



The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

79847W
p. 2

TRENDS

in the United States SUGAR INDUSTRY

PRODUCTION

PROCESSING

MARKETING

U. S. DEPARTMENT OF AGRICULTURE

AGRICULTURAL MARKETING SERVICE • MARKETING RESEARCH DIVISION

Marketing Research Report No. 294

PREFACE

A large volume of statistics on the United States sugar industry is available in Government reports, trade journals, and private reports. For a better public understanding of one of our important food industries, there is need for a summary of readily available information on production, processing, marketing, and consumption of sugar. The Sugar Research and Marketing Advisory Committee, at its meeting of January 9-11, 1957, recommended that the Department "initiate a study of trends and interrelationships within the sugar industry to supply basic facts relating to beet and sugarcane production, processing, and refining, products and markets, trade channels and prices."

This report presents a summary of the domestic sugar industry and some of the more important changes which took place from 1948 to 1957, the latest year for which reasonably complete data are now available. The report is part of a broad study designed to improve the marketing of farm products. Further studies of sugar marketing will cover the farm-to-retail spread, and marketing and pricing practices in raw sugar.

Data were obtained from statistical reports of the Sugar Division, Commodity Stabilization Service, State Experiment Station bulletins, trade association reports, business reports, and trade journals.

U. S. Agricultural Marketing Service. Marketing Research Division.

Trends in the United States sugar industry: production, processing, marketing. Prepared in Special Crops Section, Market Organization and Costs Branch. Washington, U. S. Govt. Print. Off., 1958,

24 p. illus., map. 27 cm. (U. S. Dept. of Agriculture. Marketing research report no. 294)

"Selected bibliography": p. 23-24.

1. Sugar—Manufacture and refining—U. S. 2. Sugar trade—U. S.
I. Title. (Series)

HD1751.A9183 no. 294 338.476641 Agr 58-381

U. S. Dept. of Agr. Libr.
for Library of Congress

1Ag84Mr no. 294
†

CONTENTS

	Page
Summary	4
Introduction	5
The market for sugar	8
Industrial use of sugar	8
Household use of sugar	9
Geographic distribution of sugar	9
Seasonal distribution of sugar	9
Sources of sugar	9
Prices	11
Sugar production and processing	12
Beet sugar	12
Production	12
Processing	17
Cane sugar	18
Production	18
Processing	21
Refining	22
Selected bibliography	23

December 1958

For sale by the Superintendent of Documents, U. S. Government Printing Office,
Washington 25, D. C. - 15 cents.

SUMMARY

Under the Sugar Act the Secretary of Agriculture is charged with maintaining a balance between supply and demand which will allow a reasonable return to producers and provide consumers with an adequate supply of sugar at reasonable prices. Economic trends and relationships in the sugar industry since 1934 have been influenced by and are largely the result of the various Sugar Acts and their administration. The trend has been toward larger acreages per farm in both sugarcane and sugar beets, higher yields per acre, and an increase in the use of mechanized equipment.

From 1948 to 1957 domestic sugar producing areas, including Puerto Rico and Hawaii, supplied between 51 and 54 percent of the total sugar requirements of the United States. Foreign areas, chiefly Cuba and the Philippines, supplied most of the remainder.

Consumption of sugar in the United States has increased at about the same rate as population, over the past 10 years.

Increasing labor, transportation, and capital costs are evident in all phases of the industry. Improved technology in production, processing, refining, and distribution have kept unit costs of marketing from increasing as rapidly as for most other foods.

Raw sugar prices increased about 12 percent from 1948 to 1957. Retail prices for all refined sugar in the United States increased about 17 percent. This was considerably less than observed for many food items. Controls exercised through the administration of the Sugar Act and industry pricing policies have resulted in relatively stable retail sugar prices.

The sugar beet farmer's share of the consumer dollar spent for sugar moved in the same direction but not nearly so far as for other farm commodities; this share unadjusted for Government payments decreased from 42 percent in 1948 to 36 percent in 1957. Adjusted to include payments under provisions of the Sugar Act, the farm value was 51 percent of the retail price for sugar in 1948 and 43 percent in 1957.

TRENDS IN THE UNITED STATES SUGAR INDUSTRY

PRODUCTION, PROCESSING, MARKETING

Prepared in Special Crops Section
Market Organization and Costs Branch
Agricultural Marketing Service

INTRODUCTION

Sugar is one of our most widely used agricultural commodities. Sugars and sweets account for about 5 percent of the average household expenditure for food. These are staple items in almost every household. Consumers use refined sugar in the home, and they also use sugar in a wide variety of prepared food mixes, beverages, confectionery products, bakery products, canned and frozen foods, ice cream, jellies, jams, syrups, and other sweeteners.

Per capita civilian consumption of refined sugar in the United States amounted to about 97.1 pounds in 1957 and is forecast at about 97 pounds in 1958. Total consumption in the United States amounted to about 8.8 million tons of raw sugar in 1957, including amounts used for military consumption and for feed. A complex system (production, processing, and distribution) was required to produce sugarcane and sugar beets, process them into sugar, and make the sugar available to consumers in whatever form it was desired and as it was needed.

Sugar consumed in the United States is supplied by domestic production from sugarcane and sugar beets and from foreign suppliers, mostly from Cuba and the Philippines. Except for a few war years, the balancing of supply and demand since 1934 has been by legislation through the administration of the Sugar Act by the Secretary of Agriculture. The effectiveness of the balance maintained by the various sugar acts is reflected in the price of sugar at various levels over the years. The effect of regulation on the industry is of such importance that a brief discussion of the purpose and operation of the Sugar Act of 1948, as amended, will be given here to provide the framework in which changes and trends in the industry have developed.

The stated purpose of the Act is "to regulate commerce among the several States, with the Territories and possessions of the United States, and with foreign countries; to protect the welfare of consumers of sugars and of those engaged in the domestic sugar-producing industry; to promote the export trade of the United States; and for other purposes."

The Act requires the Secretary to determine the amount of sugar needed to meet the requirements of consumers in the United States. In making this

determination, he must consider the quantity of sugar distributed during the previous year with allowances for surplus and deficits, changes in consumption because of changes in population and demand condition, the welfare of consumers and those engaged in the domestic sugar industry. In addition, consideration is required of the relationship between the wholesale sugar prices resulting from the determination and the general cost of living in the United States as compared with the relationship in 1947-49. This determination is made during December preceding the year in which it is effective and may have to be revised during the year. The determination becomes the initial quota.

When the determination is made, quotas are established by the Secretary for each domestic producing area and each foreign supplier according to the provisions of the Act. For each domestic area the Secretary must establish the amount it may produce including carryovers with allowances for deficits or surpluses. The area quota is then distributed among individual producers in the area. Individual allotments or proportionate shares place a maximum limit on individual farm production.

In addition to establishing area quotas and proportionate shares, the Secretary may allot quotas to persons importing and marketing sugar to promote orderly marketing and insure adequate supplies.

A system of payments to growers known as conditional payments was established as an incentive to stay within the proportionate share and to assure producers an equitable return for sugarcane and sugar beets. To obtain conditional payments growers must stay within their proportionate share, pay for field work at rates determined to be fair and reasonable, not employ children under 14; and growers who are also processors must pay a fair price for cane or beets purchased from other growers.

Conditional payments are paid out of general funds of the Treasury appropriated by Congress each year. A tax of 0.5 cent per pound levied on all sugar processed or imported for direct consumption provides funds which more than cover the payments and administrative costs incurred by the Department of Agriculture in the administration of the Sugar Act.

