



# Changing the Conversation about High Fructose Corn Syrup

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## Foreword

*Audrae Erickson, President, Corn Refiners Association*



Products made from corn have been an integral part of the story of America since its inception. Thanks to the extraordinary productivity and ingenuity of American corn farmers and refiners, innovative ingredients from the corn refining industry enrich people's lives in a myriad of ways. From the grocery store to the pharmacy, the home improvement store to automobile gas tanks, refined corn products make a positive difference in the fabric of American lifestyles.

This has been a year of heightened activity at the Corn Refiners Association as we strive to provide Americans with accurate information about refined corn products, particularly sweeteners made from corn, often in the face of misleading claims that lack scientific merit.

Our industry launched a nationwide multimedia campaign to correct the record on high fructose corn syrup by addressing mischaracterizations and misinformation in the public domain. The campaign, grounded in science-based facts and buttressed by credible outside experts, puts forward an irrefutable message: that high fructose corn syrup and sugar are nutritionally the same. The 2008 *Corn Annual* focuses on our efforts to change the conversation about high fructose corn syrup and serves as a commemorative review of this extraordinary campaign.

We are honored to feature a statement from U.S. Department of Agriculture Secretary Ed Schafer, noting the importance of high fructose corn syrup in the American diet and how it is no different metabolically than table sugar.

As Corn Refiners Association Chairman Tim Kortemeyer indicates in the Year in Review, our industry addressed a number of critical topics and achieved notable accomplishments this past year.

Ours is a resilient industry, standing the test of time in providing high quality ingredients to the American public through the food, animal feed, and industrial sectors. We are mindful of this important distinction as our association nears its 100 year mark of service.

In short, we are proud of the successes of our industry and the valuable role it plays in improving the lives of Americans.

## U.S. CORN REFINING INDUSTRY AT A GLANCE — 2007

<b>Corn Refining Plants</b>	27
<b>Location:</b>	12 states
<b>Corn Grind:</b>	1.5 billion bushels
<b>Value of Corn Purchased:</b>	\$5.1 billion
<b>Number of Corn Suppliers:</b>	41,000
<b>Employment by CRA Member Companies:</b>	65,300*
<b>Capital Investment (Replacement Value):</b>	\$14.8 billion
<b>Major Products (estimated)</b>	
<b>Sweeteners (dry weight):</b>	24.1 billion pounds
<b>Starches:</b>	7.0 billion pounds
<b>Ethanol:</b>	1.2 billion gallons
<b>Co-products:</b>	27.4 billion pounds
<b>Value Added by Manufacture:</b>	\$6.8 billion

\*Includes employees that provide services in non-corn refining areas.

Compiled by the Corn Refiners Association based on 2007 data from the U.S. Department of Agriculture, LMC Commodity Studies, Renewable Fuels Association and industry data compiled for CRA by Veris Consulting, LLC.

## Perspective Makes the Difference

*Ed Schafer, Secretary, U.S. Department of Agriculture*



Truly amazing research results have advanced American farming and food production for generations. The consuming public enjoys the results of abundance, safety, quality and affordability of food from the farm. Productivity advanced by USDA's Agricultural Research Service has kept American producers competitive, America secure in food supplies, and a hungry world able to rely on American citizens to respond.

Corn yield in the United States has quadrupled from 38 bushels per acre to 151 bushels — in the span of just over 50 years. In advancement of quality, USDA developed the “Stiff Stalk Synthetic” corn variety that is the foundation of at least half of the gene pool of U.S. Midwestern “Corn Belt Dent,” the most productive race of corn in the world, valued at billions of dollars.

In the abundance of quantity and quality, there is also a quandary. The consuming public is trying to digest a great deal of information about what new advancements in food production mean to their health. Complex issues such as obesity cannot be oversimplified by focusing on just one aspect. What we eat and who we are have as many variables as the variety of food and the individual metabolism of our bodies shaped by family history, diet or personal exercise.

The public is looking for perspective. USDA research is providing the context.

In March, USDA's Agricultural Research Service and the non-profit International Life Sciences Institute co-sponsored a workshop to address the state of the science on dietary sweeteners containing fructose. A related

issue is that the name high fructose corn syrup implies this sweetener is unusually high in fructose, but this is not the case since it is about half fructose, just like table sugar.

During the USDA workshop, university, and private industry scientists who have studied the effects of fructose and other sugars on health, concluded that high fructose corn syrup is no different metabolically than table sugar. Details will be published soon in the *Journal of Nutrition*.

High fructose corn syrup is a familiar ingredient in our foods because it works well in food and beverage production and lends texture and browning ability to baked goods. USDA scientists were the first to report a technique adopted by industry for the production of high fructose corn syrup.

