United States
Department of
Agriculture

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Number 711

An Economic Research Service Report

Sugar

Background for 1995 Farm Legislation

Ron Lord

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Sugar: Background for 1995 Farm Legislation. By Ron Lord. Commercial Agriculture Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report No. 711.

Abstract

Current U.S. sugar price support programs have their origin in 1981 legislation. The price support program has resulted in significant expansion of the industry in the last decade. Beet sugar production has expanded in many regions, but has contracted in some western regions, particularly California. Cane sugar production has expanded in Florida, Louisiana, and Texas, but has shrunk in Hawaii where costs are high. National average costs of producing beet and cane sugar have been declining in the last decade, and returns have exceeded costs. Average production costs of refined beet sugar are below those of refined cane sugar. Overall sugar demand has been growing at about 2 percent a year since 1986, when the rapid replacement of sugar by high-fructose corn syrup ended. Sugar imports under quota have fallen to levels close to the minimum provided by law. Prospects are for sugar production and consumption to continue to rise. No major impacts on the industry are expected from the GATT Uruguay Round or NAFTA.

Keywords: Sugar, sugarcane, sugar beets, price supports, import quotas, imports, exports, cost of production, returns, high-fructose corn syrup, corn sweeteners, world sugar, low-calorie sweeteners.

Foreword

Congress will soon consider new farm legislation to replace the expiring Food, Agriculture, Conservation, and Trade Act of 1990. In preparation for these deliberations, the U.S. Department of Agriculture and other groups are studying previous legislation to see what lessons can be learned that are applicable to the 1990's and beyond. This report updates *Sugar: Background for 1990 Farm Legislation* (AGES-9OO6), by Robert D. Barry, Luigi Angelo, Peter J. Buzzanell, and Fred Gray. It is one of a series of updated and new Economic Research Service background papers for farm legislation discussions. These reports summarize the experiences with various farm programs and the key characteristics of the commodities and the industries that produce them. For more information, see Additional Readings at the end of the text.

Washington, DC 20005-4788 April 1995

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The sugar portion of the 1995 farm bill debate will likely focus on the level and type of support to the industry, as well as the effectiveness of the sugar provisions in the 1990 omnibus farm legislation (entitled the Food, Agriculture, Conservation, and Trade Act).

The current U.S. sugar price support program has its origins in 1981 legislation. The foundations of the program are tariff-rate import quotas, domestic marketing allotments, and price supports. They restrict overall supply to help maintain price. The current U.S. minimum price support level, unchanged since the 1985 crop, is based on a raw cane sugar loan rate of 18 cents a pound, raw value. Import quotas have meant that the U.S. sugar price has been largely unaffected by movements in the lower world price.

The 1990 farm legislation added a minimum sugar import requirement of 1.25 million short tons (1 short ton = 2,000 pounds), standby domestic sugar marketing allotments (domestic supply controls), and a marketing assessment of 1 percent of the loan rate, later increased to 1.1 percent. USDA assesses whether or not to implement the standby allotments at the beginning of each quarter of the fiscal year. If imposed, allotments apply to the entire fiscal year, and have been imposed for fiscal years 1993 and 1995.

Several options exist for the U.S. sugar program. Preserving the basic structure of the nonrecourse loan program provides one set of options. To continue price support, a mechanism for domestic supply control is necessary. At the other extreme, the domestic program could be eliminated.

Another factor in this year's debate will be the General Agreement on Trade and Tariffs (GATT). Under GATT, the U.S. is committed to maintain a minimum access level for imports of 1.256 million tons. This commitment precludes domestic sugar legislation from increasing the protection afforded domestic sugar producers from foreign sugar, even if surpluses arise.

The domestic sugar and sweetener industry is the largest in the world, with total annual consumption of caloric sweeteners approaching 20 million tons a year. The United States is among the top five countries in the world in production, consumption, and imports of sugar. About 83 percent of the sugar consumed in the United States during 1992-94 was produced domestically, with 38 percent from sugarcane and 45 percent from sugar beets.

Domestic sugar production is expanding rapidly, and is forecast at a record 8.29 million short tons, raw value, in fiscal year 1995. Over the last decade, beet sugar production has expanded an average of over 140,000 tons per year, and cane sugar production has risen more than 40,000 tons per year. Since 1986, sugar use has grown about 2 percent a year, and for 1994/95 is forecast at 9.43 million short tons. High-fructose corn syrup (HFCS) consumption is forecast at 7.4 million tons in 1994/95, and HFCS consumption is growing at about 4 percent a year.

Sugar beets are grown in 14 States and sugarcane in 4 States. Since sugar beets and sugarcane deteriorate rapidly, they are grown only in proximity to a processor and generally only under contract. Technological progress continues to improve efficiency on sugar beet and sugarcane farms and in sugar processing facilities. The U.S. cost of producing sugar is falling both in absolute terms and relative to other countries.

U.S. sugar prices, as supported by Federal farm policy, have stimulated production. By providing a price umbrella, the higher sugar prices stimulated production of alternative sweeteners, such as HFCS, and lowered sugar consumption. Refined sugar is processed and sold in the United States by 11 companies, with the three largest controlling over half the market. Industry concentration has increased dramatically over the last 3 decades.

Sugar
Background for 1995 Farm Legislation

Ron Lord

Introduction

The U.S. sugar and sweetener industry is the largest in the world, with annual consumption of caloric sweeteners approaching 20 million tons a year. The United States ranks among the top five world sugar producers and consumers, and produces about 75 percent of the world's high-fructose corn syrup (HFCS). While U.S. sugar imports have fallen in the last decade, import levels of over 1.5 million tons place the United States among the top five sugar importers.

Sugar beets are grown in 14 States, and sugarcane is grown in 4 States. While sugar beets are processed directly into refined sugar, sugarcane is processed into raw cane sugar, which must be refined by a cane refinery before final sale. Since sugar beets and sugarcane deteriorate rapidly, they can be grown only in proximity to a processor and generally only under contract.

Since 1982, the U.S. sugar price has been largely unaffected by movements in the lower world price, as the U.S. price was supported through a restrictive import quota (now a tariff-rate quota). Under the 1990 Farm Act, domestic marketing allotments are also available to support price, if supply restriction is still needed after import levels are reduced to the minimum level of 1.25 million tons.

U.S. sugar prices, as supported under the farm acts of 1981, 1985, and 1990, have stimulated production. By providing a price umbrella, the higher sugar prices stimulated production of alternative sweeteners, such as HFCS, and lowered sugar consumption. Beet sugar production has expanded in most areas except California, where alternative crops and higher input costs constrain production. Cane sugar output has declined in Hawaii, where input prices are high, but expanded in Florida, Louisiana, and Texas.

Technological progress continues to improve efficiency on sugar beet and sugarcane farms and in sugar processing facilities. The cost of producing U.S. sugar is falling both in absolute terms and relative to other countries. Beet processors are extracting record levels of sugar from sugar beets. Beet processors have also invested in new facilities to extract sugar from beet molasses, which has added about 235,000 tons to U.S. supplies. New breakthroughs, such as the ability to commercially extract sugar from cane molasses and seed improvements through DNA-splicing, are possible.

Refined sugar is processed and sold in the United States by 11 companies; the 3 largest have over half the market. Industry concentration has increased dramatically over the last 3 decades.

Characteristics of the Sugar Sector

Sugar consumed in the United States is derived from sugarcane or sugar beets.[1] About 83 percent of sugar consumed in the United States was produced domestically during fiscal years 1992-94,[2] 38 percent from domestic sugarcane and 45 percent from domestic sugar beets.

Structure of the U.S. Sugar Industry

There are three major stages in the production of refined sugar: (1) production and harvest of sugarcane and sugar beets, (2) extraction of raw sugar from sugarcane, and (3) refining of raw cane sugar and processing of sugar beets (see Box, "Sugar Beets and Sugarcane: Similarities and Differences") into commercial refined grades of sugar.

[1] USDA uses data on deliveries from cane refineries and beet processors to first users as a proxy for consumption of sugar.

[2] The fiscal year is October-September: for example, fiscal 1994 is the year beginning October 1.1993. In contrast, the crop year for sugar is most closely associated with the year beginning September: for example, the 1993 crop year is the year beginning September 1993.

Sugar Beets and Sugarcane: Similarities and Differences

Where the crops are grown: Sugar beets are a temperate crop in most of the United States, although they can be grown in warmer areas such as the Imperial Valley of California. Sugar beets are grown in 14 States.

Sugarcane, a tall perennial grass, is grown in tropical and semitropical climates. U.S. production is in four States: Florida, Louisiana, Hawaii, and Texas. Puerto Rico also grows some sugarcane.

Since sugar beets and sugarcane deteriorate rapidly once harvested, they can only be grown in proximity to a processor and are almost always grown under contract.

How they are grown: Most growers plant sugar beets in 3- to 5-year crop rotations. The rotation results in higher yields and fewer problems with diseases. Independent farmer/operators are the most efficient type of enterprise for managing such multicrop farms. Virtually all sugar beets are grown on "family-sized farms." Farmers generally harvest their own sugar beets.

Sugarcane production generally occurs on plantation-style operations that harvest only sugarcane (monoculture). After planting cane stalk cuttings, the plant matures in 12 months or less, except in Hawaii where climate allows a 24-month growing period. Two to four crops (ratoon or stubble crops) are usually harvested from the original plantings. In some cases, farmers harvest and deliver the sugarcane, but more often the factory does the harvest.

How they are processed: Processor transform sugar beets directly into refined sugar. There are two main byproducts, beet molasses and beet pulp. All sugar beet processors rely on independent growers or members of grower cooperatives for their supply of sugar beets.

Beginning in 1988, some beet sugar processors have built facilities that can extract crystalline sugar from beet molasses, a process called "desugarization of molasses." Desugarization results in 10 percent more sugar from the same acreage. Desugarization of cane molasses is technically more difficult, although trials are underway in Hawaii.

Sugarcane is not processed directly into refined sugar, but rather into raw sugar, with two main byproducts, cane molasses and bagasse. The bagasse is usually burned to provide energy to run the sugarcane mill, and some mills sell surplus electricity, particularly in Hawaii. The molasses is mostly used in animal feed.

Raw sugar is not consumed directly, but must be further refined. Cane sugar refineries buy raw sugar from both domestic and foreign sources and process it into the usable product, refined sugar. Cane refiners refine sugar throughout the year and are not restricted to any seasonal production patterns.

While in some countries such as Mexico and Brazil refineries are attached to the sugarcane processing mill, in the United States they are generally separate facilities, except for one combined mill/refinery in Florida.

Most U.S. sugarcane refining facilities are located at ports of entry near densely populated areas. This gives refiners easy access to offshore raw sugar. In 1993, cane refiners accounted for 54 percent of U.S. domestic sugar deliveries; the balance was beet sugar.

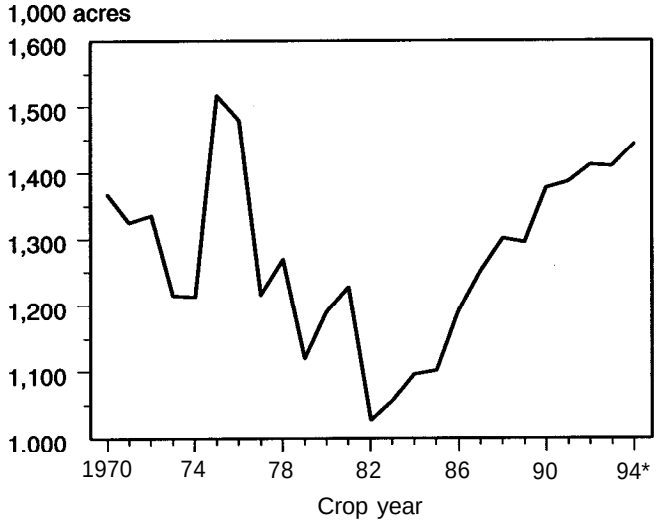
Sugar Beet Production and Harvesting

Sugar beet harvested area peaked at over 1.5 million acres in 1975 when world sugar prices skyrocketed, then fell to a low of 1.03 million acres in 1982 (fig. 1). In the last 12 years, harvested acres have risen steadily to a forecast 1.44 million in 1994. According to the Census of Agriculture, the number of U.S. sugar beet farms rose from 8,360 in 1987/88 to 8,810 in 1992/93, while the average acreage harvested per farm rose from 149 to 164 acres (table 1). Sugar beet yields per acre have shown no trend since 1970, but vary widely from year to year due to weather (fig. 2). In contrast, sugar per acre has been rising steadily as farmers adopt practices that yield more sugar (fig. 3). It is more efficient to increase the percentage of sugar in, rather than the weight and size of, sugar beets.

Sugar beet production occurs in five regions: Michigan/Ohio; Minnesota/eastern North Dakota; Great Plains; Pacific Northwest; and California. All sugar beets are irrigated except in Michigan/Ohio and Minnesota/eastern North Dakota.

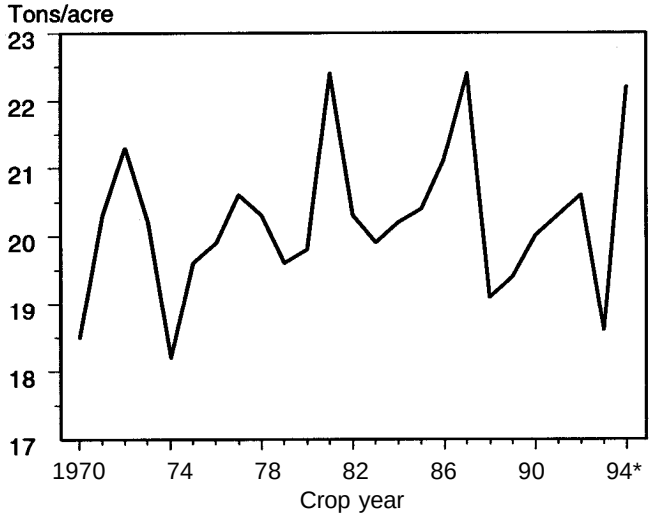
Sugar beet acreage per farm in Ohio and Michigan, at 115 and 88 acres in 1992, is lower than the national average (table 1). Total sugar beet harvested area in Ohio has not exceeded 21,000 acres since the mid-1970's (app. table l), while Michigan harvested

Figure 1
U.S. sugar beet acreage harvested



*Forecast.
Source: USDA.

Figure 2
Sugar beet yield per acre



*Forecast.
Source: USDA.

Table 1—US. sugar beet farms and average acreage harvested, by area, 1987/88, 1992/93 crop years

Region	1987/88		1992/93	
	Farms	Average area harvested per farm	Farms	Average area harvested per farm
	Number	*Acres*	*Number*	*Acres*
Region 1:				
Michigan	1,435	97	1,518	115
Ohio	222	62	227	88
Region 2:				
Minnesota	1,340	229	1,501	247
North Dakota	816	200	849	237
Region 3:				
Colorado	451	84	488	90
Kansas	0	0	1	NA
Montana	429	113	476	120
Nebraska	524	118	615	140
New Mexico	0	0	2	NA
Texas	254	118	357	107
Wyoming	400	142	497	146
Region 4:				
Idaho	1,397	121	1,406	144
Oregon	166	78	148	136
Washington	1	NA	2	NA
Region 5:				
California	924	228	723	212
Total	8,360	149	8,810	164

NA = Not available.
Source: 1992 Census of Agriculture.

acreage has doubled since the mid-1970's to a forecast 187,000 acres in 1994.

Sugar beet production in Minnesota and eastern North Dakota is concentrated in the Red River Valley along the North Dakota-Minnesota border, and in west-central Minnesota. About 12,000 acres of sugar beets are grown in far western North Dakota and delivered to a factory in Montana. The area harvested in Minnesota and eastern North Dakota has almost doubled since the mid-1970's to 600,000 acres in 1995 (app. table 1). Both the number of sugar beet farms and average size increased between 1987/88 and 1992/93. Climate in the northern part of the region limits the number of alternative crops.

The Great Plains region includes the Panhandle of Texas and eastern New Mexico; southeastern, central, and north central Wyoming; western Nebraska; northeastern Colorado; eastern and south central Montana; and far western North Dakota. Harvested sugar beet area has varied from 200,000 to 300,000 acres since the mid-1970's. Prospective area harvested in 1994 is up from a decade before in all Plains States except Texas. Harvested area in Texas for 1995, at 25,000 acres, was down 30 percent from the previous year, as growers cut back their sugar beet acreage due to low returns compared to alternative crops, such as cotton.

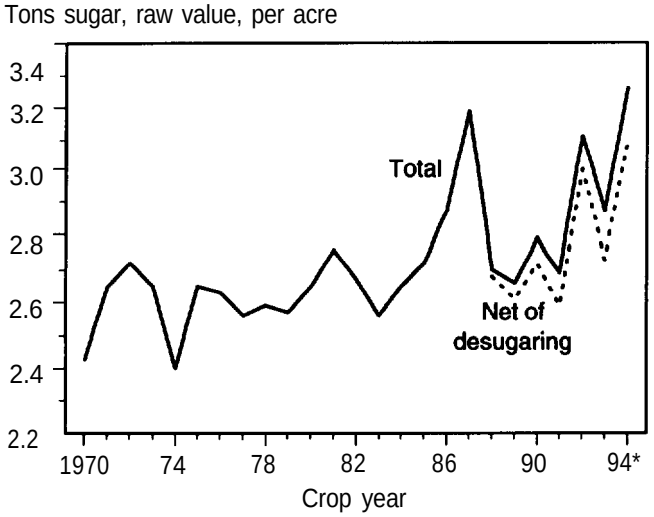
The Pacific Northwest region includes Idaho, Oregon, and Washington. Sugar beet production in eastern Idaho is in the high-elevation, low-rainfall area between the Rocky Mountain and Cascade-Sierra ranges. Only a few thousand acres of sugar beets were grown in Washington for delivery to factories in Idaho after the last processing facility in Washington closed in 1979. A few years ago, however, production started again in the Moses Lake region of Washington, which is well suited to sugar beet agriculture. Farmers in the Moses Lake area, who grow about 10,000 acres of sugar beets which are delivered both to Idaho and California, are attempting to finance a sugar beet processing facility in the region. Sugar beet farmers in Idaho and eastern Oregon are forming a cooperative and hope to purchase the processing company in the area.

California has four distinct production regions: the north central (Sacramento Valley), the south central (San Joaquin Valley), the coastal, and the Imperial Valley. The California climate is highly beneficial to crop production, and more than 30 different crops are grown on farms producing beets. Harvested beet area in the State has fallen to 141,000 acres in 1995, less than half of the peak during the mid-1970's, as diseases and drought have raised costs and driven farmers to alternative crops.

Sugar Beet Processing

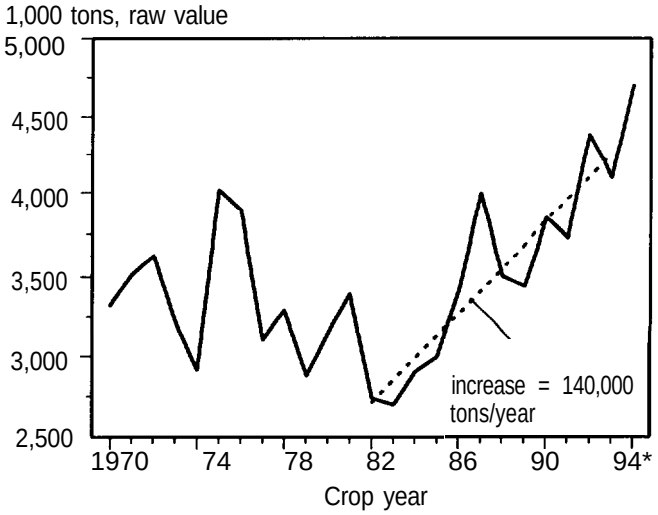
Technological changes between 1975 and 1993 contributed to the production of 9 percent more beet sugar from 7 percent fewer sugar beet acres. Harvested area in 1992 was about 100,000 acres less than the 1975 peak, while beet sugar production was up 400,000 tons to 4.4 million short tons (fig. 4).

Figure 3
Beet sugar per acre



*Forecast.
Source: USDA.

Figure 4
U.S. beet sugar production



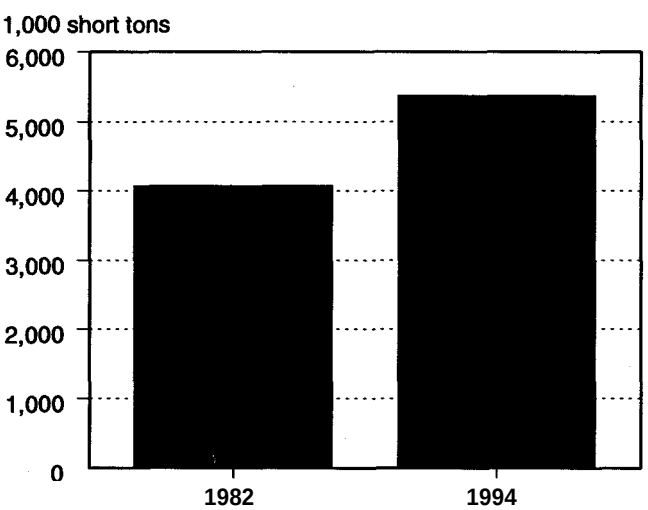
*Forecast.
Source: USDA.

Table 2—U.S. sugar beet processing companies

Location/company	Factories, 1994	Desugaring facilities	Daily slicing capacity	
			1988	1994
	--------Number--------		--------Tons--------	
Michigan/Ohio:				
Michigan Sugar Co.[1]	4	0	13,300	15,300
Great Lakes Sugar Co.[1]	1	1	3,800	3,800
Monitor Sugar Co.	1	0	8,000	8,000
Minnesota/North Dakota:[2]				
American Crystal Sugar Company	5	1	25,500	28,600
Southern Minnesota Beet Sugar Cooperative	1	1	7,200	10,000
Minn-Dak Farmers Cooperative	1	0	5,500	5,900
Plains:				
Western Sugar Co.[3]	7	1	20,200	23,000
Northwest:				
Amalgamated Sugar Co.	4	1	29,000	37,000
California:				
Spreckels	3	0[4]	12,000	12,000
Delta	0[5]	0	3,000	0
California and Plains:				
Holly Sugar Corporation[6]	7	1	41,400	39,100
U.S. total[7]	34	6	168,700	182,700

[1]Subsidiary of Savannah Foods & Industries, Inc.
[2]The three companies, all cooperatives, formed a joint marketing company in 1994, United Sugars Corporation.
[3]Owned by Tate & Lyle, based in London, UK. Tate & Lyle also owns Domino Sugar Corporation, a cane sugar refiner,
[4]Spreckels is planning to build a desugaring facility, which would be the seventh.
[5]Delta closed in 1993.
[6]Part of Imperial Holly Co., which includes cane refiner Imperial Sugar Co. Closed one California factory in 1993.
[7]In 1994, there were 10 beet sugar companies. Due to joint ownership or marketing arrangements, there are seven separate beet sugar marketing companies.
Source: USDA.

Figure 7
U.S. sugar beet factories daily average slicing capacity



Source: United States Beet Sugar Association.

longer in the sheds and are shielded from the sun and weather.

Sugarcane Production and Harvesting

U.S. cane sugar production, including Puerto Rico, is forecast at a record 3.59 million tons in fiscal 1995 (fig. 8). Since 1982, cane sugar production has trended up 1.5 percent, or 42,000 tons, a year. Sugarcane acreage harvested for sugar rose from 739,000 acres in 1970 to a record 927,000 acres in 1993 (fig. 9). An additional 55,000 acres of cane was grown for seed.

Florida's sugarcane production has expanded significantly since the United States ceased importing Cuban sugar in 1960. In 1980, Florida surpassed Hawaii as the largest cane sugar producing State and now accounts for over half of all U.S. cane sugar. In 1995, Florida is forecast to produce a record 1.84 million tons of sugar from 428,000 acres (figs. 10 and 11).

Changes in the field and factory have improved the U.S. sugar beet factory recovery rate, which measures sugar output as a percentage of sugar beet input, from 13 percent in the early 1970's to a record 15 percent in 1992 and 1993 (fig. 5).

Improved beet seed genetics contributed to greater production by increasing disease resistance, improving sucrose content, and enhancing other desirable attributes. Conventional industry wisdom states that "sugar is made in the field, not the factory," and factory managers increasingly work with farmers to tailor production practices to maximize sucrose production. Nitrogen management has become more important, since the sugar beet plant produces more sucrose at the end of the season if it is nitrogen-starved. Computers have become an important tool in testing alternative production practices and providing faster feedback. At the same time, contracts between processors and growers provide stronger incentives to "grow sugar." For example, some contracts prohibit the application of nitrogen after a certain date.

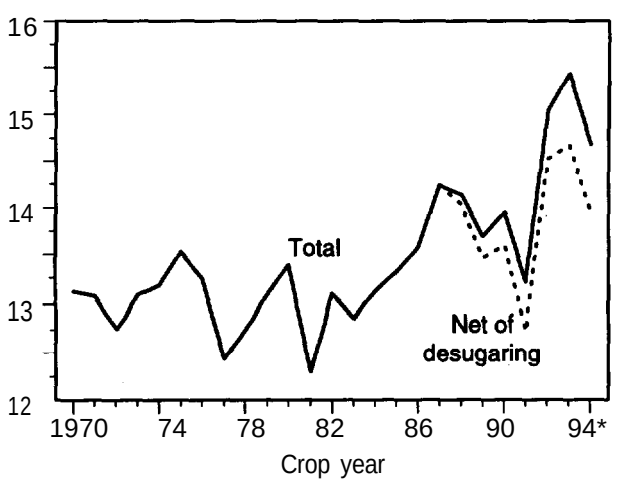
Installation of facilities for the desugarization of molasses began in 1988 (see box, Sugar Beets and Sugarcane: Similarities and Differences). By 1994, six such facilities were operating, with plans for at least two more. In some cases, the desugaring facilities replaced older, similar technologies, such as the Steffen process. USDA estimates that the amount of sugar produced in the desugaring facilities, net of that which would have been produced in terminated Steffen facilities, was 235,000 tons in fiscal 1994 (fig. 6).

There were 34 U.S. sugar beet processing factories in 1994, down from 43 in 1981 (table 2). Ten beet processing companies own the plants. Three are grower cooperatives which jointly market their sugar, while two are subsidiaries of two cane refining companies. The four largest beet sugar companies operated 23 facilities and accounted for about 70 percent of the beet sugar produced in the United States in 1994.

U.S. beet sugar production in fiscal 1995 is forecast at a record 4.7 million tons, and has risen at 4 percent or about 140,000 tons a year since 1982. Production is limited by the industry's capacity to slice sugar beets and extract sugar from beet molasses. Industry slicing capacity rose from 168,700 tons a day in 1988 to 182,700 tons in 1994 (table 2). Average factory slicing capacity per factory has risen from 4,100 tons a day in 1982 to 5,400 tons in 1994 (fig. 7).

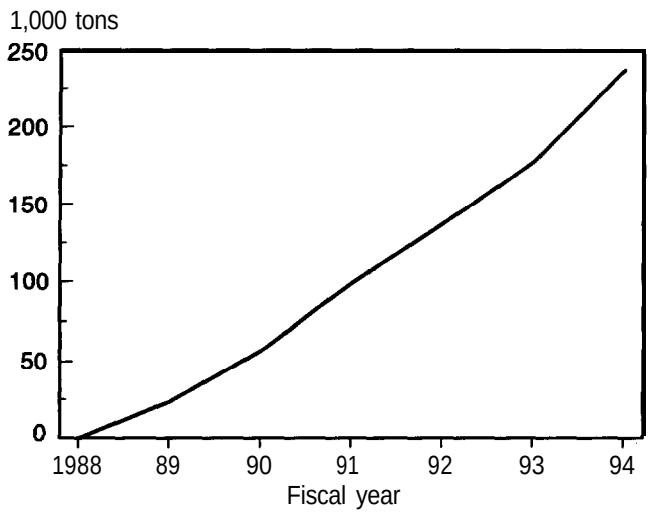
The number of days that a factory can slice beets, called a campaign, along with per-day slicing capacity determines annual sugar production capacity. Climate is the major factor affecting each region's potential campaign length. Once harvested and put into piles, beets are at risk of deteriorating rapidly. Colder temperatures reduce the risk, and rate, of deterioration. In California, some campaigns last less than 100 days. In the Great Plains, the campaign is generally 150-180 days, compared with over 200 days in the Minnesota/eastern North Dakota region. One cooperative in the Red River Valley has built insulated sheds, which aerate beets with ambient air at 20-30 degrees below zero and then are sealed. Beets stay frozen

Figure 5
Beet sugar recovery per ton sugar beets



*Forecast.
Source: USDA.

Figure 5
U.S. production of sugar from beet molasses desugarization



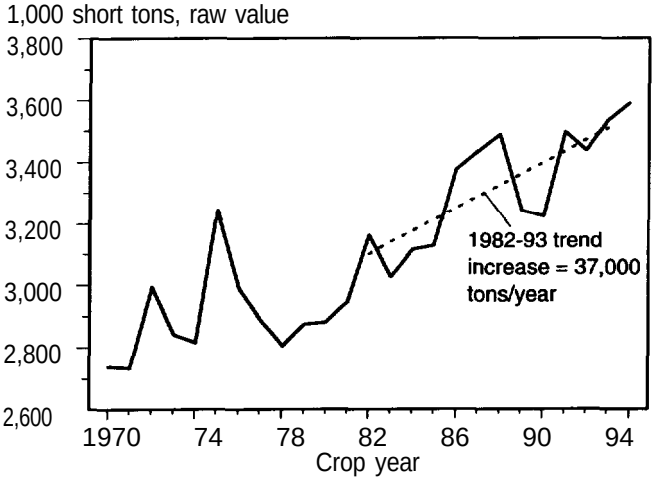
Source: USDA.

The Florida sugar industry is highly vertically integrated. The two largest processing companies each owns over 130,000 acres of sugarcane, and over two-thirds of the sugarcane is grown by processing companies. The average farm size was 3,106 acres in 1992, up slightly from 1987 (table 3).

Two major changes have affected Florida's sugar industry recently. Technological improvements in machine harvesters and in the ability of factories to accommodate more trash coming in with the cane have allowed most cane companies to switch from hand to mechanical harvesting. As a result, the number of Caribbean "guest worker" cutters, who work for a few months a year under special work permits, has declined from 10,000 in the mid-1980's to an estimated 1,200 in 1995.

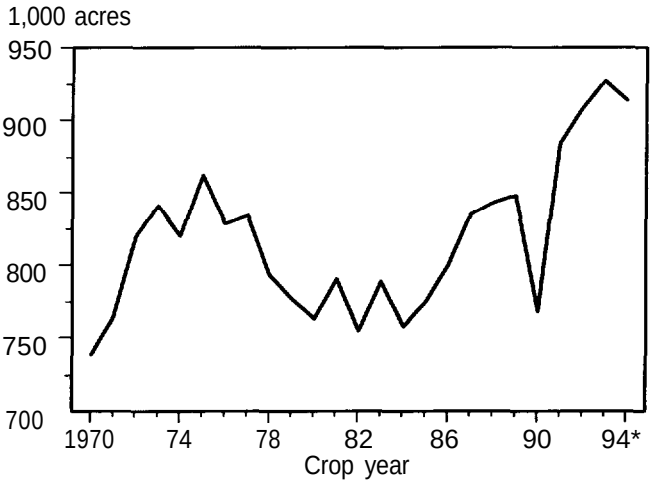
At the same time, the Florida sugar industry has been involved in debates over the causes and extent of ecological deterioration of the Everglades. Water flows south from sugarcane fields to conservation areas and

Figure 8
U.S. cane sugar production 1/



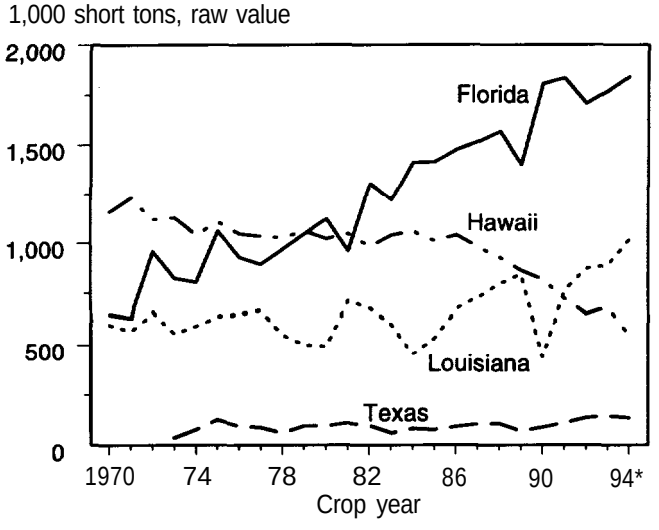
*Forecast.
1/ Includes Puerto Rico.
Source: USDA.

Figure 9
U.S. sugarcane area harvested for sugar 1/



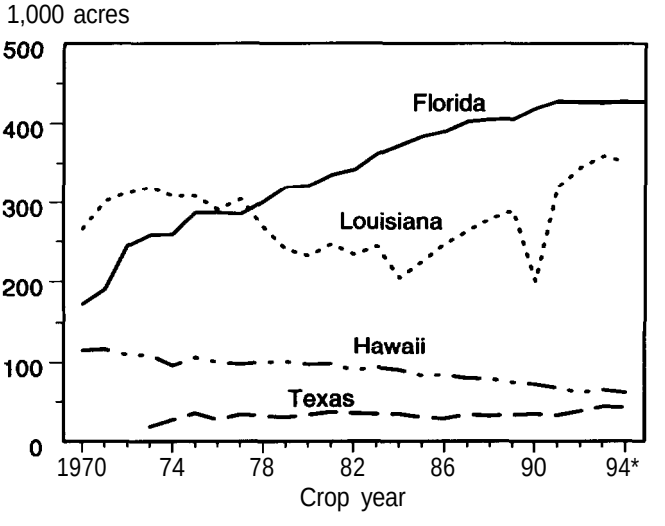
1/ Includes Puerto Rico.
*Forecast.
Source: USDA.

Figure 10
U.S. cane sugar production, by State



*Forecast.
Source: USDA.

Figure 11
Sugarcane acreage harvested for sugar, by State



*Forecast.
Source: USDA.

Table 3—U.S. sugarcane farms and average acreage harvested, by State

Location	1987/88		1992/93	
	Farms	Average area harvested per farm	Farms	Average area harvested per farm
	Number	*Acres*	*Number*	*Acres*
Florida	138	2,920	139	3,106
Hawaii[1]	79	1,003	31[1]	2,030
Louisiana	687	385	755	472
Texas	85	383	106	311
U.S. total	989	788	1,031	857

[1]By September 1994, all independent growers had ceased operations. All cane is now grown by the five processing companies. After 1996, all cane will be grown by only three remaining companies.
Source: 1992, 1987 Census of Agriculture.

eventually to the Everglades National Park. Federal and State agencies have determined that phosphorus exported via canals from the Everglades Agricultural Area (mostly sugarcane land) has impaired the ecological integrity of the Loxahatchee National Refuge and is threatening the Everglades National Park.

