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# Sugar Backgrounder

Stephen Haley and Mir Ali

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Approved by USDA's  
World Agricultural  
Outlook Board

## Abstract

The sugar title in the 2007 Farm Bill will determine how U.S. sugar policy is to be conducted. Currently, the U.S. sugar program uses domestic marketing allotments, price supports, and tariff-rate quotas to influence the amount of sugar available to the U.S. market. The program's effect has been to support U.S. prices of sugar at levels above world market levels. U.S. sugar users maintain that keeping U.S. sugar prices higher than world levels has made U.S. sugar manufacturers increasingly uncompetitive in domestic and export markets and that a new approach to sugar policy is needed. Also, the U.S. sugar program's effectiveness will be challenged in 2008 when all sweetener trade restrictions with Mexico are removed as part of the North American Free Trade Agreement. This report on the U.S. sugar sector places into context the challenges facing sugar producers, users, and policymakers in the United States, including description and analysis of farm-level production of U.S. sugar crops, cane and beet sugar processing and refining industries, imports and exports of sugar, sugar consumption, and U.S. sugar policy issues likely to be important in the 2007 Farm Bill.

**Keywords:** Sugar, sugarcane, sugarbeets, U.S. sugar program

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## Introduction

The United States is one of the world's largest sugar producers, ranking high in the second tier of sugar-producing countries, with less production than China but more than Thailand or Mexico (table 1). Unlike most other producing countries (China being an exception), the United States has large and well-developed sugarcane and sugarbeet industries. The United States also has the world's largest corn-based sweetener industry. If the production of high fructose corn syrup were added to the sugar total, U.S. production of the combined sweeteners would be over 16.4 million tons, raw sugar equivalent basis.

Although the United States is an important sugar producer, sugar crop production accounts for a relatively small part of total agricultural output. The value of the combined 2004 sugarbeet and sugarcane crop was \$1.93 billion. This amount constituted about 2.4 percent of the all U.S. field and miscellaneous crop values in 2004 (table 2). Its value was higher than some crops such as tobacco, rice, and peanuts, but much less than other crops such as corn, soybeans, wheat, and cotton (fig. 1)

Table 1 -- World sugar production, average 2000/01 - 2004/05

Country/region	Production (1,000 metric tons, raw value)
Brazil	23,177
Western Europe, including EU-15	18,679
India	18,491
China	9,419
United States	7,552
Thailand	6,197
Sub-Sahara Africa, excluding South Africa	5,630
Mexico	5,419
Australia	4,970
Middle East	4,801
Central America	3,773
Caribbean	3,496
Pakistan	3,406
South America, excluding Argentina, Brazil, and Colombia	3,192
South Africa	2,658
Colombia	2,544
Philippines	2,071
Eastern Europe	1,855
Indonesia	1,812
Russian Federation	1,788
Argentina	1,706
Ukraine	1,701
Japan	847
Others	4,147
World total	139,333

Source: USDA, Foreign Agricultural Service, PSD Database.

Table 2 -- U.S. field and misc. crop values in 2004

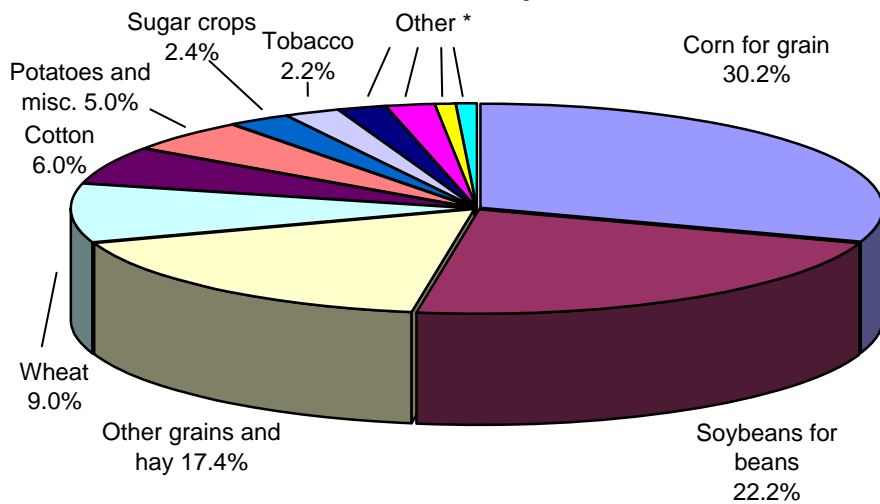
Crop	Value	Amount of total
	<i>Million dollars</i>	<i>U.S. crops</i>
Corn for grain	24,381	30.22%
Soybeans for beans	17,895	22.18%
Other grains and hay	14,001	17.36%
Wheat	7,283	9.03%
Cotton	4,854	6.02%
Potatoes and misc.	4,055	5.03%
<b>Sugar crops 1/</b>	<b>1,928</b>	<b>2.39%</b>
Tobacco	1,752	2.17%
Rice	1,702	2.11%
Other oilseeds	1,411	1.75%
Peanuts	814	1.01%
Dry beans, peas and lentils	596	0.74%
<b>Total</b>	<b>80,671</b>	<b>100.00%</b>

1/ Includes value of sugarcane for seed.

Source: USDA, National Agricultural Statistics Service, *Crop Values*.

Figure 1

**U.S. field and miscellaneous crop values in 2004**



\* Other includes (left to right) rice; other oilseeds; peanuts; and dry beans, peas and lentils.

Source: USDA, National Agricultural Statistics Service, *Crop Values*.

The value of the sugarbeet crop since 1978 has constituted about 55.7 percent of the combined sugar crop value (table 3). The sugarbeet share has been growing about 0.2 percentage points a year. Likewise, beet sugar production has the larger share of production in terms of tonnage: 53.1 percent for 1980/81-2005/06 (table 4). The production share has been growing at about 0.25 percent per year. The latest 5-year average (2000/01-2005/06) is 54.5 percent.

Table 3 -- Sugar crops - marketing year average price received and value of production

Crop year	Sugarbeets		Sugarcane for sugar	
	Unit return <i>Dollars per ton</i>	Production value <i>Dollars (1,000)</i>	Unit return <i>Dollars per ton</i>	Production value <i>Dollars (1,000)</i>
1979	33.90	745,273	38.50	661,212
1980	47.20	1,108,974	26.00	984,559
1981	32.20	803,569	24.90	650,721
1982	35.40	740,342	26.50	755,038
1983	37.00	777,718	27.80	755,574
1984	33.90	750,162	28.20	734,026
1985	33.80	761,236	26.70	717,690
1986	35.90	901,771	27.30	788,678
1987	38.20	1,073,584	29.10	816,801
1988	41.20	1,022,284	29.40	836,810
1989	42.10	1,058,298	29.20	819,057
1990	43.00	1,182,220	30.80	815,630
1991	38.50	1,085,728	29.00	840,194
1992	41.40	1,206,480	28.10	811,350
1993	39.00	1,023,687	28.50	846,132
1994	38.80	1,234,470	29.20	857,438
1995	38.10	1,070,663	29.50	859,604
1996	45.40	1,211,001	28.30	784,113
1997	38.80	1,160,029	28.10	842,840
1998	36.40	1,181,494	27.30	893,049
1999	37.20	1,242,895	25.60	859,175
2000	34.20	1,113,030	26.10	895,917
2001	39.80	1,025,306	29.00	951,813
2002	39.60	1,097,329	28.40	961,896
2003	41.40	1,270,026	29.50	943,646
2004	36.90	1,106,878	28.30	771,734
2005	41.30	1,137,777	27.90	688,973

Source: USDA, National Agricultural Statistics Service, *Crop Values*.

Table 4 --U.S. beet and cane sugar production (including Puerto Rico), by fiscal year and share of total

Year	Fiscal year 1/ (October/September)			Share of production		
	Beet	Cane	Beet and cane	Beet	Cane	Beet and cane
	----- 1,000 short tons, raw value -----			----- Percent -----		
1980/81	3,234	2,987	6,221	52.0	48.0	100
1981/82	3,318	2,804	6,122	54.2	45.8	100
1982/83	2,692	3,263	5,955	45.2	54.8	100
1983/84	2,837	3,073	5,910	48.0	52.0	100
1984/85	2,915	3,025	5,940	49.1	50.9	100
1985/86	2,988	3,136	6,124	48.8	51.2	100
1986/87	3,653	3,506	7,159	51.0	49.0	100
1987/88	3,822	3,425	7,247	52.7	47.3	100
1988/89	3,396	3,408	6,804	49.9	50.1	100
1989/90	3,466	3,225	6,691	51.8	48.2	100
1990/91	3,854	3,124	6,978	55.2	44.8	100
1991/92	3,845	3,461	7,306	52.6	47.4	100
1992/93	4,392	3,446	7,838	56.0	44.0	100
1993/94	4,090	3,565	7,655	53.4	46.6	100
1994/95	4,493	3,434	7,927	56.7	43.3	100
1995/96	3,916	3,454	7,370	53.1	46.9	100
1996/97	4,013	3,191	7,204	55.7	44.3	100
1997/98	4,389	3,632	8,021	54.7	45.3	100
1998/99	4,423	3,951	8,374	52.8	47.2	100
1999/00	4,956	4,076	9,032	54.9	45.1	100
2000/01	4,680	4,089	8,769	53.4	46.6	100
2001/02	3,915	3,985	7,900	49.6	50.4	100
2002/03	4,462	3,964	8,426	53.0	47.0	100
2003/04	4,692	3,957	8,649	54.3	45.7	100
2004/05	4,611	3,265	7,876	58.5	41.5	100
2005/06	4,444	2,956	7,399	60.1	39.9	100

1/ Reported quarterly by *Sugar Market Statistics*, National Agricultural Statistics Service, prior to IV quarter 1991, and currently by *Sweetener Market Data*, Farm Service Agency.

Sources: USDA, National Agricultural Statistics Service, *Crop Report*, and Farm Service Agency, *Sweetener Market Data*.

### Sugarbeets

Sugarbeets are currently grown in 11 States grouped into 5 regions (fig. 2): Great Lakes (Michigan); Upper Midwest (Minnesota, North Dakota); Great Plains (Colorado, Montana, Nebraska, Wyoming); Northwest (Idaho, Oregon, Washington); and Southwest (California). Production no longer takes place in several States, including Ohio, New Mexico, Texas, and Arizona.

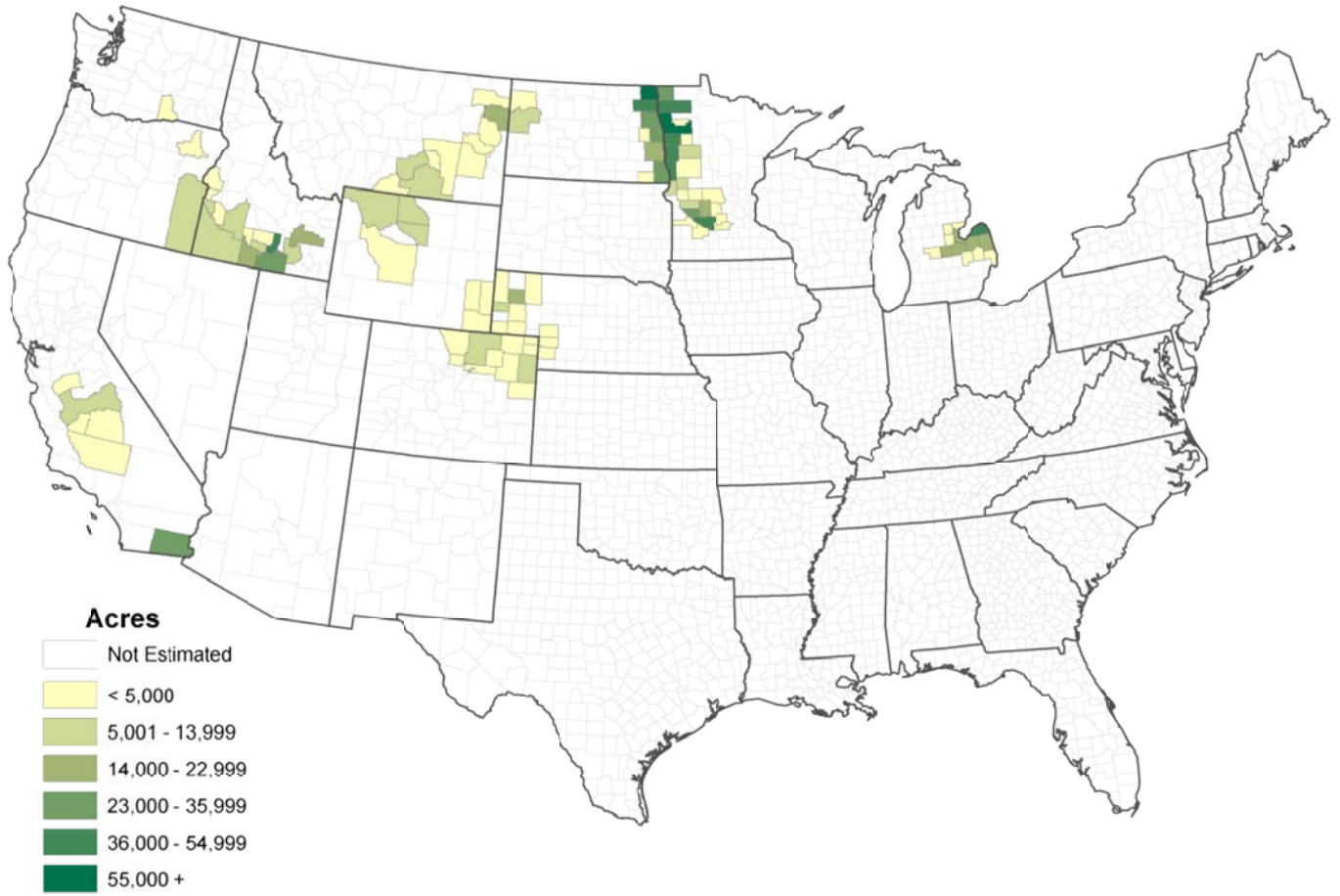
Sugarbeet production has grown from about 21 million tons in the first half of the 1980s to between 29 million and 30 million tons since 1995 (table 5, fig. 3). Production growth has been largest in the Upper Midwest—its share of national production has grown from about 30 percent in the early 1980s to about 48 percent in the 2000s. The Northwest has also seen its share of national production grow from about 17 percent to 20 percent over the same time period. Production has held steady in the Great Lakes region (10 percent to 11 percent). Production declines have taken place in the Great Plains (20 percent in early 1990s to 13 percent in the 2000s) and especially in the Southwest (24 percent in the early 1980s to just above 7 percent in the 2000s).

In 2002 there were 5,027 farms producing sugarbeets (table 6). This level represented about a 29-percent decline in sugarbeet-producing farms since 1997. Although this decline seems large, the total number of crop-producing farms in those same States fell about 12 percent over the same time period. The largest sugarbeet-farm reductions took place in California (50 percent), Nebraska (50 percent), Wyoming (50 percent), and Colorado (43 percent). Harvested sugarbeet acreage fell the most in these same States. However, on an aggregate basis, harvested sugarbeet acreage fell only 6 percent from 1997 to 2002, a decline which is only slightly higher than the 5-percent rate for all crops in the same States.

Average sugarbeet farm size increased from 205 acres in 1997 to 272 acres in 2002. The number of farms averaging less than 500 acres fell between 1997 and 2002, while those exceeding 500 acres grew in number (fig. 4). In comparison with 1997, more production has taken place on larger farms (fig. 5). In 2002, 75 percent of all sugarbeet production occurred on farms harvesting more than 250 acres. This compares with 64 percent in 1997. Farms over 500 acres produced 46 percent of the crop in 2002 and only 33 percent in 1997; and farms over 1,000 acres produced 18 percent of the crop in 2002 and only 11 percent in 1997.

Unlike other crops, sugar crops must be processed soon after being harvested into either refined beet sugar (sugarbeets) or raw cane sugar (sugarcane). There are no markets for the crops themselves. The crops' chief economic value is as a source for sucrose, which requires processing for the recovery of the sugar. Sugarbeets can be stored for a period of time in piles adjacent to or otherwise close to the processing facility before the sucrose in them deteriorates. The implication is that the costs and returns to the sugarbeet (and sugarcane) processors are just as important to the viability of sugar crop farming as are the costs and returns of growing the crop. If a processing facility is shut down, the grower must have an alternative processor destination available in close proximity for the crop or cease producing the sugar crop.

**Figure 2 Sugarbeets 2004  
Harvested Acres by County**



Source: USDA, National Agricultural Statistics Service

Table 5 -- U.S. sugarbeet production, by region, crop years 1980-2005

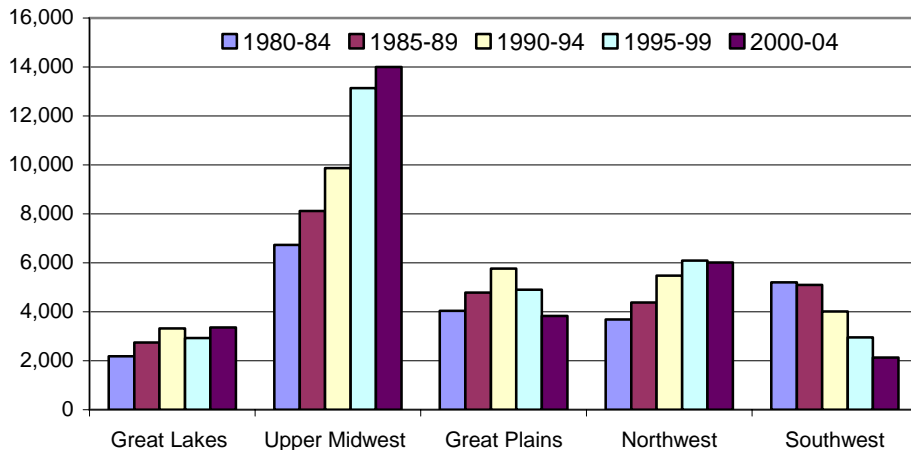
Year	Great Lakes (MI, OH)	Upper Midwest (MN, ND)	Great Plains (CO, MT, NE, NM, TX, WY)	Northwest (ID, OR, WA)	Southwest (CA, AZ)	Others 1/	Total U.S.
<i>1,000 short tons</i>							
1980	2,231	5,638	4,808	3,493	5,885	1,447	23,502
1981	2,314	7,098	5,166	4,054	7,254	1,652	27,538
1982	1,853	7,214	3,264	3,433	3,852	1,278	20,894
1983	2,198	7,066	3,276	3,803	3,938	711	20,992
1984	2,318	6,649	3,684	3,619	5,088	776	22,134
1985	2,583	7,511	3,951	3,815	4,669	0	22,529
1986	2,597	8,126	5,121	4,486	4,832	0	25,162
1987	3,180	9,361	4,739	4,699	6,091	2	28,072
1988	2,627	7,323	5,091	4,460	5,300	9	24,810
1989	2,764	8,284	4,996	4,429	4,614	44	25,131
1990	3,621	8,169	6,000	5,324	4,334	65	27,513
1991	2,869	9,739	5,894	5,595	4,029	77	28,203
1992	3,426	10,233	5,888	5,294	4,230	72	29,143
1993	3,391	8,456	5,658	5,105	3,536	103	26,249
1994	3,293	12,739	5,357	6,064	3,948	452	31,853
1995	3,200	11,363	4,694	5,132	3,192	484	28,065
1996	2,049	12,184	4,588	5,440	2,419	0	26,680
1997	3,057	12,456	5,104	6,299	2,970	0	29,886
1998	2,787	15,096	4,729	7,164	2,723	0	32,499
1999	3,567	14,585	5,390	6,422	3,456	0	33,420
2000	3,420	14,372	4,793	6,811	3,145	0	32,541
2001	3,232	12,086	3,671	5,179	1,596	0	25,764
2002	3,241	13,653	3,309	5,544	1,960	0	27,707
2003	3,446	15,234	3,565	6,506	1,959	0	30,710
2004	3,476	14,669	3,831	6,050	1,995	0	30,021
2005	3,167	13,977	3,701	5,102	1,707	0	27,654

1/ Includes Arizona, New Mexico and Washington prior to 1996, after 1996 these states are included in the regional totals.

Source: USDA, National Agricultural Statistics Service, *Crop Production*.

Figure 3  
**U.S. sugarbeet production, by region, averaged over 5-year periods, 1980-2004**

1,000 short tons



Source: USDA, National Agricultural Statistics Service, *Crop Production*.