The basic objectives of sugar legislation have been the same from 1934 to the present. The Act of 1937 contained the principles of earlier legislation but provided for grower payments out of general funds appropriated for that purpose. The Act of 1937 was superseded by the Act of 1948. The 1937 Act provided for the assignment of fixed percentages of the estimated quotas to domestic and foreign areas. The Act of 1948 provided for the assignment of fixed quotas to domestic areas and variable quotas to foreign countries by distributing the balance on a percentage basis among the countries. The Sugar Act of 1948 was amended and extended in 1951 and again in 1956.

Through the quota provisions of the Sugar Act the amount of sugar produced in domestic areas and the amount of sugar imported are balanced against anticipated demand. The size of the quota creates the price climate in which the industry operates. The quotas on imports insulate U. S. prices from world

prices to a large extent. When world prices are below U. S. sugar prices, foreign supplying countries are able to sell their U. S. quota sugar at better prices than in the world market. During periods when world prices have been above the U. S. price, foreign suppliers have filled their U. S. quotas at lower prices rather than jeopardize their future quotas. The result has been that supply and prices have been more stable for the U. S. than for the world sugar market.

The changes which have taken place in the sugar industry during the past 10 years can be understood better when considered in light of the regulation of the industry through the administration of the Sugar Acts.

Sugarcane and sugar beet production, and the processing and marketing of sugar produced from these crops, offer striking contrasts to those of many other farm commodities. Sugar beets are produced and marketed under contract to the sugar beet factory. Before beets are planted producers contract with the factory to grow a specified number of acres of beets. The contracting company usually furnishes the producer with seed and other supplies. Sugarcane in most cases is not contracted to a particular mill before the harvesting season but is sold according to well defined arrangements known before marketing begins.

Payments to producers for both sugarcane and sugar beets are based on a share of the return from the sale of raw cane sugar and refined beet sugar. The return to the producer is based on the sugar content of cane or beets delivered to the mill and the price of raw cane sugar or refined beet sugar. This contract system of marketing eliminates much of the risk involved in selling perishable farm commodities. It also permits the mills and factories to plan their procurement and mill operations.

Beet sugar is produced from beets in one continuous operation. Sugarcane is processed into raw sugar and sold to refiners for further processing. A small number of raw sugar producers also produce refined sugar.

Cane sugar refineries are located mainly along the seaboards and waterways. Raw sugar from the mainland mills and from Hawaii, Puerto Rico, and from foreign sources is refined and marketed by some 22 refineries owned by 16 companies.

Refined sugar is sold through a system of sugar brokers located throughout the country. The refiners do not maintain a large sales organization but depend on brokers to sell their sugar and to transmit orders to the refiner.

Modern refiners manufacture an "assortment" of more than 30 kinds of sugar. In addition, some refiners specialize in producing liquid sugar to meet specific needs of users.

THE MARKET FOR SUGAR

The consumption of sugar in the United States has been relatively stable compared with that of many other farm commodities. Per capita consumption since 1948 has fluctuated between 93.8 and 100.8 pounds. The estimates for 1957 and for 1958 are roughly 97 pounds.

While most of the increase in amount of sugar consumed in the United States during the past 10 years has been the result of a population increase of about 1.7 percent per year, small changes in the rate of consumption have considerable effect on the sugar industry. A change of 1 pound or a little more than 1 percent in the rate of consumption would change our total requirements by more than 170 million pounds. At the 1955 average rate of production this would affect about 42.5 thousand acres of mainland sugarcane or, if applied to beet production, 39 thousand acres of sugar beets.

The aggregate demand for sugar has been described as relatively inelastic, corresponding fairly closely to demand for farm commodities as a whole. Low price and income responses have been indicated. The official estimates of consumption are based on deliveries by primary distributors of sugar. Some large fluctuations in this series apparently reflect changes in unreported inventories in the hands of industrial users, wholesale and retail grocers, and consumers.

Sugar delivery data provide useful marketing information on industrial and household use of sugar, and on seasonal and geographic distribution of sugar.

Industrial Use of Sugar

The proportion of sugar going into industrial use increased steadily from 1949 to 1957. There was an increase in the proportion of sugar going into canned and frozen foods, beverages, and bakery goods. The proportion of sugar delivered to ice cream makers, hotels, other food and non-food uses remained about the same, while the proportion going to confectionery manufacturers decreased.

A relative increase in the quantities of sugar going to industrial users reflects the increasing demand for canned and frozen foods, prepared mixes, and prepared foods. As the demand for these items increased the use of refined sugar in the household decreased.

The amount of liquid sugar going to industrial users also has increased along with the increase in the proportion of sugar going to industrial users.

Household Use of Sugar

The use of refined sugar in the home, as reflected by deliveries to wholesale and retail grocers, decreased steadily from 1949 to 1957. Two factors, the demand for prepared foods and mixes and a growing urbanization, appear to have played an important part in this shift. The growing demand for more prepared foods, sometimes associated with higher incomes, means less sugar will be used in the preparation of foods in the home. Relatively less home canning and baking is done by urban families than by rural families. This shifts more sugar to industrial use as the proportion of the population in urban areas increases.

The shift from household use to industrial use of sugar was accompanied by an almost equal decrease in the proportion of sugar sold in consumer size packages during the period.

Geographic Distribution of Sugar

Sugar deliveries by regions reflect sugar deliveries for household consumption and for industrial use. The fact that deliveries do not correspond closely to population is due largely to a difference in the concentration of sugar-using industries such as canning and frozen foods, confectionery in some regions as well as differences in the rate of consumption of sugar and other sweeteners.

Seasonal Distribution of Sugar

The distribution of all types of sugar by primary distributors shows a definite seasonal fluctuation. The distribution of sugar is much lower the first, second, and fourth quarters. However, this does not give a true picture of the actual sugar consumption throughout the year since the sugar used in canning and freezing fruits and vegetables is distributed and consumed over the following year.

The western region shows the greatest seasonal fluctuation in deliveries, with New England having a fairly even distribution of sugar throughout the year. Cane sugar and beet sugar distributions followed the same general pattern, while the amount of direct consumption sugar was greatest in the second quarter and lowest in the fourth quarter.

SOURCES OF SUGAR

In 1957 approximately 8.8 million tons of sugar were consumed in the United States. A little more than half this sugar was supplied by domestic production, which includes sugar beets in the Central and Western States; sugarcane production in the mainland cane area of Louisiana and Florida,

offshore areas of Hawaii, Puerto Rico, and the Virgin Islands. Cuba is the major foreign supplier of sugar, with the Philippines the second largest, and several other countries supply small amounts (fig. 1).