In May 1994, the Florida State legislature passed the Everglades Forever Act, which calls for a multimillion-dollar environmental restoration plan spanning several decades. About 40,000 acres of filtration marshes are to be constructed to reduce the level of phosphorus in water flowing into the conservation area. Some of the acreage could be taken from sugarcane production areas. According to the Act, the sugar industry will pay about $12 million annually for the next 20 years, which is about one-third of the estimated cost of the project.

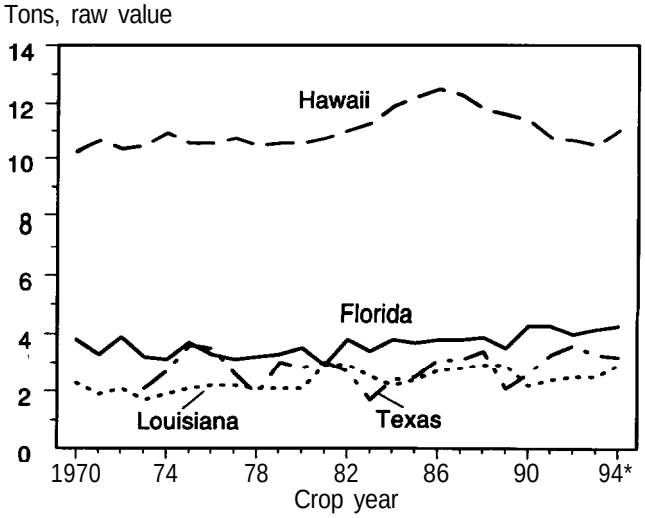
Like Florida, Louisiana's sugar industry is expanding, with acreage harvested for sugar in 1994 at 352,000 acres, up almost 50 percent from 1983 (fig. 11). Sugar production was a record 1.020 million tons in 1994 (fig. 10). Some of the expansion in sugarcane acreage in recent years occurred as returns for competing crops, such as rice and soybeans, declined. Further increases in sugarcane acreage will be limited because of the cost of hauling sugarcane from production areas that are not close to a mill.

There were 755 cane farmers in Louisiana with an average of 472 acres of sugarcane harvested in 1992/93, up from 687 farms and 385 acres in 1987/88 (table 3). In Louisiana, the northernmost cane-growing State, most sugarcane production has been confined to the Mississippi Delta's fertile soils and warm climate. However, freezing weather makes the growing season shorter than in other States, and yields are lower because the cane is generally harvested before fully maturing.

In contrast, Hawaii's unique year-round growing season, ideal climate, and biennial harvest pattern result in the highest cane sugar yields per acre in the world. Yield of sugar per acre peaked at 12.5 tons in 1986, but fell to 10.4 tons in 1993 because of poor weather, disease, and lack of recapitalizing by companies preparing to cease production (fig. 12). This yield is based on a 2-year growing season. However, even if the yield were annualized by dividing by two, the resulting yield of 5-6 tons of sugar per acre per year would be among the world's highest.

Hawaii's sugar production has declined from over 1 million tons as recently as 1986 to a forecast 540,000 tons in 1995. Sugarcane area harvested in Hawaii has decreased from over 100,000 acres in 1979 to a forecast 50,000 acres for 1995 (fig. 11). The State's

Figure 12
Cane sugar yield per acre, by State



*Forecast.
Source: USDA.

higher land, labor, and transportation costs have contributed to the industry's decline. In addition, it has been costly to comply with water and air effluent standards and with restrictions on the pre-harvest burning of fields.

Texas sugarcane farmers formed a cooperative in 1973. The co-op is forecast to harvest 42,500 acres and produce 145,000 tons of sugar in 1994 (figs. 10, 11). Texas sugarcane is produced in the lower Rio Grande Valley in the southern tip of the State. This area has a subtropical climate of long hot summers and short mild winters. Killing freezes are a recurrent threat. Hurricanes and drought have significantly reduced production in some years, and excessive rainfall periodically delays harvest and processing. Disease and insects also have affected yields.

Sugarcane Processing

Sugarcane processing takes two stages. First, sugarcane is converted into raw sugar by extracting juice from the stalk. The juice is then clarified, boiled, and crystallized. The raw sugar, usually 96-99 percent pure, is shipped to a refinery for further processing into refined sugar. Technically, it is possible to combine the cane processing and refining operations, as is done in one location in Florida; however, it has usually been the practice to transport raw sugar to refineries close to major use areas, so the refined product does not need to be shipped as far. Refineries also receive imported raw cane sugar, and must be situated in port cities.

Sugarcane mills are located near the cane fields to minimize transportation costs and postharvest losses. Many sugarcane processors grow their own sugarcane (producer/processor) and supplement their production with sugarcane purchased from independent growers. Others are either cooperatives that process members' cane or producer/processors that process only their own production.

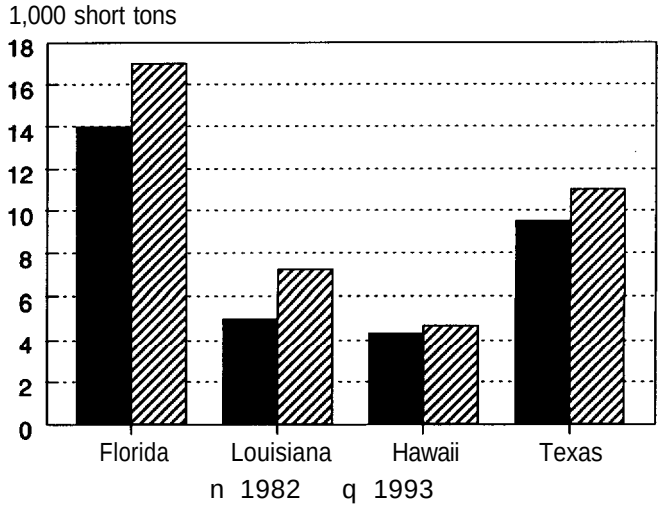
The seven Florida mills producing raw cane sugar, for example, are owned by a cooperative, an independent mill, a company with two mills, and another with three mills. The average daily grinding capacity of the seven mills rose from about 14,000 tons a day in 1982 to 17,000 tons a day in 1993 (fig. 13 and app. table 9). The large size of the Florida mills is in part due to the plantation-style farms near the mills, which allow the cane to be transported efficiently over relatively short distances, level roads, and in some cases by rail. Recent investments to better handle machine-cut cane and to upgrade capacity, coupled with the continued development of better cane varieties, increased Florida sugar yields from 3.4 tons per acre in 1979-83 to 4.1 tons in 1989-93. Yields reached a record 4.3 tons per acre in 1991 (fig. 12).

Louisiana ran 20 mills in 1994, down from 24 in 1982. The average mill can grind about 7,250 tons of sugarcane a day, compared with under 5,000 tons in 1982 (fig. 13). Smaller mills are not as efficient as larger mills and the industry continues to consolidate, closing some mills while increasing the capacity of remaining mills. Louisiana has averaged 2.5 tons of sugar per acre in recent years (fig. 12).

Hawaiian factories are much smaller than their mainland counterparts, with an average capacity to grind about 4,700 tons of sugarcane daily (fig. 13). However, the 12-month grinding season means the average Hawaiian factory produces almost as much sugar annually as the average mainland factory, which runs only 3-6 months of the year.

Two Hawaiian factories closed in 1994, one of which was the last to process cane from independent growers. As a result, all of the small, independent growers have stopped growing sugarcane, and all sugarcane is now grown by the companies which own the mills. A factory on Oahu is scheduled to close in April 1995, as are two more in 1996 including the last factory on the island of Hawaii. If these three factories close as scheduled, the State would contain seven factories, owned by three companies.

Figure 13
U.S. sugarcane mills: Average daily grinding capacity



Source: USDA.

Texas cane is refined in a mill owned by a 100-member cooperative. The mill can grind about 10,000 tons of sugarcane per day (fig. 13), up from 9,500 in 1982. While the average campaign runs about 170 days from mid-October to April, rain delays have forced much longer campaigns. Texas has been averaging above 3 tons of sugar per acre in recent years.

Cane Sugar Refining

Cane refiners process virtually all domestic and imported raw cane sugar, except for very small quantities sold for direct consumption in niche markets. In fiscal year 1994, domestic deliveries of refined cane sugar were about 54 percent of total deliveries, or just under 5 million short tons, raw value. In fiscal 1982, cane sugar deliveries, 6.2 million tons, were 67 percent of the total.

The number of refineries shrunk from 21 in 1982 to 12 in 1994 (table 4). In the 1970's, over 4 million tons of imported sugar were annually refined, providing over half of the raw sugar supplies for refiners. By 1994, imports for consumption had fallen to about 1.3 million tons annually and provided only about 30 percent of refiners' raw sugar supplies. The industry's daily melting capacity fell from 31,000 to 23,000 tons from 1982 to 1994 (fig. 14). The refining industry decline was due to the U.S. sugar program's stimulus of the HFCS industry, the subsequent decline in U.S. sugar consumption, and the reduced sugar import quota. Under optimal conditions for efficient plant operations of 260 days per year, the industry could refine about 5.7 million tons of raw sugar, down from over 8.1 million tons in 1982.

Table 4—U.S. cane sugar refiners: Company, factory location, and capacity

Company	Factory location	Daily melting capacity			
		1982	1988	1992	1994
		Short tons, raw value			
Domino Sugar Corp.	Baltimore, MD	2,600	2,600	2,950	3,000
	Boston, MA[1]	1,000	1,000	—	—
	Brooklyn, NY	2,100	2,100	2,000	2,000
	Chalmette, LA	3,250	3,250	2,850	3,000
	Philadelphia, PA[2]	2,100			
California and Hawaiian Sugar Co.	Aiea, HI[3]	200	200	200	142
	Crockett, CA	3,000	3,000	3,000	3,000
Florida Sugar	Belle Glade, FL[4]	390	—	—	—
Godchaux-Henderson	Reserve, LA[5]	1,900	—	—	—
Imperial Holly Corp.	Sugar Land, TX	1,650	1,650	1,950	1,950
Industrial	St. Louis, MO[6]	300	—	—	—
Louisiana Sugar Cane	Mathews, LA[5]	600		—	—
Florida Crystals Refinery	South Bay, FL	500	500	725	725
Refined Sugars, Inc.	Yonkers, NY	1,800	1,800	1,800	2,000
Revere	Boston, MA[7]	1,200	—	—	—
	Brooklyn, NY[5]	1,120	—	—	—
	Chicago, IL[7]	850	—	—	—
Savannah Foods and Industries, Inc.	Port Wentworth, GA	3,000	3,000	3,000	3,100
Everglades Sugar Refinery, Inc.	Clewiston, FL	750	750	800	850
Colonial Sugars, Inc.	Gramercy, LA	1,750	1,750	2,000	2,150
Supreme Sugar Co., Inc.	Supreme, LA	700	800	800	850
Total capacity		30,760	22,400	22,075	22,767
Average capacity		1,465	1,723	1,840	1,897
				Number	
Total plants		21	13	12	12

—- = Factory closed. [1]Closed 1988. [2]Closed 1982. [3]Aiea stopped producing crystalline sugar in 1994 and is now producing only liquid sugar. [4]Closed 1988. [5]Closed 1985. [6]Closed 1987. [7]Closed 1984.
Source: USDA, Economic Research Service.

In 1994, 11 cane sugar refineries operated in the continental United States, and a small refinery in Hawaii was being converted to liquid sugar production (table 4). All but two of the refineries were located on or near the east and gulf coasts. Of seven refining companies, the four largest account for 85 percent of total refining capacity.

To allow U.S. refiners to be competitive on the world refined sugar market, USDA operates a Refined Sugar Re-Export Program under which refiners may import world-priced raw sugar and re-export world-priced refined sugar. In recent years, this program has provided refiners with additional annual volume of about 600,000 tons. U.S. refiners are most competitive in nearby refined sugar markets, such as Canada, Mexico, and the Caribbean.

Production and Processing Costs and Returns

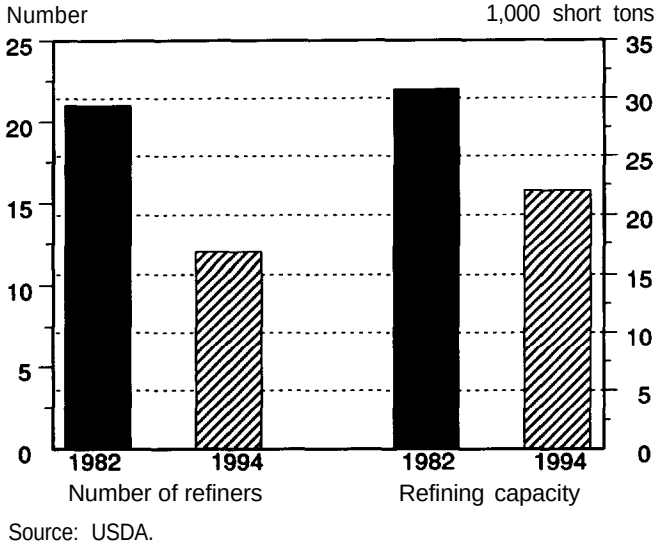
Refined Beet Sugar

Sugar beet production costs (farm level) rose from 11.5 cents a pound in 198 1 to 14 cents in 1992 (fig. 15). In part, this rise reflects adjustments made in the survey in 1988, which incorporated new cost items such as the cost of owning a cooperative share for the first time. Sugar beet growers, like processors, are adopting new technologies and methods that reduce costs. While the "family farm" is still the most efficient unit for growing sugar beets, slow growth in the average sugar beet farm size likely reflects some room for additional economies of size. Average returns (cents-per-pound of refined sugar) to sugar beet growers have been higher than both total and variable costs over 1981-92.

In crop year 1992, the latest crop year for which data are available, total sugar beet production costs averaged $823 per acre for the Nation. Costs varied from $627 per acre in Michigan and Ohio to $1,152 in California (app. table 19). Costs are higher in the West due to more extensive irrigation, more disease problems, and higher labor and land costs. Sugar beet farmers received an average of $41.40 per net ton, ranging from $35.90 in California to $47.20 in Minnesota and eastern North Dakota. Receipts averaged $850 per acre, and the national average market value of sugar beets sold exceeded the estimated average total economic cost of production by $27 per acre.

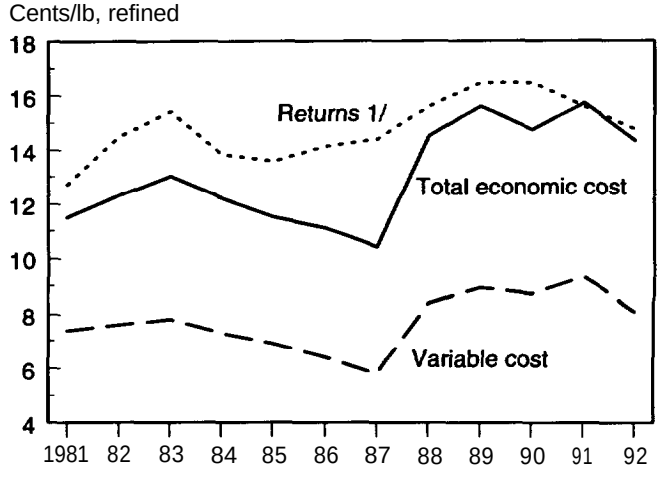
Sugar beet processor costs, net of byproduct credits, fell from 12.2 cents a pound in 1981 to 7.7 cents a pound in 1992 (fig. 16). Lower unit costs because of increased production accounted for part of the decline. Processors cut their energy and labor requirements and took advantage of computer technology to reduce costs at the factory. Processors have instructed growers to use sugar beet management practices that yield more extractable sucrose, and factories have improved their ability to test beets for "extractable sugar." Better field management of nutrients, especially nitrogen, helps raise sugar recovery and thus lower costs. Processor returns, estimated as the refined sugar price

Figure 14
U.S. cane sugar refinery numbers and daily capacity



Source: USDA.

Figure 15
Costs and returns for sugar beet growers



1/ U.S. average sugar beet price adjusted to a cents-per-pound-sugar basis (refined sugar).
Source: USDA.

minus payments for sugar beets, were above total and variable costs in all years except 1982 and 1984.

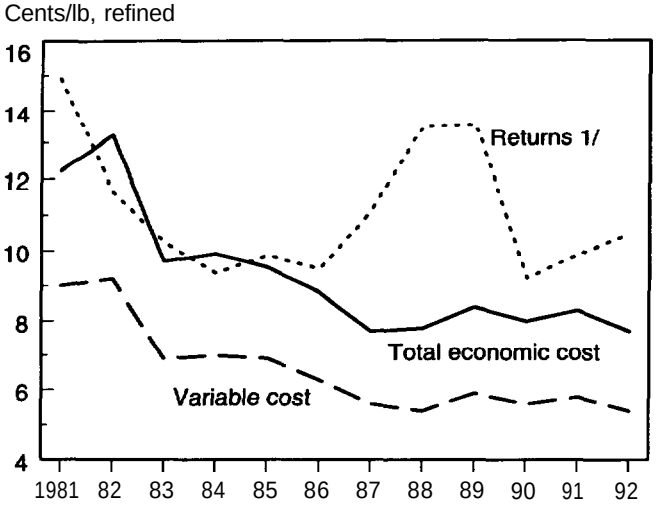
The national average total economic cost of producing beet sugar (combining grower and processor costs) fell from 23.7 cents a pound in 1981 to 22.0 cents a pound in 1992, the latest crop for which data are available (fig. 17, app. table 21). Total costs were less than the Midwest refined beet sugar price. Variable costs accounted for about 60 percent of total costs of beet sugar.

Costs of beet sugar production are generally lower in the East than in the West (fig. 18). Irrigation is not used in the East, where climate allows a longer processing season, which can lower fixed costs per unit of sugar produced. The lack of irrigation, however, also raises the variability of yields and returns in the East.

Over three-fourths of sugar in the East is produced by the three cooperatives in Minnesota and eastern North Dakota, and the cooperative structure appears to be very efficient for beet sugar production. Farmers also get all returns from cooperative factory operations, so they have a stronger incentive to tailor their farm practices to maximize recovery of sugar. A typical beet sugar factory risks uncertainty over the supply of sugar beets; for example, higher prices for alternative crops could cause farms to reduce sugar beet acreage. A cooperative virtually eliminates this risk. The farmer-member is considering not just the returns from sugar beets, but from the combined farm and factory operations. A lower supply risk enhances the factory's ability to make investments. Eastern producers also have lower transportation costs to the Nation's largest sugar market, which centers around Chicago.

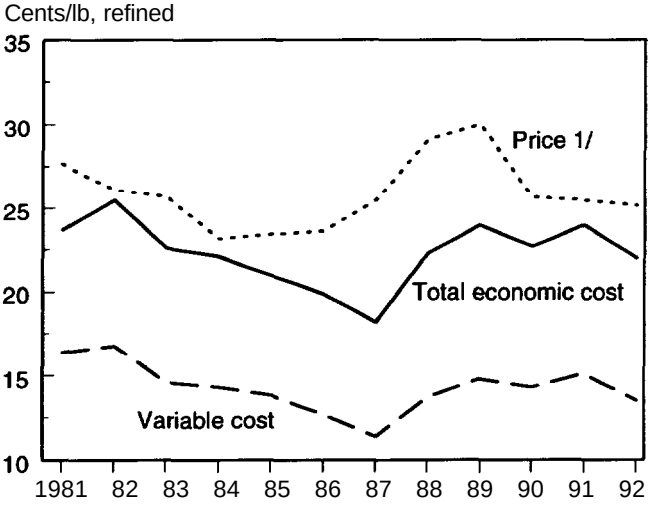
Landell Mills Commodities Studies indicated that the U.S. beet sugar industry had the 2nd-lowest cost of production out of 32 beet-sugar-producing countries in 1987/88-1991/92. In 1979/80-1983/84, the United States beet sector ranked 9th of 31 countries.

Figure 16
Costs and returns for beet processors



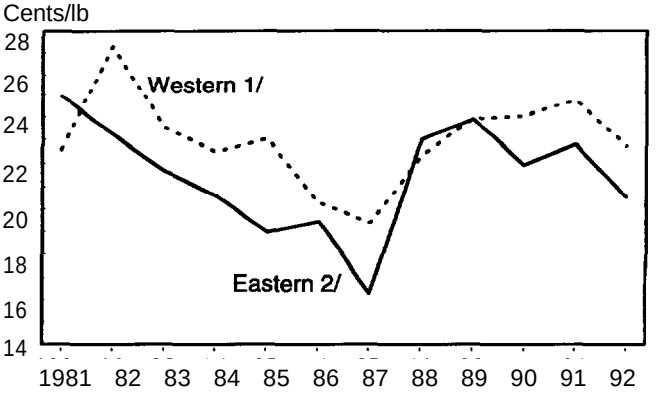
1/ Midwest wholesale beet sugar price minus payments to growers.
Source: USDA.

Figure 17
Costs and returns for beet sugar



1/ Midwest wholesale beet sugar.
Source: USDA.

Figure 18
Total economic cost of beet sugar, Eastern and Western United States



1/ Western is irrigated and includes Colorado, Nebraska, Wyoming, Texas, Montana, western North Dakota, Idaho, Oregon, and California.
2/ Eastern is largely nonirrigated and includes Michigan, Ohio, Minnesota, and eastern North Dakota.
Source: USDA.

Raw Cane Sugar

Sugarcane growers' costs fell from 14.1 cents a pound in 1981 to 12.7 cents in 1992 (fig. 19 and app. table 22). Variable costs accounted for about two-thirds of total grower costs. Returns, as measured by the national average sugarcane price converted to cents per pound of raw sugar, were generally above total costs and well above variable costs. Production costs for the 1992 crop ranged from 11 cents a pound in Louisiana to 14.7 cents a pound in Hawaii (app. table 22).

Cane processor total economic costs, net of byproduct credits, declined from 7.7 cents a pound in 1981 to 7.1 cents in 1992 (fig. 20). Returns, estimated as the raw sugar price minus payments to sugarcane growers, were above total and variable costs during the period.

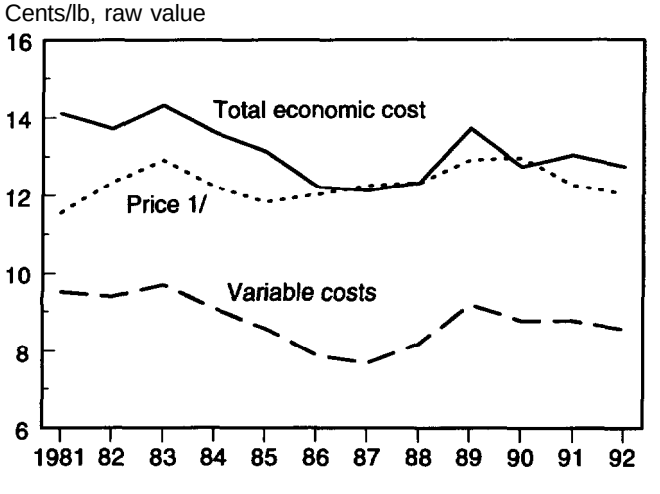
In 1992, total processing costs (including byproduct credits) averaged 8.2 cents a pound of raw sugar. Processing costs were lowest in Florida at 6.36 cents a pound and highest in Hawaii at 14.1 cents. Some of the recent structural changes in Hawaii may not be reflected in the 1992 costs, which are based on a 1988 survey. For example, some of the higher cost producing areas of Hawaii have reduced or even ceased production.

The combined return for sugarcane growers and processors is the key variable when the grower and processor are the same economic unit. The mill in Texas, for example, is a cooperative, and the sugarcane grower-members receive returns from growing and processing. In Hawaii, all sugarcane is now grown by the processing companies, for which the separate costs of growing and processing sugarcane are not as important as the overall combined cost of producing raw cane sugar. Over half of the sugarcane in Florida is grown either by the company that also owns the processing mill, or by members of a cooperative mill. In Louisiana, about half the mills are cooperatives.

The combined grower and processor average total economic cost of producing cane sugar, net of byproduct credits, fell from 21.9 cents a pound, raw value, in 1981 to 19.9 cents in 1992 (fig. 21 and app. table 24). The 20-percent increase in production volume over the period helped lower unit costs. Growers and processors also were able to maintain investment programs to improve efficiency. Returns have exceeded total economic costs in most years and in every year since 1986 (fig. 21).

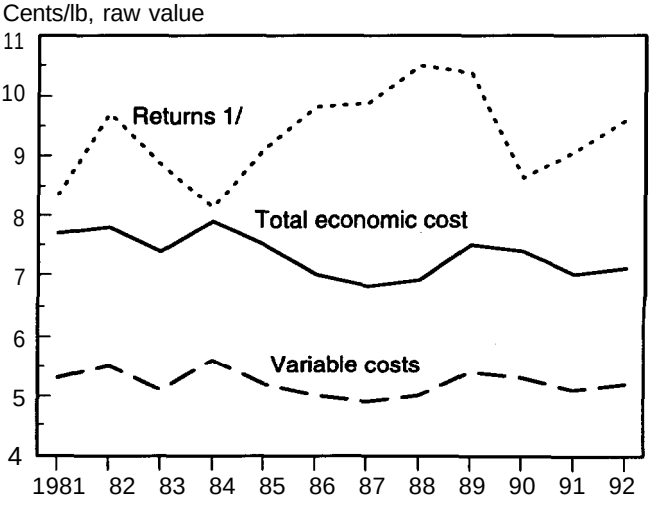
Prices paid for sugarcane are based on the returns that processors receive from the sale of raw sugar and molasses. The grower generally receives about 60 percent and the processor 40 percent from the sale of raw sugar. The grower also receives a share of the value of the molasses in the sugarcane. The average price for 1992 sugarcane was $25.40 per net ton in Louisiana and Texas, and up to $29.80 in Florida (app. table 22). No return is given for Hawaii, because integrated producer/processor operations do not impute a value to their cane before processing. A net

Figure 19
Costs and returns for sugarcane growers



1/ U.S. average sugarcane price adjusted to a cents-per-pound-sugar basis (raw value).
Source: USDA.

Figure 20
Costs and returns for cane processors



1/ Raw sugar price (New York) minus payments to growers.
Source: USDA.

ton is gross weight less dirt, leaves, trash, debris, and other extraneous materials.

According to Landell Mills Commodities Studies, the U.S. cane sugar cost of production ranked 31st out of 62 cane sugar-producing nations or regions in 1987/88-1991/92. In 1979/80-1983/84, the U.S. cane sector ranked 39th.

Comparison of Beet and Cane Sugar Costs of Production

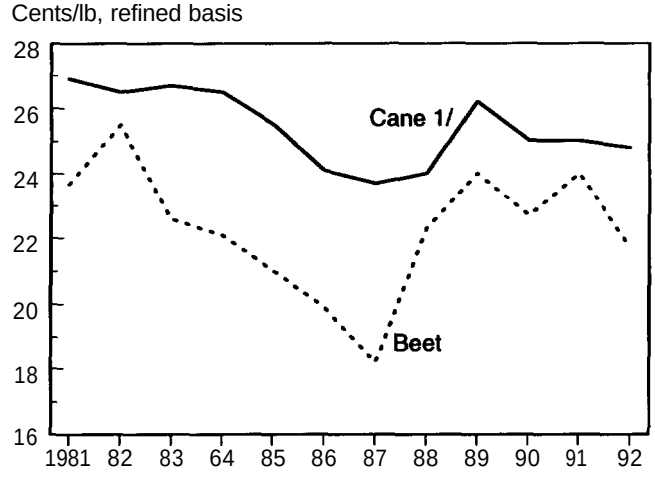
To compare the cost of producing refined cane and beet sugar, it is necessary to add to the raw cane sugar costs the cost of refining, which some analysts estimate at about 3.5 cents a pound in recent years. Since the volume of refined cane sugar is always less than the amount of raw sugar produced, an estimated refining loss of 7 percent is added. With these two adjustments, the cost of growing, processing, and refining cane sugar in the United States has consistently been higher than for beet sugar (fig. 22): in 1992, about 3 cents higher.

U.S. Sugar Prices and Consumption

U.S. sugar prices have been well above world prices since 1982 (fig. 23). The main mechanisms for maintaining U.S. sugar prices have been a restrictive import quota and more recently, domestic marketing allotments. The two key sugar prices in the United States are the raw cane sugar price and the refined beet sugar price (fig. 24). The raw cane sugar price is based on sugar delivered to New York, and is quoted on the (New York) Coffee, Sugar & Cocoa Exchange. There is no futures market for U.S. refined sugar, but a price for wholesale Midwest refined beet sugar, f.o.b. factory, is quoted each week in *Milling and Baking News.*

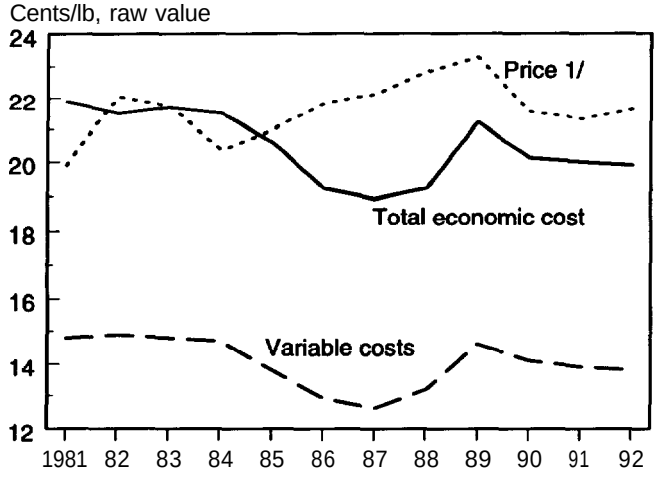
From 1982 to 1993, the U.S. raw sugar price averaged 21.6 cents a pound, ranging from 19.9 cents in 1982 to 23.3 cents in 1990. The monthly average raw

Figure 22
Cost of production of U.S. beet and cane sugar



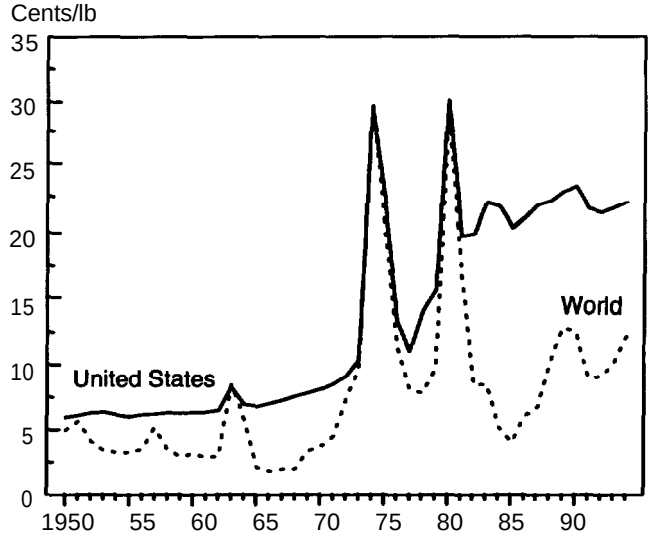
1/ Cane sugar cost, raw value, adjusted to refined basis by multiplying by 1.07 and adding 3.5 cents as a refining margin.
Source: USDA.

Figure 21
Costs and returns for cane sugar



1/ Raw sugar price, New York Coffee, Sugar, and Cocoa Exchange, No. 14 Contract.
Source: USDA.

Figure 23
World and U.S. raw sugar prices, 1950-94



Source: USDA, Economic Research Service.

sugar price ranged from 18.7 cents in October 1985 to 23.8 cents in April 1990 (app. table 10).

In contrast to raw sugar, refined sugar prices have been more variable. Refined sugar prices tend to drop when there is a large beet sugar crop, and rise when beet sugar production declines. Drought and other weather problems reduced the beet crops in 1988 and 1989, contributing to high refined sugar prices in those years. Monthly refined beet sugar prices since 1982 have ranged from 22.5 cents a pound in late 1987 to 31.5 cents a pound for most of 1990 (fig. 24). Refined beet sugar prices averaged 26.8 cents a pound in 1989-94, up 10 percent from 24.3 cents during 1984-88 (app. table 11). Weather has much less influence on raw cane sugar prices, since weather-induced shocks to domestic supply can be accommodated by changing the import quota.

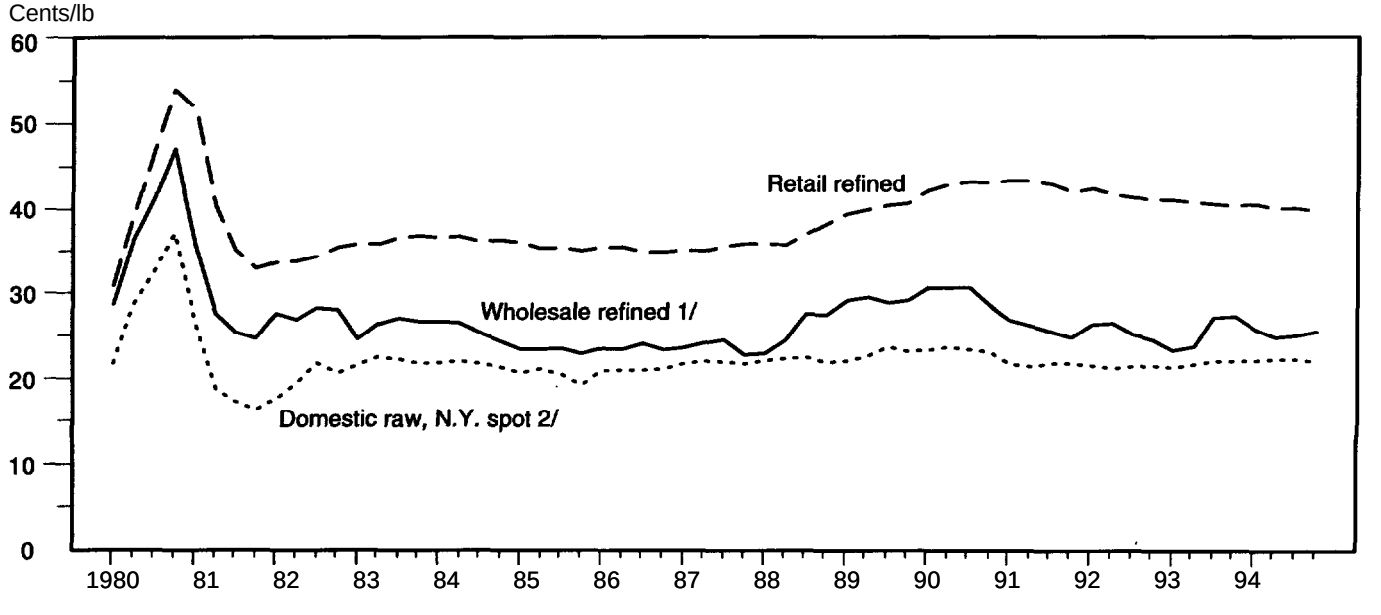
The margin between refined and raw sugar prices has varied from about 10 cents a pound in the early 1980's to less than 1 cent in 1988 (fig. 25). When this margin is low, cane refiners pay almost as much for raw sugar as they charge for refined sugar and are not able to cover their costs.

