



**All the food  
claims and  
benefits you need  
to keep dairy  
consumers  
healthier, and  
happier**



# Consumer trends urge change

From gut and bone health to weight management, dairy consumers are becoming increasingly aware of the benefits of low sugar and high fiber. Now, consumer studies show that they want more ways to incorporate healthy dairy 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.

Are you one of them?

Luckily, all the desired claims and benefits lay within your raw material, milk.

Create yogurt with less-added sugar and low-fat, lactose-free milk, hypoallergenic infant formula, and more. Here's how.

## Succeed by unlocking more of the magic of your raw materials



Lactose free claim

Milk

Yogurt



Increased fiber claim

Yogurt



Reduced sugar claims

Milk

Yogurt



Improved texture

Yogurt

White cheese



Improved taste

Whey protein

Cheese flavors (EMC)



Reduced allergenicity

Infant formula

# 'Lactose free' claim

## Growth in the lactose-free category is picking up steam as consumers shift to healthy dairy

### 2X GROWTH VS. PLANT MILK

- The growth rate of the plant milk category was 2.8% while that of lactose-free cow milk was **9%**.
- 2.8% growth in plant milks is only slightly ahead of whole milk, a category **twice** its size.
- In the first eight months of 2021, Americans bought an **additional \$101 million of lactose-free cow milk** compared to \$50 million more plant-based milk.

**81%** consumers says it is somewhat important or of high importance that their dairy products are healthy

# Lactose-free goes WAY beyond lactose intolerance

- Life-style choices
- Gut health
- Reduced sugar foods
- Personalized diet

### Wide choice of low-lactose dairy products



Dulce de leche  
UHT-milk  
Ice Cream  
Butter  
Yogurt  
Infant food  
Cream  
Fresh milk  
Cheese  
Sweet milk drinks



# Saphera®

First lactase from a strain of **Bifidobacterium**



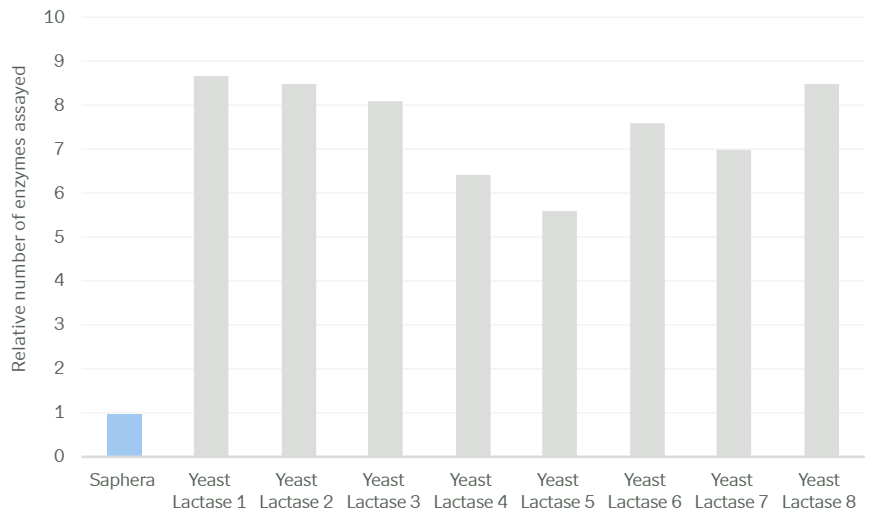
**Advantages over yeast lactase platforms:**

- 1. Superior purity
- 2. Better performance at reduced pH

## Novozymes Saphera® is an exceptionally pure lactase

### 1 Saphera contains one detectable enzyme

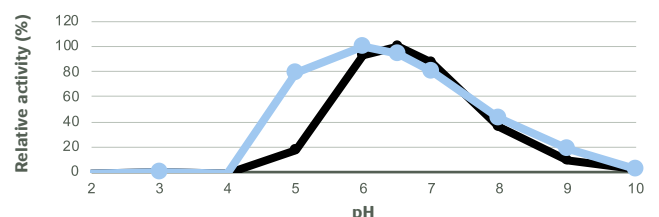
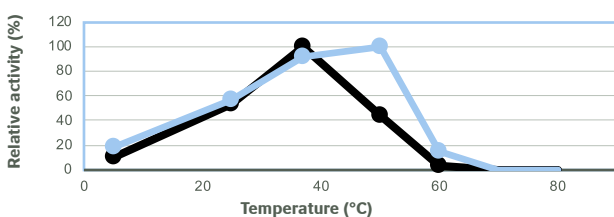
Free of invertase, protease and arylsulfatase