Table 6 -- Sugarbeets and other crops, farm numbers and harvested acres, 2002 and 1997, by State

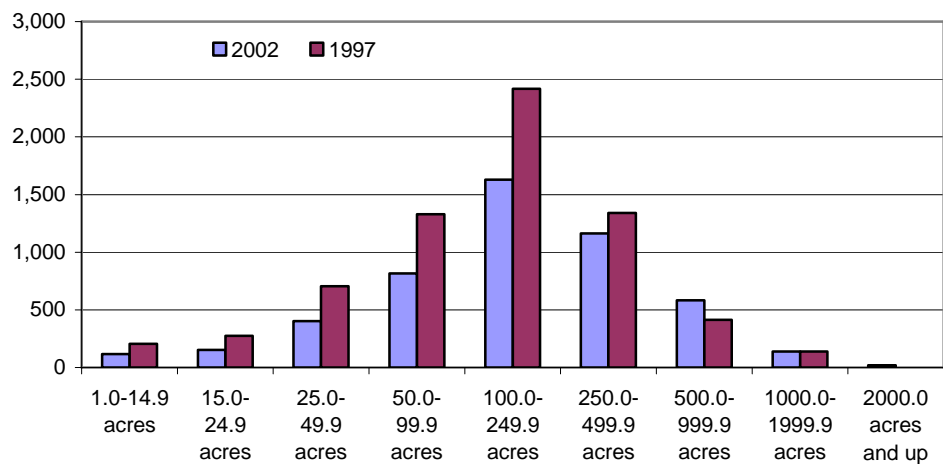
States	-----Number of producing farms-----			-----Harvested crop acreage-----		
	2002	1997	Percent change	2002 (1,000 acres)	1997	Percent change
<i>Sugarbeets</i>						
California	228	456	-50.0	55.7	104.4	-46.6
Colorado	312	544	-42.6	39.4	67.4	-41.6
Idaho	655	926	-29.3	202.9	195.9	3.6
Kansas	1	3	-66.7	NA	NA	NA
Michigan	989	1,164	-15.0	180.1	160.1	12.4
Minnesota	1,369	1,536	-10.9	476.6	446.0	6.9
Montana	282	408	-30.9	56.0	58.1	-3.6
Nebraska	184	366	-49.7	41.3	59.5	-30.6
North Dakota	694	901	-23.0	260.2	239.0	8.9
Ohio	21	34	-38.2	1.5	1.9	-17.5
Oregon	101	173	-41.6	11.3	19.6	-42.2
Utah	3	NA	NA	NA	NA	NA
Washington	7	59	-88.1	3.7	17.8	-79.1
Wyoming	181	360	-49.7	36.1	65.3	-44.7
Total	5,027	7,057	-28.8	1,365.8	1,449.8	-5.8
<i>All crops</i>						
California	54,115	62,031	-12.8	8,466.3	8,676.2	-2.4
Colorado	14,655	18,532	-20.9	4,347.0	6,099.4	-28.7
Idaho	13,444	16,388	-18.0	4,313.3	4,581.2	-5.8
Kansas	--	--	--	--	--	--
Michigan	38,244	42,704	-10.4	6,827.9	6,989.3	-2.3
Minnesota	57,323	62,760	-8.7	19,398.3	19,794.1	-2.0
Montana	16,543	19,254	-14.1	8,742.1	9,792.2	-10.7
Nebraska	37,143	43,198	-14.0	17,336.6	17,897.6	-3.1
North Dakota	20,789	25,813	-19.5	19,908.7	20,675.0	-3.7
Ohio	58,577	63,686	-8.0	10,041.4	10,070.8	-0.3
Oregon	23,013	24,392	-5.7	3,119.4	3,258.1	-4.3
Utah	--	--	--	--	--	--
Washington	21,802	24,168	-9.8	4,894.6	5,160.7	-5.2
Wyoming	5,003	6,198	-19.3	1,298.7	1,801.3	-27.9
Total	360,651	409,124	-11.8	108,694.4	114,795.9	-5.3

Source: USDA, National Agricultural Statistics Service, *Census of Agriculture* .

Figure 4

**U.S. farms producing sugarbeets by beet farm acreage size distribution, 2002 and 1997**

Number of farms

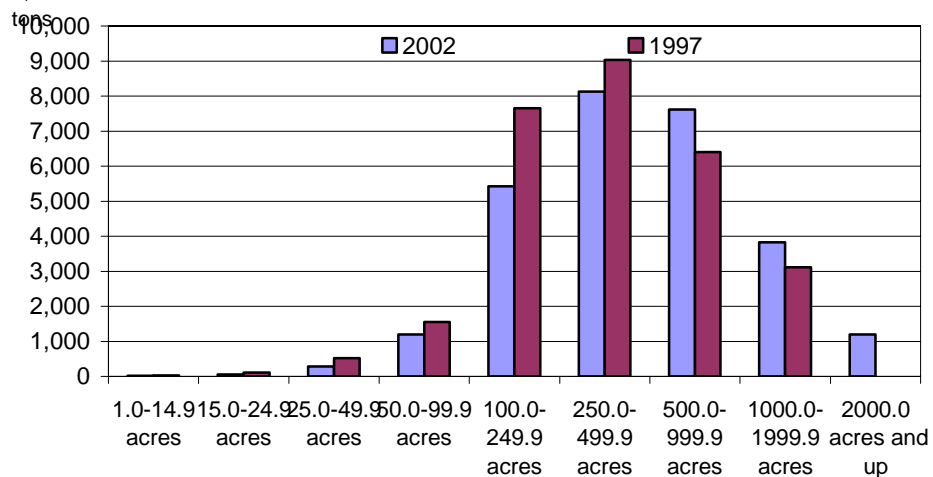


Source: USDA, National Agricultural Statistics Service, Census of Agriculture.

Figure 5

**U.S. sugarbeet production by beet farm acreage size distribution, 2002 and 1997**

1,000 short tons



Source: USDA, National Agricultural Statistics Service, *Census of Agriculture*.

Table 7 -- U.S. sugarbeet factories: location, capacity, current owner

State	Factory (Date of construction) * = molasses desugaring	Daily capacity (tons)					
		1992	1995	1998	2001	2004	2006
California	Clarksburg, CA. (1935)	3,000	--	--	--	--	--
	Hamilton City, CA (1906)	4,000	4,000	--	--	--	--
	Betteravia, CA (1897)	5,600	--	--	--	--	--
	Manteca, CA (1919)	4,200	--	--	--	--	--
	Tracy, CA (1917)	5,000	5,000	5,000	--	--	--
	Brawley, CA (1947)	8,000	8,000	8,200	8,500	9,000	8,500 1/
	Woodland, CA (1937) *	3,600	3,600	3,600	--	--	--
	Mendota, CA (1963)	4,200	4,200	4,200	4,200	4,500	4,000 1/
Colorado	Greeley, CO (1902)	2,200	3,500	4,000	4,000	4,000	-- 2/
	Fort Morgan, CO (1906)	3,800	5,000	5,250	5,250	5,800	5,820 2/
Idaho	Mini-Cassia, ID (1917)	9,000	10,000	10,000	12,500	14,000	17,500 3/
	Twin Falls, ID (1916) *	6,200	6,200	6,200	6,500	6,700	6,500 3/
	Nampa, ID (1942) *	11,800	11,800	11,800	12,000	12,000	12,000 3/
Michigan	Caro, MI (1899)	3,500	3,500	3,600	3,600	3,700	4,000 4/
	Carrlton, MI (1902)	2,900	3,000	3,200	3,200	3,300	3,300 4/
	Croswell, MI (1902)	3,200	3,780	3,852	3,850	3,900	4,000 4/
	Sebewaing, MI (1902)	4,300	5,500	5,500	5,550	5,500	5,500 4/
	Bay City, MI (1901)	8,000	8,000	8,000	8,000	8,000	7,500 4/
Minnesota	Moorhead, MN (1948)	4,400	5,500	5,400	5,600	5,900	5,900 5/
	Crookston, MN (1954)	4,500	5,400	5,300	5,600	5,900	5,900 5/
	Renville, MN (1975)	9,000	10,000	10,000	11,000	12,500	16,000 6/
Montana	Sidney, MT (1925)	5,400	5,400	5,500	6,300	6,200	6,400 7/
	Billings, MT (1906)	4,000	4,800	2,900	4,600	4,600	4,850 2/
North Dakota	Hillsboro, ND (1974) *	4,500	5,850	5,900	7,200	8,200	9,000 5/
	E. Grand Forks, MN (1926) *	6,700	8,500	8,000	9,000	9,300	9,200 5/
	Wahpeton, ND (1974)	5,900	5,900	7,500	9,000	9,300	9,400 8/
	Drayton, ND (1965)	5,400	6,100	5,900	5,900	6,700	6,700 5/
Nebraska	Scottsbluff, NE (1910) *	3,200	4,700	5,000	5,000	4,700	5,000 2/
	Bayard, NE (1917)	2,250	2,900	3,050	2,900	--	--
	Mitchell, NE (1920)	2,250	2,600	--	--	--	--
Ohio	Freemont, OH (1900)	3,800	3,800	--	--	--	--
Oregon	Nyssa, OR (1938)	9,000	9,000	9,000	9,000	9,000	--
Texas	Hereford, TX (1964) *	7,700	7,700	7,000 Molasses Desugaring	--	--	--
Washington	Moses Lake, WA (1997) *	--	--	6,000	--	--	--
Wyoming	Torrington, WY (1923)	5,400	5,400	5,500	5,500	5,500	5,500 2/
	Worland, WY (1917)	3,600	3,600	3,500	6,300	3,500	3,300 9/
	Lovell, WY (1916)	2,500	3,050	3,050	3,050	3,000	3,000 2/
<b>Total capacity</b>		<b>182,000</b>	<b>185,280</b>	<b>180,902</b>	<b>173,100</b>	<b>174,700</b>	<b>168,770</b>

1/ Owner in 2005: Imperial Sugar Co., sold to Southern Minnesota in 2005. 2/ Western Sugar Co. 3/ Amalgamated Sugar. 4/ Michigan Sugar Co. 5/American Crystal Sugar Co.

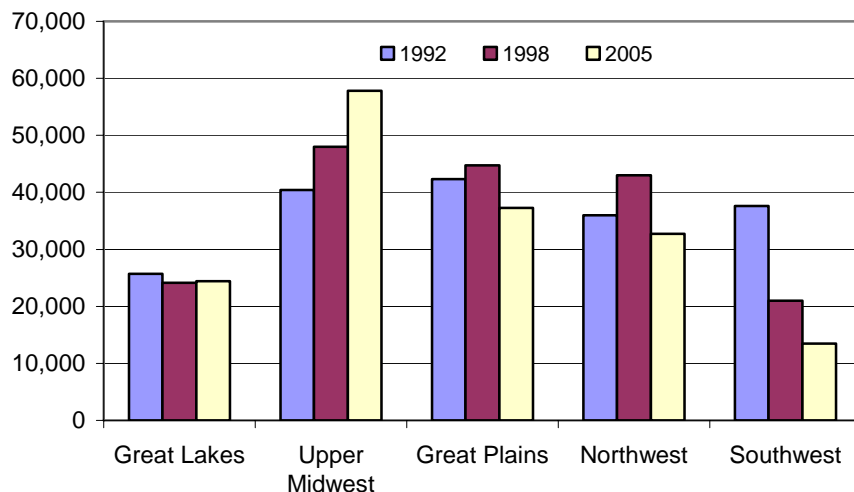
6/ Southern Minnesota. 7/ Sidney Sugars Inc. 8/ Minn-Dak. 9/ Wyoming Sugar Co. LLC

Source: U.S. Beet Sugar Association, Sugar Journal.

Figure 6

**U.S. sugarbeet factories, 24-hour slicing capacity**

Tons/24 hours



Source: U.S. Beet Sugar Association, *Sugar Journal*.

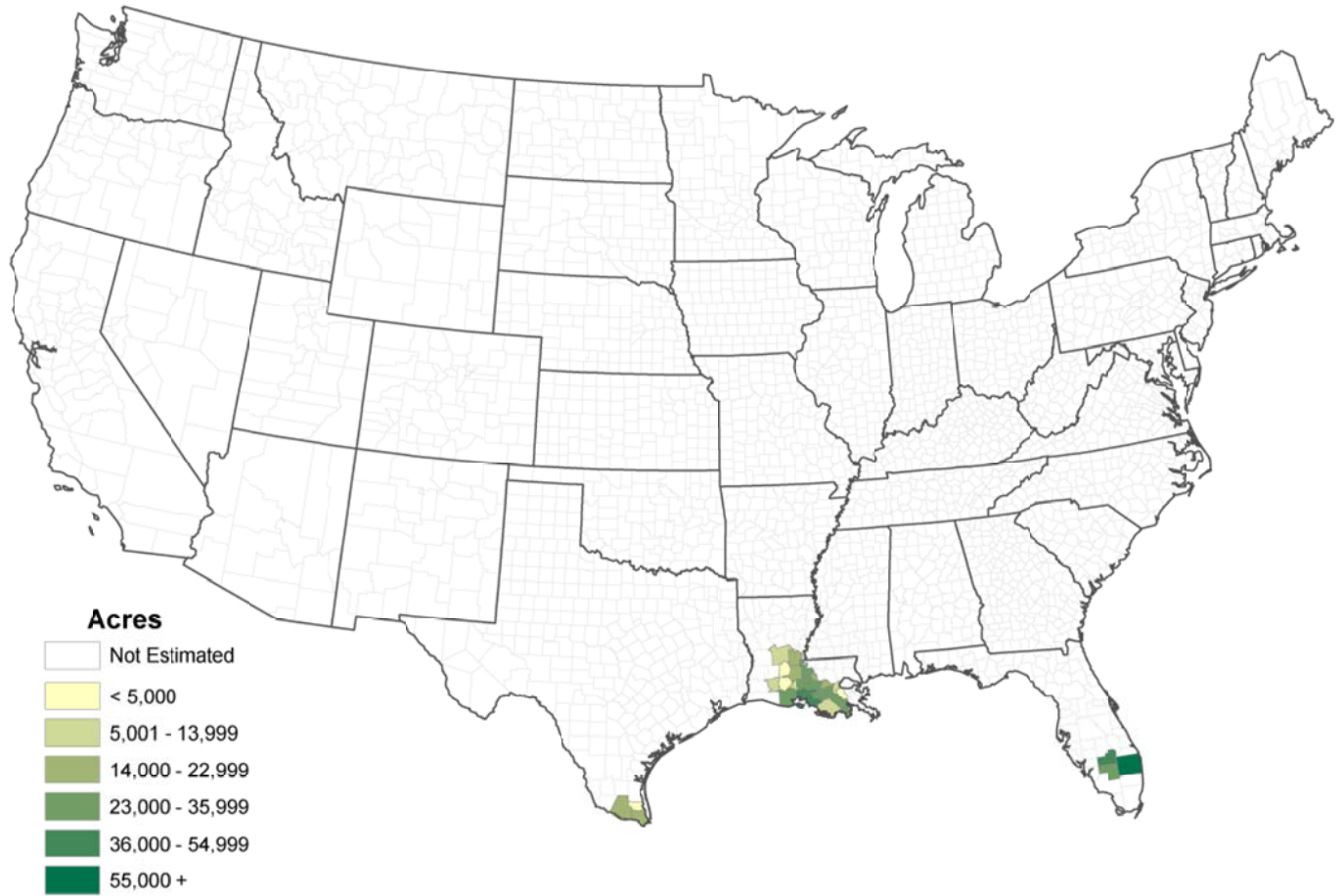
Table 7 shows sugarbeet-processing facilities that were operating in 1992, how capacities have been added to, and which factories have ceased operations. Figure 6 shows processing adjustments for the sugarbeet regions. The figure is roughly comparable to figure 3, especially where capacity has expanded in the Upper Midwest and contracted in the Southwest.

**Sugarcane**

Sugarcane is grown in four States: Florida, Louisiana, Texas, and Hawaii (fig. 7). Sugarcane production has grown from an average of 27.7 million tons in the first half of the 1980s to about 32.0 million tons in the 2000s (table 8, fig. 8). The largest growth has been in Louisiana, where production has more than doubled since the early 1980s. Growth in Florida and Texas has been strong as well. Area and yield growth have both been instrumental in increasing sugarcane production. In Hawaii, on the other hand, high costs and better alternative uses for land have meant a reduction in sugarcane production from 8.8 million tons in the early 1980s to 2.0 million tons in the 2000s. Sugarcane is now grown on only two islands, Kauai and Maui.

In 2002 there were 953 farms producing sugarcane (table 9). This level represents about a 12-percent decline in sugarcane producing farms since 1997. In percentage terms, the farm number decrease is about the same as for all other farms producing other crops within a particular State, except for Texas, where the number of sugarcane farms increased by more than 60 percent and total-crop farms decreased by almost 10 percent. Overall sugarcane harvested area increased about 10 percent from 1997 to 2002, and average sugarcane farm size increased from 825 acres in 1997 to 1,027 acres in 2002, an increase of more than 24 percent. Sugarcane farms are much larger than sugarbeet farms: on average 3.75 times larger in 2002.

**Figure 7 Sugarcane for Sugar 2004  
Harvested Acres by County**



Source: USDA, National Agricultural Statistics Service

Table 8 --U.S. sugarcane: 5-year averages of area, yield, production, sugar output, recovery rate, and sugar yield per acre, 1980-2005. 1/

Crop year 1/	Total	Area for seed ----- 1,000 acres -----	For sugar	Area for seed Percent	Sugarcane yield for sugar Tons/acre	Sugarcane production for sugar 1,000 short tons	Sugar production 1,000 tons, raw value	Recovery rate Percent	Sugar yield per acre 2/ Short tons, raw value
Florida									
1980/81-1984/85	359.5	13.6	345.9	3.8	31.8	11,003.6	1,205.2	10.95	3.48
1985/86-1986/90	412.3	15.5	396.9	3.7	32.3	12,800.8	1,474.2	11.52	3.71
1990/91-1994/95	441.6	17.4	424.2	3.9	34.3	14,532.0	1,768.9	12.17	4.17
1995/96-1999/00	444.4	19.6	424.8	4.4	35.9	15,270.8	1,894.3	12.40	4.46
2000/01-2004/05	443.0	19.4	425.4	4.4	37.0	15,760.6	2,002.5	12.71	4.71
Louisiana									
1980/81-1984/85	253.8	21.2	232.6	8.4	24.8	5,774.8	586.6	10.16	2.52
1985/86-1986/90	285.0	23.8	261.2	8.4	25.0	6,532.0	715.0	10.95	2.74
1990/91-1994/95	347.0	31.2	315.8	9.0	22.8	7,211.8	797.7	11.06	2.53
1995/96-1999/00	416.0	32.4	383.6	7.8	29.0	11,117.8	1,276.7	11.48	3.33
2000/01-2004/05	489.0	35.0	454.0	7.2	27.5	12,467.0	1,413.2	11.34	3.11
Texas									
1980/81-1984/85	35.9	1.0	34.9	2.8	30.2	1,056.0	88.4	8.37	2.53
1985/86-1986/90	33.3	1.6	31.7	4.9	29.8	945.2	89.8	9.50	2.83
1990/91-1994/95	39.7	1.4	38.2	3.6	31.5	1,205.8	125.1	10.37	3.27
1995/96-1999/00	34.1	1.5	32.6	4.4	31.7	1,032.6	103.2	9.99	3.16
2000/01-2004/05	45.0	1.1	43.9	2.4	39.4	1,731.0	180.8	10.44	4.12
Hawaii									
1980-1984	99.7	6.4	93.3	6.4	94.8	8,846.6	1,032.0	11.67	11.06
1985-1990	84.6	6.9	77.7	8.2	96.8	7,523.8	917.2	12.19	11.80
1991-1995	66.8	5.5	61.3	8.2	84.8	5,202.8	639.4	12.29	10.42
1996-2000	36.4	2.2	34.2	6.2	84.6	2,890.6	363.4	12.57	10.64
2001-2005	22.4	1.4	20.9	6.4	95.7	2,003.8	259.4	12.95	12.39
Total									
1980/81-1984/85	749.0	42.2	706.7	5.6	37.8	26,681.0	2,912.2	10.91	4.12
1985/86-1986/90	815.3	47.8	767.5	5.9	36.2	27,801.8	3,196.2	11.50	4.16
1990/91-1994/95	895.1	55.5	839.6	6.2	33.5	28,152.4	3,331.1	11.83	3.97
1995/96-1999/00	930.9	55.7	875.2	6.0	34.6	30,311.8	3,637.7	12.00	4.16
2000/01-2004/05	999.3	56.9	944.2	5.7	33.8	31,962.4	3,855.9	12.06	4.08

1/ Crop year is October/September for Florida, Louisiana, and Texas. Crop year for Hawaii is the calendar year.

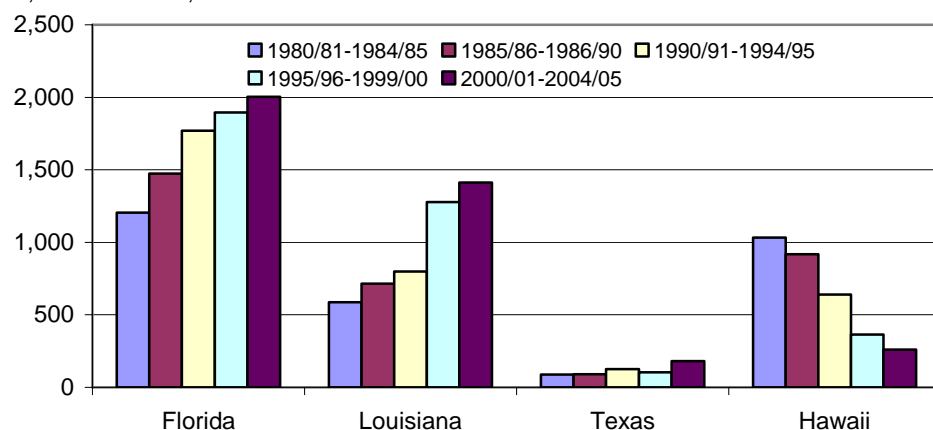
2/ Yield per acre harvested for sugar only (excludes sugarcane for seed).

Sources: USDA, National Agricultural Statistics Service, *Crop Production*; Farm Service Agency, *Sweetener Market Data*; *World Agricultural Supply and Demand Estimates*.

Figure 8

**U.S. cane sugar production, by State, averaged over 5-year periods, 1980-2005**

1,000 short tons, raw value



Source: USDA, Farm Service Agency, *Sweetener Market Data*.

As was the case with sugarbeet farms, the number of sugarcane farms averaging less than 500 acres fell between 1997 and 2002, while those exceeding 500 acres grew in number (fig. 9). More revealing is figure 10, which shows sugarcane production by farm size. The share of sugarcane production of farms larger than 2,000 acres is disproportionately high: in both 1997 and 2002, the share of production coming from farms larger than 2,000 acres was in the range of 57 percent to 59 percent of total production. Also, sugarcane farms larger than 500 acres contributed about 91 percent of total sugarcane production. (The corresponding percentage for sugarbeet production was 45 percent.) Although figure 9 shows a fair number of sugarcane farms smaller than 250 acres, these farms contributed only about 3 percent of total sugarcane production in both 1997 and 2002.