The HFCS product that is most substitutable for sugar, HFCS-55 (55-percent fructose, a liquid), is typically priced about 10 percent below the price of refined sugar. As a result, HFCS rapidly replaced sugar in a wide range of products, particularly soft drinks. HFCS consumption climbed an average of 560,000 tons or nearly 5 pounds per capita annually between 1980 and 1986, while U.S. consumption of sugar fell by 394,000 tons per year (fig. 26). Consumption of domestic sugar was not constrained, however, as imports were forced to absorb the decline in sugar consumption (fig. 27).

After capturing most of the market for liquid sweeteners by 1986, HFCS growth slowed to an increase of about 240,000 tons, dry basis, a year, compared to an increase in sugar of 169,000 tons, raw value. The estimated HFCS use of 7.4 million tons in 1994 represents an annual growth rate of about 4 percent since 1986. Estimated sugar consumption for food and beverage use in calendar 1994 of 8.4 million tons (refined basis) represents an annual growth rate since 1986 of 2 percent a year (table 5).

Most of the growth in HFCS has been at the expense of sugar, but HFCS also generated new uses and was the primary impetus in raising overall caloric sweetener consumption from 124 pounds per capita annually during 1975-79 to 150 pounds in 1994. Refined sugar comprised 44 percent of caloric sweeteners consumed in 1994, and 54 percent of the sugar/HFCS market.

Figure 24
U.S. raw, wholesale and retail refined sugar prices, quarterly



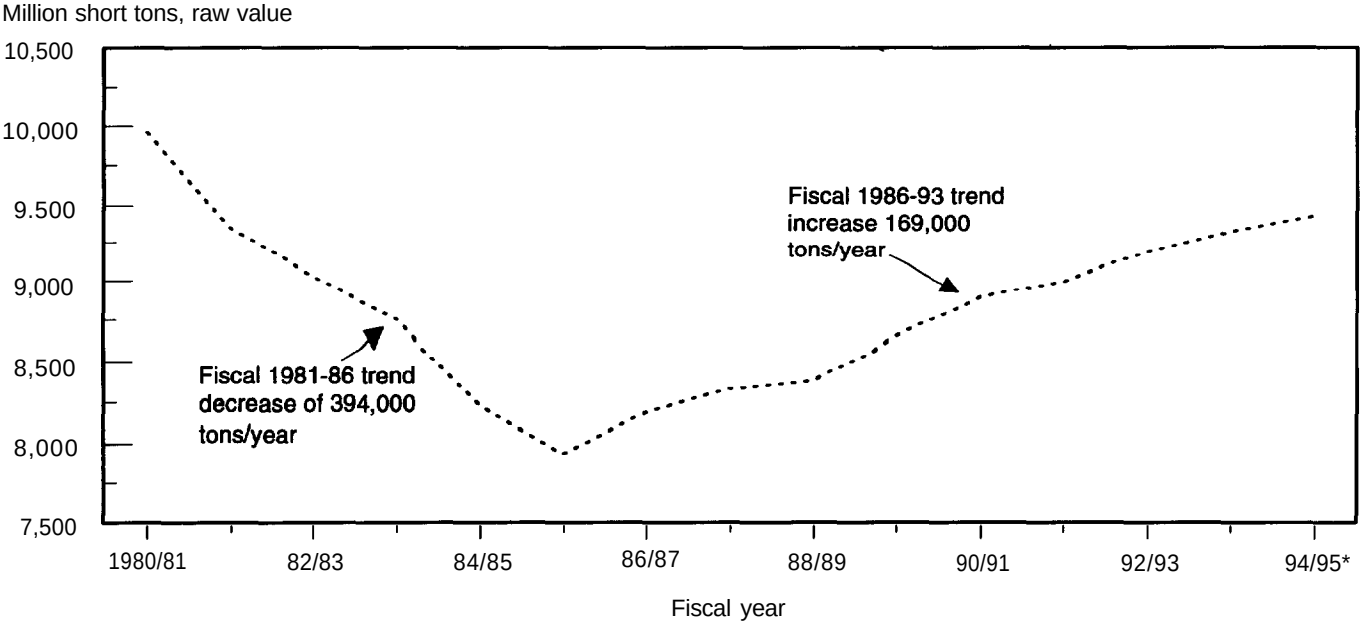
1/ Midwest.
2/ Starting June 1985, prices are for nearby futures.
Source: U.S. Department of Labor, Bureau of Labor Statistics, *Mining and Baking News,* and New York Coffee Sugar & Cocoa Exchange, Inc.

The 0.9 percent U.S. population growth rate has helped lift consumption of sugar. In addition, higher incomes, greater consumption of processed food and meals away from home, an increased immigrant population whose diets traditionally are high in sugar, and a growing awareness of the nutritional benefits of a high-carbohydrate diet, have raised per capita sugar consumption. A sugar industry campaign

Figure 25
Margin between refined and raw sugar prices

1/ Difference between Midwest wholesale refined beet sugar price and New York raw sugar price. Not adjusted for refining loss of approximately 7 percent.
Source: USDA.

Figure 26
U.S. sugar consumption

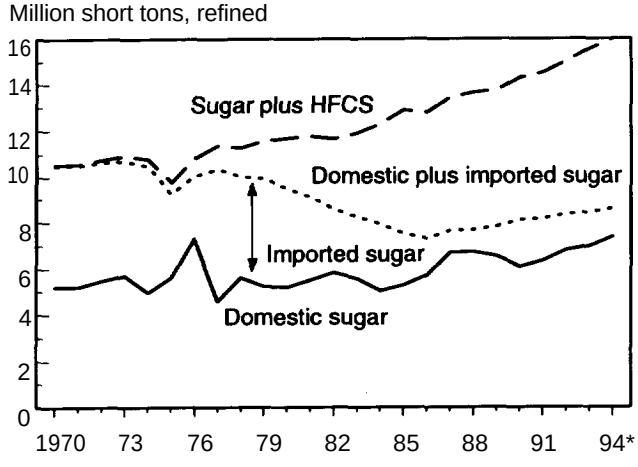


*Forecast.
Source: USDA.

to promote sugar as a natural product also helped boost consumption.

The future of U.S. sugar consumption will depend on the development of other alternative sweeteners. Crystalline fructose, a corn sweetener that is almost 100 percent fructose and sweeter than sugar, has until recently been more expensive than sugar and found very limited markets. When blended with other sweeteners, crystalline fructose can have a synergistic (complementary) effect, intensifying the sweetness that would not exist with either sweetener alone. Because it has different sweetness characteristics and "mouthfeel," crystalline fructose is not a direct substitute for sugar in many commercial products. Though no published data are available on the price or volume of crystalline fructose, its price is apparently falling and use is growing, and these trends are likely to continue.

Figure 27
U.S. consumption of domestic and imported sugar and HFCS



*Forecast.
Source: USDA.

U.S. consumption of low-calorie (or high-intensity) sweeteners, such as saccharine and aspartame, also has grown rapidly. Increased use of diet soft drinks, the largest market for low-calorie sweeteners, pushed annual consumption of these alternate sweeteners from 6 pounds per capita in 1970 to 24 pounds in 1991, the latest year for which estimates are available.

Low-calorie sweeteners are not expected to significantly affect consumption of caloric sweeteners in the near future. It is difficult to substitute low-calorie for caloric sweeteners in many food products, since the bulk or body of the caloric sweetener is critical to the

Table 5—U.S. total consumption of caloric sweeteners, 1980-94[1]

Calendar year	Sugar[2]		Corn sweeteners				Pure honey	Edible syrups	Total caloric sweeteners[3]
	Raw value	Refined basis	HFCS	Glucose syrup	Dextrose	Total			
				1,000 short tons, dry basis					
1980	10,189	9,522	2,159	1,908	433	4,500	94	50	14,166
1981	9,769	9,130	2,625	1,940	442	5,007	96	50	14,283
1982	9,153	8,554	3,090	2,011	459	5,560	104	50	14,268
1983	8,812	8,236	3,657	2,066	474	6,197	111	50	14,594
1984	8,428	7,877	4,404	2,110	487	7,001	104	50	15,032
1965	8,003	7,479	5,396	2,157	497	8,050	107	50	15,686
1986	7,731	7,225	5,508	2,197	508	8,213	117	50	15,605
1987	8,103	7,573	5,808	2,240	517	8,565	133	50	16,321
1988	8,136	7,604	6,015	2,287	525	8,827	115	50	16,596
1989	6,304	7,761	5,986	2,346	536	8,872	124	50	16,807
1990	8,615	8,051	6,227	2,433	557	9,217	126	50	17,444
1991	8,815	8,051	6,401	2,558	570	9,529	128	50	17,758
1992	8,827	6,250	6,682	2,700	573	9,955	124	50	18,379
1993	8,873	8,293	7,114	2,811	584	10,509	126	50	18,978
1994[4]	9,015	8,425	7,418	2,900	600	10,918	125	50	19,518

[1]Totals may not add due to rounding.
[2]Does not include Puerto Rico, or sugar imported in blends and mixtures.
[3]Total includes sugar, refined basis.
[4]Forecast
Source: USDA, Economic Research Service.

consumer's taste for the product. Development of a suitable and cheap bulking agent could expand the market for low-calorie sweeteners and erode caloric sweeteners' share. Furthermore, if the blending of caloric and low-calorie sweeteners gains consumer acceptance, soft drinks are likely to be the first major category to use blended sweeteners. If so, HFCS would face more competition from low-calorie sweeteners than would sugar, since virtually all caloric soft drinks are sweetened with HFCS.

The World Sugar Market

The world sugar market has undergone profound changes in recent decades. The world sugar price, since recovering from very low prices in the mid-1980's, in recent years has not exhibited the volatility of previous decades. Policy reforms and the privatization of some industries have reduced regulatory constraints within many countries, and a number of countries have lowered barriers to trade. Gradually, world price changes are being transmitted to the producers and consumers in more countries.

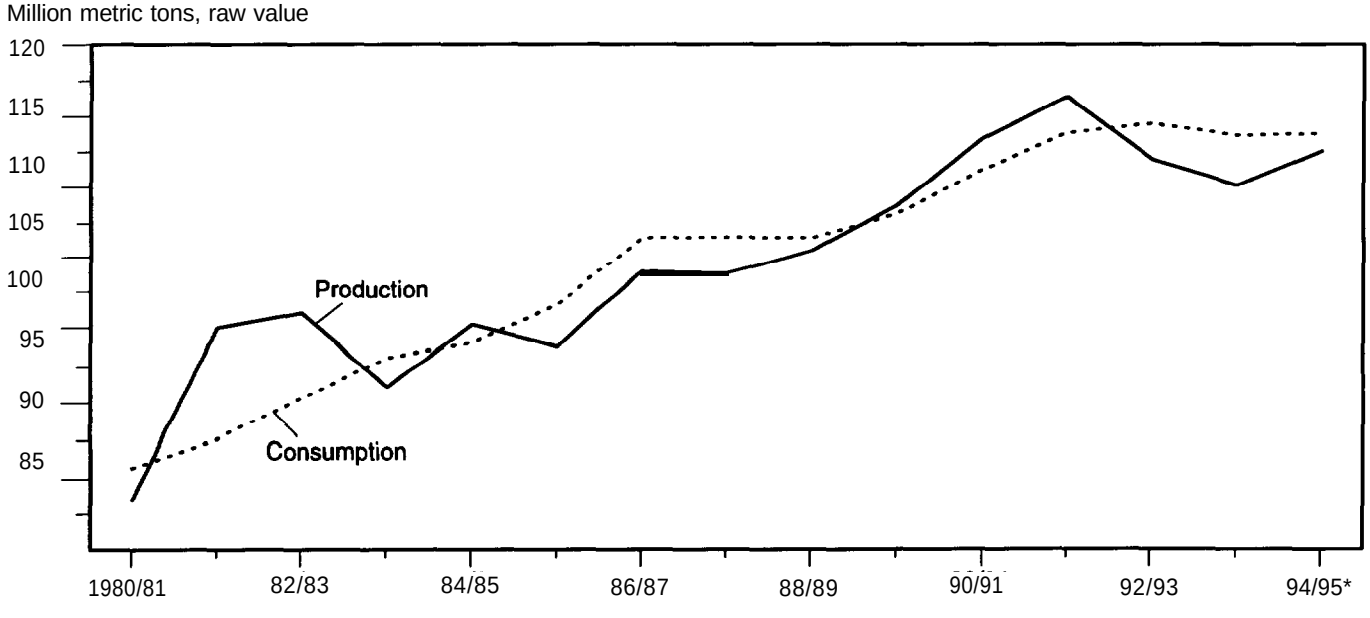
World Consumption, Production, and U.S. Share

World sugar consumption has risen about 2 percent, or 2 million metric tons, a year over recent decades (fig. 28). However, world consumption in 1993/94 fell about 800,000 metric tons from the year before, to about 113.7 million metric tons (table 6), in part due to the economic turmoil in eastern Europe and the former Soviet Union. As those economies stabilize, world sugar consumption is likely to resume its growth trend of l-2 percent a year. For 1994/95, USDA forecasts world consumption to be unchanged.

World sugar production was 110 million metric tons in 1993/94, and is forecast to rise to 112.6 million in 1994/95, the third year in a row below consumption. Cane sugar production accounts for about 65 percent of world output, compared with 61 percent in the late 1970's. World sugar production has not been very responsive to world prices since many countries insulate their producers, especially from low prices. As an annual crop, beet sugar can generally respond more quickly than cane. But world production rose about 7 million metric tons in the 2 years after the price rose to almost 14 cents in 1990, up from about 4 cents in 1985. In 1995, as the world price continues to rise from its recent low of 8.15 cents a pound in December 1992, world sugar production is rebounding along with the rising price.

U.S. sugar consumption in 1994/95 is forecast at about 7.6 percent of world consumption. In the European Union (EU), sugar consumption has grown very slowly in the last decade, and is estimated at 12.9 million metric tons, about 11.5 percent of world consumption. While sugar consumption growth in the

Figure 28
World sugar production and consumption



*Forecast.
Source: USDA.

industrial market economies has been lackluster over the last decade, sugar consumption has grown rapidly in developing countries, especially in Asia (fig. 29).

U.S. sugar production, about 6 percent of world production in 1993/94, ranked behind only the EU, India, and Brazil. The 12 countries of the EU jointly produce around 15-17 million metric tons, about 16 percent of world production, in line with quota levels and the usual surplus for export (fig. 30). India has increased production rapidly and now produces the most of any single country, 12-14 million metric tons. Cuba, once the world's largest producer, has seen its production fall to 4 million metric tons in 1993/94, and a forecast 3.2 million in 1994/95. The economic problems of Cuba are very severe, and will likely continue to hinder production for some time.

World Sugar Trade and U.S. Share

World sugar imports and exports are forecast at about 28 million metric tons in 1994/95, or about 25 percent of world production. World trade has been 27-32 million metric tons since 1980. The share of world production traded has declined slightly as production has grown.

U.S. sugar imports in 1994195, including almost half a million metric tons for re-export, are forecast at 1.67 million metric tons, 6 percent of world imports (table 7). Subtracting U.S. exports of 0.46 million metric tons, the U.S. is a net importer of 1.2 million metric tons. The Russian Federation and Japan are the only consistent larger net importers, with imports forecast at 3.1 and 1.6 million metric tons, respectively, and negligible exports.

The EU is forecast to import about 2 million metric tons in 1994/95, although it is also the world's largest exporter (fig. 31). U.S. and EU imports have declined significantly over the last few decades. For example, during 1974-76, U.S. net imports amounted to 18 percent of world trade, while during 1992-94,

Table 6—World sugar supply, use, stocks-to-consumption ratio, and price[1]

Marketing year	Beginning stocks	Production	Imports	Supply/ distribution	Exports	Domestic consumption	Ending stocks	stocks/ consumption ratio	World raw sugar price
	Million metric tons, raw value							*Percent*	*Cents/lb*
1980/81	19.46	88.47	27.66	135.59	27.66	90.69	17.24	19.01	24.80
1981/82	17.24	100.00	31.08	148.32	31.08	93.59	23.65	25.53	10.43
1982/83	23.65	100.99	30.01	154.65	30.01	95.41	29.23	30.64	7.58
1983/84	29.23	96.15	28.45	153.83	28.45	98.18	27.20	27.70	6.75
1984/85	27.20	100.28	28.97	156.45	28.97	99.09	28.39	28.65	3.68
1985/86	28.39	98.80	28.87	156.06	28.87	101.55	25.64	25.25	6.00
1986/87	25.64	103.95	27.46	157.05	27.46	106.47	23.12	21.17	6.19
1987/88	23.12	103.79	27.08	153.99	27.08	106.56	20.35	19.10	8.95
1988/89	20.35	105.56	28.67	154.58	28.67	106.52	19.40	18.26	11.58
1989/90	19.40	108.80	33.17	161.36	33.17	108.75	19.45	18.52	13.93
1990/91	19.45	113.49	32.54	165.49	32.54	111.92	21.03	19.92	9.39
1991/92	21.03	116.45	30.77	168.25	30.77	113.90	23.58	21.22	9.23
1992/93	23.58	112.01	29.55	165.14	29.55	114.55	21.04	18.22	9.56
1993/94[3]	21.04	110.24	29.73	161.01	29.73	113.72	17.56	15.85	10.67
1994/95[4]	17.56	112.60	27.87	158.02	27.87	113.84	16.31	14.33	NA

NA = Not available.

[1]The world production, supply, and distribution table covers all countries. Estimates are based on reports from USDA's agricultural counselors and attaches in 60 countries and analysts. The marketing year used by USDA varies by country because of differences in the timing of crop production. Stocks are measured at the end of the market year. Trade estimates exclude intra-EU trade. Unrecorded data have been introduced into the time series as a balancing mechanism to equalize exports and imports. It is assumed that a certain quantity of sugar imports go unrecorded by USDA each year, with the result that imports appear unrealistically low. It is also assumed that these imports of sugar are consumed. Therefore, the 'unrecorded' data have been introduced to rectify these inconsistencies.

[2]World raw sugar price, September-August year average. Contract No. 11, f.o.b. stowed Caribbean ports.

[3]Preliminary.

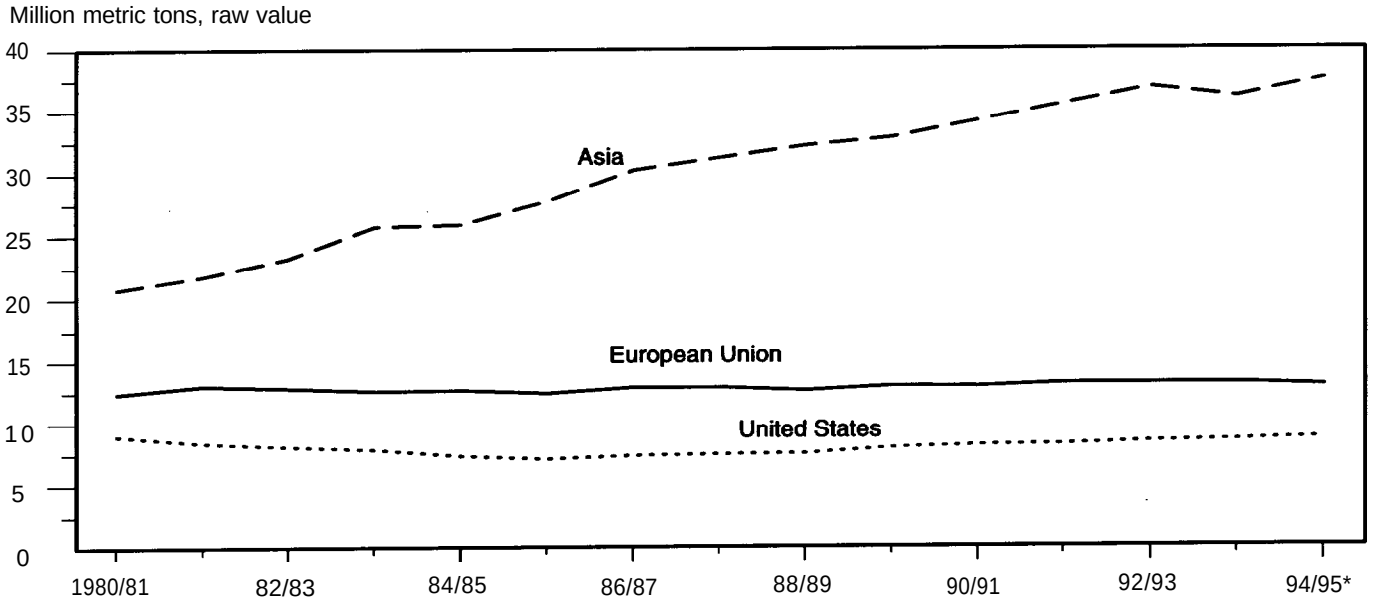
[4]Forecast.

Source: USDA, Foreign Agricultural Service.

U.S. net imports averaged 4 percent of world trade (fig. 32). Over the same period, the EU switched from net imports (7 percent of world trade) to net exports (13 percent of world trade).

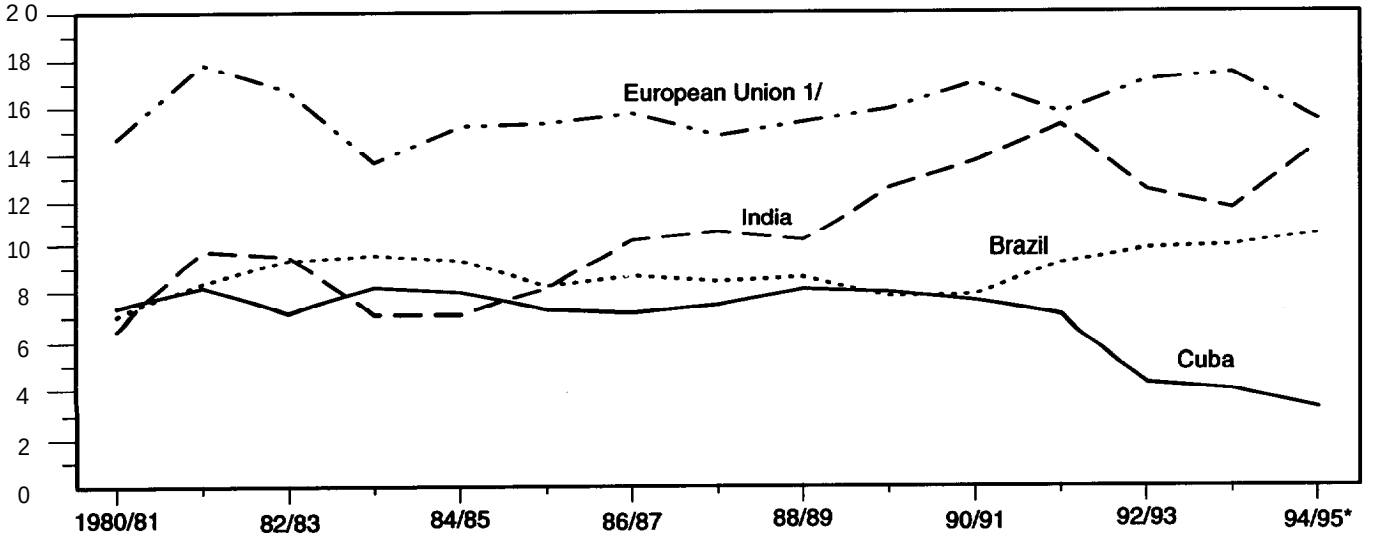
Other major importers include Japan, China, Canada, and the Republic of Korea. Although often a net exporter, India is forecast to import 500,000 metric tons in 1994/95.

Figure 29
Consumption in selected regions



*Forecast.
Source: USDA.

Figure 30
Production in selected countries



*Forecast.
1/ The EU is composed of 12 countries.
Source: USDA.

U.S. sugar exports are forecast at 465,000 metric tons in 1994/95, largely composed of refined sugar that was imported raw at the world price under the Refined Sugar Re-Export Program. Cuba, once the world's dominant exporter, is forecast to export 2.5 million metric tons in 1994/95, far below the EU's 5.09 million (fig. 31, table 7).

Australia is forecast to export 3.8 million metric tons in 1994/95, ahead of Cuba to second place in world rankings (first if EU countries are counted separately). Thailand's exporting capacity has risen rapidly over the last 2 decades, and Thailand is now consistently among the world's top exporters. Brazil is still a steady exporter, even though over half of its sugarcane is used to produce fuel ethanol, and 1994/95 exports are forecast at 2.8 million metric tons. Much of China's export business is from imports of raw sugar, which are refined for re-export. In 1994/95, China will be a net importer after several years as a net exporter. Unless China acts to impose policies which raise sugar prices, prospects are for China's consumption to outpace production in the rest of the century.

Prospects for the World Sugar Market

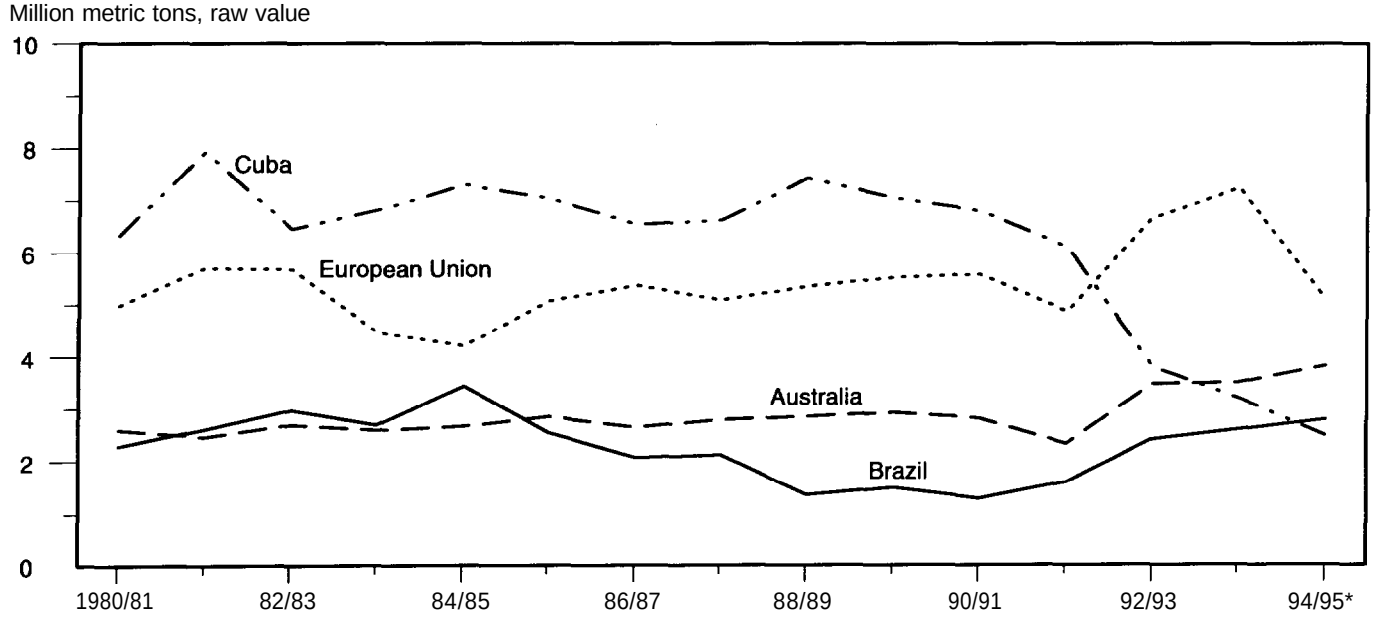
The world sugar market is often characterized as a "residual" market. After World War II, the world sugar market generally had the following characteristics:

Table 7—World sugar trade, by leading sugar exporters and importers

Country or area	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
						Million metric tons, raw value					
Sugar exporters:											
Cuba	7.3	7.05	6.53	6.62	7.44	7.07	6.80	6.10	3.80	3.20	2.50
European Union[1]	4.3	5.08	5.38	5.10	5.36	5.51	5.58	4.87	5.65	6.41	5.09
Ukraine	NA	NA	NA	NA	NA	NA	3.45	1.50	2.00	1.80	1.90
Australia	2.7	2.86	2.66	2.80	2.86	2.93	2.82	2.35	3.48	3.49	3.82
Thailand	1.8	2.06	1.96	1.89	3.00	2.61	2.74	3.66	2.33	3.00	3.30
Brazil	3.4	2.56	2.09	2.13	1.37	1.50	1.30	1.61	2.43	2.56	2.80
China	0.1	0.27	0.46	0.31	0.28	0.62	0.3	1.42	2.10	1.05	0.30
Total leading exporters	19.70	19.88	19.08	18.85	20.31	20.24	22.69	21.51	21.79	21.51	19.71
World total	28.97	28.87	27.46	27.08	28.67	28.65	32.54	30.77	29.55	29.73	27.87
						Percent					
Leading exporter's share of global exports	68	69	69	70	71	71	70	70	74	72	71
						Million metric tons, raw value					
Sugar importers:											
Russian Federation	NA	NA	NA	NA	NA	4.55	3.58	3.85	3.50	3.15	3.10
European Union[1]	2.3	2.26	2.21	2.21	2.43	2.23	1.88	1.89	2.01	2.00	2.01
United States[2]	2.1	2.05	1.50	1.14	1.75	2.35	2.62	2.07	1.83	1.60	1.67
Japan	1.9	1.86	1.70	1.85	1.91	1.79	1.76	1.80	1.77	1.63	1.62
China	1.9	1.22	1.51	3.70	2.48	1.13	1.06	1.23	0.51	0.68	1.50
Canada	1.1	1.15	1.12	0.93	0.71	0.82	1.11	0.96	1.01	1.21	1.21
Korea, Republic of	0.9	0.97	1.10	1.11	1.11	1.11	1.23	1.26	1.23	1.26	1.24
Total leading importers	10.07	9.51	9.14	10.94	10.37	13.98	13.24	13.06	11.85	11.52	12.35
World total	29	29	27	27	29	29	33	31	30	30	28
						Percent					
Leading importer's share of global imports	35	33	33	40	36	49	41	42	40	39	44

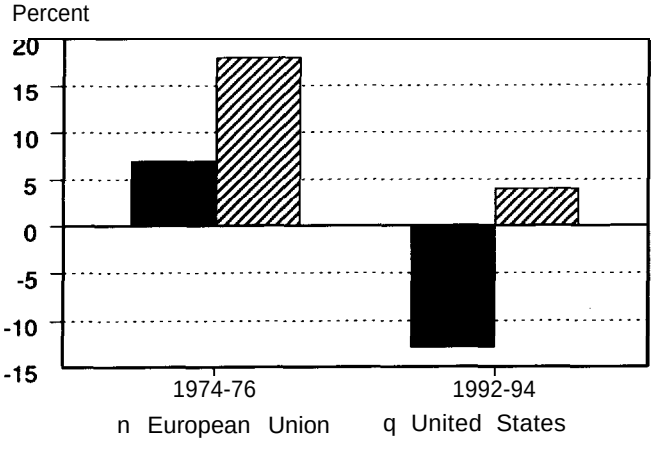
NA = Not available.
[1]Excludes intra-EU trade, includes Unified Germany. Does not include Finland, Austria, and Sweden.
[2]Based on offshore receipts and includes sugar imports for re-export.
Source: USDA, Foreign Agricultural Service.

Figure 31
Exports by selected countries



*Forecast.
Source: USDA.

Figure32
U.S. and EU net imports as share of total world imports 1/



1/ Net imports defined as total imports minus total exports: if negative, country is a net exporter.
Source: USDA.

- Occasional sharp price "spikes" of short duration were followed by longer periods of relatively low prices (fig. 23).
- The largest share of world imports was purchased by industrialized countries.
- There were few substitutes for sugar, and thus price increases did not significantly dampen demand, especially among high-income buyers.
- Producers in many countries were shielded from low world prices, but not from price spikes: i.e., many producers received prices above the world price.

But over the last two decades, world sugar market conditions have changed dramatically.

- There are more substitutes than before. Partly spurred by technological advances, world HFCS production rose from almost zero before 1975 to almost 9 million metric tons in 1994, and consumption of low-calorie (high-intensity) sweeteners increased considerably.
- The bulk of import demand is no longer from high-income, price-insensitive countries but from price-responsive lower-income countries.
- Policy reforms or changes have occurred in many countries, and more producers and/or consumers now face the world price.

Past world sugar price spikes (prices above 20 cents a pound) would often lead to expanded sugar production all over the world. The higher production would result, a few years later, in lower prices.

The world sugar price has historically been volatile; for example, it was twice as variable as the world wheat price from 1960 to 1980 (fig. 33).[3] However, the variability of the world sugar price has dropped considerably, even though it remains more volatile than some other commodity prices. Since the world price rose above 8 cents a pound in 1986, and the world ending stocks/use ratio fell below 21 percent (fig. 34, table 6). the world price has traded between 8 and 16 cents a pound.

At one time, a large share of world sugar imports was made under special, or fixed-price, agreements, and the amount of sugar that actually traded at the world price was significantly less than total world trade. For example, the arrangement by which the former Soviet Union paid a premium price to Cuba, from the 1960's until 1991, typically involved about 4 million metric tons of sugar. Since 1992, the republics of the former Soviet Union have stopped paying a premium price for Cuban sugar. Those republics which continue to import Cuban sugar, in particular the Russian Federation, now pay the world price (even if expressed in barter terms).

But in 1995, the only significant special import arrangements remaining are the U.S. and EU import quotas, which together account for about 3 million metric tons, about 10 percent of world sugar trade, or about 20 percent of raw sugar trade. The remaining 90 percent of world imports are traded at the world price, though of course, many governments still shield producers from the world price. The share of total world production that is traded on world markets is far higher for sugar (26 percent) than for commodities such as wheat (18 percent), corn (12 percent), or rice (3 percent).

Over the last decade, countries such as Brazil, Mexico, Argentina, Venezuela, Jamaica, and many republics of the former Soviet Union have embarked on programs to privatize sugar industries. Australia has significantly reduced internal regulations and reduced import tariffs. The declining variability of the world sugar price reflects these and other similar policy changes around the world.