USDA scientists also developed a cholesterol lowering oil from corn fiber, now licensed to a major agricultural company for further development.

And USDA scientists were behind one of the most commercially successful cornstarch products ever, “Super Slurper” a superabsorbent polymer able to absorb hundreds of times its own weight in water. It is used in disposable diapers, fuel filters, bandages, and baby powder. It's also used as a seed coating that accelerates germination, to remove water from fuels, dry out waterlogged books and to clean up chemical spills.

Many other new technologies developed by our scientists have been adapted by industry for creating hundreds of new products. Public agricultural research solves problems like helping farmers deal with pests and diseases and addresses broad national goals like improving our energy security by developing biofuels crops and new technologies.

Recently, in partnership with the University of Illinois, USDA researchers developed a new enzymatic wet milling process for ethanol production. This new process avoids the use of sulfites as a processing aid and produces higher yields of starch, lowering the overall production costs for making ethanol. One of the world's largest enzyme companies has licensed this technology.

Had we not advanced the yield production of corn four times above its 1950 levels, the only way we would be able to meet today's demand for corn would be to use every bit of our available 340 million acres farmed in the United States to the exclusion of absolutely anything else that could be planted. Instead, we use just 86.6 million acres to meet corn demands for food, feed, and fuel and still have more than enough to sell for exports worldwide.

Advancement from research leads to acceptance when the public has the benefit of perspective and can judge the benefits and the results. Without development of corn sweeteners, new technologies in corn starch, processes for wet milling — to name but a few — our modern day lives might not seem so modern these days. Now, that's perspective.

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## WORLD CORN PRODUCTION, CONSUMPTION AND STOCKS

	2006/07	2007/08
	(thousand metric tons)	
<b>Production</b>		
Argentina	22,500	20,500
Brazil	51,000	58,600
Canada	8,990	11,650
Peoples Republic of China	151,600	151,830
Egypt	6,149	6,174
EU-27	53,829	47,314
India	15,100	19,310
Indonesia	6,700	7,500
Mexico	22,350	22,650
Nigeria	7,800	6,500
Philippines	6,231	7,250
Russian Federation	3,600	3,950
Serbia	6,415	4,054
Republic of South Africa	7,300	12,500
Ukraine	6,400	7,400
Others	68,671	70,966
United States	267,598	332,092
<b>World Total</b>	<b>712,233</b>	<b>790,240</b>
<b>Total Consumption</b>		
Argentina	6,700	6,500
Brazil	41,000	42,500
Canada	11,436	13,800
Peoples Republic of China	145,000	149,000
Egypt	10,700	10,400
EU-27	62,300	61,500
India	13,900	16,900
Indonesia	7,900	7,700
Japan	16,500	16,500
Republic of Korea	8,833	9,100
Mexico	30,700	32,000
Nigeria	7,600	6,550
Philippines	6,550	7,150
Republic of South Africa	8,600	9,600
Vietnam	4,900	5,300
Others	111,949	115,525
United States	230,769	264,044
<b>World Total</b>	<b>728,313</b>	<b>775,324</b>
<b>Ending Stocks</b>		
Brazil	3,592	11,442
Peoples Republic of China	36,602	38,882
EU-27	7,382	5,696
Iran	2,247	2,347
Republic of Korea	1,352	1,436
Mexico	3,084	2,834
Republic of South Africa	1,661	3,261
Others	19,508	17,539
United States	33,114	40,021
<b>World Total</b>	<b>108,542</b>	<b>123,458</b>

Source: USDA—Foreign Agricultural Service.  
Based on local marketing years in thousand metric tons.

## Year in Review

*Timothy Kortemeyer, Chairman, Corn Refiners Association  
President, Penford Products Co.*



Despite domestic economic headwinds, the corn refining industry maintained its vital role in the U.S. economy, shipping approximately 58 billion pounds of food, feed and industrial

products in 2007, equivalent to its production in 2006. And, the industry turned in a record year in the export market, providing the world with over \$1.8 billion of refined corn products, a twenty-three percent increase over the previous record.

It has been my pleasure to serve as Chairman of the Corn Refiners Association during 2008 and to work with CRA's members and staff on numerous challenging issues during the year. In this issue of the *Corn Annual*, I would like to highlight the most prominent of these activities.

### Changing the Conversation about High Fructose Corn Syrup

Obesity has become an increasingly politicized subject in recent years, as concern about this important issue has grown among the American public. Researchers, doctors and government officials are searching for solutions to the problem. The critical importance of their efforts and the urgent need to find viable solutions are self-evident. Unfortunately, attempts by some to single out for blame one ingredient in our nation's food supply, like high fructose corn syrup, only serve to confuse or even mislead the public and delay efforts to find measures with tangible results. An increasing body of evidence continues to point to the unassailable role of calories consumed and energy expended as a critical factor affecting obesity conditions. It is important to note that both high fructose corn syrup and sugar contain the same number of calories — four per gram.

