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by

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Salad dressing, crackers, hot dogs, apple sauce, sliced bread, and non-dairy creamer all have a common link, corn syrup. To some people, this is a tremendous breakthrough in food-technology. A greater amount of food can be made for less the price, but greater the profits. Not to mention, obtaining the desired results in food production is now quicker and easier than ever before. Just as technology has advanced all other aspects of our lives, it has also made an impact on the food industry as well. Whether the food industry has advanced as a result of it or not is up to debate. In spite of the wonderful attributes of corn syrup and High Fructose Corn Syrup (HFCS), we cannot shut our eyes to the ever real harmful effects of them as well. Naturally a nutritious food, corn undergoes an extensive chemical process to produce an unnatural substance, corn syrup, which poses many health risks including, obesity, diabetes, and food allergies to almost everyone. Who would have thought that this sticky goo would have revolutionized our food production industry? What seems like a harmless even beneficial way to use our over abundant wealth of corn actually inflicts many troubles on those who eat it.

Using a relatively new system of manufacturing corn, another use for it was found with the invention of corn syrup in the late 19th century. While for most of history, the main sweeteners people used were sugar, honey, molasses, etc., but now corn syrup seems to over power them as the major sweetener in our lives. Strangely enough, only in the last 30 -40 years has it come to be so widely used. Ever since the first simple corn syrup was made by the United Sugar Company in 1865 in New York City, corn has been used to sweeten some foods (Fussel 29). It was not until the late 1960's and early 70's that the sweeter version, High Fructose Corn Syrup (HFCS) appeared on the market. This was the beginning of the corn industry's tremendous competition to the sugar industry, for

several reasons. One reason is that, corn syrup is less expensive than sugar. Businesses are always seeking to increase profits. If they could achieve the same result while earning much more money, why would they not use the cheaper sweetener? Besides the business aspect, a second reason is that bakers and cooks also prefer corn syrup to sugar in some instances because of its variety of beneficial attributes to making food.

The processing of corn syrup has definitely undergone some great technological advancements from the late 1800's to the early 1970's to now. At its humble beginnings, it emerged as a simple syrup. As the years went on, more knowledge was gathered to produce a super-sweet syrup. A simple form of this cheap syrup is not difficult to make, but HFCS on the other hand is more complex. The process of making corn syrup begins when a certain type of corn, yellow #2 dent, enters the processing plant. After the grain is inspected and cleaned, it gets dumped into the steeping tank for 36-48 hours. The steepwater is 120 degrees F and mixed with sulfur dioxide. From here the germ gets separated from the bran at the mill. The germ is then further separated into light and heavy parts with the aid of cyclone separators or a hydrocyclone. The heavy germ is squeezed for oil and ground into meal, while the light germ is the portion used to make corn syrup. There are three parts to the light germ: the gluten, which is given to animals; the protein zien, which is made into medicine tablets; and the heart of the kernel, which is the starch. Although the starch can be used to make many different products, one of the most important uses is forming syrup by adding heat, acid, or enzymes (Fussel 270-2, Kyung-Sun 148).

In order to make corn syrup, the starch must undergo a process called acid hydrolysis. This takes place when wet starch is combined with hydrochloric acid and then heated (Kyung-Sun 149). The pressurized heat and the acid transform the starch into sugar. The longer the starch remains in this solution, the sweeter the syrup becomes. However, even after this stage, the corn syrup is still not changed in to HFCS. To transform ordinary corn syrup, which is about ¾ as sweet as sugar, into HFCS, which is comparable to sugar in sweetness level, an enzyme is added to the syrup. Making the super sweet syrup

involves a process of evaporation, crystallization, drying and melting, to elevate the fructose level, or dextrose equivalent (D.E.).

