10 Things You Need To Know About HFCS.

(As answered by industry researchers and experts.)
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Numerous experts from a variety of backgrounds ranging from health professional organizations to consumer advocacy groups support the consensus that high fructose corn syrup (HFCS) is safe and nutritionally the same as sugar.

In this e-book, experts address the 10 things you need to know about HFCS. These responses can help guide you in many matters, including answering consumer concerns, understanding the FDA’s position, and the possible implications of switching from HFCS to sugar.

If you wish to find additional information on any of these topics, please visit CornNaturally.com/askanexpert.

How did HFCS become controversial?

A 2004 commentary by University of North Carolina professor Barry M. Popkin and Louisiana State University professor George Bray, M.D., suggesting that HFCS was uniquely responsible for obesity, sparked a wildfire of misinformation about this safe sweetener made from corn. It caught the attention of the media and consumer advocates, and many have erroneously linked several years of declining demand for HFCS directly to this commentary. However, in 2009 Professor Popkin — in keeping with numerous other researchers and experts — stated: “We were wrong in our speculations on HFCS about their link to weight.” (FoodNavigator-USA.com, September 16, 2009)
1. What is the economic benefit of HFCS?

Len Corzine, Grower

As a fifth-generation Illinois corn farmer, I know we have many products that are made possible from corn grown in the United States that have been enjoyed by Americans for decades. They provide value and benefit to American consumers every day. High fructose corn syrup or corn sugar is one of them. And I can tell you it is natural and safe.

High fructose corn syrup is an ingredient made from corn and provides many functional benefits valued by consumers and long understood by farmers. It is also made by an American industry that creates jobs and strengthens our rural economies.

The corn refining industry collectively buys American-grown corn from more than 41,000 corn farmers in this country and employs more than 65,000 workers. In Illinois alone, corn refining employs nearly 11,000 workers, with an aggregate payroll of almost $532 million, paying property taxes of $242 million. Corn refiners purchase corn from more than 10,000 of the state’s farmers. Conversely, table sugar is imported from over 40 countries.

Contrary to misperceptions, high fructose corn syrup is not subsidized; it is subject to all of the highs and lows of marketplace supply and demand. In recent years, the price of corn has been relatively higher than in past years due to a variety of factors including increasing demand, speculation in the commodity markets, volatile energy prices and numerous other factors.

There are significant economic implications to the rural economy when companies switch, often because of misinformation, from high fructose corn syrup to another sweetener. Jobs in our communities should not be put at risk when the economic benefits from this versatile sweetener are so obvious. If you want to be sure you are buying home-grown and keeping jobs here at home, choose corn sugar.

Len Corzine, Grower

Len Corzine is a fifth-generation farmer from Assumption, Ill. He runs the farm with his wife, Susie, and his son, Craig — the sixth generation of Corzine farmers. Len and Susie also have two daughters, Allison, a nurse practitioner, and Ashley, a real estate broker and Illinois farm wife, as well as six grandchildren.

Len currently serves on the leadership team for the American Farmers for the Advancement and Conservation of Technology, the Illinois Corn Growers Association and the National Corn Growers Association. He is also an adviser to the Dudley Smith Initiative at the University of Illinois, a program that explores food, feed and fuel initiatives within rural communities and various agriculture systems.

In 2008, Prairie Farmer awarded Len the Master Farmer Award. In 2007, Len was presented with The Abraham Lincoln National Agriculture Award for his work in biotechnology and renewable energy.

He is past president of the National Corn Growers Association and the Illinois Corn Growers Association. While serving as NCGA president, Len helped shepherd the Renewable Fuels Standard and the Energy Bill through Congress in 2005. He has also been prominently involved with other groups over the years, including the Biotech Working Group for NCGA, the USGC International Biotechnology Information Conference, the joint USGC/NCGA Officer EU biotech missions, Advisory Council for Biotechnology and 21st Century Agriculture (AC21) for USDA and the Agriculture Policy Advisory Council (APAC) for USDA/USTR.
Since corn originated in Mexico, it is perfectly appropriate that corn sweeteners have begun to play a bigger role in that nation's food and beverage industries. Of course, Mexico is also a major producer of sugar, and the politically powerful sugar industry did its best over the years to discourage competition from corn sweeteners. But the North American Free Trade Agreement (NAFTA) signed in the mid-1990s changed the rules of the game by phasing out tariffs on imports of high fructose corn syrup (HFCS) from the United States.