After a lengthy study of the issue, the American Medical Association (AMA) concluded that “high fructose syrup does not appear to contribute to obesity more than other caloric sweeteners.” The AMA further noted that “[b]ecause the composition of HFCS and sucrose are so similar, particularly on absorption by the body, it appears unlikely that HFCS contributes more to obesity or other conditions than sucrose.” This finding by the nation's leading body of physicians provides powerful, independent corroboration of the science behind high fructose corn syrup and its parity with sugar.

On the heels of the AMA's announcement, the U.S. Food and Drug Administration (FDA) issued a critical clarification indicating that high fructose corn syrup meets the FDA's requirements for the use of the term natural. High fructose corn syrup contains no artificial or synthetic ingredients or color additives and is made from corn, a natural grain product. The FDA, referring to a production process commonly used by the high fructose corn syrup industry, stated that it “would not object to the use of the term ‘natural’ on a product containing high fructose corn syrup produced by [that] manufacturing process....”

In an effort to build upon these and other notable, independent findings, and to correct misinformation at all levels in the public domain, we have fortified our media monitoring system, expanding its scope to provide science-based information to the nation's opinion leaders, health professionals, nutritionists, journalists and most importantly consumers.

A commitment to daily rapid response efforts, immediately correcting the record when high fructose corn syrup is mischaracterized, serves as a central component of our efforts.

Another cornerstone of our campaign is two information-rich websites that provide useful

facts for consumers and opinion leaders. These websites, [www.SweetSurprise.com](http://www.SweetSurprise.com) and [www.HFCSfacts.com](http://www.HFCSfacts.com), house scores of science-based sources containing information that will enable consumers and health professionals to get the facts about high fructose corn syrup. They also highlight the reason why our versatile sweetener made from corn can be found in many of the foods and beverages that Americans enjoy every day. It is because high fructose corn syrup retains moisture in bran cereals, lends chewy features to breakfast bars, enhances fruit flavors in yogurts and spice flavors in sauces and marinades, maintains product freshness in condiments, gives a golden brown appearance to baked goods, and makes many healthy foods palatable that our product has become an important ingredient in our nation's food supply.

Our efforts to educate the public and key constituencies about high fructose corn syrup have been informed by the extensive research we have conducted into consumer attitudes and impressions concerning obesity and corn sweeteners. This research provided a solid foundation on which to construct our multi-media campaign.

As the section "Changing the Conversation about High Fructose Corn Syrup Campaign" in this *Corn Annual* indicates, significant

efforts are underway to reach hundreds of thousands of dietitians, doctors, school nutritionists, pediatricians and other health professionals who regularly address obesity issues, as well as key opinion leaders who help shape public understanding of these topics. These efforts are aimed at disseminating the results of recent peer-reviewed research and credible third-party findings about high fructose corn syrup.

### Opening the Mexican Border to Two-way Trade in Sweeteners

During the 2008 Farm Bill negotiations, our industry worked diligently to defeat a proposal to manage sweetener trade with Mexico that would have derailed the important North American Free Trade Agreement (NAFTA) milestone achieved just this year: an open border for all goods, including sweeteners. This open border provides North American consumers more choices and higher quality products at competitive prices and is strongly supported by our industry.

Our efforts, along with those by many other agricultural sectors, prevailed in the Farm Bill debate. Defeat of the managed trade proposal was endorsed by legislative leaders in both the House and Senate and the U.S. and Mexican governments. And it served as an

## SHIPMENTS OF PRODUCTS OF THE CORN REFINING INDUSTRY – 2007

<b>Starch Products</b> (includes corn starch, modified starch and dextrins)	6,472,866,000
<b>Refinery Products</b> (includes glucose syrup, high fructose syrup, dextrose, corn syrup solids, maltodextrins)	32,465,048,000
High Fructose Corn Syrup 42%	10,016,775,000
High Fructose Corn Syrup 55% & Above	12,678,028,000
Total High Fructose Corn Syrup	22,694,803,000
<b>Total — Domestic Basic Products</b>	38,937,914,000
<b>Total — Export Basic Products</b>	2,936,968,000
<b>Corn Oil — Crude and Refined</b>	1,209,505,000
<b>Corn Gluten Feed and Corn Oil Meal</b>	10,696,660,000
<b>Corn Gluten Meal</b>	2,387,354,000
<b>Steepwater</b>	1,413,583,000

Compiled for the Corn Refiners Association by VERIS Consulting, LLC. Statistics represent shipments by members of the Association. Shipments are in pounds, commercial weights, and do not include co-products derived from ethanol production.

important victory culminating the longstanding dispute with Mexico that, over more than ten years, restricted and eliminated shipments of high fructose corn syrup to that market. Consumers on both sides of the border now benefit under the open trade regime with Mexico as promised by the NAFTA.