U.S. Sugar Policy

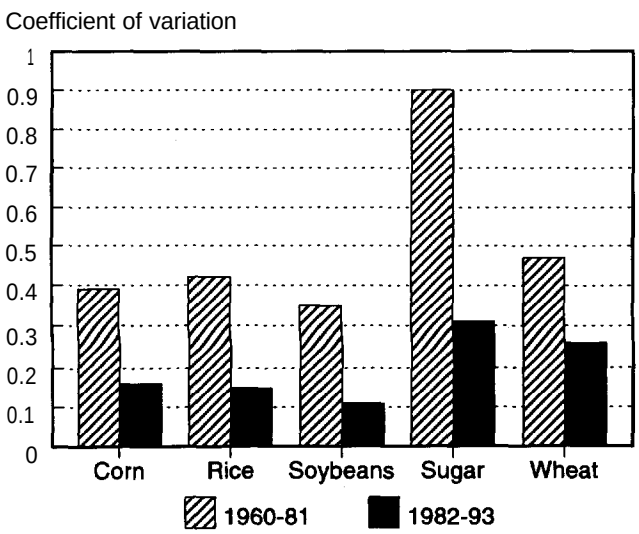
U.S. sugar policy can be divided into three distinct periods. During 1934-74, the Government maintained comprehensive control of the sugar industry. During 1974-81, there was less Federal involvement. Since 1981, government control of the sugar market has consisted primarily of a nonrecourse loan program, import quotas, and marketing allotments.

Historical Perspective of U.S. Sugar Legislation

The Sugar Act of 1934 initiated 40 years of extensive government regulation of the sugar industry. The law

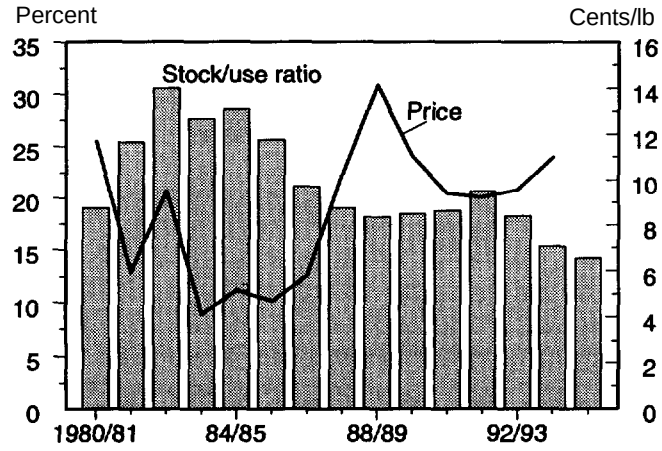
[3]Variability is measured by the coefficient of variation of annual prices. The coefficient of variation is the standard deviation divided by the mean.

Figure 33
Variability of world prices for major commodities



Source: USDA, Economic Research Service.

Figure 34
World sugar price and stock/use ratio 1/



September-August price, No. 11 contract.
1/ End-of-year stocks weighted mainly with countries with September/August marketing years.
Source: USDA.

Nonrecourse Loans: A Basic Tool of Current Sugar Policy

Nonrecourse loans are the major price support instrument used by USDA's Commodity Credit Corporation (CCC) to support the price of sugar, wheat, feed grains, oilseeds, cotton, peanuts, tobacco, and rice. Farmers or processors who agree to comply with each commodity program provision may pledge a quantity of a commodity as collateral and obtain a loan from the CCC. Borrowers receive the established price per unit (pound, bushel, bale, or hundredweight) known as the loan rate.

Unlike other commodity programs, sugar loans are made to processors and not directly to producers. This is because sugarcane and sugar beets, being bulky and very perishable, must be processed into sugar before they can be traded and stored.

To qualify for loans, a processor must agree to pay producers the USDA-established minimum price support levels based on the loan rates for sugarcane and sugar beets. Growers generally receive about 60 percent of the loan or sale proceeds of the sugar and processors 40 percent, but the exact arrangements vary by contract and the quality of the crop.

If the sugar processor does not take out a nonrecourse loan, then the farmer delivering sugar beet or sugarcane to the processor does not, technically, have price support through the loan program.

The borrower may elect to repay the loan with interest within a specified period and regain control of the collateral commodity, or default on the loan. In case of a default, the borrower forfeits without penalty the collateral commodity to the CCC. The loans are nonrecourse because the Government has no option (or recourse) but to accept forfeiture as full satisfaction of the loan obligation, including the accumulated interest, regardless of the price of the commodity in the market at the time of default. The processor will be inclined not to default if the market price for sugar is high enough to permit repayment of the loan, interest, freight, and related marketing expenses. (Freight is not part of the formula for beet sugar because the buyer pays the freight.)

required the Secretary of Agriculture to determine the consumption requirements for sugar in the United States each year and divide these requirements among domestic areas and foreign countries by assigning each a quota. The act also provided for (1) benefit payments to growers, (2) a processing tax on sugar, (3) minimum wage rates for fieldworkers, (4) child labor provisions, and (5) acreage restrictions. These basic provisions remained in effect through subsequent legislation until 1974. At that time, with record-high world sugar prices far exceeding the domestic price objective, Congress decided not to renew the Sugar Act. The introduction of HFCS in the early 1970's was also reshaping the sweetener industry.

Then in September 1976, with a growing sugar surplus and world prices below 9 cents a pound, Congress voted to include sugar support provisions in the Food and Agriculture Act of 1977. The 1977 and 1978 sugarcane and sugar beet crops were supported through loans and purchases (table 8). Processors were required to pay growers at least the support prices specified by the program for average-quality sugar beets and sugarcane as long as the growers met USDA minimum wages for fieldworkers. To provide incentive for processors to sell their sugar in the marketplace rather than forfeit it to the Commodity Credit Corporation (CCC), import duties and fees were used to maintain the domestic sugar price at the market price objective.

A sugar loan program was adopted for the 1979 crop under title III, section 301, of the Agricultural Act of 1949 (known as the "permanent legislation"). The 1949 Act gives the President discretionary authority to make available price support at up to 90 percent of parity through loans, purchases, and other operations. No support program was provided for the 1980 and most of 1981 sugar crops because world and U.S. market prices were relatively high.

By 1981, several factors were influencing the debate on U.S. sugar policy. The development of HFCS in the 1970's added corn growers and corn sweetener producers to those concerned about sweetener prices. As a result, sugar support was included in the omnibus farm bill rather than specific sugar legislation.

Cost of production studies published by the USDA in 1981 estimated the total economic costs of producing refined beet sugar at about 24 cents a pound, and raw cane sugar at about 25 cents a pound. Assuming that inflation would continue at 7 percent a year, some analysts at the time estimated sugar costs of production

would rise to over 35 cents a pound in 1985. (For the 1992 crop, total costs are estimated at 22 cents a pound for refined beet sugar, and 19.9 cents a pound for raw cane sugar.)

Congress voted to support the domestic sugar industry by providing a nonrecourse loan program for sugar under the Food and Agriculture Act of 1981. In part due to assumptions about inflation prospects, Congress mandated increases in the loan rate over 4 years to 18 cents by the 1985 crop, 38 percent higher than the 13-cent level of the 1979 crop. Loan rates differed by location so that loans would not distort the routine marketing of sugar.

For a time, a market stabilization price (MSP) was used as a guide to establish a price for raw cane sugar above the loan rate. The MSP was considered to be the minimum market price required to discourage sale or forfeiture of any sugar to the CCC. The difference between the loan rate and the MSP covered all transportation costs, the interest required to redeem a loan, and an incentive factor to encourage processors to sell rather than forfeit sugar. The MSP was last announced in September 1989 at 21.95 cents a pound for raw sugar.

Other Legislative Authorities To Support the U.S. Sugar Industry

Sugar Import Quotas

While sugar import quotas are not technically part of the domestic sugar support legislation, they are integral in overall sugar policy. Without the quota, low-priced sugar in the world market would be free to enter the U.S. market. Extensive imports could depress domestic prices below the loan rate and result in large forfeitures of sugar to the CCC. In response to this threat, a sugar import quota system was implemented in May 1982. Subsequent to a successful GATT challenge in 1990, a tariff-rate quota replaced the previous absolute quota system, with the same general goal: to maintain prices at levels that prevent forfeiture of CCC loans.

Table 8-U.S. national average cane and beet sugar loan rates

Fiscal year	Raw cane sugar loan rate	Beet/cane returns ratio[1]	Fixed marketing expenses[2]	Refined beet sugar loan rate	Ratio, beat to cane loan rate
	Cents/lb	*Ratio*	*Cents/lb*		*Ratio*
1977/78	13.50	1.10	0.73	15.57	1.15
1978/79	14.73	1.10	0.80	16.99	1.15
1979/80	13.00	1.10	0.85	15.15	1.17
1980/81[3]	n.a.	n.a.	n.a.	n.a.	n.a.
1981/82[4]	16.75	1.13	0.77	19.70	1.18
1982/83	17.00	1.13	0.94	20.15	1.19
1983/84	17.50	1.13	1.08	20.86	1.19
1984/85	17.75	1.12	0.88	20.76	1.17
1985/86	18.00	1.12	0.90	21.06	1.17
1986/87	18.00	1.12	0.93	21.09	1.17
1987/88	18.00	1.12	1.00	21.16	1.18
1988/89	18.00	1.13	1.03	21.37	1.19
1989/90	18.00	1.13	1.20	21.54	1.20
1990/91	18.00	1.16	1.05	21.93	1.22
1991/92	18.00	1.21	1.07	22.85	1.27
1992/93	18.06	1.23	1.19	23.33	1.30
1993/94	18.00	1.25	1.12	23.62	1.31
1994/95[5]	18.00	1.23	1.29	23.43	1.30

n.a. = Not applicable.
[1]Prior to 1985/86, based on a 10-year weighted average of the ratio of the raw sugar price to the net returns for beet sugar. After 1985/86, calculated as the 10-year weighted average of beet-to-cane grower returns, on a cents-per-pound basis. Beginning 1991/92, is on basis of a 5-year weighted average ratio.
[2]Beet processor marketing expenses that would be incurred regardless of whether sugar is forfeited or not.
[3]No loan rate in effect.
[4]Purchase program in effect December 1981-May 1982 only.
[5]Announced January 26, 1995.
Source: USDA.

The Secretary of Agriculture is authorized to proclaim tariff-rate quota amounts under Additional U.S. Note 5, Chapter 17 of the Harmonized Tariff Schedule of the United States (HTSUS). That chapter fixes the rate of duty to countries granted Most-Favored-Nation status by the United States. The minimum duty is 0.625 cent a pound, raw value. Allocations of quotas under Additional Note 5 must be appropriate to carry out the rights and obligations of the United States under any international agreement to which the United States is party or be appropriate to promote the economic interests of the United States.

The Secretary of Agriculture is empowered to establish the overall quota amount, and the United States Trade Representative to allocate the quota among countries. The aggregate quota for raw cane sugar cannot be less than 1.117 million metric tons (1.23 million short tons), and not less than 22,000 metric tons (24,250 short tons) for refined sugar (defined as several types of sugars other than raw cane sugar).

Prior to January 1, 1995, both the quota level and the period to which it applied could be adjusted, based on estimated demand for sugar in the U.S. market and on domestic supplies. Under the new Uruguay Round GATT tariff schedule, beginning October 1, 1995, the quota period will be October l-September 30. Allocation of the quota to individual countries is based largely on their share of the U.S. market during 1975-81 when imports were relatively unrestricted. Quotas are currently extended to 40 countries (app. table 27). In 1995 Canada will be placed back on the list of quota-holding countries.

Section 22 Quotas

In the recent Uruguay Round GATT agreement, actions under Section 22 have been effectively eliminated by being converted to tariffs. Previously under Section 22 of the Agricultural Adjustment Act of 1933, the President had been empowered, on the basis of an investigation and report by the International Trade Commission (ITC), to regulate commodity imports whenever it was found that such imports tended to render ineffective or materially interfere with USDA's commodity price support or stabilization programs. This authority had permitted the imposition of fees not in excess of 50-percent ad valorem or quotas not in excess of 50 percent of the quantity imported during a representative period determined by the President. The only sugar fee imposed under Section 22 authority in 1994 was a 1-cent-per-pound fee on refined sugar imports which, effective January 1, 1995, has been combined with sugar duties in the Tariff Schedule.

As the world sugar price fell and the U.S. price rose in the early and mid-1980's, incentives to import products containing cheaper world-priced sugar increased. In response, the United States imposed quotas under Section 22 on various categories of products containing a large percentage of sugar, such as cocoa powder. These sugar-containing product quotas were separate from, and in addition to, the import quota on sugar. As of January 1, 1995, these quotas have been converted to tariff-rate quotas.

Other Sugar Supply Management Measures

To boost the ability of U.S. cane refiners to compete in world markets, USDA instituted the Refined Sugar Re-export Program in 1983. Under this Program, licensed refiners may purchase raw sugar at the world price as long as they export a like amount of refined sugar within 90 days. A similar program was created for manufacturers of sugar-containing products, who may purchase world-priced sugar as long as they can demonstrate the export of a like amount of sugar in products within 18 months.

Sugar Legislation: 1985-Present

The Food Security Act of 1985 largely continued the sugar provisions of the 1981 Act, and continued the minimum cane sugar loan rate at 18 cents a pound. Sugar forfeited to the CCC largely from the 1984 crop resulted in costs to the U.S. Treasury of about $105 million over fiscal years 1986-88. Partly as a result of these forfeitures, Congress inserted the no-cost provision into the 1985 Act, which required administrators of the sugar program to more strongly avoid forfeitures.

When consideration of the 1990 farm legislation began, falling U.S. sugar imports were central to the debate. Imports for consumption had dropped below 1 million tons in fiscal 1988, and U.S. sugar production had risen from about 6 million tons to over 7 million tons. Bad weather lowered U.S. production and raised imports back to almost 2 million tons in 1990, but renewed lower imports were forecast and cane refiners were concerned about access to raw sugar. Quota-holding countries were likewise concerned about the continued decline of sales to a market in which their sugar received a premium price.

Cane refiners and quota-holding countries supported a legislated minimum level of sugar imports. To control price, another supply control mechanism was needed once a floor was placed on imports, and thus

the 1990 Farm Act included the first domestic supply controls since 1974.

The 1990 Farm Act provides for marketing allotments on domestically produced sugar if "estimated sugar imports" are less than 1.25 million tons, raw value. The estimate is not actual imports of sugar, but the result of a formula. The Secretary of Agriculture calculates "estimated imports" for a fiscal year by adding estimated consumption and reasonable ending stocks and then subtracting domestic production and beginning stocks. The estimates must include Puerto Rico, and are recalculated quarterly. If allotments are announced, they apply to sugar marketed for a fiscal year, and to crystalline fructose at a level of 159,757 tons, though crystalline fructose is not included in the trigger formula.

If allotments are implemented, the Secretary sets the overall allotment quantity by adding consumption and reasonable ending stocks, and subtracting from that beginning stocks and 1.25 million short tons. The allotment is then allocated between beet and cane sugar based on three factors: past marketings, processing and refining capacity, and the ability to market. If either the beet or cane sector cannot fill its allocation, imports must fill the gap.

The same three factors are used to allocate the cane and beet sugar allotments among producers. In Louisiana, each sugarcane grower receives a proportionate share based on historical acreage; in all other cases, the allocations are only to processors. The legislation (as amended) provides for penalties to processors who knowingly exceed their allocations.

In September 1994, USDA calculated the allotment formula for fiscal year 1995 as follows.

Add:	
Consumption	9.247 million tons
Reasonable ending stocks	1.278 million tons
Subtract:	
Beginning stocks	1.386 million tons
Production	7.890 million tons
Equals:	
Marketing Allotment Import Estimate (MAIE)	1.249 million tons

Since estimated imports were below 1.250 million short tons, allotments were triggered for fiscal year 1995.

The basic support price level of 18 cents a pound for raw cane sugar was unchanged in the 1990 Farm Act. The legislation, however, mandated changes in the calculation of the loan rate for beet sugar.

In the 1985 Act, the beet sugar loan rate had been required to be "fair and reasonable" in relation to the cane sugar loan rate. During the 5 years of the Act, a two-step procedure was used to determine the beet loan rate. The first step was to multiply the cane sugar loan rate (18 cents) by the ratio of grower returns for refined beet sugar to grower returns for raw cane sugar, both on a cents-per-pound basis. The ratio was based on weighted national averages for the most recent 10-year period. The second step was to add fixed marketing expenses of beet sugar processors.

The 1990 Farm Act required that the period used to derive the ratio of sugar beet-to-sugarcane grower returns be reduced from 10 to 5 years. Since the ratio had been higher in recent years, the 5-year derivation effectively raised the ratio, and thus the beet sugar loan rate (fig. 35 and table 8). Each percentage increase in the ratio raises the beet loan rate by 0.18 cent a pound (1 percent of 18 cents). The ratio rose from 1.16 in fiscal 1991 to 1.23 in 1995. The beet loan rate also rises if fixed marketing expenses rise.

Because effective support levels for many crops other than sugar were reduced in the 1990 Farm Act, the Omnibus Budget Reconciliation Act of 1990 (P.L. 101-508) provided for an assessment on all sugar processed of 0.18 cent per pound of raw cane sugar and 0.193 cent per pound of refined beet sugar. Revenues from the assessments total $25-30 million annually. Legislation enacted in August 1993 (P.L. 103-66) increased the assessments on sugar by 10 percent beginning October 1, 1994, and extended the sugar provisions of the 1990 Farm Act through fiscal year 1998. Depending upon crop size, revenues will likely rise above $30 million annually.

Economic Effects of the Sugar Program

Groups affected by U.S. sugar policy include sugar producers and processors, consumers and users of sugar and products containing sugar, taxpayers, foreign suppliers of raw and refined sugar, manufacturers of sugar-containing products, cane sugar refiners, sugar brokers and traders, employees of sugar processing and refining firms, corn sweetener manufacturers, and possibly corn farmers. The effects change over time. For example, while foreign suppliers benefit from the higher price in the U.S. market, declining import quotas have reduced each quotaholder's shipments. Industry structure itself may also change because of the program, complicating the analysis of program effects.

While measuring the full effects of the sugar program is complex, the key element is the price premium provided in the U.S. market. The premium is higher or lower, based on an estimate of the world price in the absence of the U.S. sugar program. The premium could also be based on a estimate of what the world price would be in the absence of any trade-distorting policies worldwide. If, without the multitude of trade-distorting policies around the globe, the world price were as high or higher than the U.S. price, the premium could even be zero.

Most studies of the removal of sugar trade-distorting policies in the major industrialized nations project a world price at levels lower than the U.S. price. A USDA study estimated such a hypothetical world price 15 cents a pound (16.5 cents, New York basis)! During fiscal 1992-94, the U.S. raw sugar price averaged about 21.5 cents a pound. Based on this price gap, the premium would be 5 cents a pound, or $100 per ton of sugar, raw value. For each 1 cent price gap, the premium would be $20 per ton.

The following estimates are based on recent quantities and prices of sugar and do not account for how producers and consumers would change their behavior if prices were different. The estimates are very similar to analyses that account for reactions to price.

Producers and Processors

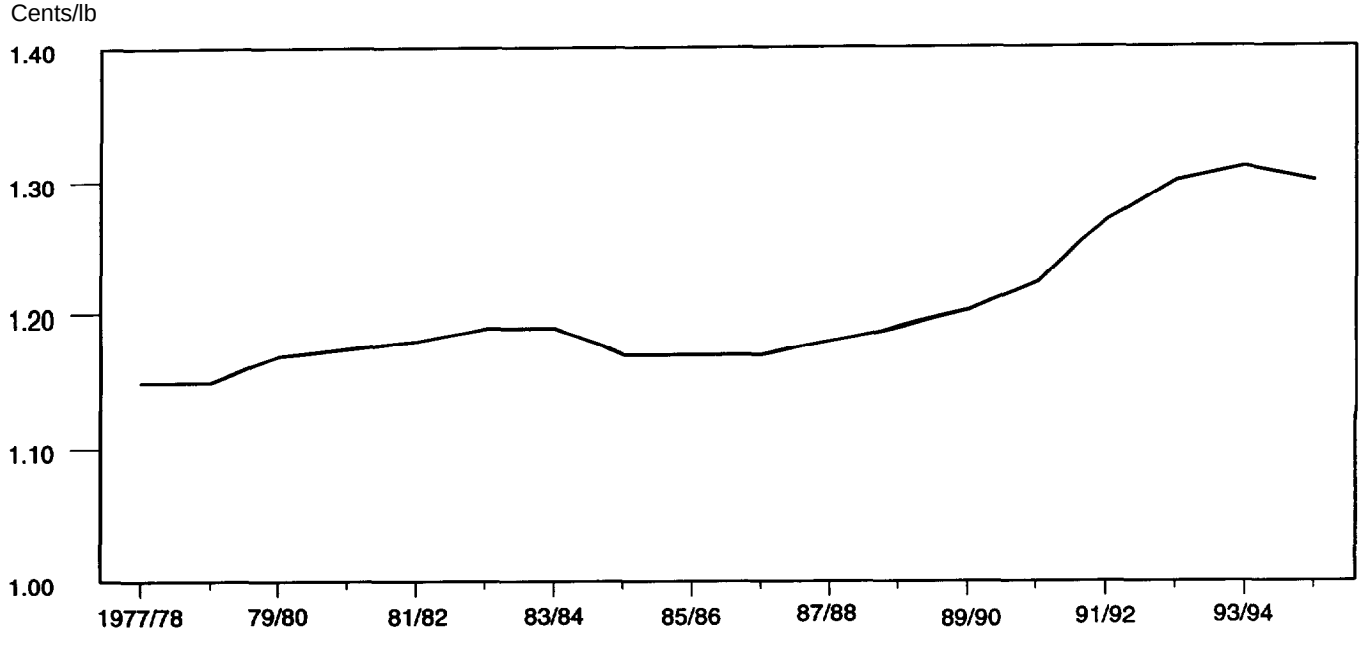
Producers and processors benefit from sugar policy through income and wealth effects. The higher U.S. price made possible by the sugar program directly raises the income of producers and processors through higher receipts from the sale of raw cane and beet sugar. Less obvious are the program's effects on the value of fixed assets such as capital and land used for sugar crops, specialized harvesting and processing equipment, and processing facilities.

U.S. sugar production averaged 7.5 million tons, raw value, in fiscal 1992-94. Thus if there were any premium attributable to the U.S. sugar program, for each 1-cent a pound ($20 a ton) industry revenues were raised by $150 million a year. Based on their typical 40 percent share of proceeds, processors received $60 million in program benefits. Cane and beet growers, who typically receive about 60 percent of revenues, received an estimated $90 million.

Beet sugar averaged 55 percent of total sugar production over 1992-94. Thus, the benefit to sugar beet growers for each 1-cent premium was $50 million, or $5,600 per farm, and for sugarcane growers a total of $40 million, or $39,000 per farm.

[4]See: Barry, Robert D., et al., *Sugar: Background for 1990 Farm Legislation;* Lord, Ron and Robert D. Barry, *The World Sugar Market-Government Intervention and Multilateral Policy Reform.*

Figure 35
Ratio of U.S. beet sugar loan rate to cane sugar loan rate



Source: USDA.

In addition to direct benefits, sugar policy also has numerous indirect benefits. For example, because the sugar program increases producer revenues, sugarcane and sugar beet acreage is more valuable. Input suppliers, such as manufacturers of specialized equipment and chemicals, also benefit from higher sales.

Consumers

During fiscal years 1992-94, domestic sugar consumption averaged 8.9 million tons a year, raw value. For each 1-cent-per-pound ($20-per-ton) premium, the cost to consumers would be $178 million. In addition, the price of HFCS is influenced by the price of sugar. Expenditures for HFCS undoubtedly would have been lower were the sugar price per pound 5 cents lower.

If HFCS did not exist, the consumer cost of the sugar program would be higher, since there would be no savings from consumption of a lower priced alternative. However, savings from the use of HFCS is only a reduction from what would have been a much higher cost of the sugar program. For example, if the 1992-94 average use of 7 million tons of HFCS had been sugar, at its higher price, sweetener expenditures would have been higher.

Foreign Suppliers

Countries that supply raw and refined sugar to the United States benefit from the premium U.S. price associated with a price support program. However, to the extent that a country pays an import duty and/or fee on sugar imports, the premium is reduced. Some countries, during a tight market, are able to pass part of the cost of the import duty and/or fee on to the buyer.

In fiscal years 1992-94, only five or six countries were subject to the import duty of 0.625 cent a pound: other quota suppliers were exempt through the Generalized System of Preferences or the Caribbean Basin Initiative. Based on average quota imports of 1.315 million tons, for each 1-cent-per-pound premium foreign suppliers received benefits of an estimated $26.3 million. This is much lower than benefits during the early 1980's when U.S. imports averaged over 3 million tons a year.

Cane Sugar Refiners

Most of the cane sugar consumed in the United States is refined from raw sugar. The refining companies also refine sugar for re-export.

The U.S. sugar program has contributed to the reduced volume of cane sugar in the U.S. market. The loss of the U.S. liquid sweetener market to HFCS was at the expense of imported sugar, which is almost entirely cane sugar.

Ten refineries have ceased operations since 1981 and refining capacity has declined 35 percent. Only 12 refineries remain, with an annual capacity of about 5.5 million tons of raw sugar. The increase in domestic cane sugar production as a result of the sugar program has only slightly offset the decline in raw sugar imports for refining. The interests of cane sugar refiners in U.S. sugar policy are complicated because some companies own beet and cane processing facilities, HFCS production facilities, and/or sugarcane acreage.

Corn Sweetener Manufacturers and Corn Growers

Corn sweetener, particularly HFCS manufacturers, benefit from the U.S. sugar program. The sugar program provides a price floor for sugar above the cost of producing liquid HFCS, and thus guarantees that sugar cannot be price-competitive with HFCS.

The sugar program's guarantee of a price floor for sugar (and thus indirectly HFCS) stimulated investment in HFCS facilities, and a more-rapid acquisition of share for HFCS in the U.S. sweetener market. Further, higher HFCS revenues have funded substantial research and development in the corn wet-milling industry, indirectly benefitting other products such as fuel ethanol.

Expansion of HFCS production has increased the demand for corn. The amount of corn used in HFCS production increased from 165 million bushels in 1981 to 440 million bushels in 1994. The amount of corn used in all corn sweeteners increased from 321 million bushels in 1981 to 660 million bushels in 1994. During 1992-94, about 8 percent of the U.S. corn crop was used by the wet milling industry to produce corn sweeteners.

Some have claimed savings from the sugar program due to a reduction in Treasury expenditures on corn deficiency payments: savings would occur if the corn price is raised by the sugar program. Although the HFCS industry uses 8 percent of U.S. corn production, it is not necessarily true that without the sugar program HFCS use would decline. The variable cost of HFCS production is estimated at 12 cents a pound or less, below the world price of refined sugar (usually about 4 cents higher than the raw sugar price). In 1994 and early 1995, HFCS producers have added, or announced plans to add, over 30 percent to existing capacity. With so much investment in fixed capacity either in place or under construction, HFCS producers would likely maintain their market share regardless of

U.S. sugar policy and price. In the short run, even if U.S. sugar prices fell to world levels, HFCS would keep its market share, corn prices would not likely be affected, and there would be little or no reduction in Treasury expenditures on corn deficiency payments. If sugar prices remained low in the long run, further investment in HFCS expansion might be curbed, and sugar might regain some liquid sugar markets.

Taxpayers

The impacts of the sugar program on taxpayers are minimal, since the sugar program's benefits are received through the market price and not through direct payments. The Government receives interest on the nonrecourse CCC loans, and the interest rate for these loans is based upon the estimated cost to the Treasury of 1-year securities. But since the CCC interest rate is well below the prime rate, which is usually the lowest commercial interest rate usually available for large borrowers, nonrecourse loans provide a subsidy to processors and likely take business away from other banks.

Processors pay about $25-30 million per year from the assessment on sugar marketings, and some revenues, about $5 million per year, are collected from import duties. Within-quota duties may be eligible for drawback (returned to payee) if sugar is subsequently exported. Some sugar was forfeited in fiscal 1994. Some of the forfeited sugar was sold at a slight gain, and some remains to be sold.

Effects of GATT and NAFTA on the Sugar Sector

The Uruguay Round GATT Agreement

The Uruguay Round (UR) GATT agreement brings agriculture, including sugar, under world trading rules for the first time. Of the three major areas of reform, only tariff reduction will affect U.S. sugar policies.

Current domestic support and minimum import access provisions of U.S. sugar policy are already consistent with UR provisions. As a result, the UR will have little impact on U.S. sugar price. The UR is likely to raise the world price by 2-5 percent by the year 2000, largely because of worldwide income gains which will increase sugar consumption. However, this small increase in the world price is not likely to have much impact on the U.S. sugar market.

In the UR, the United States agreed to maintain (in GATT parlance, "bind") a minimum annual low-duty import level of 1.139 million metric tons, raw value (1.256 million short tons), a level similar to the minimum estimated import level provided for in the 1990 Farm Act. Of the total, 22,000 metric tons will be reserved for refined sugar. The current low duty of 0.625 cent a pound, raw value, will continue to apply to quota imports, the level of which is to be determined by the Secretary of Agriculture. Most countries will still have the low duty waived under either the GSP or the CBI program.

The high duty on raw sugar applies to sugar imports above the tariff-rate quota level. Beginning January 1, 1995, the high duty is 17.62 cents a pound, and will be lowered about 0.46 cent each year until it reaches 15.36 cents a pound in the year 2000.

Section 22 quotas on sugar-containing products have been converted to tariff-rate quotas, with low-tariff quota amounts set at approximately the same levels as the previous quotas. The new tariffs on over-quota amounts are based on 1986-88 tariff-equivalents, and will be lowered by 15 percent over 6 years, Most of these over-quota tariffs will probably remain prohibitive. By the year 2000, the U.S. tariff of 15.36 cents a pound, given transportation costs of 1.5 cents, would protect a U.S. raw sugar market price of 22 cents a pound at a world price above 5 cents a pound.

NAFTA

The North American Free Trade Agreement (NAFTA) became effective on January 1, 1994, and will eliminate most trade barriers between Canada, Mexico, and the United States over the next 15 years. NAFTA does not address sugar trade between the United States and Canada.

For purposes relating to access to the other country's sugar market, a formula defines "net surplus production" at roughly equal to projected sugar production minus projected domestic consumption. If this formula yields a positive number, the country is a net surplus producer. HFCS will be included in the formula, but on the consumption side only. Thus, a country would have to produce sugar in excess of its consumption of both sugar and HFCS in order to attain net surplus producer status.

Although NAFTA sugar provisions are reciprocal, it is simplest to describe them in terms of Mexican access to the U.S. market. In years l-6, Mexico will have duty-free access for sugar exports to the United States in the amount of its net surplus production, up to a maximum of 25,000 metric tons, raw value. If

Mexico is not a net surplus producer, however, it will still have duty-free access for 7,258 metric tons, or the "minimum boatload" amount authorized under the U.S. tariff-rate quota.

In years 7-15, Mexico will have duty-free access to the U.S. sugar market for the amount of its net surplus production, up to a maximum of 250,000 metric tons, with minimum duty-tree access still at the "boatload" amount.

Sugar tariffs between the United States and Mexico are scheduled to decline by 15 percent over the first 6 years and to Zero by year 15. By the end of year 6, Mexico will install a tariff-rate quota system, with a second-tier tariff applicable to all other countries that is equal to the U.S. second-tier tariff.

U.S. cane sugar refiners shipping sugar to Mexico under the Re-export Program will be guaranteed Most-Favored-Nation (see Glossary) treatment, but NAFTA will not provide lower tariffs for the re-exported sugar since refining does not confer origin on the sugar. NAFTA does allow for reciprocal duty-free access between the United States and Mexico for sugar that is refined from raw sugar produced in the other country.

The Mexican tariff on U.S. HFCS, initially 15 percent, is scheduled under NAFTA to decline to zero over 10 years: for 1995 it was 12 percent. Barriers to sugar-containing products are converted to tariffs and likewise will decline to zero over 10 years. U.S. manufacturers of sugar-containing products are optimistic that the reduction in tariffs will open market opportunities in Mexico.

Given that NAFTA is reciprocal, the same barriers for Mexican sugar access to the U.S. market also apply to U.S. sugar access into the Mexican market. Since the United States is not likely to attain "net surplus pro ducer" status, especially with a GATT-bound minimum import level, U.S. sugar will not have duty-free access (except for a boatload quantity) to the Mexican market until the year 2008. Without these trade barriers, more U.S. sugar would be sold in Mexico. For example, there might be cross-border trade from U.S. production facilities near the border. Also, sugar quality is important to many buyers, and the United States has a comparative advantage in some high-quality types of sugar.

During the debate over NAFTA, the U.S. sugar industry was concerned with how rapidly the Mexican HFCS market would grow. In the United States, HFCS has gained approximately 45 percent of the combined sugar/HFCS market, and a similar share in Mexico would amount to more than 1.5 million tons.

Mexico currently produces no HFCS but is expected to slowly develop capacity. The substitution of HFCS for sugar in Mexico will, if left to market forces, depend upon relative prices. If the Mexican sugar price level approximates the U.S. sugar price, then HFCS use in Mexico will likely grow. However, HFCS will not likely attain as high a market share as in the United States for a variety of reasons. Mexico is not competitive in corn production, and so will have to import either the HFCS or corn, resulting in increased transportation costs. The distribution system within Mexico will also likely continue to be higher cost, and the smaller market will prevent some economies of size. HFCS would become competitive in southern Mexico only if transportation costs fall and its price relative to sugar continues to fall.

Whether or not HFCS substitution results in Mexico becoming a major surplus sugar producer, NAFTA will limit Mexican access to the U.S. sugar market until the end of the 15-year phase-in period when the second-tier tariff falls to zero.

Current U.S. Sugar Market Issues

Rising Beet Sugar Market Share

Expanding beet sugar production is an ongoing structural shift in the U.S. sugar sector, and could increase competitive pressure on domestic cane sugar producers and foreign cane suppliers. The de facto minimum import level of 1.25 million short tons provides foreign cane sugar suppliers and domestic cane sugar refiners with an assured floor for cane sugar imports, regardless of beet sugar supplies. The standby domestic marketing allotments, by being based in part on historical market shares, tend to preserve market share for domestic cane sugar.

The structural shift could also test the limits of the ability of the program to function effectively. For example, the dependence of the price support mechanism on a quota system that restricted raw cane sugar supplies worked well when imported cane sugar was over 30 percent of the domestic market, but imports are now about 15 percent.

There is no futures market in refined sugar, so the futures price for raw cane sugar has served for many years as a guide to all sugar prices. When cane sugar dominated the refined sugar market, this was a reason-

able (though rough) guide. However, as beet sugar market share rises, the raw cane sugar price becomes less accurate as an industry indicator. A trade publication survey of refined beet sugar prices is best viewed as indicative, not as a price discovery mechanism.

The absence of a refined sugar futures market is not surprising, given the structure of the industry. There are seven refined cane sugar sellers, two of which are not large and market mostly locally, and also seven refined beet sugar sellers. There are only 11 independent sellers of refined sugar (7 cane, 7 beet, but 3 joint beet/cane). The three companies that process both beet and cane sugar have over half the market. The purchasing side of the market is also concentrated, though not as much.

