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Sugar and Sweeteners Outlook

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NAFTA Sugar March 2012

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Approved by the World Agricultural Outlook Board.

Based on revised analysis of data from the *Comite Nacional Para El Desarrollo Sustentable de la Cana de Azucar* (CNDSCA), the U.S. Department of Agriculture (USDA) made corrections to its Mexico 2010/11 sugar supply and sweetener use from last month. Sugar for human consumption is estimated at 3.950 million metric tons (mt) and ending stocks are estimated at 759,906 mt. Also, high fructose corn syrup (HFCS) consumption is estimated at 1.635 million mt, dry weight.

In spite of difficult February harvest conditions, the USDA still projects Mexico 2011/12 sugar production at 5.0 million mt. The USDA projects 2011/12 sugar imports at about 383,000 mt. Of this amount, 171,000 mt is expected to be imported from the United States–most, if not all, comes from the U.S. Refined Sugar Re-Export Program. The remainder of the projected imports, about 211,000 mt, is sugar already imported into Mexico through the end of January 2012. Although the Secretariat of the Economy (*Economia*) has announced plans to establish a framework under which an additional 250,000 mt of sugar may be imported later in the year, no tariff-rate quota has been formally announced.

The USDA projects combined sugar and HFCS consumption at 5.467 million mt by assuming the same per capita sweetener consumption in 2011/12 as in 2010/11– 49.11 kilograms. HFCS is projected at 1.635 million mt, dry weight. Sugar is residually projected at 4.012 million mt. Ending stocks are projected at 22.0 percent of projected sugar consumption– about 883,000 mt. Sugar exports are projected at 965,000 mt, most of which is expected to be exported to the United States and Puerto Rico.

The USDA increased its forecast of FY 2012 Florida cane production to 1.790 million short tons, raw value (STRV) based on expectations of increased sugarcane yields and area harvested. Certain components of 2010/11 sugar imports were revised. Forecasts of 2011/12 imports from Mexico were increased to 1.115 million STRV and imports under the re-export import program were increased to 500,000 STRV.

Because of revised direct consumption import data from USDA's *Sweetener Market Data* (SMD), the forecast of FY 2012 deliveries for human consumption was increased by 210,000 STRV to 11.185 million STRV. To meet this forecast, direct consumption imports by non-reporters to the USDA would have to increase to record levels above 1.1 million STRV. Ending FY 2012 stocks are forecast at 1.047 million STRV, implying an ending stocks-to-use ratio of 9.0 percent.

Sugar in the North American Free Trade Area (NAFTA)

On March 9, 2012 USDA released its latest U.S. and Mexico sugar supply and use estimates for fiscal year (FY) 2011 and projections for FY 2012 in the *World Agricultural Supply and Demand Estimates* (WASDE) report.

Mexico Supply and Use in 2010/11

Based on revised analysis of data from the *Comite Nacional Para El Desarrollo Sustentable de la Cana de Azucar* (CNDSCA), USDA made corrections to its Mexico 2010/11 sugar supply and use from last month (table 1). Sugar for human consumption is estimated at 3.950 million metric tons (mt). Imports for consumption are estimated by the CNDSCA at 107,448 mt. Official imports reported by the Secretariat of the Economy (*Economia*) are 289,159 mt (the same as reported last month). The difference between the two import series is 181,711 mt. USDA assumes this amount is destined for use in Mexico's sugar-containing product export program (IMMEX). CNDSCA estimates that 111,068 mt of domestic production was delivered into IMMEX, implying total sugar deliveries to IMMEX of 292,779 mt. Estimated exports are the same as last month's at 1.469 million mt, as reported by *Economia*. Of this amount, 1.432 million mt were exported to the United States and Puerto Rico.

The USDA accepts the CNDSCA estimate of 2010/11 ending stocks at 759,906 mt. Because of procedural differences in import and export reporting between *Economia* and the CNDSCA, a miscellaneous adjustment of about negative 81,000 mt enters on the use side of the USDA supply and use accounting to achieve balance. The USDA has not included estimates of additional sugar supply from undocumented sources in the WASDE.

The USDA accepts the CNDSCA estimate of 2010/11 high fructose corn syrup (HFCS) consumption of 1.635 million mt, dry weight. Combined per capita consumption of sugar and HFCS is 49.11 kilograms, a decrease of 4.3 percent from the previous year. This year-over-year percentage decrease is the largest since 1982/83.

Mexico Supply and Use in 2011/12

The USDA projects Mexico 2011/12 sugar production at 5.0 million mt, the same level since the January 2012 WASDE. Each week personnel in the Economic Research Service (ERS) use interim CNDSCA-compiled production statistics to update projected production for the entire harvest season. For the entire month of February and into March, these projections have pointed to season-long production of 4.9 million mt, but without sufficient statistical properties to rule out production at 5.0 million mt.

Table 2 shows the latest ERS projections of various production parameters, along with those of the CNDSCA (November 2011 and January 2012) and the USDA projection set that led to the reduction to 5.0 million mt in January. The USDA-based projections show lower levels of sucrose recovery than the CNDSCA projections. The ERS March projection has a lower sugarcane yield that implies about 81,000 mt less sugar than projected in January. The sugar projection is further lowered by the lowering of expected harvested area by 1,365 hectares.

Figure 1 shows weekly amounts of sugar produced in 2011/12, compared with the 2010/11 season and an average of weekly sugar produced during the years 2004/05 through 2008/09. As shown by the chart, 2011/12 production was below average for the entire month of February–the low point coming the week of February 20. Rain contributed to poor harvest conditions that closed several mills during this period. It is possible that these production losses can be made up by extending the harvest season longer than usual, the main threat being the arrival of the rainy season in early summer.

The USDA projects 2011/12 sugar imports at about 383,000 mt. Of this amount, 171,000 mt is expected to be imported from the United States. This is sugar exported under the U.S. Refined Sugar Re-Export Program. The chief

Table 1 -- Mexico: sugar production and supply, and sugar and HFCS utilization

Fiscal year (Oct/Sept)	2010/11	2011/12 1/
	1,000 metric tons, raw value	
Beginning stocks	973	806
Production	5,495	5,300
Imports	307	405
Imports for consumption	114	224
Imports for other uses (includes IMMEX)	193	181
Total Supply	6,774	6,511
Disappearance		
Human consumption	4,187	4,252
Other deliveries (IMMEX)	310	300
Miscellaneous	-86	
Total	4,411	4,552
Exports	1,558	1,023
Total use	5,969	5,576
Ending stocks	806	935
	1,000 metric tons, tel quel/actual weight	
Beginning stocks	918	760
Production	5,184	5,000
Imports	289	383
Imports for consumption	107	211
Imports for other uses (includes IMMEX)	182	171
Total supply	6,391	6,142
Disappearance		
Human consumption	3,950	4,012
Other deliveries (IMMEX)	293	283
Miscellaneous	-81	
Total	4,161	4,295
Exports	1,469	965
Exports to the United States & Puerto Rico	1,432	955
Exports to other countries	38	10
Total use	5,631	5,260
Ending stocks	760	883
Stocks-to-human Consumption	19.2	22.0
Stocks-to-use	13.5	16.8
High fuctose corn syrup consumption (dry weight	1,635	1,635

1/ Forecast

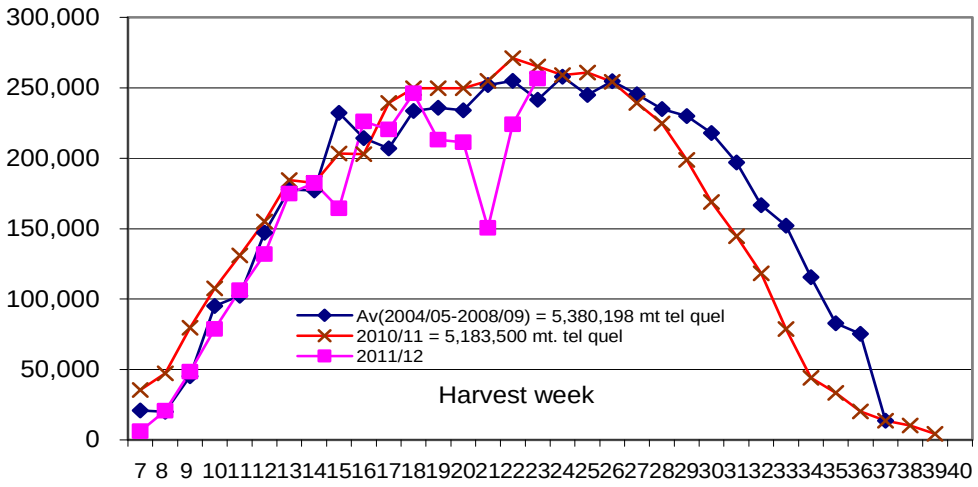
Source: USDA, WASDE and ERS, MTED, *Sugar and Sweeteners Outlook* .