Table 10 shows sugarcane-processing facilities that were operating in 1992, how capacities have been added to, and which factories have ceased operations. Figure 11 shows the aggregate capacity changes within States over time. Sugarcane-milling capacity has decreased about 12 percent since 1992. Capacity changes in Florida mirror this average, while capacity in Louisiana has grown 24 percent over the period. The largest percentage decreases have been in Puerto Rico (100 percent) and Hawaii (78 percent).

**Sugar Crop Returns**

Data from table 3 indicate a 1981-2005 average sugarbeet price of \$38.38 per ton and an average sugarcane price of \$28.11 per ton. The real-price series for both sugarbeets and sugarcane are plotted in figure 12. Real returns for both crops have been fairly constant since 1981. The sugarbeet price indexed by the farm producer price index (1982 = 100) has averaged \$36.30 per ton and the corresponding real sugarcane price has averaged \$26.63 per ton.

Table 9 -- Sugarcane and other crops, farm numbers and harvested acres, 2002 and 1997, by state

States	-----Number of producing farms-----			-----Harvested crop acreage-----		
	2002	1997	Percent change	2002 (1,000 acres)	1997	Percent change
<i>Sugarcane</i>						
States						
Florida	120	162	-25.9	440.8	421.7	4.5
Hawaii	2	13	-84.6	D	31.5	NA
Louisiana	665	802	-17.1	471.6	410.4	14.9
Texas	166	102	62.7	D	26.6	NA
Total	953	1,079	-11.7	978.4	890.2	9.9
<i>All other crops</i>						
States						
Florida	20,495	23,520	-12.9	2,313.5	2,434.4	-5.0
Hawaii	4,522	4,594	-1.6	109.5	100.1	9.4
Louisiana	14,017	17,679	-20.7	3,332.1	4,022.7	-17.2
Texas	106,827	118,215	-9.6	17,750.9	20,357.8	-12.8
Total	145,861	164,008	-11.1	23,506.1	26,914.9	-12.7

Source: USDA, National Agricultural Statistics Service, *Census of Agriculture*.

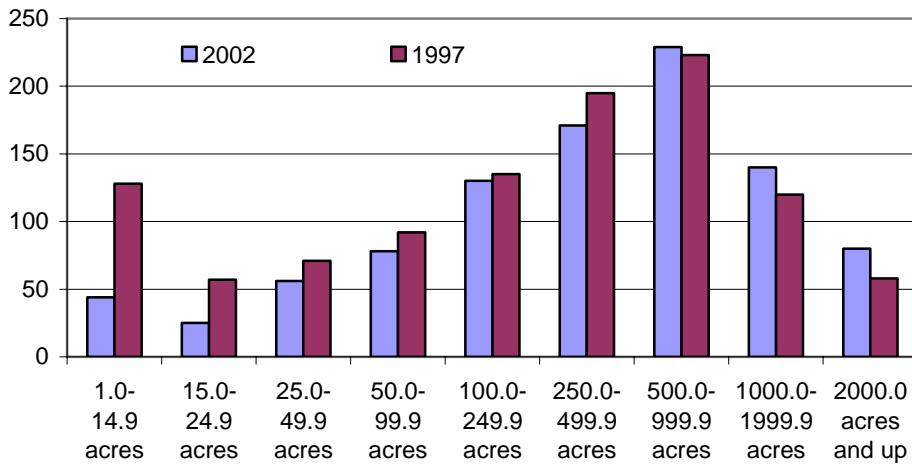
D = disclosure withheld.

NA = not available

Figure 9

**U.S. farms producing sugarcane by cane farm acreage size distribution, 2002 and 1997**

Number of farms



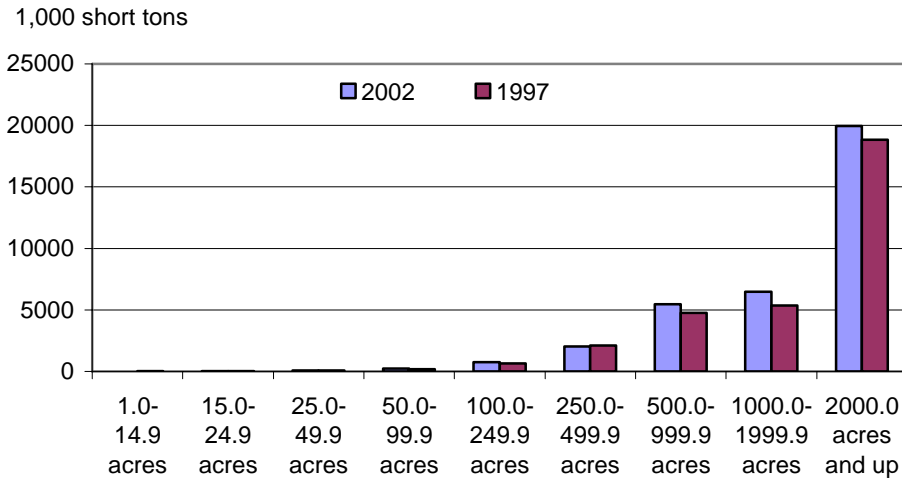
Source: USDA, National Agricultural Statistics Service, *Census of Agriculture*.

The sugar crop unit prices are based on processor returns from the sale of products made from the sugar crops. These are primarily sugar, and to a lesser extent, molasses and other byproducts. Real prices of refined beet sugar and raw cane sugar, indexed on the food product producer price index (2000 = 100), are shown in figure 13. Unlike the sugar crop price series, the real sugar product prices have been



Figure 10

**U.S. sugarcane production by cane farm acreage size distribution, 2002 and 1997**



Source: USDA, National Agricultural Statistics Service, *Census of Agriculture*.

declining since 1985. Increases in crop sucrose content and sugar extraction technology countered this negative effect on real sugar crop returns. These trends can be seen in figure 14, in which the tonnage of sugarbeets and sugarcane necessary to produce 1 ton of sugar, raw value, are shown from 1980 through 2005. As can be seen, it has taken progressively fewer tons of sugar crops to produce 1 ton of sugar. Productivity increases have effectively countered real product price declines to keep crop returns more or less constant since the 1980s.

**Costs of Production and Sugar Processing**

Costs of producing sugar in the United States vary from region to region, but all are higher than the world’s low-cost sugar producers. Cost ranges based on estimates made by LMC International are shown in table 11 for U.S. mainland cane sugar producers and for U.S. eastern and western beet sugar producing areas.<sup>1</sup> The eastern beet sugar regions are the Great Lakes and Upper Midwest, and the western regions include the Great Plains, Northwest, and Southwest. Mainland cane sugar-producing regions exclude higher cost Hawaii.

U.S. cane costs of production are at least twice as high as the world’s lowest cost producers, and are typically higher than the production-weighted world average of all cane-producing countries. The range of U.S. raw cane sugar costs, adjusted to

<sup>1</sup> LMC International Ltd is an independent economic and business consultancy providing economic research and consultancy services for a broad range of industries related to agricultural commodities, foods, industrial materials, biofuels, and their end markets.

Table 10 -- U.S. cane sugar millers: factory, location, and capacity, 1992-2005.

Factory name	Factory location	Daily milling capacity, tons/24 hours				
		1992/93	1996/97	1999/2000	2002/03	2004/05
<b>Louisiana</b>						
Alma Plantation, Ltd.	Lakeland	6,000	7,000	7,000	9,000	10,000
Breaux Bridge Sugar Cooperative	Breaux Bridge	3,000	3,600	--	--	--
Cajun Sugar Cooperative	New Iberia	7,500	9,000	12,000	14,000	15,130
Caldwell Sugar Cooperative	Thibodaux	6,000	6,000	6,500	--	0
Cinclare Central	Brusly	5,000	5,500	6,500	7,000	8,000
Columbia Factory	Edgard	2,000	NA	NA	NA	0
Cora Texas Manufacturing	White Castle	9,500	11,000	12,500	15,000	15,900
Enterprise Factory	Jeanerette	14,000	15,500	18,000	20,500	23,000
Evan Hall Sugar Cooperative	Donaldsonville	7,200	7,500	7,500	--	0
Glenwood Cooperative	Napoleonville	5,200	5,800	6,500	6,500	0
Iberia Sugar Cooperative	New Iberia	6,000	6,000	7,000	7,400	0
Jeanerette Sugar Company	Jeanerette	6,000	7,000	7,800	8,500	0
Leighton (Lafourche Sugar)	Thibodaux	8,500	8,500	8,500	11,500	12,000
Lula Factory	Belle Rose	6,500	7,800	8,500	9,000	9,500
Raceland factory	Raceland	9,000	10,500	13,000	13,500	15,000
South Louisiana Sugars Cooperative, Inc.	St. James	6,000	7,000	7,000	8,200	9,000
St. Martin (LaSuCa Coop, Inc.)	St. Martinville	6,000	6,000	8,000	9,000	9,600
St. Mary Sugar Cooperative	Jeanerette	5,180	9,000	12,000	12,500	13,000
Sterling Sugars, Inc	Franklin	8,000	11,250	11,250	11,000	12,000
Westfield Factory	Paincourtville	6,000	7,000	10,000	11,000	12,500
Total		132,580	150,950	169,550	173,600	164,630
<b>Florida</b>						
Atlantic Sugar Association, Inc.	Belle Glade	12,000	12,000	13,300	15,500	0
Glades Sugar House	Belle Glade	21,000	21,000	22,000	22,000	25,000
Okeelanta Corporation	South Bay	21,000	22,800	24,500	25,000	26,000
Osceola Farms Company	Pahokee	12,000	14,500	15,500	15,500	16,300
Talisman Sugar Mill	Belle Glade	11,000	11,000	--	--	0
U.S. Sugar - Clewiston Factory	Clewiston	46,500	45,000	26,000	42,000	24,000
U.S. Sugar - Bryant Factory 1/	Bryant	--	--	18,000	--	17,500
Total		123,500	126,300	119,300	120,000	108,800
<b>Hawaii</b>						
Hilo Coast Processing Co.	Pepeekeo	4,800	--	--	--	--
Hamakua Sugar Co.	Paauilo	6,000	--	--	--	--
Ka'u Agribusiness	Pahala, Ka'u	2,880	--	--	--	--
Mauna Kea	Pepeekeo	NA	--	--	--	--
Gay and Robinson, Inc. 2/	Kaumakani, Kauai	2,880	2,880	3,240	3,600	3,500
Lihue Plantation (Amfac Sugar)	Lihue, Kauai	4,680	4,680	3,600	--	--
Kekaha Sugar (Amfac Sugar)	Lihue, Kauai	3,000	3,000	3,200	--	--
Hawaiian Commercial & Sugar Co.	Puunene, Maui	7,200	7,200	7,200	7,200	7,000
Hawaiian Commercial & Sugar Co.	Paia, Maui	3,800	3,800	3,800	--	--
Pioneer Mill Co., Ltd.	Lahaina, Maui	2,700	2,880	--	--	--
Oahu Sugar Co., Ltd.	Waipahu, Oahu	6,000	--	--	--	--
Waialua Sugar Co.	Waipahu, Oahu	4,000	--	--	--	--
Total		47,940	24,440	21,040	10,800	10,500
<b>Texas</b>						
W.R. Cowley Sugar House	Santa Rosa	11,000	11,000	11,000	11,000	10,000
<b>Puerto Rico</b>						
Central Coloso 3/	Aguadilla	6,000	6,000	6,000	--	--
Central Mercedita	Mercedita	5,000	--	--	--	--
Central Plata	San Sebastian	4,600	4,000	--	--	--
Central Roig	Yabucoa	4,000	4,000	4,000	--	--
Total		19,600	14,000	10,000	0	0
<b>Total United States</b>		<b>334,620</b>	<b>326,690</b>	<b>330,890</b>	<b>315,400</b>	<b>293,930</b>

1/ Capacity of Bryant included in Clewiston Factory except where noted.

2/ Olokele Sugar Co. Ltd. in 1992/93.

3/ Central Agraso in 1992/93.

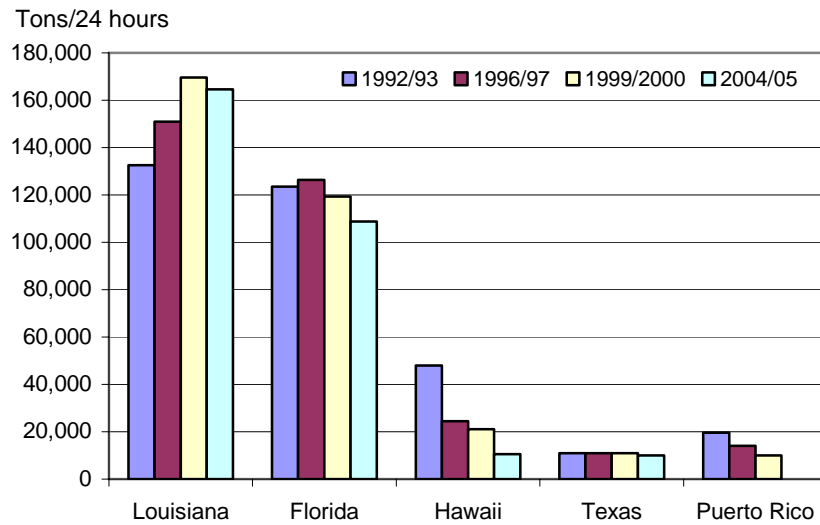
Source: Lilleboe Communications Ltd., Gilmore Sugar Manual.

white value equivalence, and U.S. beet sugar costs are overlapping. U.S. beet sugar costs of production are below the production-weighted world average of all beet sugar-producing countries. The world's average beet-sugar cost of production, however, is about 75 percent above the average cane-sugar cost of production, white value equivalence. U.S. costs of producing high fructose corn syrup (HFCS) have been much lower than U.S. sugar production costs.

Figures 15 and 16 show added field and factory cost details for individual U.S. cane and beet sugar producing areas. All U.S. regions have field costs that are higher than the world's production-weighted field cost cane sugar average. Sugar crop growers in the Red River Valley (or Upper Midwest) have the lowest relative field costs of production, according to the LMC International estimates. Florida cane growers are ranked as second in field costs within the United States. All other areas except for extremely high-cost Hawaii have field costs below the world's production-weighted beet sugar average. U.S. factory costs of producing sugar are more competitive relative to world averages than are the field costs.<sup>2</sup> Exceptions are the Great Lakes and Great Plains where factory costs are higher than the other U.S. regions.

<sup>2</sup> Factory costs tend to be only about 40 percent of field costs. This is partly reflective of LMC International's attribution of byproduct credits to factory costs. These credits include molasses and beet pulp sales revenue.

Figure 11  
**U.S. sugarcane millers, 24-hour grinding capacities**

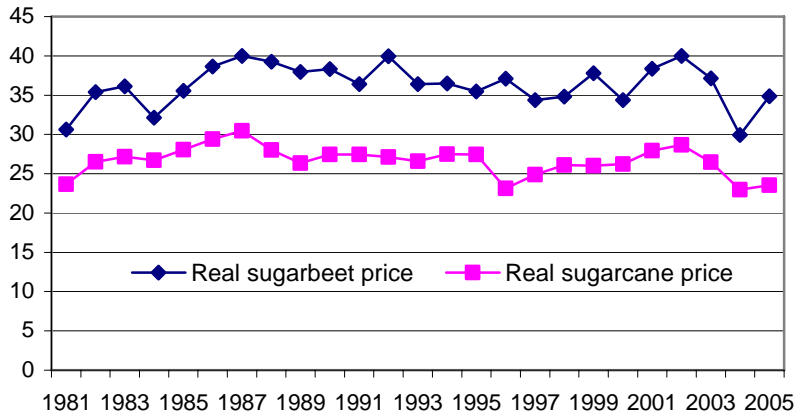


Source: Lilleboe Comm. Ltd., *Gilmore Sugar Manual*, and USDA, Farm Service Agency database.

Figure 12

### Real producer unit price for U.S. sugarbeets sugarcane, 1981-2005

Dollars per ton



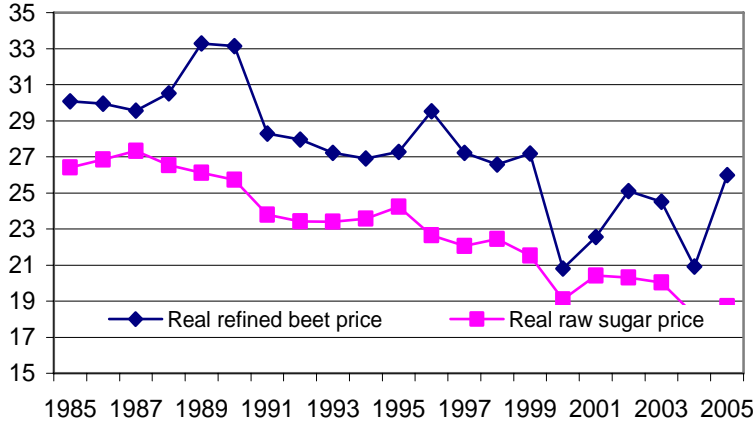
Indexed by farm product producer price index, 1982=100

Source: USDA, National Agricultural Statistics Service, Crop Values.

Figure 13

### Real prices for U.S. refined beet sugar and raw cane sugar, 1985-2005

Cents/lbs

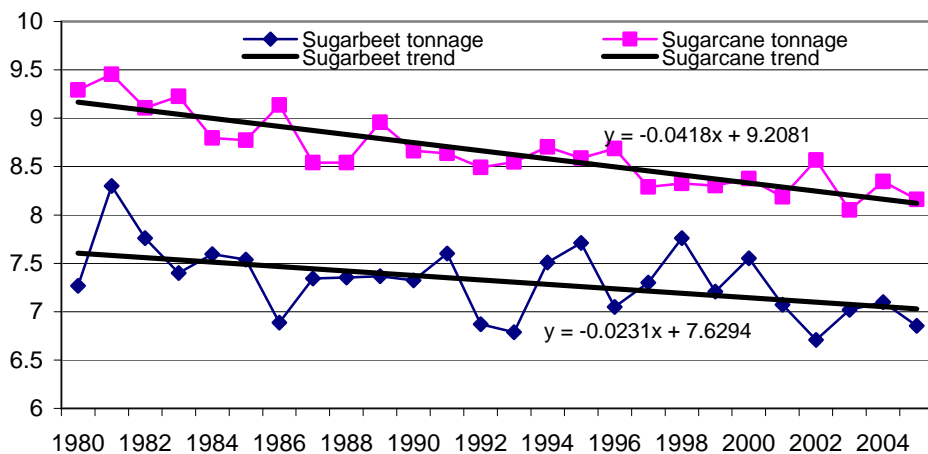


Indexed by food product producer price index, 2000=100

Source: New York Board of Trade, Milling and Baking News.

Figure 14

**Tonnage of sugarbeets and sugarcane needed to produce 1 ton of sugar, raw value, 1980-2005**



Source: ERS analysis based on USDA, National Agricultural Statistics Service, *Crop Production*, and on USDA, Farm Service Agency, *Sweetener Market Data*.

Table 11 -- Costs of producing raw cane sugar, refined beet sugar, and high fructose corn syrup, 1999/00-2004/05.

Category	Dollars/metric ton 1/	Cents/pound
<b>Raw cane sugar</b>		
U.S. mainland producing regions 2/	276.60 - 442.60	12.55 - 20.08
Mexico - Eastern producing regions 3/	293.80 - 361.50	13.33 - 16.40
Mexico - Western producing regions 4/	304.40 - 540.70	13.81 - 24.53
Low-cost producers 5/	119.50 - 254.30	5.42 - 11.53
Weighted world average	237.20 - 270.20	10.76 - 12.26
<b>Cane sugar, white value equivalent</b>		
U.S. mainland producing regions 2/	365.66 - 546.11	16.59 - 24.77
Mexico - Eastern producing regions 3/	384.36 - 457.95	17.43 - 20.77
Mexico - Western producing regions 4/	395.88 - 652.74	17.96 - 29.61
Low-cost producers 5/	194.90 - 341.42	8.84 - 15.49
Weighted world average	322.84 - 358.71	14.64 - 16.27
<b>Beet sugar, refined value</b>		
Eastern U.S. producing regions 6/	369.70 - 555.35	16.77 - 25.19
Western U.S. producing regions 7/	411.10 - 718.00	18.65 - 32.57
Weighted world average	573.10 - 622.20	26.00 - 28.22
<b>High fructose corn syrup 8/</b>		
United States and Mexico	221.20 - 473.20	10.03 - 21.46

1/ Ex-mill, factory basis.

2/ U.S. producing mainland regions comprise Florida, Louisiana, and Texas.

3/ Mexican eastern regions include: Central, Gulf, Northeast, and South.

4/ Mexican western regions include: Northwest, and Pacific.

5/ Seven producing regions (Brazil - North/East, Brazil - Center/South, Malawi, South Africa, Sudan, Swaziland, and Zimbabwe).

6/ Eastern U.S. producing regions comprise the Great Lakes and the Red River Valley.

7/ Western U.S. producing regions comprise the Northern Great Plains, Central Great Plains, the Northwest, and the Southwest.

8/ HFCS-55, dry weight.

Source: LMC International, Oxford, UK: *Survey of Sugar and HFCS Production Costs*.