By the mid-2000s, Mexican imports of HFCS were rising and supplementing the small amount of HFCS produced at plants within Mexico. The Mexican government tried to use various tactics to block the imports, but lost a succession of trade cases brought by the United States and ultimately fully liberalized trade as required by the NAFTA.

The rising volume of Mexican imports of HFCS today is being driven by two factors in combination: reduced physical availability of sugar to the domestic market and the low cost of HFCS relative to the cost of sugar. Mexico’s sugar production the last two years has fallen below 5 million metric tons, from a range of 5.3 million to 5.5 million tons before that. At the same time, the final merging of the U.S. and Mexican sugar markets under NAFTA in 2009 resulted in a lot more Mexican sugar being exported to the United States. This has left a sweetener supply gap in Mexico that U.S. corn refiners are well suited to fill.

The difference in cost has also been an important driver. Sugar prices in both Mexico and the United States have been quite high the last couple of years due to the way the two governments have been managing their sugar support programs. At the wholesale level, refined sugar prices in both countries have been 40 cents or more per pound. Mexican food and beverage companies have been able to import HFCS at about half that cost on an equivalent dry basis. So there have been powerful economic incentives to change to the lower cost sweetener ingredient, particularly in the soft drink industry. The result is that imports in 2010 will exceed 1 million metric tons on a dry basis, up from 400,000 tons in 2009, and that HFCS will account for 25 percent of Mexico’s caloric sweetener consumption this year. That share is expected to rise further in 2011. In all, it is a sweet ending to a long-awaited liberalization of the U.S. and Mexican sweetener markets.

2. Why is Mexico’s consumption of HFCS on the rise?

Thomas Earley, Vice President, Promar International

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There is overwhelming scientific evidence and agreement in the scientific community that high fructose corn syrup is not a unique cause of either obesity or diabetes. Multiple scientific studies, as well as the findings from two major expert panels, have confirmed that by every measurement yet made in humans, high fructose corn syrup and sucrose (table sugar) are interchangeable or virtually or essentially identical, and that neither is a unique cause of obesity and diabetes. Both the American Medical Association and the American Dietetic Association have issued statements supporting this consensus.

High fructose corn syrup is utilized in two forms in many foods that we enjoy. Both of these forms are roughly equal proportions of fructose and glucose. Table sugar (sucrose) is also equal proportions of fructose and glucose. Both high fructose corn syrup and table sugar contain the same number of calories per gram, have the same sweetness, are absorbed the same way in the human body and have the same effects on the human body. Other “nutritive” sweeteners such as honey and maple syrup also contain roughly half fructose and glucose. More sucrose is consumed each year in the United States than high fructose corn syrup; worldwide nine times as much sucrose is consumed as high fructose corn syrup.

Weight gain and obesity are caused by consuming more calories than an individual burns. There are two types of diabetes. Type 1 (also called juvenile onset diabetes) is caused by the inability of the pancreas to make insulin. About 10 percent of diabetes is Type 1 diabetes. Type 2 diabetes (also known as adult onset diabetes) is caused when the pancreas cannot make an adequate amount of insulin to keep up with the body’s needs. About 90 percent of all diabetes is Type 2 diabetes. There is a strong association between Type 2 diabetes and obesity.

In the last 30 years, the average number of calories consumed by individuals in the United States has increased by 700 calories a day. This alone could have caused the obesity epidemic in the United States. While sweeteners such as high fructose corn syrup and sucrose contain calories, fat contains more than twice as many calories per gram as these nutritive sweeteners. In our diet, we consume three times as many calories from fat than from all of the sweeteners combined.

While high fructose corn syrup and sucrose both contain calories, both can be enjoyed in moderation and are not uniquely linked to obesity or to diabetes.

James M. Rippe, M.D.

Dr. James M. Rippe is a graduate of Harvard College and Harvard Medical School with postgraduate training at Massachusetts General Hospital. He is currently the founder and director of the Rippe Lifestyle Institute, associate professor of medicine (cardiology) at Tufts University School of Medicine and professor of biomedical sciences at the University of Central Florida.

Over the past 20 years, Dr. Rippe has established and run the largest research organization in the world exploring how daily habits and actions impact short- and long-term health and quality of life. This organization, Rippe Lifestyle Institute (RLI), has published hundreds of papers that form the scientific basis for the fields of lifestyle medicine and high-performance health. RLI also conducts numerous studies every year on nutrition and healthy weight management. In addition, Dr. Rippe is an author of several books including “Healthy Heart for Dummies,” the first in the “Dummies” health series.