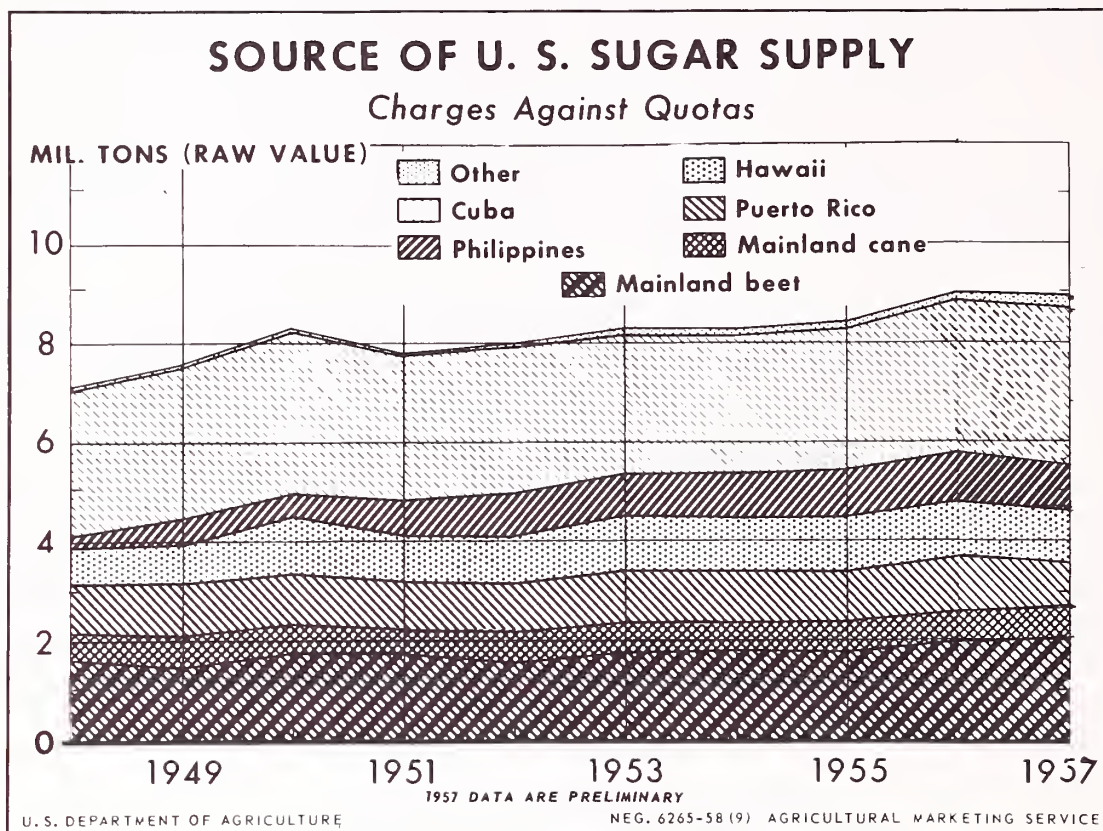


Figure 1

Mainland sugar beet producers supplied almost 22 percent of our sugar in 1956, mainland sugarcane almost 7 percent, and Hawaii and Puerto Rico sugarcane each supplied more than 12 percent. Cuba sugarcane supplied about 34 percent of the total sugar and the Philippines almost 11 percent of the total supply.

The relative position of each area has shown only slight changes since the recovery of Philippine production following the end of World War II. From 1953 to 1956 there were only small changes in the relative proportion supplied by each of the domestic areas and by importing countries.

Beet sugar is produced from sugar beets in factories scattered throughout the beet-producing area. It is produced in one continuous operation. The majority of sugar beets are harvested and processed during the last four months of the year. Sugar beets produced in southern California are harvested and processed in the spring.

Cane sugar, on the other hand, is harvested and processed into raw sugar in or near the producing area, then sold to refiners for further processing into refined sugar. A few raw sugar mills also have facilities for producing refined sugar but this accounts for only a small proportion of the refined sugar marketed. Most cane sugar consumed in the U. S. is sold to mainland refineries as raw sugar. The refineries are located along the coast near sea-ports and some on inland waterways.

The production of sugar beets and sugarcane in the continental United States; sugarcane in Hawaii, Puerto Rico, the Virgin Islands, and major foreign suppliers Cuba and the Philippines, gives the United States sugar from a wide geographic area. Sugarcane produced in these areas varies widely as to length of growing season and time of harvest. It is unlikely that adverse weather conditions and other factors will affect the production of sugar in all areas at the same time. These different sources of supply assure the United States of an adequate supply of sugar.

PRICES

The price structure for sugar centers on the price of raw sugar. Raw sugar prices established in New York are used as a basis for prices for the rest of the country. Raw sugar prices are the result of the balance obtained between demand and supply through the quota management under the Sugar Act.

The price received by farmers for sugarcane is derived from the average raw sugar prices over designated time periods. Sugarcane producers are paid by the raw mills on the basis of sucrose in cane delivered and the price of raw sugar over the pricing period. The price received by beet producers is based on the returns from the sale of refined sugar by the sugar beet factory. Producers share in the "net returns" to the factory on the basis of the sucrose in beets delivered. The price of sugarcane and sugar beets is determined after the raw cane sugar and the refined beet sugar are sold.

Prices or returns to producers for sugar beets increased from \$10.60 per ton in 1948 to a high of \$12.00 in 1952, declined to \$10.80 in 1954 and turned upward to reach \$11.90 in 1956. Government payments ranged from \$2.41 per ton in 1949 to \$2.30 in 1957, raised the total returns each year but did not eliminate fluctuations. The farmer's return from sugarcane fluctuated between a low of \$6.25 per ton in 1948 to a high of \$8.04 in 1956 but declined to \$6.89 in 1957. Government payments ranged from \$1.01 to \$1.22 per ton during the period (fig. 2).

Raw sugar prices in New York, which are comparable to wholesale prices of other commodities, rose from about \$5.76 per hundred in 1949 to \$6.29 in 1953, then fell to \$5.95 in 1955. In 1957 average raw sugar prices in New York were above the 1948 prices by approximately \$0.68 per hundred.

Refined sugar prices reflect the pricing policy of refiners in maintaining a relatively constant relationship between refined sugar and raw sugar

