The fiber opportunity

What if you could increase dietary fiber in your milk and yogurt without changing their flavor profile?

A white paper by Novozymes A/S | February 2022

Rethink Tomorrow

novozymes®
Food & Beverages

Consumer trends necessitate change

From gut and bone health to weight management, consumers are becoming increasingly aware of the benefits of fiber. Now, consumer studies show that they want more ways to incorporate fiber into their diet, as well as more eating occasions and options to do so.

If these benefits sound familiar to dairy producers, it's because they're benefits already positively associated with dairy products. Dairies, however, have the added pressure of reducing sugar in their products – a continuing consumer trend that is already making reformulation a key focus.

The pressure is real. Dairies need to address these trends before savvy consumers begin switching to rival dairy brands, dairy alternatives, or other means such as dietary supplements. And, to keep their ingredient lists as short as possible, they need to do this without adding high intensity sweeteners, fiber ingredients, or flavoring solutions.

This white paper examines an in-situ solution that converts lactose to fiber, enabling dairies to address both trends at once, and without significant change to their existing processes.

69%

Believe sugar reduction is important in dairy offerings

59%

Are more likely to buy Dairy products with higher fiber content.

47%

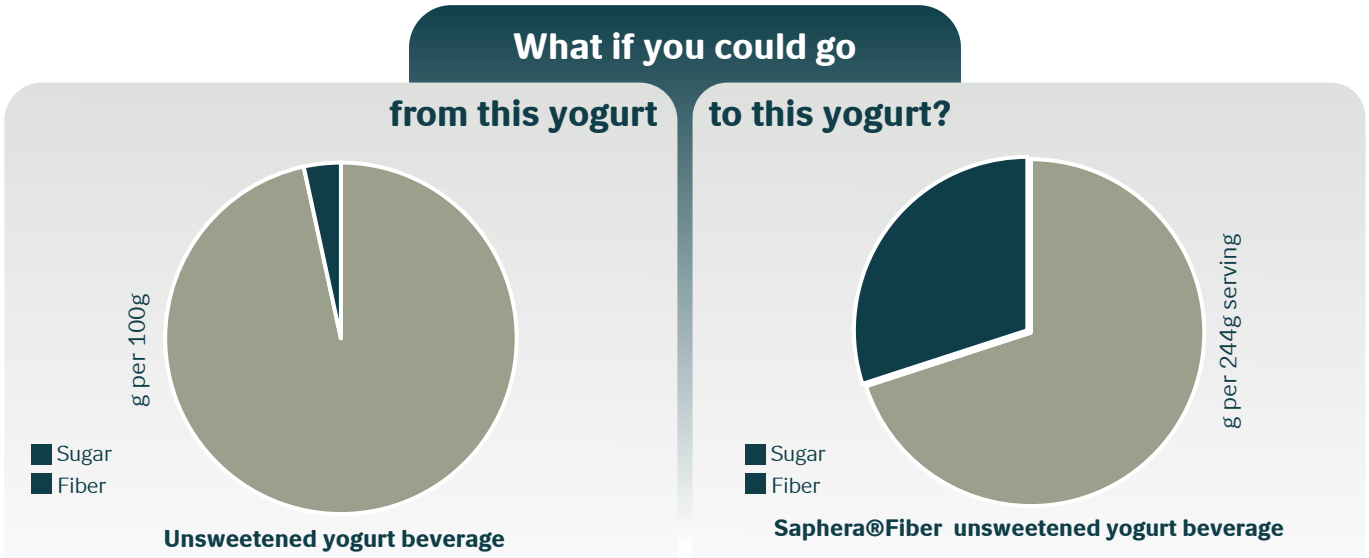
Rate common* dairy sweetener ingredients as "natural"

Canning, Kathie. "The quest for sugar reduction in dairy products." [ADM Outside Voice Research], Dairy Foods, March 26th, 2021
Novozymes/Lindberg International – "Consumers' perception of fiber in dairy", February 2020
*Stevia, Aspartame, Monk fruit, Sucralose