Under the 1981 and 1985 Acts, as long as the raw sugar price was high enough to prevent cane sugar forfeitures, beet sugar prices were generally above forfeiture levels. But as the beet sugar loan rate rose under the 1990 Farm Act (fig. 35), higher beet sugar prices were required to discourage forfeiture.

Cane sugar refiners continue to be at a disadvantage under the current program. They must purchase raw sugar at supported prices and sell refined sugar in competition with beet processors, who do not face a purchase price above 20 cents a pound for their primary input.

Marketing Allotments

Standby domestic marketing allotments have been controversial. Marketing allotments were not implemented for fiscal years 1992 and 1994 but were imposed for fiscal years 1993 and 1995. For fiscal year 1993, allotments were announced at the beginning of the last quarter of the fiscal year (about June 30, 1993), when some companies had already marketed more than their annual allotment. The late announcement also caused significant market disruption, particularly for some small buyers who had difficulty obtaining supplies. Equal weights were applied to each of the three factors (past marketings, processing capacity, and ability to market) in determining the allotment levels.

When allotments were announced for fiscal 1995, the weights applied to the three factors were 25 percent on past marketings, 25 percent on capacity, and 50 percent on ability to market. For the fiscal 1995 decision, USDA determined that market efficiencies would be recognized by changing the weights for the three factors so as to create a closer correlation between each company's production and allocation.

The beet sugar share of the overall 1995 allotment is 54.17 percent, and the cane sugar share 44.83 percent.

An August 1993 lawsuit filed against USDA questioned whether the threat of forfeitures (that is, low prices) could be used as justification for allotments, even if forecast sugar imports were above 1.25 million tons. The USDA won the case and will continue to use allotments as circumstances require to control supply.

Import Quota Issues

The sugar import quota is allocated to about 40 countries based on U.S. imports during 1975-81. The justification for using that period weakens with time; many quota-holding countries are no longer net exporters. An alternative allocation would be to auction off the U.S. import quota to domestic or foreign firms. Quota rents (extra revenues received due to the U.S. price exceeding the world price) currently accrue to the quota-holding country, but the rents could be retained domestically if given to domestic firms. Also, this approach would remove much of the concern about quota shortfalls, which occur when supplying countries are unable to fill their quota.

Policy Options and Alternatives

Several options exist for the sugar program. Preserving the basic structure of the nonrecourse loan program provides one set of options. To continue price support, a mechanism for domestic supply control is necessary. At the other extreme, the domestic program could be eliminated. The policy debate in 1995 will occur in the context of the U.S. commitment to bind a minimum access level for imports of 1.256 million tons in the Uruguay Round of GATT. This commitment precludes domestic sugar legislation from increasing the protection afforded domestic sugar producers from foreign sugar, even if surpluses arise.

Policy Options Within Current Sugar Program Mechanisms

Loan Rate Options

The nonrecourse loan rate and domestic marketing allotments could be preserved. Import restrictions, under the Harmonized Tariff Schedule, would continue to provide border protection.

If the raw cane sugar loan rate were lowered from 18 cents a pound and price fell correspondingly, sugar

consumption would be slightly higher and production lower. As a result, import requirements would be higher. The magnitude of these adjustments would be larger, the lower the loan rate. Marketing allotments would less likely be triggered. Compared with the current support level, consumers would benefit and producers would lose. Quota-holding countries would experience a lower quota premium, although they could also gain volume if import requirements rose above the minimum level. HFCS producers would face more competition from lower priced sugar.

The effect of a lower loan rate on sugar prices, however, would depend upon import requirements and import policies. Prices could be maintained at levels well above the minimum implied by the lower loan rate if import constraints (at GATT-consistent levels) resulted in sufficient supply control to maintain higher prices.

Raising the loan rate (and price) would increase sugar production, slow consumption, and reduce import requirements. U.S. producers would gain, consumers would lose, and quota-holding countries would benefit from the higher price. Domestic supply control would be required. Supply controls would impede the potential for competitive evolution of market shares among various processors and could preserve historical market shares. Depending upon how the allotments were structured, some companies might receive perpetual quota value from their allotments. The market shares of domestic beet and cane sugar would likely be set by the Government. Beet sugar production might be so constrained that it would be lower with a higher loan rate, depending upon the supply control provisions.

Marketing Allotment Options

Under the current program, "allotments" refers to the overall amount of beet sugar and cane sugar permitted to be marketed, and "allocations" refers to a company's permitted marketings.

There has been considerable debate over the current method of dividing up the domestic market between beet sugar processors and raw cane sugar processors. In general, any formula that includes a base period (such as the 1985-89 crops) will tend to preserve market share for companies that are not expanding and to constrain the market share of companies that would otherwise expand. If the base period were eliminated, the penalty on expanding companies would be eliminated, and market forces would have a stronger impact on company production levels.

The current law also mandates a strict separation of the beet sugar and cane sugar allocations. A shortfall of production below either the domestic beet or cane allotment must be filled by imports, not from the other (cane/beet) domestic sector. Thus, imports could be increased while domestic sugar was being held off the market. A single allotment could hurt cane sugar refiners and quota-holding countries, but would likely benefit those parts of the U.S. sugar industry that have been expanding, since it would allow excess domestic sugar to be used to fill production shortfalls.

Deficiency Payment Program

While the current sugar program is intended to support farmers, processors also benefit. A deficiency payments program at the farm level would focus support mainly to farmers.

Sugar deficiency payments could work much as they do for other crops. A level of support would be chosen, expressed as a target price for sugarcane and sugar beets. The current levels of support prices for sugarcane and sugar beets could be maintained, for example, and distinguished by region. Processors would receive a market price for their sugar, and pay sugar beet and sugarcane farmers as they do now, based on contracts. If the grower received a price below the target price, a deficiency payment would make up the difference.

Payments could be targeted under a deficiency payment program similar to other agricultural support programs. Payment limitations, which are not possible under a price support loan program, could be implemented if desired.

While the world sugar price has been well below the U.S. price for many years, the actual U.S. price under a deficiency payments program would be affected by administrative decisions about the size of the import quota. If sugar imports were kept at minimum levels, it is quite possible that in some years the U.S. sugar price would equal or exceed support levels, reducing or eliminating Treasury costs under a deficiency payments program.

A deficiency payments program would allow sugar to more freely compete for market share with other sweeteners. Consumers would likely pay less for sugar and other sweeteners. Cane refiners could compete with beet processors without the current constraint of a price floor on raw cane sugar. Depending upon where the target price was set, sugarcane and sugar beet farmers could be better or worse off

than under the current program. Sugarcane and sugar beet processors would likely receive lower revenues. However, a portion of the decline in the sugar price received by the processor could be passed back to growers, who receive about 60 percent of revenues from sugar.

While more economically efficient than a supply control/price support program, direct support payments can be highly visible due to the potential for budget outlays.

Elimination of Domestic Program

Elimination of the U.S. domestic sugar program implies a reduction of the U.S. sugar price. The actual effect on price, however, depends on how imports are managed and on the levels of domestic sugar production and consumption.

Under one scenario, the United States could target the level of imports under the first-tier tariff at 1.256 million tons, the GAIT minimum. If domestic sugar supply were to fall or not keep up with consumption growth, the U.S. price would likely climb, perhaps even above its current level. If the price increase were sustained, U.S. sugar production would rise and consumption fall, constraining the price increase.

Alternatively, the U.S. sugar price could fall if U.S. sugar production rose sharply and low-duty imports were held at 1.256 million tons. In response to lower prices, sugar production would fall and consumption increase until a new equilibrium was reached.

The price equilibrium depends upon the level of imports and tariffs. If first-tier tariff imports were fixed at the 1.256-million-ton level and if that level of imports resulted in a surplus in the U.S market, then the U.S. price could fall to the world price plus the first-tier tariff (0.625 cent a pound) plus transportation costs (about 1.5 cents a pound to coastal cities, more to inland areas). If 1.256 million tons of imports resulted in a shortfall in the domestic market, the U.S. price could rise as high as the world price plus the second-tier tariff (currently 17.62 cents a pound) plus transportation costs.

Actual U.S. prices would not sink as low as indicated. Most U.S. refined sugar is of high quality and could maintain a premium over refined imports. The higher transportation costs to get imported sugar to the interior of the United States, the area with the largest demand for sugar, would also preserve a premium for many U.S. sugar producers.

Further U.S. Sugar Policy Considerations

Other features of the current program could be changed. A loan program for processors could be maintained, but converted to a recourse loan program where the loans would have to be paid back: there would be no Federal budget costs, continuing the no-cost feature of the current program. The assessment on domestic sugar marketings, currently providing the Treasury about $30-35 million a year, could be changed or dropped.

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Glossary

Bagasse. Fibrous residue remaining after sugarcane has been crushed to extract the sugar-containing juices.

Blends. Generic term usually referring to certain liquid and dry mixtures of sugar and other ingredients that were (1) embargoed by Presidential Proclamation No. 5071 of June 28, 1983, (2) treated as commingled merchandise pursuant to a U.S. Customs Service ruling of November 7, 1984, or (3) subjected to emergency import quotas established by Presidential Proclamation No. 5294, as amended by Presidential Proclamation No. 5340 of May 17, 1985.

Caribbean Basin Initiative (CBI). Popular name for the Caribbean Basin Economic Recovery Act of 1983, which eliminates duties on imports of products from designated Caribbean countries until September 30, 1995. The CBI also provides for import relief to U.S. industries injured or threatened by increased imports from CBI countries.

Commodity Credit Corporation (CCC). USDA agency responsible for directing and financing major USDA "action programs," including price support, production stabilization, commodity distribution, and related programs. CCC also directs and finances certain agricultural export activities. CCC activities are implemented by the Consolidated Farm Service Agency (formerly Agricultural Stabilization and Conservation Service).

Corn syrup. A purified concentrated solution of nutritive saccharides obtained from corn starch by partial hydrolysis, clarification, decolorization, and evaporation to syrup density. Many people consider the expression "glucose" synonymous with corn syrup.

Cost of production. The sum, measured in dollars, of all purchased inputs, allowances for management, investment, and rent necessary to produce farm products. Cost-of-production statistics may be expressed as an average per acre, per bushel, or per pound.

Crop year. In the sugar beet areas, the crop year is defined as the year of intended harvest. The only exception is for spring-planted beets in California that are intended to be overwintered and harvested the following year. In the mainland cane areas, the crop year corresponds with the year in which harvest normally starts, and corresponds closely to the following fiscal year. For example, Florida's 1994 crop year includes sugar produced from October 1994 to April 1995. Thus Florida's 1994 crop year is the same as fiscal 1995. In Hawaii, the crop year is the calendar year, and does not correspond to the fiscal year, since Hawaii produces sugar year-round.

Desugarization of molasses. An industrial process that extracts sugar from beet molasses. Desugarization of cane molasses is more difficult and has not achieved broad commercial application, but is reported to be under development in Hawaii. In a typical processing factory, about 15-25 percent of theoretically available sugar remains in molasses and is not recovered. A desugarization facility, usually adjacent or attached to the processing factory, can recover much of the sugar in beet molasses, raising the total recovery of theoretically available sugar in sugar beets from 75-85 percent to over 90 percent. This process allows about 10 percent more sugar to be recovered from a given tonnage of sugar beets.

Dextrose. A monosaccharide produced commercially by the complete hydrolysis or conversion of starch. Since dextrose historically has been produced largely from corn starch, it is commonly called "refined corn syrup." To the chemist, the name "glucose" is synonymous with "dextrose," but to the layman glucose usually means corn syrup or a glucose-type syrup produced from sorghum, wheat, or potato starch. Dextrose is of two principal types, hydrate and anhydrous. The larger share of the dextrose is of the hydrate type which contains approximately 8-percent moisture; the anhydrous type contains less than 0.5-percent moisture.

Direct-consumption sugar. The term "direct consumption" means any sugars that are principally of crystalline structure and any liquid sugar that are not to be further refined or otherwise improved in quality.

Drawback. A practice authorized by the U.S. Customs Service whereby an exporter of a product may claim for refund up to 99 percent of any duties

and fees paid to import the components of the product. Under regulations dealing with drawback, an export of a product is eligible for drawback if the product was made within 3 years of the date of importation of the components of the product, if the product was then exported within 2 years of the time the product was made, and if documents are to U.S. Customs within 3 years of the date the product was exported.

European Union (EU). An organization established by the Treaty of Rome in 1957 and also formerly known as the European Economic Community (EEC), the Common Market, and the European Community (EC). The EU attempts to unify and integrate member economies by establishing a customs union and common economic policies. Through 1994, the member nations included the original six countries of Belgium, Germany, France, Italy, Luxembourg, and the Netherlands, as well as Denmark, Greece, Ireland, Portugal, Spain, and the United Kingdom. Three countries, Sweden, Austria, and Finland joined in January 1995, bringing membership to 15 countries.

Extraction rate. The percentage of theoretically available sugar in sugar beets or sugarcane which a factory recovers.

Free market. A system in which the market forces of supply and demand determine prices and allocate available supplies. A free-market approach in agriculture would eliminate price and income support programs and barriers to international trade.

Free trade. Exchange of goods between countries with no trade barriers or restrictions such as tariffs or import quotas.

Food, Agriculture, Conservation, and Trade Act of 1990 (P.L. 101-624). The omnibus food and agriculture legislation signed into law on November 28, 1990, that provides a 5-year framework for the Secretary of Agriculture to administer various agriculture and food programs. The act amended permanent legislation—the Agricultural Adjustment Act of 1938 and the Agricultural Act of 1949—for the 1991-95 crops. A further amendment extended the price support loan program for sugar to include the 1996 and 1997 crops (i.e. through fiscal 1998).

Fructose. A highly soluble, simple sugar generally considered sweeter than sucrose, and present in considerable quantities in combination with dextrose and sucrose in invert sugars.

Futures. Contracts that are legally binding commitments to deliver or take delivery of a given quantity and quality of a commodity at a specified price, during a specified month, and at a specified location.

Futures contract. A standardized fixed-price forward contract entered into on an exchange (organized center for trading in commodities). The contract is subject to all terms and conditions included in the rules of that exchange.

General Agreement on Tariffs and Trade (GATT). An agreement, originally negotiated in Geneva, Switzerland, in 1947 among 23 countries, including the United States, to increase international trade by reducing tariffs and other trade barriers. This multilateral agreement provides a code of conduct for international commerce. GATT also provides a framework for periodic multilateral negotiations on trade liberalization and expansion. The eighth and most recent round of negotiations, the Uruguay Round, was concluded in 1994 and will establish a new organization, the World Trade Organization, to oversee the multilateral trade agreement. The United States approved the Uruguay Round agreement in December 1994, and it became effective January 1, 1995 (although some provisions become effective at later dates).

Generalized System of Preferences (GSP). A policy that permits duty-free entry of certain imports from designated developing countries, for the purpose of increasing economic growth, helping maintain favorable foreign relations with free-world developing countries, and providing low-cost aid.

Glucose. Chemically, another name for dextrose. Commercially, another name for corn syrup. Glucose or glucose corn syrup is obtained by the action of acids and/or enzymes on cornstarch. Commercial corn syrups are nearly colorless and very viscous. They consist principally of dextrose and small amounts of maltose, combined with gummy organic materials known as dextrins, in water solution.

Gross returns. The measure of returns used for all sugarcane areas where the principal product of the mills is raw sugar. Gross returns from sales contained herein include CCC payments and the values of raw sugar and molasses at mainland ports of entry or market locations, based on the average market price for sugar and molasses during the applicable settlement periods.

High-fructose corn syrup (HFCS). HFCS is produced by the enzymatic conversion of a portion of the

glucose in corn syrup to fructose. The product is roughly comparable to invert syrup made from sucrose in terms of sweetness and physical properties.

Typical composition of commercially available HFCS products

	HFCS-42	HFCS-55	HFCS-80-90
		Percent	
Fructose	42	55	80-90
Dextrose	52	40	7-19
Higher saccharides	6	5	1-3

Industrial users. Sugar users, (except restaurants hotels, wholesalers, and retailers) who receive sugar directly from primary distributors.

Invert or invert sugar. The mixture of equal parts dextrose and fructose produced by the action of acid or enzymes on sucrose.

Invisible stocks. Stocks of sugar held by wholesalers, retailers, and users of sugar as distinct from stocks of primary distributors.

Market stabilization price (MSP). The market stabilization price has served numerous purposes. From December 22, 1981, to May 5, 1982, import fees and duties were applied to imported sugar to raise its price to the MSP. The import fee system was subsequently adjusted (May 5, 1982) so that import fees and duties were applied to imported sugar in an amount equivalent to the difference between the MSP and the domestic market price. Finally, when the import fee system was suspended on an emergency basis by Presidential Proclamation No. 53 13 of March 29, 1985, the calculation of the MSP was also suspended. For that reason, the calculation of the MSP was put in regulations on September 5, 1985, and the MSP served as a guide for calculating certain bonds and penalties under regulations governing quota-exempt programs. On July 8, 1991, the basis for calculating the bond requirements was changed to the difference between the No. 11 world price and the No. 14 domestic price for sugar. Currently it has no formal role in the management of the sugar program.

Molasses. The edible byproduct of the manufacture of sugar when some, but usually not all, of the crystallizable sugar in the sugarcane juice is removed by the crystallization process.

Most-Favored-Nation principle. Principle embodied in Article I of the General Agreement on Tariffs and Trade whereby any privelege or concession granted by one contracting party to GATT to a product of another contracting party will be unconditionally granted to the like product of all other contracting parties.

Net returns. The measure of returns to be shared by growers and processors in the domestic beet area. The output of the beet sugar factories consists of refined sugar, which moves directly into marketing channels. The net returns from sales of refined sugar are total returns minus delivery and marketing expenses as defined in the sugar beet purchase contract.

(New York) Coffee, Sugar & Cocoa Exchange, Inc. World and domestic raw cane sugar contracts are traded daily on the exchange. The world price is the No. 11 contract price for raw cane sugar (f.o.b. Caribbean) and the domestic price is the No. 14 contract price for raw cane sugar (c.i.f., duty/fee-paid, New York).

Ninety-six degree (96-degree) basis. A computed weight of sugar determined by dividing the weight of its sucrose content by 96 percent.

No cost. A provision of the Food Security Act of 1985, which continues to be in effect, requiring the President to use all available authorities to enable the Secretary of Agriculture to operate the sugar program at no cost to the Government. By "no cost," the sugar price support program is meant to operate so that there are no forfeitures of sugar to the CCC. The import quota on raw and refined sugar may be adjusted, or marketing allotments imposed, such that there are no forfeitures and thus no cost to the Government.

Noncentrifugal sugars. Crude sugars made from sugarcane juice by evaporation and draining off the molasses. Among local names are "muscovado," "panocha," and "papelon."

Nonrecourse loan (program). The loan program for sugarcane and sugar beets is a nonrecourse loan program. This means that if the sugar processor chooses not to redeem (pay back) the loan, the sugar used as collateral for loans from the CCC can be forfeited as full compensation for the loan, without penalty.

No. II contract price. As traded on the (New York) Coffee, Sugar, & Cocoa Exchange, this is an f.o.b., Caribbean price for raw cane sugar, and is usually referred to as the world price. It is traded in both spot and futures. The No. 11 is used under quota-exempt

programs in conjunction with the market stabilization price to calculate bonding requirements and penalties.

No. 12 contract price. As traded on the (New York) Coffee, Sugar, & Cocoa Exchange, this was the c.i.f. duty/fee-paid New York price for imported raw cane sugar. It stopped being traded on the spot market on May 31, 1985, and on the futures market on October 8, 1986. It had been used in conjunction with the market stabilization price to calculate import fees.

No. 14 contract price. As traded on the (New York) Coffee, Sugar, & Cocoa Exchange, this is the c.i.f. duty/fee-paid New York price for imported raw cane sugar. It is traded only on the futures market, and commenced on July 8, 1985. It trades at a premium (higher grade sugar) of about 0.25 cent a pound to the old No. 12 contract, and is now usually referred to as the domestic price (for raw cane sugar). The USDA uses the nearest futures as a proxy for a spot price, and for monthly averages, uses the nearest futures month for which there is a full month of data.

North American Free Trade Agreement (NAFTA). A trade agreement between Canada, Mexico, and the United States which became effective January 1, 1994. For sugar, NAFTA contains provisions which apply to U.S.-Mexico trade, but NAFTA has little effect on U.S.-Canada sugar trade. A formula defines, for each country, the net surplus production of sugar. In years l-6, Mexico will have duty-free access to the United States for the amount of its net surplus production, up to a maximum of 25,000 metric tons, raw value; in years 7-15, the maximum rises to 250,000 metric tons. If Mexico does not have any net surplus production, it will still have duty-free access for 7,258 metric tons or the minimum boatload amount authorized under the U.S. tariff-rate quota. NAFTA is reciprocal: thus the same provisions apply for access of U.S. sugar into Mexico. Over-quota tariffs are scheduled to decline by 15 percent during years l-6, and then to zero by year 15.

The Mexican tariff on U.S. HFCS will decline from its base of 15 percent *ad valorem* to zero over 10 years.

Sugar exported to Mexico under the U.S. Refined Sugar Re-export Program will not be considered of U.S. origin, and will not receive special treatment under NAFTA, but will continue to receive MFN (Most-Favored Nation) treatment.

Parity. The price per pound of sugar produced that would be equivalent to the purchasing power of a pound of sugar in the 1910-14 base year. The concept of parity was originally defined in the Agricultural Adjustment Act of 1933. The 1910-14 purchasing power is not adjusted for subsequent productivity growth. In 1986-88, the parity price for sugar approximated 1.9 times the 10-year average of the sugar price.

Polarization. A measure of sucrose concentration based on its ability to rotate the plane of polarized light. Degree of polarization is determined by means of a saccharimeter (commonly referred to as a polariscope) and is indicative of the percentage of sucrose in high-purity products such as raw cane sugar and white refined sugar.

Primary distributors. Primary distributors consist of continental cane sugar refiners, domestic beet processors, importers of direct-consumption sugar, and mainland cane processors.

Quota-exempt sugar. That sugar imported into the United States which is exempt from quota charge. This sugar is entered under bond for the purpose of re-exportation or for use as livestock feed, or production of polyhydric alcohol.

Ratoon. Second and subsequent crops grown from the root systems of previous plantings of sugarcane. Usually one or more ratoon crops are harvested before the fields are plowed and replanted. Sometimes called stubble.

Raw sugar. Any sugars, whether or not principally of crystalline structure, which are to be further refined or improved in quality to produce any sugars principally of crystalline structure or liquid sugar. In Chapter 17 of the 1995 Harmonized Tariff Schedule of the United States, raw sugar means sugar whose content of sucrose by weight, in the dry state, corresponds to a polarimeter reading of less than 99.5 degrees.

Receipts. Sugar receipts as reported by primary distributors, including quota sugar, quota-exempt sugar for livestock feed, polyhydric alcohol, and export and over-quota sugar held in bond to be charged to a subsequent year's quota.

Re-export sugar. Refers to the process, under regulations governing "Sugar to be Re-Exported in Sugar Containing Products" (7 C.F.R. 1520.200-1520.214) and "Sugar to be Re-Exported in Refined Form" (7 C.F.R. 6.100-6.113), whereby program participants import sugar exempt from quota and subsequently process the sugar for export either as refined sugar or in a sugar-containing product.

Refined sugar. A sugar with most of the undesirable nonsucrose constituents (impurities) removed, and used primarily for human consumption.

Section 22. A section of the Agricultural Adjustment Act of 1933 (P.L. 73-10) that authorizes the President to restrict imports by imposing quotas or fees if the imports interfere with Federal price support programs or substantially reduce U.S. production of products processed from farm commodities. Fees may not exceed 50-percent *ad valorem* nor may quotas exceed 50 percent of the quantity imported during a representative period determined by the President.

Section 22 import quota. Under the authority of Section 22 of the Agricultural Adjustment Act of 1933, the Secretary of Agriculture may recommend to the President the imposition of quotas on imports of an article or articles which the Secretary has reason to believe will or are likely to disrupt domestic program operations. The quotas can be imposed on an emergency basis at the discretion of the President but in no event can they be less than 50 percent of the volume of trade during a representative period. Since enactment of the Agriculture and Food Act of 1981, Section 22 import quotas have been imposed under Presidential Proclamation No. 5071 of Jude 28, 1983, and under Presidential Proclamation No. 5294 as amended by Presidential Proclamation No. 5340 of May 17, 1985. Under the Uruguay Round of the GATT, Section 22 quotas have been converted to tariffs and merged with the Harmonized Tariff Schedules of the United States.

Specialty sugar(s). Regulations governing "Certificates for the Importation of Specialty Sugars" (15 C.F.R. 2013.1-2013.7) indicate that specialty sugars are sugars provided for in items 155.20 and 155.30 of the Tariff Schedules of the United States and which: (1) are not currently commercially produced in the United States or reasonably available from domestic sources; (2) are the product of a country listed in Headnote 3(c)(ii) of Subpart A, Part 10 Schedule 1 of the Tariff Schedules of the United States, and (3) require no further refining, processing, or other preparation prior to consumption, other than incorporation as an ingredient in human food. If the certifying authority determines that a sugar meets the above criteria, then a certificate can be issued to authorize its importation as a specialty sugar. The total U.S. import quota for specialty sugars has been 2,000 tons a year. The main types of specialty sugars imported into the United States under the specialty sugar quota include brown slab sugar (an Asian sugar used for cooking) and pearl sugar used in baking. Quota amounts and new regulations to implement the Harmonized Tariff Schedule under the Uruguay Round GATT agreement are not finalized.

Sucrose. A sweet, crystallizable, colorless substance that constitutes the "sugar" of commerce. Refined cane and beet sugars are essentially 100-percent sucrose. Technically, sugar is a disaccharide of glucose and fructose having formula $C_{12}H_{22}O_{11}$, derived from either sugarcane or sugar beets.

Sugar-containing products. Products containing at least lo-percent embodied sugar. With limited exceptions, imported products that contain less than lo-percent sugar are not considered competitive with comparable domestic products.

Syrup. Concentrated clarified cane juice before crystallization.

Tariff. Taxes (duties or fees) imposed on commodity imports by a government. A tariff may be either a fixed charge per unit of product imported (specific tariff) or a fixed percentage of value *(ad valorem* tariff).

Tariff-rate quota. A system in which a certain quantity of imports, called the quota amount, receives a low tariff, and imported quantities above that quota level pay a higher tariff.

Tel quel. Literally, "as such." In describing sugar, it means a polarization usually varying among mills and producing areas.

Appendix table 1--Sugar beets: Acreage harvested by region and State, crop year

Region and State	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994 1/
													1,000 acres												
Region 1:																									
Michigan	90	83	87	87	80	91	91	86	92	88	97	99	97	104	106	118	110	142	145	150	157	166	175	187	187
Ohio	39	41	33	30	33	39	37	23	23	14	18	14	2/	13	11	13	15	16	15	12	19	19	21	18	16
Region 2:																									
Minnesota	151	111	112	131	163	196	248	260	263	244	243	256	252	259	263	276	311	310	334	341	364	363	370	379	411
North Dakota	93	74	74	79	140	131	150	155	155	143	143	145	145	142	139	144	164	161	176	160	193	194	195	191	202
Region 3:																									
Colorado	145	139	134	114	126	155	121	72	84	73	91	77	46	37	44	3	37	37	39	40	40	40	40	40	43
Kansas	44	39	36	34	35	43	38	24	26	12	15	14	10	7	7	0	0	0	0	0	0	0	0	0	0
Montana	57	47	45	45	44	49	46	45	45	43	43	45	43	41	25	43	47	49	49	52	55	56	56	54	54
Nebraska	79	78	62	74	76	96	85	68	76	72	85	78	45	65	68	53	59	60	62	62	71	70	78	80	74
New Mexico	2	1	1	1	0	1	1	1	2	2	2	2	1	2/	2/	2/	2/	2/	2/	2/	2/	2/	2/	2/	2/
Texas	29	20	23	21	20	34	23	18	24	20	24	25	29	32	38	37	37	32	33	35	41	31	40	39	25
Utah	29	25	22	18	17	23	18	10	13	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wyoming	59	62	57	54	54	58	56	48	49	46	45	45	38	32	33	49	51	53	56	59	64	66	69	64	62
Region 4:																									
Idaho	169	164	173	144	91	156	139	107	132	126	138	144	136	143	144	152	160	162	166	177	166	195	200	204	201
Oregon	20	20	22	18	12	16	15	8	9	7	7	11	10	11	12	12	13	14	14	15	17	19	17	15	16
Washington	62	70	92	92	63	62	77	62	69	2/	2/	2/	2/	2/	2/	2/	2/	2/	2/	2/	2/	2/	2/	2/	2/
Region 5:																									
Arizona	12	10	13	10	to	17	17	13	15	11	9	13	13	0	0	0	0	0	0	0	0	0	0	0	0
California	266	334	329	263	no	326	312	217	194	215	229	260	162	169	206	203	168	216	212	169	166	156	150	136	141
Other States	4	2	4	1	0	1	6	1	2	2	2	2	1	0	0	0	0	0	12	2	2	2	3	12	
U.S. total	1,367	1,326	1,335	1,215	1,213	1,517	1,479	1,216	1,269	1,120	1,190	1,226	1,027	1,056	1,096	1,103	1,191	1,252	1,301	1,295	1,377	1,367	1,412	1,409	1,443

1/ Preliminary.
2/ Included with Other States.
Source: USDA.

Appendix table 2--U.S. sugar beets and beet sugar: Acreage, production, yield, and recovery rate

Crop year	Sugar beets					Beet sugar		
	Acreage		Production	Yield per acre		Production, raw value	Recovery rate	Yield per harvested acre, raw value
	Planted	Harvested		Planted	Harvested			
	----- *1,000 acres* -----		*1,000 tons*	---------- *Tons* ----------		*1,000 tons*	Percent	Tons
1950	1,012	924	13,565	13.4	14.7	2,015	14.83	2.18
1951	763	696	10,497	13.8	15.1	1,541	14.66	2.21
1952	716	661	10,181	14.2	15.4	1,519	14.92	2.30
1953	815	765	12,507	15.4	16.3	1,873	14.97	2.45
1954	943	855	13,766	14.6	16.1	1,999	14.52	2.34
1955	802	744	12,238	15.3	16.4	1,730	14.14	2.33
1956	836	789	13,107	15.7	16.6	1,971	15.04	2.50
1957	921	882	15,640	17.0	17.7	2,213	14.15	2.51
1958	942	895	15,254	16.2	17.0	2,213	14.51	2.47
1959	940	897	16,757	17.8	18.7	2,302	13.74	2.57
1960	979	962	16,618	17.0	17.3	2,475	14.89	2.57
1961	1,146	1,091	17,927	15.6	16.4	2,431	13.56	2.24
1962	1,179	1,101	18.236	15.5	16.6	2,595	14.23	2.36
1963	1,300	1,249	23,406	18.0	18.7	3,086	13.19	2.47
1964	1,456	1,393	23,643	16.2	17.0	3,332	14.09	2.39
1965	1,308	1,240	20,470	15.6	16.5	2,816	13.76	2.27
1966	1,240	1,161	20,478	16.5	17.6	2,853	13.93	2.46
1967	1,210	1,136	19,598	16.2	17.3	2,694	13.74	2.37
1968	1,509	1,442	25,670	17.0	17.8	3,490	13.59	2.42
1969	1,670	1,563	28,737	17.2	18.4	3,472	12.08	2.22
1970	1,431	1,367	25,320	17.7	18.5	3,322	13.12	2.43
1971	1.389	1,325	26,867	19.3	20.3	3,512	13.07	2.65
1972	1,424	1,335	28,466	20.0	21.3	3,632	12.76	2.72
1973	1,277	1.215	24,569	19.2	20.2	3,216	13.09	2.65
1974	1,252	1,213	22,123	17.7	18.2	2,916	13.18	2.40
1975	1,595	1,517	29,704	18.6	19.6	4,019	13.53	2.65
1976	1,525	1,479	29,386	19.3	19.9	3,895	13.25	2.63
1977	1,273	1.216	25,007	19.6	20.6	3,108	12.43	2.56
1978	1,305	1,269	25,788	19.8	20.3	3,289	12.75	2.59
1979	1.161	1,120	21,996	18.9	19.6	2,879	13.09	2.57
1980	1,231	1,190	23,502	19.1	19.8	3,149	13.40	2.65
1981	1,252	1.228	27,538	22.0	22.4	3,388	12.30	2.76
1982	1,054	1,027	20,894	19.8	20.3	2,737	13.10	2.67
1983	1,081	1,056	20,992	19.4	19.9	2,699	12.86	2.56
1984	1,124	1,096	22,134	19.7	20.2	2,905	13.12	2.65
1985	1,125	1,102	22,529	20.0	20.4	3,000	13.32	2.72
1986	1,232	1,191	25,162	20.4	21.1	3,416	13.58	2.87
1987	1,267	1,252	26,072	22.2	22.4	3,998	14.24	3.19
1988	1,327	1,301	24,810	18.7	19.1	3,507	14.14	2.70
1989	1.324	1,295	25,131	19.0	19.4	3,442	13.70	2.66
1990	1,400	1,377	27.513	19.6	20.0	3,842	13.96	2.79
1991	1.427	1,387	28,203	19.8	20.3	3,729	13.22	2.69
1992	1,437	1,412	29.143	20.3	20.6	4,366	15.05	3.11
1993	1,438	1,409	26,249	18.3	18.6	4,047	15.42	2.87
1994 1/	1,476	1,443	32,008	21.7	22.2	4,650	14.53	3.22

1/ Forecast. Beet sugar production estimate is fiscal year basis.
Source: USDA.