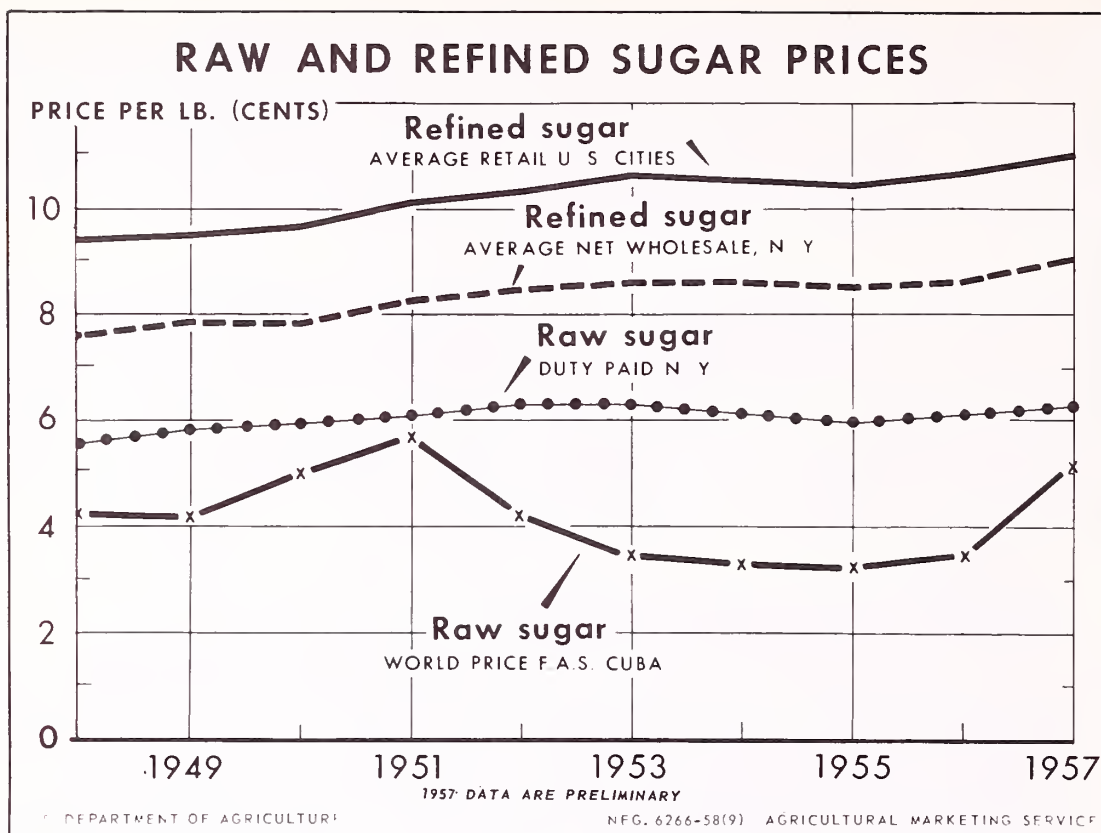


Figure 2

prices. The refining, distribution, and retailing margin, as measured by the difference between the prices, increased throughout the period. The average U. S. retail price of sugar increased from 9.4 cents per pound in 1948 to 11.0 cents in 1957. The 1.6-cent increase in the price of sugar over the period represents a 17-percent increase from 1948 to 1957.

In comparison, the retail price of other food items such as rice increased 10 percent, corn flakes 27 percent, flour 11 percent, bread 35 percent, lettuce 29 percent, and potatoes 5 percent (table 1).

The farmer's share of the consumer dollar spent for sugar followed the same trend as other farm commodities (table 2). The farmer's share of the consumer dollar for sugar decreased from 40.0 percent in 1947 to 36.0 percent in 1957.

SUGAR PRODUCTION AND PROCESSING

Beet Sugar

Production

Sugar beets are produced in 21 North Central and Western States. The most important States in volume of beets produced in 1957 were: California,

Table 1.--United States average retail prices of selected food items, 1948-57

Item	Unit	Year									
		1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Rice	1 pound	20.8	18.4	16.8	17.8	18.0	20.0	19.5	19.1	18.6	18.8
Corn flakes	12 ounces	18.2	18.4	18.7	20.6	21.5	21.7	21.9	22.0	22.0	23.1
Flour	5 pounds	49.0	47.9	49.1	51.9	52.3	52.2	53.3	53.3	53.3	54.6
Bread	1-pound loaf	13.9	14.0	14.3	15.7	16.0	16.4	17.1	17.5	17.9	18.8
Lettuce	Head	13.6	16.3	13.9	16.1	15.3	15.1	15.3	16.4	16.4	17.6
Potatoes	10 pounds	54.1	53.0	44.8	49.2	73.7	53.2	52.0	56.4	67.7	57.0
Sugar (beet)	5 pounds	47.6	48.3	49.5	51.4	52.3	52.8	52.6	52.1	52.8	55.2

Table 2.--Farmer's share of consumer dollar, selected food items, 1948-57

Item	Year									
	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Rice	42	35	39	42	44	44	35	34	35	37
Corn flakes	20	12	16	16	18	17	14	12	13	13
Flour	42	40	40	40	39	38	39	39	38	37
Bread	19	17	17	17	16	15	16	15	15	14
Lettuce	41	44	38	42	39	38	38	39	35	34
Potatoes	51	47	40	42	51	35	34	34	39	28
Sugar (beet)	42	38	36	38	39	39	37	36	38	36

Colorado, Idaho, Michigan, Minnesota, and Montana, which, combined, produced almost two-thirds of the beets grown in the United States.

The volume of sugar produced from sugar beets fluctuated with acres planted and harvested, yield of beets, and sugar content of beets produced. In 1948 about 1.2 million tons of refined sugar were produced. Production in 1957 reached about 2.0 million tons (fig. 3).

The acreage planted to sugar beets fluctuated between 776 thousand acres in 1948 and slightly over 1 million in 1950. Harvested acreage has been from 50 thousand to 106 thousand acres less than planted acreage, due to crop failures and poor harvesting conditions (fig. 4).

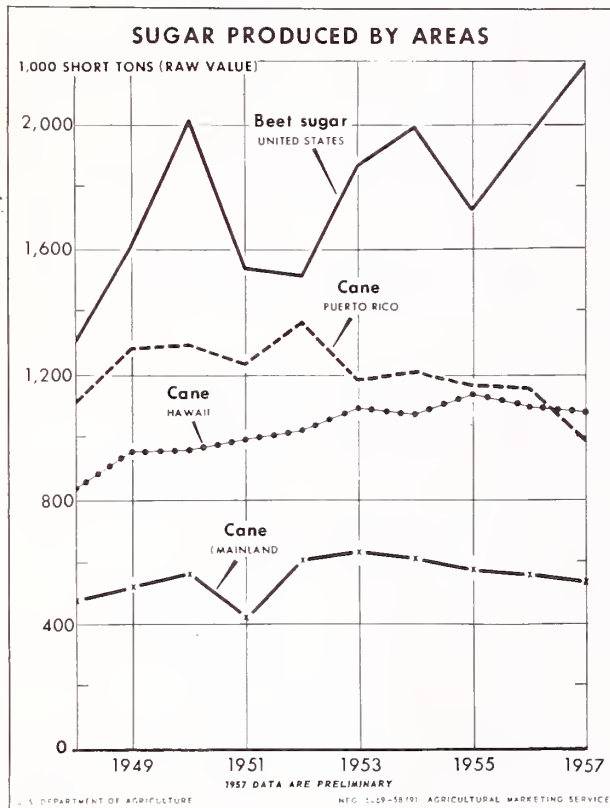


Figure 3

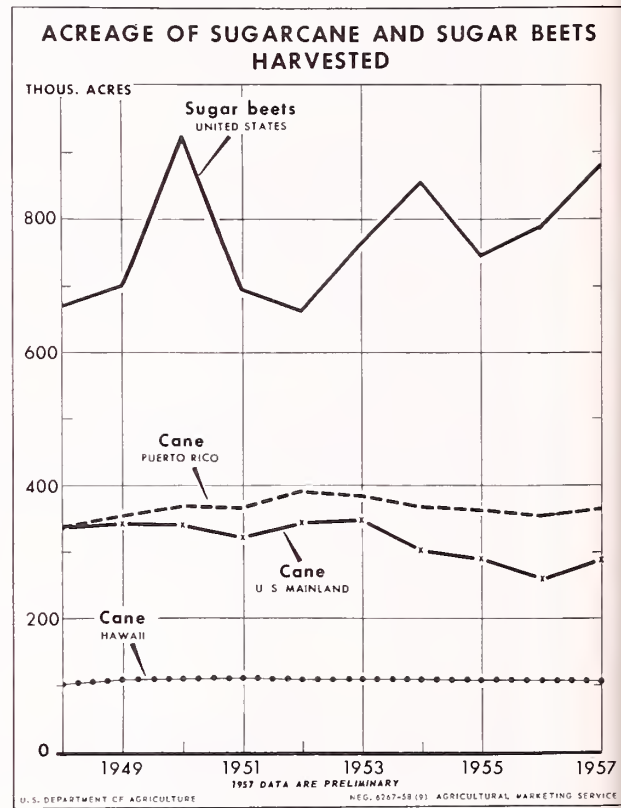


Figure 4

The average yield of sugar beets per acre harvested increased from 13.5 tons in 1948 to an estimated 17.4 tons in 1957. There was an increase in yield in all regions with the Eastern region increasing most. Yields have been increased through use of improved varieties, improved cultural practices, and more extensive use of fertilizer in all areas (fig. 5).