As the D.E. of corn syrup increases, the nutritious value plummets. A 42% D.E. is adequate for sweetening canned fruit and condiments. When a slightly sweeter version is desired, the 42% syrup is sent through a series of tubes which concentrates the fructose content. The concentrated version has an 80-90% D.E. HFCS 55 is made by mixing the 42% with the high level version. This D.E. 55% is used in ice cream, soda and frozen desserts. HFCS 55 is the version that is 100% as sweet as sugar (King 4). Although this is the sweetest version currently being used in products sold on the market, the Vogelbusch biotechnology research and development team invented a device to make HFCS 90. They manufacture this product by means of enriching the syrup with chromatographic methods (Hak). After the long, extensive process of making HFCS, the final product ends up as a mass of chemical sweetness. Even if the corn it starts out as was wholesome and nutritious, by the time it reaches the corn syrup stage, there is no goodness left at all. It is this very substance used in hundreds of process foods that pose harm to our health.

When HFCS first came out, the scientists and food producers thought they had struck a pot of gold. Of course at first glance this is definitely how it appears. For now we could grow, manufacture and produce a product comparable to sugar. This outcome has not only affected the world economically and environmentally but also with what we are eating. Evidently, many attractive characteristics are achieved in these areas.

Let us begin with concentrating on the positive economic effects of corn syrup. This is a valuable sweetener because through extensive chemical processing, it can be made even sweeter than sugar. This is a wonderful plus for the food industries. Food manufacturers can use less sweetener in their products with HFCS than with sugar, thereby saving money. According to Oral Williams and David A Bessler, authors of a paper in the Applied Economic Journal, U.S. sugar prices are a lot higher than sugar substitutes. This is especially true for HFCS, which is 10-30% less expensive than sugar (Bessler 1).

Finally, since we have more than enough corn growing to make corn syrup in our own country, there is no need to spend money on importing corn from others.

Beside the economic gains, corn is a hardy crop. It can grow in almost any climate around the world. The U.S. is not the world's only corn producer. Many people like corn because it is so versatile; a vast variety of different products can be made from this one crop. Since it is one of those plants which can be transformed in many ways, it ends up in hundreds of processed products, in the most unsuspected places. In The Story of Corn, Betty Fussel lists several uses for corn. For instance, she says corn products are used as a preservative and a flavorer in some jellies. Also, they are used as an emulsifier for toothpaste, as a liquid detergent and in various foods like soup, instant hot chocolate mix, etc. Finally, corn products are used to make animal food and drugs too, like cough syrup (Fussel 273). Because such a large number of different products are made with corn, the valuable land space in our world is therefore used more efficiently. Instead of planting one crop to grow food, another for sweetener, and still others for toothpaste, detergent, etc., corn can be the only crop grown for all these goods.

More than anything else, corn syrup has transformed our food supply making it easier for food companies to make the goods they want to produce. Corn syrup is highly valued for its numerous attractive baking characteristics. Firstly, it is an effective bodying agent, enabling sauces to turn out cohesively with ease. Also, when added to foods that are fried or sautéed, the result is a nice brown, caramelized look. Furthermore, it keeps foam stable and from deflating. This is especially beneficial when making a frosting with egg whites because it will stay high and fluffy. The Kitchen Aid recipe for Fluffy Frosting includes only a little over a tablespoon of corn syrup, in addition to the sugar (Kitchen Aid 33). Two important features are its lower freezing point than sugar and its ability to prevent sugar crystallization. Many ice cream makers use corn syrup so that instead of being hard and icy, the ice cream is soft and creamy. While the cheaper brands of ice cream use this fast and cheap method to a smooth, creamy dessert, the higher brands do not use it and their version is just as good or better tasting. This feature is also helpful when making sauces or frosting because just a little bit of corn syrup keeps the sugar

from crystallizing. Other attractive characteristics include moisture absorption and stabilization, osmotic pressure (candy), and an added sheen and viscosity (Fussell 272). To sum up the benefits of corn syrup, Phil Lempert said, “It is about 75% sweeter than sucrose, less expensive than sugar, and mixes well in many foods.”

It would be easy to think that HFCS is a wonderful gift to mankind after hearing all of its benefits to the economic, environmental and food-related circles of the world, but we cannot ignore its harmful side, too. The food industry likes corn syrup because of its ability to be made sweeter than sugar. The more extensively processed it is, the sweeter it becomes, as explained in (Kyung-Sun 272). As a result of this chemical processing the HFCS (which ends up in a variety of foods, from sandwich bread to “fruit” juice) is almost completely unnatural. Virtually every bit of goodness has been squeezed out and the remainder is a sweet, sticky goop.