### Opening Markets for Refined Corn Products through Trade Agreements

Our industry strongly supports the administration's trade agenda because it opens markets for American industries and workers. As a result, the CRA urged the House and Senate to move forward with a constructive trade agenda, including the passage of the Colombia Trade Promotion Agreement and similar deals for Panama and Korea. We have also supported administration efforts to achieve a breakthrough in the Doha Round of negotiations at the World Trade Organization.

These bilateral agreements lift duties on corn wet milled products by reducing tariffs to zero over the life of the agreements and eliminating many of the trade barriers that now block our products. These treaties, once adopted, will promote American ingenuity by increasing U.S. exports, including refined corn products shipments to markets where they are expected to achieve strong footholds.

### Adopting Global Policies Favoring Biotechnology

The market for U.S. corn gluten feed in the European Union has been severely curtailed for several years due to the continued slow pace of European action on applications for new crop varieties and the lack of science-based tolerances for the presence of low levels of biotechnology varieties in the European approval pipeline. Benefits to European farmers and consumers, and American industries and workers, are not realized when European policies stand in the way of technological achievements like biotechnology.

The CRA has worked diligently with its customers and allies in Europe to seek improvements in the European regulatory system

and has participated in numerous coalitions to highlight the importance of science-based decisions in matters concerning biotechnology globally.

### Working to Improve Scientific Principles in Environmental Policy

Notable among our successes was the official implementation of a test method for the corn wet milling industry that improves upon previous requirements to capture volatile organic compounds (VOC). This new method provides a systematic approach to develop a specific list of target organic compounds and the scientifically robust methods to measure those target compounds during subsequent VOC emissions testing.

In addition, collaborative efforts with EPA to further strengthen an air quality modeling tool, known as AERMOD, will better serve the nation's environmental goals in determining the change in ambient concentrations of pollutants.

We take pride in our industry's strong working relationship with the EPA on matters of environmental importance to our country. We look forward to continued opportunities to work collaboratively with the nation's environmental leaders to improve the quality of life for Americans based on sound scientific principles.

### Ninety-Five Years of Industry Service

As these snapshots illustrate, it has been a busy and productive year for the Corn Refiners Association. The Association provides valuable services to its members in many areas of congressional and regulatory affairs, international trade, food safety, and technical matters.

In only five years, the Association will celebrate its 100th year of service to the U.S. corn refining industry. On behalf of the CRA Board, I am honored to serve as Chairman of this respected and effective Association. We hope you enjoy this year's annual report.

## “Changing the Conversation about High Fructose Corn Syrup” Campaign

This summer, the Corn Refiners Association launched a multi-media advertising and public relations campaign “Changing the Conversation about High Fructose Corn Syrup”—a nutritional and versatile food ingredient that has been the subject of considerable attention and misinformation in recent years.

The goal of the campaign is to dispel myths and correct inaccuracies associated with this versatile sweetener and highlight the important role high fructose corn syrup plays in our nation’s foods and beverages. The campaign provides science-based information to consumers to enable them to make informed decisions about their food choices.

### Consumer Awareness of High Fructose Corn Syrup

A recent national survey<sup>1</sup> indicated that the myths associated with high fructose corn syrup have led many consumers to believe that it is different from table sugar. Results from this survey served as the foundation of our campaign to ensure that its messages resonate with consumers and provide accurate, easy-to-understand information.

The survey revealed that two-thirds of household shoppers are aware of high fructose corn syrup, yet they are not aware of the similarities between high fructose corn syrup and table sugar. More than two-thirds of consumers do not know that high fructose corn syrup and table sugar have the same number of calories. Only 19 percent of consumers understand that table sugar and high fructose corn syrup have the same sweetness. And, almost two-thirds of those surveyed do not understand that high fructose corn syrup contains the same simple sugars — glucose and fructose — as table sugar.

### Magazine Advertisements



Newspaper Advertisements

**AND NOW,  
A LITTLE  
FOOD  
FOR  
THOUGHT.**

PHOTO BY PAUL D. SMITH

A little sweetness in life is good. And what sweetens lots of our favorite foods and beverages are sugars made from corn, including high fructose corn syrup. It has the same calories and sweetness as table sugar and honey. Nutritionally, they're all the same. But like many foods, sweeteners should be enjoyed in moderation. Please visit [www.SweetSurprise.com](http://www.SweetSurprise.com) and learn the facts. You're in for a Sweet Surprise!