A lifelong and avid athlete, Dr. Rippe maintains his personal fitness with a regular walk, jog, swimming and weight training program. He holds a black belt in karate and is an avid wind surfer, skier and tennis player. He lives outside of Boston with his wife, television news anchor Stephanie Hart, and their four children, Hart, Jaelin, Devon and Jamie.
4. What concerns consumers most about high fructose corn syrup?

Sara Martens, Vice President, The MSR Group

Nothing in particular. Or, more specifically, nothing that doesn't also concern them about sugar.

The top three concerns of consumers who try to limit or avoid sugar are identical to the concerns of those who try to limit or avoid high fructose corn syrup. In a June 2010 survey, consumers cited “general health concerns,” “diabetes concerns” and “weight control” as the top three reasons they try to consume less of both ingredients.

But there is one major difference: There are four times as many consumers who say they limit or avoid sugar as there are those who specifically try to limit or avoid high fructose corn syrup.

When we asked 1,610 U.S. adults what foods, beverages or ingredients they’ve tried to consume less of or avoid in the last six months, 24.7 percent of them told us sugar or added sugars. By comparison, only 6.5 percent were specifically trying to avoid or consume less high fructose corn syrup.¹

A general health concern was the biggest reason given by those who try to limit the use of either sweetener. To better understand their behaviors, we dug deeper by asking them why they think high fructose corn syrup or sugar is unhealthy.

The largest single response given was that these ingredients are unhealthy simply because they are unhealthy (approximately 33 percent). This begs the question: Do consumers have specific knowledge? Or are they simply relying on what mom told them back when they were 5, which was “Don’t eat so much sugar. It’s not good for you.” The remaining two-thirds cited a wide-ranging list of concerns from dental decay to weight gain, and hyper kids to empty calories.

All of this data makes it hard to pin down the average shopper’s concerns outside of a desire to eat healthy foods, avoid disease and maintain a healthy weight. Isn’t this, in the end, what concerns us about everything we eat?

¹ Respondents were reached through random-digit dialing. They classified themselves as 18 years or older and the primary grocery shopper for their household. Individuals working in advertising, marketing, public relations or for food or beverage manufacturer were excluded.

The MSR Group is an independent, full-service market research firm based in Omaha, Neb. Studies conducted on behalf of the Corn Refiners Association represent a random cross-section of the American population. The June 2010 survey cited in this article has a margin of error of +/- 2.42 percent at the 95 percent confidence level.

Sara Martens has been studying consumer attitudes toward HFCS since 2008. In 2009, she joined The MSR Group and has continued to track consumer attitudes, most recently interviewing more than 6,500 consumers to understand the use of sweeteners in their diets and their attitudes toward caloric and non-caloric sweeteners. Prior to joining The MSR Group, Martens was partner-in-charge, strategic planning, at Bozell. She holds a BA degree in journalism from the University of Nebraska.
5. What is the FDA’s official position on HFCS?

Clausen Ely, Senior Counsel, Covington & Burling, FDA Regulatory Expert

The FDA, the expert regulatory agency responsible for the safety and truthful labeling of food ingredients, has confirmed that HFCS is safe and qualifies as a “natural” food ingredient. HFCS is made through use of enzymes acting on cornstarch to yield sugars that are common in nature.

In 1983, the FDA confirmed that specified glucose isomerase enzyme preparations are safe for use in the manufacture of HFCS and that HFCS is “Generally Recognized as Safe (GRAS)” for use in food.1 In 1996, following a comprehensive review of the health aspects of several common sweeteners, including sucrose and HFCS, the FDA affirmed that both of the commonly used forms of HFCS (HFCS containing 42 percent fructose and HFCS containing 55 percent fructose) are safe for use in food with no limitation other than current good manufacturing practice.2 The FDA evaluation was based on a review of all available safety studies and the report of an independent expert scientific committee. In affirming the GRAS status of HFCS, the FDA found that the saccharide composition (glucose-to-fructose ratio) of HFCS is approximately the same as that of honey and sucrose and that HFCS is as safe as other commonly used sweeteners, including sucrose and honey.