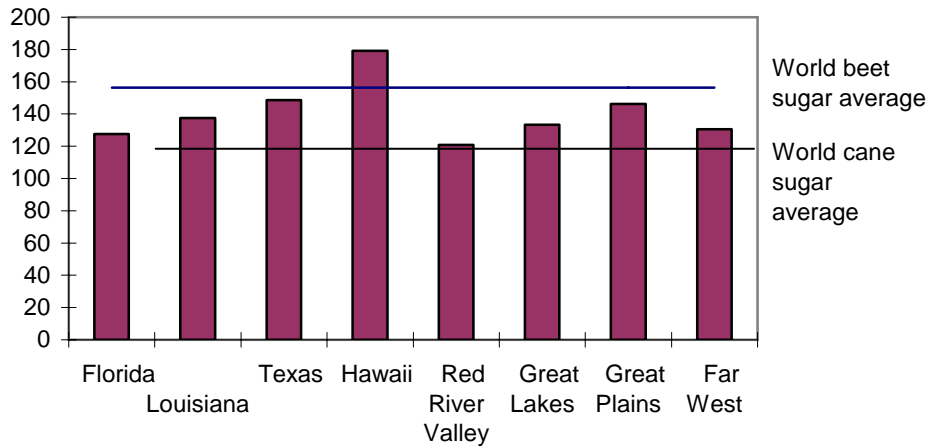
## Sugar Processing and Refining

While the beet sugar that comes from sugarbeet processing is refined and ready for use as a food product, U.S. raw cane sugar must be further refined for use as a food ingredient. Many refineries have closed, beginning in the 1980s, as raw sugar imports decreased due to reduced sugar demand (table 12, fig. 17). Reduced demand resulted from the substitution of HFCS for liquid sugar in beverage and

Figure 15

### U.S. field costs of sugar production, relative to world average for cane and beet sugar, 1999/00 - 2004/05

Field cane cost=100

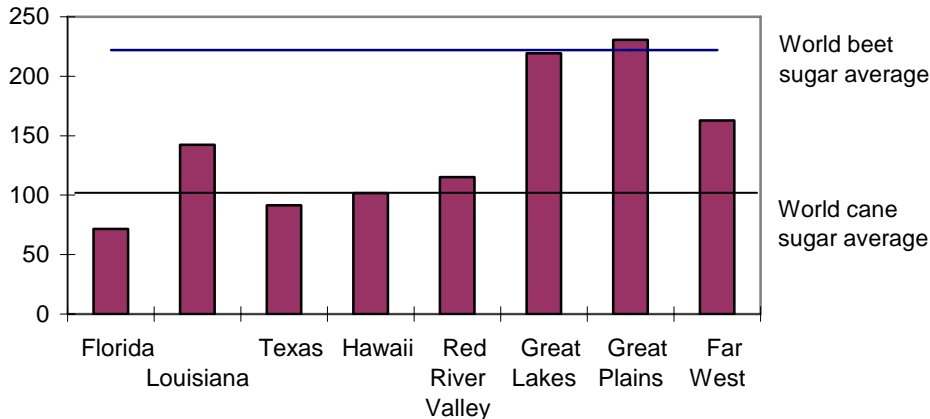


Source: LMC International, Oxford, UK: *Survey of Sugar and HFCS Production Costs*.

Figure 16

### U.S. processing and refining factory costs of sugar production, relative to world average for cane and beet sugar, 1999/00-2004/05

Factory cane cost=100



Source: LMC International, Oxford, UK: *Survey of Sugar and HFCS Production Costs*.

Table 12 -- U.S. cane sugar refining industry.

Refinery location	Company	Daily capacity 1/	Annual capacity 2/	Monthly capacity 3/	Date closed
Aeia, HI	C&H	142	42,600	3,550	Dec-96
Baltimore, MD	Domino	3,000	900,000	75,000	
Belle Glade, FL	Florida Sugar	390	117,000	9,750	Mar-86
Boston, MA	Domino	1,000	300,000	25,000	Mar-88
Boston, MA	Revere	1,200	360,000	30,000	May-84
Brooklyn, NY	Domino	2,000	600,000	50,000	Feb-04
Brooklyn, NY	Revere	1,120	336,000	28,000	Mar-85
Chalmette, LA	Domino	3,100	930,000	77,500	
Chicago, IL	Revere	850	255,000	21,250	May-84
Clewiston, FL	U.S. Sugar	2,400	720,000	60,000	
Crockett, CA	C&H	3,400	1,020,000	85,000	
Gramercy, LA	Imperial	2,200	660,000	55,000	
Mathews, LA	LA Sugar Cane	600	180,000	15,000	Sep-85
Philadelphia, PA	Domino	2,100	630,000	52,500	Oct-82
Philadelphia, PA	National	2,100	630,000	52,500	Sep-81
Port Wentworth, GA	Imperial	3,150	945,000	78,750	
Reserve, LA	Gochaux	1,900	570,000	47,500	Jan-85
St. Louis, MO	Colonial	300	90,000	7,500	Mar-87
South Bay, FL	Florida Crystals	1,100	330,000	27,500	
Sugar Land, TX	Imperial	1,950	585,000	48,750	Nov-03
Supreme, LA	Supreme	850	255,000	21,250	Oct-95
Yonkers, NY	Domino	2,000	600,000	50,000	
<b>Total in 2005</b>		<b>20,350</b>	<b>6,105,000</b>	<b>508,750 /4</b>	

1/ 24-hour melting capacity, short tons, raw value (STRV)

2/ 300 days.

3/ Annual capacity divided by 12.

4/ Capacity in 2006 assuming Chalmette at 50% of capacity = 5,712,000 STRV.

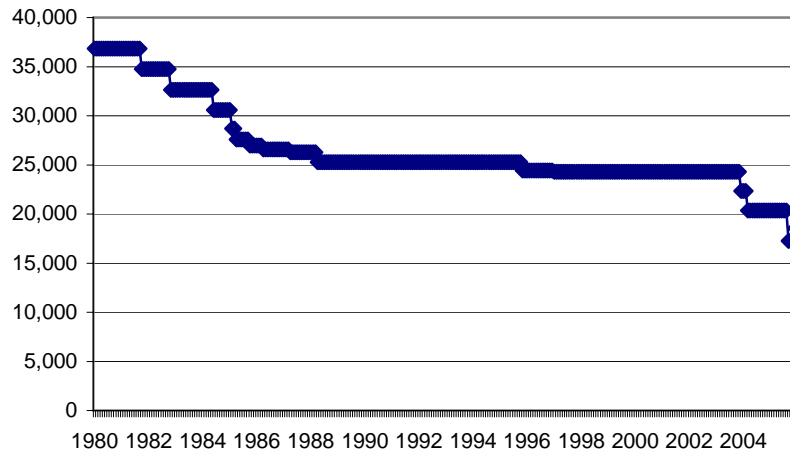
Note: Cargill Sugar North America and Louisiana Sugar Cane Products, Inc. plan to build and run a sugar refinery in Reserve, La. in the next few years, with capacity to process 1 million of tons of sugar a year.

Source: U.S. Cane Sugar Refiners Association, *Sugar Journal*.

Figure 17

**U.S. sugar refining capacity**

24hr. Melting capacity, short tons, raw value



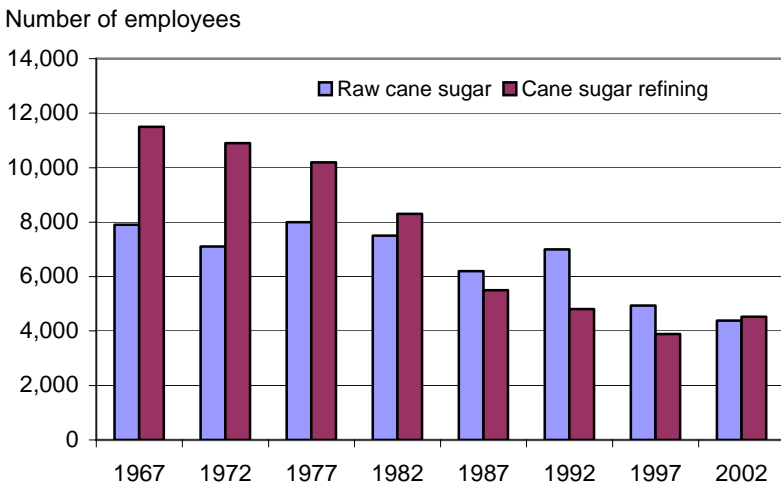
Source: U.S. Cane Sugar Refiners' Association.

other end uses. The raw cane-sugar refining industry has also been challenged by production increases in the U.S. beet sugar industry.

The number of companies in sugar manufacturing (sugarbeet and sugarcane processing and raw sugar refining) fell from 98 in 1967 to 54 in 2002 (table 13). The number of establishments or facilities with more than 20 employees fell from 162 to 62 over the same time period. The numbers of total employees, production workers, and hours worked fell in all three sectors. From 1967 to 2002, cane industry employment dropped by 54 percent and beet processing employment by 50 percent. In 1967, employment in cane refining was 45 percent larger than employment in cane processing; by 2002 employment in the two sectors was about equal (fig. 18). The same trends are seen for production workers and for the annual number of hours for workers engaged in production.

Total real wages in 2002 for beet and cane processing were about 57 percent to 59 percent of their level in 1967, while total real wages paid in the refining industry in 2002 were only about 35 percent of their 1967 level (fig. 19). Hourly real wages increased in the beet and cane processing industries but not in the sugar refining sector from 1967 to 2002.

Figure 18  
**Distribution of employees between cane milling and cane refining**



Source: U.S. Department of Commerce, U.S. Census Bureau, *Census of Manufacturers*.



Table 13 -- U.S. sugar manufacturing: companies, employment, and wages, 1967-2002

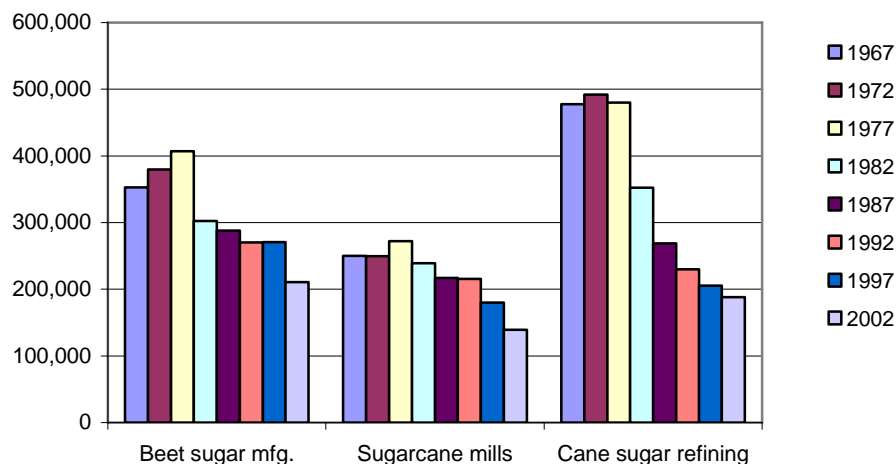
Industry type	---All establishments---			All		-----Production workers and wages-----					
	Companies	Total	>20 employees	employees	Payroll (\$1,000)	Number (1,000)	Hours (\$1,000)	Wages Nominal	Wage/hr (2000 \$)	Real wages (2000 \$)	Real wage/hr (2000 \$)
Beet sugar manufacturing (NAICS-311313)											
2002	11	35	27	5,697	\$220,394	4,903	10,493	\$174,444	\$16.62	\$166,932	\$15.91
1997	8	36	36	7,718	\$252,236	6,684	14,333	\$203,040	\$14.17	\$217,854	\$15.20
1992	13	40	37	7,600	\$220,200	6,600	14,300	\$173,400	\$12.13	\$212,761	\$14.88
1987	14	42	38	7,900	\$190,100	6,600	14,400	\$151,000	\$10.49	\$228,788	\$15.89
1982	14	48	44	10,300	\$169,400	8,800	17,300	\$136,400	\$7.88	\$243,571	\$14.08
1977	14	57	52	11,400	\$143,300	9,900	21,300	\$119,000	\$5.59	\$338,068	\$15.87
1972	16	61	54	11,500	\$92,300	10,400	21,200	\$78,400	\$3.70	\$322,634	\$15.22
1967	15	65	61	11,500	\$68,400	10,100	20,300	\$56,300	\$2.77	\$290,206	\$14.30
Sugarcane mills (NAICS-311311)											
2002	29	32	23	4,386	\$145,486	3,109	7,280	\$113,018	\$15.52	\$108,151	\$14.86
1997	34	38	31	4,938	\$167,589	3,362	8,768	\$109,506	\$12.49	\$117,496	\$13.40
1992	37	45	41	7,000	\$175,800	5,100	11,700	\$128,200	\$10.96	\$157,301	\$13.44
1987	31	40	40	6,200	\$143,300	4,800	11,000	\$108,400	\$9.85	\$164,242	\$14.93
1982	43	51	44	7,500	\$133,800	5,800	13,100	\$100,500	\$7.67	\$179,464	\$13.70
1977	49	65	55	8,000	\$95,800	6,300	13,600	\$70,800	\$5.21	\$201,136	\$14.79
1972	61	77	62	7,100	\$60,700	5,200	12,300	\$44,000	\$3.58	\$181,070	\$14.72
1967	61	83	74	7,900	\$48,500	6,200	14,500	\$35,400	\$2.44	\$182,474	\$12.58
Cane sugar refining (NAICS-311312)											
2002	14	20	12	4,523	\$196,771	3,185	7,608	\$130,680	\$17.18	\$125,053	\$16.44
1997	12	18	12	3,891	\$191,663	2,823	6,833	\$126,215	\$18.47	\$135,424	\$19.82
1992	12	17	15	4,800	\$187,500	3,600	7,900	\$129,400	\$16.38	\$158,773	\$20.10
1987	14	21	16	5,500	\$177,400	4,200	9,000	\$130,400	\$14.49	\$197,576	\$21.95
1982	19	30	25	8,300	\$197,200	6,200	12,800	\$139,500	\$10.90	\$249,107	\$19.46
1977	27	40	27	10,200	\$168,900	7,200	15,400	\$116,400	\$7.56	\$330,682	\$21.47
1972	22	33	28	10,900	\$119,500	8,200	18,100	\$83,800	\$4.63	\$344,856	\$19.05
1967	22	34	27	11,500	\$92,700	8,700	18,700	\$69,200	\$3.70	\$356,701	\$19.07

Source: U.S. Department of Commerce, U.S. Census Bureau, *Census of Manufacturers*.

Figure 19

**Total real payroll, U.S. sugar industry, 1967-2002**

1,000 dollars



Source: U.S. Department of Commerce, U.S. Census Bureau, *Census of Manufacturers*.

Table 14 -- Top sugar importing countries/regions, 2000/01 - 2004/05

Region/country	Average Imports (1,000 metric tons, raw value)
Total Middle East	7,531
Russian Federation	4,494
Western Europe, including EU-15	2,495
United States	1,573
Indonesia	1,548
Japan	1,434
Canada	1,307
China	1,157

Source: USDA, Foreign Agricultural Service, PSD Database.

**U.S. Sugar Trade**

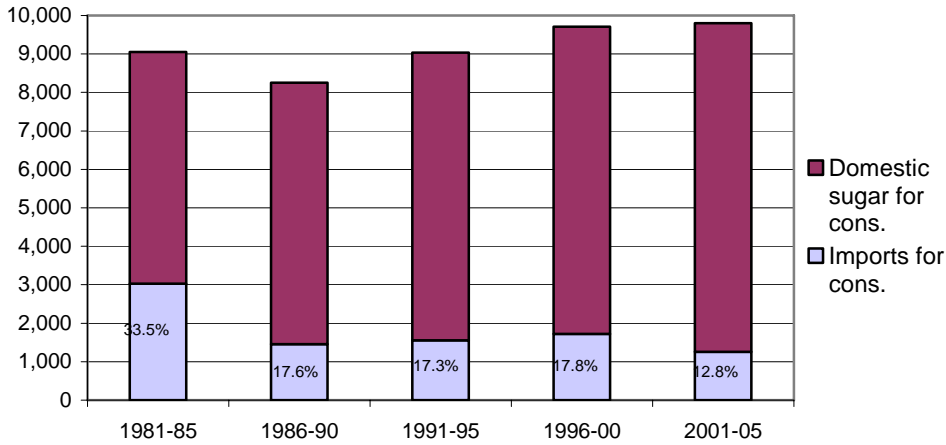
The United States is the fourth-largest of the world's importers (table 14). Although sugar imports are not nearly as high as they were before the 1980s, the U.S. sugar imports averaged 1.573 million metric tons, raw value (MTRV) from 2000/01 through 2004/05.

Although imports have long been an important source of sugar supply for the United States, their percentage of total supply has been trending downward over time (fig. 20). From 1981 through 1985, imports on average constituted 33.5 percent of consumed sugar. After 1985, demand for sugar was lower because of HFCS replacement of sugar in beverages. The level of sugar imports decreased. Subsequent increases in sugar demand through the 1990s were met by increases in

Figure 20

**Sourcing of sugar for human consumption, 1981-2005:  
imports and domestic production**

1,000 short tons, raw value



Percentage = import share

Source: USDA, Farm Service Agency, *Sweetener Market Data*.

domestic production. During this period, the import share of consumption ranged between 17.3 and 17.8 percent. From 2000 through 2007 (not including 2006), the import share of consumption has averaged 12.8 percent due to lower demand and continuing strong domestic production.

In spite of these downward trends in sugar imports, sugar imports can increase to compensate for domestic production disruptions. Due to storm damage from three hurricanes in fiscal year 2006 (October 1, 2005 through September 30, 2006), domestic cane sugar production was 750,000 short tons, raw value (STRV) less than what had been forecast before the hurricanes occurred. Also, sugar refining in Louisiana was disrupted for over half of the year due to hurricane damage. As a consequence of these events, sugar imports to the United States increased 1.34 million STRV, or 64 percent, over the previous fiscal year.

Most sugar imported into the United States enters through sugar tariff-rate quotas (TRQs). Under a TRQ, a certain amount of import access is provided at a lower, preferential tariff rate (in-quota tariff). For imports outside the TRQ, the (over-quota) tariff rate is much higher. In the case of sugar, the United States as part of the World Trade Organization's Uruguay Round Agreement on Agriculture (URAA), committed itself to provide minimum access for 1.256 million STRV (1.139 million MTRV) by way of TRQs. Prior to the start of each fiscal year, the U.S. Department of Agriculture (USDA) makes an assessment of sugar import requirements and announces the level of the raw and refined sugar TRQs. The U.S. trade representative (USTR) then has the responsibility to make any determination and announcement of country-specific TRQ allocations. The United States did not bind any country-specific sugar TRQ allocations. Current allocations of U.S. sugar imports under the WTO TRQs are made based on historic trade shares during the 1975-81 period when the United States had more or less unrestricted sugar import access.<sup>3</sup>

<sup>3</sup>Although Mexico was one of the original 40 countries eligible for quota, its share now is based on NAFTA

Although the United States makes provision for this sugar access, not all countries fulfill their quotas. It is customary for USDA to make a projection of TRQ shortfall and include that shortfall when making monthly supply and use projections/estimates of U.S. sugar in the *World Agricultural Supply and Demand Estimates* (WASDE) report. An initial shortfall projection of 50,000 STRV or 45,360 MTRV is typically made in the sugar supply portion of the WASDE. (Table 15 shows country allocations and sugar imported for the last three fiscal years, highlighting that the shortfall for those years averaged 53,116 MTRV a year.)

TRQ allocation system was established more than 20 years ago. Since then certain countries' sugar supply-and-demand balances have changed dramatically. Table 16 shows the raw sugar TRQ countries' production, imports, exports, and disappearance averaged over the 6 years since 1999/2000. Country balances are evaluated with respect to two standards: (1) net surplus producer—measured as production minus domestic disappearance; and (2) net surplus exporter—measured as a country's exports to destinations other than the United States minus its imports. For the first standard, 9 of the 39 countries are no longer net-surplus sugar producers. Their minimum access allocations sum to 116,321 MTRV, or 10.5 percent of the total. For the second standard, 12 countries cannot be classified as net-surplus exporters. Included in this set are countries with large U.S. WTO minimum allocations such as the Dominican Republic (185,300 MTRV), the Philippines (142,200 MTRV), and Peru (43,200 MTRV). The minimum access allocations of all non-net-surplus exporters sum to 450,021 MTRV, or 40.5 percent of the total.