Table 2 -- Comparison of Mexico sugar and sugarcane forecasts by CNDSCA, USDA, and ERS Sugar and Sweeteners Outlook 1/

Source	Area harvested (Hectares)	Sugarcane yield (tons/hectare)	Sugarcane (tons)	Sugar (tons)		Sucrose recovery (percent)	Sugar yield (tons/hectare)
CNDSCA (Nov., 2011)	718,255	63.95	45,929,813	5,339,462		11.63	7.43
CNDSCA (Jan., 2012)	716,890	63.81	45,747,744	5,098,901		11.15	7.11
USDA (Jan., 2012)	718,255	63.92	45,913,140	5,001,646	2/	10.89	6.96
ERS (March 2012)	716,890	62.89	45,084,376	4,915,759		10.90	6.86

1/ CNDSCA = Comite Nacional Para El Desarrollo Sustentable de la Cana de Azucar
2/ Rounded to 5,000,000 in the January 2012 World Agricultural Supply and Demand Estimates
Source: CNDSCA; USDA, ERS, Sugar and Sweeteners Outlook.

Figure 1
Sugar production, by week of harvest, 2004/05-2011/12
metric tons



Source: CNDSCA.

use of this sugar in Mexico is as an ingredient in food products that are exported out of Mexico under the IMMEX program. Most of these food products are exported to the United States. The remainder of the projected imports, about 211,000 mt, is sugar already imported into Mexico through the end of January 2012. These imports resulted from two previously established tariff-rate quotas, the second of which allowed imports only through the end of January. Although *Economia* has announced plans to establish a framework under which an additional 250,000 mt of sugar may enter later in the year, no TRQ has been formally announced.

The USDA projects combined sugar and HFCS consumption at 5.467 million mt by assuming the same per capita sweetener consumption in 2011/12 as in 2010/11– 49.11 kilograms. HFCS is projected at 1.635 million mt, dry weight. Sugar is residually projected at 4.012 million mt.

Figure 2 shows sugar and HFCS consumption through the end of January (4 months of the marketing year). Overall sweetener consumption is 1.86 percent higher than the corresponding period last year – this is above the assumed rate of population growth of 1.10 percent. HFCS consumption is estimated at 544,433 mt, about 28.6 percent of total combined sweetener consumption and 11.35 percent ahead of the same corresponding period last year. Sugar

consumption is estimated at 1.356 million mt, about 1.5 percent less than the same period last year. If these trends continue beyond January, the USDA may revise its consumption projections in the coming months.[1]

Figure 3 shows estandar and refinado sugar prices in Mexico City and unit import values of HFCS 55 adjusted to dollars per dry mt since 2008. The HFCS 55 unit value increased to $507 per mt in December 2011. This is about an 11-percentage point increase since January. Nonetheless, the December 2011 estandar price is 1.78 times higher than the HFCS unit value. The corresponding ratio in January was 1.82.

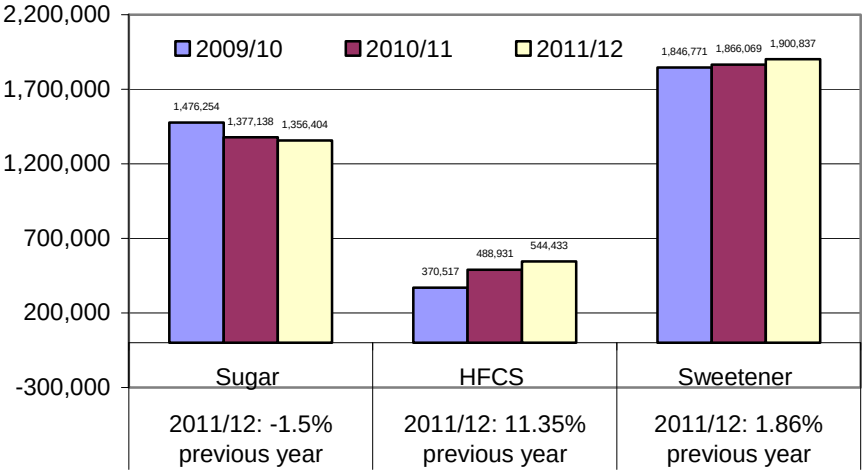
Ending stocks are projected at 22.0 percent of projected sugar consumption – about 883,000 mt. This amount is necessary to assure sufficient supplies for consumption until the next sugarcane harvest begins in November 2012. Other deliveries, mostly to Mexico's sugar-containing re-export program IMMEX, are projected at 283,000 mt.

Exports are projected residually– total supply less the sum of total deliveries (consumption plus IMMEX) and ending stocks. Projected sugar exports are, therefore, 965,000 mt. Of this amount, 955,000 mt are expected to be exported to the United States and Puerto Rico.

Figure 2

Cumulative sweetener consumption in Mexico through 4 months: October through January, 2009/10 -- 2011/12

Metric tons, tel quel

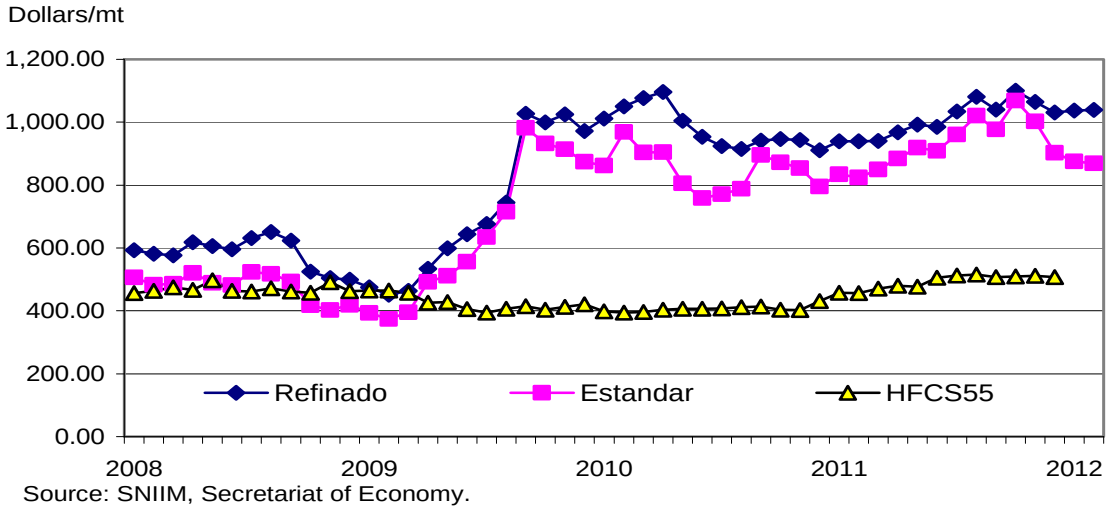


Source: CNDSCA.

