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30 July 2012

## **History of High Fructose Corn Syrup**

*High fructose corn syrup, a sweetener derived from corn, has been used since the late 1960s in most packaged products. The idea of deriving starch from foods as a sweetener came from the ninth century and other types of sweeteners have followed since. High fructose became the most popular and cheapest sweetener in the 1960s & 70s and production and usage has continued to rise since. The increased use of this product today has led some scientists to believe that with long term consumption, there may be life-threatening risks that follow.*

Statistics from the United States Department of Agriculture (USDA) (2011) show that the average consumption of high fructose corn syrup (HFCS) has increased from 0.5 pounds a year in 1970; to 43.5 pounds a year in 2010. HFCS is one of many ordinary processed food sweeteners on the market, and it is used in almost every packaged food American consumers see today. The health risks that come with eating this product on a regular basis are very alarming, and it has recently been discovered that HFCS may be one of the leading causes in the dramatic amplification of obesity rates since the 1970s. HFCS was created in the late 1950s and developed further in the 1960s by the Japanese; it has since been used as a cheaper alternative to cane sugar (sucrose). HFCS started gaining popularity rapidly in the 1970s, and today, the popularity continues to rise. Also, the consumers in the top quintile, which represents 20% of all Americans, consume more than 11% of their calories from HFCS (Bray, Nielse, & Popkins, 2004). Research shows that on average, Americans today eats more packaged foods containing HFCS than ever, and they consume approximately 60 pounds of HFCS per person every year (Parker, 2010). HFCS is a very important part of food history in the United States; however, it is

thought to be one of the most prominent consumable substances linked to the obesity epidemic today (Bray, Nielse, & Popkins, 2004; Pakzad, 2006; Parker, 2010).

Since its introduction in the late early 1970s, HFCS use has risen dramatically over time due to its effect on foods. HFCS, made from cornstarch, was first invented in the late 1950s by Japanese scientists but, ever since the 1970s, after much further development, it has given food manufacturers a cheaper way to sweeten their packaged products. Weil (2008) explains that HFCS was initially considered a "revolutionary" food science innovation because it retains moisture, prevents drying, controls crystallization, blends with other sweeteners, acids, and flavorings, and helps maintain a stable texture in packaged foods (Weil, 2008). In the 1970s, HFCS was unmistakably rising to be the most popular processed food sweetener and since then, the effect it has on processed foods has increased the use of the product everywhere.

There are many different foods that HFCS is used in today and there are many different reasons for using it in all different types of foods. HFCS-55, a disaccharide composed of 55% fructose and 45% glucose, was introduced in the late 1970s, and is still the most commonly used sweetener in U.S. soft drinks. HFCS is still commonly used because it has a sweetness comparable to table sugar (cane sugar); it also maintains the long-term quality of drinks and condiments by protecting them from variations in storage temperature fluctuations or low product acidity. Baked good such as chewy cookies and snack bars acquire their soft and moist texture from HFCS since it retains moisture and resists crystallization after baking. It is also used in baked goods to give them superior browning and flavor. The sugars in HFCS also are quickly and easily fermented, resulting in sweeter bread that is more economical to make than with table sugar. It is also present in breads, dinner rolls, cakes, cookies, and breakfast cereals. (Why HFCS n.d; International Food Information Council Foundation 2009; Blumenthal 2008). There are

many foods that contain HFCS and many different reasons that it is used in every different product.