  
Get the facts at [www.SweetSurprise.com](http://www.SweetSurprise.com)

**Could it be  
another schmear  
campaign?**

Lately, high fructose corn syrup has had its name dragged through the media. Truth is, it's nutritionally the same as table sugar. Has the same number of calories, too. Even registered diabetians agree that you can keep enjoying the foods and beverages you love, just do it in moderation. To get the facts, visit our website. We welcome a healthy discussion.

[www.SweetSurprise.com](http://www.SweetSurprise.com)

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<sup>1</sup> Survey of 1,610 adults age 18 and older, conducted by The MSR Group, March 28-April 11, 2008, on behalf of the Corn Refiners Association. The maximum margin of error is +/- 2.4 percent.

Internet Advertisement

Television Advertisements



### Campaign Dispels Common Myths and Shares Facts

Among the frequently published myths, high fructose corn syrup is often labeled “unnatural” and is mischaracterized as being uniquely responsible for obesity without consideration of the other nutritional, demographic and lifestyle changes that have occurred in the forty years since it was first introduced to the market.

The campaign highlights that high fructose corn syrup is made from corn, a natural grain product and contains no artificial or synthetic ingredients or color additives.

Another primary campaign message is that high fructose corn syrup contains the same four calories per gram as table sugar.

Finally, the campaign notes that high fructose corn syrup is nutritionally the same as sugar and, like all foods, is fine if enjoyed in moderation.

### Multimedia Aspects of the Campaign

Newspaper, magazine and television advertisements, along with web-based information, are central components of the campaign, coupled with on-going outreach efforts to dietitians and health professionals.

The media campaign kicked off with full-page color newspaper advertisements in major media markets across the country. Three television spots, three full page color ads in magazines read primarily by

moms, and internet banner ads complement the effort. Most of these placements purposely focus on the family’s key decision makers — moms — because of the important role they play in buying and preparing foods for their families.

A carefully coordinated public relations component designed to produce integrated science-based messages in the public domain enhances the campaign. Direct mailings to more than 250,000 influential nutritionists and medical professionals often quoted by the press, and continued outreach to key reporters to correct mischaracterizations concerning high fructose corn syrup, lay the groundwork for balanced and accurate coverage in the future.

In September, we launched a Back to School initiative concerning what moms pack in their children’s lunches featuring medical expert James M. Rippe, Ph.D. The initiative noted that high fructose corn syrup and sugar are nutritionally the same and equally caloric. More than 60 TV and radio stations highlighted the effort.

Several major media outlets have featured our campaign with balanced reports, including the Associated Press, CBS and Fox News.

The Corn Refiners Association is working diligently to ensure that American consumers understand the science behind corn sweeteners and can use it to make responsible and informed food choices based on fact, not myth. As a result of these and other extensive efforts, the conversation about high fructose corn syrup is beginning to change in a manner that reflects science-based facts.



## CORN FOR GRAIN: ACREAGE, YIELD AND PRODUCTION

State	Area Harvested (thousand acres)			Yield (bushels per acre)			Production (thousand bushels)		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
AL	200	165	280	119	72	79	23,800	11,880	22,120
AZ	22	18	23	195	170	185	4,290	3,060	4,255
AR	230	180	590	131	146	168	30,130	26,280	99,120
CA	130	110	200	172	165	180	22,360	18,150	36,000
CO	950	860	1,060	148	156	142	140,600	134,160	150,520
DE	154	161	185	143	145	97	22,022	23,345	17,945
FL	28	30	35	94	82	95	2,632	2,460	3,325
GA	230	225	450	129	112	130	29,670	25,200	58,500
ID	60	65	105	170	170	165	10,200	11,050	17,325
IL	11,950	11,150	13,050	143	163	175	1,708,850	1,817,450	2,283,750
IN	5,770	5,380	6,370	154	157	155	888,580	844,660	987,350
IA	12,500	12,350	13,850	173	166	171	2,162,500	2,050,100	2,368,350
KS	3,450	3,000	3,700	135	115	140	465,750	345,000	518,000
KY	1,180	1,040	1,360	132	146	129	155,760	151,840	175,440
LA	330	290	730	136	140	165	44,880	40,600	120,450
MD	400	425	455	135	142	103	54,000	60,350	46,865
MI	2,010	1,960	2,350	143	147	124	287,430	288,120	291,400
MN	6,850	6,850	7,800	174	161	146	1,191,900	1,102,850	1,138,800
MS	365	325	940	129	110	150	47,085	35,750	141,000
MO	2,970	2,630	3,250	111	138	142	329,670	362,940	461,500
MT	17	18	38	148	146	145	2,516	2,628	5,510
NE	8,250	7,750	9,200	154	152	160	1,270,500	1,178,000	1,472,000
NJ	62	64	82	122	129	125	7,564	8,256	10,250
NM	55	45	55	175	185	175	9,625	8,325	9,625
NY	460	480	550	124	129	127	57,040	61,920	69,850
NC	700	740	1,020	120	132	100	84,000	97,680	102,000
ND	1,200	1,400	2,350	129	111	116	154,800	155,400	272,600
OH	3,250	2,960	3,610	143	159	150	464,750	470,640	541,500
OK	250	220	270	115	105	145	28,750	23,100	39,150
OR	25	29	35	160	180	195	4,000	5,220	6,825
PA	960	960	980	122	122	128	117,120	117,120	125,440
SC	285	290	370	116	110	100	33,060	31,900	37,000
SD	3,950	3,220	4,500	119	97	121	470,050	312,340	544,500
TN	595	500	785	130	125	106	77,350	62,500	83,210
TX	1,850	1,450	2,000	114	121	148	210,900	175,450	296,000
UT	12	17	22	163	157	148	1,956	2,669	3,256
VA	360	345	405	118	120	85	42,480	41,400	34,425
WA	80	75	120	205	210	210	16,400	15,750	25,200
WV	28	26	27	109	120	111	3,052	3,120	2,997
WI	2,900	2,800	3,280	148	143	135	429,200	400,400	442,800
WY	49	45	60	140	129	129	6,860	5,805	7,740
<b>US</b>	<b>75,117</b>	<b>70,648</b>	<b>86,542</b>	<b>148.0</b>	<b>149.1</b>	<b>151.1</b>	<b>11,114,082</b>	<b>10,534,868</b>	<b>13,073,893</b>