[1]Estimated HFCS consumption in Mexico is based on data collected in Mexico. At the ERS Sugar and Sweetener Briefing Room site (www.ers.usda.gov/briefing/data.htm) Table 34a reports U.S. Census Bureau estimates of HFCS exported to Mexico, and Table 35a reports *Economia* estimates of HFCS imported from the United States. For 2011 *Economia* estimates that HFCS imports from the United States totaled 1,198,120 mt, dry weight (sum of HFCS 42, HFCS 55, and crystalline fructose), whereas the U.S. Census Bureau estimates corresponding U.S. HFCS exports to Mexico at 958,037 mt, dry weight. The difference between the two estimates is large: 240,083 mt, dry weight, or about 20 percent of the Mexico import total from the United States. It is usually the case that import data is more reliable than export data; however, without further information in this specific case, one cannot be certain. The implications of these data discrepancies will be further analyzed in next month's *Sugar and Sweetener Outlook*.

Figure 3

Mexico sweetener values: wholesale sugar prices in Mexico City and high fructose corn syrup unit import values, 2008-2012



Source: SNIIM, Secretariat of Economy.

U.S. Sugar

The USDA revised estimates of FY 2011 sugar imports (table 3) and import projections for FY 2012 (table 4). The FY 2011 import revisions were made: for imports from Mexico – 1.708 million short tons, raw value (STRV), an increase of 2,355 STRV; for re-export program imports – 291,113 STRV, an increase of 9,651 STRV; and for high-tier tariff imports – 18,390 STRV, a decrease of 446 STRV. Total FY 2011 sugar imports are estimated at 3.738 million STRV. For FY 2012, projected imports from Mexico are increased to 1.115 million STRV (per the discussion above) and imports for the re-export program imports are increased to 500,000 STRV, based on updated information from reliable sources. Total FY 2012 imports are projected at 3.200 million STRV.

The USDA increased its projection of FY 2012 Florida cane sugar production by 30,000 STRV to 1.790 million STRV. This increase was based on revised Florida sugarcane processors' forecasts published in the latest edition of *Sugar Market Data* (SMD) and also on revised sugarcane data published by the National Agricultural Statistics Service (NASS) in the March 2012 *Crop Report*. NASS increased its forecast of area harvested for sugar by 3,000 acres to 382,000 acres, and its forecast of sugarcane yield to 37.1 STRV per acre from 35.5 STRV in February. Total sugarcane production for sugar is forecast at 14.172 million STRV. Implied sucrose recovery is 12.63 percent and sugar yield is 4.69 STRV per acre. These forecast parameters are the highest since FY 2004.

The USDA increased its projection of deliveries for human consumption by 210,000 STRV to 11.185 million STRV. This increase largely reverses the 250,000 STRV decrease in deliveries made in the February WASDE. The change in the March WASDE was made because of revised data from the most recent SMD. Direct consumption imports by SMD non-reporters were increased by 36,919 STRV for October 2011, by 18,600 STRV for November 2011, and by 19,683 STRV for December 2011. These increases sum to 75,202 STRV.

A model-based forecast of the 8 remaining months of FY 2012 and annual totals are shown in table 5. This ERS model is based on SMD and projects total deliveries for human consumption at 11.187 million STRV. Projected deliveries by domestic sugarbeet processors and cane sugar refiners sum to 10.082 million STRV -- 61,000 STRV less than in FY 2011. Direct consumption imports by SMD non-reporters are forecast at a record 1.105 million STRV, an increase of 138,644 STRV above last year. The implication is that imports by non-reporters will have to

average 95,650 STRV a month for the next 8 months in order to reach the forecast. This would seem to be a challenge, especially given the current forecast sugar export potential in Mexico.[2]

Forecast ending stocks are the difference between forecasts of total supply and total use. The March 2012 WASDE forecast is 1.047 million STRV, implying an ending stocks-to-use ratio of 9.0 percent.

[2] The SMD remains the official source of sugar delivery data for the WASDE. However, the reliability of individual monthly delivery estimates in the SMD has been questioned many times in the Sugar and Sweeteners Outlook. Differences in the timing of reporting imports by the U.S. Customs Service and by cane sugar refiners, as well as errors in reporting by cane refiners, have led to estimation problems in the past.

Table 3 -- USDA estimate of sugar imports in FY 2011

	Metric tons, raw value	Short tons, raw value
Raw sugar tariff-rate quota (TRQ)	1,520,892	1,676,497
Less shortfall attributable to Mexico 1/	0	0
Less other shortfall (not including waivers)	-83,330	-91,856
Plus FY 2010 TRQ entries in October 2010	32,971	36,344
Less FY 2011 TRQ entries in September 2010	-37,007	-40,793
Less FY 2011 TRQ entries in October 2011	-79,906	-88,081
Plus FY 2012 TRQ entries in September 2011	20,062	22,115
Total raw sugar TRQ	**1,373,682**	**1,514,225**
Refined sugar TRQ		
Allocation to Canada	35,300	38,912
FY 2011 Canada sugar to enter in FY 2012	-25,575	-28,192
Allocation to Mexico	0	0
Less Mexican shortfall 1/	0	0
Global	118,168	130,258
FY 2011 global to enter in FY 2012	-111,078	-122,443
Specialty		
Base	1,656	1,825
Additional	77,111	85,000
August increase	9,072	10,000
Total refined sugar TRQ	**104,654**	**115,361**
CAFTA/DR TRQ		
Entries in Oct.-Dec. 2010	4,411	4,862
Entries in Jan.-Sep. 2011	78,735	86,790
Total entries in FY 2011	**83,146**	**91,653**
Other:		
Singapore, Bahrain, Jordan	**20**	**22**
Less shortfall	**-4**	**-4**
Peru	**2,000**	**2,205**
Less shortfall	**-2,000**	**-2,205**
Total estimate TRQ entries	**1,561,498**	**1,721,257**
Mexico	**1,549,045**	1,707,530
Re-export program imports	**264,093**	291,113
Sugar syrups, high-tier	**16,683**	**18,390**
Total projected imports	**3,391,319**	**3,738,289**

1/ Total entries from Mexico, quota and non-quota, reflected below.
Source: USDA, FAS.

Table 4 -- USDA estimate of sugar imports in FY 2012

	Metric tons, raw value	Short tons, raw value
Raw sugar tariff-rate quota (TRQ)	1,117,195	1,231,497
Less shortfall attributable to Mexico 1/		
Less other shortfall	-120,000	-132,277
Plus FY 2011 TRQ entries in Oct. and Nov. 2011	79,906	88,081
Less FY 2012 TRQ entries in September 2011	-20,062	-22,115
Total raw sugar TRQ	**1,057,039**	**1,165,186**
Refined sugar TRQ		
Allocation to Canada	12,050	13,283
FY 2011 Canada sugar to enter FY 2012	17,535	19,329
Allocation to Mexico		
Less Mexican shortfall 1/		
Global	8,294	9,143
FY 2011 global sugar to enter FY 2012	111,078	122,443
Specialty		
Base	1,656	1,825
Additional	90,718	100,000
Total refined sugar TRQ	**241,331**	**266,022**
CAFTA/DR TRQ - calendar 2012	**116,820**	**128,772**
CAFTA/DR FY 2011, likely to enter in FY 2012	31,543	34,770
CAFTA/DR FY 2012, forecast to enter in FY 2013	-15,000	-16,535
Other:		
Singapore, Bahrain, Jordan	21	23
Peru	2,000	2,205
Total estimate TRQ entries	**1,433,754**	**1,580,444**
Mexico	**1,011,511**	**1,115,000**
Re-export program imports	**453,592**	**500,000**
Sugar syrups, high-tier	**4,536**	**5,000**
Total projected imports	**2,903,394**	**3,200,444**

1/ Total entries from Mexico, quota and non-quota, reflected below.
Source: USDA, FAS.

