



# Optimizing available options

As costs rise and supply chain problems persist, bakers may need to explore alternative sweetener choices.

by Michelle Smith

With price increases and supply chain woes, bakers are looking for ways to cut or hold down costs. Or they may need to consider reformulating temporarily or for the long-term if they can't get the right ingredients, including their sweetener of choice.

Forecasts were bullish for 2022-23 sugar prices at the International Sweetener Colloquium earlier this year, and pressures continue to mount. In early April, Northeast cane sugar prices, which are a benchmark, were 52¢/lb, up from 42¢/lb a year ago, a jump of 24%, according to Sosland Publishing Co. Midwest beet sugar prices, also a benchmark, were 42¢ to 44¢/lb, up from 36.5¢/lb a year ago, a hike of 15% to 20%.

For bakers interested in or forced to make changes in their sweeteners, several factors must be weighed in their formulations.

"If supply chain challenges arise, it's often helpful to take a step back, define your parameters, determine your goals and talk to your ingredient supplier," said Keyla Rodriguez, technical services manager, Cargill. "Finding the best sweetening solution alternative hinges

on a number of factors, including the total sweetness required, the functionality needed and the flavor profile of the finished product."

## Tackling functionality challenges

Figuring out what each sweetener brings to an application allows bakers to choose a replacement and use it in the best way possible to ensure cost effectiveness.

"Understanding the ingredient's physical properties is the basis for overcoming replacement challenges," said Eric Shinsato, senior project leader, innovation and technical service, sweeteners, Ingredient. "Knowing that the original sweetener has a given level of sweetness, provides texture, flavor, color and shelf life to the finished product will help screen the potential choices and match the characteristics. Maintaining a sweet flavor profile is usually the easiest attribute to maintain as the sweetness can be topped off with a high-potency sweetener like stevia."

Considering what sweetener to use is dependent on the application, which means there are few easy answers when reformulating.

Often a combination of ingredients is needed to rebalance moisture and solids when replacing sweeteners.

Batory Foods

## SWEETENERS



“While we wish there was a simple table that laid out the alternatives and that every ingredient had a one-to-one replacement, it’s just not that simple,” Ms. Rodriguez said. “Unfortunately, we can’t take out one sweetener, drop in another at the same rate and expect the same result. It’s usually going to take a combination of ingredients to yield a similar finished product, and the solutions will vary based on the specific application.”

### CONSIDERING WHAT SWEETENER TO USE IS DEPENDENT ON THE APPLICATION, WHICH MEANS THERE ARE FEW EASY ANSWERS WHEN REFORMULATING.

Most experts agree that replacing the sweetness in baked goods is easier than replacing the functionality and bulk provided by sugar.

“Functionality is the most difficult to replicate when switching sweeteners as the alternative usually has some but not all of the same properties and cannot be a one-for-one replacement,” Mr. Shinsato explained.

Melissa Riddell, head of innovation and technical services, Batory Foods, concurred that a combination most likely will be needed.

“The best option is not always going to be a single ingredient and will most likely require rebalancing the moisture and solids in the formula,” she said.

Sensory perception will need to be replicated when choosing an alternative sweetener.

“The biggest workaround is functionality, for example, ensuring that baked goods rise and deliver the desired mouthfeel,” said Thom King, chief executive officer of Icon Foods. “This is where allulose and soluble tapioca play a role, as well as FOS, or fructooligosaccharides, fiber.”

The use of high-intensity sweeteners can provide off notes, which may require some trial-and-error recipe adjustments.

“When switching sweeteners, a challenge bakers face is matching the level of sweetness perceived by the consumers,” said Yanling Yin, PhD and director of bakery applications at Corbion. “Bakers must optimize their formula with the consumer’s sensory experience in mind.”

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Top: Replacing functionality can be one of the most challenging parts of switching sweeteners.

Ingredient

Bottom: Bakers must reformulate with consumers’ sensory experience in mind.

Corbion



## SWEETENERS

Using replacement ingredients that come in the same format as the original present fewer problems.

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If a new option can offer additional benefits, like cost savings, nutrition, etc., customers might be flexible on the differences.”