FDA policy permits the use of the term “natural” for food ingredients that contain no artificial or synthetic substances and that are produced through use of natural enzymes.3 HFCS satisfies the FDA definition of “natural” because it is made from corn, a natural grain product, contains no artificial or synthetic ingredients, and is obtained through use of natural enzymes. The glucose and fructose constituents of HFCS are not chemically synthesized or altered, and enzymes used in production of HFCS are found in nature. An FDA official recently affirmed that HFCS may be called “natural” when produced by the manufacturing process commonly used by the HFCS industry.4

1 48 Fed. Reg. 5716; February 8, 1983.
3 21 C.F.R. 101.22.
4 July 3, 2008 Letter from Geraldine June, FDA Center for Food Safety and Applied Nutrition, to Audrae Erickson, President of the Corn Refiners Association.
6. Faced with all the HFCS research, how can people tell what is pertinent and what is pointless?

Dr. John S. White

New studies appear in the scientific literature monthly claiming HFCS is the magic bullet causing obesity in America. Unfortunately, many of the new reports are simply poorly constructed experiments posing as solutions to a nonexistent problem.

Studies commonly use exaggerated doses of pure fructose fed to rats, cultured cells or human subjects. Subsequent reports that the study looked at the effects of “high fructose” are often misinterpreted or misreported as high fructose corn syrup. Institutions with public relations offices can generate significant misleading press coverage of this kind, causing considerable concern to the general public. To further complicate matters, food and beverage manufacturers have seized an opportunity to market high fructose corn syrup-free versions of their products that are promoted as “healthier” or more “natural” than their corn-sweetened counterparts. But that simply isn’t so.

Credible experts and scientific societies agree there’s no metabolic difference between high fructose corn syrup and sugar, leading the American Dietetic Association to confirm these two sweeteners are “indistinguishable” to the human body. And the American Medical Association noted that high fructose corn syrup and sugar have similar compositions and neither affects obesity or other conditions differently from the other.

To discern whether a new scientific study is pertinent to high fructose corn syrup or pointless, it’s important to evaluate the following:

**Experimental design** — randomized controlled studies contrast treatment groups with controls and are considered the gold standard in comparison with population-based epidemiological and ecological designs, which are more susceptible to confounding error and other forms of bias.

**Subjects tested** — human subjects are the gold standard in comparison with animals or cell cultures; the former are more costly to study, while the latter two are physiologically distant from humans, making extrapolation of data unreliable.

**Sugars compared** — high fructose corn syrup versus sugar is the best comparison, since (a) both sweeteners contain similar amounts of fructose and glucose, and (b) sugar is often erroneously characterized as a safer sugar. Fructose versus glucose is a poor comparison, because (a) humans don’t eat either one exclusively; (b) using just one simple sugar is not representative of calorific sweeteners in the diet; and (c) glucose alone would be a poor substitute for other calorific sweeteners.

**Levels tested** — the range of fructose encountered in the human diet is 5 percent to 17 percent of calories. Be wary of studies that use exaggerated fructose levels in human (25 percent to 50 percent of calories) and animal (60+ percent of calories) testing.

Knowing what to look for in a study’s design can help referees, editors, health professionals, journalists and the public evaluate whether new research is pertinent or pointless.
7. What is the sales impact on products that have switched to sugar?

Audrae Erickson, President, Corn Refiners Association

Recent grocery store sales receipt data* confirm that companies that have switched out high fructose corn syrup to sugar fail to gain market share for their brands — but they have gained significant increases in input costs. Worse yet, these brands dramatically underperform their competitors, not a winning position in a tight economy.

As the graphs below indicate, sales receipt data from several major company brands were analyzed to determine the impact from switching out high fructose corn syrup for sugar.

In the first example, sales for a major brand of barbecue sauce dropped significantly from the time of its switch in June 2008. Its market share continued a steady decline from June 2008 to January 2010, despite the switch.

In the second example, a major bread company’s products lost market share after the switch from high fructose corn syrup to sugar and their sales underperformed the market segment.

For a major ready-to-drink tea company’s product line, the switch did not increase market share and its sales performance remained below that of its market segment.

In yet another example, a major soup company’s change of sweeteners in one soup line did not result in increased market share overall. The trend line shows the continuously declining market share over the period for this company’s sales, which fell from September 2008 to January 2010, with the exception of increased sales due to seasonality (soup season).