Table 5 -- Projection model of U.S. sugar deliveries for human consumption in FY 2012

Model coefficients

	Symbols	(1) Total deliveries	(II) Beet deliveries	(III) Cane deliveries	(IV) Direct Cons. Imports
Constant	A	785,032	406,140	554,512	Residual = I - (II+III)
Shifter	B	-88,527	0	28,144	
Trend (value in FY 2011)	C	328,113	0	0	
Beet deliveries	D	0	0	-0.2062	
Oct	E	0	0	0	
Nov	F	-94,514	-44,050	-27,121	
Dec	G	-187,438	-83,937	-90,552	
Jan	H	-193,479	-66,079	-104,335	
Feb	I	-204,366	-68,737	-106,859	
Mar	J	-62,386	-23,547	-21,251	
Apr	K	-122,297	-40,884	-63,153	
May	L	-89,506	-19,964	-37,943	
Jun	M	-65,159	0	-20,019	
Jul	N	-75,565	-20,387	-41,019	
Aug	O	0	0	0	
Sept	P	0	0	0	

Model projections of monthly deliveries: total, beet sugar, cane sugar, and direct consumption imports (short tons, raw value).

Delivery months	Formula	(1) Total deliveries	(II) Beet deliveries	(III) Cane deliveries	(IV) Direct Cons. Imports 1/
Oct	A+B+C+D*(II)+E	1,163,411	381,153	524,060	258,198
Nov	A+B+C+D*(II)+F	802,338	361,345	485,687	-44,694
Dec	A+B+C+D*(II)+G	848,337	320,535	430,691	97,111
Jan	A+B+C+D*(II)+H	795,102	351,813	414,483	28,806
Feb	A+B+C+D*(II)+J	820,253	337,403	406,230	76,619
Mar	A+B+C+D*(II)+J	962,233	382,594	482,521	97,118
Apr	A+B+C+D*(II)+K	902,322	365,256	444,194	92,872
May	A+B+C+D*(II)+L	935,113	386,177	465,090	83,846
Jun	A+B+C+D*(II)+M	959,460	406,140	478,897	74,422
Jul	A+B+C+D*(II)+N	949,053	385,754	462,102	101,198
Aug	A+B+C+D*(II)+O	1,024,619	406,140	498,917	119,562
Sept	A+B+C+D*(II)+P	1,024,619	406,140	498,917	119,562
Total projected deliveries	Sum	11,186,858	4,490,450	5,591,789	1,104,619

1/ Calculated as a residual.
Forecast: FY 2012
Source: USDA, ERS, *Sugar and Sweeteners Outlook* .

Table 6 -- U.S. sugar: supply and use, by fiscal year /1

Items	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
						1,000 short tons, raw value						
Beginning stocks 2/	2,216	2,180	1,528	1,670	1,897	1,332	1,698	1,799	1,664	1,534	1,498	1,472
Total production 3/, 4/	8,769	7,900	8,426	8,649	7,876	7,399	8,445	8,152	7,531	7,963	7,831	8,030
Beet sugar	4,680	3,915	4,462	4,692	4,611	4,444	5,008	4,721	4,214	4,575	4,659	4,525
Cane sugar	4,089	3,985	3,964	3,957	3,265	2,955	3,438	3,431	3,317	3,387	3,172	3,505
Florida	2,057	1,980	2,129	2,154	1,693	1,367	1,719	1,645	1,577	1,646	1,433	1,790
Louisiana	1,585	1,580	1,367	1,377	1,157	1,190	1,320	1,446	1,397	1,469	1,411	1,400
Texas	206	174	191	175	158	175	177	158	152	112	146	145
Hawaii	241	251	276	251	258	223	222	182	192	161	182	170
Puerto Rico	0	0	0	0	0	0	0	0	0	0		
Total imports	1,590	1,535	1,730	1,750	2,100	3,443	2,080	2,620	3,082	3,320	3,738	3,200
Tariff-rate quota imports 5/	1,277	1,158	1,210	1,226	1,408	2,588	1,624	1,354	1,370	1,854	1,721	1,580
Other Program Imports	238	296	488	464	500	349	390	565	308	448	291	500
Non-program imports	76	81	32	60	192	506	66	701	1,404	1,017	1,726	1,120
Mexico 6/							60	694	1,402	807	1,708	1,115
Total Supply	12,575	11,615	11,684	12,070	11,873	12,174	12,223	12,571	12,277	12,817	13,067	12,703
Total exports 7/	141	137	142	288	259	203	422	203	136	211	248	250
Quota-exempt for reexport	141	137	142	288	259	203	422	203	136	211	248	250
Other exports	0	0	0	0	0	0						
CCC disposal, for export	0	0	0	0	0	0						
Miscellaneous	123	-24	161	23	94	-67	-132	0	0	-45	10	0
CCC disposal, for domestic non-food use	10	0	0	0	0	0	0	0	0	0	0	0
Refining loss adjustment 7/	0	0	0	0	0	0	0	0	0	0	0	0
Statistical adjustment 8/	113	-24	161	23	94	-67	-132	0	0	-45	10	0
Deliveries for domestic use	10,132	9,974	9,711	9,862	10,188	10,340	10,135	10,704	10,607	11,152	11,337	11,405
Transfer to sugar-cont. products for exports under reexport program	98	156	183	142	121	106	169	141	120	201	196	180
Transfer to polyhydric alcohol, feed	33	33	24	41	48	51	53	61	46	35	31	40
Deliveries for domestic food and beverage use 9/	10,000	9,785	9,504	9,678	10,019	10,184	9,913	10,501	10,441	10,917	11,109	11,185
Total Use	10,396	10,087	10,014	10,172	10,542	10,476	10,424	10,907	10,743	11,319	11,595	11,655
Ending stocks 2/	2,180	1,528	1,670	1,897	1,332	1,698	1,799	1,664	1,534	1,498	1,472	1,048
Privately owned	1,395	1,316										
CCC	784	212										
Stocks-to-use ratio	20.97	15.15	16.68	18.65	12.63	16.21	17.25	15.26	14.28	13.24	12.70	8.99

1/ Fiscal year beginning October 1. 2/ Stocks in hands of primary distributors and CCC. 3/ Historical data are from USDA, Farm Service Agency, Sweetener Market Data (SMD), and National Agricultural Statistics Service, Sugar Market Statistics prior to 1992. 4/ Production reflects processors' projections compiled by the Farm Service Agency.
5/ Actual arrivals under the tariff-rate quota (TRQ) with late entries, early entries, and (TRQ) overfills assigned to the fiscal year in which they actually arrived.
6/ Starting in 2007/08, total includes imports under Mexico's WTO TRQ allocation for raw and refined sugar.
7/ Receipts compiled by NASS and FSA Customs data. 8/ Calculated as a residual. Largely consists of invisible stocks change.
9/ For FY 2008-09, combines SMD deliveries for domestic human use, SMD miscellaneous uses, and the difference between SMD imports and WASDE imports.
Source: USDA, Economic Research Service calculations based on FSA and NASS data.
NOTE: Numbers may not add due to rounding.

Table 7 -- U.S. sugar: supply and use (including Puerto Rico), fiscal years, metric tons 1/

