized for grazing. The 1950 census reported only 155 farms on St. Thomas. Many of these farms represent either small vegetable growers or the subsistence plots of families who earn their living in nonfarm employment. For the same year, only 92 farms were reported for St. John. Because of the limited possibilities for expansion of intensive agriculture on these islands, and the limited time available for making the study, it appeared desirable to devote attention, as far as problems of production were concerned, largely to St. Croix.

Population and Socio-Economic Considerations

The general economic decline in the islands in the last century has been reflected in the trends in population. A population peak of a little more than 43,000 persons was reached about 1830, and a low point of approximately 50 percent of this number was recorded 100 years later (table 1). The rural population declined even more drastically. In 1930 it was only 39 percent of the number on farms in 1830. But since 1930 increases of about 20 percent in the total population and 30 percent in the rural population have occurred. During this period the population of St. Thomas has increased considerably, whereas the populations of St. Croix and St. John were about the same in 1950 as in 1930.

Table 1.--Virgin Islands: Population for selected years, 1835-1950 1/

Year	Virgin Islands	Urban places	Rural territory	St. Croix	St. Thomas	St. John
	Number	Number	Number	Number	Number	Number
1835	43,178	16,877	26,301			
1841	40,955	15,412	25,543			
1846	39,588	15,668	23,920			
1850	39,614	19,639	19,975			
1855	37,137	19,378	17,759			
1860	38,231	20,100	18,131			
1870	37,821	20,625	17,196			
1880	33,763	20,183	13,580			
1890	32,786	18,637	14,149			
1901	30,527	17,768	12,759			
1911	27,086	16,042	11,044			
1917	26,051	15,465	10,586			
1930	22,012	13,501	8,511	11,413	9,834	765
1940	24,889	14,296	10,593	12,902	11,265	722
1950	26,665	15,581	11,084	12,103	13,813	749

1/ U. S. Census of Population, 1950 (18).

In examining both past and possible future changes in the agriculture of the Islands, the characteristics of the population, particularly as these relate to employment in agriculture, are important. Although a comprehensive treatment of this subject is not intended, it may be well to discuss briefly what appear to be the major relevant characteristics of the people of the Islands.

Negroes are the predominant racial group; in 1950 they accounted for about 70 percent of the total population (appendix table 16). Those of mixed and other races make up almost a fifth of the total. A considerable proportion of these are Puerto Ricans. Members of the white race make up a little more than 10 percent of the total population. From 1917 to 1950 the principal changes occurring in the racial composition of the population were the fairly small increase in number of white persons which about equaled the decline in number of Negroes, and the somewhat fluctuating proportion accounted for by members of other races. This latter total increased sharply from 1930 to 1940 and then declined slightly from 1940 to 1950. A small increase has occurred in the last 2 years, and it is estimated locally that approximately a fourth of the farmers in St. Croix are Puerto Ricans.

Although recent information as to the age distribution of agricultural workers is not available, it is clear that the more elderly segments of the population tend to engage in farming. It was estimated on the basis of a survey in 1947 that the average age of farmers in St. Croix was 52 years (24). Population data from the 1950 census shown in appendix table 17, indicate that about 20 percent of the rural population is more than 50

years old. The proportion of Negroes living in rural areas who are in this age group was higher. During the conduct of field work in connection with this report it was observed that most of the Negro farm operators interviewed were of middle to advanced age, frequently more than 60 whereas most Puerto Rican operators were younger. Young men do not select farming as an occupation. For example, it is reported by the Superintendent of Education that since the war no St. Croix high school graduate has become a farmer, despite the fact that a number of students have taken the agricultural course offered in some recent years.

Many people on the Islands are descendants of slaves. Although slavery was abolished in 1848, the type of economy that had been built around it continued in some degree into the 20th century. 5/ A commonly expressed view is that the association of slavery with agriculture and low incomes has meant that agricultural employment has an unpreferred position in the judgment of many Negroes (1) as well as others in the Islands. It appears also that the slave tradition, together with such factors as limited economic opportunities, has contributed in a diminishing degree over time to family instability among some population groups, and to lessened initiative of some agricultural producers (31, 1940, p. 35).

Despite this attitude toward agriculture more people are employed in this industry, including forestry and fisheries, than in any other industry on the Islands. For the three islands combined, agricultural employment makes up about 20 percent of the total; and on St. Croix about a third of the civilian labor force is so engaged. 6/ Other main employment categories are wholesale and retail trade, personal services--both of which are influenced markedly by the tourist industry--construction, and public administration (table 2).

5/ After the abolition of slavery according to Earl B. Shaw, (16, p. 421), "the Government of the islands . . .created a condition of virtual slavery by means of contract and colonization systems, by the importation of cheap labor from the British West Indies, by drastic penal restrictions, and by the use of free rum. This situation existed until the close of the nineteenth century, when labor vigorously opposed existing conditions. Offered higher wages in outside areas, many of the laborers emigrated. Work on the Panama Canal and on the various Caribbean fruit and oil developments attracted some, and with the purchase of the islands by the United States in 1917 the favorable emigration laws and a large demand for labor in that country accelerated the general exodus."

6/ These data pertain to March 1950; agricultural employment would probably be moderately lower at other times in the year when sugarcane is not being harvested. However, employment by the Virgin Islands Corporation was approximately 20 percent lower in March 1950 than in the same month in 1951 and 1952.

Low incomes, at least as compared with mainland levels, further characterize the economy of the Virgin Islands. Information for March 1950, presented in table 2, indicates that of the total population of about 26,000 in 1949 about 8,300 persons had civilian employment. As is discussed in greater detail later, about half of those employed had annual incomes of less than $500. Average per capita income for the population represented by these wage earners probably did not exceed $200 in 1949. The substantial increase in hourly wage rates from 1949 to 1952 no doubt has had an upward influence on annual earnings.

It is likely that incomes are significantly lower in agricultural than in urban employment. A survey of 412 farms in St. Croix in 1947 showed an average gross cash income per farm of just under $230 for the year. Some of these operators worked part time off the farm. But information from the 1950 census indicates that additions to income from this source were not particularly large for many farmers. In St. Croix, 477 farmers reported some off-farm work and 31 reported none. Of the 477, about half worked less than 49 days. 7/ Assuming an average of 40 days per farmer for this group, total earnings from off-farm work for the year at the wage rates established for unskilled labor early in 1950 would have been less than $100.

Partly because of the low incomes of many families in the Islands serious dietary problems exist. Poor diets also occur partly because of lack of information concerning, or an aversion to, the use of some of the foods raised locally. A survey by the American Public Health Association in 1951 (6) concluded that, "malnutrition continues to be a major health problem among all age groups." This situation may be adjudged highly significant in explaining the present level of industry and initiative of local agricultural labor, although in recent years nutritional and medical programs have been expanded.

One consequence of the characteristics discussed is that there is no large middle class of farm operators, such as are found in typical mainland rural areas, who have both an interest in and some financial means of adopting new technology and who have demonstrated the initiative and leadership necessary to achieve full success. Nevertheless, many Virgin Islands farmers are as interested as those on the mainland in learning of new practices and procedures and in improving their economic position and some, of course, have been successful in doing so. Research and extension programs will be of value to these operators, particularly to those whose resources will enable them to utilize research findings. Further delays in the widespread adoption of better technology and other agricultural improvements will be reflected in continued low incomes in agriculture. In turn, as long as many potential farmers can earn higher

7/ Thirty-nine St. Croix farmers worked from 50 to 99 days off their farms, 54 worked from 100 to 199 days, and 137 worked 200 days or more.

Table 2.--Virgin Islands: Labor force and industry of employed persons, total and by islands, March 1950

Item	Virgin Islands total	St. Croix	St. John	St. Thomas
	Number	Number	Number	Number
Total labor force	9,021	4,133	271	4,617
Civilian labor force	8,809	4,124	271	4,414
Unemployed	540	187	22	331
Employed	8,269	3,937	249	4,083
Industry of employed persons:				
Agriculture, forestry, and fisheries	1,661	1,376	45	240
Construction	939	317	14	608
Manufacturing	464	309	9	146
Transportation and communication	613	245	10	358
Wholesale and retail trade	1,088	402	10	676
Finance, insurance, and real estate	97	28	1	68
Business and repair services	119	45	---	74
Personal services	1,436	573	49	814
Entertainment and recreation	54	16	---	38
Professional and related services	767	344	28	395
Public administration	803	221	53	529
Industry not reported	228	61	30	137

incomes from working as unskilled laborers than as farmers, it will be difficult to attract better trained and younger individuals to agriculture.

Some of these considerations may appear to be only remotely related to agricultural production and marketing. But these undertakings occur in a substantially different setting in the Islands than in continental communities. As was stated in the Governor's Annual Report for 1940 (31):

> "The Virgin Islands have the physical beauty, the warm climate, the charm and hospitality of the West Indies. But they also have suffered the long, inexorable economic decline which has made one recent commentator on the British West Indies declare

that 'the social and economic study of the West Indies is necessarily a study of poverty.' The casual visitor too often relates his experiences and findings in the Virgin Islands to norms, or what he regards as norms, in his own community in the North, leaving out of consideration local history and geography, and the tough web of local culture which is their expression. He frequently overlooks the attitudes of insularity, exaggerated parochialism, excessive and suspicious individualism, political and social conservatism, and heritages of an inadequate educational system and of deficient public health services, and conditions of undernourishment and malnutrition, and the problems arising from economic and political re-orientation which are common to West Indian islands . . ."

Labor and Wage Rates

The problem of adequate and efficient labor to perform the necessary production and marketing jobs is important for the future of agriculture in the Virgin Islands. Until a few years before this country bought the Islands, nonagricultural alternatives for most of the local population were more limited. The shortage of farm workers apparently was not a serious problem, except during the cane harvesting season in some years. But since that time, and particularly after the middle thirties, the number who have either emigrated or gone into nonagricultural employment in the Islands has been an increasing proportion of the total population. 8/ In its request for authority to bring in several hundred workers from the British West Indies to assist in harvesting the 1953 crop, the Virgin Islands Corporation stated: "For the last several years our 'resident' labor force has been increasingly inadequate to our needs, resulting in a great amount of lost time in our milling operations due to insufficient deliveries of cane, thereby causing a large financial loss to this Corporation." The extension of the United States immigration law to the Islands shortly after their purchase also made it harder for individuals from neighboring islands to seek temporary employment in the Virgin Islands as had been done on occasion in earlier years.

In this connection no evidence was found to substantiate the claim occasionally made that some able-bodied individuals receive sufficient income through relief payments so that they do not seek employment. Of the 700 who were receiving public welfare assistance in St. Croix in September 1952, for example, all but 64 were in one of the following groups: (1) Over 65, (2) minor, (3) totally and permanently disabled, or (4) blind. The 64--equal to less than 2 percent of the labor force--

8/ Of all persons employed in the Virgin Islands in 1940, 24 percent were engaged in agriculture as compared with only about 20 percent in 1950.

were judged to be unemployable on the basis of medical certificates. The average payment per person receiving assistance was $9.20 for the month.

As indicated in appendix table 18, the principal increases in nonagricultural employment in the Islands in the last decade occurred in construction and Government activities, although most industry groups reported increases.

Much of the reason for the increase in nonagricultural employment, as compared with that in agriculture, and the consequent difficulty of employing agricultural workers, lies in the level of wages in each. Because of the importance of this subject, the wage situation is reviewed here.

In St. Croix wage rates are subject to regulation by: 9/ (1) The Harrigan Wage and Hour Act enacted by the Municipal Council of St. Croix (14); (2) the United States Secretary of Labor under the provisions of the Fair Labor Standards Act of 1938 (26, 52 Stat. 1060); (3) special determinations made of "prevailing rates" in connection with particular projects; and (4) the Secretary of Agriculture under provisions of the Sugar Act of 1948 (26, 61 Stat. 922).

Perhaps the chief wage legislation now operating in St. Croix is the Harrigan Wage and Hour Act which was enacted about 3 years ago. This law establishes minimum hourly wage rates for those persons earning less than $100 a month, except those employed by Government, by a Federal corporation, or in exempted occupations. Table 3 shows the hourly rates that prevailed under this act during the first part of 1952 and the new rates which became effective July 14, 1952:

For the year ended June 1952, 744 employed persons came under the scope of this act. The act has an important bearing on agricultural wage rates, and it is estimated by the Wage Commissioner that approximately 70 percent of the workers who come under its provisions are employed in agriculture. The rate of 40 cents an hour commonly applies in the employment of farm workers by individual farmers, although some are paid a higher wage.

9/ A similar situation prevails in St. Thomas and St. John, except that the Virgin Islands Corporation does not conduct sugar operations on these Islands, which means that findings by the Secretary of Agriculture do not apply. Also the minimum wage rates established by local authority in St. Thomas and St. John are as set forth in the Hill's Wage and Hour Act (15) first passed in November 1941. Since February 1953, the minimum wage rates established by this act have been the same as those established by the Harrigan Wage and Hour Act, effective July 14, 1952.

Table 3.--Minimum hourly wage rates established by the Municipal Council of St. Croix

Classification of worker 1/	Rates effective July 14, 1952	Rates effective through July 13, 1952	Number of employees covered--year ended June 1952
	Cents per hour	Cents per hour	Number
Utility worker	30	15	93
Sales and service clerk	35	20	107
Unskilled labor	40	30	298
Semiskilled	50	40	84
Skilled	65	50	162

1/ Classification of workers is determined by the Wage Commissioner.

The Virgin Islands are exempted from application of the Federal 75-cent-minimum-wage law. Nevertheless, the Secretary of Labor is authorized to establish minimum wage rates, and he has done so for many occupational classifications in the Virgin Islands for industries engaged in interstate commerce. In one industry an hourly minimum of 15 cents was established and in others rates up to 50 cents an hour were fixed. The two rates that apply specifically to agriculture are 37 cents an hour for the meatpacking industry, and 30 cents an hour for fruit and vegetable packing and assembly of farm products.

A third wage minimum arises from the fact that in connection with certain projects which have a bearing on or affect interstate commerce, special determinations are made of the "prevailing rates" for labor. For example, the Federal Housing Project while under construction in Christiansted had some minimum hourly rates of $1.25 or more for certain types of skilled employment.

Finally, the Secretary of Agriculture establishes minimum rates of pay for "all persons employed in sugarcane work on the farm." In the establishment of these rates particular attention has been paid to the wage levels that prevail in the community. Consequently, changes by the Secretary normally have occurred along with or after a general change in rates has taken place. Under this authority the following were established for the calendar years 1952 and 1953.

Job	Minimum rates per hour	
	1952	1953 1/
Spraying weeds (chemical)	$0.35	$0.43
Tractor and truck operator	40	50
Mechanical cane loader operator	50	65
All other jobs	30	40

1/ The regulations for 1953 permit the employment of workers, certified to be handicapped, by the St. Croix Wage Commissioner at rates up to one-third less than those shown.

These are basic rates. Persons employed in excess of 8 hours a day or 44 hours a week receive overtime rates for such excess not less than $1\frac{1}{2}$ times the basic rate.

The largest employer of sugarcane labor in the Islands--the Virgin Islands Corporation--has put many of its field operations on a job, or piecework basis. As a result wages actually received by a large number of those employed by the corporation are above the minima established by the United States Department of Agriculture. 10/

Because of several wage regulations, wage rates generally are higher than they would be under any one of the four authorities. Thus, under the Harrigan Act an unskilled laborer must receive at least 40 cents an hour; but under present determinations by the Secretary of Labor the minimum wage in the construction industry for unskilled labor is 45 cents an hour. Conversely, some of the determinations of the Secretary of Labor are rendered at least partly inoperative because the higher minima for certain jobs established by the Harrigan Act. No doubt, the Harrigan Act has benefited agricultural workers directly, inasmuch as no other authority establishes a higher minimum, for unskilled agricultural work. But effective operation of this act has been aided by the regulatory activities of other authorities.

In addition, the demand for labor during recent years has been such that many employees have received wages above the statutory minima. A survey by the Wage Commissioner in 1952 disclosed that 70 percent of private industry in St. Thomas was paying above-minimum wages--a condition which appears to be more prevalent in industry than in agriculture.

The tendency in the last few years has been to increase the minimum wage established under each authority. In exempting the Virgin Islands from the operation of the 75-cent wage minimum, Congress nevertheless indicated that this goal should be reached as soon as practicable.

So long as the present level of economic activity continues, wage floors in the Virgin Islands probably will tend upward. Such minima have been raised despite earlier protests of agricultural producers in the Islands. The rational course now would appear to be to find ways in which labor can be used more efficiently in agricultural operations, so that labor income from agriculture can be increased. Otherwise, it is difficult to establish a defense against the proposition that the most desirable course for the youth of the Islands is to find nonagricultural employment either in the Islands or elsewhere.

10/ Of the 643 workers employed in harvesting the 1952 crop, 253 earned from 30 to 39 cents an hour; 160 earned 40 to 49 cents; 118 earned 50 to 59 cents; and the earnings of others ranged up to more than $1 an hour. The highest minimum established by the Secretary, as noted previously, was 50 cents an hour, and for most workers it was 30 cents an hour.

Thus, wages need to be geared to productivity, and labor productivity in agriculture needs to be increased. To the extent that productivity varies among workers because of age, initiative, and other factors, wage payments also should vary. Further attempts to improve other sources of income should be made for elderly and handicapped people so they would not need to depend entirely on agricultural employment for their income.

One further aspect of employment relating to agriculture merits attention. During earlier years programs of public construction usually were undertaken only during months when the need for labor in agriculture was low. Individuals employed on construction projects thus were available for work in agriculture during the sugarcane harvesting season. But in recent years the expanded program of public construction has continued on a year-round basis. It is clear that further public construction will be necessary to provide adequate community services; but the annual rate at which this takes place may decline. Public construction should not be looked upon as continuing indefinitely to provide the level of employment that it has provided in the past several years. Preferably, construction projects should be coordinated effectively with other work that needs to be done. In this way the need for off-island labor to harvest sugarcane can be minimized, and the effects of fluctuations in funds for public works lessened.

During the last four decades labor unions on the Islands have helped bring about changes in wage rates and conditions of employment. Even though the determination of wage rates in recent years has shifted largely from private bargaining to decisions by public agencies, labor unions continue to participate in these determinations.

The oldest of these organizations is the St. Croix Labor Union, an unaffiliated union organized in 1917. It reports roughly 700 active members, about 200 of whom are engaged in agriculture. A second union, affiliated with the American Federation of Labor, is also active in St. Croix. It reports a membership of approximately 200, many of whom are employed in agriculture. A local union organized in St. Thomas in 1949 also numbers about 200 members, very few of whom are agricultural workers. In approximate terms the reports of these organizations indicate that active union membership in the Islands totals about 1,100, with perhaps an additional 400 to 600 persons taking a limited part in union activities. In addition, farmers have at least one bargaining association with about 200 members, which maintains an interest in wage and labor problems.

Local Tax Policies

Two general objectives apparently were adhered to throughout the formative period of the tax policies currently in effect on St. Croix. Both of these, it is believed, currently hinder development of adapted agricultural enterprises. First, a consistent effort to keep taxes on

real property as low as possible has prevailed throughout the years and has doubtless influenced to some extent the present pattern of land use. Second, revenues from taxes directed at the volume of trade or level of business activities have been used in meeting the increased costs of local government. Thus, the general excise tax indirectly taxes all commercial agricultural enterprises, and because of its peculiar application, certain enterprises (nonfood products) are also taxed by direct levies on the products sold. Perhaps some further elaboration of these general aspects is needed.

The tax payment required for a given piece of property is the product of the percentage levy times the assessed valuation. In general, assessments on St. Croix are low in relation to normal values. Also assessed values vary widely. One authority who recently made a study of tax procedures in the Virgin Islands comments on this situation as follows: ". . .Many people pay twice as much property taxes in proportion to the value of their holding as the average, while others pay only half as much. Payments on 64 percent of value (as judged by records of sales) at a rate of $1.25 on $100 assessment is an effective rate of 80 cents on 100 percent valuation. Effective rates in continental United States are from less than 50 cents to more than $5, the average being around $2 (12)."

Real property on St. Croix is taxed at 1.25 percent of the assessed valuation. Values of land and improvements are determined separately. With the installation of new buildings the increase in value of the property is accounted for at the first subsequent assessment. Land that is now used for production of sugarcane, or which was used for this purpose in recent years, is usually assessed at $40 an acre, regardless of its present use. Thus the annual tax rate for such acreage is 50 cents an acre. Land that has not produced sugarcane in recent years and which presently is used for pasture or has been allowed to revert to bush is assessed at $30 an acre, which gives an annual rate of 38 cents an acre. These two rates of taxation, which do not differ greatly in actual amounts, are probably applicable to three-fourths of all agricultural land on the island. As a rule, annual returns on land used for sugarcane are several times the returns from land that is either in bush or in reasonably good pasture. 11/ Thus it seems that differences in tax rates applicable to land devoted to various uses should be somewhat greater than is indicated above.

Two conditions have been recognized as a basis for varying from these assessment procedures. Inaccessibility and low rainfall have contributed to low valuations for a comparatively small acreage. Most of this lies in the eastern end of St. Croix, and the valuation runs from $15 to $20 per acre, giving an actual tax of 25 cents or slightly less.

11/ This statement assumes a comparable level of management with the sugarcane and livestock enterprises.

Likewise, in other sections where accessibility has been improved through construction of the few hard-surfaced roads on the Island, the value of adjacent property has been adjusted upward a flat 10 percent. Also in a few instances in which the desirability of a given location has resulted in recent sales of property largely for residential sites or other non-agricultural purposes, valuations have been adjusted upward. These general adjustments appear to be justified, although their amounts may not have reflected accurately the differences in the relative value of such property compared with that assessed at normal rates.

In general, it is undesirable to adjust tax assessments on real property piecemeal as individual parcels of land are sold. New owners are at a disadvantage compared with longtime owners of property. The ultimate effect may be to retard shifts to new uses which may represent improvements over present ones.

No direct taxes are levied against chattels used in agricultural operations or on personal property, nor is the assessed value of land changed when reservoirs or wells are established.

The only other tax of major importance to the agricultural interests of St. Croix is the general excise tax referred to earlier (13). This bill imposes a 5-percent tax on all nonfood products, except charcoal, whether imported or locally produced. The tax is computed on the gross sales value and applies to materials such as seeds, plants, farm machinery, fertilizers, and insecticides which are used in agricultural operations. Thus, from the standpoint of producing for their own markets, local farmers operate at a 5-percent disadvantage with offshore producers of foodstuffs. Such a tax can hardly be said to encourage general agricultural operations, particularly production of food for local markets.

From the standpoint of the competitive position of alternative farm enterprises, the tax works a special hardship on livestock growers who sell in local markets, as live animals are classified as nonfood items, even though they are marketed for direct slaughter. Farmers who sell livestock are subject to the tax. Inspectors at local slaughter-houses provide the tax assessor with a listing of all animals butchered. Local buyers for export are also contacted at regular intervals for their records of purchases. From these records tax statements are prepared.

Perhaps it should be pointed out that any livestock grower who feeds animals to heavier weights, thus improving the quality of his product, is doubly taxed. That is, he pays the 5-percent levy on the feeds and other materials he buys as well as on the gross value of the finished animal. Thus the possibilities of expanding the quality of home-produced meats through the feeding of grain appear to be substantially offset by this tax legislation.

As charcoal is the only nonfood item expressly exempted in the tax ordinance, it is assumed that any farm product which cannot be classed as food, such as grain, forage crops, specialty items such as grass seeds (for pasture establishment), oil-producing seeds or cotton, and related products would be subject to this tax. Apparently this would work a hardship on farmers who in the future might attempt to develop any of these as new enterprises.

Finally, in regard to the large acreage of idle land in the Island, much of which is suited only to grazing, it should be pointed out that the 5-percent tax on livestock is an added obstacle to any program for rendering this land agriculturally useful. Ways to put such lands into more productive uses have been suggested. They include heavy taxes which would continue until the land is converted into some productive use (23, p. 18; 31, p. 6; 12, p. 40). It might be more practicable, however, to tax each piece of land in proportion to the productive capacity it would have after development into its best use.

Thus, it appears that present tax policies impede some aspects of agricultural development on St. Croix. These policies are manmade and are under the control of local governing bodies. It is recognized that they developed over a long period and that to make substantial revisions would require compromises between major interest groups. But these groups would be the first to benefit from any programs that would accomplish substantial economic improvement through efficient use of resources. Furthermore, until these locally instituted restrictive factors are removed, apparently justification for substantial Federal assistance in an agricultural improvement program is impaired.

Land Ownership and Tenure

Two contrasting situations characterize the distribution of land on St. Croix: (1) The concentration of large acreages under control of a few; and (2) many holders of small subsistence units. The nine largest units, which range in size from 1,100 to a little more than 5,000 acres, contain about half the land in farms, although they represent only 2 percent of the farm owners.

Distribution of farms by size groups and the change in distribution that has occurred since 1940 are presented in tables 3 and 4. When all farms reported in 1950 are included regardless of tenure (table 4) 56 percent were less than 10 acres in size representing a change from the 1940 census which reported 67 percent of the farms in this group.

Between 1940 and 1950 the number of farms included in each group above 10 acres in size increased somewhat, although very slightly for some groups. The increase was significant mainly for the 20- to 100-acre group. These shifts in distribution among groups may be attributed largely to (1) a decline of about 20 percent in numbers of farms, the greater part

of which was among the less-than-10-acre group, and (2) the purchase of land by outside interests which in some cases resulted in consolidation of two or more ownership units.

Data in table 5 summarize farm operating units as reflected by records of the Soil Conservation Service. Although these records do not include all farms they reflect the situation more accurately than do the data from census reports. Two or more related individuals frequently own estates together and operate the land as a unit. For the census enumeration each of these ownership parcels was reported as a farm, thus giving a downward bias so far as reflecting the concentration of land in the hands of the few was concerned. According to this summary, 14 operators own about two-thirds of the land in farms, whereas 55 percent of the operators control only 3 percent of the land.