Defining an optimal solution

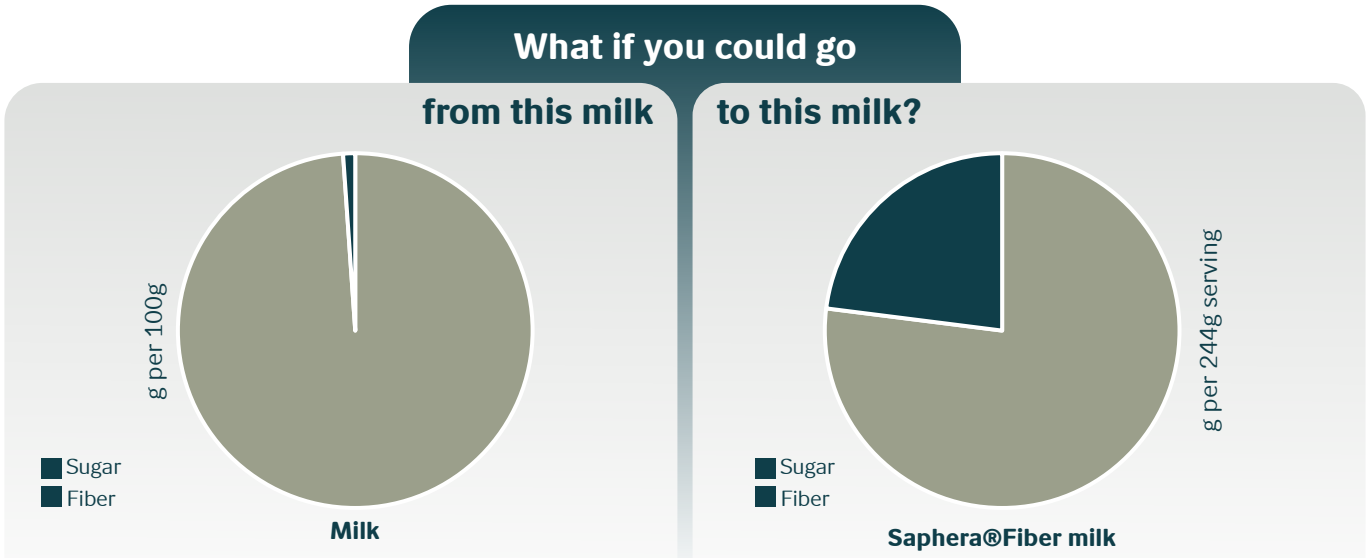
Many current solutions involve reformulation and the addition of new ingredients. And yet, if we think about what an ideal solution might look like, we could start by asking dairies a couple key questions:

- What if you could enrich your product with fiber and reduce the sugar and caloric content without changing the taste of their product?
- What if you could do this without adding more ingredients, but instead by using a biological solution that maintains the simple, wholesome image of traditional dairy products?



Composition of yogurt beverages products treated with and without Saphera® Fiber treatment.

For the model yogurt in Table 2, treatment with Saphera® Fiber can be expected to yield 3.4 g of fiber in a 170g serving of finished yogurt. In a Novozymes pilot-scale trial, test product was produced at North Carolina State University Food, Bioprocessing & Nutrition Sciences from pasteurized milk according to the process described above. Samples were stored at 4°C and analyzed for carbohydrate profile over time. Results shown in Figure 3 after 14-day storage validate that a claim of 3g fiber per 244g serving is supported.



Composition of milk products treated with and without Saphera® Fiber.

In a Novozymes pilot-scale trial, test product was produced at North Carolina State University Food, Bioprocessing & Nutrition Sciences from fresh pasteurized milk according to the process described above.

Samples were stored at 4°C and analyzed for carbohydrate profile over time. Results shown in Figure 3 over 30-day storage validate that claims of 3g fiber per 244g serving (US “good source”) and reduced sugar can be supported in this model.

The solution: Saphera® Fiber

Novozymes Saphera® Fiber is a beta-galactosidase that converts lactose (the sugar inherently in milk) into galacto-oligosaccharide (GOS) fiber.

As a conversion of lactose into GOS – and not an added ingredient – the enzyme simultaneously reduces sugar and calories while increasing fiber (fiber generated has the caloric value of 2 kcal/g whereas sugar has 4 kcal/g). This provides innovation opportunities for brands to combine fiber claims in reduced sugar product reformulation.

How does it work?

Saphera® Fiber converts lactose into GOS via a transferase process. During this process, galactose residue is transferred from the disaccharide lactose to a neighboring saccharide molecule, extending the length of the saccharide by one galactose unit.

This process repeats until maximum yield and the optimal fiber profile is reached. Once that occurs, the enzyme is heat inactivated and the process stops.

Illustration 1. How Saphera® Fiber works.

Key facts

- Saphera Fiber is a liquid food-grade enzyme product safe for use in the production of food and beverages.
- The shelf life of the commercial product is 24 months after production if stored at 0–10 °C/32–50 °F.
- The enzyme which is originated from *Bifidobacterium bifidum* has been produced by fermentation of a strain of *Bacillus licheniformis*.
- The enzyme is applied as a processing aid and typically doesn't need to be mentioned on the final product label. When labeling is needed, the enzyme can be labeled as "lactase" or "enzyme," which are familiar terms for a dairy ingredient label.

Application

The GOS can be made directly in milk. Add Saphera® Fiber to regular milk and incubate for 24 hours at 5–10°C followed by a heat inactivation process at e.g. 75°C for 5 minutes. Forty-five percent of the lactose is converted into total GOS of which 25% is GOS fiber.

- Higher yield can be obtained with higher concentration of lactose, such as in lactose syrup, concentrated milk or ultrafiltration permeate streams, as well as with higher temperature.
- Inactivation or highly reduced enzyme activity is important when the GOS have been made as the enzyme will hydrolyze the GOS formed to galactose and glucose at prolonged incubations.
- Dosage and process recommendation are specific to every set of substrate, temperature and time, please ask for specific suggestion to your Novozymes technical contact.