Items	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
	1,000 metric tons, raw value											
Beginning stocks 2/	2,010	1,977	1,386	1,515	1,721	1,208	1,540	1,632	1,510	1,392	1,359	1,336
Total production 3/, 4/	7,955	7,167	7,644	7,846	7,145	6,712	7,662	7,396	6,832	7,224	7,104	7,285
Beet sugar	4,245	3,552	4,048	4,257	4,183	4,032	4,543	4,283	3,822	4,151	4,227	4,105
Cane sugar	3,710	3,615	3,596	3,590	2,962	2,681	3,119	3,113	3,009	3,073	2,877	3,180
Florida	1,866	1,796	1,932	1,954	1,536	1,240	1,559	1,492	1,431	1,493	1,300	1,624
Louisiana	1,438	1,433	1,240	1,249	1,049	1,079	1,198	1,312	1,267	1,332	1,280	1,270
Texas	187	158	173	159	143	159	161	143	138	101	132	132
Hawaii	219	227	251	228	234	202	201	165	174	146	165	154
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0
Total imports	1,443	1,393	1,570	1,588	1,905	3,124	1,887	2,377	2,796	3,012	3,391	2,903
Tariff-rate quota imports 5/	1,158	1,051	1,098	1,113	1,277	2,348	1,473	1,228	1,243	1,682	1,561	1,434
Other Program Imports	216	269	443	421	454	317	354	513	279	407	264	454
Non-program imports	69	73	29	54	174	459	60	636	1,274	923	1,566	1,016
Mexico 6/	0	0	0	0	0	0	54	630	1,272	732	1,549	1,012
Total Supply	11,408	10,537	10,599	10,949	10,771	11,044	11,088	11,404	11,138	11,627	11,854	11,524
Total exports 3/	128	125	129	261	235	184	383	184	123	191	225	227
Quota-exempt for reexport	128	125	129	261	235	184	383	184	123	191	225	227
Other exports	0	0	0	0	0	0	0	0	0	0	0	0
CCC disposal, for export	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	112	-22	146	20	85	-61	-120	0	0	-41	9	0
CCC disposal, for domestic non-food use	9	0	0	0	0	0	0	0	0	0	0	0
Refining loss adjustment 7/	0	0	0	0	0	0	0	0	0	0	0	0
Statistical adjustment 8/	103	-22	146	20	85	-61	-120	0	0	-41	9	0
	0	0	0	0	0	0	0	0	0	0	0	0
Deliveries for domestic use	9,191	9,048	8,810	8,946	9,243	9,381	9,194	9,710	9,623	10,117	10,284	10,346
Transfer to sugar-cont. products for exports under reexport program	89	141	166	129	110	96	153	128	109	183	178	163
Transfer to polyhydric alcohol, feed	30	30	22	38	44	46	48	56	42	31	28	36
Deliveries for domestic food and beverage use 9/	9,072	8,877	8,622	8,780	9,089	9,239	8,993	9,527	9,472	9,903	10,078	10,147
Total Use	9,431	9,151	9,084	9,228	9,563	9,504	9,457	9,895	9,746	10,268	10,519	10,573
Ending stocks 2/	1,977	1,386	1,515	1,721	1,208	1,540	1,632	1,510	1,392	1,359	1,336	951
Privately owned	1,266	1,194	0	0	0	0	0	0	0	0	0	0
CCC	711	192	0	0	0	0	0	0	0	0	0	0
Stocks-to-use ratio	20.97	15.15	16.68	18.65	12.63	16.21	17.25	15.26	14.28	13.24	12.70	8.99

1/ Fiscal year beginning October 1. 2/ Stocks in hands of primary distributors and CCC. 3/ Historical data are from USDA, Farm Service Agency, Sweetener Market Data (SMD), and National Agricultureal Statistics Service, Sugar Market Statistics prior to 1992. 4/ Production reflects processors' projections compiled by the Farm Service Agency. 5/ Actual arrivals under the tariff-rate quota (TRQ) with late entries, early entries, and (TRQ) overfills assigned to the fiscal year in which they actually arrived.
6/ Starting in 2007/08, total includes imports under Mexico's WTO TRQ allocation for raw and refined sugar.
7/ Receipts compiled by NASS and FSA Customs data. 8/ Calculated as a residual. Largely consists of invisible stocks change.
9/ For FY 2008-09, combines SMD deliveries for domestic human use, SMD miscellaneous uses, and the difference between SMD imports and WASDE imports.
Source:USDA, Economic Research Service calculations based on FSA and NASS data.
NOTE: Numbers may not add due to rounding.

High-Intensity Sweeteners

The development of high-intensity sweeteners (HIS) has presented consumers with many viable alternatives to sugar and other caloric sweeteners such as high-fructose syrup. In their Chemical Economic Handbook (CEH), SRI Consulting estimates world consumption of high-intensity sweeteners at nearly 117,000 metric tons (mt) in 2009. Translated to sucrose equivalence, this amount is equal to 17.633 million mt, or 10.2 percent of combined HIS, refined sugar, and high- fructose syrup consumption. Factors promoting the worldwide growth of HIS consumption include increased concerns over health and nutrition, the use of HIS blends to enhance taste in food and beverages, and the use of HIS as sucrose substitutes for cost reduction, especially in developing country regions for cyclamates and saccharin.

End-uses ranked by volume demand are beverages, food manufacturing, tabletop sweeteners, and personal use products and pharmaceuticals. In terms of sucrose equivalence, the most widely used high-intensity sweetener in 2009 was saccharin, at 36 percent of total world HIS demand. Following in volume demand were aspartame (25 percent), cyclamates (10 percent), sucralose (8 percent), Acesulfame K (6 percent), and products derived from stevia (2 percent).

HIS use in the United States in 2009 is estimated at 17,475 mt, or about 15 percent of total world HIS. In terms of sucrose equivalence, consumption in the United States is estimated even higher, at 26 percent. Other regions' sucrose-equivalence shares are China at 21 percent, Western Europe at 16 percent, Latin America at 10 percent, and Other Europe at 5 percent. SRI Consulting estimates HIS world growth through 2014 at 2.9 percent. Especially high growth is expected in Latin America (over 5 percent) and in China. Growth in these regions is due to opportunities for cost containment in manufactured product use. Growth in developed countries (United States, Western Europe, Japan) are below the mean, due mainly to maturity in their respective diet beverage industries.

High-Intensity Sweeteners in the United States

Table A-1 lists high-intensity sweeteners either in use or expected to be in use in the United States, along with their sucrose sweetness equivalence and Federal Drug Administration (FDA) approval status. Prior to 1980, HIS use in the United States was largely limited to saccharin. Cyclamates were banned in 1969 after being linked to cancerous bladder tumors in laboratory rats. (Almost all scientific evidence since then, however, has supported the safety of

Table A-1 -- Relative sweetness intensity (sucrose equivalence) and regulatory status

	Relative sweetness 1/	*Regulatory status*
Acesulfame K	200	Approved
Advantame	20,000	Pending
Alitame	2,000	Approval sought
Aspartame	200	Approved
Cyclamate	30	Pending
Glycyrrhizin	50	Approved for use as flavor enhancer
Neotame	8,000 2/	Approved
Rebaudioside A	200 3/	No FDA objection for use as all-purpose sweetener
Saccharin	300	Approved
Stevioside	200	Approved for use in dietary supplements
Sucralose	600	Approved

1/ Assumes a high concentration of sucrose equivalence; sucrose =1.
2/ When coupled with low concentration of sucrose, equivalence can rise to 13,000
3/ When coupled with low concentration of sucrose, equivalence can rise to between 350 and 400.
Source: SRI Consulting, *Chemical Economic Handbook* .

cyclamates, and FDA approval is pending.) Aspartame was introduced in the 1980s and its share of the HIS market grew rapidly, with its use exceeding that of saccharin by 1987. Acesulfame K and sucralose use began to grow significantly in the late 1990s and early 2000s. More recently, rebaudioside A from the stevia plant has entered into the United States with growing popularity and market share.

Production of high-intensity sweeteners in the United States is limited to aspartame and saccharin. Sucralose production ceased in late 2009 after its manufacturer relocated all its U.S. production to Singapore. In 2009 the United States sourced about 70 percent of its HIS consumption to imports. Except for aspartame and saccharin, there are no uniquely defined U.S. Harmonized Tariff Schedule (HTS) listings for individual high-intensity sweeteners. This complicates the estimation of supply and use of these sweeteners.

