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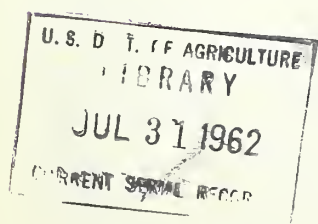
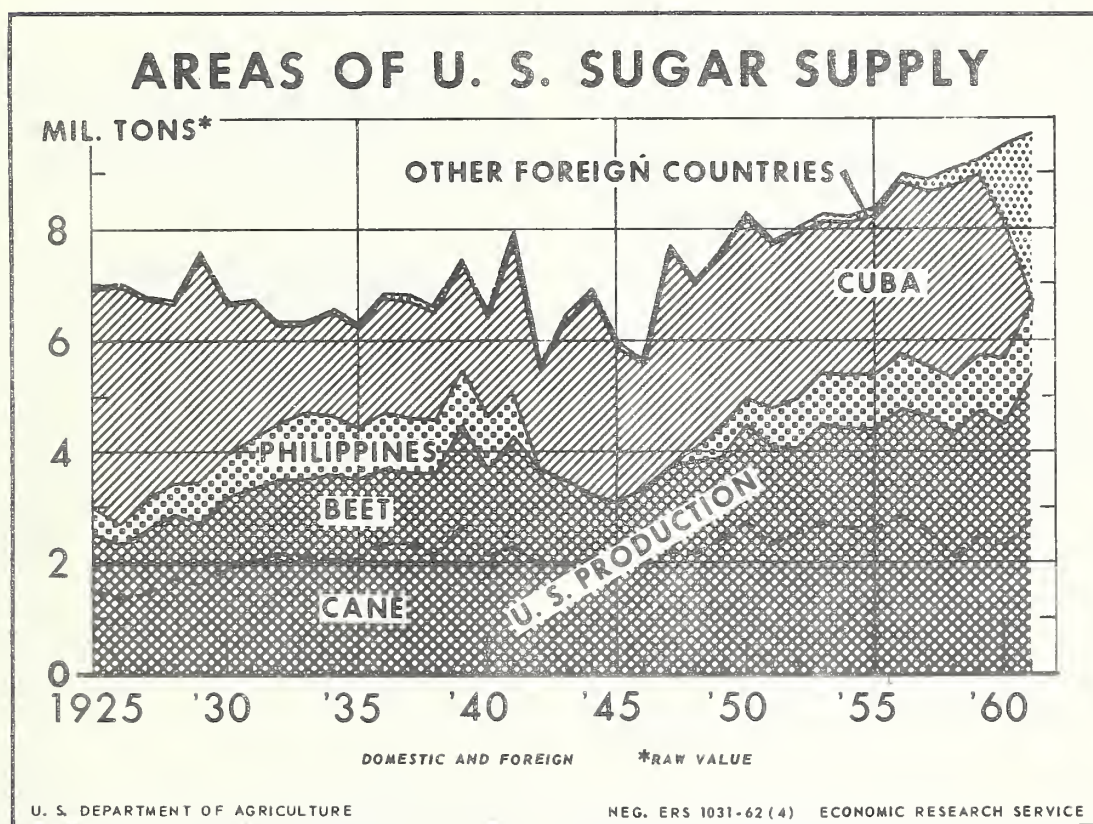
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RECENT DEVELOPMENTS IN THE U.S. SUGAR INDUSTRY



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RECENT DEVELOPMENTS IN THE U. S. SUGAR INDUSTRY ^{1/}

Raw cane sugar for the U. S. market is produced in Hawaii, Louisiana, Florida, Puerto Rico, and the Virgin Islands and in many foreign countries. Most of it, however, is refined at mainland refineries located in coastal cities. Beet sugar, all in refined form, is produced in factories located in 15 western and midwestern States from beets grown in 22 States. The level of technological development, particularly in the production of sugar

cane, varies widely among producing areas, depending on socio-economic factors peculiar to each area. Some areas have progressed rapidly in recent years, while others have continued to lag. This report considers recent shifts of supply of sugar for the United States, technological developments in producing, refining, and handling sugar, and the growing importance of alternative sweeteners.