Problems of land ownership and tenure stem from the slave-owning period of the 18th and 19th centuries; they have long been recognized as barriers to widespread economic improvement. Although the scope of this study did not permit thorough examination of all aspects of these problems, the efforts made to achieve a wider distribution of the land are briefly reviewed and desirable future steps are outlined.

Table 4.--Distribution of farms by size groups--St. Croix, Virgin Islands 1/

Size groups	Percentage of farms	
	1940	1950
Under 10 acres	67	56
10 to 19 acres	17	18
20 to 99 acres	6	13
100 to 260 acres	3	5
260 and over	7	8
All farms	100	100

1/ From U. S. Census of Agriculture, 1950. (17)

Table 5.--Distribution of operators and of land in farms by size groups, St. Croix, Virgin Islands 1/

Size groups	Farm operators	Acreage of land
Acres	Numbers	Percent
0 to 24	119	3
25 to 99	41	6
100 to 249	27	11
250 to 499	16	15
500 and over	14	65
Total	217	100

1/ Summarized from records of the Virgin Islands Soil Conservation District. Includes farm plans for 217 operating units representing about 300 tracts which comprise upward of 80 percent of the land in farms.

The Danish Government recognized these problems before we acquired the Islands in 1917. As early as 1791 a commission concerned with improving the living conditions of slaves recommended extended privileges in the use of land for garden plots. 12/ Another such group, appointed in 1902 to study local problems and advise the authorities of opportunities for general improvement, recommended the "parceling out of land to Agricultural workers for the establishment of small farms." Still a third group, which surveyed the problems of the Islands just before they were transferred to this country, recommended "the establishment of homesteads" as a necessary step to improving the local economy (5, pp. 30, 33).

During the initial years of control by the United States, the Governors appointed by the Navy (1917-31) "realized that the public welfare was jeopardized by the concentration of land ownership" (8, p. 275), but no effective programs to modify the situation were undertaken. An attempt to induce the sale of land in small units, which proved ineffective, was connected with a road-improvement program. Public funds were granted for development of roads in rural areas provided adjacent owners would agree to sell a part of their lands at reasonable rates (8). One program initiated during this period did accomplish results. The St. Croix Labor Union, organized about 1917, initiated a program which marked the establishment of small-farm-owners as a group in the Islands. Through the assistance of the Municipal Council this organization bought two estates which were parceled out to its members in small plots. The units were too small to provide adequate family incomes, even with prudent management which was rare. The families did gain security of residence and independent control of land for subsistence requirements. Many of them have continued to earn a greater part of their expendable funds from off-farm employment.

The groundwork for a comprehensive attack on the problems of landownership and tenure was laid during the last days of administration by the Navy, although that agency was not responsible for its development. A comprehensive investigation of the social, economic, and administrative problems of the Islands, made in 1929-30 under the supervision of Herbert D. Brown, Chief of the Bureau of Efficiency, emphasized these matters in the agricultural phase of an overall rehabilitation program. Under the leadership of Dr. Brown and Dr. Paul M. Pearson, the first Governor after responsibility for administration of the Islands was transferred to the Department of Interior, this program was pursued with much vigor during the last few months of the Hoover Administration and continued well into the Roosevelt Administration. A homestead commission was established and given responsibility for administering the program. This body has continued and is now concerned with the administration of certain federally owned lands in the Islands.

12/ Larsen, Jens. The Virgin Islands Story (8, p. 131). See recommendations of a commission appointed to study the problems and recommend steps to be taken toward the elimination of slave traffic and eventually freeing of the slaves.

The Commission's immediate tasks were the location and purchase of available lands, and the allocation of such land in 5- to 10-acre plots to deserving families who were competent to carry through successfully to ownership. Substantial funds were made available for this purpose and by 1940, 3,552 acres had been bought on St. Croix and St. Thomas (mainly on the former) and distributed among 328 families. In addition, the Municipality of St. Croix had bought enough land to accomodate 77 families (31, p. 13). Later the Farm Security Administration (now the Farmers Home Administration) became instrumental in this program. Currently it provides loans to many families for production operations, purchases of land, and the long-term improvements required for a well-rounded program.

The scope of this study does not permit full appraisal of these programs. Briefly, however, their accomplishments in general were not impressive. But similar programs carried on within the States, where the physical resources, institutional factors, and general economic conditions were somewhat more favorable, often have a high percentage of failures. On St. Croix very few of the homestead sites were in the more desirable areas from the standpoint of soils, rainfall, and evaporation rates. 13/ Many of the initial plots were too small to provide adequate family incomes. Finally, some of the families evidently did not consider farming a desirable permanent occupation. Despite these difficulties, such programs have contributed substantially to the establishment of the family-sized farms presently found on St. Croix, although the number of such farms is small.

It is desirable that some program through which family-sized farms can be bought and operated as individual units be continued on St. Croix. An educational and supervisory service to assist prospective owners is also needed. The extension phase of the Virgin Islands Agricultural Program should be adequate to provide this service.

Leasing of land for agricultural use must be commented upon briefly. About 25 percent of the farm operators enumerated in the 1950 census were classified as tenants. Since 1940 this group of operators has declined by about 20 percent, a somewhat greater decline than occurred in total number of operators during this period.

During the depression period, many estate owners abandoned production of sugarcane and turned to more extensive farming or to other interests. Many former wage-hand families remained on the estates and farmed as tenants. The number of acres operated by these families ranges from 2.5 to 8 or 10 and usually is near the lower of these limits. These tenant operators generally pay an annual cash rental of $7 to $8 per acre (based on limited observations) which applies to the total acreage they use.

13/ Estate Calquohoun and parts of Mt. Pleasant and Princess are desirably located, whereas Whim, LaVallee, and Rattan are marginal areas.

Most of them grow some sugarcane and a few vegetables; but in areas not favorably located for production of cane, the land may be devoted entirely to production of vegetables and miscellaneous truck crops.

In general, tenant-operated farms produce at a very low level, even compared to average production rates observed on St. Croix. In many instances, their land lies in the less productive areas, but poor cultural practices and inadequate rainfall are the main reasons for poor production. Practically all rental agreements are oral and are renewed annually. As three or more crops are harvested from each planting of sugarcane, such leases are not conducive to best results with this enterprise. Longer term planning would benefit both tenants and landowners. Greater mutual interest between landlords and tenants and improved leasing agreements should be developed. Some tenants exercise initiative, and it seems likely that periodic discussions of their mutual problems would benefit both landowners and tenants.

Power and Equipment Problems

A major problem confronting farmers on St. Croix is the shortage of farm power and equipment. The typical machinery inventory of an average operator includes a machete for grass cutting (feed for horse or donkey), a few hoes for cultivation, a pickax for stumping, and possibly a hammer and miscellaneous small tools. A cart and horse or donkey provide transportation.

Oxen once furnished the power for land preparation and other operations. Many oxen were maintained by estate owners; they were used to prepare the land for the tenants. The animals were worked in teams of 6 to 8, with each team working a half day and grazing for the rest of the day. In the 1930's many estate owners were forced out of sugarcane production and their work animals were sold.

A period of reorientation and adjustment followed and the small farmers, although they had to rely to a greater extent upon their own means, did not acquire the necessary work animals and equipment needed for the farm operations. It is reported that the old agricultural station encouraged farmers to buy both work animals and equipment for preparing and tilling the land. But horse-drawn equipment was found on very few farms, and only two farmers said they used this method in tilling their land. About 1935, the old agricultural station began to provide small farmers with power and equipment at custom rates, although on a limited scale.

Later the Virgin Islands Company initiated a similar program, and in trying to serve the needs of farmers adequately, more equipment was made available. At present, three sets of equipment (each unit composed of tractor, disk plow, disk harrow, and banking plow) are assigned to this program. In addition, four privately owned tractors or bulldozers, or both, are available at custom rates for such heavy jobs as land clearing

and brush cutting (on pastures). The 1950 census reported 26 tractors on St. Croix. About two-thirds of these belong to the Virgin Islands Corporation for use in its operations and for general service activities.

Farmers interviewed differed as to the adequacy of the services provided. Little assurance of obtaining the equipment for land preparation or for hauling the cane at the desired time to avoid undue loss was a common complaint of the small- and medium-scale farmers. But some managers of large farms, as well as Vicorp representatives, point out that many small operators are so isolated that they cannot be served at reasonable cost and that frequently their farms are in areas that are marginal for intensive agricultural use. It is held that by serving these individuals Vicorp is at its own expense fostering continued poverty.

Each of these positions appears to be supported by much factual information. The essential points to be recognized as a basis from which a sound program for improvement may be projected are about as follows: (1) Small farmers, even those more favorably situated, generally do not have enough capital, credit, or sufficient resources, to justify owning the equipment needed for land preparation and hauling; (2) until such time as private ownership by a few individuals who could own and operate such equipment for the benefit of themselves and neighboring farmers can be fostered, these services must be provided if even the more desirably located operators are to operate effectively; (3) in providing such services it is reasonable for Vicorp to give priority to certain farms and to discourage continuing uses of land that conflict with recognized soil-conservation standards; (4) producers should not be denied these services because their acreage is small or badly located, but the rates charged by Vicorp in such instances should reflect the higher costs of such services; and (5) a program to foster private ownership of power equipment through long-term loans and other means should receive early consideration. As a service to private owners, Vicorp might repair certain heavy equipment at a charge that would cover only materials and replacement parts. In return, such individuals would agree to serve neighboring farmers at reasonable custom rates.

The Virgin Islands Corporation

Practically all programs concerned with agricultural improvements in the Islands are implemented through the Virgin Islands Corporation, a Federal corporation which is referred to locally as "Vicorp." This agency holds as "one of its fundamental objectives the economic, political, and social development of the Islands" (22). The Virgin Islands Corporation (organized as the Virgin Islands Company until 1949) was created in 1934 for the purpose of buying the holdings of the Danish West Indian Company and initiating a program to rehabilitate the sugar industry of the Islands. Under its present charter, the Congress has granted Vicorp broad administrative powers designed "to bring about the utmost possible development of the economic resources of the Virgin Islands in the interest of enabling the

people of the Islands to attain a standard of living more nearly commensurate with that prevailing in the United States (20, p. 12)." The Corporation controls, mainly through ownership, approximately 5,000 acres of land in one of the more desirable agricultural sections of St. Croix. Most of this land is used for sugarcane; it produced about three-fourths of the Island's 1952 crop. The Corporation is presently developing its less desirable land for pasture, which will be used to produce beef cattle and other livestock.

The Corporation owns the only sugar mill that is operating on the Island. Other facilities include: (1) The electric generating and distributing plants which serve St. Croix and St. Thomas; (2) a fully equipped machine shop used for general repair and maintenance of the sugar mill and the heavy equipment used in sugarcane and other agricultural operations, and for miscellaneous repair work; (3) considerable heavy equipment for land clearing, brush cutting, dirt moving, and the like; and (4) a fully equipped abattoir which is operated only occasionally.

In operating these plants and facilities Vicorp performs a number of services of general benefit to rural families. These services are discussed briefly here.

In connection with the production and processing of sugarcane Vicorp receives the quota established by the United States Department of Agriculture for the Islands. It performs certain administrative and accounting work in connection with the sugar program which compares with that required of privately operated mills in other domestic areas. Some production loans, materials, and services are supplied to growers; these represent additional services not usually performed by other mills. And as it is the Island's major producer of sugarcane and only processor of sugar, the Corporation takes the lead in bargaining for higher quotas, seeking permission to import field laborers, and in similar matters.

Cooperating with the Soil Conservation Service, Vicorp has implemented a program of water and land conservation and improvement for the Islands. This includes technical assistance and the necessary equipment for clearing land and installing reservoirs. In 1952, the first year of operation, 18 reservoirs with a total capacity of 105,557,000 gallons were completed. The land-clearing operations were initiated a few months later.

As a service to the livestock industry, Vicorp maintains a veterinarian with a limited staff to advise local stockmen and to render various services at a minimum charge. They also devote attention to a cattle-breeding program through which the services of superior sires are made available and special inducements have been made to encourage improvement in breeds.

Other services, some of which were mentioned previously are: (1) A land-preparation service, and cane hauling; (2) purchase of certain supplies such as fertilizers, herbicides, and insecticides, which are

furnished to growers at minimum charges; and (3) repair and servicing of privately owned heavy equipment in its machine shop, which is the only place on St. Croix where certain repairs can be made.

Examination of the general operations and functions of the Virgin Islands Corporation is not regarded as a primary purpose of this report. But the importance of the Corporation to agriculture is recognized, and some of its policies warrant further consideration.

The Virgin Islands Company devoted a major part of its funds and energies toward providing local people with employment. To this end the Company expanded its acreage of sugarcane and used large numbers of field workers. Presently, however, this aspect of its operations is not so important to the welfare of the population. Local employment opportunities have improved and wage rates are higher. Also the attitude of some workers leaves much to be desired, and productivity of field workers is low. The generally adverse effects of these conditions upon the effectiveness of its program, and especially its costs of production, are of concern to the management of Vicorp.

The legislative action granting the Corporation its present charter emphasized the need for full "development of the local resources" and "a broadening of the economic base of the Islands" (20). Much has been accomplished along these lines as, for example, the land and water conservation program mentioned earlier. But evidence is not immediately present which would indicate that other phases of the general responsibilities placed on Vicorp have received full consideration. For example, the same legislation directed the Corporation to encourage the establishment and development of small farms and small farm communities in the Virgin Islands, and for that purpose, to construct, equip, improve, and supervise such small farms or communities and to give them other assistance (21). Thus it appears that Congress anticipated the development of a positive program to assist small farmers in acquiring full ownership. At the time this study was made comparatively little had been done on such a program. 14/

It is recognized that all problems could not be attacked at the beginning, and that much assistance has been provided small farmers through various services and the overall program of the Corporation. However, its high cost of producing sugarcane during recent years and associated problems suggest that the Corporation would benefit by shifting a part of the land and the responsibilities for production into private hands. Such a program, if well planned and executed, should accomplish one of the stated purposes for which the Corporation was created.

14/ Since the data for this study were compiled, the Board of Directors of the Virgin Islands Corporation has approved the sale of about 800 acres of land to the Farmers Home Administration. This land is to be divided into family-sized units and sold to individual families.

Local Demand for Agricultural Products

A factor common to each commodity, discussed in this report is the demand for it within the Islands. Consequently, the principal factors that affect local demand are examined in light of the information available.

Demand for farm products for local consumption is low because of the small population and the low income received by most of those gainfully employed. As indicated by data from the United States Census in table 6, almost 14 percent of the 9,821 individuals reporting had incomes of less than $100 in 1949, and more than 50 percent received less than $500. Only about 7 percent had annual incomes in excess of $2,500. In St. Croix, incomes were even lower, 15 percent of 4,572 persons receiving less than $100, 60 percent less than $500, and 4 percent having incomes of more than $2,500. With such incomes for employed individuals, it is probable that per capita expenditures for food in many families did not exceed $50 a year. This may be compared with annual per capita expenditures on the mainland, where the proportion of urban population is higher but where retail prices for most foods tend to be lower, $300 to $350 annually in the last few years. Even though incomes in the Islands have increased significantly since 1949, they still are low.

Several producers who sell pasteurized milk or fresh leafy vegetables estimated that only 5 to 10 percent of the local population buy any appreciable quantities. Low incomes are a primary reason although other factors, such as lack of refrigerated storage space in many homes, have limited purchases.

Local demand for agricultural products is augmented by tourists and others who come to the Islands for short periods of time. The Islands attracted some visitors before World War II, but the numbers have expanded since the end of the war. The Virgin Islands Tourist Development Board estimates that the tourist traffic in St. Thomas increased from 36,000 in 1949-50 to 94,000 persons in 1951-52, and that the number of people visiting St. Croix rose from 14,000 in 1950-51 to 28,000 in the following year. These totals probably exaggerate the number of tourists, 15/ but it is apparent that the increase in recent years adds appreciably to the local demand for food. Most tourists visit the Islands from late December through April, although some success is being achieved in expanding tourism during the summer and fall months. 16/

15/ The information available does not enable a clear distinction between tourists and local residents who are traveling. Neither are there reliable estimates of the amount of time spent in the Islands by the average tourist.

16/ For St. Croix, the rate of hotel-room occupancy in 1952 was estimated as follows by the St. Croix Chamber of Commerce: January-March-98 percent; April--75 percent; May-July--50 percent; and August-December--20 percent.

Table 6.--Virgin Islands: Income, total and by Islands, by income level, 1949 1/

Income level	Virgin Islands total	St. Croix	St. John	St. Thomas
Dollars	Number	Number	Number	Number
1 to 99 or less	1,342	701	115	526
100 to 299	2,231	1,158	79	994
300 to 499	1,670	902	57	711
500 to 699	1,176	591	34	551
700 to 999	1,061	450	34	577
1,000 to 1,499	971	338	12	621
1,500 to 1,999	458	145	8	305
2,000 to 2,499	267	90	5	172
2,500 to 4,999	443	140	3	300
5,000 and over	202	57	4	141
Total persons reporting	9,821	4,572	351	4,898
Median income for persons reporting	$460	$395	$253	$579

1/ U. S. Census, 1950 population (18). Minimum wage-rates have risen substantially since 1949, indicating that the median incomes shown above probably were significantly higher in 1952.

Tourism also affects local demand indirectly. It has been estimated that approximately 30 percent of the employment in St. Thomas in 1951-52 was accounted for by tourism.

For the next few years it is likely that demand for food will increase moderately. Incomes may be strengthened by increases in wage rates and further gains in the tourist trade. Support for sugar prices provided by the Sugar Act of 1948, and continuation of public works and housing projects will tend to modify such declines as might otherwise occur in these segments of the economy. Public work projects call for expenditures at an annual rate of roughly $3 million through 1954, if not longer, and Federal construction of housing probably will provide employment for between 300 and 500 persons in the same period. Several other projects that have not been undertaken were specified in the basic legislation--Public Law 510, 78th Congress--enacted in 1944 and some are likely to be considered after present projects are completed.

The substantial postwar increases in the number of tourists and some influx of permanent residents from the mainland appear to have developed partly because the Virgin Islands became much better known as a result of wartime travel. The conditions and aspects of the Islands which attract tourists are attributes that essentially must be valued subjectively. But the combination of moderate climate and natural vegetation and beauty,

the diversified influences of several cultures, perhaps the degree of isolation and mode of life, and other attractions will continue to be important influences. Nevertheless, the history of many mainland resort areas indicates that much of the appeal of the Islands could be dissipated over a period of years by highly commercialized development. The immediate future of the tourist trade must be adjudged promising, but the longer term prospects may be considerably dimmed, unless the unique conditions are preserved by land zoning and other developmental controls.

The present low nutritional level of the local diet and the poor storage conditions for food in many homes offer opportunities for improving demand, particularly if incomes increase, although some gain could be expected from strengthened educational and demonstration programs.

Expenditures for food by local residents may be expected to expand moderately if the shifts in population from rural to urban areas continue. Finally, sales of locally produced foods might increase modestly if the food-purchasing procedures of municipal governments could be made more flexible. In St. Croix, for example, purchases for use by public institutions in 1952 totaled approximately $2,000 for tomatoes and tomato products, and expenditures for each of a few other kinds of vegetables were about $1,000. Probably more fresh vegetables would be procured if local supplies were available, but in 1952 most purchases came from off-island production.

PRODUCTION PROBLEMS AND OPPORTUNITIES BY ENTERPRISES

In the sections that follow the general conditions surrounding production of the major products grown on the Islands are presented. Limitations as well as opportunities and needs for expanding the output of each commodity are briefly discussed. Enterprises are treated roughly in the same order as their present importance in the Islands.

Sugarcane

The agriculture of St. Croix centers mainly around the production, harvesting, and processing of sugarcane. Its wide acceptance among farmers is indicated by the fact that three-fourths of all farm operators reported growing this crop in 1949, and that 9 of each 10 acres harvested were in sugarcane. Sugarcane requires much labor for its production and harvesting operations, and the milling process furnishes considerable additional employment. Thus it holds first place among individual enterprises in providing employment and income for the local population.

Soils on St. Croix are in general suited to production of sugarcane, the greater part of which is grown in the level valleys of the south central and along the hillsides of the central and northwestern sections.

Soils are predominately of the clay and clay loam types, the structure of which is generally improved by the presence of organic matter and of calcareous materials. When moisture is adequate sugarcane produces good yields.

As indicated earlier, rainfall on St. Croix varies greatly. Annual yields of sugarcane also vary considerably and are held at a comparatively low average because rainfall is frequently inadequate. Continued dry periods are common in late winter and early spring. The fact that harvesting occurs at this season means that yields are not reduced as much as would otherwise be true. Other crops suffer more severely from inadequate rainfall.

Sugarcane farms on St. Croix may be classified on the basis of their size and organization into two general groups. On the one hand are a few large farms that specialize in production of cane on a plantation type of operation. In contrast to these are the many small units that produce a variety of subsistence or provisions crops, some of which are marketed, but for which cane is the major source of cash income. Operators of these latter units are often employed off the farm for the greater part of the year and cultivation of the soil is of secondary interest. Between these extremes, however, is a relatively small number of self-sustained farming units which combine production of cane with the growing of fruits, vegetables, and beef cattle.

A summary of producers by size of the cane enterprise indicates the relative importance of farms of varying sizes from the standpoint of total acreage and production (table 7). A fifth of the operators each grew less

Table 7.--Distribution of operators and of acreage and production by size of sugarcane enterprise, 1952

Acres of cane grown	Operators	Sugarcane per farm		Percentage distribution		
				Operators	Total acres	Total production
	Number	Acres	Tons	Percent	Percent	Percent
0 to 0.9	108	0.6	8	20	1.2	0.7
1.0 to 2.4	222	1.6	23	42	7.3	4.2
2.5 to 4.9	141	3.4	53	27	9.7	6.1
5.0 to 9.9	48	6.5	108	9	6.3	4.2
10.0 to 24.9	7	12.4	230	1	2.0	1.4
25.0 and over 1/	5	726.3	20,264	1	73.5	83.4
Total or average	531	9.3	229	100	100.0	100.0

1/ The Virgin Islands Corporation is included in this group and is largely responsible for the large acreage and production per farm. The acreage of Corporation cane harvested was 3,196 acres, which produced 91,930 tons of cane.

than 1 acre of cane; their combined acreage made up only 1.2 percent of the total 1952 acreage and only 0.7 percent of the total production. The largest group--42 percent of the operators--grew from 1 to 2.4 acres. Together they farmed only 7.3 percent of the acreage of cane, which grew only 4.2 percent of all cane produced. Finally, 89 percent of the growers each farmed less than 5 acres, and their combined acreage was equal to less than 20 percent of the total acreage planted to cane. They produced only 11 percent of the total quantity harvested. Thus there is a preponderance of small producers whose yields are comparatively low.

Several factors are involved in the wide differences in yields obtained. Location of the farm and the opportunity to select desirable land from the viewpoint of fertility and topography are basic to good yields. Beyond this equipment available for cultivation and weed control, fertilizer treatments, and thoroughness of cultivation are related factors. Generally, the cane fields of small growers show less thorough cultural treatments and receive little fertilizer compared with acreages on large farms. However, some small operators who are carrying out good cultural practices, and are using moderate applications of fertilizer, obtain good yields. Limited capital and unavailability of credit, as well as problems attached to purchasing, transporting, and applying small quantities of fertilizer discourage other small growers from using it, and from carrying out thorough weed control and cultural treatments.

In order to learn the influence of reasonably efficient management on yields of sugarcane, a cursory appraisal of the cultural practices of all independent growers was made. It was based largely on production records for the 1952 crop and on the knowledge of the field representative for the Virgin Islands Corporation who has worked in close cooperation with independent growers for a number of years. A summary of this information is presented in table 8.

The Virgin Islands Corporation operated 65 percent of the total acreage harvested in 1952, obtaining an average yield of 29 tons per acre. A total of 141 independent growers, or 25 percent of all operators, farmed an additional 18 percent of the total acreage and produced an average of 26 tons per acre. Thus 83 percent of the 1952 acreage received comparatively efficient or adequate management practices (as judged by St. Croix standards) and from this acreage 91 percent of the total crop was obtained. The remaining 389 growers farmed 17 percent of the acreage and mainly because of inadequate cultural methods, it is assumed, although other factors such as less desirable locations were involved, their average yield per acre was only 13 tons. If the average yield for this group had been as high as that for the more efficient independent growers, the total production from the 1952 crop would have been increased by a little less than 10 percent.

Further examination of the 141 growers whose cultural practices were reasonably adequate shows that the size of their crop averaged 6.2 acres compared with 2.2 acres for each operator in the poor-management group.

Table 8.--Distribution of farmers and of acres of sugarcane by levels of management practices followed, and of operators using each level by acres of cane grown 1/

Level of practices	Operators	Distribution of acres	Yield per acre	Distribution of production
	Number	Percent	Tons	Percent
Farmers using "Good" management practices 2/				
Virgin Islands Corporation	1	65	29	73
Individual farmers	141	18	26	18
Farmers using "Poor" management practices 2/				
Individual farmers	389	17	13	9
Total or weighted average	531	100	25	100

Acres of cane grown 3/	"Poor" practices	"Good" practices	Proportion using "Good" practices
	Percent	Percent	Percent
0 to 0.9	26	2	3
1.0 to 2.4	47	28	18
2.5 to 4.9	21	45	45
5.0 to 9.9	5	20	58
10.0 and over	1	5	64
Total	100	100	26

1/ Compiled from data supplied by Henry Schuster, an employee of the Virgin Islands Corporation concerned with field operations.

2/ Includes use of fertilizer, effective weed control (about 20 percent use herbicides) and adequate cultivation. The "poor" management classification includes no fertilizer and other practices are inadequate.