Source: USDA—National Agricultural Statistics Service. AK, CT, HI, ME, MA, NV, NH, RI, VT not estimated.

## CORN: SUPPLY AND DISAPPEARANCE

Year Beginning September 1	Supply				Disappearance						Ending Stocks
	Beginning Stocks	Production	Imports	Total	Food, Alcohol, and Industrial	Seed	Feed and Residual	Total Domestic Disappearance	Exports	Total Disappearance	
2000	1,717.5	9,915.1	6.8	11,689.4	1,937.6	19.3	5,842.1	7,799.0	1,941.3	9,740.3	1,899.1
2001	1,899.1	9,502.6	10.1	11,411.8	2,026.3	20.1	5,864.2	7,910.6	1,904.8	9,815.4	1,596.4
2002	1,596.4	8,966.8	14.5	10,577.7	2,320.2	20.0	5,562.9	7,903.1	1,587.9	9,491.0	1,086.7
2003	1,086.7	10,089.2	14.1	11,190.0	2,516.6	20.6	5,795.0	8,332.1	1,899.8	10,231.9	958.1
2004	958.1	11,807.1	10.8	12,776.0	2,666.2	20.8	6,157.0	8,844.0	1,818.1	10,662.0	2,114.0
2005	2,114.0	11,114.1	8.8	13,236.9	2,961.8	19.9	6,154.2	9,135.9	2,133.8	11,269.7	1,967.2
2006	1,967.2	10,534.9	12.0	12,514.0	3,466.5	23.8	5,594.7	9,085.0	2,125.4	11,210.4	1,303.7
2007*	1,303.7	13,073.9	18.0	14,395.5	4,322.8	22.2	6,050.0	10,395.0	2,425.0	12,820.0	1,575.5
2008**	1,575.5	12,072.4	15.0	13,662.9	5,421.7	23.3	5,200.0	10,645.0	2,000.0	12,645.0	1,017.9

Source: USDA—Economic Research Service. \* Preliminary \*\*Projected  
(in million bushels)

## U.S. PER CAPITA SWEETENER\* DELIVERIES FOR FOOD AND BEVERAGE USE

Year	Refined Sugar	High Fructose Corn Syrup	Glucose	Dextrose	Total	Honey and Edible Syrups	Total Caloric Sweeteners
CORN SWEETENERS (DRY BASIS)							
1966	97.3	0.0	9.7	4.2	13.9	1.7	112.9
1970	101.8	0.5	10.7	4.6	15.9	1.5	119.1
1980	83.6	19.0	12.9	3.5	35.3	1.3	120.2
1990	64.4	49.6	13.6	3.6	66.8	1.2	132.4
2000	65.5	62.7	15.8	3.4	81.8	1.5	148.9
2001	64.5	62.6	15.5	3.3	81.4	1.4	147.3
2002	63.3	62.9	15.5	3.3	81.6	1.5	146.5
2003	61.0	61.0	15.2	3.1	79.3	1.4	141.7
2004	61.7	59.9	15.6	3.3	78.9	1.3	141.9
2005	63.2	59.2	15.3	3.3	77.8	1.5	142.5
2006	62.5	58.3	13.8	3.1	75.2	1.6	139.2
2007	62.1	56.3	13.7	3.0	73.0	1.4	136.6

Source: USDA—Economic Research Service

Units measured in pounds

\* Per capita deliveries of sweeteners by U.S. processors and refiners and other end users represent the per capita supply of caloric sweeteners. Actual human intake of caloric sweeteners is lower because of uneaten food, spoilage, and other losses. Figures do not include deliveries to alcohol manufacturers.