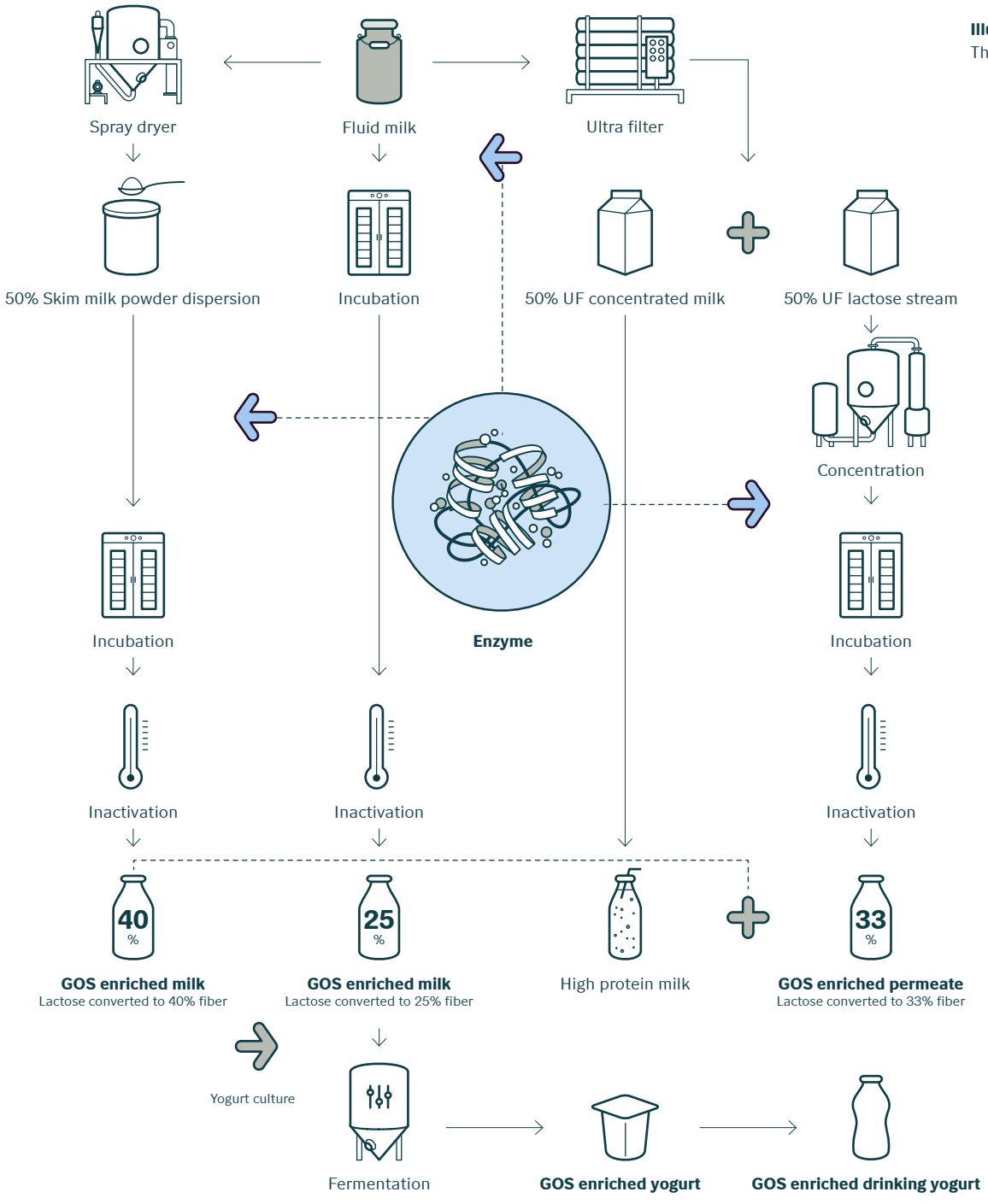


Illustration 2.
The process.

Key benefits of Saphera® Fiber

- Provides a double benefit of fiber enrichment and sugar reduction without deviating from the wholesome image of dairy products.
- Reduces sugar without reducing sweetness with no negative effects on taste and texture, maintaining the same sensory experience consumers expect.
- Is an in-situ conversion as opposed to an additional ingredient, which means it typically doesn't need to be mentioned on the final product label and, in most countries, does not restrict producers from use of the term "natural."
- Compared to other GOS enzyme offerings, it offers a high fiber yield at milk's natural lactose levels and is a stable and easy-to-handle liquid formulation.

Can we help with any reformulation challenges in your dairy production?
Click **below** to be contacted by a Novozymes account manager.

Get in touch

About Novozymes
Novozymes is the world leader in biological solutions. Together with customers, partners and the global community, we improve industrial performance while preserving the planet's resources and helping build better lives. As the world's largest provider of enzyme and microbial technologies, our bioinnovation enables higher agricultural yields, low-temperature washing, energy-efficient production, renewable fuel and many other benefits that we rely on today and in the future.

We call it Rethink Tomorrow.

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