The resulting harm and risks of corn syrup come in part from how the sticky syrup reacts with our bodies. Although it is made up of 50% fructose and 50% glucose like sugar, it is not metabolized in the body the way other sugars are (Pollan). While there is fructose in a healthy piece of fruit, concentrated amounts of pure fructose is not very healthy. Fructose disrupts the body’s normal way of processing necessary energy. Insulin, leptin and chromium are all needed to metabolize food and keep blood sugar low. Insulin and leptin are together responsible for inserting carbohydrates into the cells, while chromium keeps them in balance. A study performed at the Human Nutrition Research Center in Beltsville, Maryland on the effects of fructose to the body, has been found that fructose depletes chromium, a valuable mineral for the human body (McVitamins). Fructose also inhibits insulin secretion into the blood stream. Research performed by the University of Michigan has found that fructose inhibits the secreted insulin from being triggered. Insulin is a predominant hormone responsible for metabolizing foods, and its main purpose is to insert carbohydrates from the blood into the muscle cells (Lempert). You could eat all the food you want and not receive any energy if the food energy cannot transfer from the blood to the cells. This results in elevated blood sugar levels, a symptom found in diabetes. In addition to insulin, the body also needs the hormone

leptin, which the insulin tells the body to make. Together, these two hormones, Phil Lempert says, metabolize food and also tell your body when you are full. Now, the HFCS hinders these hormones from being secreted. Therefore, you could still feel hungry after eating a quart of ice cream that has been loaded with corn syrup! Michael Pollan in his article, "All Hail the Corn! Or Should We?" says that it is not a coincidence that an increase in corn sweeteners parallels an increase in Type II diabetes and obesity in America. Advancing from its humble beginnings, corn syrup may seem like a blessing to some and a sticky trap to others.

Besides affecting the production of necessary hormones in the body, corn syrup has adverse effects on the liver too. The more that corn syrup-containing foods are eaten, the more the liver is being overloaded. According to Dr. William J. Whelan, a biochemist at the University of Miami referred in a LA Times article by Patricia King, fructose goes directly to the liver. As a result, the liver becomes so focused on the corn syrup that it forgets about detoxifying other foods and toxins. It goes crazy and cannot detoxify toxins entering the body.

Corn syrup may benefit the economy in the U.S., but what about the other countries in the world? Do those countries that grow sugarcane as their main source of income appreciate the gradual shift away from sugar and towards corn syrup? I would say not. When the soda industries decided to shift from sugar to entirely corn syrup to sweeten their drinks, some of these smaller countries suffered. In the Philippines, for example, sugar production plummeted and there were even riots on the streets. Corn syrup production has grown from providing the U.S. with 10% of our sweetener in 1950 to providing more than 50% in 1995 (Williams).

In addition to causing trouble to our health and to economies, the abundance of corn has also taken a toll on the environment as well. There are about 80 million acres of corn field in the U.S. alone, most of which is genetically modified. This variety of genetically modified food requires more nitrogen fertilizers than any other crop we grow. Michael Pollan wrote an article about how corn is destroying the environment and he said that for

every bushel of corn, ½ gallon of fossil fuel is required to manufacture and apply these chemicals on the plants (Pollan). As it rains and the plants get watered, all the runoff flows into the nearby streams and rivers. All the pollution appearing as a result has killed a lot of marine life. These benefits and problems of corn syrup must be weighed, especially when concerning people's health.

More and more people today are trying to be healthy and take care of their bodies. Besides exercise, proper nutrition is a very important area of consideration. To accommodate people's desire to be healthy, manufacturers have come out with products like Power Bars, Balance Bars, etc. They are supposed to give people the energy and essential vitamins and minerals for a quick added energy boost or to lose weight. Since barely anyone has time these days to cook healthy meals, a nutritious bar is a much more satisfying thing to eat than a candy bar. Ironically, these supposedly "good for you foods" are loaded with corn syrup and /or HFCS. A wolf may wear sheep's clothing, but it is still a wolf. Hidden in a number of processed foods, many of which we call "healthy" or "nutritious" is an unfavorable substance. Corn syrup is this unnatural substance which everyone, not just the health conscious individual, should strive to avoid entirely.