The first type of sweetener derived from starches was a syrup invented in the ninth century by the Japanese, and, incredibly, is still used to this day as a “traditional sweetener.” The next starch-based sweetener, discovered by the German chemist Andreas Sigismund Marggraf in the middle of the 17th century, was glucose. From this discovery, by 1782, it was universally known that starches could be treated with acids to create a sweet-flavored substance. This knowledge was relatively unimportant to most of the world, except for a few small-scale laboratories until the Napoleonic wars. During this period, blockades prevented cane sugar imports from the West Indies, which gave laboratories a great incentive for the further development of alternative sweeteners. One of the first new sweeteners was D-glucose (dextrose), produced in 1801 by Proust, but the next really important find was in 1811 when the Russian chemist Gottlieb Sigismund Kirchoff overcooked a mixture of potato starch and sulfuric acid and created glucose. Even though at the time he was not searching for this type of sweetener, he created a sweet, syrupy substance that earned him a lifetime pension of 5000 rubles a year, which equaled approximately 4000 US dollars a year at the time. As his research progressed, he created a syrup that crystallized as it stood, and from which a solid (D-glucose) was obtained by pressing the mass in cloth sacks. Even though the product was non-crystallized and impure, Kirchoff still put a large effort into marketing his product until he abandoned it after the end of the Napoleon war in 1815 (Schenck & Hebeda, 1992). No further progress was developed until the late 1950s. Beginning in the late 1950s and 60s, HFCS was developed and it started being used in the 1970s. Because to people in the ninth century, we were able to further develop this product and use it as an alternative to natural sweeteners.

Increase use of HFCS can be linked to the government prices and the production of other food sweeteners in the United States. One reason for the use of HFCS in more products was due to the fact that in the 1970s, the U.S. government instituted tariffs that caused the prices of sugarcane to increase. A few years later, due to the corn subsidy, corn prices were on a rapid decline and it quickly became cheaper than sugar cane. Since then, the process of making HFCS has stayed relatively cheap, and it still remains to be the average beverage manufacturers' preference over cane sugar and other sweeteners. This is ironic though because since the mid-1990s, sugarcane has actually accounted for about 45% of the total sugar produced domestically, and sugar beets for about 55% of production in the United States. Along with those two sweeteners, domestic production of HFCS increased from 2.2 million short tons in 1980 to an average of 9.2 million ton in dry weight during the 2000s. HFCS has replaced more expensively priced sugar in a variety of uses including; the beverage industry (41%), processed food manufacturers (22%), cereal and bakery producers (14%), multiple-use food manufacturers (12%), the dairy industry (9%), and the confectionery industry (1%) (USDA 2012). The use of HFCS has been on the rise since the 1970s and it continues to climb dramatically even today.

When manufacturers started seeing HFCS as the new alternative, they switched their processes and began adding HFCS instead of using cane sugar which, in turn, added excess calories and amplified portion sizes in the average American diet. One of the main reasons portion sizes in the average meal has risen so much is mostly due to the fact that when HFCS is eaten, it doesn't fill the consumer up ("empty calories"). According to Pollan (2003), "Farmers in the United States have managed to produce 500 additional calories per person every day; each of us is, heroically, managing to pack away about 200 of those extra calories per day." There are many examples of the effects of HFCS on manufacturers and packaging as well as the rise of obesity relating to portion sizes and

calories. One example of the effects of HFCS during the time is shown through the soft drink company, Coca-Cola. Since HFCS has been used in large productions, Coca-Cola has changed their bottle size from the small 8oz bottle, to the 20 oz bottle we see everywhere today (Pakzad, 2006). HFCS has greatly increased calories and portion sizes in the American diet due to the fact that more empty calories are being added every day.

The most concerning part comes from the fact that the average American, more likely than not, has no clue about how much HFCS they are ingesting every day and the effects it really has on the body. When HFCS first started being used, there was little research into its effects, but now, since it has been used for more than 40 years, scientists are finally observing the long term effects that HFCS has on the body. Scientists are also beginning to link HFCS to the obesity epidemic in the United States. This epidemic is rising higher and faster than ever, and it is observed that it almost perfectly parallels the increase in use and production of HFCS since the 1970s. The increase in portion sizes and the decline in HFCS prices has dramatically changed the way Americans eat, and has become an important part of our food history.

Since recent testing, the relation of HFCS to obesity rates has worried many people. Some of the evidence of this includes records of weight gain, percentage of obese Americans, and corresponding trends of marketing and production. Since this has been noticed by scientists, much more research is being conducted on HFCS and the products that contain it. Many scientists believe that this epidemic is mainly caused by the effects HFCS has on the body, but others believe that this epidemic is caused by the increased portion sizes from empty calories. Whatever the truth is, there is a growing concern among many to reduce HFCS consumption, and the people seem to be trying to cut down on HFCS consumption everywhere. If this happens, manufacturing will decline dramatically. As controversy of the reduction of HFCS use continues to rise; only time

will tell if society will lower production of HFCS or continue to consume it in large amounts every day.