YIELD OF SUGARCANE AND SUGAR BEETS PER HARVESTED ACRE

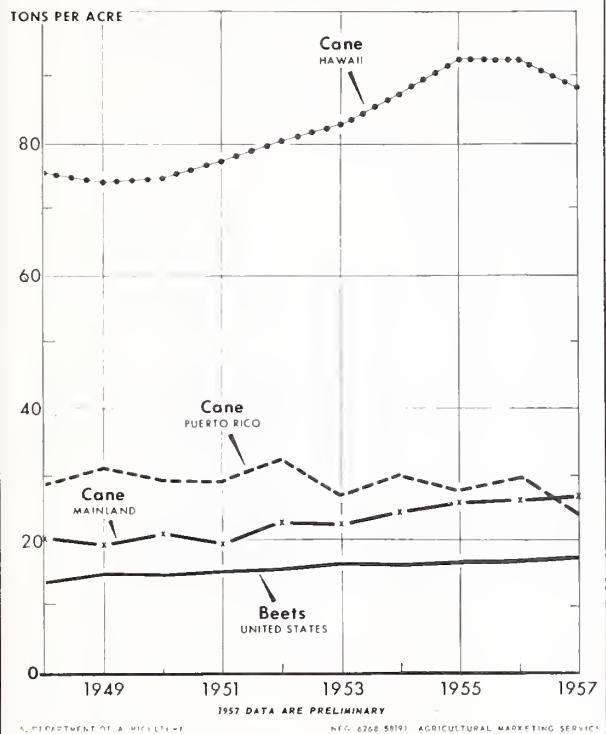


Figure 5

1944 that only 2.5 percent of the sugar beet acreage was harvested by machine methods. By 1954 about 84 percent of the acreage was harvested by machine methods.

Returns to farmers from processors per ton of beets fluctuated from \$10.60 per ton in 1948 to \$12.00 in 1952 and is estimated at \$11.20 for 1957. Sugar Act payments added to the payment received from processors gave farmers from \$2.30 to \$2.47 more per ton (fig. 7).

The farmer's share of "net returns" from the sale of beet sugar excluding Government payments has been 58 percent except for 1949 and 1954 when the farmer's share was 57 percent. When government payments are included the farmer's share was increased 63 and 62 percent (fig. 8).

There has been a pronounced westward movement of sugar beet production during the past 10 years. Total acreage planted to sugar beets declined 15.0 percent from 1947 to 1956. The Eastern region declined most with 27.1 percent reduction in acreage, the Central region declined 16.3 percent, while the acreage in the Western region increased 8.6 percent.

Total farm value of sugar beets fluctuated with acreage, yield, and prices. Farm value of sugar beets in 1948 was about \$94.1 million and \$152.4 million in 1950, and \$169.2 estimated for 1957. Government payments increased the farm value during those years to \$117.4 million in 1948 and \$186.1 million in 1950 (fig. 6).

The number of farms growing sugar beets fluctuates from year to year, but has shown a marked decline over the past 10 years from more than 40,000 in 1947 to less than 25,000 in 1956. The Central and Eastern regions showed declines and the Western region changed the least.

In contrast to the decline in number of farms growing sugar beets there was a general increase in average acreage of sugar beets planted per farm. In 1947 the average was about 24 acres per farm and in 1956 the average was 32 acres per farm. Acreage increases have been stimulated by the development and adoption of mechanized equipment in cultivating and harvesting sugar beets. It was estimated in