### How to make the right choice

Replacing a sweetener may mean substituting one high-calorie sweetener with another, swapping out low-calorie options, or reducing the calorie count in a baked item by replacing a high-calorie option with a low-calorie one.

“Sugar is the hardest sweetener to replace because of all of its ‘gold standard’ properties that include texture, mouthfeel, bulking, taste and browning,” said Dave Douglass, business development manager, Apura Ingredients.

He said that in a sugar reduction formulation change, the company’s technical experts work with a customer’s research and development team to reduce sugar while maintaining taste and mouthfeel. Although one swap is not hard, he said.

“The one exception is switching out high fructose corn syrup with sugar since the sweetness and taste are similar,” Mr. Douglass added.

Using replacement ingredients that come in the same format as the original present fewer problems, Mr. Shinsato said.

“Dry sweeteners will need to be replaced with another dry ingredient in most cases, while liquid sweeteners are easier to replace with other liquid sweeteners,” he explained. “In a frosting or icing, sucrose can be replaced with dextrose without a significant change in the finished product or processing.”

Going from sugar or another high-calorie sweetener to a low-calorie option presents numerous challenges.

“The sugar reduction holy grail to food and beverage brand owners is replacing sucrose with a single ingredient or a combination of ingredients, at or near the same price as sucrose, but without the calories of sucrose,” said Kyle Krause, Beneo product manager, functional fibers and carbohydrates, North America. “This is difficult to do, and the challenge becomes

## SUCCESS BREEDS SOURCING WOES

Replacing clean label and specialty sweeteners are some of the toughest ingredients to substitute now.

“Clean label baked goods and those needed for sugar reduction/replacement formulations will be the most challenging sweeteners to source or replace due to their fairly recent successful introduction into bakery over the last decade,” said Melissa Riddell, head of innovation and technical services, Batory Foods. “These types of functional sweeteners are allulose, erythritol, stevia extracts, steviol glycosides and sweetener blends like Batory Sweet Essentials, making reducing or replacing sugar much simpler. However, with increasing consumer popularity, improved functionality in application and widening global regulatory approval, these ingredients are becoming easier to source.”

Depending on market conditions, lower volume specialty sweeteners can be harder to source than commodity ingredients, said Eric Shinsato, senior project leader, innovation and technical service, sweeteners, Ingredient.

“Climate and environmental conditions can have a significant impact on the availability of higher volume sweeteners from corn, sugar beets, sugar cane and stevia,” he said. “However, current supply chain issues and high ingredient demand seem to impact all types of sweeteners, specialty and commodity alike.”

As the demand for products with less sugar rises, so does the demand for the ingredients used in them, said Kyle Krause, Beneo product manager, functional fibers and carbohydrates, North America.



Baked goods sweetened with honey have a natural health halo that many consumers desire.

National Honey Board

Targan said. “They took this advice and not only saved money, but the quality of their finished product also improved, thus garnering them additional market share. This kind of solution was possible because the customer was willing to be agile when it came to reformulating and relabeling.”

Consumers today are interested in products with clean, all-natural ingredients. Emergen Research said the global natural sweeteners market will grow to \$5.3 billion in 2030, a nearly 7% compound annual growth rate from 2021 to 2030. Increasing use of stevia, honey, coconut, sugar, monk fruit and other sweeteners is forecast to drive the growth.

Honey is up to 1.5 times sweeter than sugar and delivers multiple benefits such as sweetness, flavor and functionality, said Catherine Barry, director of marketing at the National Honey Board.

“Honey also has more than 3,000 varieties, each with a unique color, taste and flavor,” she said. “Bakers and snack manu-

facturers can sweeten and add a unique flavor to products by using varietal honeys.”

It also brings functionality, acts as a natural shelf life extender, mold inhibitor and binder in products such as nut- and seed-dense food bars, Ms. Barry added.

“Consumers love honey, view it as natural and understand they’re supporting beekeepers and honey-bee health when they purchase products with honey,” she said.

A natural sweetening system that eliminates added sugar and uses sweeteners and fibers that aid in functionality and leavening can deliver good results, Mr. King said.