Shifts in Sources of Supply

The U. S. sugar industry operates under a quota system that limits, by areas, how much sugar can be marketed in the U. S. each year. These quotas were suspended during the World War

II period, but were reestablished, with some modifications, in 1948. Total quota supplies and their distribution by areas of origin in 1948, 1959, and 1961 were:

	<u>Percentage of total</u>		
	<u>1948</u>	<u>1959</u>	<u>1961</u>
Domestic beet area	24	24	27
Mainland cane	6	6	8
Hawaii.....	10	11	11
Puerto Rico.....	14	10	10
Virgin Islands.....	<u>1/</u>	<u>1/</u>	<u>1/</u>
Philippines.....	4	11	14
Cuba.....	41	35	0
Other countries.....	<u>1</u>	<u>3</u>	<u>30</u>
Total.....	100	100	100
Total supplies (1,000 tons)	7,098	9,246	9,701

1/ Less than 0.5 percent.

Changes in the proportionate shares of the various areas between 1948 and 1959 were relatively minor. The largest change occurred in the Philippines, an increase from 4 to 11 percent. This was a result of the recovery of the sugar industry from the destruction suffered during World War II. The decrease in the Puerto Rican share was caused by a poor crop in 1959. Amendments to the Sugar Act in 1951 and 1956 reduced slightly the quota for Cuban sugar.

A drastic shift occurred, however, in mid-1960 when sugar imports from Cuba were suspended. Since that time nearly all of the supply formerly coming from Cuba has been purchased from other foreign countries. The Sugar Act includes a formula for allocating such supplies among countries having quotas in the U. S. market and also directions for obtaining quantities not available under the formula from the same or other countries. Replacements of former

^{1/} Prepared by Roy A. Ballinger and Robert G. Martin, agricultural economists, Marketing Economics Division, Economic Research Service.

Cuban supplies from foreign countries amounted to 1,187,000 tons during the last half of 1960, 2,975,000 tons in 1961, and 1,604,000 tons for the first half of

1962, a total of 5,766,000 tons. The percentage distribution among countries of this total quantity from mid-1960 to mid-1962 was:

	<u>Percent</u>
Mexico	21.2
Dominican Republic	16.9
Peru	15.9
Philippines	13.0
Nicaragua	1.4
Haiti	1.1
Brazil	8.4
British West Indies-British Guiana	6.4
India	4.7
China (Taiwan)	3.9
Australia	1.6
French West Indies	1.4
Columbia	1.3
Other countries	<u>2.8</u>
Total	100.0

The quantities authorized for Mexico, Peru, the Philippines and the Dominican Republic are in addition to the quotas they received under other provisions of the law. None of the other countries mentioned has a quota in the United States market.

Although the shift in the U. S. source of supply from Cuba to other countries has been much easier than many people expected, various problems have arisen. Deliveries from Cuba could be made to the United States within a few days after purchase. Much of the new supply must come far greater distances, and delivery dates are less certain. This creates a need for larger inventories in the United States, and more ships to maintain the needed volume of imports.

Variations in the quality of raw sugar obtained from different countries, as compared with the more uniform quality formerly obtained from Cuba, has caused minor difficulties for U. S. cane sugar refiners. Such variations require careful mixing of sugar from two or more sources and other adjustments in the refining process.

Fortunately, there has been no difficulty in obtaining sufficient supplies from sugar exporting countries. In recent years, sugar supplies have been abundant in world markets, and exporting countries have had difficulty disposing of their output.

Mechanization of Production

Historically, the growing and harvesting of sugarcane and sugar beets have required much hand labor. In the United States, increasing labor costs have encouraged the development of new machines. Growing, harvesting, loading, and hauling cane and beets have been mechanized to

a large extent, particularly in the mainland growing areas and Hawaii. Although progress has been slower in Puerto Rico, the situation has improved considerably in recent years, including promising developments in the mechanical harvesting of cane (table 9).