## CORN: FOOD AND INDUSTRIAL USES

Year	High Fructose Corn Syrup	Glucose & Dextrose	Starch	Fuel Alcohol	Beverage Alcohol	Cereals & Other Products	Total
1990	379	200	219	349	135	124	1,406
1995	473	227	226	396	125	161	1,608
2000	530	218	247	628	130	185	1,938
2001	541	217	246	706	131	186	2,027
2002	532	219	256	996	131	187	2,321
2003	530	228	271	1,168	132	187	2,516
2004	521	222	277	1,323	133	189	2,567
2005	529	229	275	1,603	135	190	2,961
2006	510	239	272	2,119	136	190	3,466
2007	490	236	262	3,000	135	192	4,322
2008*	490	235	260	4,000	134	193	5,422

Source: USDA—Economic Research Service. Year Beginning Sept. 1. \*Estimated  
(In million bushels)

## EXPORTS OF PRODUCTS FROM CORN—2007

Product	Volume	Units	Value
Corn meal	443,039,803	Kilograms	\$120,316,131
Corn starch	131,617,219	Kilograms	\$72,050,660
Corn oil, crude	212,272,256	Kilograms	\$182,037,523
Corn oil, once refined	3,848,384	Kilograms	\$3,946,299
Corn oil, fully refined	132,642,225	Kilograms	\$131,711,939
Glucose (dextrose)	114,460,752	Kilograms	\$ 63,180,385
Glucose syrup not containing fructose or containing in the dry state less than 20% fructose	358,174,334	Kilograms	\$114,941,290
Glucose syrup with 20–50% fructose	76,775,878	Kilograms	\$23,657,666
Chemically pure fructose	111,963,391	Kilograms	\$87,191,828
Fructose syrup with 50%+ fructose	548,467,353	Kilograms	\$174,939,331
Fructose solids containing more than 50% fructose	4,836,161	Kilograms	\$20,910,367
Bran, sharps and other residues	199,022	Metric tons	\$25,085,131
Corn gluten feed	1,516,529	Metric tons	\$191,134,682
Corn gluten meal	993,348	Metric tons	\$335,350,516
Other residues of starch manufacturing	461,426	Metric tons	\$69,332,637
Corn oil cake	15,317,601	Kilograms	\$2,443,424
Dextrins	27,350,022	Kilograms	\$23,024,063
Modified starches derived from corn starch	214,710,493	Kilograms	\$168,058,602

Source: U.S. Department of Commerce

## CORN REFINERS ASSOCIATION MEMBER COMPANY PRODUCTS

	Archer Daniels Midland Company	Cargill, Incorporated	Corn Products International, Inc.	National Starch LLC	Penford Products Co.	Roquette America, Inc.	Tate & Lyle Americas
<b>STARCH PRODUCTS</b>							
Unmodified, food	•	•	•	•	•	•	•
Unmodified, industrial	•	•	•	•	•	•	•
Modified, food		•	•	•	•	•	•
Modified, industrial	•	•	•	•	•	•	•
Dextrins	•	•	•	•	•	•	•
Cyclodextrins						•	
<b>REFINERY PRODUCTS</b>							
Glucose syrups	•	•	•		•	•	•
Maltodextrins	•	•	•		•	•	•
Dextrose monohydrate	•	•	•		•	•	•
Dextrose anhydrous		•	•			•	
High Fructose Corn Syrup-42	•	•	•			•	•
High Fructose Corn Syrup-55	•	•	•			•	•
Crystalline fructose	•						•
<b>CO-PRODUCTS</b>							
Crude oil	•	•	•				
Refined oil	•	•	•				
Corn gluten feed	•	•	•	•	•	•	•
Corn gluten meal	•	•	•	•	•	•	•
Corn germ or corn germ meal	•	•	•	•	•	•	•
Steepwater (CFCE)	•	•	•	•	•	•	•
Carbon dioxide	•						•
Corn fiber food/industrial ingredients		•					•
<b>FERMENTATION AND OTHER CHEMICALS</b>							
Citric acid	•	•					•
Lactic acid	•	•					
Lysine	•						
Threonine	•						
Xanthan gum	•	•					•
Erythritol		•	•				
Sorbitol	•	•	•			•	
Xylitol						•	
Mannitol	•	•	•			•	
Maltitol	•	•	•			•	
Hydrogenated starch hydrolysates						•	
Glucose hydrolysates						•	
<b>OTHER</b>							
Ethanol, fuel/industrial	•	•					•
Ethanol, beverage	•						

Product lists are accurate as of publication date, but may change with time. Also available online at <http://www.corn.org/memberproductlines.htm>.