## Novozymes Saphera® works efficiently even at low pH and higher temperatures

- **Stable at elevated temperatures**
- Saphera is less temperature sensitive than classic yeast lactases allowing you greater process flexibility in your operation

- **Stable even at low pH**
- Saphera is a very versatile lactase, that works very efficient across product categories. The unique pH profile allows you to efficiently use Saphera for both low pH fermented products and for low lactose milk



■ Classic Yeast Lactase ■ Saphera®

■ Classic Yeast Lactase ■ Saphera®



# A range of lactases to meet your needs

Product	Product description	Product Category
Saphera® 2600 L	Highly versatile lactase that works efficiently across pH and temperature ranges with high purity delivering a clean taste and superior process filterability	Milk Yogurt Ice cream
Saphera® 900 LS	Sterile lactase UHT processing using Tetra Pak® Flexdos™ systems	Milk
Lactozym® Pure 6500 L	Highly pure lactase suitable for organic certified dairy products	Milk Yogurt Ice cream
Lactozym Pure® Conc G	Granulated lactase for specialty applications (including Infant Formula)	Infant formula



**‘Reduced  
sugar’  
claim**





Rebirth of fat puts sugar reduction in the spotlight

**16%**

of Americans seeing fat as the nutrient most likely to cause weight gain compared with **48%** blaming carbs and sugar

New Nutrition - 10 Key Trends in Food, Nutrition & Health 2021

## Spotlight on sugar reduction in dairy offerings



**8 in 10**

U.S. consumers are engaged in sugar reduction



**69%**

Believe it is more important in dairy offerings

# Keep it natural

*Subtracting sugar usually means adding something to your formulation*



Expensive alternative sweeteners



Longer label



Unpredictable costs / supply chain?

## But what if...

*You could reduce sugar in a simple natural way*

Go from here

To here

Nutrition Facts	
1 servings per container	
Serving size	1 cup (250ml)
Amount Per Serving	
<b>Calories</b>	<b>180</b>
% Daily Value*	
Total Fat 5g	6%
Saturated Fat 2.95g	15%
Trans Fat 0g	
Cholesterol 20mg	7%
Sodium 160mg	7%
Total Carbohydrate 27g	10%
Dietary Fiber 2g	7%
Total Sugars 21g	
Includes 9g Added Sugars	18%
Protein 7g	14%

Nutrition Facts	
1 servings per container	
Serving size	1 cup (250ml)
Amount Per Serving	
<b>Calories</b>	<b>190</b>
% Daily Value*	
Total Fat 5g	6%
Saturated Fat 2.95g	15%
Trans Fat 0g	
Cholesterol 20mg	7%
Sodium 160mg	7%
Total Carbohydrate 30g	11%
Dietary Fiber 2g	7%
Total Sugars 24g	
Includes 12g Added Sugars	24%
Protein 7g	14%

OR

Go from here

To here

Nutrition Facts	
1 servings per container	
Serving size	240 mL
Amount Per Serving	
<b>Calories</b>	<b>190</b>
% Daily Value*	
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 5mg	2%
Sodium 150mg	7%
Total Carbohydrate 34g	12%
Dietary Fiber 0g	0%
Total Sugars 34g	
Includes 19g Added Sugars	38%
Protein 10g	20%