“In my formulation experience, the best combination is a sweetening system that contains allulose for its functionality in Maillard and leavening, erythritol to suppress burn point, soluble tapioca fiber to create humectancy and bulk, and a combination of stevia and monk fruit in very small amounts to bring these sweeteners to parity with the sweetness in sugar,” Mr. King said. “This would be the gold standard for clean label sugar reduction in baked goods.”

### Optimizing sweeteners

Some ingredients can be used to bolster the flavors and sweetness of baked foods. Bakers who may be tempted

even bigger given the current difficult supply chain for food ingredients. So brands must consider their options and the benefits sugar replacing ingredients provide, such as their sweetening profile, calories and glycemic profile, to name a few attributes, that they will lend to the final packaged food.”

Amy Targan, president of Malt Products Corp., said that domestic supplies can mitigate some supply chain problems and that agile companies have an advantage because they are willing to make changes based on market conditions. For example, she said that one pretzel maker, in an effort to save on costs, had been using a blend of malt extract and glucose, which was sourced from imported tapioca. But the company pivoted away from the glucose as the price of tapioca rose.

“We suggested to this customer that they revert back to their original formulation of 100% malt extract,” Ms.

**EMERGEN RESEARCH SAYS THAT THE GLOBAL NATURAL SWEETENERS MARKET WILL GROW TO \$5.3 BILLION IN 2030, A NEARLY 7% COMPOUND ANNUAL GROWTH RATE FROM 2021 TO 2030.**

# It starts in the Field...

## SWEETENERS

**IT'S IMPORTANT FOR BAKERS TO KEEP THEIR GOALS IN MIND, BE OPEN TO NEW IDEAS AND OPTIMIZE THEIR SWEETENERS.**

to reduce sugar altogether should keep in mind that sugar, like salt, is a flavor enhancer, Ms. Riddell said.

“Reducing sugar in your baked goods results in the flavors of other ingredients like butter, vanilla or chocolate to become less noticeable or even bland,” she said. “Cocoa is another ingredient that requires a certain amount of sugar to balance the bitter notes. Too much sugar reduction will result in enhanced bitterness. The same can be experienced in muffins when using whole wheat flour where bitter notes can be tasted. Honey has been found to help to balance the overall flavor profile in this particular application.”

At usage levels specified by the Flavor and Extract Manufacturers Association, certain sweeteners may be used as ingredients with flavor modifying properties (FMPs) and labeled as natural flavors, Mr. Shinsato said.

“In the case of stevia-based sweeteners, some can be used as FMPs and can enhance sweetness and potentially extend citrus, dairy and savory flavors,” he said. “The stevia-based FMPs can also help to minimize some of the bitterness associated with alternative grains and proteins. FMPs are best used in conjunction with bulk and high potency sweeteners.”

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Agile bakers willing to reformulate can save money by making changes based on market conditions.

Malt Products Corp.



Check out the **Since Sliced Bread** podcast with Lin Carson at [www.bakingbusiness.com](http://www.bakingbusiness.com) to learn more about pivoting in response to supply chain ingredient shortages and how training and investing in flour quality can improve a bakery's chances of reformulating.



Another approach is to combine sweeteners that bring an advantageous pairing.

“Bakers can get the most sweetness enhancements and stretch their sweetener ingredients by benefiting from sweetener synergies,” Ms. Riddell said. “An example of this would be a 50:50 blend of crystalline sucrose and fructose, which results in as much as a 28% increase in sweetener perception with minimal changes to the finished product.”

Casey McCormick, vice president of global innovation, Sweegen, said getting the most from sweeteners starts with quality ingredients.

“After that the deployment of a creative building block approach with taste modulators can help optimize sweeteners in those products,” he said. “Taste modulators can help to hide, mask and enhance flavors when a baker removes sugar from a recipe. The product must be adjusted to balance flavor and compensate for other attributes such as masking off-tastes or enhancing flavors that intensify desirable ones.”

Dr. Yin said that manufacturers can use natural enzymes to cut the amount of sugar during product processing.

“Enzymes reducing sugar might not give the exact same perception of sweetness as sugar, but they introduce a certain degree of sweet taste,” she said.