Table 9.--Man-hours of fieldwork required per ton of sugar (raw value) in producing sugarcane and sugar beets in the United States, 1960 and percentage decline from 1948

Area	Man-hours, 1960	Percentage reduction from 1948
	Number	Percent
Sugarcane:		
Louisiana	48	57
Florida	22	63
Hawaii	17	45
Puerto Rico.....	89	36
Sugar beets.....	23	44

Sugar Reports, Sept. 1961

The man-hours of field labor required in 1960 to produce sufficient sugarcane or sugar beets to yield 1 ton of sugar, raw value, varied from about 17 hours in Hawaii to 89 in Puerto Rico. Field labor requirements have declined significantly in all areas since 1948. The largest percentage decline has been made in Florida, and the smallest in Puerto Rico. While increased mechanization appears to be the major factor in the reduction of man-hours of labor used in producing a ton of sugar, increased yields of sugar per acre, particularly in the sugar beet areas (32 percent) and in Florida (44 percent) have contributed significantly to the decline.

Mechanization on the farm generally has resulted in larger farms and fewer farmers growing cane or beets. Increases in yields have come with improved production practices, such as the use of higher yielding varieties, greater use of fertilizer, and better insecticides. In Puerto Rico, the number of farms has declined, but there have also been declines in the acres in cane per farm, the yield of cane per acre, and the yield of sugar per ton of cane. Adverse weather conditions and delays in adopting new production practices appear to be important factors accounting for these trends.

Processing

Practically the same basic procedures have been used for several decades in extracting sugar from cane and beets. However, many improvements in techniques have either reduced the labor requirements of processing cane and beets or offer other advantages, such as the recovery as sugar of a larger proportion of the sucrose in the cane or beets. Recent developments include automatic centrifugals used at both raw sugar mills and refineries, the ion exchange pro-

cess, and the storage of beet juice for several months at the beet sugar factory before extracting the sugar.

Technological changes, both in processing plants and in the transportation of cane and beets to these plants, have encouraged the construction of larger plants or increases in the capacity of existing plants. Competition from these larger and more efficient plants has caused a number of plants, usually the

smaller and older ones, to cease operations. The number of plants processing sugar beets in the United States decreased from 71 in 1948 to 62 in 1960, although the production of beet sugar rose

86 percent during this period. In the mainland cane area 62 plants were processing sugarcane in 1948 and only 49 in 1960, while production of sugar rose about one-third.

Transportation and Handling

Bulk Raw Sugar

One of the more marked changes in the movement of raw cane sugar from producing mills to mainland refineries has been the worldwide shift from the use of bags to bulk handling. The shift started prior to World War II, but did not become of major importance in the United States until after the war.

A complete shift from bags to bulk handling involves the installation of new, or the modification of existing, facilities for handling raw sugar in mills, for loading bulk sugar in railroad cars, trucks, or ships, and for unloading at cane sugar refineries. The most expensive new equipment involved in the change is that needed to load and unload ocean vessels. Producers in Hawaii and Puerto Rico have established specialized terminals whose sole function is to load raw sugar on vessels for shipment to mainland refineries. All raw sugar from these areas is now shipped in bulk.

Some of the cane sugar refineries in the United States, particularly the smaller ones, are not equipped to handle raw sugar in bulk and some of the countries from which the United States imports sugar do not ship it all in bulk. A sizable volume of business appears to be necessary for maximum savings from bulk ocean shipments.

Handling a sufficient volume of raw sugar in bulk has cost-saving potential because of the labor it replaces both for raw sugar producers and cane sugar refineries. This method is gaining favor even in certain underdeveloped countries where labor is plentiful and wages comparatively low.

Price quotations for bulk sugar are usually 2 to 4 cents per hundred-weight lower than those for bagged sugar. This is due largely to the loss of income to refiners from the sale of used bags when they shift from bag to bulk handling.

Bulk Refined Sugar

Since World War II, there also has been a marked shift to bulk handling and shipping of refined sugar in both dry and liquid form. Liquid sugar accounted for 25 percent of the total delivered to industrial and institutional users in 1960, compared with 19 percent in 1957. Dry bulk deliveries increased to about 21 percent of the total in 1960, from 12 percent in 1957. The proportion of total deliveries in dry bulk and liquid to industrial and institutional users in 1960 varied from 62 percent in the western States to 26 percent in the South.