3/ Only the individual farmers included in this section. The 389 growers using "poor" practices farmed an average of only 2.2 acres of cane compared with 6.2 acres per farmer using "good" practices. Of the latter group 53 were Puerto Ricans and 88 were native Crucian.

Also operators in the good-management group were relatively few in the group farming less than 2.5 acres but made up 45 percent or more of the operators included in each group operating more than 2.5 acres. Thirty-eight percent of the operators in the good-management group were Puerto Ricans, which probably is a somewhat higher percentage than is true for all farm operators on the Island.

Marked improvement in practices and in yields occurred during the last few seasons on much of the cane acreage. Credit for this is due the Virgin Islands Corporation which sponsored increased use of fertilizer and herbicides. Although further increases in yields proportionate to those recently attained probably will be hard to accomplish, it is believed that the extension of improved practices offers promise.

An effort was made to obtain reliable information on the cost of growing sugarcane as a basis for judging the relative profitableness of this enterprise. But because of the widely varying conditions under which the crop is grown, it is difficult to select farms and to obtain the data necessary to show representative cost-income relationships.

Operators of large and those of small farms reacted differently concerning the relative profitableness of sugarcane. Operators of large farms expect to show a profit each year from cane, assuming reasonably favorable weather and availability of labor. Such operators as a rule can provide reasonably complete cost data for their production and harvesting operations. But operators of small subsistence units generally are not concerned about the relative profitableness of their sugarcane enterprise in itself and cannot furnish reliable estimates of materials and labor costs. They regard sugarcane as a source of income which is derived in one lump sum at the close of the harvest and from which payments on major debts can be met. The direct costs on their small acreages are comparatively low and the labor expended might not otherwise be fully utilized. Thus, even though sugarcane on small farms cannot always be shown to be profitable, it nevertheless provides a return to labor which has little or no other alternative.

Estimates of direct costs of producing sugarcane on small and large farms are presented in appendix table 19. These estimates are believed to be reasonably representative of producing costs in the 1952 season. Harvesting costs are directly related to the estimated yields per acre. The low level of management on small farms helps to explain the difference in returns per acre.

Estimates of the total costs of production and harvesting, with cultural practices and yields representative of those found on small farms, indicate an average of $125 per acre for plant cane and about $80 per acre for ratoon cane (appendix table 19). In each case 40 to 50 percent of the costs is required for preharvest operations. These estimates do not include fertilizers, but in the case of plant cane they do include sufficient spray material for two applications of weed killer. Hired labor or custom services such as plowing and hauling account for the remaining costs.

Comparable estimates for large farms, which include more adequate cultural practices, average about $250 per acre for plant cane and $125 for the ratoon acreage. These costs include a charge for the plant cane, which in the case of the larger operations is usually bought from Vicorp, and they also reflect the influence of higher yields.

In each case the income from sales of cane and the conditional payment exceeds the direct costs by only about $25 to $50 per acre. A rather common feeling among growers is that if the direct costs for plant cane can be realized from receipts from the first crop, leaving the conditional payment as return to land, management, and other overhead items, the enterprise has been reasonably successful. Because of the somewhat lower direct costs on the ratoon acreage the per acre returns to land and management are considerably larger, and operators generally look to this acreage for their annual profits. Depending upon the care given to the crop, the fertilizer applied, and other factors, as many as four to six ratoon crops can be obtained from each planting.

The future of the sugar industry on St. Croix cannot be discussed without some reference to general limitations on production and outlook for improvement for this area compared with similar factors in other producing areas. In brief, the prevailing climate and rainfall do not give this area a favorable relationship with other producing areas as reflected in yields. Also the advancing local wage rates and the comparatively low productivity of workers makes for an ever narrowing margin of profit for this high-labor-requirement crop. Although improvement in efficiency of production resulting from adoption of new methods is encouraging and may be advanced further, potential developments along these lines can hardly be expected to convert this area into one of superior economic advantage. Finally, the recent general decline in world prices of sugar makes it evident that the future economic relationship among producing areas will be characterized by stronger competition.

These conditions do not necessarily mean a further decline in and the ultimate elimination of sugarcane on St. Croix. They do force us to examine present production methods and farm organizations for the purpose of formulating general policies toward this enterprise and planning research programs for its improvement. 17/

Traditionally, production of sugarcane throughout the Caribbean area was developed on large managerial units operated according to familiar plantation patterns. Through the years many small subsistence units became established in almost every cane-growing area and as such they reflect widely contrasting production situations. Peculiarly enough, the subsistence units often came into being in given areas as a result of a fundamental weakness of the plantation organization. In times of financial stress (low sugar prices) this system is unable to furnish employment to its workers, and they in turn are encouraged to take charge of small acreages and operate with whatever financial means available. When prices are favorable the reverse is common and such units may again be included in the plantation systems. This pattern of change has become more or less traditional in areas in which the two systems have prevailed over long periods.

17/ Additional problems and general considerations relating to the desirability of continuing production of sugarcane as an important part of the agriculture of the Islands are discussed briefly in appendix B.

What is the desirable long-term relationship of these contrasting organizations in an area such as St. Croix? Despite the somewhat retarded situation with respect to technological advancements, and the relatively unfavorable wage rates and outlook for numbers and quality of workers, should emphasis be on maximizing monetary returns per unit of land, thus favoring the plantation system? Or should family farms be given a greater place, even though their management may be less effective but other compensatory advantages are present? Obviously, there is no clear-cut answer to such a question. The upward trend in wages on St. Croix continues to reduce any advantages in favor of plantations. Unless this trend is offset by improved technology or by improved cost-price relationships, neither of which appear likely, the competitive position of such units probably will decline further. One writer has stated the problem thus: "The margin between plantation and peasant lands is thus fixed by the standard wage (prevailing wage rates) and not by the relative productivity of the two systems (9, p. 68)."

The major advantage of the family-sized unit is the fact that the operator and his family are willing to work at a lower wage per hour than when the family income is derived primarily from wages. The profits accruing to the family as a managerial wage, plus other benefits associated with independent operation, supposedly would offset this per hour wage differential.

Increased emphasis on family farms, it is believed, would favorably influence the St. Croix situation for several reasons. First, it would shift the responsibility for a part of the acreage now operated under the plantation-type organization (Vicorp) to individual operators, thus spreading the risks attached to production and harvesting operations. At the same time it would improve opportunities for success with the remaining acreage (farmed by Vicorp). Second, it might provide sufficiently attractive opportunities to stimulate individual initiative among the working group. It might result eventually in the establishment of additional small farm operators on a successful basis. Third, if sufficient in numbers, these small operators and their families might serve as a reservoir of labor which the plantations could draw upon for all operations other than harvesting, and to a limited extent for harvesting. Such a backlog of labor that does not depend solely on employment as field workers, might stabilize farm wage rates at or near current levels. Finally, the establishment of a comparatively large number of family-sized farms, which under good management would provide a respectable living and a place in the community for the operator and his family, appears to be the only way to stimulate a general interest in farming as an occupation among the lower income class. At present, this interest is lacking and is lamented by those who apparently have the welfare of this group at heart.

Beef Cattle

Beef cattle make up the principal livestock enterprise on St. Croix. More of the land resources of the Island are used to support this enterprise

than any other, and the gross value of the annual production is exceeded only by that received from sugarcane.

The marked upward trend in cattle numbers on St. Croix during the last 10 years has exceeded the advance in numbers on the mainland. The 8,521 cattle reported on January 1, 1950, was 42 percent higher than for 1940 and compares with a 32-percent increase for the United States during this period.

However, the increased interest in cattle production in recent years has served only to re-establish production at the approximate level maintained in earlier years. The number reported for 1950 was only slightly above the 8,391 head reported in 1930 and somewhat lower than the 8,963 head reported in 1917. Even with present numbers of beef cattle, when taken in connection with present production of sugarcane, the total land resources of the Island are not as intensively used as they were in 1930 or in 1917. The 1949 acreage of sugarcane was equal to only 71 percent of the acreage harvested in 1929, and to only 48 percent of the acreage harvested in 1917. No doubt the beef-cattle enterprise has benefited somewhat from the reduction in acreage of sugarcane during the last 20 to 30 years, but the number of animals has not increased relative to the decline in this enterprise.

Thus the present situation, when considered in light of the relationship of these enterprises in former years, suggests that one or more of the following possibilities concerning adjustment of enterprises toward more complete use of the land resources would be desirable, and practicable in regard to internal farm organization and management: (1) That the beef-cattle enterprise could be further expanded through efficient use of land that is not presently utilized for sugarcane; (2) that a limited acreage of idle or pasture land, is potentially suited to production of sugarcane and could be shifted to this enterprise without seriously impeding the beef-cattle enterprise; and (3) that when properly balanced on units of adequate size these enterprises are more complementary than is generally realized and that either or both might be expanded on many farms without necessarily reducing the extent of the other.

The cattle population on St. Croix reflects a distribution among farmers similar to the land ownership pattern. Less than a third of the farmers reported cattle according to the 1950 census. It is estimated that 40 percent of all cattle on the Island are owned by five estates, each of which has herds of around 500 or more. An additional 25 percent is owned by some 15 owners of smaller herds ranging in size from 100 to 300 head.

A rather extensive system of production prevails on the Island, fostered partly by the type of vegetative growth and the climate of the area. Native grasses generally are high in fiber content and low in protein. They become unpalatable in dry periods. With the exception of severe droughts, farmers do not feed their cattle in any season, and

stocking rates are determined by the year-round carrying capacity which includes the usual dry period of 2 or more months between December and May of each year. Most cattle growers consider 3 acres of pasture land necessary to provide year-round grazing for each mature animal. Where improved Guinea grass pastures are provided and systematic rotation grazing is practiced, the stocking rate may be increased possibly 50 percent without serious consequence. But with a heavier stocking rate, provisions for supplemental feeding during the dry periods become increasingly important and are given serious attention by the more successful cattle growers.

The major expense incurred in producing beef cattle on St. Croix is associated with the establishment and maintenance of improved pastures. The rapid growth of trees and shrubbery in this tropical area makes it necessary to wage a continuous fight to prevent the encroachment of bush upon open pasture land. If an operator neglects his pastures for two or three seasons, a heavy stand of bush takes over and the land must be cleared with a bulldozer or other more laborious means before it can be reseeded to pasture. Currently, such a program costs from $12 to $15 per acre to clear the land, plus a comparable amount to prepare a seed bed and plant Guinea or other desirable species of grasses. After such a pasture has been established the brush must be eradicated once or twice each season. At present, brush is commonly eradicated by a mechanical brush cutter which is available to farmers at custom rates and which costs about $2 per acre each time the operation is performed. 18/ Thus the control of brush and general maintenance of pasture costs a minimum of $4 per acre annually, without taking into account the costs of repairs to fences and a proration of the original costs of establishing pastures. 19/ Assuming that 3 acres of pasture are required for each mature animal, the estimated minimum annual cost for each mature animal in the breeding herd is $12.

Beef-cattle growers on St. Croix generally market grass-fed animals anywhere from 9 to 18 months of age and from 550 to 850 pounds in weight. Possibly an average weight at marketing is 700 pounds at about 12 months of age. The percentage of breeding animals which raise a calf each year ranges from 70 to 85 percent and might average about 75 percent. Assuming that one 700-pound animal is produced each year from three-fourths of the cows of breeding age (which normally is 75 to 80 percent of all mature animals in the herd) and that 80 percent of these are available for marketing (the remaining 20 percent being kept for replacement) the annual marketable production per mature animal in the herd would be about 360 pounds of beef. This production could be maintained only with reasonably

18/ Based on a charge of $3.75 per hour for a tractor, brush cutter, and operator which possibly covers about 15 acres per 8-hour day.

19/ Preliminary results indicate that certain herbicides may be effective in controlling brush and that through their use annual per acre costs of such practices might be reduced somewhat.

well-improved pastures. It would be equal to about 120 pounds of beef per acre, which, if marketed at 14 cents a pound, would give a gross value of $16.80 per acre. But usually the more desirable animals are sold for breeding purposes, in which case a higher price may be obtained. Thus, for farmers with improved herds the above estimate of income may be on the conservative side.

However, in view of the estimated costs of maintaining pastures, plus additional costs such as fence repairs, veterinary fees, and feeding costs in excessively dry seasons, it is doubtful whether, under present levels of management, a return of more than $10 to $12 per acre above direct operating costs can be realized.

As is the case with sugarcane, both the carrying capacity of pastures and the general production efficiency of the beef-cattle enterprise could be improved. To the extent that such improvements are accomplished, beef-cattle growers could possibly realize somewhat higher per acre returns than are indicated here.

Other Meat Animals

Smaller meat animals, usually sheep and goats, are raised by many low-income families on St. Croix. A very few hogs are maintained, and chickens are kept largely for production of eggs.

It is reported that maintenance of both sheep and goats was more common among small farmers before the tick-eradication program. Many growers who owned only a few animals disposed of them rather than meet the requirements of the program, which was inconvenient and involved some risk. According to the 1950 census, 190 farmers raised an average of 6.6 goats each. Only 121 farmers raised sheep and the number per farm averaged 15.5.

Internal parasites and predatory dogs limit production of sheep. The climate is favorable for internal parasites, and untreated flocks soon become heavily infested. Parasite control is comparatively simple and inexpensive, and operators who control these pests have successfully maintained healthy flocks. If the breeding flock is kept healthy, the lambs as a rule do not need treatment prior to marketing at 4 to 6 months.

Most farmers pen their sheep at night and graze them relatively close to the farmstead during the day as a precaution against predatory dogs. Even with these precautions, losses are frequent.

Native grasses are well adapted to production of both sheep and goats, and for a small farmer who has the alternative of maintaining only a few cows these animals might be better suited to his needs. Unimproved pastures should normally carry 1 to 1 1/4 adult animals per acre. With improved pastures and rotation grazing, twice this number can be carried

adequately. Assuming an annual increase of 2 1/2 lambs per ewe (based on two lamb crops per year), which are marketed at an average weight of 50 pounds each, production per acre of unimproved pasture would approximate 125 pounds live weight. Only moderately efficient management would be needed for this level of production from beef cattle as an alternative enterprise.

About two-fifths of the farmers on St. Croix reported hogs in 1950. A few pigs are usually kept for slaughter. Very few hog enterprises are on a commercial scale mainly because of limited supplies of feed. Another obstacle is the excessive cost of fencing materials. Small operators often tie the animals out for grazing during the day and sometimes pen them at night.

The small supply of grain feeds is the only serious limitation to commercial production of hogs. If a dependable source of feed could be provided, farmers could profitably raise more. A few produce hogs for local butchers, and at present the demand is considerably in excess of the numbers available for slaughter.

Vegetable and Truck Crops

Soils on St. Croix are productive, and local people regard them as well adapted to production of most vegetables and truck crops. For the most part they are clay soils, although they vary widely. Soils in some of the flatter areas along the coast are of somewhat lighter texture compared with those of the inland sections where heavier clay soils predominate. As the organic matter in these heavier soils is reduced, the original friable structure is lost and proper land preparation and tillage become more difficult.

Vegetables and truck crops that have been grown successfully in quantity include tomatoes, peppers, cabbage, okra, beans, sweetpotatoes, yams, and tanier. Many small farmers grow enough of these crops for home use and in addition limited quantities for sale. Sweetpotatoes, yams, and tanier may be stored for short periods without loss, and for this reason larger plantings are made of these crops. Their storability also permits the sale of larger quantities to the nonfarm population. Variations in supply and demand throughout the years have enabled most small growers at some time to realize exceptional profits from one or more of these crops. This fact, together with the relative ease with which the small subsistence plantings are handled, has led to the general belief thatSt. Croix is well adapted to production of vegetables and truck crops on a commercial scale. But close examination of certain problems of production indicates that several obstacles of varying importance stand in the way of successful production.

Timeliness of production operations is not serious in subsistence farming but for a commercial undertaking it often means the difference

between success and failure. This is particularly true for a fresh-vegetable enterprise. Even during the so-called adequate moisture or rainy season, it is not uncommon for planting operations to be delayed 3 weeks or more because of insufficient moisture in some instances or excess moisture at other times. The slowness with which the clay soils dry out and, where the organic matter has been depleted, the tendency for the surface to crust over and break up in clods even though the soil is sticky underneath, increase the difficulty of performing operations according to schedule. Furthermore, with limited market outlets a gradual flow of produce is needed. Plantings must be made at regular intervals to spread the harvest over as long a period as possible. Thus weather and its influence upon soils become of even greater importance.

A second problem is the exceptionally rapid growth of grasses and weeds during periods of adequate rainfall. If land is left uncultivated more than a week or 10 days, plowing may be needed to eradicate the grass and weed growth. Only a limited acreage can be cared for with hand tools, and the commercial operator who attempts to use mule- or tractor-drawn equipment must have several machines to perform the different operations required. Because of the high cost of equipment and supplies, most St. Croix farmers would find it hard to finance more than the limited acreage that can be cultivated with hand tools.

Insect pests and diseases present additional problems, but in general effective control measures are available. For subsistence production, farmers have been reasonably successful in coping with these hazards. But for commercial acreages more technical ability, timeliness of application, and treatments of a specific nature are required. Also as the acreage of a particular crop is increased, new diseases or pests may appear. For example, nematodes on tomatoes were not revealed until a commercial acreage was planted. It was then learned that soils throughout St. Croix were infested.

These are general problems relating to production. A few fully recognize them but often they are not regarded seriously. Considering the effects of such factors leads to the conclusion that commercial production of vegetables is practicable only under certain very specific conditions. First, location on the lighter textured soils and in areas accessible to suitable water for irrigation are necessary. Irrigation is not necessarily essential for production when rainfall is adequate, but even during these periods it can frequently be used to advantage. In addition, irrigation would permit extending the growing period into the drier months when, because of limited supplies, local markets are comparatively favorable.

Because of the capital required for land, irrigation facilities, and production materials, the scale of operation should be set at levels that will permit reasonably efficient operation. The approximate minimum limits of such an operation can be determined with any degree of assurance only through experience in operating such a specialized business. These

and other problems should be recognized in appraising production opportunities and in projecting plans for their development.

Dairy and Poultry

The number of cows milked during the year and the number of hens of laying age are not reported in the 1950 Census of Agriculture for St. Croix. However, both dairy and poultry are relatively minor enterprises, and farmers usually do not maintain animals for production of milk and eggs for home use. Since the days of slavery, eggs and milk products have not been included in the diets of much of the population, and the importance of these items to normal health and body development is little appreciated. Furthermore, the lack of refrigeration and the general inadequacy of facilities for preservation of foods limit the improvement of food habits.

There are less than a half dozen commercial dairy herds on St. Croix, ranging in size from 12 to 100 head of milking cows. Ordinarily each cow is milked only once daily, a practice that can be followed only when production per cow is comparatively low. This situation can be attributed to two general conditions. First, because of the high cost of imported concentrate feeds operators rely as heavily as possible upon pastures to maintain their herds. The coarseness of the locally adapted grasses results in a high intake of roughage to provide the daily nutritive requirements of the animals. Daily rations of this kind do not permit full development of the milking capacity of dairy cows.

Second, the exceptional demand for dairy cows and heifers in other islands in the Caribbean area and in South America has apparently contributed to maintenance of large numbers of animals in relation to the volume of milk produced. This situation, combined with the fact that OPS regulations did not apply to sales of animals for such purposes, resulted in a comparatively favorable market for young animals of milking age. Some dairymen are apparently continuing to emphasize this aspect of their production program.

So far as numbers of animals maintained and adequacy of present installations are concerned, the dairy enterprise on St. Croix is adequate to supply any foreseeable market requirements. Problems relating to production are largely associated with such matters as development of satisfactory and economical supplies of concentrate feeds; feeding animals in the milking herd an adequate ration to bring them to their most efficient level of production; and general improvement in operating procedures to reduce labor requirements.

Most dairymen recognize that well-improved pastures are basic in providing adequate rations at minimum cost. The high cost of eradicating the native brush and establishing improved pastures, as in the beef-cattle enterprise, limits further improvement. Any development of new techniques

for eradicating brush will benefit the dairy enterprise substantially. As a supplement to pastures and to supply an adequate ration during the recurring dry seasons, trench silos might be used successfully. If this means of providing forage is used, additional silage-cutting equipment will be required on the Island. Also, the number of animals for which silage is provided should be reduced to a practical minimum. In other words, maximum production per cow milked is essential.

The problems connected with poultry management are in many respects similar to those which restrict the successful operation of dairy farms. The high cost of feeds and of building, fencing, and miscellaneous materials; the difficulty of keeping dependable workers; and the problems of combating diseases and predatory animals are limiting factors to production of poultry. The last of these is of particular importance in connection with keeping small flocks. The prevalence of the mongoose, which is particularly destructive to young chickens, makes securely enclosed runways and brooding houses necessary. In addition, the threat of hurricanes requires that buildings be of permanent nature. It is only in connection with commercial enterprises that the expense attached to such structures can be justified.

The high cost of grain feeds makes production of eggs a high-cost operation regardless of the efficiency of other aspects of the operation. Scratch grains were imported in the fall of 1952 at $6.50 per 100 pounds and protein feeds were somewhat higher. With feed prices at such a level only the best layers in the flock should be retained, and they should be kept healthy. The importance of skillful management and of alertness in detecting unhealthy conditions as soon as symptoms appear cannot be over-emphasized. Thus, knowledge of the symptoms and recommended treatments for poultry diseases and parasites is somewhat more essential to successful operations in the Virgin Islands than is true in the States. For this and other reasons indicated above, most of the eggs and broilers required for the local population should come from specialized operations that would justify comparatively heavy investment in buildings and equipment, as well as skilled management. Only a few such operations have thus far been attempted, and at present only one of any size is operating successfully on St. Croix.

Grain Crops

One deficiency of the agricultural program of St. Croix is the lack of grain production and the heavy dependence upon forage plants for maintenance of livestock. Even the few hogs that are grown are fed largely upon cull or excess fruit or truck crops, and miscellaneous herbage. Most of the chickens kept to supply home needs depend to a considerable extent upon similar feed supplies. The few commercial flocks are maintained entirely upon imported grain and protein feeds.

Some grain feeds are essential during the dry months, particularly for horses and donkeys, which are depended upon largely for transportation. No doubt chickens and the few hogs also receive some commercial feeds during these months. Feed purchases of farmers on St. Croix in 1949, as reported by the U. S. census (17), amounted to $19,294. For the three Islands combined they came to $33,929. Assuming that as much as 40 percent of these purchases was either imported grains or feeds for which local grains could be substituted, a local market for a considerable acreage of grain-producing crops should be available.

Soils are adapted to production of most grains and are capable of producing good yields. Climatic conditions and diseases have prevented the growing of small grains in most tropical areas. This leaves corn and grain sorghum as the principal alternatives. Corn is commonly grown in the "provisions" garden areas throughout the island both for table use and as feed for chickens and hogs. Limited acreages have been grown for market mainly by Puerto Rican farmers who report varying degrees of success. One grower produced this season on 14 acres without the application of fertilizer, about 25,000 pounds of shelled corn which he is marketing at 5 to 6 cents a pound. This may be a higher yield than could be maintained over a period of years, but it suggests that production of corn has possibilities. With improvements in varieties, in cultural methods, in selection of land, and with effective insect-control measures, this crop might be made a dependable source of grain, for both animal and human use. The growing season would permit production of two crops of corn on the same acreage on well-managed farms in years when rainfall is comparatively favorable.

Farmers have had less experience in growing grain sorghum. Some tests were carried on at Anna's Hope but the results were inconclusive. 20/ A few years ago one farmer grew grain sorghum for poultry feed with good results so far as yields were concerned. However, because of the cost of harvesting by hand, and the undependability of labor, this operator concluded that he could import grain for his flock more cheaply than he could grow his own supplies. Through the use of varieties suitable for combining it is possible that the cost of production could be reduced to a nominal figure.

Insect damage at the time the grain is forming is another problem. The seriousness of pests cannot be determined until considerable experience in producing grain sorghum has been accumulated. Improved resistant varieties may offer a solution.

An additional problem with both corn and grain sorghum is that of properly conditioning the grain for storage and of preventing insect damage while it is in storage. As a rule, the moisture content of these grains

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20/ The former agricultural experiment station under the Department of Interior was located at Anna's Hope.

is too high at harvest to permit storage without spoilage. For this reason the corn must lie in the sun after it is shelled until the moisture content is reduced. Any quantity of grain that is to be stored for as long as 90 days would as a rule need to be dried before it could be stored safely. In addition, bins would need to be cleaned and fumigated between each use. A small commercial dryer operated in connection with enough bin space to hold grain sufficient to supply the local demand for 60 to 90 days might prove to be practical. The amount of bin space would be determined by the quantities that could be disposed of within the period of safe storage. Through such a specialized service, which could be associated with a milling service that would condition grain for livestock and human consumption, locally produced grains could be utilized to supplement the ration for the dairy, poultry, and meat-production enterprises. Depending upon the number of farmers who could be encouraged to produce grain and the quality of cornmeal that could be produced, it is possible that the requirements of St. Thomas as well as of Puerto Rico could be partially met from the production on St. Croix.

MARKETING

Although the area classified as cropland in the Virgin Islands is only about one-seventh as large as the cropland harvested in the average continental county, the diversity of marketing considerations has no such limitation. In addition to the more than 30 crops and several kinds of livestock reported by the 1950 census, other crops, such as cotton and sisal, have been raised in the past. These, together with untested alternatives, are commercial possibilities for the future. Of greater significance is the fact that the Virgin Islands are only three of the large Caribbean group. Among many of these islands there is considerable commerce, and the solution of some of the major marketing problems faced by the Virgin Islands depends to a considerable extent upon developments in other areas in the Caribbean, rather than strictly on conditions within the Virgin Islands or on Virgin Island-continental United States relationships. For example, prospects for improving the quality of some livestock products are influenced by the price of cottonseed meal in the British West Indies. Possibilities of increasing off-island sales of beef are modified by prices and quantities of beef for export from the Dominican Republic. The proposed federation of British West Indies islands may have significant future effects. The growing industrialization and population of Puerto Rico are certain to have a pronounced bearing on markets for Virgin Islands production.