Aspartame

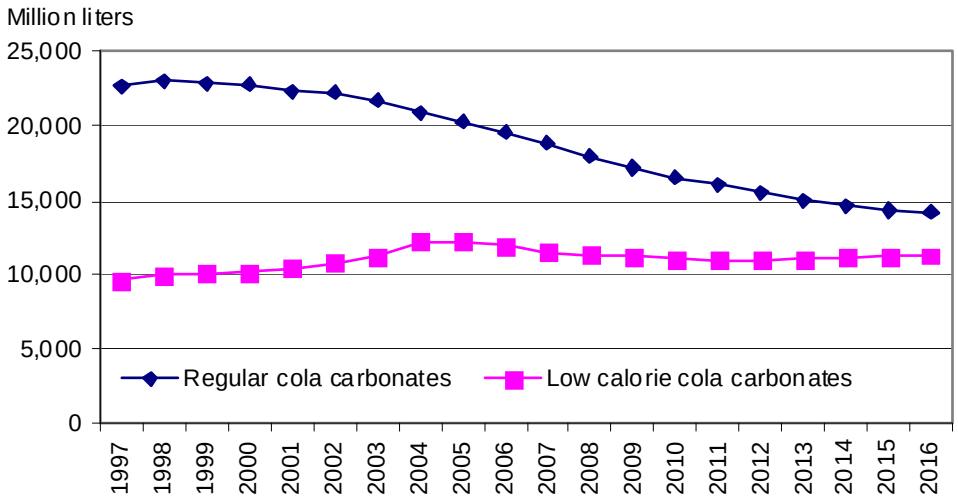
Aspartame is the most widely used high-intensity sweetener in the U.S. market -- its share of the HIS market is about 40 percent. Aspartame gained FDA approval for use in prepared foods and dry beverage mixes and as a tabletop sweetener in 1981. Its growth accelerated rapidly in 1983 with FDA approval for use in carbonated beverages. Approval as a general purpose sweetener came in 1996.

Although aspartame is in wide use, its growth prospects are expected to be only modest for the next few years. Most aspartame, between 85 and 90 percent, is used as a sweetening agent in beverages, mainly diet carbonated soft drinks. Data and projections from Euromonitor International show very weak growth for diet carbonated beverages through 2016 (fig. A-1). In addition, aspartame in carbonated beverages has faced continuing competition from acesulfame K and sucralose. Newly formulated diet beverages are expected to make expanded use of recently introduced rebaudioside A. Nonetheless, strength in residual demand comes from aspartame use in the most popular diet carbonated beverages, Diet Coke and Diet Pepsi.

Other uses for aspartame are for food (mainly confectionery and for chewing gum) and as a tabletop sweetener. Each of these uses constitutes about 5 percent of total use. Tabletop use of the most popular aspartame product (Equal) is less than 10 percent of the total HIS tabletop market. Much market share has been lost to sucralose (Splenda). The tabletop version of rebaudioside A (Truvia) has become a growing part of this market segment.

Figure A-1

Cola carbonated beverages, regular and low calorie, 1997-2016



Source: Euromonitor, 2012-2016 are forecasts.

Saccharin

Saccharin is the oldest of the high-intensity sweeteners. In 1977 the FDA proposed banning saccharin because it was suspected of being a human carcinogen. The U.S. Congress intervened to prevent a ban and FDA withdrew any plans for banning in 1991. In 2000 the FDA removed saccharin from the list of suspected human carcinogens. Demand for saccharin has continued to grow since the ban removal.

About 15 percent of saccharin is used in sweetening beverages. Saccharin, usually in combination with aspartame, is widely used in fountain syrups, or about 20-25 percent of the diet carbonated beverage market. Because of its low cost, saccharin (Sweet 'n Low) retains a strong presence in tabletop uses – demand is particularly strong from food service and institutional customers. Most saccharin is used for non-food purposes. Personal care product uses include toothpaste, mouthwashes, prebrushing products, and cosmetics. Main pharmaceutical uses include sweetening in pill coatings, cough syrups, and vitamins. Saccharin goes into animal feed and tobacco products (chewing tobacco and cigarette wrapping). There are also some industrial uses such as in copper and nickel brighteners, as a catalyst for anaerobic adhesives, and in chrome bumper electroplating.

Acesulfame K

The FDA first approved acesulfame K as a tabletop sweetener and for use in chewing gum and dry beverage mixes in 1988. Subsequent approvals for specific uses followed. The FDA approved acesulfame K as a general purpose sweetener in 2004.

Although acesulfame K constitutes far less than 10 percent of the U.S. high-intensity sweetener market, growth prospects in the next few years are likely to be strong. The key advantage of acesulfame K lies in its synergies with other high-intensity sweeteners. It contributes to taste intensification and adds a more "sugar-like" taste to the other sweeteners. It also reduces the amount needed of other sweeteners used in combination with it and promotes longer shelf life for products that contain it. In beverages, acesulfame K is almost always used as a blend, typically with aspartame.

Sucralose

Sucralose is the only high-intensity sweetener based on sucrose. It is stable in heated environments, is soluble in water, and has a clean, sugar-like taste profile. The FDA approved sucralose for 15 food and beverage uses in 1998, including, among others, for baked goods and mixes, beverages, dairy products, tabletop use, and processed fruits. In 1999, the FDA approved sucralose for general purpose use.

Sucralose constituted about 16 percent of the U.S. HIS market in 2009. Its growth is expected to be high, almost 5 percent annually, through the next few years. A little over a third of sucralose is used in beverages, either alone or in combination with acesulfame K. These beverages include colas, flavored waters, Ready-to-Drink (RTD) teas, and sports and energy drinks. Increased beverage prospects are expected to come from the introduction of new diet beverages.

About a third of sucralose is used as a tabletop sweetener (Splenda). Growth is expected to be high in the next few years, about 4.5 percent. Sucralose will continue to gain market share from aspartame but is likely to face strong competition from tabletop stevia (Truvia). Food uses constitute less than a third of sucralose consumption.

Rebaudioside A

Rebaudioside A is naturally derived from the leaves of the stevia rebaudiana shrub. The leaves are ground and processed by hot water extraction, filtration, and purification. The FDA in 2008 issued a letter to Cargill stating that it had no objection to the sweetener being regarded as generally safe in all uses. Although Rebaudioside A was

estimated to constitute only about 1 percent of the U.S. HIS market in 2009, annual consumption growth over the next 5 years was expected to be about 13.5 percent.

Perceived advantages of rebaudioside A use are that it is better tasting than other high-intensity sweeteners and can be promoted as a natural sweetener, an especially valuable trait in a range of new "better-for-you" products. Rebaudioside A is expected to be used in noncarbonated beverages, especially juices, sport drinks, and flavored waters. Rebaudioside A is also very appropriate for use in ice cream, yogurt, soy sauce, candies, and chewing gum.

Other High-intensity Sweeteners

Neotame and glycyrrhizin are important alternative sweeteners. Together they constitute about 3.5 percent of the U.S. HIS market and are expected to grow almost 3 percent annually through 2014. Neotame, which is about 8,000 times as sweet as sucrose, received FDA general purpose approval in 2002. It is mainly used in carbonated beverages and chewing gum.

Glycyrrhizin has a much lower sweetener intensity than neotame. It has received FDA approval only as a flavor enhancer (a natural flavoring agent). Glycyrrhizin is used mainly in tobacco and pharmaceuticals and is noted for its strong licorice aftertaste.

Consumption Trends and Sweetener Pricing

Concerns about health and nutrition effects of sweetener use are likely to continue over the medium-term. Euromonitor International documents the trend in reduced-sugar health and wellness foods. Figure A-2 shows the annual cumulative sales of various categories of these foods and beverages since 2002. As seen in figure A-3, average annual cumulative growth rates were especially high during 2003-07. With the exception of 2010, growth has stabilized and is projected to continue in about the 3.5- to 4.0-percent range. Projected annual growth rates from 2012 through 2015 average: 3.4 percent for reduced-sugar beverages, 4.9 percent for reduced-sugar confectionery, 3.8 percent for reduced-sugar bakery products, and 3.2 percent for reduced-sugar ice cream. Makers of many other food and beverage products besides "better-for-you" items are likely to turn to alternatives to added sugars as a way of increasing sales.