Appendix table 3--U.S. sugarcane: Acreage harvested for sugar, by area

Crop year	Mainland			All mainland	Hawaii 1/	Puerto Rico	U.S. total
	Florida	Louisiana	Texas				
				1,000 acres			
1950	37.4	273.0	n.a.	310.4	109.4	367.1	786.9
1951	38.9	258.0	n.a.	296.9	109.5	366.4	772.8
1952	42.8	275.0	n.a.	317.8	108.1	391.8	817.7
1953	44.5	260.0	n.a.	324.5	108.3	364.6	817.4
1954	38.6	247.0	n.a.	285.6	107.5	367.1	760.2
1955	34.8	232.0	n.a.	266.8	106.2	361.1	734.1
1956	30.1	204.0	n.a.	234.1	107.0	352.9	694.0
1957	32.6	226.0	n.a.	258.6	106.7	361.5	726.8
1958	34.4	219.0	n.a.	253.4	84.1	327.7	665.2
1959	46.4	250.0	n.a.	296.4	110.4	344.6	751.4
1960	48.9	255.0	n.a.	303.9	103.6	328.0	735.5
1961	56.1	277.0	n.a.	333.1	108.3	328.1	769.5
1962	114.3	254.3	n.a.	368.6	108.6	306.6	785.8
1963	139.9	295.5	n.a.	435.4	107.4	303.1	845.9
1964	219.8	325.3	n.a.	545.1	110.8	303.1	959.0
1965	185.4	266.3	n.a.	473.7	109.6	287.6	870.9
1966	190.7	286.5	n.a.	479.2	111.0	272.8	863.0
1967	190.6	293.8	n.a.	484.4	111.8	263.3	859.5
1968	181.4	282.4	n.a.	463.8	113.5	237.1	814.4
1969	153.6	236.0	n.a.	389.6	113.2	180.1	682.9
1970	171.3	266.0	n.a.	437.3	113.8	187.5	736.6
1971	189.9	301.0	n.a.	490.9	115.8	157.3	764.0
1972	243.8	312.0	n.a.	555.8	108.5	155.4	819.7
1973	257.6	319.0	18.2	594.8	108.2	137.6	840.6
1974	258.4	308.0	27.7	594.1	95.8	130.5	820.4
1975	286.6	308.0	35.0	629.6	105.1	127.7	862.4
1976	286.0	291.0	27.1	604.1	99.9	123.8	827.8
1977	285.0	304.0	33.5	622.5	96.8	114.8	834.1
1978	300.0	268.0	32.4	600.4	99.4	93.3	793.1
1979	318.2	240.0	30.9	589.1	100.6	86.8	776.5
1980	320.7	232.0	33.5	586.2	97.4	79.1	762.7
1981	334.4	247.0	36.6	618.0	97.6	74.1	789.7
1982	341.4	234.0	35.7	611.1	89.3	54.4	754.8
1983	361.1	245.0	34.5	640.6	92.8	54.4	787.8
1984	371.9	205.0	34.3	611.2	89.5	56.8	757.5
1985	383.4	226.0	30.4	639.8	83.0	51.9	774.7
1986	390.0	248.0	29.1	667.1	83.6	49.4	800.1
1987	402.0	263.0	33.8	698.8	79.5	56.8	835.1
1988	404.0	279.0	31.7	714.7	78.9	49.4	843.0
1989	405.0	290.0	33.6	728.6	74.7	44.5	847.8
1990	419.0	201.0	34.4	654.4	72.0	42.0	768.4
1991	428.0	321.0	33.2	782.2	67.4	34.6	884.2
1992	426.0	345.0	37.7	808.7	61.7	37.1	907.5
1993	425.0	360.0	43.5	828.5	64.8	33.6	926.9
1994 2/	428.0	352.0	42.5	822.5	61.5	29.9	913.9

n.a. = Not applicable.
1/ Calendar year.
2/ Preliminary.
Source: USDA.

Appendix table 4--U.S. cane sugar yield per acre

Crop year	Mainland			All mainland	Hawaii	Puerto Rico	U.S. total
	Florida	Louisiana	Texas				
				Short tons			
1950	2.9	1.7	n.a.	1.8	8.8	3.4	3.5
1951	3.1	1.2	n.a.	1.4	9.1	3.7	3.6
1952	3.6	1.6	n.a.	1.9	9.4	3.0	3.4
1953	3.4	1.7	n.a.	1.9	10.1	3.1	3.6
1954	3.4	1.9	n.a.	2.1	10.0	3.2	3.8
1955	3.4	2.0	n.a.	2.2	10.7	3.2	3.9
1956	4.3	2.1	n.a.	2.4	10.3	2.8	3.8
1957	4.2	1.8	n.a.	2.1	10.2	2.6	3.5
1958	4.0	2.0	n.a.	2.3	9.1	3.3	3.7
1959	3.8	1.8	n.a.	2.1	8.8	3.0	3.5
1960	3.3	1.8	n.a.	2.1	9.0	3.4	3.6
1961	3.7	2.3	n.a.	2.6	10.1	3.1	3.8
1962	3.3	1.9	n.a.	2.3	10.3	3.2	3.8
1963	3.0	2.6	n.a.	2.7	10.3	3.3	3.9
1964	2.6	1.8	n.a.	2.1	10.6	3.0	3.4
1965	3.0	1.9	n.a.	2.3	11.1	3.1	3.7
1966	3.4	1.9	n.a.	2.5	11.1	3.0	3.8
1967	3.8	2.5	n.a.	3.0	10.7	2.4	3.8
1968	3.0	2.4	n.a.	2.6	10.9	2.0	3.6
1969	3.5	2.3	n.a.	2.8	10.4	2.6	4.0
1970	3.8	2.3	n.a.	2.9	10.2	1.7	3.7
1971	3.3	1.9	n.a.	2.5	10.6	1.9	3.6
1972	3.9	2.1	n.a.	2.9	10.3	1.6	3.7
1973	3.2	1.7	2.1	2.4	10.4	2.1	3.4
1974	3.1	1.9	2.7	2.5	10.9	2.3	3.4
1975	3.7	2.1	3.6	2.9	10.5	2.4	3.8
1976	3.3	2.2	3.5	2.8	10.5	2.2	3.6
1977	3.1	2.2	2.6	2.7	10.7	1.8	3.5
1978	3.2	2.1	1.9	2.6	10.4	2.1	3.5
1979	3.3	2.1	3.0	2.8	10.5	2.0	3.7
1980	3.5	2.1	2.8	2.9	10.5	1.9	3.8
1981	2.9	2.9	3.0	2.9	10.7	1.5	3.7
1982	3.8	2.9	2.7	3.4	11.0	1.8	4.2
1983	3.4	2.5	1.7	2.9	11.3	1.8	3.8
1984	3.8	2.2	2.4	3.2	11.9	1.9	4.1
1985	3.7	2.4	2.5	3.2	12.2	1.8	4.0
1986	3.8	2.7	3.1	3.4	12.5	1.9	4.2
1987	3.8	2.8	3.1	3.4	12.3	1.8	4.1
1988	3.9	2.9	3.4	3.5	11.8	1.9	4.1
1989	3.5	2.9	2.1	3.2	11.6	1.5	3.8
1990	4.3	2.2	2.6	3.6	11.4	1.6	4.2
1991	4.3	2.4	3.3	3.5	10.7	1.9	4.0
1992	4.0	2.5	3.6	3.4	10.6	1.7	3.8
1993	4.2	2.5	3.3	3.4	10.4	1.5	3.8
1994 1/	4.3	2.9	3.4	3.7	2/	1.5	3.9

n.a. = Not applicable.
1/ Preliminary.
2/ Current Hawaii sugar production estimate is fiscal year, for which no estimate of area harvested is available.
Source: USDA.

Appendix table 5--U.S. cane sugar production by area

Crop year	Mainland			All mainland	Hawaii 1/	Puerto Rico	U.S. total
	Florida	Louisiana	Texas				
			1,000 short tons, raw value				
1950	106	456	n.a.	564	961	1,238	2,763
1951	122	297	n.a.	419	996	1,372	2,787
1952	154	451	n.a.	605	1,020	1,182	2,807
1953	151	479	n.a.	632	1,099	1,204	2,935
1954	132	478	n.a.	610	1,077	1,166	2,853
1955	119	455	n.a.	574	1,140	1,152	2,866
1956	129	432	n.a.	661	1,109	990	2,651
1957	136	396	n.a.	534	1.085	934	2,553
1956	136	443	n.a.	579	765	1,087	2,431
1959	175	441	n.a.	616	975	1,019	2,610
1960	160	470	n.a.	630	936	1,110	2,676
1961	208	650	n.a.	858	1,092	1,009	2,959
1962	380	472	n.a.	852	1,120	989	2.961
1963	424	759	n.a.	1.183	1,101	989	3,273
1964	574	573	n.a.	1,147	1,179	897	3,223
1965	554	550	n.a.	1,104	1,218	883	3,205
1966	652	562	n.a.	1,214	1,234	818	3,266
1967	717	740	n.a.	1,457	1,191	645	3,293
1968	546	669	n.a.	1,215	1,232	484	2,931
1969	535	537	n.a.	1,072	1,182	460	2,714
1970	652	602	n.a.	1,254	1,162	324	2,740
1971	635	571	n.a.	1,206	1,230	299	2,735
1972	961	660	n.a.	1,621	1.119	255	2,995
1973	824	558	38	1,420	1,129	291	2,840
1974	803	594	74	1,471	1,041	303	2,815
1975	1,061	640	126	1,827	1,107	312	3,246
1976	930	650	94	1,674	1,050	267	2,991
1977	894	666	88	1,650	1,034	204	2,886
1978	972	550	61	1,583	1,029	194	2,806
1979	1,047	500	93	1,640	1,060	177	2,877
1980	1,121	491	93	1,705	1,023	153	2,881
1981	963	712	110	1,785	1,048	114	2,947
1982	1,307	675	98	2,080	983	100	3,163
1983	1,223	603	60	1.886	1,044	97	3,027
1984	1,412	452	81	1,945	1,062	109	3,116
1985	1,413	532	76	2,021	1,012	96	3,129
1986	1,476	671	91	2,238	1,043	96	3,377
1987	1.517	731	106	2,354	979	101	3,434
1988	1,566	797	107	2,470	928	91	3,489
1989	1,399	844	69	2,312	864	68	3,244
1990	1,806	438	88	2,332	820	74	3,226
1991	1,833	762	111	2,706	724	67	3,497
1992	1,710	876	135	2,721	652	64	3,437
1993	1,770	890	145	2,805	677	51	3,533
1994 2/	1,840	1,020	145	3,005	540	45	3,590

n.a. = Not applicable.
1/ Calendar year until 1994.
2/ Estimate. Beginning with 1994, the 1994 crop equals the 1994/95 fiscal year.
Source: USDA.

Appendix table 6--U.S. cane sugar recovery rates 1/

Crop year	Mainland			All mainland	Hawaii 2/	Puerto Rico	U.S. total
	Florida	Louisiana	Texas				
				Percent			
1950	9.24	8.58	n.a.	8.70	11.76	11.79	10.93
1951	9.68	6.65	n.a.	7.32	11.75	10.94	11.28
1952	10.30	7.96	n.a.	8.45	11.73	11.62	9.89
1953	10.39	8.32	n.a.	8.76	12.21	11.07	11.12
1954	10.49	8.50	n.a.	8.86	11.42	11.81	10.49
1955	10.26	8.04	n.a.	8.42	11.55	11.18	10.79
1956	10.78	8.97	n.a.	9.33	11.10	11.37	10.11
1957	10.01	7.96	n.a.	8.43	11.48	10.30	10.42
1958	10.44	9.08	n.a.	9.37	10.13	10.66	10.66
1959	9.88	8.69	n.a.	9.00	10.35	10.19	9.87
1960	10.30	8.42	n.a.	8.83	10.87	10.32	10.39
1961	10.22	9.13	n.a.	9.37	11.38	10.44	10.03
1962	9.38	8.88	n.a.	9.10	11.41	9.77	10.27
1963	9.54	8.87	n.a.	9.10	10.97	10.09	9.87
1964	8.91	7.76	n.a.	8.30	11.23	10.19	9.45
1965	10.06	8.41	n.a.	9.16	11.34	9.33	10.14
1966	10.76	8.56	n.a.	9.62	11.25	10.02	9.88
1967	10.96	9.12	n.a.	9.94	10.78	9.79	9.73
1968	10.17	9.07	n.a.	9.53	10.92	8.20	9.57
1969	10.29	9.46	n.a.	9.86	10.91	7.69	9.83
1970	11.50	8.69	n.a.	9.95	11.11	7.07	9.44
1971	10.54	8.87	n.a.	9.68	11.51	6.82	9.86
1972	10.35	8.23	n.a.	9.36	11.27	7.04	10.46
1973	10.19	8.49	6.13	9.29	11.71	8.12	9.95
1974	10.72	9.06	8.24	9.84	11.46	8.58	10.19
1975	10.49	9.89	10.19	10.25	11.67	8.59	10.53
1976	9.97	8.72	9.68	9.43	11.45	8.40	9.79
1977	10.53	9.19	9.00	9.86	11.50	7.19	9.99
1978	10.61	10.09	6.43	10.17	11.11	8.48	10.15
1979	10.50	10.10	10.90	10.39	11.00	7.94	10.39
1980	11.23	9.07	9.60	10.42	11.10	7.52	10.36
1981	10.10	10.71	9.53	10.30	11.87	7.19	10.45
1982	10.81	10.47	8.87	10.59	11.16	7.07	10.53
1983	10.79	10.31	5.48	10.32	11.70	8.02	10.58
1984	11.68	10.02	8.46	11.08	12.56	8.59	11.45
1985	11.20	9.80	8.30	10.66	12.78	8.32	11.12
1986	11.43	9.91	10.45	10.89	12.45	7.94	11.20
1987	11.68	12.24	10.08	11.76	12.22	7.30	11.66
1988	12.27	11.30	10.12	11.83	12.20	7.52	11.75
1989	11.00	11.34	8.31	11.02	12.20	7.92	11.21
1990	12.14	10.55	9.64	11.70	12.54	7.95	11.77
1991	12.27	10.75	10.32	11.71	12.36	8.33	11.75
1992	12.09	10.94	10.47	11.61	12.01	8.00	11.58
1993	12.20	10.83	10.27	11.62	12.29	8.07	11.67
1994 3/	12.17	12.07	10.36	12.04	12.28	8.07	11.61

n.a. = Not applicable.
1/ Recovery rate is equal to sugar produced, divided by sugarcane processed, expressed as a percent.
2/ Calendar year, except fiscal year in 1994.
3/ Preliminary. 1994 estimate is fiscal year 1994/95.
Source: USDA.

Appendix table 7--U.S. sugarcane: Production for sugar by area

Crop year	Mainland			All mainland	Hawaii 1/	Puerto Rico	U.S. total
	Florida	Louisiana	Texas				
				1,000 short tons			
1950	1,169	5,312	n.a.	6,481	8,175	10,615	25,271
1951	1,260	4,463	n.a.	5,723	8,477	10,501	24,701
1952	1,495	5,667	n.a.	7,162	8,694	12,537	28,393
1953	1,453	5,759	n.a.	7,212	9,004	10,171	26,387
1954	1,258	5,625	n.a.	6,883	9,432	10,880	27,195
1955	1,160	5,661	n.a.	6,821	9,868	9,873	26,562
1956	1,197	4,617	n.a.	6,014	9,910	10,306	26,230
1957	1,358	4,976	n.a.	6,334	9,448	8,709	24,491
1956	1,303	4,879	n.a.	6,182	7,553	9,067	22,802
1959	1,771	5,073	n.a.	6,844	9,416	10,182	26,442
1960	1,554	5,583	n.a.	7,137	8,613	10,001	25,751
1961	2,036	7,116	n.a.	9,154	9,595	10,754	29,503
1962	4,050	5,315	n.a.	9,365	9,813	9,663	28,841
1963	4,446	8,554	n.a.	13,000	10,034	10,123	33,157
1964	6,439	7,383	n.a.	13,822	10,495	9,802	34,119
1965	5,505	6,542	n.a.	12,047	10,738	8,807	31,592
1966	6.057	6,563	n.a.	12,620	10,970	9,465	33,055
1967	6,542	8,111	n.a.	14,653	11,046	8,160	33,859
1966	5,368	7,377	n.a.	12,745	11,280	6,590	30,615
1969	5,199	5,676	n.a.	10,875	10,839	5,902	27,616
1970	5,671	6,927	n.a.	12,598	10,457	5,981	29,036
1971	6,022	6,438	n.a.	12,460	10,685	4,582	27,727
1972	9,288	8,022	n.a.	17,310	9,929	1,382	28.621
1973	6,069	6,570	620	15,279	9,645	3,621	28,545
1974	7,494	6,558	898	14,950	9,081	3,585	27,616
1975	10,117	6,468	1,236	17,821	9,485	3,533	30,839
1976	9,324	7,451	971	17,746	9,173	3,630	30,549
1977	6,493	7,265	978	16,736	8,994	3,177	28,907
1976	9,160	5,449	949	15.558	9,263	2,835	27,656
1979	9.975	4,950	853	15,778	9,632	2,288	27,698
1980	9,985	5.414	969	16,368	9,214	2,235	27,817
1981	9,530	6,650	1,154	17,334	8,831	2,038	28,203
1982	12,086	6,450	1,105	19,641	8,808	1,580	30,029
1983	11,330	5,850	1,095	18,275	8,926	1,419	28,620
1984	12,067	4,510	957	17,554	8,454	1,209	27,217
1985	12,615	5,430	916	18,961	7,916	1,271	28,148
1986	12,916	6,770	871	20,557	8,379	1,208	30,144
1987	12,990	5,970	1,052	20,012	8,014	1,389	29,415
1988	12,766	7,050	1,057	20,873	7,606	1,217	29,696
1989	12,717	7,440	830	20,987	7,082	863	28,932
1990	14,674	4,150	913	19,937	6,538	929	27,404
1991	14,937	7,090	1,076	23,103	5,857	807	29,767
1992	14,143	8,010	1,290	23.443	5,430	799	29,672
1993	14,512	8,220	1.412	24,144	5,508	628	30,280
1994 2/	15,120	8,448	1,301	24,869	5,504	560	30,933

n.a. = Not applicable.
1/ Calendar year.
2/ Preliminary.
Source: USDA.

Appendix table 8--U.S. sugarcane: Yield per harvested acre for sugar by area

Crop year	Mainland			All mainland	Hawaii 1/	Puerto Rico	United States
	Florida	Louisiana	Texas				
				Tons 2/			
1950	31.3	19.5	n.a.	20.9	74.7	28.6	32.1
1951	32.4	17.3	n.a.	19.3	77.4	34.2	32.0
1952	34.9	20.6	n.a.	22.5	80.4	26.0	34.7
1953	32.7	20.6	n.a.	22.2	83.1	28.3	32.3
1954	32.6	22.8	n.a.	24.1	87.7	26.9	35.8
1955	33.3	24.4	n.a.	25.6	92.9	28.5	36.2
1956	39.8	23.6	n.a.	25.7	92.6	24.7	37.8
1957	41.7	22.0	n.a.	24.5	88.5	25.1	33.7
1958	37.9	22.3	n.a.	24.4	89.8	31.1	34.3
1959	38.2	20.3	n.a.	23.1	85.3	29.0	35.2
1960	31.8	21.9	n.a.	23.5	83.1	32.8	35.0
1961	36.3	25.7	n.a.	27.5	88.6	29.5	38.3
1962	35.4	20.9	n.a.	25.4	90.4	32.8	36.7
1963	31.8	28.9	n.a.	29.9	93.4	32.3	39.2
1964	29.3	22.7	n.a.	25.4	94.7	29.1	35.6
1965	29.7	22.7	n.a.	25.4	98.0	32.9	36.3
1966	31.8	22.7	n.a.	26.3	98.8	29.9	38.3
1967	34.3	27.6	n.a.	30.2	98.8	25.0	39.4
1968	29.6	26.1	n.a.	27.5	99.4	24.9	37.6
1969	33.8	24.1	n.a.	27.9	95.8	33.2	40.4
1970	33.1	26.0	n.a.	28.8	91.9	24.4	39.3
1971	31.7	21.4	n.a.	25.4	92.3	27.9	36.3
1972	38.1	25.7	n.a.	31.1	91.5	23.3	34.9
1973	31.4	20.6	34.1	25.7	89.1	26.1	34.0
1974	29.0	21.3	32.4	25.2	94.8	27.1	33.7
1975	35.3	21.0	35.3	28.3	90.2	28.4	35.8
1976	32.6	25.6	35.8	29.4	91.8	25.7	36.9
1977	29.8	23.9	29.2	26.9	92.9	24.7	34.7
1978	30.5	20.3	29.3	25.9	93.2	24.5	34.9
1979	31.3	20.6	27.6	26.8	95.7	25.8	35.7
1980	31.1	23.3	28.9	27.9	94.6	25.8	36.5
1981	28.5	26.9	31.5	28.0	90.5	21.3	35.7
1982	35.4	27.6	31.0	32.1	98.6	26.1	39.8
1983	31.4	23.9	31.7	28.5	96.2	22.3	36.3
1984	32.5	22.0	27.9	28.7	94.5	22.4	35.9
1985	32.9	24.0	30.1	29.6	95.4	22.2	36.3
1986	33.1	27.3	29.9	30.8	100.2	24.4	37.7
1987	32.3	22.7	31.1	28.6	100.8	24.4	35.2
1988	31.6	25.3	33.3	29.2	96.4	24.6	35.2
1989	31.4	25.7	24.7	28.8	94.8	19.4	34.1
1990	33.5	20.6	26.5	30.5	90.8	22.1	35.7
1991	34.9	22.1	32.4	29.5	66.9	23.3	33.7
1992	33.2	23.2	34.2	29.0	88.0	21.6	32.7
1993	34.1	22.8	32.5	29.1	85.0	18.7	32.7
1994	35.3	24.0	30.6	30.2	89.5	18.7	33.8

n.a. = Not applicable.
1/ Calendar year.
2/ Net tons.
Source: USDA.

Appendix table 9--Sugarcane processors: Company, factory location and capacity

Company	Factory location	Grinding capacity			
		1982	1988	1992	1993
		Short tons			
Florida:					
Atlantic Sugar Association	Belle Glade	10,000	12,000	12,000	17,000
Okeelanta Sugar Corporation	South Bay	20,000	20,500	20,000	22,000
Osceola Farms Copmany	Canal Point	7,800	12,000	12,000	11,000
Sugarcane Growers Coop. of Florida	Belle Glade	21,000	21,000	21,000	21,000
United States Sugar Corporation	Clewiston	14,500	22,000	24,000	22,000
	Bryant	14,500	17,000	18,750	16,000
Talisman Sugar Corp.	South Bay	10,000	11,000	11,000	10,000
Total		97,800	115,500	118,750	119,000
Average		13.971	16,500	16,964	17,000
Texas:					
Rio Grande Valley Sugar Coop.	Santa Rosa	9,500	10,000	10,000	10,000
Louisiana:					
Alma Plantation, Ltd.	Lakeland	5,500	5,800	7,000	7,000
Breaux Bridge Sugar Coop., Inc. 1/	Breaux Bridge	2,900	3,200	4,800	4,800
Caire & Graugnard	Edgard	1,800	2,000	2,200	2,200
Cajun Sugar Coop., Inc.	New Iberia	5,500	6,000	8,000	8,000
Caldwell Sugars, Coop., Inc.	Thibodaux	6,000	6,000	6,800	6,800
Cinclare Central Factory	Brusly	3,100	4,200	5,500	5,500
Cora-Texas Mfg., Co.. Inc.	White Castle	6,450	9,000	11,000	11,000
Dugas & LeBlanc. Ltd.	Paincourtville	4.550	5,936	6,600	6,600
Evan Hall Sugar Coop., Inc.	McCall	5,600	6,000	7,500	7,500
Helevetia Sugar Coop., Inc.	Convert	3,000	—	---	---
Glenwood Coop., Inc.	Napoleonville	4,900	5,550	5,600	5,600
Iberia Sugar Coop., Inc.	New Iberia	4,250	5,500	6,500	6,500
Jeanerette Sugar Co., Inc.	Jeanerette	4,500	5,000	6,500	6,500
LaFourche Sugar Corp.	Thibodaux	8,000	8,500	9,000	9,000
Meeker Sugar Coop., Inc.	Lecompte	4,000	---	---	---
M.A. Patout & Sons Ltd.	Jeanerette	7,000	9,000	14,500	14,500
Raceland Factory	Raceland	7,500	8,500	9,500	9,500
St. Martin Sugar Coop., Inc. 1/	St. Martinville	4,350	4,650	5,200	5,200
St. James Sugar Coop., Inc.	St. James	5,500	6,000	7,000	7,000
St. Mary Sugar Coop., Inc.	Jeanerette	4,250	5,000	5,500	5,500
Savoie Industries, Inc.	Belle Rose	4,500	6,0003	6,800	6,800
Smithfield Sugar Coop.. Inc.	Port Allen	3,800	---	---	---
Sterling Sugars, Inc.	Franklin	7,500	7,500	9,500	9,500
Teche Sugar Company	Franklin	4,500	4,500	---	---
Total		118,950	123,836	145,000	145,000
Average		4,956	5.897	7,250	7,250
Hawaii:					
Alexander & Baldwin, Inc.					
Hawaiian Commercial & Sugar Co.	Puunene, Maui	8,300	8,300	8,300	8,300
	Paia, Maui	4,700	4,700	4,700	4,700
McBryde Sugar, Co., Ltd.	Kola, Kauai	3,200	3,200	3,200	3,200
Amfac, Inc.					
Kekaha Sugar Co., Ltd.	Kekaha, Kauai	3,000	3,000	3,000	3,000
The Lihue Plantation Co., Ltd.	Lihue, Kauai	4,700	4,700	4,700	4,700
Oahu Sugar Co., Ltd.	Waipahu, Oahu 2/	6,000	6,000	6,000	6,000
Pioneer Mill Co., Ltd.	Lahaina, Maui	2,800	2,800	2,800	2,800
Puna Sugar	Puna, Hawaii 3/	4.000	---	---	---
C. Brewer and Co., Ltd					
Hilo Coast Processing Co.	Pepeekeo, Hawaii 4/	4,700	4,700	4,700	4,700
Ka'u Sugar Co., Inc.	Pahala, Hawaii 5/	2,900	2,900	2,900	2,900
Olokele Sugar Co., Inc.	Kaumakani, Kauai	2,800	2,800	2,800	2,800
Castle and Cooke, Inc.					
Waialua Sugar Co.	Waialua, Oahu 5/	5,000	5,000	5,000	5,000
Hamakua Sugar Co.	Haina, Hawaii 4/	4,200	8,000	8.000	8,000
	Ookala, Hawaii 6/	4,300	---	---	---
Total		60,600	56,100	56,100	56,100
Average		4,329	4,675	4,675	4,675
Total United States		286,850	305,436	329,850	330,100

--- = Closed down. 1/ Breaux Bridge and St. Martin merged into Louisiana Sugarcane Cooperative, Inc.. October 1, 1993. 2/ Schedule to close April, 1995. 3/ Puna mill closed in 1982. 4/ Closed September/October 1994. 5/ Scheduled to close in 1996 or 1997. 6/ Ookala mill closed in 1987.
Source: Florida Sugarcane League, American Sugarcane League, Hawaii Sugar Planters Association.

Appendix table 10--U.S. raw sugar prices, duty fee-paid, New York, monthly, quarterly, and fiscal and calendar years

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1st Q.	2nd Q.	3rd Q.	4th Q.	Calendar	Fiscal
										Cents/lb								
1980	19.66	24.69	21.18	22.67	31.89	32.10	28.75	33.13	36.03	41.69	39.28	30.29	21.84	28.89	32.64	37.09	30.11	25.05
1981	29.61	26.07	23.81	19.91	17.43	18.95	19.09	17.42	15.49	15.66	16.28	17.07	26.50	18.76	17.33	16.34	19.73	24.92
1982	18.16	17.77	17.13	17.89	19.57	21.03	22.15	22.45	20.88	20.44	20.79	20.83	17.69	19.50	21.83	20.69	19.92	18.84
1983	21.23	21.76	21.86	22.43	22.59	22.54	22.09	22.55	22.20	21.94	21.83	21.47	21.62	22.52	22.28	21.75	22.04	21.78
1984	21.51	21.90	22.00	22.03	22.01	22.06	21.89	21.72	21.70	21.56	21.40	21.10	21.80	22.03	21.77	21.35	21.74	21.84
1985	20.72	20.38	20.91	20.97	21.09	21.27	21.23	20.59	19.51	18.68	18.89	19.89	20.67	21.11	20.44	19.15	20.34	20.89
1986	20.67	21.01	20.95	20.85	20.88	20.99	20.97	29.87	20.87	21.08	21.17	21.12	20.88	20.91	20.90	21.12	20.95	20.46
1987	21.50	21.76	21.76	21.81	22.01	22.06	22.07	21.88	21.88	21.69	21.75	21.76	21.67	21.96	21.94	21.73	21.83	21.68
1988	21.83	22.11	22.16	22.16	22.13	22.54	23.43	21.90	21.77	21.74	21.70	21.99	22.03	22.28	22.37	21.81	22.12	22.10
1989	21.88	22.07	22.12	22.30	22.45	22.99	23.56	23.57	23.50	23.14	23.24	22.84	22.02	22.58	23.54	23.07	22.81	22.49
1990	23.11	22.93	23.58	23.81	23.58	23.33	23.42	23.27	23.23	23.29	23.15	22.47	23.21	23.57	23.31	22.97	23.26	23.29
1991	21.86	21.42	21.46	21.23	21.29	21.42	21.25	21.83	22.06	21.76	21.75	21.50	21.58	21.31	21.71	21.67	21.57	21.89
1992	21.38	21.56	21.36	21.38	21.04	20.92	21.10	21.34	21.55	21.61	21.39	21.11	21.43	21.11	21.33	21.37	21.31	21.39
1993	20.76	21.16	21.56	21.76	21.36	21.42	21.89	21.85	21.97	21.80	21.87	22.00	21.16	21.51	21.90	21.89	21.62	21.49
1994	22.00	21.95	21.95	22.08	22.18	22.44	22.72	21.84	21.78	21.58	21.57	22.35	21.97	22.23	22.11	21.83	22.04	22.05

Source: New York, Coffee, Sugar and Cocoa Exchange, Inc.

Appendix table 11--U.S. wholesale refined beet sugar prices, Midwest markets, monthly, quarterly, and fiscal and calendar years 1/

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1st Q.	2nd Q.	3rd Q.	4th Q.	Calendar	Fiscal
										Cents/lb								
1980	25.02	31.30	29.81	29.81	37.90	41.19	38.04	41.33	44.14	51.77	49.37	39.85	28.71	36.30	41.17	47.00	38.29	31.86
1981	38.30	35.80	32.40	29.40	26.00	27.00	26.40	26.20	23.70	24.40	24.40	25.10	35.50	27.47	25.43	24.63	28.26	33.85
1982	27.50	27.50	27.50	27.50	26.80	26.00	27.00	28.60	29.00	28.00	28.00	28.00	27.50	26.77	28.20	28.00	27.62	26.78
1983 2/	24.00	24.00	25.60	26.00	26.50	26.50	26.88	27.00	27.00	26.69	26.50	26.50	24.53	26.33	26.96	26.56	26.10	26.46
1984	26.85	26.50	26.50	26.50	26.50	26.25	25.75	25.31	25.00	24.60	24.12	24.00	26.62	26.42	25.35	24.24	25.66	26.24
1985	23.50	23.42	23.00	23.12	23.55	23.12	23.25	23.50	23.44	23.13	22.50	22.62	23.31	23.26	23.40	22.75	23.18	23.55
1986	23.45	23.31	23.25	23.50	23.30	23.00	23.25	24.10	24.19	23.50	22.81	22.88	23.34	23.27	23.85	23.06	23.38	23.30
1987	23.30	23.50	23.50	23.50	24.15	24.31	24.50	24.50	24.00	22.85	22.50	22.55	23.43	23.99	24.33	22.63	23.60	23.70
1988	22.75	22.75	22.75	23.45	24.19	25.25	27.10	27.75	27.50	27.25	26.75	27.80	22.75	24.30	27.45	27.27	25.44	24.28
1989	28.75	29.00	29.50	29.50	29.50	29.30	28.81	28.76	28.45	27.63	29.00	30.50	29.08	29.43	28.67	29.04	29.06	28.61
1996	30.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50	29.13	28.60	27.38	30.50	30.50	30.50	28.37	29.97	30.14
1991	26.88	26.50	26.50	26.13	26.00	25.75	25.50	25.50	25.00	24.94	24.60	24.50	26.63	25.96	25.33	24.68	25.65	26.57
1992	25.40	26.50	26.50	26.50	26.40	26.00	25.00	25.00	25.00	24.90	24.13	23.90	26.13	26.30	25.00	24.31	25.44	25.53
1993	23.25	23.00	23.00	23.50	23.50	23.50	25.50	27.75	27.50	27.50	27.25	26.50	23.08	23.50	26.92	27.08	25.15	24.45
1994	25.75	25.50	25.50	24.50	24.75	25.25	25.00	25.00	24.70	25.00	25.38	25.50	25.58	24.83	24.90	25.29	25.15	25.60

Note: Revised price series beginning July 1986. 1/ These are f.o.b. basis prices, not delivered prices. To obtain delivered prices, add freight prepays and deduct discounts and allowances. Starting with 1982, prices are for bulk; prior years are for 100-pound paper bags. 2/ Starting 1983, prices are estimated market prices. Source: Milling & Baking News.