The marketing situation for sugarcane and beef cattle over the years has been in contrast to that for other commodities because buyers generally have stood ready to purchase all quantities of these two products. Whatever other uncertainties may have faced producers of sugarcane and cattle, usually there has been none concerning the possibility of sales. However, these two enterprises have limitations. The cattle industry has increased significantly in recent years. Nevertheless,

because of its extensive character and the difficulty and cost of obtaining sufficient acreage for this undertaking, only a small proportion of the present population could obtain agricultural employment in an expanding cattle enterprise. Some of the most vigorous leadership directed toward development of other agricultural enterprises on the Islands has been provided by a few prominent cattlemen.

With respect to sugarcane several factors, as discussed in appendix A, raise questions as to the future position of this crop. It is sufficient here to conclude that the experience of the last quarter of a century appears amply justification for the search for other enterprises partially to replace, if not to supplant, sugarcane in St. Croix.

These conditions mentioned are well known to Virgin Islanders, and dotted through recent history are a number of attempts to develop other enterprises on a profitable basis. Some of these have involved fairly careful appraisals of both shipping and marketing problems. In preparing this report it was not possible to reckon with all the variables which may be pertinent to a particular situation, or to assess the stability or permanence of some of the present competitive conditions, particularly in areas other than the Virgin Islands. In consequence, the conclusions reached in the following sections dealing with market prospects should be viewed as first approximations rather than as a firm basis for workable plans.

In examining the prospects for marketing the first point to be considered is the possibility of finding or expanding markets for a larger agricultural output. As this subject is closely related to the transportation services that would be needed if markets were broadened, the two are discussed together. Thereafter follow sections on (1) the adequacy and efficiency of processing facilities now available on the Islands; (2) the adequacy of other marketing services; and (3) a consideration of the type of market organization needed.

The marketing situation for each major commodity is reviewed separately.

Possibilities of Market Expansion

Sugarcane 21/

Few problems have arisen regarding the availability of a market for raw sugar, and therefore for sugarcane, produced in the Islands. However,

21/ Further considerations relating particularly to the future place of the sugar economy and possible alternatives to its continuation are presented in appendix A.

the quota for the Islands established in accordance with provisions of the Sugar Act of 1948 and earlier legislation, at times has limited the quantity which otherwise might have been sold on the mainland market during a particular year. In establishing the quota for the Islands, account was taken of the large annual variation in yields which is caused mainly by drought in some seasons. Part of the overquota production in some years can be stored and sold within the quota later when production falls below the quota. But because of the relatively large production in some years, the shortage of storage facilities, and other factors, some overquota sugar has been sold on the world market, usually at a discount as compared with the price in the domestic market. Sales on the world market by the Virgin Islands Corporation in 1952 totaled more than 4,000 tons and were at prices approximately 1.9 cents a pound--roughly 30 percent--lower than those received on domestic sales.

Only in the last few years has average production of sugar exceeded the quota. In 3 of the 4 years from 1949 to 1952, production was 11,000 tons or more, and it averaged more than 10,000 tons annually during this period. On the other hand, in no year from 1935 to 1948 did production exceed 8,000 tons, and average annual output during these 14 years was less than 5,000 tons. For several years ending in 1952, the quota for the Virgin Islands was 6,000 tons, although minor upward adjustments were made occasionally for particular years. Beginning with the 1953 crop the quota for the Islands is 12,000 tons. Although fairly close to output in the last few years, this is larger than sales in any year since 1920. Nevertheless, if production should expand to the extent that sales of overquota sugar were made continually on the world market, sugarcane marketing controls would probably be applied assuming that no further changes were made in the quota for the Islands.

Federal regulations are, thus, of major importance in determining the prices received for raw sugar produced in the Islands, and they may influence decisions concerning such other variables as timing of marketings and quantities sold. These regulations, of course, also apply in other domestic producing areas.

The income received by producers from sugarcane also is directly related to regulations contained in the Sugar Act. 22/ This income comes from three sources: (1) sales of sugar; (2) sales of molasses; and (3) conditional payments. 23/

22/ Farmers who produce sugarcane also may earn Agricultural Conservation payments if specified conservation practices are followed. However, the amount of such payments earned has been very small. Total payments in the Virgin Islands, in 1952, for example, for applying filter cake to land, planting of green-manure crops, and subsoiling were only $29.

23/ It is not possible to examine in sufficient detail to enable comment many of the detailed Corporation-grower problems involved in the sale of sugarcane. Among these are: (1) Transportation charges for hauling sugarcane from farm to factory; (2) weighing procedures used; (3) methods of determining sucrose content; (4) determination of prices at which molasses should be sold; and (5) decision as to the division of the value of raw sugar between producer and factory.

Prices received for sugarcane are primarily a function of: (1) The New York price of raw sugar (domestic contract) adjusted to a duty-paid basis from which have been deducted most selling and delivery costs; and (2) the yield of raw sugar per 100 pounds of sugarcane. 24/

Whether production of sugar is above or below the quota has only a moderate bearing on prices to producers for sugarcane. For that part of the production that is overquota a different settlement period is prescribed--January of the following year, during which month sugar prices often are roughly a third of a cent per pound below those later in the year. Storage, handling, insurance, tax, and certain other costs that arise during the month of settlement are also deducted from the price. This fairly moderate adjustment in price is predicated on the anticipation that ordinarily overquota supplies in one year are sold on the domestic market early in the following year.

Additions to the price paid for sugarcane which may arise from the sales of molasses are determined by the net income from sales of molasses and the yield of raw sugar from each producer's sugarcane. Prices paid for sugarcane, including the molasses payment, have climbed rather steadily during the last several years from a quotation of $4.28 per ton of sugarcane in 1945 to a high of $7.02 per ton in 1951.

Conditional payments under the Sugar Act depend on the yield of raw sugar and the output of each producer. 25/ In recent years most producers have received payments of $1 to $2 per ton of sugarcane, this, of course, being in addition to the price received.

Numerous factors will be associated with future prices of sugar, and thus of sugarcane, and with the part of the production in the Virgin Islands that will be sold domestically. It may be noted that the price of sugar on the world market (f.a.s. Cuban ports) reached a 31-year high of 5.67 cents a pound in 1951, then declined sharply to an average of 4.17 cents a pound in 1952. The 1952 average wholesale price per pound of refined cane sugar in New York was higher than in any other year since 1923. World factors may not affect prices of molasses as sharply as this. Prices of molasses in St. Croix are probably influenced more by the quantity used in the immediate area than is true in the case of sugar.

24/ The producer's share of the raw sugar produced in 1952 ranged from 59 percent for sugarcane yielding 6 pounds of sugar per 100 pounds of sugarcane, to 65 percent for sugarcane yielding 12 pounds of sugar per 100 pounds of sugarcane.

25/ The Sugar Act provides for a base rate of payment to producers of 80 cents per 100 pounds of sugar or liquid sugar, raw value. For farmers who produce in excess of 350 short tons, reductions from the base rate of from 5 to 50 cents per 100 pounds, depending on the amount by which production exceeds 350 short tons, are applied to this excess. As a practical matter, in most years all producers in the Islands, except the Corporation, receive the full base rate because of the low volume of production per farm. The acreage which individual growers may plant without price penalty is not regulated.

Cattle

During at least the last few years four markets have been available for the cattle or beef production of the Islands: (1) The local market; (2) the Caribbean market, principally Puerto Rico; (3) occasionally, continental United States; and (4) the market for breeding stock as far south as South America. Available evidence regarding prospects for these four markets is now examined.

Local market.--The per capita consumption of locally produced meat in the Islands is low in comparison with mainland levels. For St. Croix, for example, consumption of beef, lamb, goat meat, and pork probably did not exceed 20 to 25 pounds per person in the last year. Around 85 percent of this was beef and the rest the other meats specified. Nevertheless, 711 cattle and calves (very few calves are butchered) were slaughtered during the year ended June 1952, in St. Croix to supply the local market, and this probably represented about 30 percent of the cattle and calves sold from farms. 26/

It seems likely that the number of cattle and calves sold by Virgin Islands farmers is moderately larger than the number of cattle from the general area that is consumed locally. It is true that many cattle are imported from other islands by St. Thomas buyers, but exports from the Islands (appendix table 20) usually have been somewhat larger. Shipments are made from St. John, although the number of cattle on that island in 1950 was less than 900.

The tourist trade has increased the demand for high-grade beef. As yet the local market for this type of beef is not large, although it has increased in recent years. Very little beef of this type is produced locally. However, inshipments of fresh beef and veal from the mainland totaled 52,000 pounds in 1950, 124,000 pounds in 1951, and apparently they have increased further since. Future sales may expand moderately and they will be augmented even further if price differentials narrow between grass-fed and high-grade beef. 27/ At present possibly as many as 150 to 200 high-grade cattle could be sold annually in the

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26/ Per capita consumption of meat produced in the area cannot be estimated as easily for St. Thomas because of the greater effect of the tourist population. It is known that shipments of dressed beef from St. Croix to St. Thomas were about 45,000 pounds in 1951, and that imports of cattle from Tortola and other islands provided an additional 375,000-400,000 pounds (765,714 pounds live weight). Moreover, probably another 70,000-100,000 pounds came from local production and moderate purchases of cattle from St. John.

27/ Ceiling prices in 1952 for various types of steak produced locally (including both frozen and unfrozen) ranged from 40 to 65 cents a pound in the Virgin Islands. This was slightly less than half the prevailing prices for similar cuts brought in from the mainland.

local market. To achieve this level of sales, however, would be fairly difficult. Many purchasers have precise demands as to the dressing, cutting, trimming, and aging procedures to be used, and as to the timing of purchases. 28/ Local practices would need to be improved to meet these requirements. Furthermore, it would take time for some buyers to shift from mainland to local suppliers even assuming that local production were of equal quality and condition. Sales of high-quality beef may continue to expand in the Virgin Islands with little of it coming from local production.

Thus the prospects of significantly increasing sales of grass-fed beef for local consumption in the near future are not particularly promising. Sales should increase as population and incomes increase, and no doubt they would expand if prices declined. Locally-produced grain-fed cattle could be sold in larger volume, if cuts comparable to those now obtained primarily from mainland sources were produced.

Puerto Rican Market. 29/ --Puerto Rico has been the major market for Virgin Islands cattle for decades. The demand in earlier years was

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28/ There is also some question as to how well some of the less desirable cuts from premium beef would sell locally, unless prices were fairly close to those prevailing for grass-fed beef.

29/ On December 23, 1952, the United States Department of Agriculture announced a Federal quarantine on cattle from the Virgin Islands which prohibits shipment of cattle infested with or exposed to the fever tick from the Islands to the United States or any of its possessions. Thus shipments of cattle cannot now be made from St. Croix to its principal market--Puerto Rico. Although the enabling legislation authorizes the Secretary of Agriculture to ban exports until the Islands are tick-free, it may be presumed that shipments again will be authorized once Virgin Islands shippers provide adequate dipping facilities and inspection procedures. Prior to the present quarantine, shipments were made on this basis. In view of the funds now spent in St. Croix to improve pastures, breeds of cattle, and other phases of the livestock industry, it appears unwise to longer delay instituting a thorough-going program to control fever ticks. Failure to institute such a program may further jeopardize markets, may continue indefinitely the extra costs of coralling, dipping, and inspecting, and may continue to retard the gains in weight that can be achieved by cattle. Investigations in this country (10, p. 16) have shown that tick infestations can cause "a very heavy loss" through the reduced development and fleshing of cattle, even though the animals do not contract the fever. Some cattlemen point to the local deer population (a host for the fever tick), and the unsuccessful eradication effort in the 1930's as reasons for not undertaking another program. But those experienced with eradication procedures in other areas indicate that such a program, although difficult to carry through under any circumstances, would be relatively easy to accomplish in St. Croix provided it receives full local support. Probably it could be completed successfully within a year. Although reinfestation has subsequently occurred in some instances, successful programs have been undertaken in the past in St. Thomas, St. John, Tortola, B. W. I., practically all of the United States mainland, and the present effort in Puerto Rico is reported to be nearing satisfactory completion.

primarily for work oxen and more recently for beef. This shift occurred to a considerable degree during, roughly, the decade that followed World War I and was variously affected by the fever-tick control measures instituted in Puerto Rico and by other factors.

The Tariff Act of 1930 provided an advantage for Virgin Islands cattle in Puerto Rico as compared with those coming from foreign sources. Even with the reductions which have occurred subsequently, St. Croix still has a tariff advantage of from 1.5 to 2.5 cents a pound on live cattle and 3.0 cents a pound on beef, as compared with such other Puerto Rican suppliers as Tortola, B. W. I., which has made shipments during periods when it has been free from ticks (appendix table 21).

Although cattle have been shipped regularly from the Virgin Islands, in most instances to Puerto Rico, these shipments have made up a very small proportion of Puerto Rican imports of cattle and beef. During the last 6 months of 1950, for example, Puerto Rican producers supplied 56 percent of the beef consumed in Puerto Rico. Supplies from the Dominican Republic made up about 36 percent of the total, although the quantity of meat received from this source has fluctuated considerably in the last few years. In 1949-50 and 1950-51, beef from the continent provided about 7 percent of the total quantity consumed (27).

Clearly, Puerto Rico is a potential market for many more Virgin Islands cattle. 30/ In view of their importance in this connection, however, attention will be given to the price situation and price structure for beef animals in this area of the Caribbean. Puerto Rico may be visualized as a central market for beef, drawing supplies from

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30/ Since the late forties, price regulations in Puerto Rico, first by the Puerto Rican Government and later by the Federal Government, were important in accounting for the shift from exports of beef to exports of live cattle by the Virgin Islands. Under the OPS regulations which became effective September 26, 1951, for example, a ceiling price of 35 cents a pound was established on the sale of beef carcasses delivered to the retailer's place of business. At the same time, a ceiling price of 17 cents a pound on sales of live cattle to slaughterers was set. As the cost of delivering cattle from St. Croix to San Juan generally was not more than 2 cents a pound, buyers and cattlemen in St. Croix who had sufficient volumes to warrant shipping and also satisfactory working relationships with Puerto Rican purchasers, had the choice of selling live animals in Puerto Rico at a net price of about 15 cents a pound or of selling dressed beef delivered to retail stores in Puerto Rico at a price of 35 cents a pound. Costs of dressed beef and shipment per pound were roughly as follows: Cost of animal (assuming live-weight price of 15 cents a pound) 31 cents; slaughtering and packing, 4.75 cents; transportation, 1.5 cents; selling commission, 1 cent; inspection fees and other charges, 1 cent. Thus, alternative costs exceeded the ceiling price for dressed beef by more than 4 cents a pound.

the Dominican Republic to the west, the Virgin and Leeward Islands to the east, and the mainland to the north. Apparently the Puerto Rican market usually has offered prices of 1 to 3 cents a pound more for live cattle than could be obtained in St. Croix. For example, Office of Price Stabilization price ceilings for live cattle in Puerto Rico were 17 cents a pound--3 cents a pound above the ceiling price for young cattle in St. Croix. The differential often exceeded the costs of assembling and moving cattle from St. Croix to Puerto Rico. 31/

Prices for live cattle in St. Thomas generally are lower than in St. Croix. The following ceiling price regulations of the Office of Price Stabilization for live cattle, which became effective September 14, 1951, for example, were designed to reflect usual differentials.

	Delivered in the municipality of:	
	St. Croix	St. Thomas and St. John
Young cattle--pound . . .	$0.14	$0.125
Old cattle--pound . . .	.135	.120

Similarly, prices in Tortola, B. W. I., often a principal supplier of live animals to the St. Thomas market, generally have been lower by roughly the transportation charge--reported to be about $5 per animal. Import duties also influence the prices of cattle from Tortola. The Virgin Islands have a 6-percent levy, and the tariff for shipments to Puerto Rico is as shown in appendix table 21.

The price structure described in the foregoing, however, has been subjected to considerable stress during the past few years. Through most of 1952, Puerto Rican buyers offered prices above Virgin Islands ceilings for Islands animals. Such sales could not be made legally in the Islands, but there was no limitation, so far as OPS regulations pertaining to the Virgin Islands were concerned, against shipment of cattle to Puerto Rico for later sale by the St. Croix owner. The regulations also were interpreted as not applying to sales of cattle for

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31/ Cattle are shipped by barge or schooner from St. Croix to Puerto Rico. One buyer shipping by barge from St. Croix to San Juan reported approximate costs per animal in the fall of 1952 as follows: (1) Assembling animals from local farms where bought, 75 cents; (2) labor for corralling and dipping animals, 10 cents; (3) inspection fee, $1; (4) trucking from assembly point to barge, 75 cents; (5) barge freight, $5.50; and (6) loss in weight during shipment, 75 cents. If animals are exported for breeding purposes, an additional charge of $1.25 covers cost of inspection for disease. As the test is acceptable for only 30 days, a second similar cost sometimes cannot be avoided. In case of shipment by schooner, costs in terms of shrinkage, damage to hides, and death losses frequently are higher.

breeding purposes, or to sales in which cattle were bought for further feeding rather than immediate slaughter. As the regulations specified that the distinction between young and old cattle was to be "as commonly accepted by the trade" some small latitude was provided in determining which ceiling price applied. Finally, it is reported in some cases that after weighing some cattle were bought "by sight" in order to pay above-ceiling prices.

Thus, the Puerto Rican market, in recent years frequently has offered higher-than-usual premiums for St. Croix cattle.

As shipping arrangements between St. Croix and Puerto Rico are more economical and somewhat easier to arrange when fairly large lots of cattle are moved, it has been easier for large producers than for small ones to take advantage of price premiums in Puerto Rico. Generally large producers expect to sell practically all of their marketable stock to off-island buyers, although they occasionally buy animals from small producers in accumulating loads for shipment to Puerto Rico.

Occasionally in recent years, the Puerto Rican market has been affected by the importation of frozen beef from such distant sources as New Zealand. Although many dealers believe that frozen grass-fed beef has not been acceptable to many consumers (presumably those who buy grass-fed beef often prefer "warm" meat, and those who buy frozen meat prefer grain-fed beef), the availability of beef from other sources of supply for the Puerto Rican market will continue to influence prices of St. Croix cattle.

The increasing sale of Tortola cattle to islands to the south and east also has caused deviations from the price structure discussed earlier. Prices of 15 cents and more per pound f.o.b. Tortola were reported in 1952. As a result, St. Thomas buyers have gone to Tortola and bought cattle to be delivered at their expense on Tortola boats, whereas in the past cattle were more usually brought to St. Thomas for sale. Similarly, at least two Puerto Rican buyers had agents in Tortola during the period in which shipments were permitted. These agents bought locally rather than waiting for Tortolan shipments to be made to San Juan.

It may be concluded that several widely different competitive forces influence the prices of beef animals in this area of the Caribbean, and that price relationships between geographic points are subject to significant change. Overshadowing this, however, is the increasing need for meat to supply Puerto Rico and the advantage as to location which the Virgin Islands enjoy as a supplier of this market. The recent price conditions discussed indicate strengthened demand in Puerto Rico for beef from the Virgin Islands.

A continuation of the reported present moderate trend away from the preference for unchilled beef in Puerto Rico will be advantageous to Virgin Islands producers. In addition, establishment of an improved grading and inspection system for beef both in Puerto Rico and in other areas that

supply it would in all probability redound to the advantage of St. Croix producers, as meat shipped from St. Croix to Puerto Rico must now pass Federal inspection.

Continental market.--In the spring and summer of 1951, when prices of meat on mainland markets were very high, nine shipments of chilled beef were sold in New York by a group of cooperating St. Croix producers. A brief appraisal of the mainland as a market for Virgin Islands beef, based in part on information concerning these shipments, follows.

At the then prevailing ceiling price of 14 cents a pound live weight and a dressing percentage (based on yield of chilled product) of about 47 percent, plus a charge of 4.75 cents a pound dressed weight, for slaughtering, dressing, and wrapping, the investment amounted to approximately 34.5 cents a pound of dressed beef at the abattoir. Costs of transporting beef from the abattoir to the receiving point in New York City totaled about 4.9 cents a pound, these costs including: (1) hauling from abattoir to Frederiksted dock; (2) export tax; (3) lighterage; (4) marine freight; (5) tonnage dues; (6) insurance; and (7) handling from dock to receiving point in New York City. Finally, a brokerage commission was paid by those selling. In total, costs amounted to between 40 and 41 cents a pound. When New York prices were above this it was profitable to direct shipments to New York, but when prices there were lower, the wiser course was to sell on the local live-animal market at 14 cents a pound. 32/

Prices received on most shipments to New York ranged from 40 to 43 cents a pound and averaged roughly 41 cents a pound, although on one or two occasions premiums of several cents above this were received.

Although local producers believe that St. Croix beef is equal, if not superior, to that from other Caribbean areas, it is a completely grass-fed product, and about 30 percent of the animals slaughtered for the New York shipments were old cows. Consequently beef shipped was graded utility or cutter and canner. Prices received were from 1 to 2 cents a pound below those received by continental producers of these grades, as much of this grade of meat is boned on the mainland before sale, and St. Croix cattle have slightly higher percentage of bone because they are leaner. Prices also may have been influenced slightly by the fact that much of the meat came from bulls rather than steers.

The New York market rarely is the most profitable one for St. Croix beef of the grade now produced. Those individuals who planned the

32/ No allowance was made for the income from tails and other by-products also sold in New York, because of the small amounts involved. Nor was any allowance made for the extra effort required to arrange such shipments, as compared with sales on the local market, or for the risk of price changes in New York while beef was in transit, or certain other risks not covered by insurance.

shipments discussed showed considerable wisdom in deciding when to inaugurate and when to discontinue them. In the summer and fall of 1952, for example, New York prices were from 10 to 15 cents less per pound than when shipments were made. More recently they have been even lower, whereas prices of cattle in St. Croix remained fairly steady through 1952. More to the point is the information in table 9 which shows annual average wholesale prices of utility and canner and cutter beef. Not only were prices in 1951--the year when shipments were made--the highest on record, but they exceeded previous highs by roughly 20 percent.

Some local producers have speculated that the competitive position of St. Croix in the New York market might be improved if the grade of local cattle could be improved substantially. This is possible, particularly if the better grade could be produced without relying greatly on imports of feed, and if market prices reflect differences in quality. But the few comparisons that can be made between the choice and the utility price series shown in table 9 indicate that shipments of choice beef to New York usually would be feasible only if choice cattle were selling in St. Croix at lower premiums than on the mainland. Probably such choice cattle as might be produced in the Islands could be sold more profitably in nearby markets.

Table 9.--Western dressed beef: Monthly average, wholesale price per 100 pounds, New York

Year	Steers		Cows	
	Choice 600/700 pounds	Utility 1/ 400/600 pounds	Utility 1/ all weights	Cutter and canner all weights
	Dollars	Dollars	Dollars	Dollars
1939	17.23	13.16	12.12	---
1940	18.71	13.32	12.71	---
1941	19.13	14.96	14.01	13.31
1942	22.43	18.04	17.40	16.36
1943	22.66	17.59	17.53	14.93
1944	21.90	16.90	16.72	13.72
1945	22.00	17.00	17.00	14.25
1946	31.44	21.11	20.16	15.49
1947	45.28	---	26.89	---
1948	54.16	---	37.19	---
1949	46.38	---	31.44	---
1950	51.39	---	36.87	---
1951	2/ 60.09	2/ 50.85	45.29	---

1/ Common grade cows and steers charged to utility grade, August 7, 1939.

2/ Prime.

Breeding Stock.--As yet the St. Croix (or Nelthropp) type of animal developed in the Virgin Islands has not been formally established as a new breed. But there is already trade in this beef type for breeding purposes, and other types are sold from time to time.

Other new crosses are being tried in the Caribbean area, and a present assessment of the ultimate position of the Nelthropp strain would be premature. Nevertheless, sales of this type of animal for breeding purposes are likely to increase, particularly if the local supply is increased sufficiently so that both sires and dams can be obtained without undue difficulty. The absence of some animal diseases which are reported to exist in other Caribbean areas, also will be of benefit to St. Croix producers who are interested in increased sales of breeding stock.

Sales of animals to other islands for dairy purposes also is a profitable outlet for the output of some producers, and one that might be further developed. In the fall of 1952, these sales generally were at prices of between $200 and $300 per animal, although this substantial premium over beef prices existed partly because of the ceiling-price regulations then pertaining to beef cattle.

Other Meat Animals

Many Virgin Islands farmers, particularly those with small acreages, raise sheep, goats, or hogs. Census data indicate that the number of hogs has remained fairly constant in the last 20 years, but that numbers of sheep and goats in 1950 were more than double those in 1930. Most of this increase occurred after 1940.

Although most of the production increase has been for local use, per capita consumption of locally produced meat is still quite low. During the year ended June 1952, for example, 1,394 sheep, goats, and hogs were killed in public slaughterhouses in St. Croix. This indicates a supply of dressed meat from local sources of only about 3 pounds per capita, although no doubt this quantity was augmented by substantial farm slaughter. The volume of imports into St. Thomas would indicate a moderately higher per capita usage in that island.

Local output in the Islands is not as large as local consumption, and operators of several retail establishments said that sales would be larger if supplies were available regularly. Imports of sheep, goats, and hogs into the Virgin Islands--mainly from Tortola to St. Thomas--have exceeded 3,000 in most recent years. But shipments from the Virgin Islands to Puerto Rico have been much smaller, and in years such as 1950-51, they have been less than 100. In addition to the importation of live animals, the Virgin Islands buy substantial quantities of pork products. As shown by the data in table 10, inshipments of specified types of processed pork have ranged from about 200,000 to more than 300,000 pounds annually during recent years, and have averaged approximately 10 pounds per capita

per year. Low-priced types, such as pickled snouts and tails, account for much of the inshipment. Inshipments of sheep and goat meat are insignificant.