Since the 1970s, HFCS has developed into a major industry; however, the potential health risks involved continue to create much controversy. In the near future, people all over are looking into cutting back on HFCS, but they may not have to worry about it for long. The way that the economy is preceding now, the manufacturing companies may be making money by selling cheap HFCS, but they may later have to pay the price for increased health costs. As more cases of obesity need to be treated, the government will begin to lose money trying to fix and treat these problems. There are many different actions that could start today and could potentially save the American population and people around the world from this epidemic, but there is one act that could help more than anything. If the government could begin to tax HFCS in foods to help cover health costs from obesity, kidney disease, diabetes, heart disease, high blood pressure, and many other illness created by this product, the government could conceivably increase the prices of HFCS enough to where the manufacturers would begin to use natural sweeteners again. This outcome would greatly help end this epidemic and the government would no longer need to lose money trying to cover health costs. Even though HFCS has been around since the 1970s, rising health problems are beginning to push it out of everyday consumption everywhere, and thanks to the scientific facts that enforce it, people from all over may be able to end the obesity epidemic and save millions of lives around the world.

## **Works Sited:**

- Bray, Nielsen, Popkin, G. A. B.; S. J. N.; B. M. P. (2004).  
*Consumption of high-fructose corn syrup in beverages may play a role in the epidemic of obesity*. Retrieved from  
<http://www.ajcn.org/content/79/4/537.full>
- United States Department of Agriculture, U.S.D.A. (2011, July 25).  
*Table 52—high fructose corn syrup: estimated number of per capita calories consumed daily, by calendar year*. Retrieved from <http://www.ers.usda.gov/data-products/sugar-and-sweeteners-yearbook-tables.aspx>
- Pakzad, J. P. (2006).  
*Corn-fed calories and american obesity*. Retrieved from  
<http://www.usc.edu/org/InsightBusiness/archives/spring2005/corn.htm>
- Weil, A. W. (2008, July 10).  
*Corn syrup: What's that sweet taste?*. Retrieved from  
<http://www.drweil.com/drw/u/QAA400463/Corn-Syrup-Whats-That-Sweet-Taste.html>
- Pollan, M. P. (2003, October 12).  
*The way we live now: The (agri)cultural contradictions of obesity*. Retrieved from  
<http://michaelpollan.com/articles-archive/the-way-we-live-now-the-agricultural-contradictions-of-obesity/>
- United States Department of Agriculture, USDA (2012, May 27).  
*U.S. sugar production*. Retrieved from  
<http://www.ers.usda.gov/topics/crops/sugar-sweeteners/background.aspx>
- Blumenthal, B. B. (2008, September 14).  
*Your solution guide to foods with hfcs*. Retrieved from  
<http://sheerbalance.com/brettsblog/your-solution-guide-to-foods-with-hfcs/>
- SweetSurprise.com. (n.d.).  
*Why HFCS*. Retrieved from <http://sweetsurprise.com/why-use-hfcs?gclid=CInKiYihtrECFUEGRQodemcAKA>
- International Food Information Council Foundation, I. F. I. C. F. (2009, September 29).  
*Questions and answers about fructose*. Retrieved from  
[http://www.foodinsight.org/Resources/Detail.aspx?topic=Questions and Answers About Fructose](http://www.foodinsight.org/Resources/Detail.aspx?topic=Questions_and_Answers_About_Fructose)
- White, J. S. W. (2008).  
*Straight talk about high-fructose corn syrup: what it is and what it ain't*. Retrieved from  
<http://www.ajcn.org/content/88/6/1716S.long>

Schenck & Hebeda, F. S. & R. H. (1992).

*Starch hydrolysis products- worldwide technology, production, and applications.* New York, NY: VCH Publishers Inc.