Table 15 -- U.S. raw sugar tariff-rate quota, FY 2003-05: allocations, quantities entered, and shortfall

TRQ exporters1/	Fiscal year 2003			Fiscal year 2004			Fiscal year 2005		
	Quota Limit	Quantity Entered	Shortfall	Quota Limit	Quantity Entered	Shortfall	Quota Limit	Quantity entered	Shortfall
				<i>Metric tons, raw value</i>					
Argentina	45,281	45,350	0	45,281	46,741	0	54,171	54,225	0
Australia	87,402	85,757	1,645	87,402	87,501	0	104,561	104,812	0
Barbados	7,371	0	7,371	7,371	0	7,371	0	0	0
Belize	11,583	11,686	0	11,583	11,571	12	13,857	11,862	1,995
Bolivia	8,424	8,535	0	8,424	8,353	71	10,078	8,497	1,581
Brazil	152,691	152,564	127	152,691	156,808	0	182,668	181,820	848
Colombia	25,273	25,308	0	25,273	25,061	212	30,235	30,144	91
Congo	7,258	7,345	0	7,258	7,387	0	7,258	0	7,258
Costa Rica	15,796	15,784	12	15,796	15,947	0	15,796	15,947	0
Cote d'Ivoire	7,258	0	7,258	7,258	0	7,258	7,258	7,316	0
Dominican Republic	185,335	187,000	0	185,335	187,529	0	186,555	187,990	0
Ecuador	11,583	11,591	0	11,583	11,654	0	13,857	11,732	2,125
El Salvador	24,220	24,795	0	24,220	25,216	0	28,975	29,051	0
Fiji	9,477	9,576	0	9,477	9,534	0	11,338	9,544	1,794
Gabon	7,258	0	7,258	7,258	0	7,258	0	0	0
Guatemala	50,546	50,071	475	50,546	49,744	802	60,469	60,993	0
Guyana	12,636	12,820	0	12,636	12,662	0	15,117	15,117	0
Haiti	7,258	0	7,258	7,258	0	7,258	0	0	0
Honduras	10,530	10,988	0	10,530	10,598	0	12,597	12,609	0
India	8,424	8,606	0	8,424	8,588	0	164	164	0
Jamaica	11,583	0	11,583	11,583	11,628	0	2,950	2,950	0
Madagascar	7,258	0	7,258	7,258	0	7,258	7,258	0	7,258
Malawi	10,530	10,363	167	10,530	10,537	0	10,530	10,523	7
Mauritius	12,636	2,332	10,304	12,636	12,768	0	15,117	12,183	2,934
Mozambique	13,690	13,915	0	13,690	13,924	0	16,378	16,361	17
Nicaragua	22,114	22,573	0	22,114	22,193	0	26,456	26,456	0
Panama	30,538	30,720	0	30,538	30,824	0	36,533	36,554	0
Papua New Guinea	7,258	7,205	53	7,258	7,506	0	7,258	7,371	0
Paraguay	7,258	7,325	0	7,258	6,495	763	7,258	7,272	0
Peru	43,175	43,940	0	43,175	42,882	293	51,651	52,013	0
Philippines	142,160	141,819	341	142,160	141,786	374	142,160	141,878	282
South Africa	27,379	27,219	160	27,379	27,920	0	32,754	32,754	0
St. Kitts & Nevis	7,258	0	7,258	7,258	0	7,258	0	0	0
Swaziland	16,849	17,125	0	16,849	17,429	0	20,157	17,068	3,089
Taiwan	12,636	12,677	0	12,636	12,913	0	15,117	12,636	2,481
Thailand	14,743	14,669	74	14,743	14,732	11	17,637	14,657	2,980
Trinidad-Tabago	7,371	7,282	89	7,371	0	7,371	0	0	0
Uruguay	7,258	7,578	0	7,258	7,739	0	7,258	7,380	0
Zimbabwe	12,636	13,232	0	12,636	12,745	0	15,117	12,769	2,348
<b>Total</b>	<b>1,109,934</b>	<b>1,047,750</b>	<b>68,688</b>	<b>1,109,934</b>	<b>1,068,911</b>	<b>53,571</b>	<b>1,186,543</b>	<b>1,152,647</b>	<b>37,088</b>

1/TQR = tariff-rate quotas.

Source: U.S. Customs Service.

Table 16 -- TRQ sugar exporters to the United States: production, imports, exports, disappearance, 6-year average, 1999/00-2004/05

TRQ sugar exporters 1/	Production	Imports	Exports	Disappearance	Min.Access TRQ	Net surplus producer 2/	Net surplus exporter 3/
	<i>1,000 metric tons, raw value</i>						
Argentina	1,700.0	5.0	202.8	1,515.0	45.3	yes	yes
Australia	5,049.8	7.2	3,905.3	1,115.0	87.4	yes	yes
Barbados	44.8	14.2	39.5	17.0	7.4	yes	yes
Belize	115.3	0.0	106.3	11.0	11.6	yes	yes
Bolivia	375.7	5.5	93.8	250.0	8.4	yes	yes
Brazil	22,664.2	0.0	12,976.7	9,758.3	152.7	yes	yes
Colombia	2,508.3	45.5	1,125.8	1,425.5	25.3	yes	yes
Congo	52.5	24.3	39.5	33.5	7.3	yes	yes
Cote D'Ivoire	167.3	90.5	62.5	189.3	15.8	<b>no</b>	<b>no</b>
Costa Rica	386.2	0.0	164.5	221.3	7.3	yes	yes
Dominican Republic	481.8	15.8	185.0	317.7	185.3	yes	<b>no</b>
Ecuador	483.3	28.5	58.5	445.0	11.6	yes	yes
El Salvador	502.3	0.0	279.5	223.7	24.2	yes	yes
Fiji	341.5	4.0	287.0	47.7	9.5	yes	yes
Gabon	20.0	1.7	0.0	21.7	7.3	<b>no</b>	<b>no</b>
Guatemala	1,821.0	3.7	1,282.7	516.5	50.5	yes	yes
Guyana	314.3	6.3	289.3	27.0	12.6	yes	yes
Haiti	10.0	84.2	0.0	95.0	7.3	<b>no</b>	<b>no</b>
Honduras	336.2	5.3	70.8	259.2	10.5	yes	yes
India	18,779.0	516.3	704.2	18,865.2	8.4	<b>no</b>	yes
Jamaica	176.0	102.8	149.8	128.8	11.6	yes	yes
Madagascar	47.7	82.5	19.7	117.5	7.3	<b>no</b>	<b>no</b>
Malawi	235.7	10.7	86.7	161.2	10.5	yes	yes
Mauritius	566.7	26.7	532.2	49.2	12.6	yes	yes
Mozambique	182.7	41.0	66.5	162.5	13.7	yes	yes
Nicaragua	398.5	0.0	214.5	187.8	22.1	yes	yes
Panama	166.7	0.7	50.5	112.7	30.5	yes	yes
Papua New Guinea	47.0	0.0	4.2	41.8	7.3	yes	<b>no</b>
Paraguay	108.5	34.7	16.2	121.8	7.3	<b>no</b>	<b>no</b>
Peru	831.8	118.3	40.7	920.0	43.2	<b>no</b>	<b>no</b>
Philippines	1,995.8	109.2	162.3	1,978.5	142.2	yes	<b>no</b>
South Africa	2,662.2	237.0	1,268.5	1,570.7	27.4	yes	yes
St. Kitts & Nevis	18.7	0.0	15.2	4.8	7.3	yes	yes
Swaziland	567.5	0.0	273.3	290.0	16.8	yes	yes
Taiwan	171.3	434.7	12.5	574.7	12.6	<b>no</b>	<b>no</b>
Thailand	6,118.0	0.0	4,243.0	1,867.0	14.7	yes	yes
Trinidad-Tobago	77.7	50.0	53.5	73.2	7.4	yes	<b>no</b>
Uruguay	15.3	121.0	9.7	121.8	7.3	<b>no</b>	<b>no</b>
Zimbabwe	556.2	0.0	174.0	379.5	12.6	yes	yes

1/ TQR = tariff-rate quota.

2/ Net surplus producer = yes if production > consumption.

3/ Net surplus exporter = yes if exports less U.S. TRQ min. access > imports.

Source: USDA, Foreign Agricultural Service, Sugar PSD Database; U.S. Trade Representative.

## Sugar and Competing Sweeteners: Deliveries and Consumption

### Per Capita Sweetener Deliveries

U.S. sweetener deliveries and consumption have grown a great deal since the mid-1980s. In the period 1970 to 1984, combined deliveries of refined sugar, corn sweeteners (high fructose corn syrup, glucose syrup, and dextrose), honey, maple syrup, and other edible syrups averaged 120 pounds per capita (table 17). Starting around 1985, per capita sweetener deliveries began growing at a rapid rate. The average grew to 127.6 pounds between 1985 and 1989, representing a 6.3 percent increase over the preceding 5-year average. Between 1990 and 1994, the average grew to 136.4 pounds, or 6.9 percent; and between 1995 and 1999 the average grew to 147.4 pounds or 8.1 percent. Deliveries' growth slowed somewhat after 1999. It was estimated at 141.5 pounds in 2003, about the same level it was in 1994. Since 2003, sweetener consumption has rebounded and was estimated at 142.2 pounds in 2005, still below the 1999 peak.

Deliveries of refined sugar on a per capita basis fell from 1969 to 1974 from more than 100 pounds to 60 pounds to 66.3 pounds after 1986. Most of the decrease prior to 1986 was attributable to a one-to-one replacement of refined sugar by HFCS in products—especially carbonated beverages—that had been using liquid sugar as their sweetening agents. Since 1985, the growth in sugar demand was moderate when compared with the growth in demand for corn sweeteners. For refined sugar, average per capita deliveries grew from 62 pounds in 1985/89 to 65.3 pounds in 1995/99, for 5.3 percent growth. The deliveries' growth in high fructose corn syrup (the largest corn sweetener) rose 27.7 percent from 47.2 pounds in 1985/89 to 60.3 pounds in 1995/99. Other sweeteners (honey, dextrose, and other syrups) have not contributed greatly to the rise in overall sweetener deliveries.

Not included in the data is the sugar contained in imported products. Prior to 1995, sugar contained in imports was pretty much offset by sugar contained in U.S. food exports, therefore indicating only a minor positive adjustment to total deliveries. Beginning in 1995/96, sugar-containing product imports started increasing at a faster rate than U.S. sugar-containing product exports (table 18). On a per capita basis, the sugar in net imported products added 4.5 pounds to total per capita sweetener availability in 2005, compared with only 0.9 pounds in 1995.

### Deliveries to End Users

Figure 21 shows sweetener deliveries to the food industry, and figure 22 shows sweetener deliveries to the beverage industry. Prominent before 1985 was the rapid growth of HFCS deliveries to food and beverage industries. Corresponding sugar deliveries to food industries were stagnant, and sugar deliveries to the beverage industry became insignificantly low. Since 1985 deliveries to food industries of both sugar and HFCS have been increasing, especially sugar in the 1990s. Sugar deliveries reached a peak in 1999 and then started falling. The same phenomenon has been seen for HFCS deliveries to the beverage industry: that is, growth up to 1999 and then decline. In some contrast, sugar delivery growth, after decline, started to reemerge in 2004. Also evident is the growth of sugar in imported products, starting in the mid-1990s and continuing through the mid-2000s.

Table 17 --U.S. per capita caloric sweeteners estimated deliveries for domestic food and beverage use, by calendar year 1/ 2/

Calendar year	U.S. population 3/ (July 1)	Refined sugar 4/	Corn sweeteners				Pure honey	Edible syrups	Total caloric sweeteners
			HFCS	Glucose syrup	Dextrose	Total			
	<i>Millions</i>		<i>Pounds, dry basis</i>						
1966	196.6	97.3	0.0	9.7	4.2	13.9	1.0	0.7	112.9
1967	198.7	98.5	0.0	9.9	4.3	14.2	0.9	0.5	114.2
1968	200.7	99.2	0.1	10.3	4.4	14.8	0.9	0.7	115.7
1969	202.7	101.0	0.3	10.5	4.5	15.3	1.0	0.6	117.9
1970	205.1	101.8	0.5	10.7	4.6	15.9	1.0	0.5	119.1
1971	207.7	102.1	0.8	11.2	4.6	16.7	0.9	0.5	120.2
1972	209.9	102.3	1.2	12.0	4.6	17.8	1.0	0.5	121.5
1973	211.9	100.8	2.1	13.1	4.6	19.7	0.9	0.5	122.0
1974	213.9	95.7	2.8	13.8	4.5	21.2	0.7	0.4	117.9
1975	216.0	89.2	4.9	14.0	4.4	23.3	1.0	0.4	113.8
1976	218.0	93.4	7.2	13.9	4.1	25.2	0.9	0.4	119.9
1977	220.2	94.2	9.6	13.8	3.9	27.3	0.9	0.4	122.8
1978	222.6	91.4	10.8	13.9	3.7	28.4	1.1	0.4	121.3
1979	225.1	89.3	14.8	13.5	3.5	31.8	1.0	0.4	122.6
1980	227.7	83.6	19.0	12.9	3.5	35.3	0.8	0.4	120.2
1981	230.0	79.4	22.8	12.9	3.4	39.1	0.8	0.4	119.8
1982	232.2	73.7	26.6	12.7	3.4	42.7	0.9	0.4	117.7
1983	234.3	70.3	31.2	13.0	3.4	47.6	1.0	0.4	119.3
1984	236.3	66.7	37.2	13.1	3.5	53.8	0.9	0.4	121.8
1985	238.5	62.7	45.2	13.5	3.5	62.2	0.9	0.4	126.2
1986	240.7	60.0	45.7	13.6	3.6	62.8	1.0	0.4	124.3
1987	242.8	62.4	47.7	13.8	3.6	65.2	0.9	0.4	128.8
1988	245.0	62.1	49.0	14.3	3.7	66.9	0.8	0.4	130.2
1989	247.3	62.8	48.2	12.8	3.5	64.6	0.8	0.4	128.5
1990	250.1	64.4	49.6	13.6	3.6	66.8	0.8	0.4	132.4
1991	253.5	63.6	50.3	14.0	3.7	68.0	0.9	0.4	132.9
1992	256.9	64.2	51.8	15.1	3.6	70.5	1.0	0.4	136.1
1993	260.3	63.8	54.5	15.8	3.7	73.9	1.0	0.4	139.2
1994	263.4	64.4	56.2	15.9	3.8	75.9	1.0	0.4	141.6
1995	266.6	64.9	57.6	16.3	4.0	77.9	0.9	0.4	144.1
1996	269.7	65.1	57.8	16.4	4.0	78.2	1.0	0.4	144.7
1997	273.0	64.9	60.4	17.3	3.7	81.4	0.9	0.4	147.7
1998	276.1	64.9	61.9	17.1	3.6	82.7	0.9	0.4	149.0
1999	279.3	66.3	63.7	16.3	3.5	83.5	1.1	0.4	151.4
2000	282.3	65.5	62.7	15.8	3.4	81.8	1.1	0.4	148.9
2001	285.0	64.5	62.6	15.5	3.3	81.4	0.9	0.4	147.3
2002	287.7	63.3	62.9	15.5	3.3	81.6	1.1	0.4	146.5
2003	290.3	61.0	61.0	15.2	3.1	79.3	1.0	0.4	141.7
2004	293.0	61.7	59.9	15.6	3.3	78.9	0.9	0.4	141.9
2005	295.7	63.0	59.2	15.3	3.2	77.7	1.1	0.4	142.2

1/ Per capita deliveries of sweeteners by U.S. processors and refiners and direct-consumption imports to food manufacturers, retailers, and other end users represent the per capita supply of caloric sweeteners. The data exclude deliveries to manufacturers of alcoholic beverages. Actual human intake of caloric sweeteners is lower because of uneaten food, spoilage, and other losses. See Table 51 of the *Sugar and Sweeteners Yearbook* series for estimated intake of sugar.

2/ Totals may not add due to rounding.

3/ Source: U.S. Census Bureau.

4/ Based on U.S. sugar deliveries for domestic food and beverage use.

Source: USDA, Economic Research Service.



Table 18 -- Estimated sugar in U.S. product imports and exports, 1995-2005

Year	Sugar in imported sugar-containing products:						Total sugar in imported products	Total sugar in exported products	Net sugar inflow in products
	Sugar confectionery	Cocoa & cocoa preparations	Cereal/bakers preparations	Bread, pastry, cakes, etc.	Misc. edible preparations	Carbonated soft drinks			
1,000 short tons									
1995	137,760	66,265	6,286	43,705	68,945	26,405	349,365	317,809	31,557
1996	148,383	75,911	8,580	49,882	60,729	32,456	375,940	356,966	18,974
1997	161,894	92,664	14,273	64,812	68,172	39,403	441,218	390,159	51,060
1998	186,572	97,616	19,110	74,726	91,119	39,811	508,954	371,414	137,540
1999	223,421	111,807	20,116	87,875	118,876	48,165	610,261	392,208	218,053
2000	239,914	130,407	19,548	99,740	120,366	58,745	668,719	442,596	226,122
2001	259,975	160,350	18,097	115,917	127,331	64,961	746,630	470,991	275,639
2002	299,003	193,608	19,419	117,838	140,369	70,852	841,090	459,931	381,159
2003	362,786	208,260	25,139	134,500	150,859	83,440	964,985	507,950	457,035
2004	400,819	220,067	25,082	138,898	186,328	97,731	1,068,925	539,237	529,689
2005	456,969	231,322	26,012	143,742	187,838	109,747	1,155,630	596,960	558,670

Source: ERS calculations based on U.S. Census Bureau, HTS Import and Export Data.

Table 19 -- U.S. sugar deliveries for human consumption by type of user, calendar year, 1980-2005 1/

Year/ quarter	Bakery, cereal, and allied products	Confectionery and related products	Ice cream and dairy products	Bever- ages	Canned, bottled, & frozen foods	All other food uses	Non- food use	Subtotal industrial use	Hotels, restaurants, and institutions	Wholesale grocers, jobbers, sugar dealers	Retail grocers, chain stores	All other deliv- eries 2/	Subtotal non- industrial use	Total U.S.
1,000 short tons, refined value														
1980	1,284	895	436	2,119	516	548	117	5,915	96	1,841	1,150	205	3,292	9,207
1981	1,279	963	451	1,829	474	571	125	5,693	90	1,980	1,152	167	3,389	9,082
1982	1,296	939	404	1,583	450	526	106	5,305	85	1,951	1,086	92	3,214	8,519
1983	1,387	1,087	385	1,248	454	431	131	5,123	94	1,713	1,168	101	3,076	8,199
1984	1,404	1,115	408	908	433	416	127	4,810	108	1,744	1,100	101	3,053	7,863
1985	1,494	1,059	456	340	428	441	131	4,349	85	1,874	1,045	119	3,123	7,472
1986	1,432	1,051	447	266	387	443	138	4,164	84	1,867	1,066	58	3,075	7,239
1987	1,513	1,146	449	212	398	534	149	4,400	91	2,040	996	72	3,199	7,599
1988	1,541	1,107	394	237	354	529	121	4,283	89	2,200	940	86	3,315	7,598
1989	1,532	1,187	426	215	342	637	126	4,465	106	2,051	1,026	75	3,258	7,723
1990	1,608	1,279	462	228	332	642	109	4,660	108	2,130	1,077	76	3,391	8,051
1991	1,632	1,277	439	204	331	623	88	4,594	100	2,079	1,182	108	3,469	8,063
1992	1,719	1,246	429	164	315	649	69	4,591	101	2,104	1,230	233	3,668	8,259
1993	1,785	1,292	424	158	336	725	85	4,805	108	2,075	1,235	171	3,589	8,394
1994	1,952	1,313	453	156	322	704	77	4,977	93	2,039	1,269	197	3,598	8,575
1995	1,905	1,372	452	169	279	863	64	5,103	103	2,173	1,236	189	3,701	8,804
1996	1,993	1,335	445	196	318	849	66	5,202	80	2,241	1,263	175	3,759	8,961
1997	2,161	1,350	436	158	308	793	66	5,272	78	2,283	1,281	186	3,828	9,100
1998	2,301	1,336	438	165	331	907	76	5,556	79	2,223	1,230	229	3,760	9,316
1999	2,312	1,361	499	179	346	862	71	5,630	72	2,257	1,263	212	3,804	9,434
2000	2,264	1,328	499	168	330	817	85	5,491	71	2,241	1,242	339	3,893	9,383
2001	2,273	1,316	484	158	310	800	74	5,414	59	2,250	1,255	364	3,927	9,341
2002	2,075	1,223	529	189	297	725	99	5,136	53	2,406	1,322	327	4,108	9,244
2003	2,108	1,130	548	214	303	632	99	5,034	52	2,387	1,279	321	4,039	9,073
2004	2,180	1,125	603	242	315	697	91	5,254	76	2,398	1,267	216	3,956	9,210
2005	2,353	1,153	590	239	344	609	132	5,419	110	2,411	1,270	255	4,046	9,466

1/ Does not include Hawaii until fourth-quarter 1991. Does not include Puerto Rico until fourth-quarter 1993.

2/ Includes deliveries to Government agencies.

Sources: USDA, National Agricultural Statistics Service, *Sugar Market Statistics*; Farm Service Agency, *Sweetener Market Data*.

With minor exceptions, there is no direct consumption of “primary sweeteners” that are used in the preparation of other products, which are directly consumed. These secondary products are either made by food manufacturers or prepared by consumers. Table 19 shows end-use delivery destinations of sugar from U.S. beet processors and cane refineries (excluded are deliveries from direct-consumption imports).

Since 1985, sugar deliveries to food manufacturers have constituted 57 percent to 59 percent of total deliveries. The baking and cereal industries are the largest end-users of sugar. Confectionery makers are the next largest sugar end-user. The declines of sugar deliveries to these two sectors after 1999 have contributed the most to overall sugar delivery reductions (figs. 23, 24), referred to earlier. Figures 23 and 24 also reveal two developments: renewed sugar delivery growth to the cereal and baking industries after 2002, and the importance of sugar in imported confectionery as a factor affecting reduced deliveries to the U.S. confectionery industry.

Table 20, based on data from the U.S. Census Bureau, shows sugar and sweetener usage by specific food manufacturing industries. (The industries are identified by their North American Industry Classification System (NAICS) number.) The table shows what sweeteners other than sugar are used in an industry. Figure 25 shows sugar use rankings. The largest end-user is the breakfast-cereal manufacturing industry, followed by confectionery manufacturers, who use purchased chocolate, and so on.

### **Cost Share of Sugar in Food Product Manufacturing**

Table 21 shows the sugar cost share of total material costs of industries that use sugar. The breakfast cereal manufacturers have the highest sugar-cost share component of all the industries, followed by nonchocolate-confectionery manufacturers, and then flour mixes and dough manufacturing from purchased flour.

The table also shows elasticity values that give the percentage change in a food sector’s “value added” (value of product shipments less total material costs and inventory changes) when the price of sugar changes by 10 percent. These numbers are all fairly low and are only partially related to the sugar share of material costs. The size of total material costs relative to the value of product shipments is another determining factor. The industry most directly affected by sugar price changes is flour mix and dough manufacturing from purchased flour, followed by frozen cakes, pies, and other manufactured pastries, and then nonchocolate confectionery manufacturing.