Why are these companies failing to capture financial gains from their sweetener switch-out? Because the overwhelming majority of American consumers aren’t buying it. Independent research shows that when primary shoppers are asked what foods they are consuming less of or avoiding, 24.7 percent mention sugar, but only 6.5 percent indicate high fructose corn syrup. A total of 36.6 percent of primary shoppers look for sugar on food and beverage labels, but only 3.7 percent look for high fructose corn syrup.**

Consumers clearly aren’t swallowing these switcheroo marketing tactics. But companies engaging in it are swallowing higher input costs for no gain.

*Source: The Nielsen Company

**The MSR Group, August 2010

To see these and other examples visit CornNaturally.com/tool-kit/nielsen-charts/

Audrae Erickson, President, Corn Refiners Association

Audrae Erickson is the president of the Corn Refiners Association (CRA) based in Washington, D.C. She represents the CRA interests as a cleared adviser on the Agricultural Policy Advisory Committee that advises the USDA and USTR on trade issues affecting the food and agricultural sector. Prior to joining the CRA, Erickson served as the senior director of congressional relations for the American Farm Bureau Federation (AFBF); director of agricultural affairs at the United States Trade Representative (USTR) office; and as an economist at the U.S. Department of Agriculture’s Economic Research Service. Erickson earned a Master of Arts degree in economics as a Rotary scholar from McGill University in Montreal, Quebec, Canada. She graduated magna cum laude with Bachelor of Arts degrees in economics/business and French at Linfield College in McMinnville, Ore. Erickson resides in Maryland with her husband and three children.
8. What are the cost implications of switching from HFCS to sugar?

David “Guilley” Guilfoyle

Since the late 1970s, bakeries have used high fructose corn syrup (HFCS), because it is an inexpensive sweetener. Bakeries typically use 42 percent DE HFCS, as it is similar chemically to sucrose (granulated sugar), though 42 percent DE HFCS has less fructose than sucrose. Recently consumers have pressed bakery marketing groups to move to cleaner ingredient labels on packages causing some bakeries to switch from HFCS to granulated or liquid sugar. The switch is at a cost that not only impacts manufacturing costs — formulary, labor, sanitation and capital expenses — but it also impacts the environment.

Impact on formulary and labor costs
Formulary costs on a typical bakery product, when switching from HFCS to granulated sugar, can increase 15 percent to 20 percent. Labor cost can increase 3 percent to 8 percent due to manual handling of bagged sugar and increased sanitation-related labor.

Impact on capital expenditures
When switching to granulated sugar, a significant capital expenditure may be necessary. Installing a granulated sugar delivery system in a bakery could cost between $1.25 million and $3 million. Explosion protection is added to the pneumatic material handling system, as uncontrolled sugar dust is explosive. Conversion to liquid sugar, the equipment cost can range from $1 million to $4 million. An in-line brix analyzer is necessary for liquid sugar because the soluble solids tend to modulate in storage, causing inconsistent soluble solid delivery. HFCS soluble solids, by contrast, are homogenous and consistent, and so require no in-line analyzers.

Impact on sanitation
Sanitation in a bakery is crucial to producing safe food. Bakeries purchasing bagged sugar need to increase sanitation protocols, as the packaging material is typically lined paper. During storage of bagged sugar, many possible sanitation breaches can occur from rodents, water damage, and/or microbial growth and transfer. Liquid sugar tanks must be sanitized frequently, as microbial growth is inherent. HFCS is shipped in sealed pails, reusable totes, or bulk tanker, all of which present a lower risk profile for sanitation breaches and require less frequent sanitizing.

Impact on environment
Within the past year, more awareness of sustainability and carbon footprint has affected manufacturing as consumers are demanding products focused on these two principles. HFCS is delivered in bulk, totes, or pails, all of which are reusable. Granulated sugar is delivered in bulk and bags. Depending on the throughput of a bakery, 1,000-plus bags per week could be generated by a single bakery, creating landfill waste.

Conclusion
Due diligence is necessary if a bakery considers switching from HFCS to granulated or liquid sugar. Manufacturing baked goods with granulated or liquid sugar can significantly increase costs — formulary, labor and sanitation — and require further capital expenditures. The environmental impact can be significant when using bagged sugar. All things considered, it is not as easy as swallowing a spoonful of sugar when it comes to the added costs of switching out HFCS to sugar.
High fructose corn syrup and ADD/ADHD in children: Is there a link or is it a myth?

As a practicing pediatric nutritionist for 25 years, I have probably answered more questions about sugar and now high fructose corn syrup (HFCS), and a supposed link to hyperactivity/attention deficit disorder than you can imagine. People often assume that sugar causes hyperactivity because of all the nutritional myths and misinformation they’ve read or heard about.