Disguised under a number of different names, corn syrup inflicts a multiple of adverse effects on our bodies. In order for consumers to recognize and avoid this substance, they must be aware that corn syrup is used in foods under a variety of different names including dextrose, dextrin, dextrate, maltodextin, caramel, or malt syrup (Tidwell). Through extensive chemical processing, fields of corn are transformed into low quality, low priced syrup (King). Although the FDA has approved of this sweetener for public consumption, it is still relatively new and has not been extensively tested. Ironically, an uncanny parallel between an increase in the use of corn syrup and an increase in obesity, diabetes and other diseases have been detected over the past several years. It is also thought to be the cause of child-onset Type II diabetes, when children formerly mostly got juvenile or Type I diabetes. Other health problems caused by corn syrup include heart disease and food reactions or allergies (King). Although it has only recently begun,

research is being performed in different places to uncover the harmful effects of corn syrup. For example, Dr. William J. Whelan of the University of Miami has studied effects of corn syrup on the body (King). According, to a recent poll, only 1% said they did not have a corn allergy, while 99% said that they did or knew someone who did (Tidwell).

Corn syrup is found in such a wide variety of foods and ever since the early 1970's its presence has soared. For centuries before this time people were happy with sugar. Why then the big switch over a short time to corn syrup? Like any smart business, the corn and food industries are largely out to make a profit, while not caring about our health.

These companies prefer corn syrup because of its economic advantages and beneficial cooking characteristics. Because of extensive processing, corn syrup is a lot sweeter than sugar, making many companies very happy. Also, US sugar prices are much higher than sugar substitutes, especially HFCS by 10-30% (Bessler 1). A lower price gives companies an added incentive to use the product. In fact, since 1984, soft drink companies in America have changed their formulas by completely switching over 100% from sugar to HFCS to sweeten their drinks; not including diet soda (9). Of everyone involved, the corn industry and the soda industry are the biggest winners of the switch. For instance, according to Drew Davis, Vice President of the National Soft Drink Association, the cost of manufacturing soda dropped by mere pennies by using corn syrup. This seemingly trivial amount translates to actually saving millions of dollars after calculating all the soda they make (Squires). The corn industry has discovered another venue to use their over abundance of corn while earning extra cash at the same time. The soda industry was able to increase their profits by doing nothing other than switching over to corn syrup.

Not only has the use of a cheaper sweetener raised their profits, but also clever advertising techniques can attract more people. Many people seem to want to shy away from sugar and are searching for the perfect substitute. The word corn gives the consumer the impression that they are eating something healthy. Furthermore, it is

known that fructose comes from fruit, a nutritious food. So by labeling the sweetest form High Fructose, they deceive people that they are being healthy, when they are really doing the opposite for their bodies. The effect of the "big switch" is taking its toll on the American population.

Great, with the invention of HFCS, another use for the abundance of corn in our own country has been found! Corn syrup production has greatly advanced over the century and is now found as part of almost all processed foods. But we have been blind-sided by the numerous beneficial consequences of HFCS that people seem to not realize the harm it is bringing about. So, what exactly is this cheap benefactor to the food industry? Exactly that. To Robert Landis, a writer and educator, "High–fructose corn syrup is a really low quality, really cheap sugar" (King). Once just a simple syrup, it can now be made sweeter than sugar, like Vogelbusch HFCS 90 (Hak). Many studies and research have linked corn syrup closely to diabetes, among other diseases. Corn syrup has not only affected the body, but it has revolutionized our country and our world economically, environmentally, and physically through the way in which food is manufactured as well. As time goes on, its dominance has shown its face and will certainly grow more potent if left to run free. Of course balance is the key too good health, but as Robyn Landis said, when is comes to corn syrup, "abstinence, not moderation" (King).

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