Table 10.--Virgin Islands: Imports of specified products, by years, 1949-51 1/

Commodity	Unit	1949	1950	1951
Sheep and goats	Number	3,029	1,559	2,318
Hogs	Pounds L/W	83,469	34,088	23,174
Poultry and game, fresh or frozen	"	75,211	152,623	2/
Beef and veal, fresh or frozen	"	42,393	51,996	123,542
Pork, fresh or frozen	"	35,716	38,345	34,700
Pork, pickled, salted, or N.E.S.	"	124,968	167,478	214,186
Hams and shoulders, cured	"	44,202	56,351	62,807
Fish and fish products	"	624,228	532,849	474,955
Eggs (shell)	Dozens	34,844	46,837	69,001
Cheese	Pounds	145,224	144,361	137,275
Milk and cream, condensed and evaporated	"	1,114,256	1,377,671	1,390,182
Beans (dry)	"	123,935	132,305	182,775
Onions	"	65,006	24,950	67,100
Potatoes (Irish)	"	873,862	566,759	922,207
Fresh vegetables, N.E.S.	"	17,332	23,625	50,201
Avocadoes	"	25,623	30,195	22,490
Limes	"	11,315	8,446	23,243
Mangoes	"	14,489	13,706	10,898
Bananas	Bunches	4,352	4,098	2,887
Coconuts	Number	88,189	38,752	35,349

1/ Includes both inshipments from the United States including Puerto Rico, and imports from other countries. Amounts shown are net, that is, weight of shipping containers is not included.

2/ Not available.

Current price relationships between Puerto Rico and the Virgin Islands are apparently not as conducive to shipment of hogs, sheep, and goats from the Virgin Islands to Puerto Rico, as in the case of cattle. 33/ But it seems likely that future Puerto Rican demand for hogs and goats will increase. Puerto Ricans are reported generally to prefer goat meat to that of sheep and lambs (11, p. 105)

In addition to their advantage as to location, Virgin Islands producers also benefit from Puerto Rican tariffs. The present tariff (appendix table 21) is $3 a head for live goats--25 percent or more of the market value--and 75 cents a head for sheep and lambs. Sheep and goat mutton is subject to levies of from 2.5 to 3.5 cents a pound. Shipments from the Virgin Islands to Puerto Rico enter duty free, although sheep and goats as well as cattle must be tested for brucellosis, and hogs must be found free from cholera.

It may be concluded that further significant increases in the production of sheep, goats, and hogs could be sold locally in the Virgin Islands without lowering present price levels appreciably. St. Croix producers might substantially increase shipments of goats to St. Thomas at price relationships that prevailed in 1952. Furthermore, sales of goats and hogs in Puerto Rico could be increased. Also, strictly from the marketing standpoint, the outlook for hogs may be almost as promising as that for cattle. But both local and Puerto Rican sales of hogs would be limited somewhat, because some buyers consider the quality of local production not equal to that of continental supplies of fresh pork, and because much of the large quantity of pork products now shipped from the mainland to both the Virgin Islands and Puerto Rico is made up of the lowest-priced cuts.

Vegetables

Considerable attention has been given to the possibilities of developing broader markets for fresh and, in some cases, canned vegetables. By 1920, some planters had considered selling fresh tomatoes in eastern United States markets. Many other vegetables, such as peppers, carrots, pigeonpeas, string beans, okra, beets, onions, and garlic, were recommended by the former experiment station and trial shipments of several kinds were made to New York. In the 1932-33 season, the St. Croix Cooperative Vegetable

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33/ In late 1952, ceiling prices in St. Thomas and St. John for sheep and goats were 12 cents a pound, and in St. Croix the ceilings were 12 cents a pound for sheep, and 10 cents a pound for goats. Live-weight ceilings were not established for these animals in Puerto Rico; rather sheep and goat mutton were controlled by the General Ceiling Price Regulation, which was not subject to later upward revision as was true in the case of cattle. Similarly, ceiling prices on live hogs of 19 cents a pound in St. Croix and of 17 cents a pound in St. Thomas and St. John were operative, whereas Puerto Rico did not establish ceiling prices for live hogs.

Growers sold 7,200 lugs of tomatoes on the mainland, and from 1935 to 1937 shipments ranged from 50,000 to 270,000 pounds per year. In the late thirties, plans were considerably advanced for the establishment of a tomato cannery in St. Croix which was to process the production of up to 10,000 acres. This cannery was not established, but a small cannery unit had limited success during part of World War II when shipments from the States for civilian use were restricted.

In the 1947-48 season a few individuals produced a small acreage of tomatoes which were flown to New York and brought per-acre returns several times those obtained from sugarcane. As a result, an organization was formed and the St. Croix tomato acreage was increased roughly to 300 acres in 1948-49. This may be compared with the 2 acres reported by the Census for 1939. An unsuccessful season resulted, primarily because of insect damage, and in 1949-50 the acreage was reduced to about 100 acres. In the wake of a second unprofitable season, caused mainly by the unfavorable weather at harvest time, the project was abandoned, and the packing equipment was put in storage where it remains.

In 1951 and 1952, there was little effort to produce tomatoes for sale outside the Islands. One producer in St. John reported some sales in Puerto Rico. The other exception is the vegetable project which was developed in St. Croix beginning in 1951 with the assistance of the Virgin Islands Corporation. This operation, which is managed by one individual, planted 12 acres of peppers and 2 of tomatoes in 1951. The season was successful, and in 1952 partly because of arrangements providing for sales of fresh vegetables to Government installations in Puerto Rico, more than 40 acres were planted as follows: Tomatoes, 17; peppers, 15; cabbage, 3; field beans, 3; and sesame, 2. The rest was in test plots of castorbeans and Sea Island cotton.

Despite physical conditions which are often reasonably favorable for production of many vegetables in late fall and early winter, the failure thus far to develop a continuing market from year to year indicates the complexity of establishing an expanded vegetable enterprise on a profitable basis. Four possibilities for the future may be considered in greater detail; (1) Processing; (2) local sales; (3) sales in Puerto Rico or elsewhere in the West Indies; and (4) sales in continental United States.

Processing.--There is considerable doubt as to the possibility of establishing a commercial export canning industry on the Islands, at least for those staple vegetables now imported from the mainland. In addition to a transportation charge to the continental market of about 2 cents per standard can of produce and the additional costs of obtaining containers, as compared with costs to continental packers, there is the probability that certain other local processing costs would be higher because of the small output and its greater variability from year to year, as compared with commercial areas on the mainland.

Mainland farmers who produce tomatoes for the processing market have received prices of little more than a cent a pound in recent years, which establishes a competition that the Islands probably are not prepared to meet.

The prime advantage of St. Croix--season of production--would not apply to a canning industry. A more favorable conclusion might be reached regarding some specialty product such as canned whole tomatoes--the relatively low labor costs in the Islands might enable successful competition with other sources of supply for the mainland market. But the case is by no means clear, on the basis of the limited evidence available, as special skills are needed in packing such products. Frequently, varieties most suited for the fresh market are not the best ones for canning, so that a canning industry cannot necessarily be developed as an adjunct to production for the fresh market.

Canning for the local market would benefit in the first instance, as compared with imports from continental sources, by reason of the transportation differential. 34/ The small size of the local market and the additional costs of importing containers and of local processing, however, indicate that this probably would not be an economic undertaking at present.

The canning factory established by the St. Croix Agricultural Association in the early forties had difficulty in selling its canned tomatoes and tomato juice in competition with standard-brand merchandise. Problems also arose because it could not obtain the small cans preferred locally. Its operation was discontinued and more recent efforts to re-establish a cannery have not succeeded.

Local Sales.--The Virgin Islands import a significant percentage of the food their inhabitants consume. But factors must be considered in connection with this observation: (1) In the dry season production is accomplished with considerable difficulty, if at all; (2) the acreage required to produce quantities of fresh vegetables usually imported is small. It has been estimated that seasonal increases of only a few acres in the local production of a given vegetable usually are more than enough to glut the market. 35/ A grower in St. Croix, for example, tried to develop larger sales of tomatoes in St. Thomas in 1951. He was unable

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34/ A shipment of canned vegetables landed in Frederiksted from New York in November 1952 was transported at a charge of $21 a ton, plus $4.90 for lighterage and other costs.

35/ In no year between 1935 and 1947 did the total imports of all fresh vegetables to the Virgin Islands exceed $20,000 valuation, except in the war years, 1942-45, when War-Food-Administration shipments were large. Imports in 1947 were valued at $2,006 (2). The fairly small quantities of principal vegetables imported from 1949 to 1951 are indicated by the information in table 10.

to sell more than 500 to 600 pounds a week during the tourist season, and in many weeks sales were considerably less. Similar efforts were somewhat more successful in 1952-53, when sales to St. Thomas during the season totaled approximately 10,000 pounds and sales in St. Croix were about as large. At average yields achieved in 1952-53 these sales were equal to the production of about 4 acres of tomatoes.

It is not meant to imply that small increases in production for local consumption would not be justified at present, or that production of fresh vegetables could not be expanded somewhat over time as a result of increased purchasing power, changing tastes, or a larger population. But the acreage that would be involved at the present time would be small.

Sales in Other Caribbean Areas.--Puerto Rico and perhaps other islands in the Caribbean loom as a third possible market for Virgin Islands production.

Although the supplying of vegetables to places in the area other than Puerto Rico is under commercial consideration in the Islands, little promise can be seen for this possible market, at least during the next few years. Import data for 1947 indicate that only four of the many republics and possessions in the area imported in excess of 40 long tons of fresh vegetables during the year. These imports were as follows: British Guiana, 178; Netherlands West Indies, 2,079; Surinam, 354; and Puerto Rico, 1,735. Distances involved, seasonality of production, currency exchange problems, and the likelihood of nearer areas supplying the first three markets listed raise doubt concerning the marketing of fresh vegetables from the Virgin Islands in them.

The experience of those few vegetable growers contacted in St. Croix who have sold vegetables in Puerto Rico is that the quantities that will be taken may not be large except for a few kinds in some years. Despite usual Puerto Rican imports of between 2.8 and 4 million pounds of fresh vegetables a year since the end of World War II, the wide diversity in these imports and the fact that many of them occur at times other than the usual harvest season in the Virgin Islands mean that only moderate quantities have been exported by Virgin Islands producers. More than 90 percent of the Puerto Rican imports come from continental United States, but supplies from the Dominican Republic, the second largest supplier in most years, are probably most competitive with those from the Virgin Islands.

Nevertheless, there are reasonably good immediate prospects for expanding sales of tomatoes and probably a few other vegetables, such as peppers, in Puerto Rico. It is also likely that this market for Virgin Islands produce will improve moderately during the next several years if industrialization of Puerto Rico continues and its per capita purchasing power is raised. Such changes would be expected to lead to shifts in

diets that would involve the use of more fresh vegetables. 36/ Some further increase in sales in Puerto Rico may occur as the number of retail stores handling vegetables increases. It is estimated that only about 10 stores in San Juan now sell fresh produce.

As the problems and costs of transportation are less vexatious on shipments from the Virgin Islands to Puerto Rico than to the mainland, it is reasonable to consider the production of some of the more staple vegetables for the Puerto Rican market. Dry beans have been suggested, partly because Puerto Rican imports of this product have increased considerably in the last decade and now usually exceed 50 million pounds annually. At the relatively high level of prices prevailing in Puerto Rico and with yields comparable to those in mainland producing areas, gross income from production of dry beans in the Virgin Islands would approximate $200 to $250 an acre. A small test planting of Puerto Rican white beans in St. Croix in 1952-53 yielded more than 1,100 pounds per acre, enabling a gross return of $200 per acre. Costs of marketing, excluding harvesting but including transportation to Puerto Rico, were less than $10 for the production of an acre. Pinto and Red Kidney beans, also showed promise on the basis of yields from test plantings. Ordinarily there are significant differences in price between different varieties of beans in Puerto Rico, some inshipments from the mainland having been sold for from 8 to 10 cents a pound. Puerto Rican white beans, on the other hand have brought prices of 12 to 20 cents a pound in the last few years. If production and harvesting operations can be conducted economically on a commercial scale, there are excellent income prospects for this crop. If production were to reach commercial proportions, construction of storage facilities would appear to be advisable, so that advantage could be taken of the rather wide seasonal price fluctuation in most years.

Likewise, annual imports of onions, which are normally in excess of 12 million pounds, and the prices of onions in Puerto Rico for the last year or more, indicate market possibilities for Virgin Islands producers. It may also be observed that imports of these two products by the Virgin Islands (table 10) are large enough to warrant consideration of production for the local market. But the few times that commercial production of onions has been tried, serious cultural difficulties have arisen. These difficulties probably indicate a need for improved practices and varieties before the enterprise can be conducted successfully.

36/ A study conducted in the midthirties reported that annual per capita consumption of all fresh vegetables in Puerto Rico was only about a third that in continental United States (58 pounds as compared to 169). Per capita consumption was about twice as high, however, in families with a per capita income of more than $200 as in families with a per capita income of between $50 and $99 (4).

Continental United States Market.--The fourth possible market for fresh vegetables produced in the Virgin Islands is continental United States. Many previous attempts to expand the acreage of vegetables were generated partly by successful shipments or by promising prospects on the mainland. Furthermore, imports into the United States from all sources have ranged, for fresh tomatoes for example, upward of 132 million pounds in each year since 1940. Although Mexico and Cuba have supplied most of this supply in recent years, imports from the British West Indies, some of which are as distant from New York as are the Virgin Islands, and to whose shipments tariffs apply in contrast to those from the Virgin Islands, have totaled from 1.5 to more than 4 million pounds annually.

In presenting some of the problems and possibilities of developing a mainland market, several factors should be considered.

First comes transportation. Both the adequacy and the costs of transportation are pertinent but the first is probably the most important. St. Croix is not as far from eastern continental markets as are some of the mainland supply areas. Likewise, the costs of boat shipment from St. Croix to New York, as shown in table 11, are lower than the transportation charges for movement by rail from some mainland producing areas to New York. The cost of transportation is considered first.

In the spring of 1952, there was prepared for the Virgin Islands Corporation by Frederick Gottschalk a careful report of the costs of transporting various vegetables by different routings and means of transportation from St. Croix to continental United States. The principal findings are presented in table 11. The marketing costs shown in this table may be slightly low as brokerage and one or two minor items which might arise because of the method of sale are not included. Furthermore, production costs vary significantly among farms and among years. But those shown may be used as rough guides to the general level of prices necessary to make shipments worth considering. These costs may be compared with prices in the New York market for tomatoes, as set forth in table 12. 37/

Frequently, December prices average above those in January; however, marketings usually extend into January and, at any rate for tomatoes, they may continue into February. 38/ In the 8 years from 1940 to 1952 for which

37/ Differing reports were received as to the price relationship in the New York market between Florida and Virgin Islands tomatoes. But it seems reasonable to conclude on the basis of information from New York buyers that if the Virgin Islands product were properly graded and packed, were supplied regularly during the winter season, and were of uniform size and quality from shipment to shipment, prices received would not be less than those paid for Florida tomatoes. Under adequate refrigeration and proper initial quality, little loss of quality has been reported in connection with shipments made thus far, except when picking was done shortly after heavy rains. It has been suggested that some vegetables be waxed before shipment.

38/ Climatic and other production factors in the Islands are best suited to production of fresh vegetables which are ready for market in mid-November to mid-December.

Table 11.--Per container cost of producing and transporting specified vegetables by various means from St. Croix to New York, 1952 1/

Type of transportation and product	Per container						
	Cartage	Freight to San Juan	Refrigeration	Freight to New York	Total	Production cost 2/	Total
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Mailboat to San Juan-boat to New York							
Pepper	.40	.20	.10	1.05	1.75	2.00	3.75
Cucumber	.35	.20	.10	.75	1.40		
Tomato	.20	.10	.10	.50	.90		
Air to San Juan-boat to New York							
Pepper	.30	1.00	.10	1.05	2.45	2.00	4.45
Cucumber	.22½	1.10	.10	.75	2.17½		
Tomato	.15	.85	.10	.50	1.60		
Small boat to San Juan-boat to N. Y.							
Pepper	.30	.17	.10	1.05	1.62	2.00	3.62
Cucumber	.22½	.15	.10	.75	1.22½		
Tomato	.15	.12	.10	.50	.87		
Small refrigerated boat to San Juan-boat to New York							
Pepper	.25	3/	---	1.05	3/	2.00	---
Cucumber	.19	3/	---	.75	3/		
Tomato	.12½	3/	---	.50	3/		
Air to New York							
Pepper	.35	---	---	6.65	7.00	2.00	9.00
Cucumber	.25	---	---	7.40	7.65		
Tomato	.17½	---	---	5.70	5.87½		
Air to Miami							
Pepper	.20	---	---	2.35	2.55 4/	2.00	4.55
Cucumber	.15	---	---	2.60	2.75 4/		
Tomato	.10	---	---	2.00	2.10 4/		
Boat to New York							
Pepper	.20	---	---	1.40	1.60	2.00	3.60
Cucumber	.15	---	---	1.05	1.20		
Tomato	.10	---	---	.70	.80		

1/ Cartage is figured at 2½ cents per cubic foot in St. Croix and San Juan; 7½ cents per cubic foot in New York at dock and double this at airport; 7½ cents per cubic foot in Miami. Freight to San Juan is figured on a boat with a cubic capacity of 4,000 feet and a tonnage capacity of 50 tons of a charter costing $1,000 a week. Cucumbers and tomatoes are on a weight basis, peppers by volume, and estimates are for a maximum load. Costs of refrigeration in San Juan have proved to be rather arbitrarily set; at listed rates, the cost per pepper crate would go up to 20 cents, that per cucumber crate up to 15 cents. Production costs are included only for peppers and are figured on a yield of 160 1¼ bushel crates per acre. Taken from an unpublished manuscript by Frederick C. Gottschalk, "A review of Transportation Possibilities for the Exportation of Winter Vegetables from St. Croix to the United States" May 6, 1952.

2/ Includes costs of growing, picking, grading, packing, and container.

3/ Information not available.

4/ Charge to Miami, not New York. This rate contingent on obtaining a return cargo from Miami.

February price data are available, the February average was lower than the January average shown in table 11 on seven occasions; the average January quotation exceeded that for February by only 37 cents a lug. By March, prices frequently fell below the January average by a dollar or more per lug, although in occasional years it was well above that for January, for example, by $4.70 per lug in 1952.

Table 12.--Wholesale prices per lug of fresh tomatoes (6 by 6 and larger) in New York City, by area of origin, January average, and range in January weekly averages, by years, 1940-52

Year	January prices per lug for tomatoes from:			
	Florida		Cuba and Mexico	
	Weekly range	Average	Weekly range	Average
	Dollars	Dollars	Dollars	Dollars
1940	2.08 - 2.34	2.23	1/	
1941	3.33 - 3.88	3.62	3.31 - 4.25 2/	3.62
1942	3.81 - 4.64	4.04	4.00 - 4.75 2/	4.25
1943	4.84 - 6.12	5.49	5.83 2/	5.83
1944	5.21 - 6.06	5.73	6.00 2/	6.00
1945	4.85 - 5.50	5.24	1/	1/
1946	5.67 - 6.25	6.12	6.25 3/	6.25
1947	5.65 - 8.19	6.56	4.50 - 8.00 2/	6.18
1948	5.62 - 9.45	8.08	1/	1/
1949	5.94 - 6.00	6.00	5.00 - 6.25	5.91
1950	1/	1/	1/	1/
1951	1/	1/	1/	1/
1952	5.70 - 9.50	7.95	1/	1/

1/ Not available.
2/ State of origin--Mexico.
3/ State of origin--Cuba.

It is apparent that at a cost of approximately $9 per lug or other container, shipment of vegetables from St. Croix to New York by air is rarely profitable. Prices of as much as $20 a hamper have been paid on single days in recent years for products such as peppers, which are produced in St. Croix, but this is extremely unusual. Therefore, if transportation by air is required, it seems clear that a fresh vegetable industry in St. Croix producing for the mainland market cannot succeed at the present level of charges for such transportation.

From a straight cost-price comparison, on the other hand, there seems to be a reasonable case for shipment by boat directly from St. Croix

to New York (this service is not operating at present); by air to Miami; or by boat to New York via San Juan. These several alternatives provide a way to reach the continental market at a cost, including that estimated for production, of about $4.50 or less per lug or hamper. Direct boat shipment would be more than $1 lower per container. In all years since 1942 (when shipping costs were lower) the January average New York price for tomatoes has been above this amount, in some cases by more than $5 per lug. The average differential between costs of production plus shipping by boat via San Juan, and wholesale quotations in New York has been about $3.20 per lug. Prices vary from lot to lot because of size, quality, and other factors.

Having said this much, however, equal prominence should be given to the fact that the transportation facilities to which these costs apply are not waiting to transport vegetables at such times and to such places as sellers may elect. A principal producer in St. Croix states that, "The present transportation system from St. Croix scarcely could be worse." 39/ For example, ships of the line that provided the lowest cost means of reaching the New York market scheduled calls only once every 21 days at Frederiksted, and local shippers identified this as a "theoretical" schedule. 40/ In any event, the infrequency of this service, in comparison to the need for harvesting vegetables several times a week, means that at best it could provide only part of the transportation service required.

The second possibility--shipping to New York by boat via San Juan--also is influenced by the fact that there is only one scheduled sailing each week from San Juan, and by the uncertainty as to whether sufficient refrigerated cargo space will be available unless it is reserved well in advance. In addition, other hurdles exist in the movement of produce

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39/ This may be compared with the conclusion reached by a Federal commission 30 years earlier: "The existing systems of transportation between the various islands and between Puerto Rico and the islands are highly unsatisfactory" (19).

40/ Shipments of chilled beef to New York were facilitated by arrangements to have rum and meat shipments ready for the same sailings.

Both shipping schedules and marine transportation rates are established by the shipping companies, and are not subject to review and approval as is true, for example, of rail transportation on the mainland. However, the (1) small volume of freight originating in St. Croix; (2) the irregular and highly seasonal character of shipments of such crops as fresh vegetables; (3) the poor loading facilities in St. Croix (lighters are necessary); and (4) the present costs of operating oceangoing vessels all have an important bearing on the kind of transportation service shipping companies can provide the Virgin Islands. These factors, no doubt, are related to the sizable difference between ocean shipping charges from San Juan to New York as compared with those from Frederiksted to New York, even though the distances are practically the same (table 11). Rates for movement of freight by air are subject to regulation by the Civil Aeronautics Board.

from St. Croix to the mainland via San Juan. The chronology of a typical shipment may serve as a background for brief comments on some of these hurdles.

(1) Tuesday - Harvesting, grading, and packing in St. Croix (this is the last day that harvesting can be done for Thursday shipment from San Juan).

(2) Shipped by boat Tuesday evening to arrive in San Juan by the opening of customs Wednesday morning (some interisland shipping calls at Fajardo necessitating unloading and completing the transportation to San Juan by truck).

(3) Puerto Rican inspection 41/ and customs 42/ release permit.

(4) Trucked to San Juan refrigerated warehouse.

(5) Customs and inspection clearance obtained Thursday morning.

(6) Trucked to shipping pier.

(7) Loaded aboard ship sometime before sailing Thursday afternoon for arrival in New York the following Monday.

Several possible difficulties are involved in this process, although successful shipments have been made in most cases. First, the shipping service between St. Croix and San Juan is not dependable, at least for the volume sometimes involved. Second, produce must be moved out of refrigerated storage at least twice during the process, which increases the risk of marked deterioration. Also, dock strikes, such as occurred late in 1951, may preclude shipment during the height of the vegetable season. Shipment by this routing means that all other phases of marketing must adjust to transportation. Thus, it is likely that cucumbers would not be raised

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41/ A shipment of vegetables entered into Puerto Rico is considered to have originated in Puerto Rico, which means that it is governed by quarantine No. 58 (Fruit and Vegetable Quarantine). This quarantine prohibits, except sometimes in case of special treatment, the exportation of okra, sweetpotatoes, mango, guava, and certain other products, and requires certification (which normally can be obtained without delay) for exportation of string beans, lima beans, pigeonpeas, peppers, and citrus fruit. Inspection normally requires about 24 hours, but an immediate release permit can usually be obtained which enables perishable produce to be moved ashore and placed in refrigerated storage while waiting for clearance. It is reported that ways of shortening this time period might be found, and the same result might be achieved by transshipment in bond.

42/ Shipments to Puerto Rico from the Virgin Islands valued at more than $100 must be entered through customs, even though a tariff is not paid on Virgin Islands vegetables shipped to the United States regardless of whether shipments are made directly or via Puerto Rico.

because of the danger of loss of quality. Labor for harvesting may need to be employed at overtime rates in order to have picking done as shortly before sailing as possible. Overtime rates also may be required to obtain inspection services.

This routing could be improved considerably by reopening pier storage facilities in San Juan, or possibly by establishing reliable refrigerated boat service between the Islands and San Juan, which might provide storage for a few days each week while loading in St. Croix. This routing also would be improved by the application of Quarantine 58 to the Virgin Islands which would enable shipments to be federally inspected (or inspected and certified) in the Virgin Islands. Assuming that satisfactory arrangements could be made with officials of the Government of Puerto Rico, this in turn would mean that shipments could be routed to or through Puerto Rico without further inspection. San Juan has limited fumigation facilities for treatment of vegetables under quarantine, whereas the Virgin Islands have none. Customs clearance, either in San Juan or the mainland port of entry, would still be necessary. 43/

Direct shipment from St. Croix to Miami by air has definite advantages from the standpoint of simplicity of arrangements. But it costs somewhat more, particularly if less-than-full planeloads are shipped. In addition, transloading in Miami and shipping by refrigerated rail service to eastern markets would probably be necessary if full advantage of mainland prices were to be obtained.