Table 20--Sweetener usage in selected U.S. food and beverage manufacturing industries in 2002 (continue)

Food and beverage manufacturing (mfg.) sectors	NAICS	Sugar		Molasses		High fructose corn syrup		Crystalline fructose	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		(1,000 ton)	(\$1,000)	(1,000 ton)	(\$1,000)	(mil lbs)	(\$1,000)	(mil lbs)	(\$1,000)
Flour mixes and dough mfg. from purchased flour	311822	388.4	191,228	--	--	41.1	4,927	--	--
Frozen cakes, pies, and other pastries mfg.	311813	270.9	111,794	--	--	76.8	9,204	--	--
Nonchocolate confectionery mfg.	311340	376.0	194,030	--	--	166.0	21,291	S	918
Confectionery mfg. from purchased chocolate	311330	S	247,410	--	--	D	D	1.0	346
Breakfast cereal mfg.	311230	585.0	257,821	--	--	--	--	--	--
Cookie and cracker mfg.	311821	519.0	214,622	--	--	S	17,258	--	--
All other miscellaneous food mfg.	311999	196.2	113,624	--	--	--	--	--	--
Ice cream and frozen dessert mfg.	311520	169.3	79,532	--	--	S	33,745	D	D
Dry, condensed, and evaporated dairy product mfg.	311514	152.5	67,799	--	--	517.1	57,255	S	9,100
Commercial bakeries	311812	579.4	238,050	--	--	949.7	118,533	--	--
Fluid milk mfg.	311511	242.5	99,054	--	--	S	104,380	S	4,559
Mayonnaise, dressing, and other mfg.	311941	52.2	25,896	--	--	--	--	--	--
Flour milling	311211	26.1	13,141	--	--	--	--	--	--
Chocolate and confectionery mfg. from cacao	311320	S	10,857	--	--	D	D	--	--
Fruit and vegetable canning	311421	S	51,089	--	--	1,317.3	138,628	S	5,592
Spice and extract mfg.	311942	23.7	13,060	--	--	--	--	--	--
Soft drink mfg.	312111	107.5	42,994	--	--	8,038.4	1,113,977	--	--
Flavoring syrup and concentrate mfg.	311930	24.4	15,071	--	--	--	--	--	--
Frozen fruit, juice, and vegetable mfg.	311411	15.8	8,175	--	--	--	--	--	--
Other animal food mfg.	311119	15.9	7,637	847.4	93,657	--	--	--	--
Dog and cat food mfg.	311111	15.2	8,376	0.9	190	--	--	--	--
Dried and dehydrated food mfg.	344423	5.7	3,252	--	--	--	--	--	--
Specialty canning	311422	15.2	5,553	--	--	54.5	6,841	D	D
Cheese mfg.	311513	7.0	2,675	--	--	S	4,511	D	D
Other snack food mfg.	311919	9.4	3,854	--	--	--	--	--	--
Breweries	312120	0.6	383	--	--	D	D	--	--
Perishable prepared food mfg.	311991	D	D	--	--	--	--	--	--

1/ North American Industry Classification System (NAICS) 32510053 (mannitol, sorbitol, etc.).

2/ NAICS 32510057.

D = data suppressed to avoid disclosure of identity of business or individual.

S = More than 30 percent of data is estimated from quantity-value relationships.

Source: U.S. Department of Commerce, U.S. Census Bureau, *Census of Manufacturers*.

Table 20--Sweetener usage in selected U.S. food and beverage manufacturing industries in 2002

Food and beverage manufacturing (mfg.) sectors	NAICS	Corn syrup/dextrose		Other natural sweeteners		Sugar substitutes 1/		Artificial sweeteners 2/	
		Quantity (mil lbs)	Value (\$1,000)	Quantity (mil lbs)	Value (\$1,000)	Quantity (1,000 ton)	Value (\$1,000)	Quantity (mil lbs)	Value (\$1,000)
Flour mixes and dough mfg. from purchased flour	311822	20.8	3,145	60.7	14,261	--	--	1.1	954
Frozen cakes, pies, and other pastries mfg.	311813	41.1	7,008	32.1	16,121	--	--	4.3	5,221
Nonchocolate confectionery mfg.	311340	815.9	123,928	--	--	67.7	94,558	--	--
Confectionery mfg. from purchased chocolate	311330	S	60,702	--	--	7.7	5,558	--	--
Breakfast cereal mfg.	311230	--	--	--	--	--	--	--	--
Cookie and cracker mfg.	311821	112.7	17,786	102.6	40,855	--	--	3.7	4,293
All other miscellaneous food mfg.	311999	277.7	53,058	S	254,594	--	--	0.7	1,706
Ice cream and frozen dessert mfg.	311520	S	40,127	--	--	--	--	--	--
Dry, condensed, and evaporated dairy product mfg.	311514	306.7	45,812	--	--	--	--	--	--
Commercial bakeries	311812	287.3	46,547	265.6	86,136	--	--	3.9	6,723
Fluid milk mfg.	311511	S	24,582	--	--	--	--	--	--
Mayonnaise, dressing, and other mfg.	311941	338.7	35,818	86.4	34,985	--	--	--	--
Flour milling	311211	--	--	--	--	--	--	--	--
Chocolate and confectionery mfg. from cacao	311320	S	10,857	--	--	S	6,183	--	--
Fruit and vegetable canning	311421	365.9	47,235	--	--	--	--	--	--
Spice and extract mfg.	311942	68.4	5,607	36.8	11,242	--	--	S	2,161
Soft drink mfg.	312111	--	--	84.6	22,627	--	--	23.5	33,746
Flavoring syrup and concentrate mfg.	311930	--	--	73.0	20,355	--	--	D	D
Frozen fruit, juice, and vegetable mfg.	311411	--	--	--	--	--	--	--	--
Other animal food mfg.	311119	--	--	--	--	--	--	--	--
Dog and cat food mfg.	311111	--	--	--	--	--	--	--	--
Dried and dehydrated food mfg.	344423	D	D	--	--	--	--	--	--
Specialty canning	311422	D	D	--	--	--	--	--	--
Cheese mfg.	311513	S	3,636	--	--	--	--	--	--
Other snack food mfg.	311919	6.9	860	--	--	--	--	--	--
Breweries	312120	67.6	13,000	--	--	D	D	--	--
Perishable prepared food mfg.	311991	D	D	39.9	15,466	--	--	S	59

1/ North American Industry Classification System (NAICS) 32510053 (mannitol, sorbitol, etc.).

2/ NAICS 32510057.

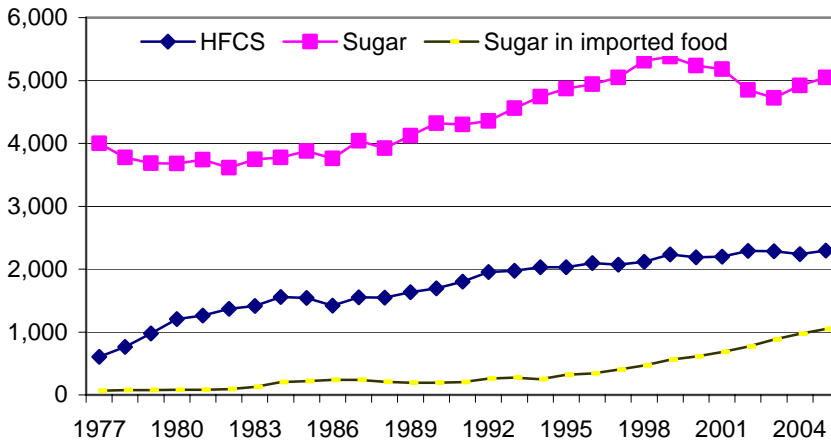
D = data suppressed to avoid disclosure of identity of business or individual.

S = More than 30 percent of data is estimated from quantity-value relationships.

Source: U.S. Department of Commerce, U.S. Census Bureau, *Census of Manufacturers*.

Figure 21  
**U.S. sweetener deliveries to food industry manufacturers, 1977-2006**

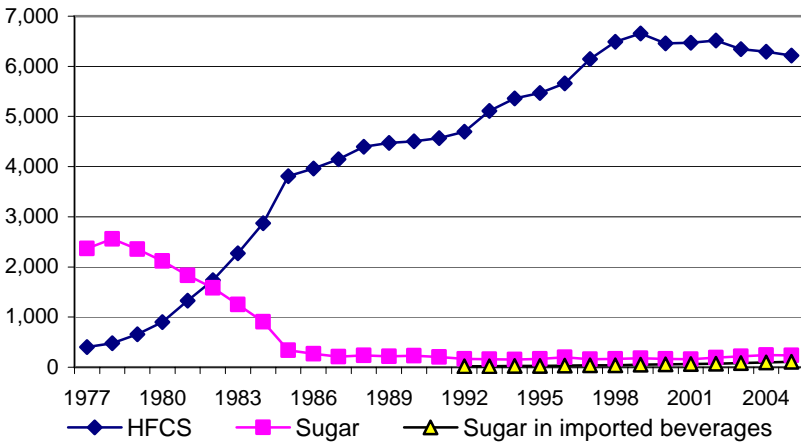
1,000 short



Source: USDA, Farm Service Agency, *Sweetener Market Data*; and Economic Research Service, (sugar in imports).

Figure 22  
**U.S. sweetener deliveries to beverage industry manufacturers, 1977-2005**

1,000 short tons

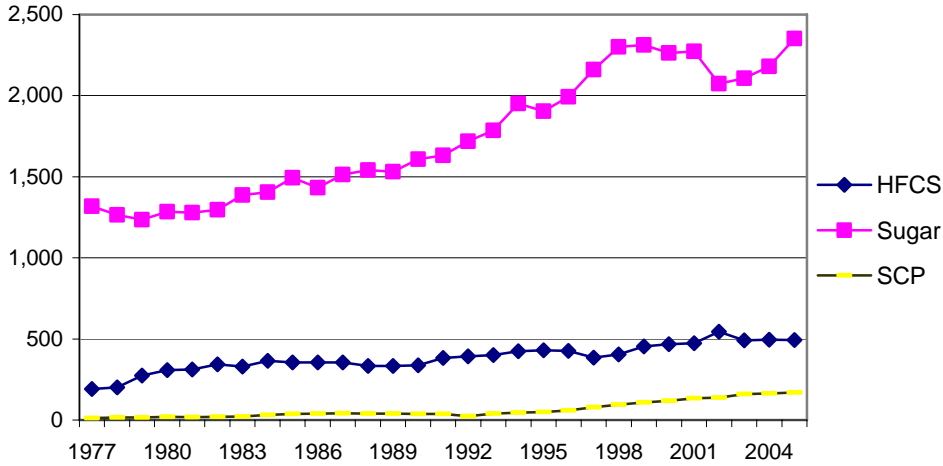


Source: USDA, Farm Service Agency, *Sweetener Market Data*; and Economic Research Service, (sugar in imports).

Figure 23

**Sweetener deliveries to cereal and bakery industry**

1,000 short tons

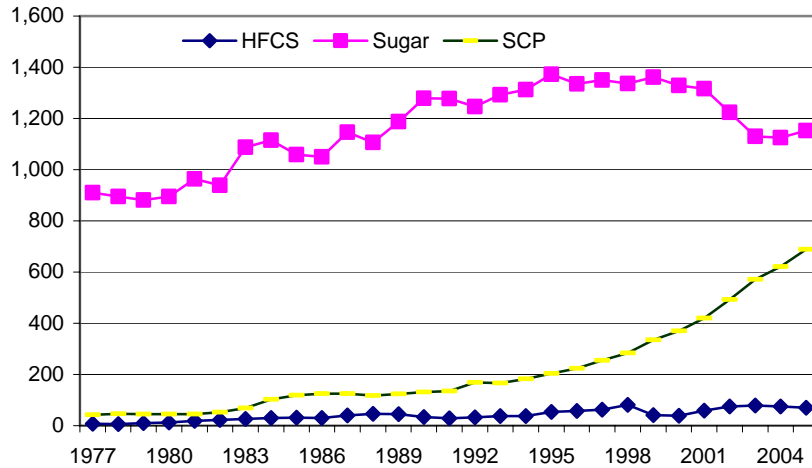


Source: USDA, Farm Service Agency, *Sweetener Market Data*; and Economic Research Service, (sugar in imports).

Figure 24

**Sweetener deliveries to confectionery industry**

1,000 short tons



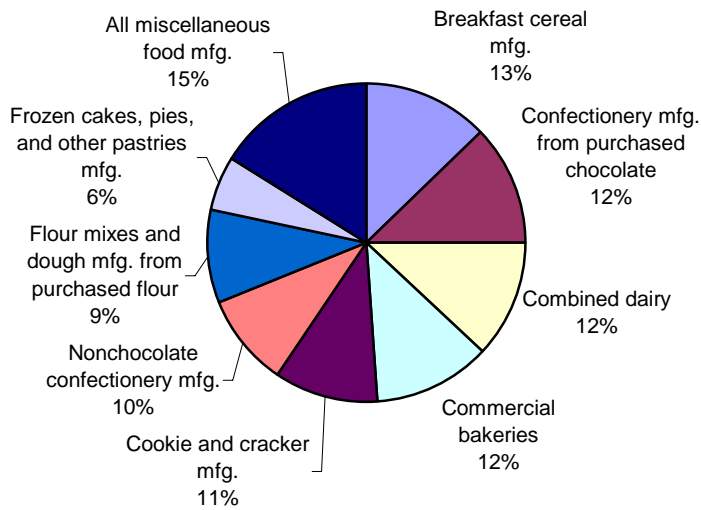
Source: USDA, Farm Service Agency, *Sweetener Market Data*; and Economic Research Service, (sugar in imports).

**Ethanol and U.S. Sugar**

The demand for ethanol in the United States has been increasing due to high prices of petroleum-based fuels and reduced use of methyl tertiary butyl ether (MTBE) because of environmental problems. In 2005, the United States produced 3.9 billion gallons (14.8 billion liters) of ethanol, of which about 97 percent was produced from corn as the feedstock. The increase in demand for ethanol has generated interest in using U.S. sugar crops as feedstocks for producing the fuel. However, the

Figure 25

### Sugar usage by U.S. food manufacturers



Source: U.S. Department of Commerce, U.S. Census Bureau, *Census of Manufacturers*.

costs of producing ethanol from various sugar crops, byproducts, and products vary widely (fig. 26).<sup>4</sup>

Of the various sugar crops and products, molasses is the most cost-competitive with corn, USDA estimates. The cost of producing 1 gallon of ethanol from molasses is estimated at \$1.27, which compares with \$1.03 for corn wet milling and \$1.05 for corn dry milling. Single-gallon ethanol costs from the primary sugar crops are more than double the corn cost: \$2.35 for sugarbeets and \$2.40 for sugarcane. The costs of using U.S. sugar products are even higher: \$3.48 for raw cane sugar and \$3.97 for refined sugar. Although high ethanol prices seen in 2006 imply that ethanol production from U.S. sugarcane and sugarbeets could be profitable, these prices are expected eventually to drop when increased corn-based production from newly built factories begins.

<sup>4</sup> U.S. Department of Agriculture, *The Economic Feasibility of Ethanol Production from Sugar in the United States*, Office of the Chief Economist, July 2006.

Table 21 -- Sugar cost shares and value-added elasticities for U.S. food manufacturing sectors

Food and beverage manufacturing (mfg.) sectors	NAICS	Sugar cost share of total material costs	Value-added elasticity for sugar price change 1/
Flour mixes and dough mfg. from purchased flour	311822	9.91	0.871
Frozen cakes, pies, and other pastries mfg.	311813	6.49	0.505
Nonchocolate confectionery mfg.	311340	10.14	0.500
Confectionery mfg. from purchased chocolate	311330	9.18	0.432
Breakfast cereal mfg.	311230	12.53	0.387
Cookie and cracker mfg.	311821	8.46	0.292
All other miscellaneous food mfg.	311999	2.62	0.201
Ice cream and frozen dessert mfg.	311520	2.46	0.181
Dry, condensed, and evaporated dairy product mfg.	311514	1.40	0.159
Commercial bakeries	311812	4.57	0.142
Fluid milk mfg.	311511	0.70	0.125
Mayonnaise, dressing, and other mfg.	311941	0.99	0.095
Flour milling	311211	0.29	0.066
Chocolate and confectionery mfg. from cacao	311320	0.55	0.057
Fruit and vegetable canning	311421	0.58	0.054
Spice and extract mfg.	311942	0.56	0.043
Soft drink mfg.	312111	0.25	0.035
Flavoring syrup and concentrate mfg.	311930	1.23	0.021
Frozen fruit, juice, and vegetable mfg.	311411	0.21	0.017
Other animal food mfg.	311119	0.07	0.016
Dog and cat food mfg.	311111	0.22	0.014
Dried and dehydrated food mfg.	344423	0.17	0.011
Specialty canning	311422	0.24	0.011
Cheese mfg.	311513	0.02	0.005
Other snack food mfg.	311919	0.12	0.004
Breweries	312120	0.01	0.000

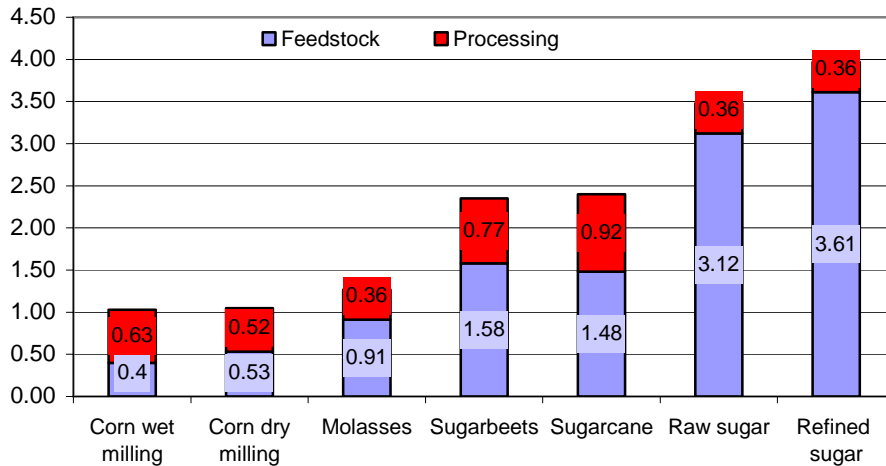
1/ Elasticity = percentage increase in sector's value-added when sugar price decreases by 10 percent

Value-added = value of shipments - material costs + net change in inventory.

Source: U.S. Department of Commerce, U.S. Census Bureau, *Census of Manufacturers*.

Figure 26  
**Estimated ethanol production costs in the United States**

Dollar/gallon



Source: USDA, Office of the Chief Economist, *The Economic Feasibility of Ethanol Production from Sugar in the United States*. July 2006.



# Domestic Price Support, Marketing Allotments, and Sugar Trade Policies

## Domestic Price Support

The 2002 Farm Act provides for USDA to make loans available to processors of domestically grown sugarcane at a rate of 18 cents per pound and to processors of domestically grown sugarbeets at the rate of 22.9 cents per pound for refined beet sugar. The 2002 Farm Act allows processors to obtain loans for “in process” sugar and syrups at 80 percent of the loan rate.

Loans are taken for a maximum term of 9 months and must be liquidated along with interest charges by the end of the fiscal year in which the loan was made. Unlike most other commodity programs, sugar loans are made to processors and not directly to producers. This is because sugarcane and sugarbeets, being bulky and very perishable, must be processed into sugar before they can be traded and stored. To qualify for loans, processors must agree to provide payments to producers that are proportional to the value of the loan received by the processor for sugarbeets and sugarcane delivered by producers. USDA has the authority to establish minimum producer payment amounts.

The loans are nonrecourse. This means that when the loan matures, USDA must accept sugar pledged as collateral as payment in full in lieu of cash repayment of the loan, at the discretion of the processor. “In process” sugar and syrups must be converted into raw cane or refined beet sugar at no cost to the Commodity Credit Corporation (CCC) before being eligible for forfeiture. The processor is not required to notify USDA of the intention to forfeit the sugar under loan. By forfeiting the sugar, the processor effectively withdraws sugar from the market, thereby reducing excess supply and helping to support the market price of sugar.

The 2002 Farm Act requires USDA, to the maximum extent possible, to operate the U.S. sugar loan program at no cost to the Federal Government. Specifically, this provision means USDA must operate the program in order to avoid the forfeiture of sugar to CCC. In order to discourage forfeiture of nonrecourse loans, the sugar price at the time of loan repayment must be high enough to cover the loan principal plus interest expenses and other costs. The 2002 Farm Act gives USDA the authority to accept bids from sugarcane and sugarbeet processors to obtain raw cane sugar or refined beet sugar in CCC inventory in exchange for the reduction of the production of raw cane sugar or refined beet sugar. This is one way to control expected excess supplies of sugar. The 2002 Farm Act notes specifically that this authority is in addition to any other authority that CCC may have under any other law. (For example, CCC relied on the cost reduction options of the 1985 Farm Security Act (section 1009) for its authority for the payment-in-kind (PIK) diversion programs for the 2000/01 crop years.)

## Flexible Marketing Allotments

As another way to guarantee the sugar loan program operates at no cost to the Federal Government, USDA is required to establish flexible marketing allotments for sugar. The 2002 Farm Act specifies the method of determining the overall allotment quantity (OAQ). It is determined by subtracting the sum of 1.532 million STRV and carry-in stocks of sugar (including CCC inventory) from USDA’s

estimate of sugar deliveries for domestic food and beverage use and reasonable carryover stocks at the end of the crop year. During the course of the marketing year, USDA is required to adjust allotment quantities to avoid the forfeiture of sugar to CCC.

USDA's authority to operate sugar marketing allotments is suspended if USDA estimates that sugar imports levels for human consumption, not including the re-export programs (see below), will exceed 1.532 million STRV such that the overall allotment quantity would have to be reduced. The marketing allotments would remain suspended until such time that imports have been restricted, eliminated, or otherwise reduced to or below the 1.532 million STRV level.