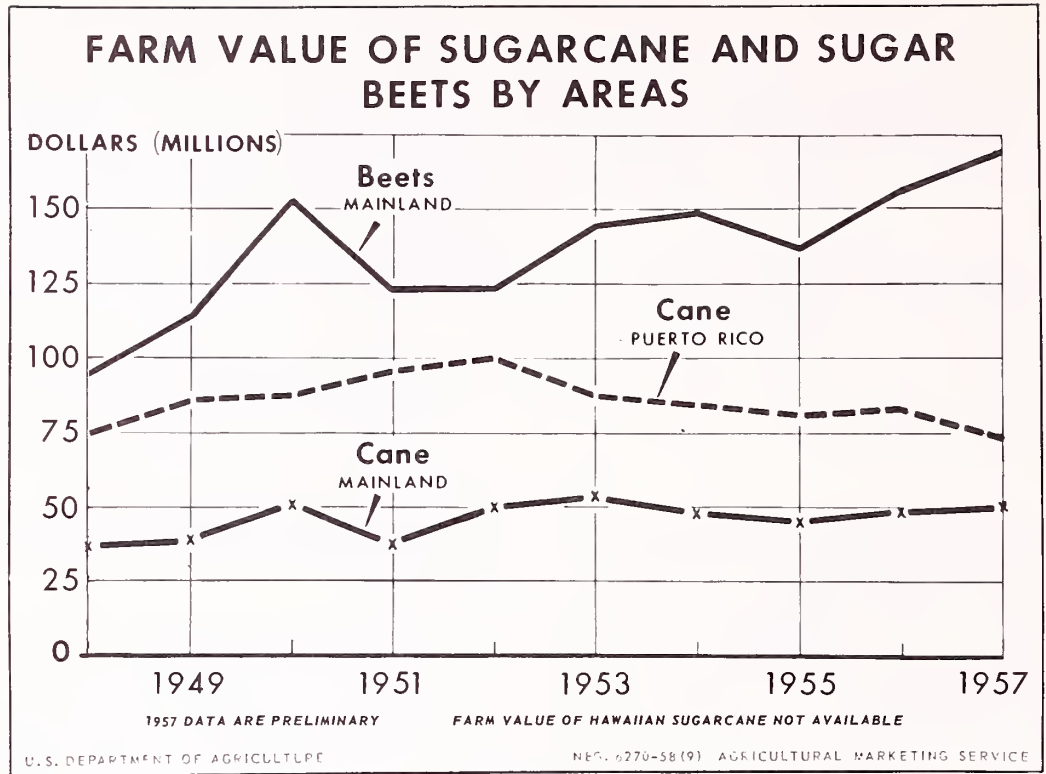


Figure 6

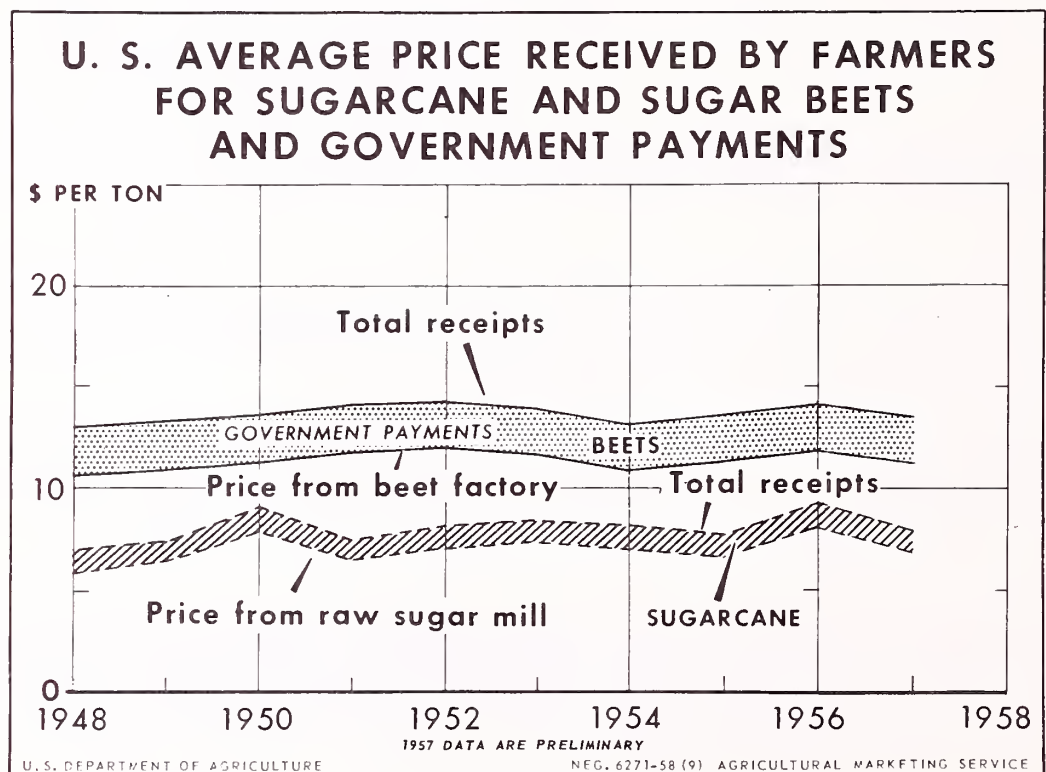


Figure 7

DISTRIBUTION OF RETURNS FROM THE SALE OF RAW CANE SUGAR AND BEET SUGAR BETWEEN GROWER AND PROCESSOR 1947-1956

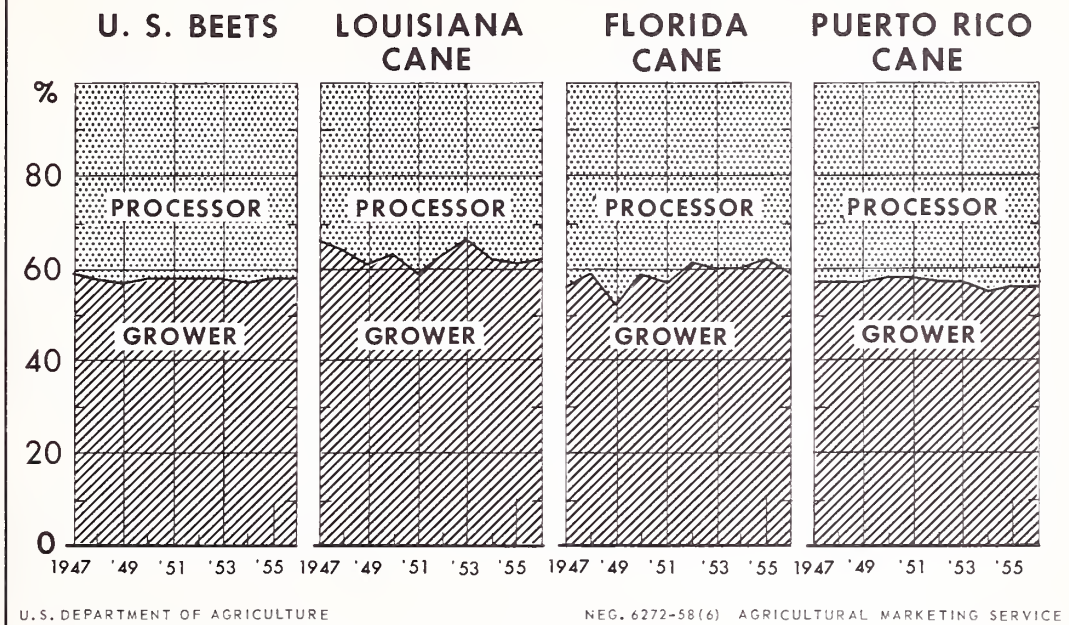


Figure 8

Processing

Sixteen companies operate 70 beet sugar factories in 15 of the Central and Western States for processing beets into sugar. In 1956 the average production was 52,600,000 pounds per factory (fig. 9). In 1948 there were 83 beet sugar factories with average production amounting to 41 million pounds annually. Shifting production, increased efficiency through larger scale operations, and obsolescence of plants have contributed to the decline in number of plants processing beets.

By regions, in 1956 the Far West produced 833,000 tons of refined sugar, the Central 879,000 tons, and the Eastern 130,000 tons. The Western region increased production of beet sugar by 37,000 tons from 1947 to 1956 while the Central region increased 26,000 tons and the Eastern region increased production 34,000 during the period.

To produce 1,867,000 tons of sugar in 1954 the sugar beet factories employed an annual average of about 11,000 persons. This was about 2,500 less than were employed in 1947 to produce 1,745,000 tons of beet sugar. Total salaries and wages paid employees amounted to about \$41 million in 1954 compared with about \$37 million in 1947.

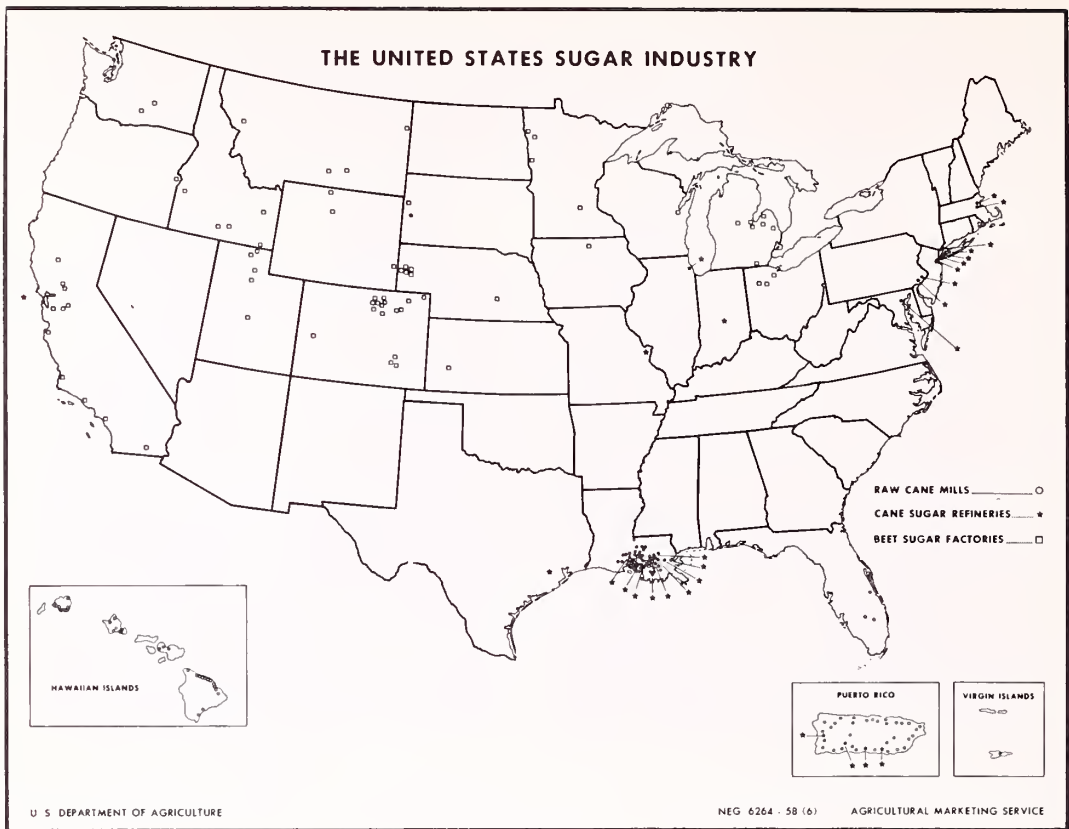


Figure 9

Investment in sugar beet processing plant, land, and equipment almost doubled from 1945 to 1955. The reports of 6 sugar beet processing companies indicate an increase in investment by these firms from about \$54 million in 1945 to almost \$100 million in 1955.