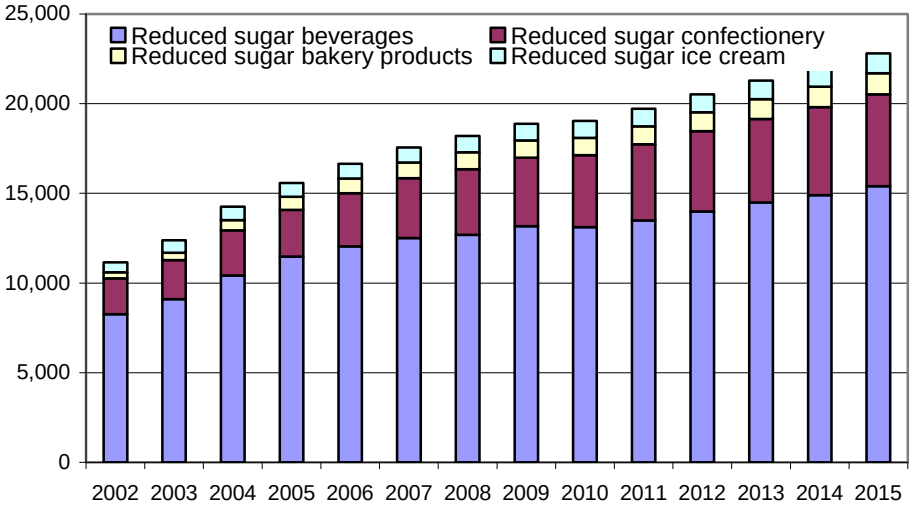
Also important for future sales of reduced-calorie food and beverage products are prices of high-intensity sweeteners. Figure A-4 shows sucrose-equivalent HIS pricing relative to refined sugar for 2003, 2006, and 2009. All relative HIS prices have been declining except for saccharin, whose price is already the lowest of all sweeteners. The largest decrease is for sucralose, the sweetener whose growth has been the greatest during the 2000s. The drop in sucralose pricing has coincided with increased imports and the phase-out of domestic production.

Lower wholesale ingredient prices do not necessarily translate into lower product prices. Other ingredient, marketing, and packaging costs, along with what consumers are willing to pay, are important. Table A-2 shows the pricing of alternative tabletop sweeteners for sweetening a single cup of coffee or tea. The saccharin-based sweetener is the lowest cost alternative, followed closely by sugar. The price of the aspartame-based product, whose market share has been declining, is ranked third. The sucralose-based product, the fastest growing in sales, has a unit price more than twice the cost of either saccharin or sugar. The stevia-based product, the newest tabletop sweetener, has a unit price almost twice as high as sucralose; there may be a premium associated with a product that is considered more "natural."

Figure A-2

Reduced sugar health and wellness foods, 2002-15

Million Dollars

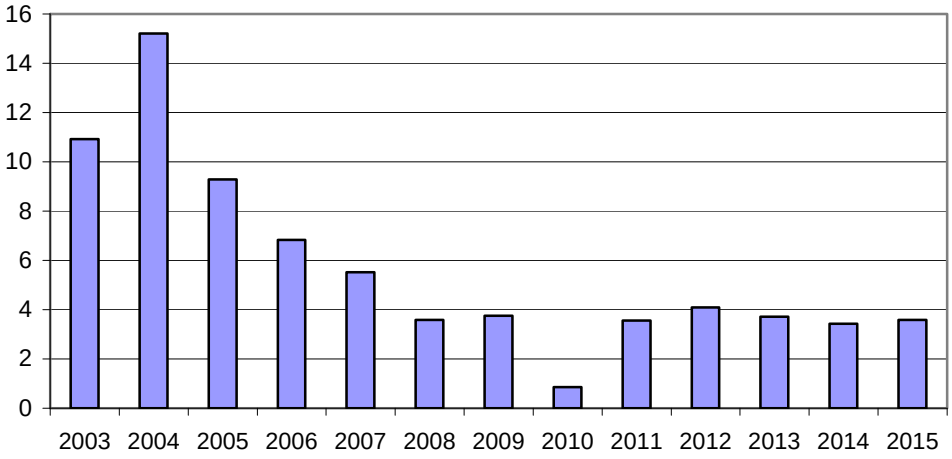


Source: Euromonitor. 2012-2015 are forecasts.

Figure A-3

Reduced-sugar health and wellness beverages and food year-over-year growth, estimated and projected, 2003-15

Percent

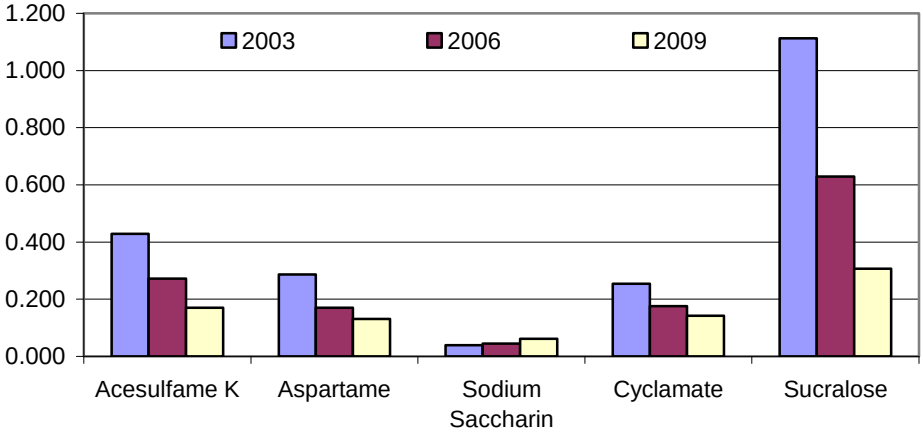


Source: Euromonitor, 2012-2015 are forecasts.

Figure A-4

High-intensity sweetener (HIS) sucrose-equivalent list pricing relative to wholesale price of refined beet sugar

HIS proportion relative to sugar price



Source:USDA, ERS, *Sugar and Sweeteners Outlook,* calculations based on data from *SRI Consulting* and *Milling and Baking News.*

Table A-2 -- Comparison of cost of sweetening 1 cup of coffee/tea from various alternative sweeteners

Sweetener	Cost of 1 sweetener packet for individual cup of coffee or tea	Retail cost per ounce
	Dollars	
Saccharin (Sweet 'n Low)	0.0200	0.5703
Sugar (Domino)	0.0239	0.1912
Aspartame (Equal)	0.0365	1.0414
Sucralose (Splenda)	0.0549	1.5686
Rebaudioside A (Truvia)	0.1073	1.2618

Source: USDA, Economic Resource Service, estimates made based on data acquired at: www.giantfood.com (February 2012).

Estimated and Projected HIS Use through 2014

Growth in the use of high-intensity sweeteners has been high since 2002. Total sucrose-equivalent HIS use in 2002 is estimated at 3.799 million mt. Total use expanded to 4.052 million mt in 2006, implying annual growth of 1.63 percent. Total use for 2009 is estimated at 4.632 million mt, implying a large annual growth rate of 4.55 percent. Use in 2014 is projected at 5.117 million mt, implying more muted annual growth of 2.01 percent. The rapid expansion in the availability of sucralose in the mid-2000s was the major factor in increased HIS use.

Figure A-5 shows these use data by product sector use. Over the period 2003-09, the beverage industry has been responsible for about 51 percent of total HIS use, followed by "other industry" (mainly pharmaceutical and personal care product firms) at 25 percent, tabletop sweeteners at 14 percent, and food manufacturers at 10 percent. Although

the beverage and "other industry" segments are projected to still be the largest users in 2014, the shares of each should decline. The beverage industry's share is projected to decrease to 47.5 percent from its 2006 high of 52.6 percent. The "other industry" share decreases to 22.4 percent from its 2002 high of 26.5 percent. The food industry share increases from 9.2 percent in 2002 to a projected 13.5-percent share in 2014, a 47-percent increase. The tabletop sweetener share increases from 12.8 percent in 2002 to a projected 16.6 percent in 2014, a 29.5-percent increase.

Figure A-6 shows the estimated and projected component shares of high-intensity sweeteners in beverages. Although aspartame is the chief high-intensity sweetener for beverages, its use is projected to decline to 69.1 percent in 2014. The relative decline in aspartame use mirrors the consumption decline in diet carbonated beverages in favor of RTD coffees and teas, flavored waters, and sports drinks. Also, the introduction of new products within these emerging categories tends to result from the availability of the newer sweeteners like sucralose and rebaudioside A. This mechanism of new product generation, in turn, increases the demand for these new sweeteners.