The OAQ is divided between refined beet sugar at 54.35 percent of the overall quantity and raw cane sugar at 45.65 percent of the overall quantity. For cane sugar, Hawaii and Puerto Rico are jointly allotted 325,000 STRV. (USDA has since eliminated Puerto Rico from receiving an OAQ allotment because Puerto Rico has ceased producing sugarcane for sugar.) The allocations for the mainland cane sugar producing States (Florida, Louisiana, and Texas) would be assigned based on past marketing of sugar, the ability to market sugar in the current year, and past processing levels. Beet sugar processors are assigned allotments based on their sugar production for the 1998-2000 crop years. The 2002 Farm Act provides for a number of contingencies that could require reassignment of allotments during the crop year. If a cane processor who has been allocated an OAQ share cannot market the share, that share is reassigned to the other processors within the same State, taking into account those processors' ability to make up the deficit and also the interests of producers served by the processors. If the deficit cannot be eliminated by this step, then the remainder is allocated to the other cane-producing States and then to the processors in those States. If the deficit still is not eliminated, it is assigned to the CCC for sale from CCC inventories. If CCC inventories are insufficient to cover the deficit, then the deficit is assigned to imports. The procedure for a beet-sugar-processor deficit is similar except there is no reassignment based on States where processing takes place.

There is no provision for cane sugar OAQ deficits to be reassigned to beet sugar processors, or for beet sugar OAQ deficits to be reassigned to cane sugar processors. There is also a provision that any reassignments to imports do not count against the 1.532-million-STRV import trigger for the suspension of marketing allotments.

## **Sugar Import Control**

The United States establishes separate TRQs for imports of raw cane sugar and refined sugar (also called "certain other sugars, syrups, and molasses"). Prior to the start of every fiscal year (October 1–September 30), the Secretary of Agriculture announces the quantity of sugar that may be imported at the preferential in-quota tariff rate during that fiscal year. There is no limit to the quantity that may be imported at the higher over-quota tariff rate.

Under the Uruguay Round, the United States agreed to make available for import a minimum quantity of raw and refined sugar each marketing year. This amount is equal to 1.139 million MTRV, or 1.256 million STRV. Included in this amount is a

commitment to import at least 22,000 MTRV, or 24,251 STRV, of refined sugar. As mentioned earlier, the United States administers additional TRQs on imports of various sugar-containing products that originally had been subject to absolute quotas under section 22. There are four of these additional TRQs, none of which apply to Mexico under NAFTA.

As examined earlier in this report, the raw cane sugar TRQ is currently allocated by USTR to 40 countries based on a representative period (1975-1981) when trade was relatively unrestricted. A separate, additional allocation is made to Mexico to satisfy U.S. obligations under NAFTA. The refined sugar tariff rate quota is currently allocated to Canada and Mexico, and there is a quantity of refined sugar that is available to all countries on a first-come, first-served basis. There is also an allocation for specialty sugars, which is also on a first-come, first-served basis.

The in-quota tariff for sugar imported under the WTO quota is equal to 0.625 cents per pound. Most countries have the low-tier tariff waived under either the Generalized System of Preferences or the Caribbean Basin Initiative. The over-quota tariffs for sugar are shown in table 22. In addition to the general tariff, there are safeguard duties based on the value or quantity of the imported sugar. Currently these duties are based on value as shown in the table.

Table 22 -- High-tier sugar import tariffs, safeguard duties, and high-tier NAFTA tariffs

Category/sugar values for safeguard duties	Raw sugar 1/		Refined sugar /2	
	Cents/kg	Cents/lb	Cents/kg	Cents/lb
General	33.87	15.36	35.74	16.21
Additive safeguard duties based on sugar unit values of:				
Less than 5 cents/kg (0 to 2.27 cents/lb)	12.90	5.85	21.60	9.80
5 cents/kg or more less than 10 cents/kg (2.27 to 4.54 cents/lb)	8.70	3.95	17.10	7.76
10 cents/kg or more less than 15 cents/kg (4.54 to 6.80 cents/lb)	5.50	2.49	13.10	5.94
15 cents/kg or more less than 20 cents/kg (6.80 to 9.07 cents/lb)	3.00	1.36	9.60	4.35
20 cents/kg or more less than 25 cents/kg (9.07 to 11.34 cents/lb)	1.50	0.68	7.10	3.22
25 cents/kg or more less than 30 cents/kg (11.34 to 13.61 cents/lb)	0.00	0.00	4.60	2.09
30 cents/kg or more less than 35 cents/kg (13.61 to 15.88 cents/lb)	0.00	0.00	3.10	1.41
35 cents/kg or more (15.88 cents/lb or more)	0.00	0.00	0.00	0.00
NAFTA high-tier tariffs:				
2007 3/	3.33	1.51	3.53	1.60
2008	0.00	0.00	0.00	0.00

1/ HTS 1701.11.50

2/ HTS 1701.12.50, 1701.91.30, 1701.99.50, 1702.90.20, 2106.90.46.

3/ Safeguard duties are not additive to high-tier NAFTA imports.

Source: U.S. International Trade Commission, Harmonized Tariff Schedule for the United States.

## Re-export Programs

The United States also operates two re-export programs to help U.S. sugar refiners and manufacturers of sugar-containing products compete in world markets. The Refined Sugar Re-Export Program establishes a license against which a company can import sugar at world prices for refining and sale to replace sugar in the market that has been exported as refined sugar or as sugar in sugar-containing products. The Sugar Containing Products Re-Export Program allows U.S. participants to buy sugar at world prices for use in products that will be exported onto the world

market. Raw cane sugar imports under the two programs are not subject to the sugar TRQs. The 2002 Farm Act specifies that all refined sugars derived from either sugarbeets or sugarcane are substitutable under these programs.

## **North American Free Trade Agreement**

NAFTA went into effect on January 1, 1994. The original agreement contained provisions that related to trade in sugar. In order to secure U.S. Congressional support for NAFTA, the U.S. and Mexican Governments exchanged side-letters that altered the sugar provisions of the original NAFTA text. Although Mexico has since rejected the validity of the side-letter agreement, the United States maintains that the side-letter provisions supersede those of the original NAFTA agreement.

Original NAFTA provisions subjected Mexico's sugar exports to the United States to several conditions. During the 15-year transition period, Mexican exports were to be limited to no more than Mexico's net production surplus of sugar (domestic sugar production less domestic sugar consumption). At a minimum, Mexico was allowed to ship 7,258 metric tons of raw cane sugar duty-free. For the first 6 years of NAFTA, duty-free access was limited to no more than 25,000 metric tons, raw value. In the seventh year, the maximum duty-free access quantity was to become 150,000 metric tons, and, in each subsequent year, was to increase by 10 percent. However, NAFTA provided that these maximums could be exceeded if one of two conditions prevailed. The first condition required that Mexico achieve net production surplus status for 2 consecutive marketing years. The second condition specified that Mexico be a net surplus producer for the first year and be projected as a net surplus producer in the second year unless it was subsequently determined, contrary to the projection, that Mexico was not a net surplus producer for that year.

Based on the English text version, the side-letter agreement changed key sugar provisions of NAFTA. The agreement stipulated that projected Mexican sugar production would have to exceed Mexico's consumption of both sugar and HFCS to be considered a net surplus producer. For the first 6 years of NAFTA, Mexico was entitled to duty-free access for sugar exports to the United States in the amount of its projected net surplus production, up to a maximum of 25,000 metric tons. If Mexico was not a net surplus producer, it still would have duty-free access for 7,258 metric tons. During fiscal years 2001/07, Mexico would be entitled to have duty-free access to the U.S. market for the amount of its surplus as measured by the formula, up to a maximum of 250,000 metric tons.

NAFTA specifies a declining over-quota tariff phase-out schedule for raw and refined sugar over the transition period to duty-free sugar trade in calendar year 2008. For 2007, the raw sugar over-quota tariff is 1.51 cents a pound, and the refined sugar over-quota tariff is 1.60 cents a pound. Both rates decrease to zero in 2008.

## **Mexico–U. S. Discord Over NAFTA Sweetener Provisions**

Mexico has rejected the validity of the side-letter agreement and maintains that the original NAFTA provisions are binding. Even so, Mexico maintains that in its version of the side-letter, HFCS consumption does not enter into the formula for calculating net surplus producer status, nor does it limit exports to 250,000 MTRV

during the 2001/07 phase-in period. According to the Mexican interpretation, Mexico was entitled to export duty-free its total net surplus production to the United States beginning in October 2000.

Mexico has placed a limit on HFCS imports and began taxing consumption of beverage products that use HFCS in Mexico. In 1996 Mexico put HFCS tariffs above levels specified in NAFTA. In 1997 Mexico placed antidumping duties on HFCS sourced from various U.S. companies. In January 2000, a WTO panel determined that the antidumping duties were illegal under the terms of the WTO Antidumping Agreement. Mexico attempted to technically comply with elements of the ruling but their efforts were rebuffed by a subsequent WTO panel in June 2001. The panel decision was affirmed by a WTO appellate body in October 2001. Mexico then increased its most favored nation (MFN) tariff (the tariff granted to all WTO trading partners) from 15 percent to 210 percent and applied this to the United States in spite of NAFTA. In April 2002, Mexico formally developed a TRQ for U.S. HFCS imports that set the quota exactly to the amount of the in-quota volume access given to Mexican sugar imports by the United States under NAFTA. NAFTA did not contain TRQ provisions for HFCS, and the HFCS tariff was scheduled to be phased out in 2003.

On January 1, 2002, Mexico imposed a 20-percent tax on beverages that use sweeteners other than cane sugar. The effect of the tax was immediate as beverage manufacturers in Mexico abandoned HFCS for domestically produced cane sugar. U.S. exports of HFCS and crystalline fructose to Mexico fell from a pre-tax high of 188,516 metric tons, dry basis, in fiscal year 1997 to 6,294 mt in FY 2003 and 10,584 mt in FY 2004. Mexican import data showed a larger decrease: FY 1997 HFCS imports from the United States were recorded at 287,118 mt; in FY 2003 they were at 11,323 mt; and in FY 2004 at 8,672 mt. The U.S.-based Corn Refiners Association estimated that lost HFCS sales averaged \$944 million a year for 2002, 2003, and 2004.

On March 16, 2004, the USTR announced that it had filed a case against Mexico in the WTO because of Mexico's 20-percent tax on beverage sales. The WTO established a panel in July 2004 to make a determination on the case. The United States maintained that the tax violated WTO provisions regarding national treatment: a product imported into a WTO member country cannot be subject to an internal tax above the level applied to like domestic products. Although the tax was applied in the use of domestically produced HFCS, it was not applied to cane sugar produced in Mexico. For its part, Mexico argued that WTO rules exempt efforts that are necessary to secure compliance of commitments made under the terms of the NAFTA. Also, Mexico argued that the United States has barred low-duty access to Mexican sugar, contrary to the provisions of the NAFTA, justifying retaliation.

The WTO panel sided with the U.S. position, stating specifically that the tax is contrary to WTO rules that prohibit higher taxes on imported products compared with domestically produced products that are similar or directly competitive. The panel also ruled that a WTO panel settlement is not the appropriate forum in which to resolve a NAFTA disagreement. Mexico appealed the panel decision; and in March 2006, the WTO Appellate Body upheld all the panel's original decisions.

On July 27, 2006 the United States and Mexico announced an agreement to ease the transition to full duty-free trade in sweeteners in 2008 and resolve disputes related

to each nation's interpretation of the NAFTA sweetener provisions. Under the agreement, the United States provides for duty-free access to 250,000 MTRV of Mexican sugar for FY 2007, and for duty-free access to between 175,000 and 250,000 MTRV of Mexican sugar for the period October 1, 2007 through December 31, 2007. In turn, Mexico provides for duty-free access to equivalent amounts to U.S. HFCS corresponding to the same time periods. Effective on January 1, 2008, there will be no duties or quantitative restraints either on Mexican sugar shipments to the United States or U.S. HFCS shipments to Mexico. Under the agreement, the United States is entitled to ship 7,258 MTRV of sugar to Mexico for each of the marketing years 2006, 2007, and 2008. Mexico's over-quota tariff on U.S. sugar will be eliminated on January 1, 2008 as required by the NAFTA. Also, the United States and Mexico confirmed that on July 3, 2006, they submitted a joint letter to the WTO Dispute Settlement Body in which both countries had accepted in principal the elimination of Mexico's soft drink and distribution taxes. Mexico eliminated the beverage tax, effective January 1, 2007.

### **Dominican Republic-Central American Free Trade Agreement**

Central American Free Trade Area (CAFTA) negotiations began in January 2003. Negotiations were completed with El Salvador, Guatemala, Honduras, and Nicaragua in December 2003 and with Costa Rica in January 2004. Negotiations to include the Dominican Republic began in early 2004 and concluded in March 2004. The Agreement was signed by trade ministers (USTR in the case of the United States) in August 2004. Implementing legislation passed in the U.S. Congress and was signed by the President in August 2005. By April 2006, all countries but Costa Rica had ratified the agreement, and as of July 1, 2006, the agreement had been implemented for El Salvador, Guatemala, Honduras, and Nicaragua.

Under the agreement, there are specific provisions for trade in sugar. The United States establishes country-specific TRQs for the DR-CAFTA countries, starting at a total of 107,000 mt in the first year and growing to 151,140 mt in year 15, thereafter growing by 2,640 mt per year, into perpetuity. A 2,000 mt TRQ, with no growth, will be established for Costa Rica for organic sugar under the U.S. specialty sugar TRQ. Each country's duty-free access will be the lesser of its trade surplus or its TRQ for that year. Provisions have been agreed upon to allow alternative forms of compensation to be established to facilitate sugar stock management by the United States. (See table 23 for annual quantities by country.)

Table 23 - U.S. sugar tariff-rate quota commitments under DR-CAFTA.

Year 1/	Dominican Republic	Costa Rica 2/	El Salvador	Guatemala	Honduras	Nicaragua
<i>Metric tons, raw value</i>						
1	10,000	11,000	24,000	32,000	8,000	22,000
2	10,200	11,220	24,480	32,640	8,160	22,440
3	10,400	11,440	24,960	33,280	8,320	22,880
4	10,600	11,660	28,000	37,000	8,480	23,320
5	10,800	11,880	28,560	37,740	8,640	23,760
6	11,000	12,100	29,120	38,480	8,800	24,200
7	11,200	12,320	29,680	39,220	8,960	24,640
8	11,400	12,540	31,000	42,000	9,120	25,080
9	11,600	12,760	31,620	42,840	9,280	25,520
10	11,800	12,980	32,240	43,680	9,440	25,960
11	12,000	13,200	32,860	44,520	9,600	26,400
12	12,200	13,420	34,000	47,000	9,760	26,840
13	12,400	13,640	34,680	47,940	9,920	27,280
14	12,600	13,860	35,360	48,880	10,080	27,720
15	12,800	14,080	36,040	49,820	10,240	28,160
For each succeeding year, the TRQ for each of the CAFTA-DR countries increases by:						
	200	220	680	940	160	440

1/ Based on year of actual implementation, which may not be the same for all countries.

2/ Costa Rica has an additional quota for specialty sugar of 2,000 mt per year which does not grow.

Source: U.S. Trade Representative.

## Challenges for U.S. Sugar

Sugar provisions in the 2002 Farm Act were adopted after U.S. producers and processors experienced a sustained period of low prices and loan forfeitures in the crop years immediately before the Act. Policy options were limited (as they are now) by U.S. commitments made in the Uruguay Round Agreement on Agriculture and also by NAFTA commitments. At that time, the USDA had only limited authority to provide incentives to influence domestic marketings and production when prices were low.

Central provisions of the 2002 Farm Act required USDA under certain conditions to place limits on sugar sales and marketing that kept unneeded sugar out of marketing channels, thereby keeping prices high enough to avoid forfeitures on CCC-backed loans. The responsibility of keeping sugar outside of marketing channels was placed with sugar processors and not the CCC. The explicit goal of the Act was to minimize the cost of the sugar program to the Federal budget. Notwithstanding, the Act provided for the suspension of allotments if sugar imports were expected to exceed 1.532 million short tons (1.390 million metric tons, roughly the sum of the URAA minimum import access and the maximum low-duty NAFTA access) such that allotments would have to be further reduced to maintain prices higher than forfeiture levels.<sup>5</sup> If allotments were suspended, domestic processors would be free to compete with the expanded import competition, with the backup protection of the nonrecourse loan program for price support. Essentially the cost of supporting prices would fall back onto USDA through Federal budgetary expenditure.

<sup>5</sup> USDA has recommended that the provision be eliminated in the next Farm Bill that requires the Secretary of Agriculture to suspend marketing allotments when sugar imports exceed 1.532 million STRV. Elimination of this provision would allow the U.S. sugar program to continue to be operated at no net cost to taxpayers.



## **Sugar Imports Into the United States Set To Increase**

U.S. sugar processors and producers now face the prospect of increasing import competition. On January 1, 2008, over-quota NAFTA sugar tariffs fall to zero and there will be no quantitative limit on sugar imports from Mexico. An agreement with Mexico announced in July 2006 reaffirms the NAFTA duty-free provisions regarding sugar and HFCS trade between the United States and Mexico after January 1, 2008. The agreement also allows Mexico, consistent with authorities under the NAFTA and the side-letter, to export duty-free a maximum of 250,000 MTRV of sugar to the United States in FY 2007, and between 175,000 and 250,000 MTRV from October 1, 2007 to December 31, 2007. Correspondingly, the United States can export equivalent amounts of HFCS to Mexico during the same time periods.

In addition to sugar from Mexico, sugar imports increase as a result of other free trade agreements, present (DR-CAFTA) and future (Peru, Colombia, others). The Doha round of WTO multilateral trade negotiations, although experiencing difficulties, could eventually result into more foreign sugar access to the U.S. market. Under the current U.S. sugar program, all these increased imports increase the likelihood of high Federal expenditure to support the sector.

## **Do High Sugar Prices Reduce U.S. Sugar Demand?**

With the current program design, the sugar user pays for supporting sugar processors and producers. Bearing the cost of support could be affecting trends in recent sugar sales. As seen earlier in figure 22, sugar deliveries to food manufacturers peaked in 1999 at 5.63 million tons, and fell to slightly over 5.0 million tons in 2003. Since then, deliveries have resumed their growth, but in 2005 were still 200,000 tons below their level in 1999. On a per capita basis, refined sugar deliveries for human consumption were estimated at 63.0 pounds in 2005, compared with 66.3 pounds in 1999. Also notable is that sugar in imported products has grown markedly since 1995 and in 2005 totals over 1.15 million tons. Although not explicitly shown in the figure, especially strong growth has been evidenced in nonchocolate confectioneries. In 1995, imported product constituted 10.7 percent of demand, and in 2005, imported product grew to 33.9 percent of demand.<sup>6</sup>

Although it is far from certain that U.S. sugar prices higher than corresponding world levels are responsible for the delivery downturn, sugar users have used the downturn as an argument for lower sugar prices. Although sugar users have typically called for expanded sugar imports, there is now more focus on changing the form of support for domestic sugar production rather than diluting the support. Some users argue for a sugar program with more market orientation, in which producers receive support directly in the form of income payments from USDA. The resulting program would more resemble other USDA commodity programs. (See appendix I for an expanded analysis of this alternative.)

An income support program would be an explicit cost to the Federal budget, as opposed to placing the cost on users and consumers. The current nonrecourse loan program, coupled with the marketing allotment program, is meant to keep the program costless to the Federal budget, with all the costs born by users. An income support program, on the other hand, necessarily means paying a government

<sup>6</sup>  
U.S. Census Bureau,  
*Current Industrial Report,*  
*Confectionery, MA311*

subsidy through a combination of direct payments, countercyclical payments, and loan marketing gains. If future imports from Mexico become sizeable, then the cost of the program could increase.

## **Ethanol as New Variable in the Program Equation**

High petroleum prices and the ongoing growth of ethanol as a gasoline additive and/or replacement, both nationally and internationally, present opportunities and complications to sugar policy. Clearly, higher petroleum prices translate into higher production costs for producers and (especially beet) processors. On the other hand, both sugarcane and sugarbeets have certain technical advantages for ethanol production, although USDA has shown that ethanol from U.S. sugar crops (except molasses) is likely to be unprofitable over the medium and long term. However, some may argue that initial subsidization of the ethanol industry, both in the United States and in Brazil, has yielded economywide benefits that probably could not have been reliably forecast beforehand.

High petroleum prices have helped to buoy world sugar prices. In Brazil, the growth in availability of flex-fuel vehicles (FFVs) that can use either gasoline or ethanol has stimulated demand for ethanol and helped to push more sugarcane to be used for ethanol and less for sugar. Given Brazil's large export share of the world sugar market, greater ethanol production has brightened prospects for higher world sugar prices well into the future. A few years ago, many analysts were expecting sugar prices in the 6 cents to 8 cents per pound range, but now many expect world sugar prices to average at or above 12 cents per pound.

To the extent that the United States is dependent on imports, higher world sugar prices may translate into higher U.S. domestic prices to attract that sugar away from alternative export destinations or may provide a higher floor price for U.S. sugar. Higher bounds for U.S. prices make it easier to argue for a deficiency payment option to support the U.S. sugar sector. The potential size of the deficiency payment rate is made smaller by higher world prices. Although there is increased Federal budget exposure under a deficiency payment policy than with a nonrecourse loan rate program, sugar users benefit more than proportionally of the cost because they pay lower prices for sugar. Lower sugar prices discourage the use of sugar-alternatives and also reduce the incentive to import sugar containing products.

## Appendix I—An Income Support Program Alternative for Sugar?

The U.S. sugar program does not include income-based support provided by the 2002 Farm Act to producers of other crops, including wheat, feed grains, upland cotton, rice, oilseeds, and peanuts. Income support has three elements: direct payments, countercyclical payments, and marketing loans. A producer is defined as an owner, operator, landlord, tenant, or sharecropper who shares in the risk of producing a crop and is entitled to share in the crop available for marketing, or would have shared had the crop been produced. As a means of targeting benefits and reducing commodity program costs, there are payment limitations on each of the programs that put ceilings on payments to farm operations. Program provisions are described herein.

