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UNDER EMBARGO UNTIL AUGUST 20, 2018, 12:01 AM ET

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## Techniques for reducing sugar content in dairy products show promise

*Progress is being made in producing reduced-sugar ice cream, yogurt, and flavored milk that are more acceptable to consumers, say researchers in the Journal of Dairy Science®*

**Philadelphia, August 20, 2018** – Dairy foods are popular among consumers, and sales gross more than \$125 billion per year (IDFA, 2017). With dairy product popularity comes new demands from consumers for healthier, low-calorie products that taste the same as their higher calorie counterparts. In a [report](#) published in the *Journal of Dairy Science* researchers review the options available to the dairy industry to reduce sugar in products such as ice cream, yogurt, and flavored milk without sacrificing flavor.

The public health and consumer focus on health has increased in the past 20 years, leading to a significant push for healthier food choices including dairy products. Overconsumption of sugar, for example, can contribute to a host of issues such as hypertension, type 2 diabetes, cardiovascular disease, and dental cavities.

“Dairy foods represent a large market,” explained lead investigator MaryAnne Drake, PhD, William Neal Reynolds Distinguished Professor, Department of Food, Bioprocessing, and Nutrition Sciences, Southeast Dairy Foods Research Center, North Carolina State University, Raleigh, NC, USA. “The dilemma of how to reduce sugar content without sacrificing flavor and negatively affecting product sales is challenging, as sugar plays an important role in dairy foods, not only in flavor, but also in texture, color, and viscosity. Replacing sugar can have negative effects, making substitution inherently difficult.”

Dairy products like ice cream, yogurt, and flavored milk are potentially high in unwanted added sugar. Some of the standard processes for developing healthier food products, such as fat, sugar, and salt reduction, result in an unacceptable flavor. Sweet taste perception can also be affected by texture of the food matrix and the presence of fat. Other sugar reduction techniques include hydrolysis of lactose, ultrafiltration, and direct reduction. In this review, researchers review recent studies to assess the role of sugar, alternative sweeteners, and sugar reduction in ice cream, yogurt, and flavored milk and discuss the options available to the dairy industry.

### **Ice cream**

Ice cream is one of the most heavily consumed dairy products in the world. To achieve the sweet taste desired by consumers, between 10 to 14 percent sugar needs to be added. Studies have shown that reduced sugar and reduced fat products, such as ice cream, show a higher propensity for a bitter aftertaste and a lower intensity of creaminess. Among the promising options the researchers found were:

- Calorie-reduced ice creams sweetened with sorbitol and sucralose were most accepted compared with other “light” vanilla ice creams or ice cream with a minimum reduction of 25 percent of the total energy, sugar, or lipid.
- Erythritol and lactitol are sugar alcohols that have been used to create low-calorie ice cream. Erythritol is more commonly used for sugar reduction in ice cream because it provides volume and texture and is only a fraction of sucrose calories.
- Chocolate-flavored ice creams are typically formulated with higher sugar content to decrease the bitterness associated with cocoa. When the sugar is reduced, not only does the ice cream taste more bitter, but it also tastes less chocolatey. In one study, researchers proposed a solution by marketing sugar-reduced chocolate ice cream to dark chocolate lovers, who already desire and tolerate substantially higher levels of bitterness.
- Frozen yogurt is often viewed as a healthy alternative to ice cream because of its lower fat content and the presence of lactic acid bacteria, even when frozen, but the sugar content is typically the same as regular ice cream. A study of frozen yogurt determined that substituting inulin and isomalt for sugar and fat led to a similar sweetness and a reduction in fat with no added sugar.

### **Yogurt**

Yogurt is generally recognized as a healthy food because of its nutritional content, but it is usually sweetened with sugar to increase palatability. Several studies have reported that liking yogurt is influenced by texture, aroma, and taste and that sweetness is an important component.

- Several studies found that sweetener blends of nonnutritive sweeteners have been very successful in reducing sugar content of yogurt.
- One study reported that it was possible to produce a probiotic yogurt successfully using sweeteners without affecting the viability of the probiotic microorganisms. The addition of nonnutritive sweeteners did not negatively affect the yogurt-making process because the sweeteners did not break down over time.

### **Flavored milk**

Flavored milk is popular among children and adults because of its special taste and ability to meet the dietary requirements for dairy foods in the United States. Studies have shown that flavored milk increases

milk consumption. Chocolate milk, the most popular flavor, typically has higher sugar content and is therefore a frequent target for sugar reduction techniques. However, reducing sugar in chocolate milk is quite costly and many school directors choose the higher sugar alternative to reduce cost or choose to eliminate chocolate milk entirely. There have been several studies into alternative ways of reducing sugar calories in chocolate milk with some contradictory results.

- One study showed that withdrawing a chocolate milk option meant that three or four additional foods needed to be added into the diet to replace the nutrients from milk, adding additional calories and cost. Therefore, sugar-reduced chocolate milk should be considered the cheaper alternative.
- In another study parents preferred natural nonnutritive sweeteners over nutritive sweeteners as the sweetener source in chocolate milk.
- Some studies found that added sugar could be directly reduced in chocolate milk and still be accepted by children and adults if it did not exceed 30 percent.

Overall, the most successful techniques for sugar reduction in dairy foods involve replacing sugar with nonnutritive sweeteners, whether natural or artificial, because these provide the sweet taste desired by consumers without added calories. Direct reduction of sugar and lactose hydrolysis methods also show promise.

“Understanding current sugar-reduction techniques, research, and consumer response to sugar reduction in dairy products is important for dairy manufacturers in order to design and produce sugar-reduced products,” noted Dr. Drake. “Sugar reduction is an inherently difficult task due to the many functions of sugar in food products, but progress is being made in developing products acceptable to consumers.”

"Reducing sugar is everyone's responsibility in order to improve individual and public health and this review paper is timely to highlight options available to dairy industry," commented Siva Kaliappan, Vice President Product Research, National Dairy Council, Rosemont, IL, USA.

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#### **Notes for editors**

The article is “Invited review: Sugar reduction in dairy products,” by H.R. McCain, S. Kaliappan, and M.A. Drake (<https://doi.org/10.3168/jds.2017-14347>). It will appear in the *Journal of Dairy Science*, volume 101, issue 10 (October 2018) published by FASS Inc. and Elsevier on behalf of the American Dairy Science Association®.

Full text of the article is available to credentialed journalists upon request. Contact Eileen Leahy at +1 732 238 3628 or [jdsmedia@elsevier.com](mailto:jdsmedia@elsevier.com) to obtain copies. Journalists wishing to interview the authors should contact MaryAnne Drake at [mdrake@ncsu.edu](mailto:mdrake@ncsu.edu).

This research was funded by the National Dairy Council.

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The *Journal of Dairy Science* (JDS®), official journal of the American Dairy Science Association®, is co-published by Elsevier and FASS Inc. for the American Dairy Science Association. It is the leading general dairy research journal in the world. JDS readers represent education, industry, and government agencies in more than 70 countries, with interests in biochemistry, breeding, economics, engineering, environment,

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The [American Dairy Science Association](http://www.adsa.org) (ADSA) is an international organization of educators, scientists, and industry representatives who are committed to advancing the dairy industry and keenly aware of the vital role the dairy sciences play in fulfilling the economic, nutritive, and health requirements of the world's population. It provides leadership in scientific and technical support to sustain and grow the global dairy industry through generation, dissemination, and exchange of information and services. Together, ADSA members have discovered new methods and technologies that have revolutionized the dairy industry.

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