First, let’s set the record straight about what sugar and high fructose corn syrup are. Essentially they’re the same. High fructose corn syrup is just another form of sugar. No better; no worse. Here’s why: Regular table sugar, called sucrose, is made up of 50 percent glucose and 50 percent fructose. There are two types of high fructose corn syrup mainly used in foods and beverages: one is 55 percent fructose and the other is 42 percent fructose with the balance for both made up of primarily glucose, almost the same as regular table sugar. Glucose is how the body uses most of its carbohydrate energy and is the body’s preferred energy source, so it breaks down and converts most carbohydrates into glucose. Fructose is a sugar found in most fruit (hence the name “fructose”) and the body can use it for energy, too.

As for carbohydrates and attention deficit hyperactivity disorder (ADHD), this myth got started back in the 1960s by a researcher at Harvard, who thought that sugar, certain food colorings and even certain nutritious whole foods caused ADHD in children. His studies tended to be extremely flawed and no other researchers could replicate his results. In fact, numerous other researchers over the past several decades showed no link at all between ADHD and sugar of any kind.

ADHD is a definable medical condition, but it’s not caused by sugar, high fructose corn syrup or any other form of sweetener. This is the conclusion of dozens of well-controlled studies.

In the scientific world, the sugar-ADHD issue has been largely put to rest, but individuals, and especially parents, have yet to get the memo. Why? All too often they see kids having foods and drinks containing high fructose corn syrup or sugar in situations where kids are likely to be active anyway. A relatable story: A mother attended a birthday party with her child and about a dozen 6-year-olds. Cake, ice cream and punch were served and the mother said, “The food had too much sugar in it and they’re running all over the place.” Actually, the kids were just a bunch of 6-year-olds at a birthday party acting their age. In this situation, it’s not fair to point the finger at the sugars themselves but rather the amount of sugars provided, minimal limit-setting and the level of activity that were bound to create some chaos, regardless of diet.

High fructose corn syrup and other sugars may give you a quick burst of energy, but it is short-lived and relatively mild. Ironically, carbohydrates can actually increase the production of serotonin, a brain hormone that stimulates calmness and sleep.

Now, let’s be clear. All sugars still have calories, so keeping to a modest intake of foods with added sugar is key for children and adults alike. One way to consume sugars like high fructose corn syrup is when they help you consume foods your body already needs. So, let your child drink that low-fat chocolate milk! It’s a great example of using some added sugar or high fructose corn syrup that’s also providing important dairy benefits.
There is no scientific or professionally agreed upon quantity of sugar considered “too much.” Sugar, in general terms, is a carbohydrate.

Nutrition authorities recommend consuming a wide variety of foods from the five food groups to provide 55 percent of total daily calories from carbohydrates, 25 percent from protein and 20 percent from fats. Fruits, vegetables, grains, meat alternatives and dairy products provide sugars including lactose, fructose, sucrose and starch.

Too much sugar in the diet traditionally applies to added sugars such as those found in non-nutritive beverages, candy or foods also high in fat, such as ice cream, cookies or other desserts. When diets are evaluated by clinical nutritionists or registered dietitians, quality of food selection is determined based on typical patterns of eating. If desserts are selected frequently, such as twice daily over more nutrient-dense foods such as fruits or vegetables, dietitians likely would describe the eating pattern as excessive in sugar. Although no precise limit is defined, a diet like this appears excessive in foods containing sugar. A recommendation would be to reduce the number of desserts selected to three per week compared to two per day. The amount of sugar in the diet would be considerably reduced, but not eliminated. Most dietitians would agree that the diet would be improved and positively modified.

Moderation, according to the Food Guide Pyramid guidelines, refers to restraint and the avoidance of excesses, especially of food components such as fats, sugars, alcohol and sodium — ingredients that taken in excess are associated with suboptimal health outcomes or more specifically, chronic diseases such as cardiovascular disease, obesity, alcoholism and hypertension, or high blood pressure.

In general it appears that moderation to the average person means simply eating “less” of what he or she otherwise would enjoy more of. Examples of moderation include reducing the portion size of a favorite food, consuming the food with less frequency or eliminating a food entirely. Moderation does not only apply to higher calorie foods or beverages, but can also apply to any food or beverage consumed in excess that may contribute excess calories or be taking the place of other nutrient-dense foods missing in the diet.