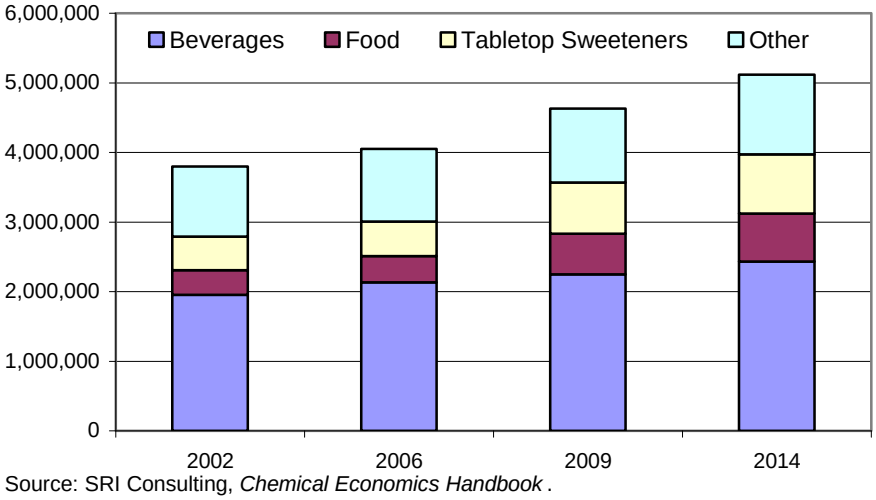
HIS use in food is expected to increase to almost 700,000 sucrose-equivalent mt in 2014. As figure A-7 shows, this growth is fueled by the expanded availability of sucralose and the combination of rebaudioside A and neotame. These sweeteners together are projected to constitute 58.4 percent of HIS food demand. The relative use of aspartame use decreases markedly to just 16.5 percent in 2014.

HIS tabletop use is projected to be about 850,000 sucrose-equivalent mt in 2014, up from less than 500,000 mt in 2002 (fig. A-8). As with food use, sucralose and rebaudioside A are the large gainers in tabletop use. Due to its lower cost, tabletop saccharin still retains the highest market share, although this is estimated at 43.4 percent in 2014 compared with a 68.0-percent share in 2006.

Figure A-5

Total high-intensity sweetener (HIS) use, by type of use: 2002, 2006, 2009, and 2014 (projected)

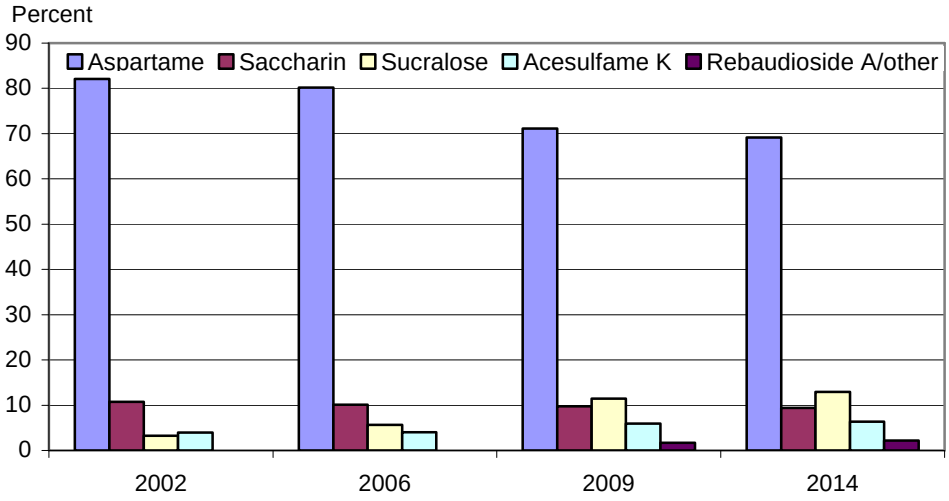
Sucrose - equivalent tons



Source: SRI Consulting, *Chemical Economics Handbook* .

Figure A-6

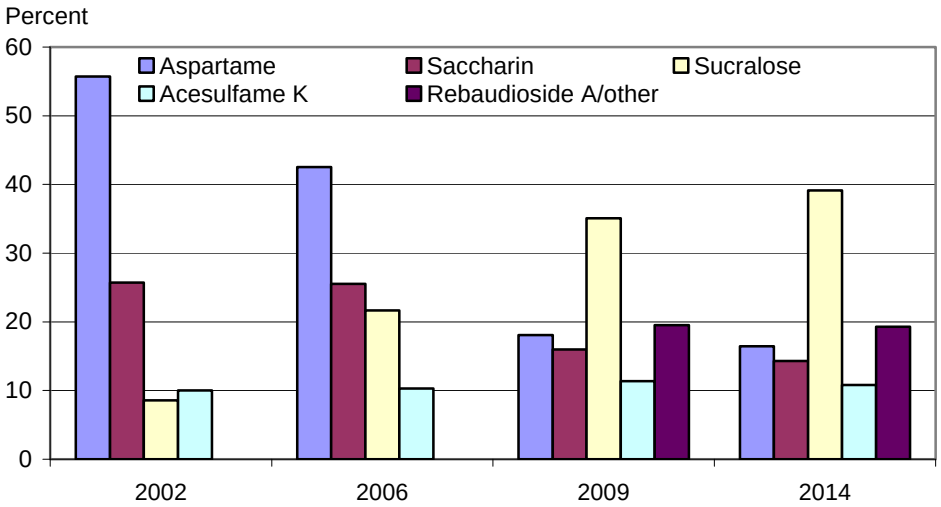
Share of high-intensity sweeteners in beverage use, estimated and projected, 2002-14



Source: SRI Consulting, *Chemical Economics Handbook.*

Figure A-7

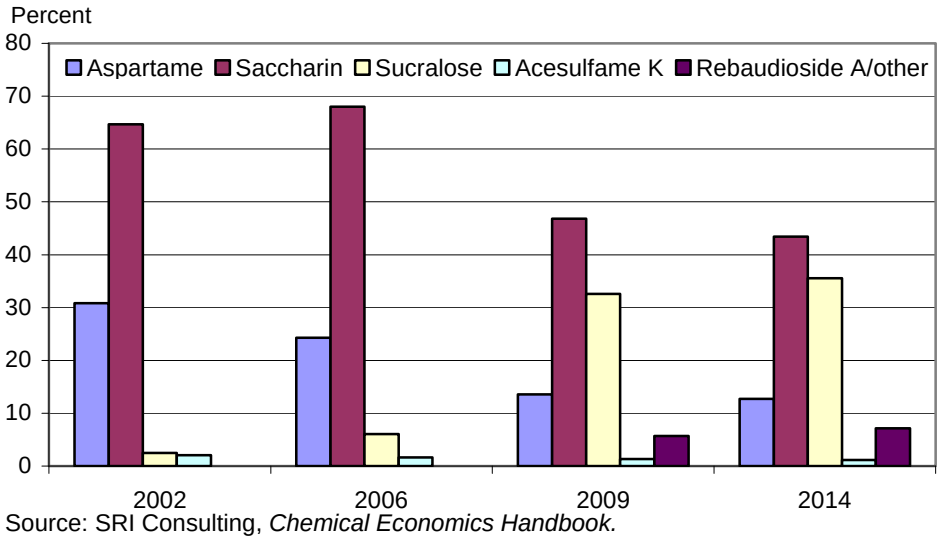
Share of high-intensity sweeteners in food use, estimated and projected, 2002-14



Source: SRI Consulting, *Chemical Economics Handbook.*

Figure A-8

Share of high-intensity sweeteners in tabletop use, estimated and projected, 2002-14



Source: SRI Consulting, *Chemical Economics Handbook.*

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Data

Tables from the *Sugar and Sweeteners Yearbook* are available in the Sugar and Sweeteners Briefing Room at http://www.ers.usda.gov/briefing/sugar/. They contain the latest data and historical information on the production, use, prices, imports, and exports of sugar and sweeteners.

Related Websites

Sugar and Sweeteners Outlook http://www.ers.usda.gov/Publications/SSS/
WASDE http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documented=1194
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