Thus, it may be concluded that the lack of a presently available first-class transportation service is a major deterrent to production of vegetables for shipment to the mainland. Unless transportation services can be improved production increases scarcely seem justified. But arrangements have been made for workable transportation on occasion in the past, and improvement of the service, particularly between the Islands and San Juan, appears to be both a reasonable and a desirable goal.

Production of certain kinds of vegetables for the winter mainland market does not offer the stability of income that is offered by cane and cattle. Nevertheless, given an adequate transportation service, there is reasonable promise for future expansion, provided skilled management is available for both production and marketing. Most farmers on St. Croix have had no experience in the commercial production of vegetables for off-island sale.

43/ Late in 1952 biweekly steamship service from St. Thomas to New York was inaugurated. Although this made possible reduction of some costs and difficulties as compared with shipping via San Juan, total costs of reaching the New York market are not appreciably different. Lack of local refrigeration facilities, the infrequency of this service, and poor inter-island shipping facilities also reduce the advantages of this routing.

Fruit

A wide variety of fruit is produced in the Virgin Islands. The 1950 census lists 11 kinds, and from observation, it is apparent that at least as many more are grown for home use, if not for sale. 44/ Most of this production is in small tracts and the number of farms reporting exceeds the number of acres for each kind, except for bananas. Much of the fruit consumed in the Islands is imported, primarily from Tortola, B. W. I. For example, imports in 1950 of limes, bananas, coconuts, and avocados (table 10) were from 10 to 45 percent as large as the local production reported in 1949. Lesser quantities of several other kinds also are imported.

Receipts from Tortola and other foreign sources have been an important source of local supply for many years. In view of this situation, the limited information available concerning the supply situation in Tortola is briefly reviewed. 45/

It is apparent, first, that economic opportunities for Tortolans are fewer than those for Virgin Islanders. There are few tourists and little nonagricultural industry on that Island, nor have there been sizable public projects, such as housing or military installations, which have provided employment in the Virgin Islands. Perhaps more important is the fact that Tortolans do not have the opportunities to seek mainland employment, except under usual immigration procedures, which are available to residents of the Virgin Islands.

Second, prevailing agricultural wage rates in Tortola are only about half those in the Virgin Islands. A wage of about $1.50 a day, plus rum, appears to have been fairly common in 1952. It is also reported that the industry of the Tortolan in agriculture often exceeds that of the native Virgin Islander who is available for agricultural employment. A common lament among Virgin Island farmers who employ labor is that they cannot obtain Tortolans, who generally would be younger than Virgin Islanders available for agricultural employment.

Furthermore, a few agricultural enterprises in Tortola, such as coconut planting, and the use of improved bulls have been encouraged by Government payments.

In addition to agricultural production in Tortola, a fleet of about 80 privately-owned sloops and schooners is operated. Although most of

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44/ In addition to those reported by the census, also raised in the Virgin Islands are: Breadfruit, cocoplum, custard-apple, grape (seaside), guavaberry, mammee, honeydew melon, mespil, papaya, pomegranate, soursop, sugar-apple, sapodilla, and passion fruit.

45/ Much of this information was obtained in conversation with J. A. C. Cruikshank, Commissioner of the British Virgin Islands.

these are wind-driven without auxiliary power, a fairly regular schedule is maintained in transporting agricultural products to both St. Thomas and St. Croix.

Finally, fresh fruits and fresh vegetables are the only two main commodity groups which are exempt from the 6-percent tariff applicable to entries into the Virgin Islands from foreign sources.

It might seem that instead of importing fruit from Tortola, it would be produced advantageously in the Virgin Islands. But this general characterization does not seem realistic. Because of the present agricultural situation in both areas, it is likely that Virgin Islands producers can replace Tortolan imports only if they are willing to do so at present or possibly lower prices, a course of action that seemingly has not been acceptable during the last decade or longer. Probably, most farmers in the Islands can obtain higher incomes from sources other than production of fruit. It is concluded, for fruits generally at any rate, that considerable difficulty in finding local markets would be experienced if production were increased under present procedures.

Probably a few of the fruits now produced in the Islands could be marketed successfully in distant markets; or the quality of existing varieties might be improved to an extent that would change market potentials in both local and other markets. Oranges, limes, and papayas, appear to have such prospects.

Experiences of other subtropical areas, such as Hawaii, in attempting to introduce new kinds of fruit or fruit products in mainland markets in the last several years generally have been unsuccessful. Nevertheless, such possibilities should not be ruled out. 46/ Among other factors, the growing West Indian population in northeastern United States will have some upward effect on the mainland demand for fruits native to the Caribbean.

A current activity, which is being conducted under auspices of the Virgin Islands Corporation, relating to a change in the variety produced, is the planting of about 15 acres of Persian limes. At yields comparable to those obtained in Florida lime groves in recent years (roughly 4,000 pounds per acre), production from this acreage would be considerably larger than the annual quantity of native limes imported from nearby islands. Whether significant price premiums could be obtained locally for limes is not known, although practically no such limes are imported.

46/ It is reported that some Puerto Rican buyers had been interested in handling Virgin Island mangoes, but decided that they lacked sufficient quality and uniformity. Occasional shipments of mangoes, canned soursop, and other fruits have been made to New York. Some local people believe that an off-island market might be developed for the mespil. Pineapples are produced in St. Croix, but it is reported that most of the soils on the Island are not adapted to commercial production of this fruit.

The feasibility of producing limes for export to the mainland market depends upon several factors. Disregarding the difficulties of obtaining transportation, it is probable that the present costs of shipment by water would not exceed $2 a box, to which should be added production and packing outlays. Assuming an arbitrary production and packing cost of $2 a box, it would appear that mainland prices, as shown in table 13, have been high enough to amply justify production for export. Production of limes would benefit from the fact that they are harvested throughout the year in the Islands, in contrast to the shorter harvest season on the mainland. Limes are also less perishable than some other export possibilities such as tomatoes. Thus they can be handled and shipped more easily.

Table 13.--United States: Production, prices, and sales of limes, by years, 1944 to 1953

Year	Production	Price per box 1/	Sales	
			Fresh	Processed
	1,000 boxes	Dollars	1,000 boxes	1,000 boxes
1944 - 1945	250	6.50	239	11
1945 - 1946	200	6.18	158	42
1946 - 1947	170	6.71	142	28
1947 - 1948	170	5.77	164	6
1948 - 1949	200	5.88	164	36
1949 - 1950	260	6.23	219	41
1950 - 1951	280	5.24	206	74
1951 - 1952	260	7.20	187	73
1952 - 1953	300	---	---	---

1/ Fresh, as sold f.o.b. Florida packinghouses. Wholesale quotations on eastern markets are higher.

Producers in continental United States have sold an increasing proportion of the limes they produce to processors, even though the processing market has yielded prices substantially less than those in the fresh market. 47/ Sales of limes in the fresh market (table 13) have declined in the last few years. At the same time, production has tended to increase with the result that diversions to the processing market have increased substantially--amounting to 28 percent of total production in the last season. It is reported that a major factor retarding an increase of sales on the fresh market is the difficulty of producing and delivering

47/ For the 1951-52 crop fresh-market sales (as sold) averaged $7.20 a box, whereas processing sales averaged $1.50 a box. Likewise, the 1950-51 crop was sold at average prices of $5.24 and $1.65 per box for fresh and processing uses, respectively.

to market limes of the quality necessary to obtain the prices quoted. The control of water-rot has been particularly difficult. Nevertheless, domestic producers may be expected to make further efforts to increase sales on fresh markets if wide price differentials between fresh and processing outlets continue. Sales of concentrated lime juice, however, may influence demand in the fresh market.

Production of limes has increased rather steadily in other areas in the last several years. Production in Mexico, which supplies about 25 percent of the limes consumed on the mainland, has increased substantially. The output of 1.9 million boxes in 1951 was more than double the 1935-39 average. Production of limes in the Dominican Republic, Grenada, Jamaica, and Trinidad and Tobago was from two to four times larger in 1951 than average annual production in 1935-39. Such increases may mean growing competition for a share of the mainland market. But they also indicate that commercial production of limes is proving successful in certain other areas that are roughly comparable to the Virgin Islands with respect both to physical conditions of production and to distance from market. In some of these countries there are tariff disadvantages as compared with the Islands (appendix table 21).

It may be concluded that prospects for marketing limes on the mainland are highly promising. This potential enterprise merits further consideration, if fruit of fresh-market quality can be grown commercially on the Islands, and if hazards to groves from hurricanes are not adjudged to be serious. It would take several years to achieve a sizable production of proper varieties even if it proves feasible to topwork some of the native lime trees. In view of this situation, before a substantial planting is encouraged, more detailed attention should be given to prospective competitive developments in Mexico, Florida, and possibly other supply areas.

In addition to limes, a careful correlation of marketing and production possibilities may indicate other kinds of fruit, improved varieties of which might justifiably be produced commercially, and perhaps in considerable volume.

Poultry and Eggs

Despite the fact that 60 percent of the farms in the Virgin Islands reported chickens when the 1950 Agricultural Census was taken, production of poultry and eggs for sale is not sufficient to meet local demand. Reported sales from farms during 1949 were less than 10 eggs per capita for the population of the Islands, and sales of chickens by the 186 reporting farms numbered just above 10,000, or about 1 pound per capita.

Shipments of eggs to the Virgin Islands from the mainland increased from about 35,000 dozen in 1949 to almost 69,000 dozen in 1951, and small additional quantities are brought in from other sources (table 10). Fresh and frozen poultry shipped in from the mainland exceeded 150,000 pounds

in 1950, the most recent year for which data are available, and this total was also increased by small imports of live birds from nearby islands, although such imports of live fowl have declined fairly steadily since the end of World War II.

Local production of eggs has failed to meet local demand despite prices of from 80 cents to $1.20 a dozen in the last few years. Prices charged consumers by one supplier in St. Croix in late 1952 ranged from 85 cents to $1.10 a dozen, depending on size, and prices during the preceding year were approximately 10 cents a dozen lower. Producers reported no seasonal price variations. To some extent this arises from the fact that months of high production are also months of heavy tourist traffic. During 1951, a producer in St. Thomas sold all eggs for $1.08 a dozen. Prices in local retail outlets for mainland eggs are higher than the prices at which local producers sell. 48/

The commercial poultryman interviewed said they were unable to supply all orders, either during the tourist season or in summer, and hotel operators and other local buyers reported that they imported eggs primarily because the local supply was inadequate. Many buyers probably prefer locally produced eggs to those shipped in, and possibly all local production could be sold at prices of 10 to 15 cents more per dozen than prevailed in 1952.

Broilers also are produced locally on a small scale, although the difference in quality between mainland and local production is important. Generally, hotel buyers said that only the output of the few commercial poultrymen was equal to that of chicken meat brought in from the mainland. In consequence, poultry men believe that the broiler market is more "competitive" than the market for eggs, and that most producers would find it more profitable to expand the output of eggs rather than that of chicken meat. Prices of 80 to 85 cents a pound on a dressed, but not drawn, basis were received by local commercial producers.

It has been estimated that eggs from 20,000 additional layers could be sold in the Islands (30, p. 14). Although this total may be moderately

48/ Lack of a sufficient local supply of eggs may mean a relatively high marketing margin on eggs brought in from the mainland. In early December of 1952, for example, grade A large eggs from eastern mainland production areas were available in New York at prices of 65 to 68 cents a dozen, plus a transportation charge from New York of about 8 cents a dozen. Retail prices for imported eggs, which were often smaller, generally were from $1.15 to $1.20 a dozen. But costs arising from spoilage, breakage, etc. are probably higher for eggs brought in from the mainland, and local buyers are reported willing to pay 80 cents to $1 a dozen for good-quality locally produced eggs. Ceiling prices for imported eggs were about 25 cents a dozen higher than such prices for locally produced eggs.

optimistic, number might be increased from 6,000 to 10,000 birds, assuming a rate of lay of about 180 eggs per year per bird. If eggs can be produced profitably at prices bearing the same relationship to feed costs as on the mainland--about 80 to 85 cents a dozen at present 49/--and if the same general character of the demand curve can be assumed, the number of laying birds might be increased by as many as 12,000 to 15,000. Even larger increases would be justified if sales in Puerto Rico were developed.

Should such an expansion in number of layers occur, the resulting increased supply of fryers (local incubation is preferred to importation of chicks) and old hens would reduce materially the opportunity for increased output of broilers. Otherwise, there probably is a present local market at current prices for roughly 50,000 more birds than are now produced, if this production can be handled so that it equals in quality and timing the supplies now obtained from the mainland.

Fairly important obstacles to expansion of the poultry enterprise are a shortage of credit and the difficulties that arise in importing feed. It is reported that in some seasons feed normally cannot be stored for more than about 8 weeks without showing some spoilage. This means that regular imports must be scheduled, and shipping strikes, plus other transportation problems, have created difficulties on a few occasions in the last several years. Some poultrymen have tried to minimize this slightly by importing feed on their own account.

Dairy Products

There is little basis for believing that there is a much larger market for locally produced dairy products at prevailing prices than is supplied at present. It is true that some manufactured dairy products are imported. Imports of evaporated and condensed milk are fairly considerable. Nevertheless, there is no reasonable prospect, aside from occasional small seasonal surpluses, that local production of manufactured dairy products can compete 50/ even in the local market with the combination of lower-cost raw materials and large-scale processing efficiencies that prevail in some of the principal mainland dairy areas. At times, imports from Denmark and other foreign sources provide an even lower cost supply.

49/ In 1940-49, the average number of pounds of poultry ration required to equal in value the local market price received by farmers for a dozen eggs was 12.6 for the United States. Prices of poultry feed in the Virgin Islands now range between $6 and $7 per hundredweight depending partly on the size and source of purchase.

50/ The lowest price of milk reported by any producer questioned was 10 cents a quart. Producer-distributors usually reported prices of from 14 to 18 cents a quart for raw milk, and the ceiling price on pasteurized milk in St. Croix was 24 cents and in St. Thomas 25 cents a quart.

As for fluid milk, those dairies that operate in St. Croix report no difficulty, even during the tourist season, in supplying the market at the range of prices indicated earlier, 51/ although there may be an occasional day or two when supplies are not fully adequate. The closing of the largest dairy and pasteurizing plant in November 1952 caused difficulty in maintaining an adequate supply. Otherwise, such practices as once-a-day milking, little if any grain feeding, and allowing calves to remain with mothers are common. These are partly justified by operators because of the difficulty of selling larger quantities of milk.

A fairly similar situation prevails in St. Thomas, although during the last few years the supply of fluid milk has not always been adequate to supply local demand at prevailing prices during part of the tourist season. Hotel operators, for example, report that sufficient deliveries cannot always be obtained, and recently some have brought in small shipments of canned fluid milk. But at current prices, only a slightly larger volume could be sold at present. A small expansion in milk production during the tourist season seems justified, but further improvements in practices designed to increase production from present herds should be the first consideration.

An increase in local use of milk would be important from a nutritional standpoint. A study in Puerto Rico in the middle thirties indicated a per capita consumption of fluid milk of only 68 pounds a year (4, p. 50). Lack of refrigeration facilities in many homes in the Virgin Islands apparently has resulted in the use of canned rather than fresh milk by many households, even though the price of evaporated milk at times exceeds the price for an equivalent quantity of whole milk. An expansion in sales of fluid milk would be expected if incomes and the use of refrigeration increase.

Cereals

There can be little question concerning the ready local market for livestock feed and cornmeal at current prices of about $6 per hundredweight. Expanding the output of grains is more a function of production and storage than of demand. In 1950, more than 700,000 pounds of cornmeal were shipped into the Virgin Islands, and imports of livestock feed were a little more than 600 long tons. At a yield of about 30 bushels of corn per acre, the production of more than 400 additional acres of corn would have been required to replace inshipments of cornmeal alone, and other increases in acreage would have been needed to supplant part of the livestock feed brought in from other areas.

51/ The degree to which the tourist season affects sales of milk varies among the Islands. A dairy that supplied some of the larger hotels in St. Thomas during the 1952 season reported that sales to these hotels were about three times as large in the tourist season as during the preceding fall. The largest dairy in St. Croix--where the number of visitors is smaller--reported a smaller change in its deliveries to hotels.

Storage of grain would present a serious problem if output were increased. Few farmers have storage buildings, and those who have them said that it is difficult to store for more than a few months without having serious losses from spoilage.

Other Crops

There are a variety of other crops that have not been grown on a commercial scale, at least in recent years, which may have commercial prospects. A few of those more commonly mentioned may be noted.

Some years ago a small acreage of smoking tobacco was developed in the Islands, but it was discontinued because of insect damage. In 1952, one producer reported successful production of a coarser type suitable for manufacture of chewing tobacco, and in one or two other instances, farmers have grown this crop successfully.

Production of cotton was of considerable importance earlier in the Islands' history. Cotton preceded sugarcane as the major crop in St. Croix and then was replaced by cane. Following an upturn before World War I when about 1,500 acres were planted, cotton production was stopped in the middle twenties. Shipping difficulties during World War I reduced the acreage sharply, and infestation by the pink bollworm thereafter appears to have destroyed this enterprise. Although some advantage had been gained from the ratooning of cotton, this practice made it hard to control insect damage. It was finally necessary to require that all cotton plants be destroyed and that no new plantings be made during a period of several weeks each year. Control of insects is made particularly difficult because cotton and some insect-host plants such as okra grow wild in St. Croix. A test planting in 1952 became heavily infested with pink bollworm.

It is possible that new varieties of Sea Island cotton--the type that was grown in the Virgin Islands--and improved insect-control measures may alter the outlook to some extent. But there is little present basis for resuming production in view of the declining market for this type of cotton. Consumption of Sea Island cotton by United States mills has not exceeded 5,000 bales in any year since the early twenties; and for the last several years annual consumption has averaged only about 1,000 bales. In addition, there are no ginning facilities in St. Croix.

It may also be significant that principal exports of cotton occurred during ownership of the Islands by Denmark. This may have facilitated shipments to the European markets where it was sold.

Federal price support for Sea Island cotton became available for the first time in 1953. The announced level of support of about 56 cents a pound exceeded prices of Egyptian cotton delivered to eastern United States mills. Such increases in production of Sea Island cotton as may occur in the States may well go into storage rather than into mill consumption.

Some variety of American-Egyptian or other type of cotton such as Sealand may provide a better alternative in St. Croix than Sea Island, but the outlook for this is not promising.

Seed crops have been tried with limited success on a few occasions, and production of seeds such as guineagrass might possibly be expanded commercially. The few commercial attempts to produce seeds of vegetable crops have not been successful.

Expansion of the horticultural specialties industry in Puerto Rico and certain other places in the Caribbean indicates that this type of enterprise might be increased moderately in the Virgin Islands.

Small plantings of castorbeans have been made from time to time. Under somewhat unfavorable conditions in 1952, a test plot produced a yield equivalent to approximately 800 pounds per acre--more than double the yield obtained from non-irrigated land on the mainland in the last 2 years. Prices received for hulled beans in continental production areas by farmers who produced under contract with the Commodity Credit Corporation, have declined moderately during recent years, falling from a range of 10.5 to 12.0 cents a pound in 1951 to the support level of 9 cents a pound in 1953. Castorbeans landed in New York from Brazil are frequently quoted at lower prices. At such prices in mainland markets, where St. Croix production would probably be sold, gross returns to Virgin Islands producers from castorbeans might not exceed $60 an acre. As this is lower than returns from other possible enterprises, commercial possibilities would seem to depend upon keeping costs of production and harvesting relatively low, and even this would not place the enterprise in a particularly favorable competitive position. Improved production possibilities, such as those arising from new varieties, might increase the potential returns from this crop. Since 1951 the United States Department of Agriculture, at the request of the Munitions Board, has conducted a program to encourage domestic production of castorbeans. The reported planting of more than 140,000 acres in 1953 is more than 50 percent larger than the acreage in 1951, and about 20,000 acres above that of 1952. Continued expansion of acreage on the mainland would reduce the prospect for higher prices. Continental producers in nonirrigated areas believe that introduction of better varieties--principally Cimarron--and improved knowledge as to production procedures have improved the position of this crop at least temporarily. Also, prospective acreage-diversion programs for certain basic crops may influence the acreage of castorbeans, providing satisfactory markets develop. Such production as might develop in St. Croix would be faced with this prospective competitive situation.

Production of sesame has been considered in St. Croix, and test plantings were made in 1952. But as yet little is known as to the possibilities of this crop. There is some indication that at the level of prices during recent years, per acre returns would be relatively low.

Other possible crops include sisal, kenaf and other fiber crops, coffee, cacao, mung beans, certain plants from which wax may be extracted, and various medicinal plants. In many cases, the information available concerning the possibilities of these in the Virgin Islands is insufficient. The Agricultural Experiment Station would be justified in systematically assembling data, concerning production possibilities, either from its own research or from that conducted elsewhere. Likewise, United States Department of Agriculture, as well as other mainland agencies, might well suggest crops of a tropical character, for which improved markets loom on the continent, for trial in the Virgin Islands.

Summary of Market Outlets

The major conclusions reached in the foregoing commodity review may be summarized as follows.

There is no market within the Virgin Islands for any sizable increase in output of most agricultural products. The principal area of potential market expansion for agricultural production in the Islands is probably Puerto Rico. Sales of most kinds of livestock products and one or two types of vegetables could be increased substantially in Puerto Rico while smaller increases could be expected for other types of vegetables and fruit. The mainland offers a reasonably promising market for some kinds of winter vegetables and, with improvement of varieties, for a few types of fruit. Within the Islands, small increases in local production of eggs, chickens, high-grade cattle, small livestock, some vegetables, and grain could be sold locally. Marketing cattle for breeding purposes among several of the islands in this area is likely to continue. In addition, there may be other commercial possibilities among the several enterprises which have not been tested adequately as yet.

Prospects for successful market expansion would be greatly enhanced by improvement in the docking facilities in St. Croix and in transportation services, particularly between the Virgin Islands and Puerto Rico.

PROCESSING FACILITIES AND EFFICIENCY

The present situation regarding processing and some of the prospects for improvement are now examined.

Sugar

All the sugarcane produced in St. Croix is processed in the Bethlehem factory of the Virgin Islands Corporation, and the efficiency with which this factory operates in processing the Island's principal crop is important,

at least as regards the operating position of the Corporation, if not in prices paid growers. 52/

It has been the view of the Corporation that minimum-cost operations cannot be achieved until the annual output of sugar is increased to approximately 20,000 or more tons. Although it is difficult to estimate the point of lowest average costs, there appears to be an inverse relationship between costs per ton and output, at least over a part of the cost curve.

Information for the 1951 and 1952 crops and projections for 1953 and 1954 crops are shown in table 14.

Table 14.--Output of sugar, and manufacturing costs per ton, 1951-54

Crop	Cost per ton of manufacturing sugar 1/	Tons 96° sugar produced
1951	$48.54	7,500
1952	35.05	11,647
1953 (estimated)	27.45	15,620
1954 (estimated)	30.00 2/	16,260

1/ Does not include the cost of sugarcane.
2/ Calculated largely on the basis of average relationships, whereas more immediate detail is available on which to base the estimate for the 1953 crop.

These relationships indicate that with no change in the general level of prices, a 20,000-ton output probably could be produced at a cost of at least $5 less per ton of sugar than that actually incurred in 1952, when production was less than 12,000 tons.

But there are indications that even with no increase in output, manufacturing costs could be lowered significantly by: (1) Reducing idle time during the grinding season; (2) increasing the percentage of sucrose obtained from the cane handled, and (3) possibly recovering some byproducts not now used. This is a highly simplified statement concerning the complicated art of sugar production, but each of the above points may be elaborated briefly.

The desired situation in the grinding season is for the factory to operate 156 hours each week with 12 hours reserved for cleaning and the like. Obviously, no sugar factory achieves such perfection, but the possibility for improvement undoubtedly exists in the Bethlehem factory.

52/ As indicated earlier, prices paid to growers for sugarcane are not closely related to the operating income of the Corporation.

The percentage of idle time during the last 5 years has ranged from 35.3 to 49.5. In contrast, one of the more efficient Puerto Rican factories has kept its idle time to less than 25 percent during the last two grinding seasons, and even lower percentages are fairly common in other domestic areas.

Improvement in the Bethlehem factory situation would appear to depend primarily on better arrangements for the harvesting and delivery of sugarcane. It is estimated that roughly 85 percent of all idle time results from an insufficient accumulation of cane for grinding.

Further improvements can be made in the extraction of sucrose from the cane handled. The combined loss of sucrose to bagasse and molasses by the Bethlehem factory in 1952 was 2.5 pounds per 100 pounds of cane. In 1951 it was 3.1 pounds as compared with losses of about 1.5 pounds in some Puerto Rican factories. Output of sugar at Bethlehem in these 2 years might have been increased by 10 percent or more from the same tonnage of sugarcane, had the extraction rate approached that of the Puerto Rican factories cited. Some factory improvements are now in process which should increase the yield of sucrose obtained. It is true that production in St. Croix has the disadvantage of having to handle a larger tonnage of fiber per ton of sugar than is generally the case in Puerto Rico. Nevertheless, several observers have concluded that a promising way to significantly improve factory operation is to reduce present losses of sucrose.

Despite the relatively high fiber content of St. Croix sugarcane there is practically no prospect, at least in the next several years, of using the local supply of bagasse to produce such products as paper and plastics. The quantity of bagasse is small; some manufacturing processes probably would be hampered by a shortage of water; and the distance from markets places St. Croix in a relatively poor competitive position. Furthermore, bagasse is too bulky to warrant shipment to other locations for processing. There are possibilities of making more effective use of some cane byproducts, although these possibilities are limited.