### Direct Payments

A direct payment is equal to the product of the national payment rate of the applicable crop, the producer's payment acres (85 percent of base acres) for the crop, and the producer's payment yield for the crop. The payment rate is fixed for each crop and is not affected by current production or by current prices. Payments to individual producers are based on their historical acreage planted to the crop and on historical yields.

### Countercyclical Payments

Countercyclical payments provide a price-dependent benefit whenever the effective price for a covered commodity is below its target price as set out in the 2002 Farm Act. Payments are made when the higher of the crop's loan rate or season average price is less than the crop's target price less the direct payment rate. The payment amount is equal to the product of the countercyclical payment rate for the crop, the producer's payment acres (85 percent of base acres), and the producer's payment yield for the crop. As with direct payments, payments are based on historical area and yields, not to current production of the crop.

### Marketing Loans

Marketing loans provide loan deficiency payments and marketing loan gains to producers when prices are low. Producers of covered commodities can receive a loan from the Government at the crop's loan rate by pledging production as loan collateral. The loan is settled when producers: (1) repay the loan at the loan rate plus interest; (2) forfeit the crop at loan maturity; or (3) repay the loan at a lower repayment rate, if available for the crop. When the producer repays the loan at a lower repayment rate, the difference between the loan rate and the repayment rate represents the marketing loan gain to the producer. Another benefit to this third method is that accrued interest is waived when paying off the loan. An alternative to the marketing loan gain is a loan deficiency payment (LDP). Except for extra-long staple cotton, the producer can choose to receive marketing loan benefits when prices are below the loan rate. The gain is the same as the marketing loan gain but there is no crop loan.

## Payment Limitations

The payment limitation on direct payment is \$40,000 per person per crop year. The payment limitation on countercyclical payments is \$65,000 per person per crop year. The payment limitation on marketing loan gains and loan deficiency payments is \$75,000 per year. There is a three-entity rule, which allows individuals to effectively double payment limits per individual for a \$360,000 maximum per person. Producers with adjusted gross income over \$2.5 million are not eligible for payments unless more than 75 percent of adjusted gross income is from agriculture.

## Planting Flexibility

Under the 2002 Farm Act, producers have flexibility in deciding which crops to produce, although there are some limitations on using base acreage for planting fruits, vegetables, and wild rice. Base acreage must be kept in agricultural or conserving use, and certain conservation and wetland provisions must be observed. Under these conditions, producers can receive direct payments and countercyclical payments corresponding to a crop, whether or not the crop is actually being produced in the year in which the payments are received.

## Income Support Programs and WTO Commitments

As part of the WTO Agreement on Agriculture, member countries bound themselves to disciplines on domestic subsidies, export subsidies, and market access.<sup>7</sup> With respect to domestic subsidies, member countries are required to report to the WTO agricultural spending divided into outlays that distort agricultural markets (amber box) and those that do not. The latter outlays are exempt from WTO spending limits, and are generally classified as green box, blue box, de minimis, or special and differential treatment exemptions.

Green box subsidies are those that do not distort trade or only cause minimal distortion while achieving a domestic policy goal. Green box items include producer payments not dependent on current production, usually termed “decoupled.” Blue box subsidies are those made under a production-limiting program, and are considered as exempt from spending restrictions. Blue box subsidies include payment programs based on fixed area and yield or on no more than 85 percent of some base production. The direct payment and countercyclical payment programs are considered to fall under these categories, and hence are exempt from WTO disciplines.

Amber box policies cause the diversion of resources into or out of production of specific commodities, and thus affect world trade and prices. The aggregate value of a member country’s support measures is termed “aggregate measure of support” or AMS. WTO member countries are bound to fixed value limitations on their AMS. The United States’ AMS limit is \$19.1 billion a year. Policies included in the amber box are price-support measures (e.g., U.S. sugar nonrecourse loan program), input subsidies, and direct payments connected to production levels. Included in the latter category are marketing loan gains and loan deficiency payments.

<sup>7</sup> See *Agriculture in the WTO: Member Spending on Domestic Support* by Randy Schnepf, CRS Report for Congress, RL30612, Congressional Research Service, June 2005.

## Analysis of Income Support for U.S. Sugar

Reports prepared for the American Farm Bureau Federation (AFBF) and for the American Sugar Alliance (ASA) have analyzed the implications of an income support program for U.S. sugar. Both assumed a raw and refined sugar target price of 20.00 cents per pound (lb), raw sugar loan rate of 12.00 cents/lb, refined sugar loan rate of 16.48 cents/lb, and direct payment rate of 3.00 cents/lb.<sup>8</sup> Both reports allow significant NAFTA annual imports—1.3 million tons for AFBF (high import scenario) and up to 1.0 million tons for ASA. The AFBF report emphasizes large loan forfeitures under the current program, sugar user benefits under the income support alternative, and not unreasonable Federal budget expense. Most income support comes from direct payments, which lowers sugar's contribution to the U.S. AMS. The U.S. raw sugar price for their high import scenario is projected at 16.9 cents/lb. The ASA report, on the other hand, emphasizes large U.S. budget expense, projected at \$1.3 billion a year, considerably higher than the AFBF. The ASA argues that U.S. sugar prices will drop to world levels, assumed by ASA to be 10 cents/lb for raw sugar.

An implicit assumption in the ASA analysis was that a switch to sugar income support measures would need at least the acquiescence of current producers and processors. Before the peanut program was converted to income support in 2002, peanut producers had anticipated that predecessor program was unsustainable due to potentially large peanut imports from Mexico under the NAFTA. Producers were split between those who had peanut production quotas that let them sell at high (although perceived as threatened) domestic prices and non-quota producers who were forced to sell either to processors at low prices or to the export market. Non-quota producers may have had reason to support the program change, while some quota producers recognized the need to change, while arguing for additional compensation under a peanut quota buy-out program.

The AFBF analysis and arguments for program change are based on the assumption of an inevitable flood of NAFTA sugar causing massive loan forfeitures. While not necessarily disagreeing about NAFTA imports, sugar producers and processors do not see a switch to income support as a solution, as evidenced by the ASA report. Both studies recognize that large budget expenditure could be projected at much lower levels by incorporating income support payment limitations into the analysis. Applying the limitation, however, seems no way to garner support for the program switch.<sup>9</sup>

<sup>8</sup> Abler, D., J. Beghin, D. Blandford, A. Elobeid, P. Westhoff. "Sugar Policy Options and Consequences: A Study Prepared for the American Farm Bureau Federation," February 2005; and McKeany-Flavell Company, Inc., "The Future of U.S. Sugar Policy," prepared for the American Sugar Alliance, June 2006.

<sup>9</sup> Analysis of data in the 2002 U.S. Agricultural Census suggests that 91 percent of cane sugar comes from farms over 500 acres in size, 75 percent comes from farms over 1,000 acres in size, and 57 percent comes from farms over 2,000 acres in size. The payment limitation thresholds are, therefore, so low as to deny the U.S. cane sector any significant income support.

## Appendix II—Farm Profile

The annual Agricultural Resource Management Survey (ARMS) is USDA's primary source of information on the financial condition, production expenses, resource use, and economic well-being of U.S. farm households. This appendix uses the data from the 2003 ARMS to examine a profile of farms producing sugarbeets. The limited sample size available of farms producing sugarcane does not allow a profile to be created.

Compared with other farms in the same regions, sugarbeet farms on average tend to be very large and more diversified in the commodities produced. They have on average higher net farm income and substantially more financial assets than farms raising other crops in the same region. The 2003 ARMS data indicates that sugarbeet growers have performed well financially.

### Characteristics of Sugarbeet Farms

The 2003 ARMS profile (appendix tables 1, 2, and 3) shows substantial differences among sugarbeet farms and other farms in the same regions. The average farm size of sugarbeet farms was 1,700 acres, of which three-fourths were crop land. On these farms, sugarbeet accounted for nearly one-fourth of the total harvested acreage and contributed to about 40 percent of the total value of production. By contrast, other farms in the sugarbeet growing regions (henceforth referred as other area farms) were much smaller, operating on the average 685 acres of which one-third was cropland.

Crops competing with sugarbeets vary by geographical locations. The principal competing crops on other area farms were wheat, soybeans and corn. The commodity mix on sugarbeet farms tends to be more diversified than on other area farms. On average, the crop and livestock mix on sugarbeet farms involved four commodities including sugarbeet, while other area farms involved just 1.7 commodities. Other area farms had more livestock than the sugarbeet farms, with beef cattle most common. Operators of sugarbeet farms tend to be younger and more educated than their counterparts operating other farms in the same region.

Farms vary widely in size and other characteristics, ranging from very small residential and retirement farms to establishments with annual sales well over \$1 million. ERS combines farm characteristics such as operator occupation and farm sales to classify farms into one of these three categories:

1. Commercial farms (farms with annual sales of \$250,000 or more)
2. Intermediate farms (farms with sales of less than \$250,000 and whose operators report farming as their primary occupation)
3. Rural-residence farms (farms with annual sales of less than \$250,000 and whose operators report their primary occupation as either retirement or off-farm income).

Appendix table 1.--Farm characteristics in sugar beet growing area, 2003

Item	Sugarbeet growing area		
	Sugar beet farms	Other area farms	All area farms
Total farms	4,096	384,649	388,745
Farm size (acres)			
Operated	1,706	685	695
Owned	858	457	461
Rented	848	228	234
Cropland	1,218	234	244
Harvested cropland	1,171	175	186
Crops harvested (acres)			
Sugarbeet	252	0	3
Sugarbeet yield (tons/acre)	23.3	0	23.3
Cotton	35	*	*
All hay	49	45	45
Corn	182	30	32
Soybeans	229	31	33
Wheat	254	31	33
Barley/oats	48	10	10
Average number of commodities grown	4.1	1.7	1.7
Number of commodities grown (percent)			
No commodities	id	16	16
One commodity	id	41	40
Two commodities	id	24	24
Three commodities	31	9	9
Four or more	63	10	11
Production specialty (percent farms) 1/			
Field crops	31	15	15
General crop (sugarcane)	62	22	23
High value crops	id	14	14
Beef	0	21	21
Other livestock	id	27	27

Totals may not add due to rounding error or omission of a category.

Id = Insufficient data for legal disclosures. \* = Less than 5.

1/ Production specialty is the farm's production classification that represents the largest proportion of gross commodity receipts from the farm operation.

Source: USDA, ERS, 2003 Agricultural Resource Management Survey (ARMS).

Appendix table 3--Financial characteristics of farms in sugarbeet growing area, 2003

Item	Sugarbeet growing area		
	Sugarbeet farms	Other area farms	All area farms
Gross value of production (\$ per farm)	617,821	124,929	130,123
Sugarbeet value of production	230,275	0	2,426
Sugarbeet value of production (percent)	37	0	2
Farms receiving Government payments (percent)	99	40	41
Farm income statement (\$ per farm)			
Gross cash income	632,392	132,332	137,601
Livestock sales	28,457	41,265	41,130
Crop sales	387,344	65,607	68,997
Government payments	37,456	7,069	7,389
Commodity-related payments	33,798	5,767	6,063
Conservation payments	id	1,302	1,327
Cash expenses	489,670	107,840	111,863
Net cash farm income	142,722	24,492	25,738
Depreciation	63,037	11,295	11,840
Net farm income 1/	124,759	23,066	24,138
Farm balance sheet (\$ per farm)			
Farm assets	1,911,370	836,216	847,545
Farm liabilities	425,240	91,546	95,062
Farm equity	1,486,129	744,671	752,483
Debt/asset ratio (percent)	22	11	11
Favorable position 2/	66	59	59
Farm household income (\$ per household)			
Total household income	102,216	75,098	75,382
Farm related income 3/	71,158	12,785	13,395
Off-farm income	31,058	62,313	61,987
Earned sources	25,172	48,886	48,638
Unearned sources	5,885	13,427	13,348

1/ Net farm income is net cash farm income less costs for depreciation and noncash benefits for

hired worker, plus the value of the inventory change in 2003 and any nonmoney income.

Nonmoney income includes the value of farm products consumed on the farm and an imputed rental value for the farm operator dwelling.

2/ Favorable operations means a positive income and debt/asset ratio less than 0.40. These farms are generally considered financially stable.

3/ Farm-related income is that portion of farm income that is accrued by the farm household. Farm-related income is then adjusted to reflect any other households that share in the farm business income, and the farm earning of household members other than

Source: USDA, ERS, 2003 Agricultural Resource Management Survey (ARMS).

Two-thirds of sugarbeet farms were classified as commercial farms with sales more than \$250,000. In comparison, the share of other area farms was much smaller than sugarbeet farms, with less than 15 percent to be commercial farms. On the other end of the spectrum, sixty-percent of other area farms were characterized as rural-residence farms.

## Financial Characteristics of Sugarbeet Farms

As mentioned earlier, sugarbeet farms were large in acreage compared with other farms in the same region. These sugarbeet farms were also large when financial measures are considered. Their farm assets and equity positions were about 50



percent greater than that of other area farms. The sugarbeet farms had gross sales for all commodities produced on the farm roughly five times more than that of other area farms. The cash expenses of sugarbeet farms were also four-and-one-half times greater than other area farms, averaging \$489,670 per farm. Notably, sugar beet is a high-capital intensive crop (primarily farm machines) compared with other field crops such as corn, soybeans, and wheat.

The net farm income of sugar beet farms was nearly 20 percent higher than other area farms, averaging \$124,759 per farm in 2003. Partially offsetting this net farm income gap, other area farms had more off-farm income than the sugarbeet farms. Other area farms had 50 percent higher off-farm income, averaging \$62,313 per farm, a direct reflection of the fact that operators of other area farms were more likely to report nonfarm job or retirement as their primary occupation. In contrast, most operators of sugarbeet farms reported farming as their primary occupation.

### **Economic Sustainability of Sugarbeet Farms**

The longrun economic viability of sugarbeet farms can be viewed in several ways. To capture the short and longrun dimensions of farm financial viability, the analysis considers three measures of production costs for the whole farm. Variable costs are the costs for purchased inputs that are consumed in one production period (e.g., seed, fertilizer, chemicals, fuel, repairs, and hired labor). Total cash costs include variable costs plus expenses for overhead items (such as rent, taxes, insurance, and interest payments). Economic costs are total cash costs plus an allowance for depreciation, along with imputed returns to management, land, and unpaid labor of the operator and family.

A farm can often survive for years if revenue covers variable costs and perhaps for several years if revenue covers total cash costs, particularly if the operator is able to draw on cash reserves or borrow against assets, or use income from off-farm sources. However, such measures are usually temporary. For longrun financial viability, revenue must cover economic costs. For example, in the short run, the allowance for depreciation may be deferred and aging equipment may be repaired. But in the long run, as machinery wears out, a shortage of funds for replacing machinery may impact the ability of the farm business to generate revenue.

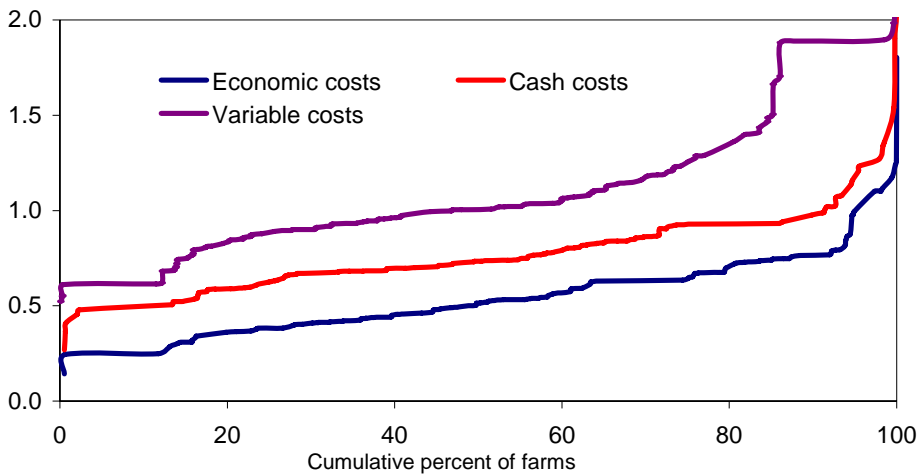
The share of sugar beet farms which cover costs varies by cost measure (appendix figs. 1, 2). A majority of these farms had revenues sufficient to cover variable cash costs as well as other overhead cash expenses in 2003. However, only half of sugarbeet farms were able to cover all economic costs in 2003. These percentages vary by year. For example, depending upon the year (2000-03), the percent of sugarbeet farms with sufficient revenues to cover their economic costs ranged from 36 percent to 54 percent.

Government payments contribute to the long-term financial sustainability of U.S. farms. Unlike most other commodity programs, sugar loans are made to processors and not directly to sugarbeet growers. This is because sugarbeets are bulky and perishable and must be processed into sugar before being traded or stored (for details refer to earlier discussion on government programs and policy). The bulk of direct government payments were from commodity-related payments, with a smaller share coming from conservation payments. Although sugarbeets themselves

Appendix figure 1

### Distribution of sugar beet farm at different costs levels, 2003

Costs per revenue dollar



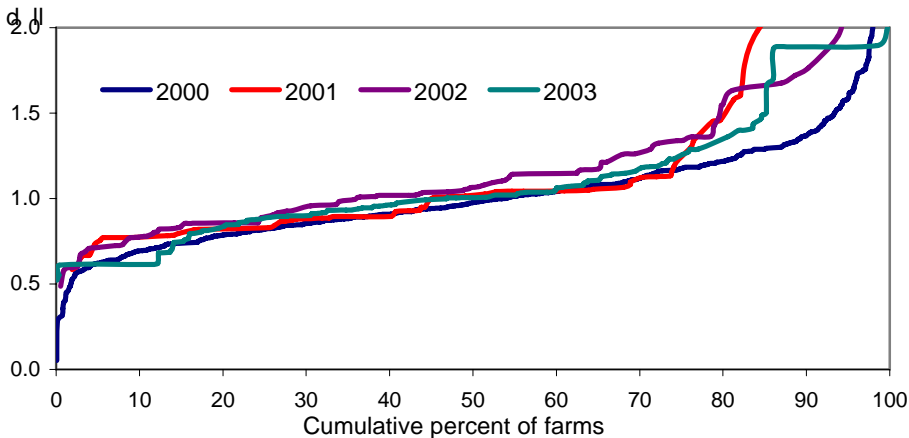
Source: USDA, Economic Research

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Appendix figure 2

### Distribution of sugar beet farms by economic costs per dollar revenue, 2000-2003

Economic costs per revenue



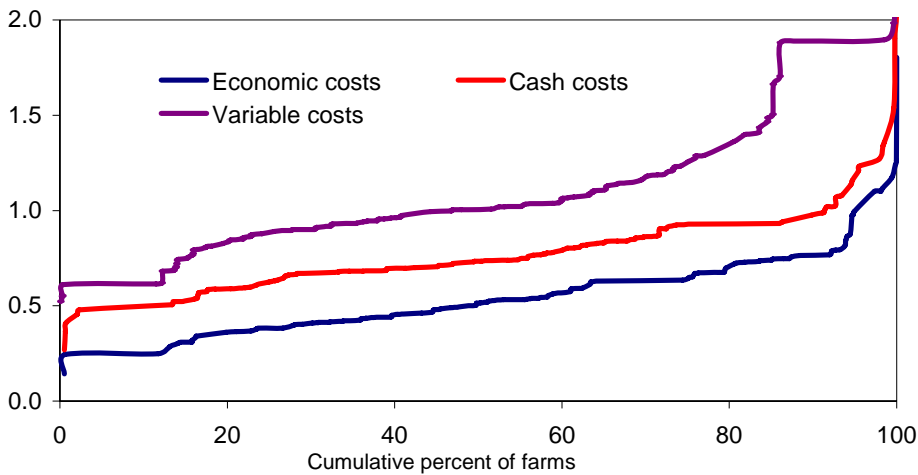
Source: USDA/Economic Research Service.

are not eligible for direct payments, most growers also produce crops such as wheat, soybeans, or corn that are eligible for participation in various government programs. As a result, all most all sugar beet farms participated in government programs in 2003. In comparison, less than half of other area farms participated in government programs and thus receiving much less in government payments. According to 2003 ARMS, the sugarbeet farms received \$33,798 per farm in government payments compared with \$5,767 for other area farms.

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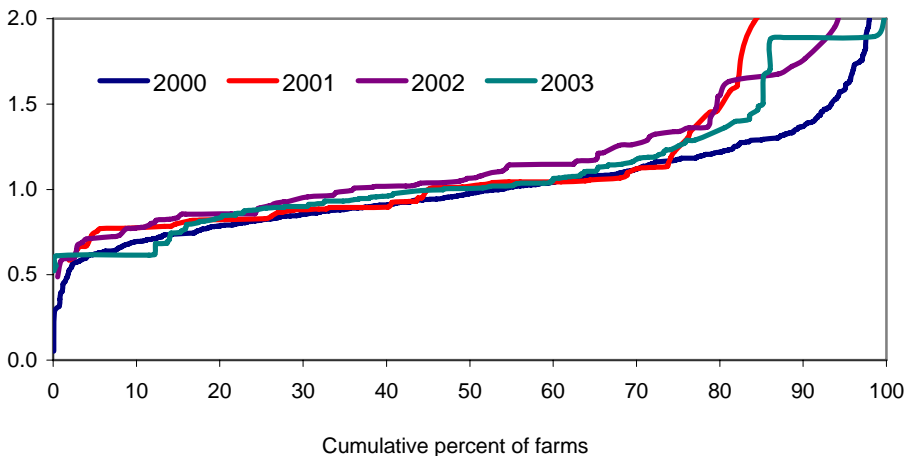


Source: USDA, Economic Research Service.

Appendix figure 2

### Distribution of sugar beet farms by economic costs per dollar revenue, 2000-2003

Economic costs per revenue dollar



Source: USDA/Economic Research Service.

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