Cane Sugar

Production

Mainland sugarcane.--In 1948 the mainland cane area in Louisiana and Florida produced the equivalent of 446,000 tons of refined sugar. In 1957 the area produced about 500,000 tons or 12 percent more than in 1948 (fig. 3). The acreage of sugarcane harvested decreased from 299.1 thousand acres in 1948 to about 288.8 thousand acres in 1957 (fig. 4).

The yield of sugarcane per acre has increased in Louisiana and Florida. In Louisiana yields increased from 19.2 tons per acre in 1948 to 23.7 tons in 1957. Yields in Florida have been around 33 tons per acre until 1957 when they were increased to more than 39 tons (fig. 5).

The farm value of sugarcane produced increased from \$36.1 million in 1948 to about \$52.3 million in 1953 but dropped to \$44.3 million in 1955 and is estimated at \$50.6 million for 1957. Government payments to producers increased the farm value of sugarcane grown by \$7.2 million in 1948, about \$8.6 million in 1953, and \$7.3 million in 1956 (fig. 6).

The price received for sugarcane by mainland producers increased from \$5.76 per ton in 1948 to a high of \$8.04 in 1956 but declined to an estimated \$6.89 per ton in 1957. Government payments have ranged between \$1.01 per ton paid in 1951 to \$1.22 per ton in 1956 (fig. 7).

There has been a steady decline in the number of farms producing sugarcane since 1948, when 5,982 farms produced sugarcane. From 1948 to 1953 there was an increase in the number of acres of sugarcane grown per farm from 56.6 to 86.5 but the trend was reversed and the average number of acres planted declined to 70.6 acres in 1956.

Mechanization of sugarcane production and harvesting has brought about a reduction in the labor required to produce a ton of sugarcane on the mainland, though Hawaii is still more advanced in mechanization. The average labor requirement on large-size farms in Louisiana during the period 1938 to 1945 was about 180 man-hours per acre. By 1952 the labor requirement was reduced to about 120 man-hours per acre. Some further reductions in labor requirements have been effected since 1952 but not at the rapid rate that occurred between 1945 and 1952.

Minimum wage rates for field workers in all sugarcane producing areas have increased steadily since 1948. Rates in Florida have increased more than any area except Hawaii.

Louisiana farmer's share of the returns from the sale of raw sugar and molasses declined from about 66 percent in 1947 to 61 percent in 1955 and 62 percent in 1956. Returns to Florida growers followed the same general pattern as in Louisiana (fig. 8).

Puerto Rican sugarcane.--The amount of raw sugar produced in Puerto Rico increased from more than 1 million tons in the 1947-48 season to more than 1.3 million tons in the 1951-52 season, but declined to about less than 1 million tons for the 1956-57 season (fig. 3).

The acreage of sugarcane harvested in Puerto Rico increased from about 336,300 acres for the 1947-48 crop to about 391,800 acres for the 1951-52 crop, but declined to about 364,000 acres for the 1956-57 crop (fig. 4). The number of farms growing sugarcane increased from less than 13,000 to more than 18,000 during the 1946-47 to 1955-56 period. With the increase in the number of farms producing sugarcane there was a decrease in the average acreage of sugarcane per farm from more than 27 acres to about 20 acres per farm. The yield of sugarcane per acre has fluctuated between 32 and 24 tons per acre (fig. 5).

Total farm value of sugarcane produced increased from about \$75 million in 1948 to almost \$100 million in 1951-52, then declined to less than \$74 million in the 1956-57 season. Government payments amounting to \$15 million in 1948, \$18.9 million in 1952, and \$14.7 million in 1957, raised total returns to producers to \$96.5 million in 1947, \$118.6 million in 1952, and \$88.5 million in 1957 (fig. 6).

The price received by Puerto Rican producers for sugarcane increased from \$7.83 per ton for the 1947-48 crop to \$8.47 per ton for the 1956-57 crop. Government payments have ranged between \$1.51 and \$1.69 per ton during the period. The distribution of total returns to Puerto Rican sugarcane growers, including Government payments, varied between 60 and 62 percent of the total returns from sugar and molasses during the 10-year period (fig. 8).

Minimum wages paid sugarcane field workers increased from 34.7 cents per hour in 1947 to 40 cents in 1954, and for 1955-56 were about 39 cents per hour.

Hawaiian sugarcane.--From 1948 to 1951 the total amount of raw sugar produced in Hawaii increased from about 835,000 tons to about 996,000 tons and from 1951 through 1957 the amount of raw sugar produced increased by about 90,000 tons (fig. 3).

The acreage of sugarcane harvested in Hawaii during the 10-year period of 1948-1957 fluctuated widely. From 1948 to 1950 the number of acres harvested increased from 670,000 acres to 924,000 acres, dropped to 661,000 in 1952 and increased to 883,000 acres in 1957 (fig. 4). The yield of sugarcane per acre harvested increased rapidly from about 75 tons in 1948 to almost 93 tons per acre in 1956 and about 89 tons in 1957. While this is 18 to 24 month sugarcane, it is the highest yield per acre of any sugarcane area (fig. 5).

The value of raw sugar produced in Hawaii increased from about \$92.9 million in 1948 to about \$136.5 million in 1953, declined to \$127.6 million in 1954, and rose to almost \$134 million in 1956. ^{1/} The value of molasses has fluctuated widely over the period from a low of \$3.3 million in 1949 to a high of \$9.5 million in 1951 and down again to \$3.1 million in 1954. Government payments of \$7.6 million to \$10.5 million were made during the period, bringing the total returns from the sale of sugar, molasses, and Government payments to \$109 million in 1948 and \$152.6 million in 1956.

In 1956 the Hawaiian plantations employed about 17,000 persons on a year-round basis with a payroll of approximately \$57 million. Average daily earnings of nonsupervisory employees increased from \$5.28 in 1946 to \$10.73 in 1956.

Invested capital in the Hawaiian sugar industry in 1956 was estimated at \$175 million. Raw sugar produced in the Territory of Hawaii is transported in bulk to mainland refineries.

^{1/} A large percentage of the sugarcane is produced on plantations owned by the same firms that own the raw sugar mills. Data on farm value of sugarcane are not available.

The production and harvesting of sugarcane in Hawaii is highly mechanized. Shortages of sugarcane workers and high wage rates have forced the development and adoption of machinery at a faster rate than in other domestic areas.

Processing

In 1957 there were 50 raw sugar mills operating in Louisiana and 3 in Florida (fig. 9). In 1948 there were 60 raw sugar mills in Louisiana and 3 in Florida. In 1947 the raw sugar mills employed about 4,600 people on an average annual basis. By 1954 the number of employees in raw sugar mills had declined to an annual average of about 3,000. Raw sugar production is highly seasonal and the number of workers employed during the grinding season would be three to four times the annual average.

While the number of employees in raw sugar mills declined, the total salaries and wages paid increased from about \$8.5 million in 1947 to about \$8.9 million in 1954.