Some continental factories are isolating and drying the soft pith from bagasse, which has many uses, either in this form or as raw material for the chemical industry. One local use for this product would be as a vehicle to hold molasses for livestock feeding although sales might not be large enough to justify the necessary additions to the plant. Its local importance might be further enhanced if the molasses-dry-pith mixture served as a base for the use of urea or some similar product in the feeding of livestock.

Also, the recovery of wax from sugarcane is reported to be commercially feasible even for a small factory, and it is said that one or two factories on nearby islands have been able to increase returns above costs by as much as 50 cents per ton of sugarcane from the recovery of wax.

Some bagasse is now used as a fuel in operating the factory; this sets a value for part of the supply which any alternative must exceed before its adoption can be justified.

Two conclusions may be drawn from the foregoing discussion. First, the difficulties in keeping the factory supplied with cane during the grinding season provide an additional reason for examining other arrangements for harvesting and hauling cane. A major factor in this situation is the difficulty of obtaining enough harvest labor, but breakeven operations will be hard to achieve unless the factory more closely approximates the reported efficiency of a number of those in Puerto Rico. Second, it is possible that the annual output of sugar could be reduced within broad limits without necessarily bringing about increases in factory costs, provided idle time could be reduced and a higher proportion of the sucrose could be recovered.

Livestock

Livestock slaughtering facilities used commercially in the Virgin Islands are publicly owned. In St. Croix, for example, the two slaughterhouses are owned by the Municipal Government, and are available for the use of meat market operators and others having animals to slaughter. Payments of 25 cents a head for cattle and calves, and 10 cents a head for sheep, hogs, and goats are made by those using these facilities through a system of tickets which are presented to the municipal employee who inspects the animals at the time of slaughter.

Partly because of the lack of facilities in local slaughterhouses for such operations as chilling meat and making meat products, and for complying with inspection standards, and because of the small volume of livestock that can be handled, an abattoir was constructed by the Federal Government in St. Croix in 1941. It has facilities for chilling (though not freezing) beef, and much of the output of the abattoir during periods of its operation has been sold in Puerto Rico, and to a lesser extent in St. Thomas. By chilling and wrapping before shipment it has been possible in most cases to reach these markets with the product in good condition, even though shipment has been made in boats not having refrigerated space.

In 1947, operation of the abattoir was discontinued because a higher income could be obtained from the sale of live animals in the Puerto Rican market, as was discussed in the section concerning livestock markets. 53/

53/ Other factors associated with the closing of the abattoir were: (1) some producers preferred to sell to buyers of live animals, which lowered the number handled by the abattoir; (2) refrigerated shipping to Puerto Rico was not available, and occasional losses from spoilage occurred; (3) competition in the dressed-meat market from the Dominican Republic dimmed export prospects at times, and this appears to have been aided by trade concessions; (4) costs at the St. Croix abattoir were relatively high as compared with Puerto Rican costs because of the sanitary and inspection procedures necessarily followed in preparing meat for shipment from St. Croix. Simple equipment and procedures are generally used in slaughtering cattle in Puerto Rico (11, p. 110). It is reported that the charges for slaughtering and dressing an animal in Puerto Rico are less than $2 a head.

Since that time, the abattoir has remainded idle except for several months in 1951, and intermittent operation following the imposition of the embargo on cattle shipments in December 1952.

On the basis of the limited information available, it appears that the cost of processing in the abattoir during the period it was in operation in 1951 was more than 4 cents per pound of dressed beef. Such a cost would be high even in comparison with those in smaller continental packinghouses where wage rates are more than double those in St. Croix. 54/ Nevertheless, achievement of more efficient processing is dubious as long as the number of animals slaughtered remains low. The present production of livestock in St. Croix could probably provide no more than about 150 cattle a month for slaughtering in the abattoir. It is designed to handle a much larger number, and the total slaughter for a year probably could be accomplished in about 2 weeks of steady operation. The chief way to improve the operating efficiency of the abattoir thus would be to increase the volume of slaughter, either from local production or from that in nearby islands.

Other steps that would enable more efficient processing if an average volume of at least 400 to 500 cattle a month could be developed are considered briefly. 55/

First, some commercial use could be made of byproducts through such forms as dried blood meal, tankage, and meat scraps. These now have a negative value because of the costs of burning or other disposition. Economies probably would not be large, but they might amount to approximately $1 per animal slaughtered, or about $\frac{1}{4}$ cent per pound in processing costs. 56/ Although attention has been given to this in connection with the operation of the abattoir, it is possible that even at the present level of livestock production better use could be made of offal.

54/ In St. Thomas the abattoir constructed by the Federal Government in 1949 has been rented by the municipality to a private operator who has charged 3/4 cent per pound liveweight for killing and dressing cattle, hogs, goats, and sheep. Several butchers pay 2 cents a pound for chilling and 2 cents a pound for cutting to the operator of a refrigerated storage facility in St. Thomas, making a total processing cost of a little more than 5 cents a pound dressed weight.

55/ Even if production of cattle is increased to this annual level, it is likely that the abattoir could not be operated efficiently in all seasons. During each of the last 5 years, cattle exports from St. Croix in the month of largest exports have been at least three times as large as those in low-export months. Furthermore, there is no regular seasonal pattern, and months of high exports in some years may be months of below-average exports in others.

56/ Assumes that an 800-pound animal would yield about 35 pounds of tankage. Based on the conversion factor of 4.32 percent calculated by the United States Department of Agriculture (11, p. 116), valued at the price presently paid for corn--about 6 cents a pound.

Second, further consideration might be given to the boning of beef before shipment, especially as utility and canner and cutter beef is normally boned in some markets before moving to retail outlets. But the possibilities are more promising in case of shipment to distant markets, where transportation costs are high, and where few Virgin Islands shipments are made. In addition, at the present time, the fact that there are no facilities for freezing beef (which probably would be necessary if it were boned) and no labor trained for the boning of meat indicates that it would not be feasible.

Other potential economies associated with a significantly expanded volume of cattle slaughter might arise from providing more regular employment for packinghouse employees, thus developing specialized skills more fully, and from improving transportation services.

Other Marketing Facilities

Present marketing facilities in the Virgin Islands generally are inadequate and would need to be improved if production were expanded, although the development of markets, as discussed earlier, is of more importance. Some of the main deficiencies may be mentioned.

Most producers who must rely on private transportation for movement of produce in St. Croix indicated difficulty in obtaining it. Only 60 of the 508 farms in St. Croix reported ownership of trucks in 1950, and few individuals have trucks for rent. Horse or donkey power is used by many. Furthermore, 66 of the farms reported in 1950 were not located on public roads, and a little more than 300 were on unimproved roads. These two factors have created problems for those farmers who ship perishables or who for other reasons need to hire a precisely timed transportation service.

As discussed in the vegetable section of this report, the present interisland transportation service is poor. In the case of St. John, it is almost completely lacking although the inauguration of motor-vessel service from Puerto Rico in September 1952 resulted in limited improvement for the other two islands. Poor shipping facilities also have been a serious obstacle in the movement of live cattle to Puerto Rico. Much of this traffic has been handled by sailboats, which usually require a day or more for the trip. Few if any facilities for feeding or watering in transit are provided. Equipment for handling is almost completely lacking. In consequence it is reported that weight and death losses have been high and that the value of animals may be further reduced by bruising during shipment.

In St. Croix the lack of pier facilities for oceangoing shipping also increases the costs and difficulties of transportation. Lighterage charges on sugar shipments, for example, are equal to about 5 percent of the price received. At times cargo is lost or loading is delayed as a result of bad weather. Although a recent estimate of the cost of constructing a pier is

not available, the potential savings on the sugar traffic alone if lighterage costs could be eliminated would probably cover a substantial part of the annual charges, including interest, involved in constructing a pier. Savings, of course, would be achieved on both inshipments and outshipments. Improvements of this character would seem justified even if shipments to the States by way of San Juan rather than directly should increase in importance.

Credit, either to finance capital investment or for operating purposes, is not readily available from commercial sources. In instances where supplies are bought other than for cash, except from the Virgin Islands Corporation for production of sugarcane, they are usually financed by the selling organization. But this type of credit usually is for only 30 days and is not generally available. Even well-established farmers emphasized the difficulties they faced in financing purchases of feed, containers, and other supplies.

The present storage capacity--particularly refrigerated--is small, and inadequate for the requirements which have existed from time to time during the last few years. In St. Thomas, the market constructed in 1941-42 by the Public Works Administration, but now privately operated, has roughly 2,400 cubic feet of refrigerated storage capacity. Much of it is used in local merchandising operations or to provide locker space for individual families. In St. Croix, two small facilities are available primarily for holding stocks to be retailed locally. The cooling room in the abattoir has been used occasionally for this purpose. Expansion of vegetable production in St. Croix would necessitate either heavier demands on refrigerated storage space on ships or in San Juan, or additional local capacity. There is no equipment for freezing on a commercial scale, although plans for construction of such facilities in St. Croix are under consideration. But until the output of electrical power is increased, expansion of refrigerated service might be difficult.

Dry storage space for such products as grain and livestock feeds appears to be geared to the fact that no satisfactory and sufficiently economical facility has been developed which will provide storage, at least during certain seasons, for more than about 2 months.

Local sales of a few products may be restricted by the type of retail service available. Most butcher shops, for example, are open for only 2 or 3 days in the week.

Market information available to Virgin Islands producers is limited primarily to that obtained from Puerto Rico by radio, or more frequently, that which is disseminated by buyers from off-island markets. A few individuals receive market news reports pertaining to particular continental markets.

Finally, the development of improved marketing facilities, to the extent that these are based on mechanical processes, would be hampered by the absence of enough well-trained mechanics and other repairmen. Some

present work of this character must be done off the Island, which means delays and higher costs. A larger group of such craftsmen is needed.

Market Organization

Whether or not shifts in production occur, improvements can be made in the agricultural marketing system in the Islands. This section is intended to review present deficiencies and some of the attempts that have been made to overcome them. With this background some of the plans now under consideration are then examined. Shortcomings of the present marketing situation are discussed first.

Lack of an Organized Market

Few agricultural commodities produced on the Islands can be bought and sold regularly on an established market. This is not true of sugarcane, and, aside from those infrequent periods when livestock shipments have been restricted, there usually is little difficulty in selling cattle and other livestock. But in the main producers must put forth much effort in finding buyers and to transact sales. These difficulties are compounded when sales are made off the Islands. In these situations it is generally necessary for producers both to locate prospective purchasers or handlers, and to make the necessary arrangements for packing, grading, transporting, inspecting, and customs clearance. In general, they must perform several functions which in most other producing areas are undertaken by specialized market intermediaries. The complexity of these arrangements, and the quantity of produce needed to make them feasible usually means that the products of several producers must be aggregated before shipments can be made.

Character of Competition

A second possible difficulty in the present market organization is the small number of buyers for some products. During much of the last quarter of a century, for example, most of the cattle exported from St. Croix were bought from local producers and shipped by one buyer. It is reported that competitive conditions in Puerto Rico are such that good working relations with Puerto Rican buyers are needed before full advantage of price premiums in that market can be obtained. Dissatisfaction with prices received from buyers was one reason for building an abattoir in St. Croix.

Somewhat similar conditions exist with respect to certain other commodities. During the last year, there has been only one pasteurizing plant each on St. Thomas and St. Croix. Both are privately owned. When off-island sales of fruits and vegetables were undertaken through other than a local cooperative, purchases usually were made by only one or two buyers.

Inadequate Service to Buyers

Despite the difficulties reported by many producers in finding local buyers, some operators of hotels and stores assert that they are not able to obtain large enough supplies from local production. Part of this difficulty arises because of seasonal variations in production. But sales of locally grown products probably could be increased by improving the services offered buyers. Such buyers, even during the production season, may have difficulty in finding a dependable source of supply. In addition, much of the local production is not uniform as to grade and quality, and insufficient care may have been taken to preserve quality and to maintain sanitary standards between harvesting and sale. Delivery service may be poor. For some products, such as beef, the cutting and aging procedures desired by some purchasers are not followed. Finally, at times supplies may be obtained more economically elsewhere, although many of the institutional buyers are apparently willing to pay small price premiums if they can be sure of an adequate supply of dependable quality.

It is important to observe in this connection that the procurement of supplies from other sources--usually mainland produce merchants--also poses problems. Orders are prepared from 2 to 4 weeks or more in advance of deliveries. Supplies usually cannot be added to on short notice, and a number of hotels maintain storage stocks that are large relative to average usage, thus increasing costs of storage and risk of spoilage. In some instances, complaints were made of quality deterioration during shipment from the mainland, and distance from supply houses increases the difficulty of adjustment. Inshipments are beset by many of the same transportation problems involved in shipping from the Islands. The wide price fluctuations that sometimes occur in mainland markets, particularly for vegetables, also are of concern to some purchasers, especially as it is difficult to modify orders. Often it is more troublesome for local buyers to arrange for satisfactory credit terms from mainland suppliers than from local ones. Despite these several difficulties, Island hotels and stores buy regularly from only a few producers.

Costliness of Operations

As indicated earlier, the range of products produced in the Virgin Islands is wide and as a result for none of them has it been possible to develop sufficient volume to enable efficient processing operations. Likewise, the wide diversification of production probably has tended to raise production costs. It was not unusual to observe farmers who had 15 or more different enterprises.

The most economical use of resources might mean a fairly small production of many products, rather than the larger production of a few. High per unit handling and processing costs might be more than offset by price premiums in the local market. But this possibility apparently is not in accord with the facts, as such wide diversification by producers generally is justified

by them on the basis of the high price risks associated with the sales of most commodities raised. Greater specialization in production, at least for the export market, would have advantages not only in reducing local production and handling costs, but in easing shipping, inspection, and other marketing problems. This should be a major goal of future agricultural plans.

Other Problems

There are many other possible beneficial changes within the present market framework in the Islands, as indicated earlier.

Processing facilities generally are either lacking or are inefficient because of their small size. Both intra- and inter-island transportation facilities are inadequate. Many farms still are not on public roads. Restricted sources of credit have retarded the marketing adjustments needed. Storage facilities are not sufficient for some enterprises that might be expanded. A supply of labor for skilled processing operations is almost totally lacking.

In connection with the marketing of sugarcane questions pertaining to marketing and pricing procedures are now under consideration.

Finally, it may be surmised that the problems mentioned are especially severe for the small producers, who frequently cannot undertake a successful marketing venture unless a number of other producers elect to participate.

Earlier Organizations

In trying to develop a marketing system that would overcome the problems discussed, several producer organizations have been formed, frequently of a cooperative character. In some cases, Government funds have furnished part of the financial support. Despite the several efforts to establish organizations of this type as going concerns, none were in operation in 1952. Some of the more recent organizations are discussed briefly in the following.

Several attempts have been made by producer groups to improve the marketing of livestock. The Cattlemen's Cooperative of St. Croix was formed in 1931 and made regular shipments of cattle to Puerto Rico. But primarily because of the sharp drop in cattle prices during the next few years, this organization went out of existence. Perhaps the most ambitious effort was the operation of the federally constructed abattoir in St. Croix by the St. Croix Livestock Association from January 1943 through December 1947 under lease from the Virgin Islands Company. Approximately 50 producers sold most, if not all, of their cattle through the association, and in the peak years of operation sales exceeded $100,000. With the change in the relationship between dressed-beef and live-animal prices in Puerto Rico,

together with other difficulties, the volume handled declined to less than $60,000 in 1947 and the association ceased to operate this facility. No further operational program concerning livestock has been attempted since, except for the shipments of dressed beef in 1951 as discussed earlier.

A number of organizations were formed in the last quarter of a century to improve the market organization for vegetables and fruit. In the last decade at least three such efforts were made in St. Thomas. The most recent was undertaken in 1946; it operated successfully for about 3 years. The primary function of this organization was to buy the fresh fruit and vegetables produced by its members, grade and and pack this produce, and sell it locally to hotels, stores, and other large buyers, although some sales were made to individual families. Prices paid to producers were established by a board and were reviewed quarterly. Although they varied by products, these prices generally were from half to two-thirds of the prices received by the cooperative, and income above expenditures was distributed to members as dividends. The assembly of products from farms was improved in that a truck was used by the cooperative, whereas many of its members previously had spent several hours a day on 2 or 3 days each week bringing produce to Charlotte Amalie by donkey and selling it in the public market. It also appears probable that through its quality protection procedures and its efforts to provide a regular source of supply, the cooperative was able to market a larger quantity of fruits and vegetables than would have been sold in the aggregate by its individual members.

Although about 60 farmers were members of the organization, attempts to increase membership further were not successful. Plans to handle poultry and dairy products and fish were not carried through, partly because of this. As time passed, it became progressively more difficult for the cooperative to obtain a sufficient supply even of fruit and vegetables. Only a few farmers irrigated their lands; consequently, from February through August there was little produce to handle. In addition, some members returned to direct selling to hotels and stores. Rather severe droughts curtailed output in 2 years. Shipments from Tortola and, at times, from St. Croix were competitive in some months. Perhaps the biggest difficulty faced by the cooperative was that several of its members left farming for industrial jobs. Because of these several factors, operations ceased in 1949.

Several cooperative organizations were formed in St. Croix to expedite the marketing of vegetables. In 1941 the St. Croix Agricultural Association, with a membership of about 50, was organized. Part of the financing was provided by a loan from the Farm Security Administration. A small cannery with a capacity of 100 to 150 cases a day was bought. Tomatoes and tomato juice were the main products canned. The association also began to operate a small grist mill, but plans to operate a dairy and to provide truck and tractor service to members on a rental basis did not materialize. Limited local sales of canned products were developed during part of the war period, apparently in the main because of restrictions on shipments of canned goods

to the Virgin Islands at that time. However, operations were discontinued shortly thereafter. A primary difficulty was that of developing a sufficient volume of sales. Operating difficulties such as obtaining containers of proper size, pilferage, and maintenance of quality controls also beset the association. The purchaser of the equipment, when the association was liquidated, planned to develop a new organization to continue canning operations, but this plan was not carried through. In 1946, the loaning agency had recommended that: (1) The management be improved; (2) the membership be increased; and (3) the entire program of the association be reconsidered.

The efforts of a St. Croix association to market the 1948-49 and the 1949-1950 tomato crops were briefly described in the vegetable section of this report. The failure of this association may be explained partly by production difficulties encountered in both years. However, a stronger financial structure would have made continuation of the project possible in years when both weather and markets were favorable.

The record of the associations described and that of others is not an optimistic one. Some of the difficulties of past organizations stemmed from lack of rainfall or other production problems, and in other instances, an important reason for failure was the small demand for the products handled. But a principal deterrent was inadequate financing, and to a lesser degree, in some instances, lack of full-time, experienced management. It is quite apparent that insistence on a local person as manager jeopardized the possibilities of successful operation of some of the organizations which have been organized.

Several changes that would improve marketing prospects can be expected only if the Islands give assurance of having a significant volume of products to sell over a period of years. In the contrary situation, it is difficult to justify construction of additional storage capacity and other processing facilities that would be needed. Shipping schedules probably cannot be changed to better serve marketing requirements. Arrangements to expedite inspection services and related shipping necessities cannot be fully developed. Local transportation services cannot be improved sufficiently, and grading and packing skills among the local labor force probably will remain undeveloped. In fact, it would be difficult to improve any of the services and facilities needed for successful marketing programs unless continuing employment for them is reasonably certain.

Nor does it seem wise to consider anything less than a fully coordinated effort toward marketing improvement. Better interisland shipping schedules, for example, will not be justified over the longer term if there is not sufficient production requiring shipment, nor will proposals to expand production be well founded unless shipping is available. Similarly, changes that pertain to other services will not be of greatest value and may actually be of no benefit, unless they are undertaken as part of a general program of improvement.

In addition, it is probable that a successful marketing organization of producers will need to emphasize sales in off-island markets, not only because of volume requirements, but because of the difficulty of operating an organization in a geographic area so small that most producers have the ready alternative of selling directly to ultimate purchasers rather than to the organization.

With this background current developments may be examined.

Present Situation

Two new private ventures, one in the planning stage and the other under construction in 1952, aim at improving storage and local shipping services. Primary emphasis, at least in the beginning stages, is on increased sale of products in the local market. In addition, some attention will be given to promoting sales of locally produced commodities in nearby islands. The need for improvement in local production conditions is recognized, but the owners of these developments have not planned intensive work with producers. Thought is being given, however, to providing production credit, and to promoting the sale of light tractors and farm machinery. Other private companies, some of which have operations in a number of places in the Caribbean, have considered the possibilities of development in the Virgin Islands from time to time.

A second and substantially broader plan is incorporated in a proposal made to the Municipal Council of St. Croix to establish a municipal marketing administration. The essential function of the administration would be "to secure a lucrative market for the various items of fruit and vegetable crops produced by the farmers of the island; and to promote and foster increased agricultural production throughout the island of St. Croix." The administration, to be financed by a loan from municipal sources reportedly in the neighborhood of $100,000, would buy products from producers at prices determined by a commission established for the purpose. It would sell them primarily in markets outside St. Croix. It would provide needed marketing facilities, and would do the necessary crating, local transporting, and other handling of products bought from farmers. Production assistance to farmers would be provided through sales of seeds and plants and through rental of farm machinery.

A third alternative, although it is not being actively considered at present would be for the Virgin Islands Corporation to establish a marketing department or in some other way to participate in the financing and management of marketing organization. 57/ Losses being incurred by the Federal Government presently perhaps give it a special interest in ways by which economic improvements can be accomplished.

57/ The Bank for Cooperatives of the Farm Credit Administration does not have authority to make loans in the Virgin Islands, and, in any case, it would appear to be preferable, if possible, for public loans to be handled by one of the Federal agencies now located in the Islands.

Producers do not appear to be active, or interested, in forming their own marketing organization at this time. Nevertheless, despite past difficulties it seems reasonable to assume that new cooperative organizations will be formed if the economic basis for them is sufficiently promising.

The private marketing organizations mentioned earlier may emphasize sales in the local market, and thus may have interests which do not come into direct conflict with the other alternatives listed. But to the extent that conflict might arise there would be merit in having marketing operations carried on by an organization representing a broad cross section of producers. The prospective volume of production for any one commodity does not appear large enough to justify more than one organization so far as off-island shipments are concerned, and some competitive abuses might develop if this organization were owned and operated by an individual. It is recognized that there are weaknesses in other types of management; but in view of the criticism that has developed in the past, it would be hard to obtain public support for some types of privately operated organizations.

No conclusion has been reached in this study as to whether the Municipal Council proposal, that involving the Virgin Islands Corporation, or some other arrangement is preferable, partly because neither the willingness nor the authority of the various parties to act has been sufficiently examined. Operation as a part of the Virgin Islands Corporation would presumably improve the financial structure of the organization, and it might provide greater stability than if the organization were subject to the review of a changing Municipal Council. Furthermore, the system of field supervision now used by the Corporation, no doubt would be of value in carrying out the educational and demonstrational efforts among producers that would be needed. Presumably, an organization within the Corporation could pertain to all the islands, whereas the Council Administration would relate only to St. Croix.

On the other hand, greater support would probably be obtained from local producers for the municipal organization--unless participation by the Virgin Islands Corporation could be channeled through an administrative arrangement which would give local producers a substantial voice in management. Organizations developed either by the Municipal Council 58/ or the Virgin Islands Corporation to some extent would be subject to Federal regulations pertaining to purchasing procedures, accounting methods, and the like. Thus, they would not have the freedom of action that an organization under private management would have. Furthermore, either organization might so minimize the contribution made by participating farmers as to weaken their support of the effort.

58/ The United States Comptroller General has under consideration the question of whether the Municipal Government is a Federal agency, and thus subject to Federal accounting and operating procedures.

A producer-managed organization with considerable financial support from either the Council or the Corporation might well be more desirable, particularly if the importance of obtaining competent management could be emphasized sufficiently. Such a firm would have greater operational flexibility than either of the two government organizations mentioned. The greater control and responsibility which producers would have concerning methods and procedures might encourage local support, and a greater willingness to adopt the particular production practices that would be needed for success. No doubt, a privately managed organization would be the ultimate goal of any of the present proposals, even though loans or other assistance from a public agency probably would be required during the early years.

Whatever the form of the organization, it should undertake a broad longer term program of improved marketing and pricing practices. The program should have sufficient continuity and enough local support so that comprehensive efforts to develop markets could be carried through, and so that the necessary specialization and improvements in production could be developed by producers. Intelligent management and careful assessments from time to time of the demand for various products are mandatory ingredients for success. The record of past failures is sufficient evidence of the complexity of operating a marketing firm profitably. Only by these measures can a thoroughgoing effort be made to improve the income potential of agriculture in the Islands.

A distinction must be made between adequate financial support for the organization and for individual producer members. Producers bear much of the price and production risk. It would be desirable to consider provisions for self-liquidating measures to minimize the effects of these risks.

APPENDIX

A.--Supplemental Statement Concerning Sugarcane and Sugar Production

Despite the dominant position which sugar now occupies in the economy of the Islands, there is a substantial basis for questioning the desirability of continuing this enterprise indefinitely. The most serious indictment, as discussed earlier, is the low level of income received by most of those producing sugarcane. Although in only a few cases are individuals presently earning higher incomes from some other agricultural enterprise, the efficiency and organization of sugarcane production will need to be greatly improved if even moderately adequate levels of living are to be obtained from it. Efforts to accomplish this objective have been made over the last few decades or more.

Second, the United States Government is the major producer of sugarcane, accounting for approximately two-thirds of the total acreage and about three-fourths of present production. Many private producers have stopped growing it. The decline of about 85 percent in the St. Croix acreage of sugarcane in the last 150 years clearly evidences dissatisfaction with this enterprise, at least by producers who have had the resources for other agricultural enterprises, or who could shift to nonagricultural employment. The decline in acreage began well before slavery was abolished in 1848, and thereafter continued to decline mainly for reasons other than the absence of slave labor. Almost without exception, the large privately held estates which in earlier centuries were the lifeblood of the industry are now idle or in pasture. In a few cases, other enterprises have been developed to use some of the resources previously devoted to sugarcane, and on some estates small tracts of land are rented for sugarcane production. 59/ The transition out of sugarcane might have been completed by this time had the Federal Government not participated in the industry since the middle thirties.

