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Formulating Strategies

Last year in this column, I wrote about “the most valuable ingredient,” which was customer service. I also addressed the “high fructose corn syrup (HFCS) conspiracy” and looked at various issues surrounding HFCS and why developers like to use it.

The high fructose manufacturers—the Corn Refiners Association (CRA)—have mounted a campaign to educate the public about HFCS. The bottom line message is that, from whatever source, a diet high in sugar is not good. Even with these efforts by the CRA, some companies have still made the decision to try and take HFCS off their labels and out of their products in an effort to provide customers with what they perceive the customer wants. Perception is reality. As a developer, right or wrong, we are tasked with finding replacements for HFCS. Here are a number of alternatives.

Background on Syrups

As a refresher, depending on what product you are developing, HFCS, an inexpensive source of sweetness, provides desirable crust color and lasting crumb softness to a product. The replacement for HFCS that you choose will depend on what you are developing. The two most challenging characteristics to match are the sustained crumb softness and low cost. Crust color can be developed by using other relatively inexpensive reducing sugars, such as dextrose or whey (lactose); pH can also be increased to create more color. Additional sweetness can be achieved by increasing sucrose or adding fructose. Both ingredients are more expensive than HFCS but will get the job done. You may be surprised by how much flavor HFCS can mask and opt to not increase the sweetness level.

HFCS’s basic components—dextrose and fructose—are readily available on the market. Using these to replace the solids in the same proportions is about twice the cost of HFCS. This gives you some idea of how inexpensive it is to use HFCS.

Often times, syrup descriptions include a reference to dextrose equivalent (DE). What does it mean? Many years ago, I was told it was a comparison of sweetness to sugar, with sugar having a sweetness of 100. It was then later described as the approximate amount of dextrose in a product. For such a common term, the amount of probing it took to learn its correct definition is surprising. The DE of a product represents the number of reducing sites in a sugar. There are chemical tests that determine if a sugar is a reducing sugar and its value. The unique quality of a reducing sugar is that it gives baked products their color by driving the maillard reaction—a reaction between protein and reducing sugars that causes browning on the crust of baked products. Dextrose, being a monosaccharide and a reducing sugar, has a DE of 100.

Other common monosaccharides that are reducing sugars are fructose and galactose. The common disaccharides maltose—two glucose molecules joined together—and lactose, a galactose molecule joined with a glucose molecule, are reducing sugars. Sucrose, or common table sugar, is a glucose molecule joined with a fructose molecule. It is not a reducing sugar and thus does not work in the maillard reaction. Note that when sucrose is broken apart during the inversion process, two reducing sugars are created—fructose and glucose; both are reducing sugars. This breaking apart of sucrose, or inversion, into its basic monosaccharides is brought on by its exposure to heat, acid, and/or enzymes.

Some of the possible replacements for HFCS include brown rice syrup and syrup made with oligosaccharides—fibers, polydextrose, agava syrup, fructose, dextrose, and invert syrup. None will be as inexpensive as HFCS, but some will function better than HFCS in keeping a product’s softness. It becomes a question of if you can afford the switch.

Dextrose and Fructose

This is the obvious replacement. After all, HFCS is 70% solids and approximately 30% water. Of the solids, it is 42 or 55% fructose dry basis and the balance of solid glucose and a little bit of long chain polysaccharides. Dextrose and fructose are common enough ingredients. You are adding the same sugars that are in HFCS, yet keep HFCS off the label. Will it keep baked items soft as long as HFCS? You would think so. This would be a good test for someone to try if they haven’t already.

Invert Syrup and Medium Invert Syrup

Invert syrup, as described above, is the conversion of sucrose into its basic saccharides, which happen to also be in very similar proportions to those found in HFCS, fructose, and glucose. Medium invert syrup is simply where the process has been stopped before all the sucrose has been inverted. These syrups work well at keeping baked items soft for a while, though it depends on the product you are making.

Brown Rice Syrup

Brown rice syrup (BRS) is one of the more popular replacements with a very natural appeal and a more natural connotation. There is regular BRS and then there is clarified BRS. The clarified BRS is clear in appearance because of an additional filtering step. The regular BRS has a brown appearance and will darken with age. There are several kinds of BRS with different sugar profiles. This variation results from the type of enzymes used to cleave the starch molecules and how far the cleaving process is allowed to progress. From my experience, the BRS that seems to provide the same qualities as HFCS is one with the highest amount of maltose.

Inulin Syrups

There are several different types of inulin syrups on the market. Those that I am most familiar with come from chicory root and agava. One of the nice things about these products is that they contribute mostly fiber (and fewer calories) to the nutritional profile and not much sugar. They are significantly less sweet than HFCS so you may need to use a high-intensity sweetener to make up for this. They do well at keeping baked products soft and moist. They also bring a strong “natural” connotation to the label. Their biggest drawback is that they tend to be more expensive than many of the other alternatives.

Polydextrose Syrups

Typically less expensive than the inulin-type syrups is liquid polydextrose. These are usually around 70% solids and 90 to 95% fiber on a dry basis and lower in calories like the inulin syrups. They also contribute moistness and softness to baked products, although they don’t seem to convey as much of the “natural” connotation as inulin syrups.

Fructose Syrup

This is one with which I have little experience. Fructose syrup is about a 75% fructose and 25% water solution. This by itself will provide more sweetness and browning than HFCS. I am not sure how much softness it will contribute or for how long. This would also be a product to run some tests on, by itself and in combination with perhaps some other syrups or sugars.

Summary

Above are some HFCS alternatives to get HFCS off your label. These replacements will all cost more than HFCS; some will not work as well as and some will work better than HFCS at keeping your product soft. Like the tropical oils scare of the late 1980s, but more so, the backlash against HFCS is an emotion-driven knee-jerk reaction with, what I have seen, zero scientific backing. Worse yet, it diverts attention and energy away from understanding what is really driving the obesity crisis. Of course, as developers, we should be thankful for the fickle nature of the consumer; working to replace HFCS will keep many of us busy for some time to come—a good thing in this economy.

Acknowledgments

Thank you to James Morano, Suzzannes Specialties, New Brunswick, NJ, U.S.A.; Kevin Ramsey, Domino Sugars, Yonkers, NY, U.S.A.; Cristina Munteanu, GTC Nutritional, Golden, CO, U.S.A.; and Scott Turowski, Sensus America, Monmouth Junction, NJ, U.S.A.

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A Stable Microsystems ad appeared here in the printed version of the journal.