Thaumatococcus also can be used as part of a clean label sweetness or flavor modulation system.

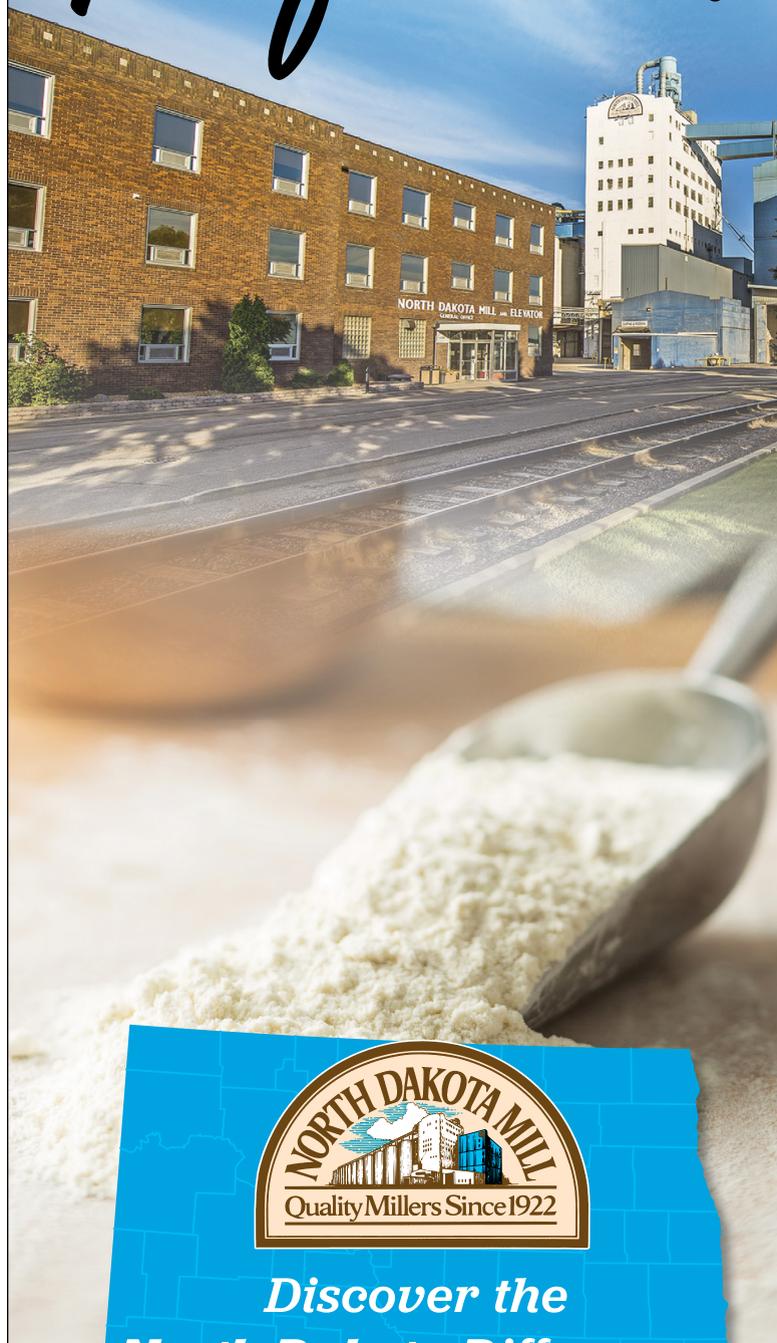
“This will enhance the sweetness if they are looking just to reduce added sugars but not eliminate them,” Mr. King said.

Jeff Hodges, bakery scientist, snacks and baking, ADM, said that bakers can optimize their sweeteners for greater cost savings.

“Notably, our glucose-fructose syrup helps to maintain important sweetness, flavor and functionality in bakery items and certain breads, while also providing a cost-sensitive solution,” Mr. Hodges said.

Bakers who need to explore alternative sweeteners have many options. It's important that they keep their goals in mind and be open to new ideas, optimize the sweeteners they are using and ensure that they are choosing options that maintain the quality of their products that consumers are expecting.

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