Appendix table 12--U.S. retail refined sugar prices, United States, monthly, quarterly, and by fiscal and calendar years

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1st Q.	2nd Q.	3rd Q.	4th Q.	Calendar	Fiscal
										Cents/lb								
1980	27.30	30.10	35.50	36.80	38.00	43.00	46.50	46.20	47.70	50.30	55.00	56.50	30.97	39.27	46.80	53.93	42.74	35.56
1981	53.80	52.30	49.10	44.60	39.50	36.90	35.50	35.10	34.60	33.50	32.70	32.50	51.73	40.33	35.07	32.90	40.01	45.27
1982	32.70	33.90	34.30	33.80	33.50	34.10	34.80	32.50	35.60	35.50	35.50	35.20	33.63	33.80	34.30	35.40	34.28	33.66
1983	36.00	35.50	35.70	35.80	35.50	35.90	36.50	36.50	36.50	36.50	36.70	37.00	35.73	35.73	36.50	36.73	36.18	35.84
1984	36.40	36.40	36.60	36.60	36.70	36.50	35.80	35.80	36.40	36.50	36.20	36.00	36.47	36.60	36.00	36.23	36.33	36.45
1985	35.90	36.00	35.80	35.60	35.40	34.60	35.20	35.40	35.40	35.10	35.00	34.70	35.90	35.20	35.33	34.93	35.34	35.67
1986	35.20	35.30	35.40	35.40	35.50	35.30	34.80	34.80	34.90	34.70	34.90	34.80	35.30	35.40	34.83	34.80	35.08	35.12
1987	35.20	34.90	34.90	34.50	35.30	35.10	34.90	35.50	35.90	35.90	35.70	35.60	35.00	34.97	35.43	35.73	35.28	35.05
1988	35.80	35.70	35.70	35.50	35.60	35.70	36.10	37.00	37.60	38.00	38.10	38.40	35.73	35.60	36.90	38.17	36.60	35.99
1989	38.90	39.20	39.90	39.90	39.90	39.80	40.20	40.30	40.50	40.70	40.40	40.60	39.33	39.87	40.33	40.57	40.03	39.43
1990	41.80	41.90	42.70	42.80	43.00	42.70	42.70	43.30	43.40	43.20	42.90	42.90	42.13	42.83	43.13	43.00	42.78	42.17
1991	43.40	43.00	43.40	43.30	43.10	43.20	43.50	42.80	42.20	42.00	41.90	41.80	43.27	43.20	42.83	41.90	42.80	43.08
1992	42.50	42.40	41.90	41.70	41.70	41.50	41.50	41.10	41.00	41.20	41.20	40.60	42.27	41.63	41.20	41.00	41.53	41.75
1993	41.20	41.00	40.60	40.80	40.80	40.30	40.20	40.60	40.40	40.50	40.30	39.80	40.93	40.63	40.40	40.20	40.54	40.74
1994	40.70	40.50	40.10	39.90	40.10	39.70	40.00	39.70	40.30	40.20	39.50	39.20	40.43	39.90	40.00	39.63	39.99	40.13

Source: U.S. Department of Labor, Bureau of Labor Statistics,

Appendix table 13--Cost of producing and processing beet sugar in the United States, 1981-92 crops

Item	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
						Cents/lb. refined sugar, bulk basis						
Production: 1/												
Variable	6.9	7.2	7.5	7.0	6.7	6.3	5.7	7.5	7.9	7.7	8.3	7.2
Fixed, net of interest	2.2	2.3	2.7	2.5	2.4	2.4	2.4	1.6	1.7	1.6	1.6	1.5
Fixed, interest only	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.3	1.4	1.4	1.3	1.0
Capital replacement	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.3	1.4	1.4	1.5	1.2
Operating capital	0.4	0.4	0.3	0.3	0.3	0.1	0.1	0.3	0.4	0.3	0.2	0.1
Nonland capital	0.4	0.5	0.5	0.5	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.1
Land	1.5	2.0	2.0	1.9	2.0	2.1	2.0	2.8	3.2	2.5	2.9	3.3
Unpaid labor	n.a.		n.a.		n.a.	n.a.	n.a.	0.6	0.7	0.7	0.7	0.8
Total economic costs 2/	11.5	12.3	13.0	11.5	11.5	11.1	10.4	14.5	15.6	14.7	15.7	14.3
Processing: 3/												
Variable	10.7	11.1	9.5	9.4	9.0	8.4	7.6	8.2	8.7	8.7	8.8	7.8
Fixed	2.0	2.4	1.6	1.7	1.5	1.3	1.2	1.4	1.3	1.3	1.4	1.3
General and administrative	0.8	1.0	0.8	0.7	0.7	0.7	0.6	0.7	0.8	0.7	0.7	0.7
Pulp drying and marketing	1.6	1.8	1.6	1.6	1.5	1.4	1.2	1.3	1.3	1.3	1.4	1.3
Total	15.1	16.4	13.4	13.4	12.7	11.8	10.6	11.5	12.2	12.0	12.3	11.0
Total production and processing	26.5	28.7	26.3	25.6	24.3	22.9	21.0	26.0	27.8	26.7	28.0	25.3
Credits:												
Dried pulp	1.9	2.3	2.7	2.6	2.4	2.0	2.1	2.7	2.7	3.1	3.1	2.4
Molasses	0.8	0.7	0.8	0.8	0.7	0.8	0.6	0.9	0.9	0.7	0.7	0.8
Other	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total	2.8	3.2	3.7	3.5	3.2	3.0	2.9	3.7	3.8	4.0	4.0	3.3
Net production and processing	23.7	25.5	22.6	22.1	21.0	19.9	18.2	22.3	24.0	22.7	24.0	22.0

n.a. = Not applicable. 1/ Cost of producing sugar beets at farm level. 2/ Excludes interest. 3/ Cost of processing sugar beets into refined sugar. Source: USDA.

Appendix table 14--Variable and fixed costs of producing and processing beet sugar in the United States, 1981-92 crops

Item	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
						Cents/lb, refined sugar, bulk basis						
Production:												
Variable 1/	7.4	7.6	7.8	7.3	6.9	6.4	5.8	8.4	8.9	8.7	9.3	8.1
Fixed 2/	4.1	4.8	5.2	4.9	4.6	4.7	4.6	6.1	6.7	5.9	6.4	6.1
Total	11.5	12.3	13.0	12.2	11.5	11.1	10.4	14.5	15.6	14.7	15.7	14.3
Processing:												
Variable 3/	9.0	9.2	6.9	7.0	6.9	6.3	5.6	5.4	5.9	5.6	5.8	5.4
Fixed 4/	3.3	4.0	2.8	2.9	2.6	2.4	2.1	2.4	2.5	2.4	2.5	2.3
Total	12.2	13.2	9.7	9.9	9.5	8.8	7.7	7.8	8.4	8.0	8.3	7.7
Total production and processing	23.7	25.5	22.6	22.1	21.0	19.9	18.2	22.3	24.0	22.7	24.0	22.0
Total variable costs	16.4	16.8	14.6	14.3	13.8	12.7	11.4	13.7	14.8	14.3	15.1	13.5
Total fixed costs	7.3	8.8	8.0	7.8	7.3	7.1	6.8	8.6	9.2	8.4	8.9	8.5

1/ Sum of variable and operating capital costs. 2/ Sum of fixed, nonland capital, and land costs. 3/ Sum of variable and 70 percent of dried pulp costs, net of byproduct credits. 4/ Sum of fixed, general and administrative, and 30 percent of dried pulp costs. Source: USDA.

Appendix table 15--Cost of producing and processing 96-degree raw cane sugar in the United States, 1981-92 crops

Item	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
						Cents/lb, raw value						
Production: 1/												
Variable	8.9	8.9	9.4	8.7	8.4	7.8	7.6	7.7	8.5	8.2	8.2	8.2
Fixed, net of interest	2.0	2.0	2.2	2.2	2.2	2.1	2.1	1.3	1.4	1.3	1.4	1.3
Fixed, interest	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.1	0.1	0.1	0.1	0.4
Capital replacement	n.a.	n.a.	n.a.	n a .	n a .	n a .	n.a.	0.7	0.7	0.7	0.7	0.7
Operating capital	0.8	0.6	0.5	0.5	0.3	0.2	0.2	0.3	0.3	0.3	0.2	0.1
Nonland capital	0.6	0.6	0.5	0.6	0.5	0.3	0.3	0.3	0.4	0.3	0.3	0.2
Land	2.0	1.8	1.9	1.7	1.9	1.9	1.9	1.8	2.0	1.6	1.8	1.9
Hauling allowance	-0.2	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
Unpaid labor	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.2	0.3	0.3	0.3	0.2
Total economic costs 2/	14.1	13.7	14.3	13.6	13.1	12.2	12.1	12.3	13.7	12.7	13.0	12.7
Processing: 3/												
Variable	6.5	6.5	6.5	6.5	6.4	6.1	6.0	6.2	6.6	6.6	6.3	6.3
Fixed	1.8	1.7	1.7	1.7	1.6	1.4	1.3	1.3	1.4	1.3	1.3	1.2
General and administrative	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7
Total	9.0	8.7	8.8	8.9	8.6	8.1	7.9	8.1	8.7	8.7	8.2	8.2
Total production and processing	23.1	22.5	23.1	22.5	21.7	20.3	19.9	20.4	21.4	21.4	21.3	20.9
Credits:												
Molasses	0.8	0.6	1.0	0.6	0.8	0.8	0.7	0.8	0.8	0.9	0.8	0.7
Bagasse	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.3
Total	1.2	0.9	1.4	0.9	1.2	1.1	1.1	1.2	1.2	1.3	1.2	1.1
Net production and processing	21.9	21.5	21.7	21.5	20.6	19.2	18.9	19.2	21.2	20.1	20.0	19.9

n.a. = Not applicable. 1/ Cost of producing sugarcane at farm level. 2/ Excludes interest. 3/ Cost of processing sugarcane into raw cane sugar. Source: USDA.

Appendix table 16--Variable and fixed costs of producing and processing raw cane sugar in the United States, 1981-92 crops

Item	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
						Cents/lb. raw value						
Production:												
Variable 1/	9.5	9.4	9.7	9.1	8.6	7.9	7.7	8.2	9.2	8.8	8.8	8.6
Fixed 2/	4.6	4.3	4.6	4.5	4.5	4.3	4.3	4.1	4.5	3.9	4.2	4.1
Total	14.1	13.7	14.3	13.6	13.1	12.2	12.1	12.3	13.7	12.7	13.0	12.7
Processing:												
Variable 3/	5.3	5.5	5.1	5.6	5.2	5.0	4.9	5.0	5.4	5.3	5.1	5.2
Fixed 4/	2.4	2.3	2.3	2.4	2.2	2.0	1.9	1.9	2.1	2.0	2.0	1.9
Total	7.7	7.8	7.4	7.9	7.5	7.0	6.8	6.9	7.5	7.4	7.0	7.1
Total production and processing	21.9	21.5	21.7	21.5	20.6	19.2	18.9	19.2	21.2	20.1	20.0	19.9
Total variable costs	14.8	14.9	14.8	14.7	13.8	12.9	12.6	13.2	14.6	14.1	13.9	13.8
Total fixed costs	7.0	6.6	6.9	6.9	6.8	6.3	6.3	6.0	6.6	6.0	6.2	6.0

1/ Sum of variable and operating capital costs. 2/ Sum of fixed, nonland capital, and land costs. 3/ Variable costs net of byproduct credits 4/ Sum of fixed and general and administrative costs. Source: USDA.

Appendix table 17--Beet sugar grower and processor costs and returns, refined basis

Item	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
						Cents/lb, refined sugar, bulk basis						
Production (grower):												
Returns 1/	12.70	14.47	15.42	13.82	13.57	14.12	14.37	15.59	16.45	16.46	15.58	14.72
Total costs	11.47	12.35	12.96	12.19	11.55	11.08	10.44	14.50	15.63	14.66	15.69	14.01
Net returns 2/	1.23	2.12	2.46	1.63	2.02	3.04	3.93	1.09	0.82	1.80	-0.11	0.71
Processing:												
Gross returns 3/	27.62	26.10	25.66	23.18	23.42	23.60	25.44	29.06	29.97	25.65	25.44	25.15
Processor share 4/	14.92	11.63	10.24	9.38	9.85	9.48	11.07	13.47	13.52	9.19	9.86	10.43
costs	12.24	13.17	9.66	9.87	9.49	8.77	7.73	7.82	8.38	8.02	8.28	7.67
Net returns 2/	2.68	-1.54	0.58	-0.51	0.36	0.71	3.34	5.65	5.15	1.17	1.58	2.76
Grower and processor	3.91	0.58	3.04	1.12	2.39	3.75	7.26	6.75	5.97	2.98	1.47	3.46

1/ Total value of crop, as reported by NASS, divided by sugar production (lbs refined).
2/ Returns minus total costs.
3/ Calendar year average for following year, Chicago Midwest refined beet sugar. For example 26.10 cents is average price for January-December 1983.
4/ Processor share of gross returns is equal to gross return minus payments to growers.
Source: USDA.

Appendix table 18--Cane sugar grower and processor costs and returns, 1981-92

Item	1981	1982	1983	1984	1965	1986	1967	1988	1969	1990	1991	1992
						Cents/lb, raw value						
Production (cane grower):												
costs	14.12	13.73	14.29	13.61	13.10	12.24	12.07	12.27	13.71	12.68	13.03	12.73
Returns 1/	11.57	12.33	12.89	12.21	11.63	12.02	12.25	12.31	12.89	12.94	12.25	12.03
Net return 2/	-2.55	-1.40	-1.40	-1.40	-1.27	-0.22	0.19	0.04	-0.82	0.26	-0.78	-0.70
Processing:												
Costs	7.73	7.80	7.40	7.94	7.45	6.99	6.81	6.91	7.49	7.39	7.02	7.14
Raw sugar price 3/	19.92	22.04	21.74	20.34	20.95	21.83	22.12	22.81	23.26	21.57	21.31	21.62
Processor share 4/	8.35	9.71	8.85	8.13	9.12	9.81	9.87	10.50	10.37	8.63	9.06	9.59
Net return 5/	0.62	1.91	1.45	0.19	1.67	2.82	3.06	3.59	2.88	1.24	2.04	2.45
Joint net return 6/	-1.93	0.51	0.06	-1.20	0.40	2.60	3.24	3.64	2.06	1.50	1.26	1.75

1/ Total value of crop, as reported by NASS, divided by sugar production (lb raw sugar).
2/ Returns minus total costs.
3/ Calendar year average for following year, No. 14 contract. New York.
4/ Raw sugar price minus average grower payment.
5/ Processor share of raw sugar price minus total processing cost.
6/ Combined net return for production and processing.
Source: USDA.

Appendix table 19--Sugar beets: Average production costs per planted acre and net ton, by sugar beet region, 1992 crop

Item	Michigan and Ohio	Minnesota and Eastern North Dakota	Colorado. Nebraska and SE Wyoming	Texas	Montana, NW Wyoming and NW North Dakota	Eastern Idaho	Western Idaho and Oregon	California	United States
				Dollars/planted acre					
Cash receipts:									
Primary crop	649.0	860.0	780.1	769.7	964.8	938.5	1,042.1	1,102.5	840.7
Beet tops	0.0	0.0	0.6	2.5	6.2	0.0	0.2	2.7	0.9
Total	649.0	860.0	780.7	772.2	971.0	936.5	1,042.3	1,105.2	849.6
Variable cash expenses:									
Seed	22.3	36.8	40.5	28.8	46.8	35.6	39.6	33.8	35.5
Fertilizer	56.6	30.2	57.2	41.6	84.5	87.5	109.2	83.1	56.1
Chemicals	53.8	65.9	66.1	99.7	67.9	72.1	76.8	85.6	68.4
Custom operations	29.7	21.0	21.0	102.5	13.2	21.8	49.9	188.2	39.6
Fuel, lube, and electricity 1/	22.5	24.4	54.4	111.1	47.5	83.4	99.9	66.0	45.9
Repairs 2/	35.7	33.4	42.9	54.3	60.9	70.1	41.0	29.6	41.5
Hired labor 3/	55.5	68.1	82.8	75.0	119.4	146.2	203.9	207.0	99.2
Noncash benefits 4/	1.5	1.9	3.5	1.0	5.4	10.1	3.4	1.6	3.2
Purchased irrigation water 5/	0.0	0.0	4.4	0.0	9.3	14.6	10.3	28.7	5.8
Freight and dirt hauling charges	6.1	9.9	14.2	3.8	21.7	11.7	12.2	44.7	15.1
Miscellaneous 6/	4.7	19.4	4.7	3.3	4.1	5.7	3.3	25.8	12.9
Hauling allowance (-)	2.2	13.6	1.8	7.5	1.2	1.4	1.3	24.5	9.2
Total	286.1	297.3	390.0	513.6	479.6	557.4	648.1	769.7	413.7
Fixed cash expenses:									
General farm overhead	49.0	49.4	58.0	64.7	70.9	77.2	62.8	57.4	56.5
Taxes and insurance	40.7	28.1	30.9	26.9	25.2	30.0	26.4	37.3	30.9
Interest 7/	52.1	60.4	63.1	56.1	76.9	61.0	68.0	38.2	58.7
Total	141.8	137.9	152.0	147.7	172.9	168.2	157.3	132.9	146.1
Total cash expenses, variable and fixed	427.9	435.2	542.0	661.3	652.5	725.6	805.4	902.6	559.9
Capital replacement	79.9	62.5	61.1	48.0	91.9	86.4	87.3	45.7	68.2
Returns to owned inputs:									
Operating capital 8/	5.1	5.5	6.9	8.2	8.5	9.9	11.5	21.1	8.6
Nonland capital 9/	10.1	7.0	7.8	4.9	9.6	10.8	12.3	5.5	8.1
Net land return 10/	102.0	166.2	224.0	136.0	172.4	250.3	218.6	162.9	173.2
Return to coop share 11/	n.a.	42.1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	16.4
Unpaid labor 12/	54.3	36.4	63.9	38.2	72.9	43.8	42.0	52.4	47.4
Total	171.6	257.2	302.7	188.3	263.5	314.9	284.5	241.9	253.8
Total economic costs 13/	827.3	694.5	842.6	841.6	931.0	1,065.9	1,109.2	1.152.0	823.1
Residual returns to management and risk 14/	21.7	165.5	-61.9	-69.4	40.0	-127.3	-66.9	-46.9	26.5
				Dollars/net ton of sugar beets					
Variable cash expenses	16.0	16.3	19.8	23.0	21.3	23.5	24.3	25.1	20.2
Fixed cash expenses	8.0	7.6	7.7	6.6	7.7	7.1	5.9	4.3	7.1
Capital replacement	4.5	3.4	3.1	2.2	4.1	3.6	3.3	1.5	3.3
Returns to owned inputs	9.6	14.1	15.4	8.4	11.7	13.3	10.6	7.9	12.4
Total economic costs	35.2	38.1	42.9	37.7	41.4	45.0	41.5	37.5	40.1
Season-average price (dollars/ton)	36.4	47.2	39.7	34.5	42.9	39.6	39.0	35.8	41.4
Yield [net tons/planted acre)	17.8	18.2	19.7	22.3	22.5	23.7	26.7	30.7	20.5

n.a. = Not applicable. 1/ Includes tractor, truck, machinery, and irrigation equipment fuel, lubrication, and electricity. 2/ Includes tractor, truck, machinery, and irrigation equipment repairs. 3/ Includes all hired labor, excludes operator labor. 4/ Includes rental values of housing, personal property, utilities, drinks, snacks, and field toilets provided for workers. 5/ Includes water purchased by the operator; excludes water purchased by the landlord which is included in the share or cash rent agreement (net land return). 6/ Includes costs deducted by the processor from the net payment. 7/ Excluded from total economic costs. 8/ Variable expense items multiplied by part of year used and the 6-month US. Treasury bill rate. 9/ Value of machinery and equipment multiplied by a longrun real rate of return to production assets in farm sector. 10/ Weighted average of cash and share rented acres including irrigation water, fees, and irrigation equipment furnished by landlord. 11/ Prior to 1988, the coop share value was assumed to be included in share or cash rent paid to landlords in Minnesota and eastern North Dakota. 12/ Includes operator, exchange, and other unpaid labor. 13/ Excludes interest (fixed cash expenses). 14 Calculated by subtracting total economic costs from cash receipts. Source: USDA.

Appendix table 20--Beet sugar: Processing costs per pound of refined sugar and net ton of sugar beets, by cost item and area, 1992 crop

Item	East 1/	West 2/	United States
	Cents/lb, refined sugar		
Variable cash expenses:			
Beet acquisition	1.1	1.6	1.4
Processing			
Labor	1.0	1.4	1.2
Fuel	0.9	1.1	1.0
Materials and supplies	1.2	1.5	1.4
Repairs and maintenance	1.1	1.2	1.1
Labor benefits	0.4	0.6	0.5
Marketing	0.8	1.3	1.0
Interest	0.1	0.2	0.1
Total	6.7	6.7	7.8
Fixed expenses:			
Depreciation	0.6	0.3	0.5
Taxes and insurance	0.2	0.2	0.2
Interest	0.8	0.4	0.6
Total	1.8	0.9	1.3
General and administrative:			
Labor	0.3	0.3	0.3
Nonlabor	0.4	0.4	0.4
Total	0.7	0.6	0.7
Pulp drying and marketing	1.6	1.0	1.3
Total processing costs	10.7	11.2	11.0
	Pounds, refined sugar		
Recovery per net ton of beets	280.4	282.0	281.2
	Dollars/net ton, sugar beets		
Variable cash expenses	18.7	24.6	21.9
Fixed cash expenses	5.0	2.5	3.6
General and administrative	1.9	1.8	1.8
Dried pulp	4.6	2.8	3.6
Total processing costs	30.1	31.7	31.0

1/ The East comprises Michigan, Ohio, Minnesota, and the eastern part of North Dakota.
2/ The West comprises all other sugar beet growing areas west of the Mississippi. Totals may not add due to rounding.
Source: USDA.

Appendix table 21--Sugar beets: Production and processing costs per net ton of sugar beets and pound of refined sugar, 1992 crop 1/

Item	United States	
	Dollars per ton	Cents/lb
Production costs:		
Variable cash expenses	20.2	7.2
Fixed cash expenses	7.1	2.5
Capital replacement	3.3	1.2
Operating capital	0.4	0.1
Nonland capital	0.4	0.1
Net land return	9.3	3.3
Unpaid labor	2.3	0.8
Total	43.0	15.3
Total economic costs 2/	40.1	14.3
Processing costs:		
Variable cash expenses	21.9	7.6
Fixed expenses	3.6	1.3
General and administrative	1.8	0.7
Pulp drying and marketing	3.6	1.3
Total	31.0	11.0
Total production and processing costs	71.1	25.3
Credits:		
Dried pulp	6.7	2.4
Molasses	2.1	0.8
Other	0.6	0.2
Total	9.4	3.3
Net production and processing costs	61.7	22.0
	Tons/acre	
Yield per planted acre	20.5	
	Pounds, refined sugar	
Recovery per net ton of beets	281.2	

1/ Totals may not add due to rounding.
2/ Interest (fixed cash expenses) excluded from total economic costs.
Source: USDA.

Appendix table 22--Sugarcane: Average production costs per harvested acre, net ton of sugarcane and per pound of 96 degree raw sugar, by cost item and area, 1992 crop

Item	Florida			Hawaii			Louisiana			Texas			United States		
	Per acre	Per ton	Per lb	Per acre	Per ton	Per lb	Per acre	Per ton	Per lb	Per acre	Per ton	Per lb	Per acre	Per ton	Per lb
	-----Dollars-----		Cents	-----Dollars-----		Cents	-----Dollars-----		Cents	----Dollars----		Cents	----Dollars----		Cents
Cash receipts	989.4	29.0	1/ 12.3		1/	1/	589.3	25.4	11.6	868.7	25.4	12.1	2/	2/	2/
Variable cash expenses:															
Seed 3/	1.1	0.0	0.0	n.a.	n.a.	n.a.	3.4	0.2	0.1	2.7	0.1	0.0	2.0	0.1	0.0
Fertilizer	53.2	1.6	0.7	237.6	2.7	1.1	40.0	1.7	0.8	40.7	1.4	0.7	60.7	1 .a	0.8
Chemicals	54.3	1.6	0.7	134.4	1.5	0.6	54.9	2.4	1.1	50.0	1.5	0.7	60.0	1.8	0.8
Custom operations	89.1	2.7	1.1	58.7	0.7	0.3	8.2	0.4	0.2	17.0	0.5	0.2	51.8	1.6	0.7
Fuel. lube, and electricity 4/	25.4	0.8	0.3	91.9	1.0	0.4	30.2	1.3	0.6	33.7	1.0	0.5	32.3	1.0	0.4
Repairs 5/	96.7	2.7	1.1	420.7	4.6	2.0	58.0	2.5	1.1	76.3	2.3	1.1	100.2	3.0	1.3
Hired labor 6/	301.6	9.1	3.6	1.274.5	14.5	6.0	127.3	5.5	2.5	21 a.0	6.4	3.0	296.6	8.9	3.8
Noncash benefits 7/	64.0	1.9	0.8	n.a.	n.a.	n.a.	3.2	0.1	0.1	0.0	0.0	0.0	32.6	1.0	0.4
Purchased irrigation water 8/	5.8	0.2	0.1	n.a.	n.a.	n.a.	0.0	0.0	0.0	42.2	1.2	0.6	4.5	0.1	0.1
Miscellaneous	3.2	0.1	0.0	95.9	1.1	0.5	11.4	0.5	0.2	20.4	0.8	0.4	14.0	0.4	0.2
Hauling allowance (-)	0.0	0.0	0.0	0.0	0.0	0.0	19.4	0.8	0.4	0.0	0.0	0.0	7.0	0.2	0.1
Total	688.2	20.7	6.6	2,313.9	26.3	10.9	317.2	13.7	6.3	519.8	15.2	7.3	646.9	19.5	8.2
Fixed cash expenses:															
General farm overhead	83.0	2.5	1.0	257.7	2.9	1.2	22.0	1.0	0.4	19.7	0.6	0.3	68.7	2.1	0.9
Taxes and insurance	37.4	1.1	0.5	42.2	0.5	0.2	23.8	1.0	0.5	34.0	1.0	0.5	32.2	1.0	0.4
Interest 9/	45.7	1.4	0.6	n.a.	n.a.	n.a.	13.9	0.6	0.3	52.9	1.6	0.7	30.1	0.9	0.4
Total	166.9	5.0	2.1	299.9	3.4	1.4	59.7	2.6	1.2	106.6	3.1	1.5	130.9	4.0	1.7
Capital replacement	42.8	1.3	0.5	159.8	1.8	0.8	56.4	2.5	1 2	45.4	1.3	0.6	574	1.7	0.7
Returns to owned inputs:															
Operating capital 10/	12.2	0.4	0.2	41.0	0.5	0.2	5.6	0.2	01	9.2	0.3	0.1	11.5	0.3	0.1
Nonland capital 11/	15.6	0.5	0.2	90.4	1.0	0.4	9.4	0.4	0.2	10.0	0.3	0.1	18.1	0.6	0.2
Net land return 12/	186.9	5.6	2.3	211.2	2.4	1.0	82.6	3.6	1.6	183.9	5.4	2.6	146.8	4.4	1.9
Unpaid labor 13/	4.0	0.1	0.1	n.a.	n.a.	n.a.	40.2	1.7	0.8	19.7	0.6	0.3	19.2	0.6	0.2
Total economic costs 14/	1,071.8	32.3	13.3	3,116.0	35.4	14.7	559.2	24.1	11.0	641.8	24.6	11.8	1,000.6	30.2	12.7
Residual returns to management and risk 15/	-62.4	-2.5	-1.0	1/	1/	1/	30.1	1.3	0.6	26.9	0.8	0.4	2/	2/	2/
Season-average price ($/ton)		29.8				1/		25.4			25.4			1/	
Yield (net tons/ harvested acre)		33.2			88.0			23.2			34.2			33.2	
Recovery per net ton of cane, lb raw value		241.8			240.2			21 a.7			209.3			236.9	

n.a. = Not applicable. Note: Totals may not add due to rounding. 1/ Hawaii cash receipts. residual returns to management and risk, and season-average price are excluded because the integrated producer/processor plantations do not value their crop before (a) milling into raw sugar and selling the raw sugar to other refiners or (b) milling, refining, and selling the refined sugar. U.S. average not available without Hawaii. 2/ U.S. averages for cash receipts and residual returns to management and risk are not included because a season-average price for Hawaii cane is not available. 3/ Includes purchased seed only: production inputs for home-produced seed cane are included in the variable cash expense items. 4/ Includes tractor, truck, machinery, and irrigation equipment fuel, lubrication, and electricity. 5/ Includes tractor, truck, machinery, and irrigation equipment repairs. 6/ Includes all hired labor, excludes operator labor. 7/ Includes rental values of housing, personal property, utilities. drinks, snacks, etc. provided for workers. 8/ Includes water purchased by the operator; excludes water purchased by the landlord which is included in the share or cash rent agreement (net land return). 9/ Excluded from total economic costs. 10/ Variable expense items multiplied by part of year used and the 6-month U.S. Treasury bill rate. 11/ Louisiana and Texas--value of machinery and equipment multiplied by a longrun real rate of return to production assets in farm sector. Florida and Hawaii-adjusted book value of assets multiplied by the 10-year U.S. Treasury bond rate. 12/ Weighted average of cash and share rented acres including irrigation water, fees. and irrigation equipment furnished by landlord. 13/ Includes operator. exchange, and other unpaid labor. 14/ Excludes interest (fixed cash expenses). 15/ Calculated by subtracting total economic costs from cash receipts. Source: USDA.

Appendix table 23--Raw sugar: Processing costs per net ton of sugarcane and pound of 96-degree raw sugar, by cost item and area, 1992 drop

Item	Florida		Hawaii		Louisiana		Texas		United States	
	Dollars/ton	*Cents/lb*	*Dollars/ton*	*Cents/lb*	*Dollars/ton*	*Cents/lb*	*Dollars/ton*	*Cents/lb*	*Dollars/ton*	*Cents/lb*
Variable dash expenses:										
Cane transportation	2.0	0.8	2.9	1.2	2.3	1.1	2.8	1.3	2.3	1.0
Processing-										
Labor	2.0	0.8	3.0	1.2	0.4	1.0	1.4	0.6	2.2	0.9
Fuel	0.1	0.1	1.8	0.8	1.4	0.2	0.3	0.2	0.5	0.2
Materials and supplies	0.7	0.3	1.6	0.7	3.9	0.6	1.4	0.7	1.1	0.5
Repairs and maintenance	2.7	1.1	6.1	2.5	1.1	1.8	2.6	1.2	3.7	1.6
Labor benefits	0.6	0.3	4.0	1.7	1.1	0.5	1.0	0.5	1.4	0.6
Marketing	3.5	1.4	6.2	2.6	0.2	0.5	2.8	1.4	3.3	1.4
Interest	0.2	0.1	0.5	0.2	0.2	0.1	0.2	0.1	0.3	0.1
Total	11.8	4.9	26.0	10.8	10.6	5.7	12.5	6.0	14.9	8.3
Fixed dash expenses:										
Depreciation	0.9	0.4	2.0	1.2	1.5	0.7	2.1	1.0	1.5	0.6
Taxes and insurance	0.5	0.2	0.4	0.2	0.5	0.2	0.6	0.3	0.5	0.2
Interest	0.8	0.3	1.8	0.7	0.5	0.2	1.3	0.6	0.9	0.4
Total	2.2	0.9	5.0	2.1	2.5	1.1	3.9	1.9	2.9	1.2
General and administrative:										
Labor	0.6	0.3	0.9	0.4	0.7	0.3	0.5	0.2	0.7	0.3
Nonlabor	0.7	0.3	2.0	0.8	0.6	0.3	0.7	0.3	0.9	0.4
Total	1.4	0.6	2.9	1.2	1.3	0.6	1.2	0.6	1.7	0.7
Total processing costs	15.4	8.4	33.8	14.1	14.4	7.4	17.6	8.4	19.4	8.2
					Pounds sugar, raw value					
Recovery per net ton of cans		241.6		240.2		218.7		209.3		236.9

Note: Totals may not add due to rounding.
Source: USDA.

Appendix table 24--Sugarcane: Production and processing costs per ton of sugarcane and pound of 96-degree raw sugar, by cost item and area, 1992 crop

Item	Florida		Hawaii		Louisiana		Texas		United States	
	Dollars/ton	*Cents/lb*	*Dollars/ton*	*Cents/lb*	*Dollars/ton*	*Cents/lb*	*Dollars/ton*	*Cents/lb*	*Dollars/ton*	*Cents/lb*
Production costs:										
Variable cash expenses	20.7	8.6	26.3	10.9	13.7	6.3	15.2	7.3	19.5	8.2
Fixed cash expenses	5.0	2.1	3.4	1.4	2.6	1.2	3.1	1.5	4.0	1.7
Capital replacement	1.3	0.5	1.8	0.8	2.5	1.2	1.3	0.6	1.7	0.7
Operating capital	0.4	0.2	0.5	0.2	0.2	0.1	0.3	0.1	0.3	0.1
Nonland capital	0.5	0.2	1.0	0.4	0.4	0.2	0.3	0.1	0.6	0.2
Net land return	5.6	2.3	2.4	1.0	3.6	1.6	5.4	2.6	4.4	1.9
Unpaid labor	0.1	0.1	n.a.	n.a.	1.7	0.8	0.6	0.3	0.6	0.2
Total	33.7	13.9	35.4	14.7	24.7	11.3	26.2	12.5	31.1	13.1
Total economic costs 1/	32.3	13.3	35.4	14.7	24.1	11.0	24.6	11.8	30.2	12.7
Processing costs:										
Variable cash expenses	11.8	4.8	26.0	10.8	10.6	4.8	12.5	6.0	14.9	6.3
Fixed expanses	2.2	0.9	5.0	2.1	2.5	1.1	3.9	1.9	2.9	1.3
General and administrative	1.4	0.5	2.9	1.2	1.3	0.6	1.2	0.6	1.7	0.7
Total	15.4	8.2	33.8	14.1	14.4	6.6	17.6	8.4	19.4	8.2
Total production and processing costs	47.7	19.5	89.2	28.8	38.5	17.6	42.2	20.2	49.6	21.0
Credits:										
Molasses	2.0	0.8	1.2	0.5	1.4	0.6	2.2	1.1	1.7	0.7
Bagasse	0.1	0.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.0	0.0
Other	0.2	0.1	3.5	1.5	0.2	0.1	n.a.	n.a.	0.8	0.3
Total	2.2	0.9	4.8	2.0	1.6	0.7	2.2	1.1	2.5	1.1
Net production and processing costs	45.5	18.6	64.5	26.8	38.9	16.9	40.0	19.1	47.1	19.9
					Tons					
Yield per harvested acre		33.2		88.0		23.2		34.2		33.2
					Pounds sugar, raw value					
Recovery per net ton of cane		241.8		240.2		218.7		209.3		236.9

n.a. = Not applicable. Note: Totals may not add due to rounding.
1/ Excludes interest (fixed cash expenses).
Source: USDA.

Appendix table 25--World raw sugar prices, monthly, quarterly, and fiscal and calendar years 1/

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1st Q.	2nd Q.	3rd Q.	4th Q.	Calendar	Fiscal
										Cents/lb								
1980	17.23	23.03	20.12	21.61	31.33	31.61	26.12	31.98	35.12	41.09	37.94	29.00	20.13	28.18	31.74	36.01	29.02	23.39
1981	28.04	24.27	21.77	17.90	15.08	16.35	16.32	14.76	11.66	12.13	11.96	12.96	24.69	16.44	14.25	12.35	16.93	22.85
1982	12.99	13.05	11.24	9.53	8.12	6.85	7.83	6.80	5.90	5.91	6.50	6.27	12.43	8.17	6.84	6.23	8.42	9.95
1983	5.98	6.40	6.18	6.71	9.27	10.80	10.53	10.52	9.48	9.67	8.52	7.82	6.19	8.93	10.17	8.67	8.49	7.88
1984	6.95	6.58	6.42	5.96	5.58	5.48	4.51	4.01	4.11	4.66	4.41	3.51	6.65	5.67	4.21	4.19	5.18	6.30
1985	3.59	3.66	3.78	3.37	2.77	2.74	3.15	4.35	5.14	5.01	5.53	5.37	3.68	2.96	4.21	5.30	4.04	3.76
1986	4.87	5.85	7.07	8.36	7.64	6.36	5.58	5.59	4.67	5.42	5.93	5.66	5.83	7.45	5.25	5.67	6.05	5.96
1987	6.47	7.32	7.51	6.64	6.71	6.40	6.03	5.57	5.79	6.60	7.28	8.25	7.10	6.58	5.89	7.38	6.71	6.29
1988	9.54	8.49	8.48	8.49	8.85	10.52	14.04	11.09	10.18	10.29	10.82	11.28	8.84	9.29	11.77	10.80	10.17	9.32
1989	9.69	10.49	11.54	12.14	11.93	12.63	14.01	13.96	14.13	14.42	15.02	13.52	10.57	12.23	14.03	14.32	12.79	11.91
1990	14.38	14.63	15.39	15.24	14.62	12.99	11.92	10.92	11.00	9.77	10.00	9.72	14.80	14.28	11.28	9.83	12.55	13.67
1991	8.88	8.57	9.22	8.55	7.88	9.37	10.26	9.45	9.39	9.10	8.79	9.03	8.89	8.60	9.70	8.97	9.04	9.26
1992	8.43	8.06	8.22	9.53	9.62	10.52	10.30	9.78	9.28	8.66	8.54	8.15	8.24	9.89	9.79	8.45	9.09	9.22
1993	8.27	8.61	10.75	11.30	11.87	10.35	9.60	9.30	9.52	10.27	10.10	10.47	9.21	11.17	9.47	10.28	10.03	9.68
1994	10.29	10.80	11.71	11.10	11.79	12.04	11.73	12.05	12.62	12.75	13.88	14.76	10.93	11.64	12.13	13.80	12.13	11.25

1/ Contract No. 11-f.o.b. stowed Caribbean port, including Brazil bulk spot price. Source: New York Coffee, Sugar & Cocoa Exchange, Inc.