## Corn Refiners Association Member Companies Domestic and International Plant Locations

### Archer Daniels Midland Company

P.O. Box 1470  
Decatur, Illinois 62525

#### Domestic Plants:

Cedar Rapids, Iowa 52404  
Clinton, Iowa 52732  
Columbus, Nebraska 68601  
Decatur, Illinois 62525  
Marshall, Minnesota 56258-2744

#### International Plant:

Guadalajara, Jalisco, Mexico

### Cargill, Incorporated

P.O. Box 5662/MS62  
Minneapolis, Minnesota  
55440-5662

#### Domestic Plants:

Blair, Nebraska 68008-2649  
Cedar Rapids, Iowa 52406-2638  
Dayton, Ohio 45413-8001  
Decatur, Alabama 35601  
Eddyville, Iowa 52553-5000  
Hammond, Indiana 46320-1094  
Memphis, Tennessee 38113-0368  
Wahpeton, North Dakota 58075

#### International Plants:

Uberlandia, Minas Gerais, Brazil  
Song Yuan, China  
Haubourdin, Pas-de-Calais, France  
Krefeld, Nordrhein-Westfalen, Germany  
Castelmassa, Veneto, Italy  
Martorell, Barcelona, Spain  
Efremov, Tula, Russia  
Bergen op Zoom, Noord-Brabant,  
The Netherlands  
SasvanGent, Zeeland, The Netherlands  
Orhangasi, Bursa, Turkey  
Manchester, England, United Kingdom

### Corn Products International, Inc.

5 Westbrook Corporate Center  
Westchester, Illinois 60154

#### Domestic Plants:

Bedford Park, Illinois 60501-1933  
Stockton, California 95206-0129  
Winston-Salem, North Carolina 27107

#### International Plants:

Cardinal, Ontario, Canada  
London, Ontario, Canada  
Port Colborne, Ontario, Canada  
Guadalajara, Jalisco, Mexico  
San Juan del Rio, Queretaro, Mexico  
Tlalnepantla, Mexico State, Mexico  
Baradero, Buenos Aires, Argentina  
Chacabuco, Buenos Aires, Argentina  
Balsa Nova, Parana, Brazil  
Cabo, Pernambuco, Brazil  
Sao Goncalo, Rio de Janeiro, Brazil  
Mogi-Guacu, Sao Paulo, Brazil  
Llay-Llay, Valparaiso, Chile  
Shouguang, Shandong, China  
Cali, Valle del Cauca, Colombia  
Lima, Peru  
Eldoret, Rift Valley, Kenya  
Icheon, Kyunggi-do, South Korea  
Incheon, Bupyeong-ku, South Korea  
Faisalabad, Punjab, Pakistan  
Cornwala, Punjab, Pakistan

### National Starch LLC

10 Finderne Avenue  
Bridgewater, New Jersey  
08807-0500

#### Domestic Plants:

Indianapolis, Indiana 46221  
North Kansas City, Missouri 64116

#### International Plants:

Trombudo Central, Brazil  
Hamburg, Germany  
Shanghai, China

### Penford Products Co.

*(A company of Penford Corporation)*

P.O. Box 428  
Cedar Rapids, Iowa 52406-0428

#### Domestic Plant:

Cedar Rapids, Iowa 52404-2175

#### International Plants:

Lane Cove, Sydney, Australia  
Onehunga, Auckland, New Zealand

### Roquette America, Inc.

1417 Exchange Street  
P.O. Box 6647  
Keokuk, Iowa 52632-6647

#### Domestic Plant:

Keokuk, Iowa 52632-6647

#### International Plants:

Lestrem, Pas-de-Calais, France  
Beinheim, Bas-Rhin, France  
Cassano Spinola, Alessandria, Italy  
Benifayo, Valencia, Spain  
Calafat, Dolj, Romania

### Tate & Lyle Americas

*(A subsidiary of Tate & Lyle, PLC)*

P.O. Box 151  
Decatur, Illinois 62525

#### Domestic Plants:

Decatur, Illinois 62521  
Fort Dodge, Iowa 50501  
Lafayette, Indiana 47902  
Lafayette, Indiana 47905  
Loudon, Tennessee 37774

#### International Plant:

Guadalajara, Jalisco, Mexico

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