Industry estimates indicate that many users of refined sugar can save one-half cent per pound or more by using bulk facilities. These savings result from lower labor requirements for handling and storing and from a reduced price from refiners. There are certain limitations in receiving bulk refined sugar such as volume of sugar needed and distance from refinery. This is especially true of liquid sugar which is approximately 35 percent water. In some areas, the transportation difficulty has been overcome by shipping dry sugar to secondary distribution points where it is converted to liquid form for local delivery.

Blending

A recent development in the marketing of refined sugar and corn sirup has been

the blending of the two products for sale to industrial users. Both sugar refiners and corn sirup producers prepare blends of liquid sugar and corn sirup, which are widely used in the candy, canning, and baking industries. The primary advantages of a ready-mixed blend to users are greater convenience, lower operating costs, and improved sanitation. Few

statistics are available on the production and sale of blends, but the corn refining industry used about 84,000 tons of corn sirup in 1959 in mixed sirup. Recent announcements by the sugar trade indicate that dry mixtures of sugar and corn sugar (dextrose) also are being offered to industrial users.

Types of Users

The proportion of sugar consumed in the United States which is being used by industrial food processors has been increasing since World War II. The share going directly to households has been decreasing. In 1960, about 54 percent of the sugar delivered by manufacturers and importers went directly to industrial users, principally canners, confectioners, bakers, soft drink bottlers, and manufacturers of ice cream and condensed milk. It is estimated that in addition

to direct deliveries, approximately 10 percent of total sugar deliveries reached industrial users through wholesalers. In 1949 direct deliveries to industrial users amounted to only 42 percent of total deliveries. Deliveries to wholesalers and retailers, however, declined from 56 percent of the total in 1949 to 44 percent in 1960. Sales to hotels, restaurants and institutions, although relatively small, increased at an even faster rate than those to industrial users.

Market Potential

New Uses

The sugar industry has sponsored considerable research in an attempt to develop new sugar products for which substantial markets could be found. As yet, none of the new products has become of much commercial importance.

The greatest potential for new uses of sugar seems to be in the chemical industry. Sugar could become a source of raw material for synthetic surface acting agents (surficants), which might be used in detergents, soap, shampoos, dentifrices, shaving preparations, printing ink, paint, and emulsifiers in food preparations. Sugar-derived chemicals are also available for use in the production of plastics. Chemicals derived

from sugar, if they are to be used commercially, must compete with products already on the market. The competitive position of new products developed from sugar would, of course, be improved if sugar for such purposes could be purchased at world prices rather than the higher prices commonly prevailing in the United States.

Byproducts

Molasses, the chief byproduct of sugar manufacture, is used mainly in commercially mixed livestock feeds. The quantity used for this purpose has almost doubled since 1950, while the volume used for the production of alcohol has declined to an insignificant quantity, except in periods of unusually low prices.

Alternative Sweeteners

The most important sweeteners other than sugar in the United States are corn

sirup and dextrose. These are purchased largely by industrial users and

are mixed with sugar by manufacturers. Relatively small quantities of noncaloric sweeteners, saccharin and sucaryl, also are used to prepare foods purchased largely by persons interested in weight control or with other health problems. The noncaloric sweeteners are used alone rather than in combination with other sweeteners.

Factors which determine the extent to which corn sirup or dextrose replaces sugar include relative cost, availability, convenience and the qualities desired in the final product. In many cases processors probably would prefer sugar as the sole sweetening agent, but the lower price at which corn sirup or dextrose usually can be obtained encourages the replacement of some sugar with either corn sirup, dextrose or a mixture of the two. The extent of the substitution depends largely on the effect on the

quality of the product being manufactured. Where the quality is lowered by corn sweeteners, the proportion used is necessarily lower than in other cases. For many canned products, regulations of the Food and Drug Administration set the maximum proportion of corn sirup or dextrose which can be mixed with sugar.

The distribution of corn sirup in the United States increased about 62 percent from 1948 to 1961 from 520,000 to 842,000 tons. In contrast, sugar deliveries rose only about 31 percent, from 6,863,000 to 8,983,000 tons. The rate of increase for dextrose was approximately equal to that for sugar. Comparable statistics are not available for noncaloric sweeteners. However available reports indicate that there has been a considerable increase in their consumption, although the total quantity used is still small relative to other sweeteners.



Growth Through Agricultural Progress