Appendix table 26--World refined sugar prices, monthly. quarterly, and fiscal and calendar years 1/

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1st Q.	2nd Q.	3rd Q.	4th Q.	Calendar	Fiscal
										Cents/lb								
1980	20.06	26.13	23.60	24.34	35.55	35.40	33.32	35.16	37.29	42.30	40.72	33.70	23.26	31.76	35.26	38.91	32.30	NA
1981	33.03	29.83	27.56	21.48	18.79	20.22	19.38	17.59	13.80	14.85	14.71	14.86	30.14	20.16	16.92	14.81	20.51	26.53
1982	14.77	14.94	13.60	13.05	11.83	10.50	11.38	9.14	8.58	8.54	9.64	10.35	14.44	11.79	9.70	9.51	11.36	12.68
1983	9.69	9.70	9.75	10.00	12.26	14.07	13.36	13.19	11.79	11.89	10.38	10.71	9.71	12.11	12.78	10.99	11.40	11.03
1984	9.61	8.76	8.27	7.89	7.40	7.62	6.88	6.95	7.48	7.79	7.36	6.51	8.88	7.64	7.10	7.22	7.71	8.65
1985	6.43	6.25	6.03	6.00	5.90	6.00	6.19	7.16	7.95	7.71	8.02	7.86	6.24	5.97	7.10	7.86	6.79	6.63
1986	7.63	7.97	8.95	10.10	9.49	8.43	8.11	8.51	8.03	8.16	8.26	8.05	8.18	9.34	8.22	8.16	8.47	8.40
1987	8.65	9.23	9.45	8.66	8.64	8.24	8.09	8.09	8.36	8.56	8.96	10.03	9.11	8.51	8.18	9.18	8.75	8.49
1988	11.41	10.51	10.67	10.86	11.25	12.39	14.85	12.46	11.62	11.94	12.76	13.39	10.86	11.50	12.98	12.70	12.01	11.13
1989	12.63	13.41	14.52	15.19	15.90	17.70	21.19	22.45	19.79	18.00	18.08	17.00	13.52	16.26	21.14	17.69	17.16	15.91
1990	19.01	19.55	20.03	20.31	20.33	18.36	17.42	16.54	14.39	13.99	14.01	13.85	19.53	19.67	16.12	13.95	17.32	18.25
1991	13.39	13.40	13.86	12.90	12.99	13.94	14.73	14.40	13.09	13.03	12.71	12.46	13.55	13.28	14.07	12.73	13.41	13.71
1992	12.18	11.92	12.19	12.54	12.89	13.41	13.41	12.96	12.29	11.94	11.68	11.26	12.10	12.95	12.89	11.63	12.39	12.67
1993	11.60	11.97	13.05	13.38	13.39	12.64	12.20	13.05	12.90	13.23	13.15	12.97	12.21	13.14	12.72	13.12	12.79	12.42
1994	13.14	14.11	15.46	14.92	15.77	16.05	15.54	15.62	15.42	15.46	17.77	18.65	14.24	15.58	15.53	17.29	15.66	14.62

NA = Not available. 1/ Contract No. 5, London Daily Price for refined sugar, f.o.b. Europe, spot. Source: Futures and Options Exchange. London.

Appendix table 27--U.S. sugar imports under quota and tariff-rate quota, by country 1/ 2/

Country		Trade pact status	1982 5/11/82-6/30/82		1982 7/1/82-9/30/82		1982/83 10/1/82-9/30/83		1983/84 9/26/83-9/30/84	
			Quota allocation	Actual imports	Quota allocation	Actual imports	Quota allocation	Actual imports	Quota allocation	Actual imports
	Percent		*Short tons, raw value*							
Argentina	4.3	GSP	9,460	9,460	18,060	18,060	120,409	100,000	130,806	130,806
Australia	8.3	MFN	18,260	0	34,860	34,860	232,400	23,701	252,466	252.646
Barbados	0.7	CBI	1,540	6,260	2,940	1,030	19,808	19,975	21,294	21,228
Belize	1.1	CBI	2,420	2,497	4,620	4,620	30,600	31,378	33,462	33,447
Bolivia	0.8	ANDEAN	1,760	0	3,360	6,347	22,400	22,468	24,336	23,669
Brazil	14.5	MFN	31,900	31,900	60,900	60,900	406,000	413,136	441,090	438,149
Canada	4/	NAFTA 3/	2,420	2,147	4,620	4,628	30,800	31,354	33,482	33,462
Colombia	2.4	ANDEAN	5,280	5,280	10,060	10,089	67,200	69,559	73,008	73,008
Congo	0.3 5/	GSP	n.a.	n.a.	1,260	6,300	n.a.	n.a.	16,776	16,878
Costa Rica	1.5	CBI	3,300	3,300	6,300	0	42,000	42,330	62,415	62,428
Coted' Ivoire	0.3 5/	GSP	660	0	1,260	0	16,500	16,860	16,776	16,970
Dominican Republic	17.6	CBI	38,726	39,204	73,920	68,712	492,600	507,423	535,392	527,810
Ecuador	1.1	GSP	2,420	0	4,620	0	30,800	0	33,462	32,778
El Salvador	2.6	CBI	5,720	5,720	10,920	10,920	72,800	73,725	89.183	88,830
Fiji	0.9	GSP	1,540	0	2,940	15,403	19,600	19,609	21,294	21,315
Gabon	0.3 5/	MFN	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Guatemala	4.8	CBI 5/	10,560	10,560	20,160	20,160	134,406	136,863	146,016	146,106
Guyana	1.2	CBI	2,640	2,640	5,040	5,040	33,600	34,255	36,504	36,402
Haiti	0.3 5/	CBI 6/	660	0	1,260	0	16,508	16.551	16,776	16,490
Honduras	1.0	CBI	2,200	2,200	4,200	4,200	28,008	28,449	59,514	59,662
India	0.8	GSP	1,760	0	3,360	0	22,400	22,985	24,338	23,801
Jamaica	1.1	CBI	2,428	2,154	4,628	4,620	30,800	31,020	33,462	33.481
Madagascar	0.3 5/	GSP	660	0	1,260	0	16,500	16,575	16,776	16,837
Malawi	1.0	GSP	2,420	0	4,620	0	19,600	20,328	29,294	29,347
Mauritius	1.2	GSP	2,420	15	4,620	4,583	30,800	31,357	33,462	33.495
Mexico	0.3 5/	NAFTA 3/	660	1	1,260	0	16,500	16,193	16,778	18.495
Mozambique	1.3	GSP	2,860	0	5,460	5,460	36,400	35,963	39,546	14,598
Nicaragua	2.1	CBI	n.a.	4,620	0	8,736	58,800	58,861	6.000	6,049
Panama	2.9	CBI	6,380	6.385	12,180	12,180	81,200	81,567	88,218	88,239
Papua New Guinea	0.3 5/	GSP	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Paraguay	0.3 5/	GSP	660	0	1,260	0	16,500	16,936	16,776	16,260
Peru	4.1	ANDEAN	9,020	0	17,220	17,194	114,800	116.593	124.722	120,569
Philippines	13.5	GSP	29,700	29,700	56,700	54,906	378,000	385,106	410,670	410,332
St. Christopher-Nevis	0.3 5/	GSP	660	6,429	1,260	0	16,500	16,155	16,776	16.751
South Africa	2.3	CBI	5,060	5,001	9,660	9.745	64,409	64,217	69.966	69,844
Swaziland	1.6	GSP	3,520	3,526	6,726	6,720	44,800	44.932	48,672	48,628
Taiwan	1.2	MFN	2,640	0	5,040	5,040	33,600	33,600	36,504	36,501
Thailand	1.4	GSP	3,080	0	5,880	5,880	39,200	39,096	42,588	42,393
Trinidad-Tobago	0.7	CBI	1,540	0	2,940	0	19,600	0	21,294	21,204
Uruguay	0.3 5/	GSP	n.a.	0	0	0	n.a.	n.a.	16,776	16,789
Zimbabwe	1.2	GSP	2,640	0	5,040	0	33,600	33,175	36,504	36,493
Subtotal			NA	178,993	NA	408,316	2,890,600	2,652,315	3,173,150	3,130,184
Specialty sugars			n.a.	n.a.	n.a.	n.a.	2,000	91	2,000	337
Total			220,000	178.993	420,000	408,316	2,892,600	2,652,406	3,175,150	3,130,521
Canada 4/			NA	NA	NA	NA	NA	NA	NA	NA

Continued--

See footnotes at end of table.

Appendix table 27--U.S. sugar imports under quota and tariff-rate quota, by country--Continued 1/ 2/

Country	Trade pact status	1984/85 10/1/84-11/30/85		1985/86 12/1/85-12/30/88		1987 1/1/87-12/31/87		1988 1/1/88-12/31/88	
		Quota allocation	Actual imports	Quota allocation	Actual imports	Quota allocation	Actual imports	Quota allocation	Actual imports
		Short tons, raw value							
Argentina	GSP	109,220	109,219	73,788	72,917	39,130	38,720	43,175	43,175
Australia	MFN	210,820	210,820	142.428	142,428	75,530	75,530	83,335	83,438
Barbados	CBI	17,780	17,800	12.500	11,678	7,500	7,500	8,205	8,205
Belize	CBI	27,940	28,104	18.876	18,876	10,010	10,010	16,692	16,692
Bolivia	ANDEAN	20,320	21,544	13,728	13.728	7,500	7,500	8,230	8,230
Brazil	MFN	368,300	368,300	248,820	248,820	131,950	131,950	145,590	145,462
Canada	NAFTA 3/	27,940	27,918	18,876	18,902	10,010	9,749	11,045	10,375
Colombia	ANDEAN	60,960	57,175	41,164	41,184	21,840	21,840	24,100	24,102
Congo	GSP	12,500	12,499	12,500	12,500	7,500	7,500	8,000	8,000
Costa Rica	CBI	52,302	52,302	34,713	34,713	17,583	17,583	19.577	19,547
Coted' Ivoire	GSP	12,500	12,500	12,500	12,151	7,500	7,500	8,000	8,000
Dominican Republic	CBI	447,040	447,040	302,016	302,016	160,160	159,319	176,710	169,190
Ecuador	GSP	27,940	28,033	18.876	18,876	10,010	10,010	11,045	7,903
El Salvador	CBI	74,581	74,561	50,000	48,133	26,020	25,893	28,815	28,815
Fiji	GSP	17,780	17.955	12,500	12,500	25,190	25,190	9,035	9,200
Gabon	MFN	12,500	3,461	12,500	12,322	7,500	7,500	8,000	8,000
Guatemala	CBI 5/	121,920	122,439	82,368	82,368	43,660	43,347	48,185	48,962
Guyana	CBI	30,480	30,362	20,592	20,592	10,920	10,920	374	374
Haiti	CBI	12,500	12,112	12,500	12,500	7,500	7,500	8,000	7,600
Honduras	CBI	50,017	50,014	32,713	32,713	15,917	15,917	17,877	17,896
India	GSP	20,320	20,320	13,728	13,728	7,500	7,500	8,230	6,026
Jamaica	CBI	27,940	28,686	18,876	18,876	10,010	10,010	16,692	16,426
Madagascar	GSP	12,500	12,593	12,500	12,462	7,500	7,500	8,000	7.934
Malawi	GSP	35,400	36,317	17,160	17,142	9,100	9,100	10,045	10,045
Mauritius	GSP	27,940	27,970	30,592	30,592	10,920	10,920	12,050	12,050
Mexico	NAFTA 3/	12,500	13,361	12,500	12,500	7,500	7,500	8,000	8,000
Mozambique	GSP	33,020	31,545	22,308	22,290	11,830	11,830	13,055	13,055
Nicaragua	CBI	6,000	6,000	0	0	0	0	0	0
Panama	CBI	73,660	73.814	49,764	49,625	28,390	26,390	0	210
Papua New Guinea	GSP	12,500	12,118	12,500	12,500	7,500	7,416	8,000	8,000
Paraguay	GSP	12,500	12,781	12,500	12,190	7,500	5,787	8,000	8,017
Peru	ANDEAN	104,140	104,108	70,356	68,686	37,310	36,883	41,165	28,580
Philippines	GSP	342,900	325,129	246,999	243,880	143,780	143,760	158,640	158,640
St. Christopher-Nevis	GSP	12,500	12,519	12,500	12,500	7,500	7,500	8,000	8,086
South Africa	CBI	58,420	58,321	24,129	24,129	0	0	0	0
Swaziland	GSP	40,640	40,604	27,456	27,456	14,560	14,560	16,065	16,065
Taiwan	MFN	30,480	30,338	20,592	19,976	10,920	10,920	12,050	12,050
Thailand	GSP	35,560	35,524	24,024	23,993	12,740	12,637	14,055	9,806
Trinidad-Tobago	CBI	17.780	17,663	12,500	12,500	7,500	7,500	8,588	8,588
Uruguay	GSP	12,500	12,347	12,500	12,500	7,500	7,500	8,000	8,000
Zimbabwe	GSP	30,460	30,481	20,592	20,592	10,920	10,920	12,050	12,050
Subtotal		2,675,000	2,646,717	1,848,054	1,838,034	1,001.430	997,131	1,054,675	1,024,794
Specialty sugars		2,000	280	2,000	306	2,000	221	2,000	243
Grand total		2,677,000	2,646,997	1,850,054	1,838,340	1,003,430	997,352	1,056,675	1,025,037
Canada 1/		NA	NA	NA	NA	NA	NA	NA	NA

See footnotes at end of table.

Continued--

Appendix table 27--U.S. sugar imports under quota and tariff-rate quota, by country-Continued 1/ 2/

Country	Trade pact status	1989/90 1/1/89-9/30/90		1990/91 10/1/90-9/30/91		1991/92 10/1/91-9/30/92		1992/93-1993/94 10/1/92-7/31/94		1994/95 8/1/94-9/30/95	
		Quota allocation	Actual imports	Quota allocation	Actual imports	Quota allocation	Actual imports	Quota allocation	Actual imports 2/	Quota allocation	Actual imports 2/
		Short tons, raw value									
Argentina	GSP	124,153	118,152	96,418	96,256	62,630	62,334	101,822	55,784	59,088	0
Australia	MFN	239,644	239,644	186,109	186,109	120,892	121,366	196,539	196,539	114,055	26,613
Barbados	CBI	20,212	8,236	15,696	0	10,195	0	16,575	0	9,619	0
Belize	CBI	31,761	31,761	24,665	24,647	16,022	16,085	26,048	26,048	15,118	0
Bolivia	ANDEAN	23,099	22,572	17,936	18,584	11,653	12,388	18,943	9,968	10,993	0
Brazil	MFN	416,656	395,795	325,130	325,130	211,195	211,124	343,350	339,096	199,253	0
Canada	NAFTA 3/	31,761	31,678	4/	4/	4/	4/	4/	4/	4/	4/
Colombia	ANDEAN	69,296	69,298	53,883	53,492	34,956	33,333	66,631	55,662	32,980	64
Congo	GSP	19,075	778	8,852	0	8,001	8,139	14,740	7,998	9,334	0
Costa Rica	CBI	54,849	54,849	33,634	33,634	21,648	21,774	35,519	35,519	20,612	51
Coted' Ivoire	GSP	19.075	19,075	8,852	8,852	8,001	117	14,740	14,740	9,334	9,334
Dominican Republic	CBI	508,162	508,162	394,638	392,158	256,348	252,526	416,755	416,755	241,852	48,059
Ecuador	GSP	31,761	31,761	24,665	24,665	16,022	16,700	26,048	14,596	15,116	480
El Salvador	CBI	78,302	78,302	58,299	58,299	37,870	37,903	61,566	61,566	35,728	151
Fiji	GSP	25,893	25,893	20,180	20,180	13,109	13,405	21,311	21,311	12,368	12,366
Gabon	MFN	19,075	17,058	8,852	8,852	8,061	7,945	14,740	0	9,334	0
Guatemala	CBI 6/	138,590	138,590	107,630	107,533	69,913	70,108	113,660	113,660	65,959	302
Guyana	CBI	34,648	7,912	26,907	0	17,478	17,685	28,415	28,415	16.489	16,488
Haiti	CBI 7/	19,075	12,939	8,852	8,830	8,001	0	14,740	0	9,334	0
Honduras	CBI	52,349	52,349	22,423	21,929	14,565	14,347	23,680	23,426	13,741	0
India	GSP	23,099	23,099	17,938	17,794	11,653	11,459	18,943	18,943	10,993	342
Jamaica	CBI	31,761	31,761	24,665	24,665	16,022	15,732	26,048	25,629	15,116	13,014
Madagascar	GSP	19,075	19,075	8,852	8,852	8,001	7,870	14,740	7,793	9,334	7,056
Malawi	GSP	28,734	28,734	22,423	22,423	14,565	15,012	23,680	13,008	13.741	0
Mauritius	GSP	34,602	34,585	26,907	26,907	17,478	17,476	28,415	28,075	16,489	325
Mexico	NAFTA 3/	19,075	19,075	8,852	8,727	8,061	7,765	14,740	150	9,334	0
Mozambique	GSP	37,535	37,431	29,150	28,242	18,934	19,307	30,783	30,783	17,864	0
Nicaragua	CBI	59,886	54,129	47,087	46,344	30,587	13,299	49,726	49,726	28,857	19
Panama	CBI	82,700	80,065	65,026	64,691	42,239	42,256	68,672	66,670	39,851	139
Papua New Guinea	GSP	19,075	18,996	8,852	8,850	8,001	8,027	14,740	26	9,334	0
Paraguay	GSP	19,075	8,567	8,852	8,850	8,001	8,156	14,740	14,740	9,334	494
Peru 8/	ANDEAN	118,379	118,317	91,934	90,299	59,718	59,308	97,085	97,071	56,340	14,696
Philippines	GSP	456,192	454,510	354,280	351,637	196,630	194.568	319,671	282,288	185,511	0
South Africa	GSP	19,075	8,040	0	0	33,500	33,904	54,463	54,463	31,605	31,605
St. Christopher-Nevis	CBI	0	0	8,852	0	8,001	7,923	14,740	3,967	9,334	0
Swaziland	GSP	46,196	46,196	35,077	35,877	23,304	23,876	37,686	37,886	21,987	21,987
Taiwan	MFN	34,648	34,648	26,907	26,907	17,478	17,469	28,415	28,415	16.491	197
Thailand	GSP	40,422	40,102	31,392	31,287	20,392	20,237	33,151	33,151	19,239	848
Trinidad-Tobago	CBI	20,212	20,212	15,696	15,536	10,195	10,090	16,575	16,545	9,619	0
Uruguay	GSP	19,075	18,850	8,652	8,626	8,001	8,127	14,740	14,740	9,334	9,334
Zimbabwe	GSP	34,648	34,648	26,907	26,907	17,478	17,669	28,415	28,415	16,491	16,491
Subtotal		3,122,903	2,995,843	2,312,921	2,242,572	1,524,876	1,476,792	2,496,390	2,274,969	1,456,508	230,460
Specialty sugars		2,001	NA	2,000	237	1,825	223	3,651	412	1,825	98
Grand total		3,124,904	2,995,843	2,314,921	2,242,809	1,526,701	1,477,015	2,500,041	2,275,381	1,458,333	230,558
Canada 4/		n.a.	n.a.	n.a.	27,127	n.a.	40,576	n.a.	88,372	n.a.	1,485

n.a. = Not applicable. NA = Not available. Note: Imports are reported on an actual-weight basis, adjusted upward by Customs by a factor of 1,035. When final polarization results are received or when adjustments are made to raw value on final vessels, cumulative import data are adjusted accordingly. A country's excess of cumulative entries and adjustments over its quota allocation are carried over and applied against the country's allocation for the next quota period. To coven from short tons 10 metic tons, divide by 1.10231125. MFN countries pay full duty on quota sugar (0.625 cent a pound on raw sugar). CBI-based duty-free access for sugar under the tariff-rate quota is permanent. ANDEAN trade pact duty-free access under the tariff-rate quota expires December 4, 2001. 1/ Amounts entered in excess of quota level are deducted from following year's quota. 2/ Through November 20 1994. Although 1992/94 quota year ended July 31, 1994, countries with unfilled quota can ship through September 30, 1995. 3/ Canada's treatment consists of a 10 year phase-out of the duty which started in 1989 under the CFTA (Canadian Free Trade Agreement). Mexican access is duty free for that amount that is determined under Annex 703.2 of NAFTA. 4/ As of October 1, 1990, Canada was exempt from the tariff rate quota's second-tier duty and, therefore, faced no prohibitive duty limiting sugar shipments to the United States. Previously Canada had a 1.1-percent share of the quota. From January 1, 1995, Canada is again under the trriff-rate quota, with a quota of 8,000 metric tons from January 1, 1995-September 30, 1995 (already filled). Canada's future share of the quota not yet announced. 5/ These countries sometimes called "minimum boatload" countries. 6/ Guatemala does not receive GSP on 1701.11.02. 7/ Haitian access currently suspended. 8/ U.S. quota imports of 8,708 tons for Peru for 1990/91 actually arrived during the 1991/92 quota period. Source: USDA, Foreign Agricultural Service.

Appendix table 28--U.S. sugar (including Puerto Rico) supply and use, fiscal years 1/

Items	5-year average 1980/81-1984/85	5-year average, 1985/86-1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
			1,000 short tons, raw value				
Beginning stocks 2/	1,620	1,504	1,224	1,524	1,477	1,704	1,338
Total production 3/ 4/	6,030	6,805	6,976	7,306	7,838	7,677	0,240
Beet sugar	2,999	3,465	3,854	3,845	4,392	4,090	4,650
Cane sugar	3,030	3,340	3,124	3,461	3,446	3,587	3,590
Florida	1,211	1,494	1,802	1,832	1,710	1,792	1,840
Louisiana	578	726	480	763	676	893	1,020
Texas	89	95	88	109	136	146	145
Hawaii	1,036	932	722	689	656	705	540
Puerto Rico	114	91	74	68	65	51	45
Total imports 3/	3,553	2,005	2,625	2,194	2,039	1,772	1.972
Quota-sugar imports 5/	1,755	1,452	2,296	1,466	1,335	1,046	1,457
Oct.-Dec.	462	357	407	162	171	193	241
Jan.-Sept.	1,294	1,095	1,691	1,324	1,164	853	1,216
Canada and high duty imports	0	0	32	39	40	56	50
Duota-exempt imports for reexport	161	511	599	667	601	641	450
Quota-exempt imports	0	0					
for polyhydric alcohol	6	17	8	10	10	16	15
Statistical adjustments 3/	654	25	(112)	(8)	53	13	0
Total supply	11,202	10,314	11,027	11,024	11,354	11,153	11,550
Total exports 3/	475	480	627	554	405	454	510
Quota-exempt for reexport	146	484	706	562	397	430	470
Other exports	304	7	0	0	10	30	40
CCC disposal, for export	0		0	0	0	0	0
Statistical difference 6/	25	(45)	-79	-8	-2	(6)	
Miscellaneous	34	137	-25	-13	46	28	0
CCC disposal, for domestic nonfood use	0	25	0	0	0	0	0
Refining loss adjustment	64	31	61	0	0	0	0
Statistical adjustment 4/	(30)	81	-86	-13	48	26	0
Total deliveries	9.067	8,303	8,901	9,006	9,197	9,333	9,430
Transfer to sugar--cont. products for exports under reexport program	7	33	59	88	148	138	160
Transfer to polyhydric alcohol	6	17	0	11	15	16	15
Deliveries for domestic food and beverage	9,054	6,252	6,634	8,907	9,034	9,179	9,255
Total use	9,576	6,920	9,503	9,547	9,650	9,615	9,940
Ending stocks 2/ 7/	1,627	1,394	1,524	1,477	1,704	1,336	1,610
Privately owned	1,609	1,355	1,524	1,477	1,704	1,322	1,610
c c c	17	39	0	0	0	6	0
			Percent				
Stocks-to-use ratio	16.99	15.63	16.04	15.47	17.66	13.63	16.20
			Millions				
Population (April 1)	236.96	247.96	255.68	258.48	261.38	264.0	266.6
			Pounds				
Per capita sugar deliveries, for domestic food and beverage use, refined basis	71.4	62.2	64.6	64.4	64.6	65.0	64.9

1/ Fiscal year beginning October 1. 2/ Stocks in hands of primary distributors and CCC. 3/ Historical data are from CFSA (formerly ASCS) "Sweetener Market Data." 4/ Production in 1994/95 is Interagency Sugar Estimates Committee. 5/ Actual arrivals under the tariff rate quota with late entries and quota overfills assigned to the fiscal year in which they actually arrived. Forcast imports under quota in 1994/95 assume a short fall of 120,000 tons from the quota covering fiscal years 1993, 1994, 1995. Moreover, projected sugar import quota do not necessarily reflect the determination by the Secretary which will be made pursuant to additional U.S. Note 3 of Chapter 17 of the Harmonized Tariff Schedule of the United States. 6/ Calculated as a residual. 7/ Includes approximately 258,000 tons beet sugar, and 53,000 tons of cane sugar in excess of marketing allotments in 1994/95. The stocks-to-use ratio without the "blocked stocks" would be 13.1 percent. Source: USDA, Interagency Sugar Estimates Committee, February 10, 1995.

Appendix table 29--U.S. high-fructose corn syrup (HFCS) supply and use, by calendar years

Calendar year	Supply					Utilization									
	Domestic production			Imports	Total supply and use	Exports			Nonfood use	Domestic disappearance for food use					
										Total			Per capita		
	HFCS-42	HFCS-55	Total			Foreign countries	Puerto Rico	Total		HFCS-42	HFCS-55	Total	HFCS-42	HFCS-55	Total
	1,000 short tons, dry weight												Pounds, dry weight		
1980	1,555	626	2,181	--	2,181	7	1	8	14	1,538	621	2,159	13.5	5.5	19.0
1981	1,622	1,052	2,674	1	2,675	6	2	8	42	1,591	1,034	2,625	13.0	9.0	22.8
1982	1,630	1,507	3,137	5	3,142	1	4	5	47	1,604	1,486	3,090	13.0	12.0	26.6
1983	1,674	1,969	3,643	79	3,722	2	10	12	53	1,664	1,993	3,657	14.2	17.0	31.2
1984	1,733	2,695	4,338	132	4,470	4	15	19	46	1,732	2,672	4,404	14.7	22.6	37.3
1985	1,843	3,420	5,271	187	5,458	3	19	22	41	1,851	3,545	5,396	15.5	29.7	45.2
1986	1,866	3,480	5,346	228	5,574	4	17	21	45	1,872	3,636	5,508	15.6	30.2	45.8
1987	2,048	3,638	5,686	202	5,888	4	23	27	54	2,051	3,757	5,808	16.9	30.9	47.0
1988	2,368	3,580	5,948	183	6,131	12	24	36	81	2,341	3,674	6,015	19.1	30.0	49.1
1989	2,396	3,549	5,945	185	6,130	48	36	84	60	2,362	3,624	5,956	19.1	29.3	48.4
1990	2,563	3,717	6,280	170	6,458	131	31	162	68	2,554	3673	6,227	20.4	29.4	49.8
1991	2,674	3,798	6,472	159	6,631	129	33	162	68	2,715	3,685	6,400	21.5	29.2	50.7
1992	2,812	3,071	6,683	193	6,876	100	31	131	63	2,815	3,867	6,682	22.0	30.3	52.3
1993 1/	2,951	4,198	7,149	189	7,330	114	42	156	68	2,906	4,208	7,114	22.5	32.6	55.1
1994 2/	3,025	4,475	7,500	158	7,656	135	35	170	70	2,993	4,425	7,410	22.9	33.9	56.9

Note: Numbers may not add due to rounding.
1/ Preliminary.
2/ Forecast.
Sources: U.S. Department of Commerce, Bureau of the Census, and USDA, Economic Research Service.

Appendix table 30--Sugar beet and sugarcane prices and crop values

Crop year	Sugarcane			Sugar beets			Total crop sugar beets and sugarcane
	Season average price	Crop production	Crop value	Season average price	crop production	Crop value	
	Dollars/ton	*1,000 tons*	*$1,000*	*Dollars/ton*	*1,000 tons*	*$1,000*	
1977/78	17.70	25,724	455,315	24.20	25,007	605,169	1,960,484
1978/79	19.50	24,662	480,909	25.20	25,788	649,858	1,130,767
1979/80	26.00	25,425	661,050	33.90	21,996	745,664	1,406,714
1980/81	38.50	25,734	990,759	47.20	23,502	1,109,294	2,100,053
1981/82	2490	26,331	655,642	29.20	27,538	804,110	1,459,752
1982/83	26.50	28,519	755,038	35.40	20,894	740,342	1,495,380
1983/84	27.80	27,330	755,574	37.00	20,992	777,718	1,533,292
1984/85	28.20	26,173	734,026	33.90	22,134	750,162	1,484,186
1985/86	26.70	26,877	717,690	33.80	22,529	761,236	1,478,926
1986/87	27.30	28,936	788,678	35.90	25,162	901,771	1,690,449
1987/88	29.10	28,026	816,801	38.20	28,072	1,073,584	1,890,385
1988/89	29.40	28,479	836,810	41.20	24,810	1,022,284	1,859,094
1989/90	29.20	28,069	819,057	42.10	25,131	1,058,298	1,877,355
1990/91	30.80	26,475	815,430	43.00	27,513	1,182,221	1,997,651
1991/92	29.00	28,960	840,194	38.50	28,203	1,085,728	1,925,922
1992/93	28.10	28,873	811,350	41.40	29,143	1,206,480	2,017,830
1993/94	28.30	29,652	839,152	39.00	26,249	1,023,711	1,862,863

Source: USDA.

Appendix table 31--Refined beet sugar loan rates, by regions

Region 1/	1982 2/	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
	Cents/lb													
1	20.54	21.02	22.29	21.80	21.97	22.05	22.10	21.94	22.12	22.86	23.70	24.17	24.51	24.26
2	19.59	20.04	20.97	20.82	21.04	21.11	21.15	21.04	21.25	22.06	22.95	23.39	23.65	23.41
3	19.37	19.82	20.16	20.18	20.35	20.54	21.01	20.91	21.24	21.65	22.55	23.03	23.37	23.11
4	19.64	20.10	21.13	21.12	21.40	21.30	21.76	21.74	21.72	22.40	23.30	23.87	24.19	23.99
5	19.45	19.90	20.31	20.27	20.35	20.54	20.97	20.90	21.17	21.44	22.25	22.95	23.20	22.98
6,7	19.03	19.47	20.20	20.07	20.44	20.58	20.76	20.55	20.61	21.27	22.17	22.74	23.06	22.99
8	20.24	20.71	21.35	21.28	21.43	21.20	21.13	21.34	21.34	22.21	23.15	23.66	24.16	23.86
Weighted average	19.70	20.15	20.86	20.76	21.06	21.09	21.16	21.37	21.54	21.93	22.85	23.33	23.62	23.43

1/ Regions are as follows: Region l--Michigan, Ohio; Region 2--Minnesota and eastern North Dakota; Region 3--Colorado, Nebraska, southeast Wyoming; Region 4--Texas; Region 5--Montana, northwest Wyoming, western North Dakota; Region 6--Eastern Idaho: Region 7--Western Idaho, Oregon; Region 8--California. 2/ Purchase program in effect from December 22,1981 to May 31,1982. Source: USDA.

Appendix table 32--Raw cane sugar loan rates, by area

Region	1982 1/	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
	Cents/lb													
Florida	16.73	NA	17.47	17.72	17.97	18.12	18.07	17.76	17.73	17.95	17.93	17.99	17.92	17.85
Hawaii	16.66	NA	17.38	17.62	17.87	17.52	17.64	17.42	17.46	17.66	17.76	17.76	17.83	17.90
Louisiana	17.16	NA	17.82	18.09	18.35	18.66	18.54	18.27	18.23	18.44	18.31	18.38	18.32	18.35
Texas	16.85	NA	17.45	17.70	17.95	18.10	18.29	18.03	18.03	18.25	18.15	18.29	18.10	18.09
Puerto Rico	16.23	NA	17.06	17.28	17.52	18.20	17.53	17.19	17.06	18.20	18.41	18.45	18.12	18.13
Weighted average	16.75	17.06	17.50	17.75	18.00	18.00	18.00	18.06	18.00	18.09	18.00	18.00	18.00	18.06

NA = Not available. 1/ Purchase program in effect from December 22, 1981, to May 31, 1982. Source: USDA.

Appendix table 33--Gross returns, marketing expenses, and net return from beet sugar

Item	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93
							Cents/lb						
Gross returns, including prepays	32.94	NA	26.45	28.33	28.88	25.68	25.79	25.54	27.95	29.55	29.48	27.82	28.8
Fixed marketing expenses													
Shipping and handling	0.40	NA	0.49	0.54	0.52	0.53	0.49	0.49	0.57	0.58	0.58	0.55	0.59
Advertising, sales promotion, salaries, and handling	0.20	NA	0.23	0.24	0.25	0.28	0.25	0.23	0.27	0.31	0.28	0.27	0.29
Storage	0.13	NA	0.12	0.13	0.17	0.17	0.21	0.19	0.23	0.26	0.29	0.30	0.33
Taxes	0.02	NA	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.03
Insurance	0.02	NA	0.01	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
Total	0.77	NA	0.87	0.95	0.98	1.03	1.00	0.95	1.13	1.20	1.21	1.18	1.288
Other marketing expenses													
Freight	1.65	NA	1.6	1.4	1.52	1.44	1.53	1.52	1.48	1.44	1.52	1.58	1.57
Cash discount	0.59	NA	0.48	0.54	0.5	0.49	0.49	0.47	0.49	0.54	0.48	0.50	0.47
Brokerage and commissions	0.09	NA	0.11	0.11	0.11	0.10	0.11	0.08	0.10	0.10	0.10	0.12	0.09
Cost of packing in excess of basis	0.38	NA	0.46	0.53	0.57	0.58	0.58	0.59	0.63	0.46	0.61	0.59	0.59
Total	2.71	NA	2.65	2.58	2.70	2.61	2.71	2.66	2.70	2.54	2.71	2.79	2.72
Total expenses	3.48	NA	3.52	3.53	3.68	3.64	3.71	3.61	3.84	3.74	3.92	3.97	3.99
Net return	29.46	NA	22.93	24.80	23.20	22.04	22.08	21.93	24.11	25.81	25.56	23.85	22.77

NA = Not available.
Source: USDA.

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