A third reason for attempting to develop other lines of agriculture in St. Croix is the source of the financing of the sugar industry. For the last few decades or longer, a principal characteristic of the sugar factories in St. Croix has been the financial losses they have incurred. During 8 of the 10 years from 1921 to 1930, the West Indian Sugar Factory, Ltd. which operated Bethlehem--the largest factory on the Island--reported deficits. Losses exceeded income during this period by about $1.2 million, as a result of which the company went into bankruptcy. In the years immediately following,

59/ The number of small producers also decreased in the last decade, although this decrease was not associated with a decline in acreage as was true when the estates discontinued production. Whereas about 500 producers sold 1952-crop sugarcane to the Virgin Islands Corporation, in the late thirties the number of small producers alone was reported to be 700 or more (29, p. 14).

several efforts were made to interest other private organizations in acquiring the concern, but with the failure of these, the United States Government bought the company in 1934. After rehabilitation of land and equipment, production was resumed and sugar was sold beginning in 1937. Other smaller factories had continued to operate--in some cases intermittently--but these were closed permanently about 1940. Thus, during the last decade Bethlehem has been the only factory in operation.

Since sales were resumed in 1937, the Virgin Islands Corporation (Virgin Islands Company prior to July 1949) has shown consistent losses on sugar operations which directly or indirectly have been covered by Federal appropriations. 60/ The loss of $633,000 in 1952 was the largest in the history of this agency. 61/ Despite a reasonably good price outlook in the domestic market, a substantial increase in quota, some factory improvement, and perhaps the best growing season of the last several decades, the outlook in late 1952 was that in 1953 the Corporation would lose about $400,000. This loss would be higher than that in any previous year except 1951 and 1952.

60/ Sufficient accounting data were not readily available for the first several years to disassociate sugar operations from such other business as was then conducted, as the sale of rum. However, examinations by the General Accounting Office show that the net losses on all operations from 1934 to 1947--and the sale of rum generally was considered to have been profitable--including depreciation charges, totaled $1,494,335. Losses on sugar operations alone have been incurred in each year since 1947, and they have become progressively larger through 1952.

61/ Losses since 1949 have been somewhat larger than in earlier years partly because of changes in accounting practices. Prior to that year the following costs were not charged, whereas, since that time they have been: (1) Government share of retirement fund; (2) depreciation; (3) compensation benefits to Corporation employees; and (4) interest on that portion of the Government investment in the Corporation represented by advances from the revolving fund and transfers from the Virgin Islands Company and the Department of Interior. These four items aggregated $127,000 for the year ended June 1950. Losses of the Corporation also should be interpreted in light of the fact that there are no proportionate shares assigned to producers. Sales of overquota sugar on the world market, as occurred in 1952, are reflected primarily in losses to the Corporation rather than in reduced payments to producers of sugarcane. In addition, partly because of the importance which prevailing wage rates have in the determination of the minimum rates to be paid by the Corporation, hourly rates are somewhat higher than in Puerto Rico for most tasks. It is estimated, for example, that hourly earnings for harvesting sugarcane in the Virgin Islands in 1952 were about 10 cents higher than in Puerto Rico. On the other hand, rates in Hawaii are reported to be about triple those in the Virgin Islands.

It appears that over the years some expenditures have been made by the Corporation primarily to provide employment, rather than because returns would be increased correspondingly. The recent losses are of special significance in this connection, as use of funds to provide jobs has been minimized in the last few years.

Thus a significant proportion of the revenue of the Corporation has come from the Federal treasury essentially as a subsidy, that is, funds in addition to payments made to producers in all domestic areas. Had the Corporation, in recent years, based its prices for sugarcane on its operating revenues, they would have ranged from $3 to $5--50 percent to 75 percent--less per ton than actually have been paid.

For almost 20 years a situation has existed in which regular deficits have been incurred by a Federal agency in conducting operations which many private growers and all private factory owners have decided to abandon, and which have yielded lower incomes to most producer participants than those received by common labor in the Islands. The record under private management in the 1920's was no brighter.

In some degree, an immediate decision as to the advantages and disadvantages of continuing production of sugarcane cannot be avoided. The Agricultural Station, for example, will need to make determinations currently as to the proportion of its research that will be directed toward problems of the sugar industry. Some projects might need to be conducted for several years before useful information would be forthcoming. A decision to inaugurate these studies no doubt would be predicated on a judgment that the sugar industry in St. Croix would continue to develop.

It would be desirable also if any sharp changes in the acreage of sugarcane could be foreseen well in advance and plans made accordingly.

Several arguments are advanced for continuing production of sugarcane. It is said that its contribution to tax revenues and the multiplier effect on income payments made by the sugar industry are advantageous to the economy of the Islands, and it is true that probably half of the present employment in St. Croix derives directly or indirectly from this industry. However, assuming the short-term validity of this position, essentially similar and perhaps more pronounced results might well be obtained from other enterprises were they to benefit from Federal funds equal to the present level of losses of the Virgin Islands Corporation. Of course, the local economy could be benefited more, even from sugar if through larger operating deficits the Corporation expanded production to less desirable lands and thus generated additional employment in both production and the business economy of the island.

It is claimed that local production of rum is benefited by the availability of molasses from a local source. The St. Croix rum industry uses some locally produced molasses, but during World War II arrangements were made to import molasses from some of the Leeward Islands. Distillers

of rum in St. Thomas--where output is much larger than in St. Croix--for years have depended exclusively on inshipped molasses.

To the extent that off-island employment is an alternative, it is suggested that this may be basically imcompatible with the desires of those who move to such employment. 62/ Defense for the sugar industry might possibly evolve from a welfare analysis of it in comparison with other industries, but again, so far as economic considerations are involved, it would seemingly be only a temporary justification as long as there are prospects over time of greater labor productivity in other employment. Essentially, the principal economic basis for continuing the sugar economy indefinitely must rest on the view that without special Federal assistance, it will afford higher incomes than will alternative employment. Although continuation of some Federal support for agriculture may be necessary, for this to be made contingent on the continuation of sugarcane production does not appear to be justified economically.

The management of the Virgin Islands Corporation is to be commended for its efforts to increase both production and marketing efficiency in some phases of its operations. Piecework wage rates may be expected to keep labor costs more nearly in line with labor needs of the Corporation. Improvements in the efficiency of processing operations, and such newer production techniques as use of chemical weedkillers will be of benefit. In addition, the courses of action suggested in this report, with respect to production and processing of sugarcane, perhaps may indicate other ways of strengthening the sugar economy. In this connection, it seems clear that achievement of some possible economies such as mechanization of harvesting operations, would be reflected in a decrease in the labor needs of the industry and require adjustment of employment by a part of the population, just as would a decline in the present acreage of sugarcane. 63/

On the basis of the information presented, it does not appear probable that the sugar industry can be improved sufficiently to make its continuation economically justified in the long run. There are prospects of increasing income from sugarcane production, but they are not as promising as prospects for certain alternatives that can be developed.

62/ Employment preferences of the local population are recognized as important considerations; however, neither these nor the military defense implications of various levels of population and economic development are examined here. In the only investigation concerning mainland employment about which information was obtained, it was concluded by a prominent group on the Islands that about 75 percent of 400 Virgin Islanders who had gone to the mainland in recent years were well satisfied with the change, 15 percent were uncertain, and about 10 percent preferred to return to the Islands.

63/ Thus, in 1952 for the first time the Corporation paid field labor on a piece rate rather than a time basis. Partly because of this, employment declined. In November 1952, total employment in field operations, exclusive of factory and yard employees, was 346. Comparable totals for 1951 and 1950 are 788 and 673, respectively.

Thus, it would seem that major attention should be given to ways of raising average incomes by shifts of those in the sugar industry to other employment over a period of time. This is a difficult problem, but one that might be managed more easily than in most earlier periods because of the development of tourism and other local industry, the industrial activity in other labor markets, and the shifts out of sugarcane production for other reasons. As indicated in the discussion of wages, the supply of resident labor for sugarcane harvesting has been increasingly inadequate in the last several years. This means that the sugarcane enterprise is relying to a progressively greater degree on labor from off the Islands, at least for harvesting operations. In a few recent years, such as 1952, sufficient labor was not obtained to harvest all the crop. Thus, creation of employment is not now quite as necessary an objective for continuing the sugar economy as it was when the industry was rehabilitated almost 20 years ago. Also, as concluded in the discussion of sugarcane processing, the output of sugar might be reduced without necessarily increasing per-ton costs of manufacturing.

A first possibility for other employment is elsewhere in agriculture. Fairly promising markets apparently exist for most livestock products and for some fruits and vegetables, including one or two products which are not now produced commercially in the Islands. Development of a market organization would increase the prospects of reaching these markets. Likewise more research attention to enterprises other than sugarcane should uncover ways of improving their production possibilities. No estimates have been made of the number of workers who would be employed in the expansion of other agricultural enterprises, including increases that might occur in livestock production on St. John, but such workers might well number from 100 to 200.

A second, and perhaps better alternative, is that of nonagricultural employment. Prospects for a moderate expansion in tourism and the current opportunity for a limited number of trained craftsmen indicate possibilities within the Islands. Other local opportunities may develop, such as would be associated with the formation of a strong marketing organization. A survey of the industrial possibilities of the Virgin Islands (3) by the Caribbean Commission indicated that promising opportunities are relatively few at present. But, it was concluded that in addition to increases in tourism, the shipments of rum conceivably might be increased to as much as 850,000 proof gallons annually (as compared with a 1949-51 average of about 525,000 gallons), and that the local fishing, handicraft, and other small industries might be expanded. In this connection, the survey indicated that: "The provision by which foreign materials can be imported free of duty from the Virgin Islands into continental United States provided they do not exceed 20 percent of the value of the article into which they are incorporated, offers a unique competitive advantage for the Virgin Islands. It is understood that little use has been made of it." In some cases, shortages of properly trained and even apprentice labor have prevented industrial developments that might otherwise have occurred because of this tariff provision.

In addition, some of the young people will almost certainly find employment in other areas. Some of them may uncover opportunities well beyond any likely to be available within the Islands. Perhaps the best way to help this development along would be to expand the courses of technical training in local schools, particularly those in nonagricultural fields.

A third alternative would be provided by a strengthened social security program for the aged. As indicated earlier, many of those now in agriculture are elderly and cannot be expected to continue for many years as productive workers either in the sugar industry or in other types of employment.

It is recognized that the transition suggested here calls for a bold program if it is to be successful. It would need resourceful leadership, and would necessitate careful appraisals of the many operational difficulties that would arise. It would take several years to accomplish. During this time sugarcane production might be continued fairly well by increasing the average acreage handled by a declining number of producers. But it would seem wise not to make heavy capital investments in the sugar industry during this period.

However, for an area in which poverty now prevails, this transition is not a step of temerity, but one which promises opportunity to raise incomes and thus standards of living, and to better the economic independence of its people.

B.--Considerations Basic to Agricultural Improvements in the Virgin Islands

In examining the agriculture of the Virgin Islands one is immediately impressed with the low returns, or input-output ratios, applicable to the various enterprises. This fact is reflected most effectively in the low incomes and living standards of the rural population. These conditions suggest that in the production of most commodities, the Islands are a marginal producing area. Although there is substantial basis for this conclusion, it should only be accepted after full recognition of the following overriding factors, which in themselves contribute a great deal to the undesirable conditions in agriculture.

1. The present distribution of land will not permit a reasonable degree of efficiency in the production operations of most families who derive their livelihood from agriculture.

2. Even for those who have units of reasonably adequate size, the production facilities available are insufficient and the associated costs do not permit a fair degree of efficiency. Such conditions apply particularly to production credit, to machinery services, and to miscellaneous materials needed in production operations.

3. The characteristic attitude of the people toward farming (conditioned by a background of slavery and generally depressed relationships), combined with dietary dificiencies and the effects of the tropical climate upon their energy and general industry, also contributes substantially to the undesirable conditions that prevail in agriculture.

Thus, the present deficiencies in agriculture result to a considerable extent from social and institutional arrangements which prevent the use of resources to benefit rural groups in an optimum and equitable way. There is also the fact that although the population of the Islands has declined for the last 100 to 150 years, a comparatively stable level appears to have been reached. Therefore, any general program to improve agriculture must provide for the proportion of the population presently found in this occupation. Any other alternative would need to foster a marked migration from the Islands.

These general conditions were taken into account in formulating the conclusions of this study relative to production opportunities and desirable adjustments between enterprises. This study was confined mainly to intra-island conditions and enterprise relationships. Only limited observations and comparisons of the competitive position of the Virgin Islands with that of other areas were made. With these limitations in mind and with specific reference to production phases of the study, the following conclusions appear to be justified:

1. The present levels of sugarcane production and beef cattle raising represent a reasonably favorable balance in use of resources under current price relationships.

2. Extended research and extension educational programs would substantially improve the production methods and returns from these enterprises. More adequate production credit, general services, and miscellaneous supplies would also improve production opportunities. Sugarcane production and cattle raising are complementary in nature and their proper combination on units of adequate size results in fuller use of land, labor, and management.

3. Of equal importance to these improvements is the need for production and preservation of increased quantities and varieties of foods for local use. It is largely through this means that a greater self-sufficiency of the Islands (in food requirements) can be attained.

4. Complementary to this program and an important part of it is an aggressive effort to improve general marketing opportunities and outlets. These aspects were developed in the marketing sections of this report.

Although the factual information and observations relating to production problems and opportunities on which this report is based support the conclusion that efforts should be made to improve production operations for sugarcane and beef cattle, there is also need to examine critically the general practice and conditions that surround the production and processing of sugarcane. The fact that these operations in the Islands are subsidized somewhat more heavily than is the case in other domestic areas emphasizes the need for such an examination. Partly because of limitations as to time, and also because such an inquiry would necessitate a comprehensive examination of the operating program and financial statements of the Virgin Islands Corporation (which was not regarded as within the scope of this assignment) no conclusive answer can be reached as to the extent to which such subsidies might be reduced by applying efficiency measures. Until such study can be made, a conclusive statement regarding the desirable permanent place of this enterprise in the agriculture of the Island must be withheld.

In this connection, it may be pointed out that the importance of the sugar industry to agriculture and to the Islands as a whole, makes it necessary in resolving this question that the Federal Government take a definite position as to the general economic conditions and living standards to be afforded the local people. A considerable share of the subsidies to the sugar industry is recognized as relief benefits; they should not be assigned as losses to the sugarcane enterprise. One way to reflect a more favorable return from sugar production would be to reduce wage rates, perhaps to the approximate levels that are presently maintained in Puerto Rico or in the British West Indies. Admittedly, this would be a step

backward from the standpoint of improving the incomes of the local population. Even so, they might choose this as an alternative to elimination of the sugar industry and the shifting of groups so maintained to continental United States or other areas.

Table 15.-- General aspects of the agriculture and indicated trends, St. Croix, Virgin Islands, 1940 and 1950 1/

Item	Unit	1940	1950
Total population	Number	12,902	12,103
Urban	"	4,495	4,112
Rural	"	8,407	7,991
Number of farms	"	610	508
Tenure of operation			
Full owners	Number	378	347
Part owners	"	22	16
Managers	"	31	21
Tenants	"	179	124
Total land area	Acres		
Land in farms	"	38,942	41,241
Cropland harvested	"	4,367	4,763
Growing crops not harvested	"	2,780	552
Crop failure or pastured	"	4,511	5,506
Pastureland	"	23,012	24,381
All other land	"	4,272	6,039
Crops			
Sugarcane	Acres	4,086	4,136
Sweetpotatoes	"	43	61
Tannier	"	38	23
Yams	"	20	46
Truck crops and miscellaneous	"	75	268
Fruits			
Trees of bearing age			
Avacados	Number	282	2,686
Cacao	"	7	1,425
Coconuts	"	2,222	1,961
Grapefruit	"	29	461
Guavas	"	2,939	1,962
Limes and lemons	"	131	2,233
Mangos	"	1,579	2,233
Oranges	"	70	855
Trees reported (both years)		7,259	15,096

1/ From U. S. Census of Agriculture, 1950 (17).

Continued

Table 15.--General aspects of the agriculture and indicated trends, St. Croix, Virgin Islands, 1940 and 1950 1/ - Continued

Item	Unit	1940	1950
Bananas	Number		6,483
Plantains	"		143
Pineapple	"		5,394
Trees reported for 1949			27,116
Trees not of bearing age:			
Avacados	Number	330	1,022
Cacao	"	2,000	2
Coconuts	"	269	233
Grapefruits	"	107	99
Guavas	"	1,727	40
Limes and lemons	"	26	253
Mangoes	"	293	205
Oranges	"	121	158
Trees reported (both years)		873	2,012
Bananas	"		6,189
Plantains	"		463
Pineapple	"		1,648
Trees reported for 1950	"	-	10,312
Livestock			
Horses	Number	715	849
Mules	"	573	213
Donkeys	"	233	150
All cattle	"	5,979	8,521
Hogs	"	869	726
Sheep	"	506	1,875
Goats	"	926	1,379
Chickens	"	4,479	6,368
Miscellaneous items			
Farm automobiles	Number	64	77
Farm trucks	"	60	72
Farm tractors	"	14	26
Operators working off farm	"	265	477
Less than 100 days	Percent	16	60
More than 100 days	"	84	40

1/ From U. S. Census of Agriculture, 1950 (17).

Continued-

Table 15.--General aspects of the agriculture and indicated trends, St. Croix, Virgin Islands, 1940 and 1950 1/ - Continued

Item	Unit	1940	1950
Expenditure reported for			
Hired farm labor	Dollars	138,482	298,029
Livestock and poultry feeds	"	13,873	19,294
Fertilizer	"	300	25,699
Farms free of mortgage	Percent		51
Farms located on			
Hard-surfaced roads	"		16
Gravel roads	"		7
Unimproved roads	"		64
Not on roads	"		13

1/ From U. S. Census of Agriculture, 1950 (17).

Table 16.--Virgin Islands: Population by racial groups, selected years, 1917 - 50 1/

	Population			Percentage distribution		
	White	Negro	Mixed and other races	White	Negro	Mixed and other races
	Number	Number	Number	Percent	Percent	Percent
1917	1,922	19,523	4,606	7.4	74.9	17.7
1930	2,010	17,243	2,759	9.1	78.3	12.5
1940	2,236	17,176	5,477	9.0	69.0	22.0
1950	2,945	18,561	5,159	11.0	69.6	19.3

1/ U. S. Census of Agriculture, 1950 (17).

Table 17.--Virgin Islands: Percentage of population in different age groups by race, urban and rural, 1940 - 1950 1/

Age groups	All races		Negro		White		Mixed and other races	
	1940	1950	1940	1950	1940	1950	1940	1950
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Urban								
24 years and less	51.5	54.9	51.1	55.8	44.2	43.0	55.4	57.4
25 to 49 years	28.8	28.2	28.5	27.9	38.3	36.4	26.3	25.0
50 years and over	19.7	16.9	20.4	16.3	17.5	20.6	18.3	17.6
Rural								
24 years and less	49.5	52.5	46.0	49.3	46.8	45.9	60.2	63.6
25 to 49 years	29.3	27.0	28.7	24.8	38.9	39.4	27.0	25.4
50 years and over	21.2	20.5	25.3	25.9	14.3	14.7	12.8	11.0

1/ Computed from data in United States Census of Population, 1950 (18).

Table 18.--Major industry groups of employed persons in the Virgin Islands, 1940 and 1950 1/

Industry	Employed	
	1940	1950
	Number	Number
Agriculture, forestry, and fisheries	1,634	1,661
Mining	---	---
Construction	461	939
Manufacturing	518	464
Transportation and public utilities	395	613
Wholesale and retail trade	957	1,088
Finance, insurance, and real estate	52	97
Business and repair services	50	119
Personal services	1,835	1,436
Entertainment and recreation services	14	54
Professional and related services	466	767
Public administration	344	803
Industry not reported	218	228
Total	6,944	8,269

1/ U. S. Census of Population, 1950 (18).

Table 19.--Estimated direct costs of producing sugarcane on small and on large farms, by major operation

Item	Small farm		Large farm	
	Plant cane	Ratoon cane	Plant cane	Ratoon cane
	Dollars	Dollars	Dollars	Dollars
Land preparation	12.50	-	20.00	-
Subsoil	-	-	-	1.50
Fertilizer	-	-	32.50	19.50
Fertilizer application	-	-	4.25	4.00
Plant cane (cost of)	1/	-	36.00	-
Planting cane	25.00	-	30.00	-
Weed control				
Spray material	4.20	-	6.50	6.50
Spray application	10.00	-	13.00	13.00
Hoe or cultivate	18.00	35.00	17.00	15.00
Cut and bunch	28.60	23.00	42.00	30.00
Load and haul	22.50	17.50	43.75	31.25
Miscellaneous items	6.50	3.50	9.00	3.50
Total direct costs	126.50	79.00	254.00	124.25
Income				
Value of cane ($7 per ton)	126.50	98.00	245.00	175.00
Conditional payment	28.80	32.40	56.00	40.00
Total	154.80	130.40	301.00	215.00
Returns above direct cost	28.30	51.40	47.00	90.75
Returns above direct costs per total acre in cane 2/	46.78		82.00	
Estimated yield per acre--ton	18	14	35	25

1/ Small growers frequently cut plant cane from their own acreage. Some operators cut plant cane from Vicorp acreage, which is only permitted without charge during the harvesting season.

2/ Assumes that an average of 5 crops is obtained from each planting.

Table 20.--Shipments of cattle from the Virgin Islands, selected years, 1920-1951

Year	St. Thomas	St. Croix	Total shipments	Total value 1/
	Number	Number	Number	Dollars
1920	75	1,298	1,373	68,857
1921	77	440	517	22,407
1922	263	1,302	1,565	79,470
1923	953	1,166	2,119	93,124
1924	486	868	1,354	42,440
1925	205	341	546	30,981
1926	673	1,099	1,772	72,362
1927	746	1,263	2,009	64,217
1928	516	1,145	1,661	79,813
1929	430	919	1,349	85,956
1930	588	1,225	1,813	85,057
1931	1,055	1,150	2,205	79,712
1932	680	1,360	2,040	57,260
1933	669	1,149	1,818	37,024
1934	581	1,690	2,271	46,913
1935	568	2,274	2,842	47,222
1936	438	1,751	2,189	43,085
1937	207	1,034	1,241	19,556
1938	375	1,500	1,875	46,995
1939	291	1,165	1,456	30,238
1940				2/
1941				2/
1942				2/
1943				2/
1944				2/
1945				20,572
1946				33,245
1947				30,132
1948				71,463
1949			998	50,292
1950			893	42,896
1951			1,135	58,456

1/ Does not include value of dressed beef exported.

2/ Not available.

Table 21.--United States import duties, January 1, 1953 1/

Item	Duty on imports from Cuba	Duty on imports from elsewhere
Fresh fruit		
Avocados	7.5 cents a pound	7.5 cents a pound
Bananas and plantains	Free	Free
Guavas	10 percent Ad. Val.	17.5 percent Ad. Val.
Soursops	10 percent Ad. Val.	17.5 percent Ad. Val.
Papayas	Free	17.5 percent Ad. Val.
Mangoes	3.0 cents a pound	3.75 cents a pound
Limes	.8 cents a pound	1.0 cents a pound
Fresh vegetables		
Cabbage	.75 cents a pound	.75 cents a pound
Tomatoes 2/	1.2 cents a pound	1.5 cents a pound
Peppers	2.2 cents a pound	2.5 cents a pound
Cucumbers 3/	1.0 cents a pound	2.2 cents a pound
Okra	15 percent Ad. Val. 4/	25 percent Ad. Val.
Dried beans 5/	3.0 cents a pound	3.0 cents a pound
Live cattle (other than for dairy or breeding) Under 200 pounds and 700 pounds or more 6/	1.5 cents a pound	1.5 cents a pound
200 pounds or more but under 700	2.5 cents a pound	2.5 cents a pound
Dairy cattle	1.5 cents a pound	1.5 cents a pound
Beef and veal, fresh chilled or frozen	3.0 cents a pound	3.0 cents a pound
Live goats	$3 per head	$3 per head
Goat meat and mutton, fresh chilled or frozen	2.5 cents a pound	2.5 cents a pound
Live lamb and sheep	75.0 cents a head	75.0 cents per head
Lamb, fresh chilled or frozen	3.5 cents a pound	3.5 cents a pound
Swine	1.0 cents a pound	1.0 cents a pound
Pork, fresh chilled or frozen	1.25 cents a pound	1.25 cents a pound
Live chickens	2.0 cents a pound	2.0 cents a pound
Chickens, eviscerated	5.0 cents a pound	5.0 cents a pound
Eggs in shell	3.5 cents a dozen	3.5 cents a dozen
Corn (other than seed)	10.0 cents a bushel	25.0 cents a bushel
Cottonseed oil meal	.3 cents a pound	.3 cents a pound
Guinea grass seed	1.0 cents a pound	1.0 cents a pound
Sesame seed	Free	Free
Sugar, over 50 but not over 75 sugar degrees	.3425 cents a pound	.428125 cents a pound
For each additional sugar degree over 75 and fractions in proportion	.0075 cents a pound	.009375 cents a pound

1/ These duties also apply to Puerto Rican imports. 2/ Rates vary by season; those shown apply from November 15 to the last day of the following February. 3/ Rates vary by seasons; those shown apply from December 1 to the last day of the following February. 4/ Rates applicable from December 1 to the end of the following May. 5/ Rates applicable to products entered for consumption from September 1 to the following April 30. 6/ Numbers which can be imported at these rates are subject to restriction.

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