Most of the raw sugar mills in Louisiana and Florida produce part of the sugarcane they grind. Cane grown on lands owned or leased by the raw sugar mills is known as administration cane. In addition to producing sugarcane, the raw sugar mills engage in related agricultural production such as livestock production, which can also utilize molasses and field crops. A small number of raw sugar mills are engaged in the processing of bagasse into other products. Some of the raw sugar mills produce refined sugar for direct consumption.

In Hawaii processing into raw sugar was carried on by each plantation. The 28 raw sugar producers own cooperatively the refineries located in Hawaii and in California. The majority of the raw sugar mills and plantations are in turn owned largely by five firms sometimes known as factors or agents. The raw sugar producers own and lease land used for the production of sugarcane and other agricultural commodities, and own related enterprises such as irrigation facilities, power generating plants, and warehousing, and conduct stevedoring operations. The entire output of Hawaiian raw sugar is marketed through a cooperative marketing association which owns a large refinery at Crockett, California, and a refinery on the island of Oahu which supplies the islands' needs.

In 1957 there were 32 Puerto Rican raw sugar mills or centrals in operation. The centrals produce some of the sugarcane that is ground but the majority of the sugarcane is produced by growers or "colonos" on small acreages. Some of the raw sugar mills own housing, hospitals, office buildings, railroads for transporting sugarcane, and other related facilities. Two centrals produce some refined sugar for direct consumption while four centrals are closely connected with separately operated refineries.

One raw sugar mill is in operation in the Virgin Islands.

In Puerto Rico and in the mainland sugarcane area the trend has been toward fewer raw mills. The older less efficient mills have been dismantled and their supplies transferred to more efficient mills.

Refining

In 1955 there were 22 refineries in operation in the continental United States. In addition, refineries in Hawaii and Puerto Rico supply the islands with refined sugar.

In 1947 the cane sugar refining industry in the continental United States employed an annual average of 17,300 workers, in 1953 approximately 15,400, and in 1954 approximately 16,000. Total salaries and wages paid employees in the sugar refining industry increased from about \$47 million in 1947 to about \$66.5 million in 1954.

Capital investment in land, plant, and equipment in sugar refining increased almost 50 percent in the 10-year period 1947 to 1956. The value of land, plant, and equipment of 4 sugar refineries increased from approximately \$79 million in 1947 to about \$118 million in 1956.

A small number of refineries own raw sugar mills and produce sugarcane. More sugar refinery firms have multiple refining plants. A few refineries own distribution warehouses and facilities other than at the refinery.

Refined sugar is sold through sugar brokers located in large cities. While refiners may deliver sugar to users near the plant, most of the refined sugar is moved by commercial truck, rail, and barge lines. Cane sugar is marketed throughout the country while beet sugar is generally marketed west of the Mississippi.

SELECTED BIBLIOGRAPHY

Production

1. Commodity Stabilization Service. Agricultural, Manufacturing, and Income Statistics for Domestic Sugar Areas. U. S. Dept. Agr., Sugar Div., Statis. Bul. 150. Dec. 1954.
This bulletin provides essential statistics on production, marketing, manufacturing, income, Government payments, and wages for individual domestic sugar producing areas.
2. Sitler, H. G., and Burdick, R. T. Economics of Sugar Beet Mechanization. Colo. Agr. and Mech. College Bul. 411-A. Fort Collins. 1953.
Describes changes which have taken place in production practices and labor requirements to produce sugar beets. Analyzes the effect of mechanical sugar beet production and harvesting equipment on production costs.
3. Campbell, J. R., and Ponder, H. G. Cost and Returns for Family Type Sugar Cane Farms in Louisiana, 1955 Crop Year. Louisiana State Univ. Agr. and Mech. College, Dept. of Agr. Econ. Circ. 209. Baton Rouge. 1957.
Presents costs and returns data for the crop year 1955. Provides information on farm organization, production practices, and labor requirements as well as data from prior studies for comparative purposes.
4. Campbell, J.R., and Ponder, H. G. Costs and Returns on Large Sugar Cane Farms in Louisiana, 1955 Crop Year. Louisiana State Univ. Agr. and Mech. College, Dept. Agr. Econ. Circ. 210. Baton Rouge. 1957.
Presents costs and returns data for the crop year 1955 as well as data for previous years.
5. Association of Sugar Producers of Puerto Rico. Manual of Sugar Statistics. Washington, D. C. Annual.
Presents statistics on production, consumption price and quotas for Puerto Rico and other domestic areas.
6. Western Beet Sugar Producers Inc. Beet Sugar Handbook. San Francisco. 1957.
Provides statistical and other pertinent information on the production of sugar beets and beet sugar, prices and farm value, and factory production. It also gives a directory of beet sugar processing companies with processing capacity, sugar beet growers' associations, and other industry organizations.
7. Hawaiian Sugar Planters Association. H.S.P.A. Manual. Honolulu, T. H. Annual.
Includes general information on the territory of Hawaii, detailed information on the sugar industry, general information on the United States sugar industry and sugar legislation.

Marketing

8. Commodity Stabilization Service. Sugar Statistics and Data. U. S. Dept. Agr. Sugar Div. Statis. Bul. 150. Washington, D. C. 1957.
Contains data on production and distribution of sugar by primary distributors, quota actions, prices, indexes used in administration of the Sugar Act, Sugar Act payments and tax collections, U. S. tariffs, Cuban and Philippine production and exports, and statistics on international production and trade.
9. Commodity Stabilization Service Sugar Reports. U. S. Dept. Agr., Sugar Div. Washington, D. C. Monthly.
Reports Sugar Act administrative actions, market review. Provides current statistical information on receipts and meltings, status of quotas, deliveries by primary distributors, sugar prices, and related data.
10. Agricultural Marketing Service. Sugar Situation. U. S. Dept. Agr., Washington, D. C. Annual.
Summarizes the domestic and foreign developments in production, marketing, and prices. Contains statistical data on sugar production in domestic and foreign areas, distribution, and prices. Also reports production, consumption, and prices of dextrose, corn sirup, maple sugar and sirup, honey, and molasses.
11. Stanley, F. E. Marketing Louisiana Sugar Cane. Sugar Branch, Prod. and Mktg. Admin. U. S. Dept. Agr. Washington, D. C. 1949.
Describes the Louisiana sugar cane industry, marketing methods and practices, and an analysis of marketing problems of Louisiana mills.
12. Miller, M. E. The Marketing of Sugar Cane in Puerto Rico. Sugar Branch, Prod. and Mktg. Admin. U. S. Dept. Agr. Washington, D. C. 1950.
Describes the sugar industry in Puerto Rico, marketing methods and practices, factors affecting the marketing of sugar cane in Puerto Rico.
13. Jackson, D., and others. Marketing Sugar Beets. Report No. 137. Agricultural Marketing Service. U. S. Dept. Agr. Washington, D. C. 1957.
A brief study of grower-processor contracts and possible alternative methods of pricing beets.
14. Campbell, J. R., and Ponder, H. G. Costs and Returns for Raw Sugar Mills in Louisiana, 1955 Crop Year. Louisiana State Univ. Agr. and Mech. College Dept. Agr. Econ. Circ. 211. Baton Rouge. 1957.
Presents costs and returns data for raw sugar mills for the 1955 crop year and for prior years.
15. Bureau of Labor Statistics. Beet Sugar Refining. U. S. Dept. Labor. Washington, D. C. 1953.
Case study data on factory production processes, plant characteristics, and man-hour requirements of selected beet factories.