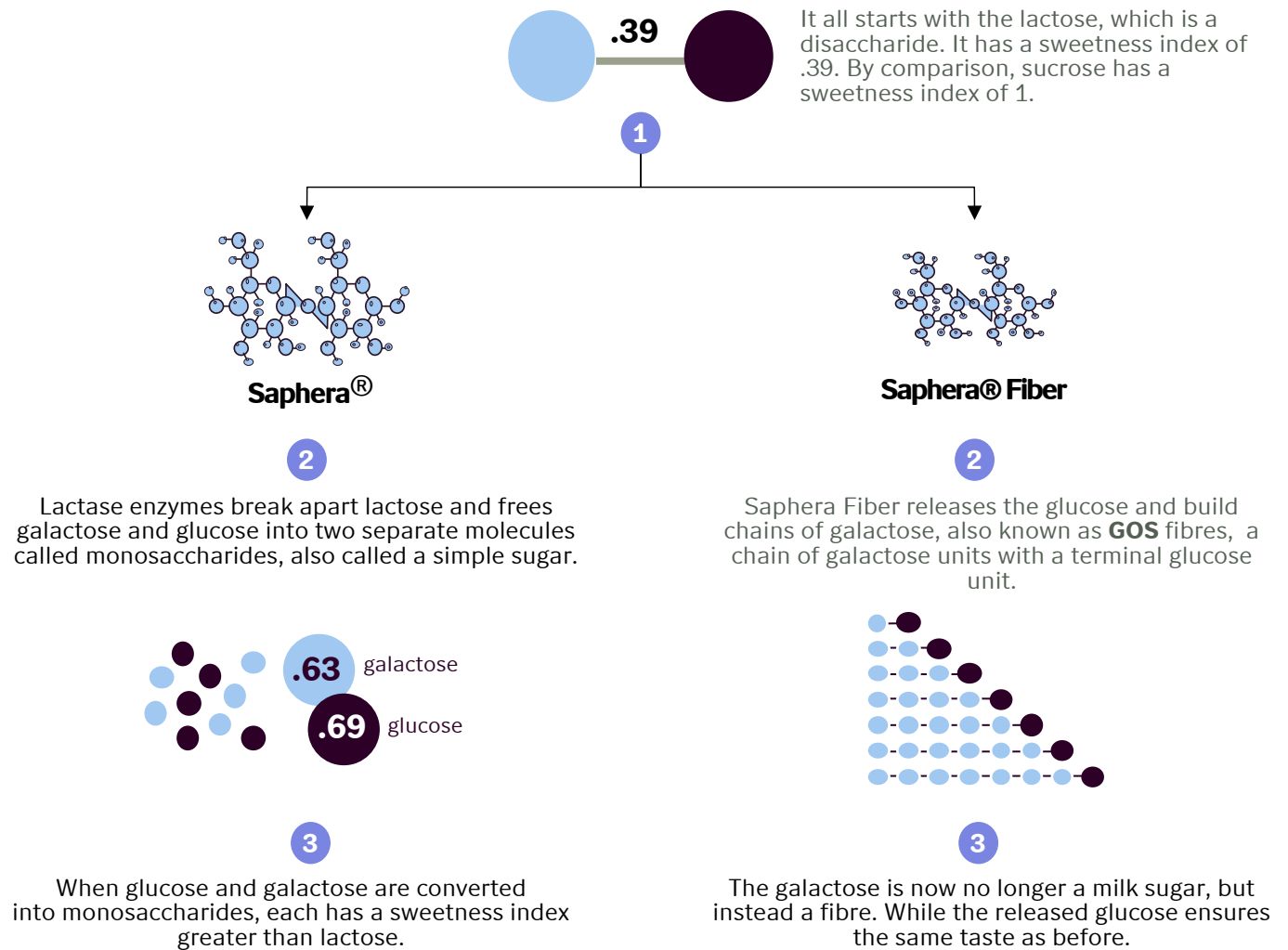
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Trans Fat 0g	
Cholesterol 5mg	2%
Sodium 150mg	7%
Total Carbohydrate 34g	12%
Dietary Fiber 3g	11%
Total Sugars 30g	
Includes 19g Added Sugars	38%
Protein 10g	20%

*...By only adding a lactase*



# The answer is hiding in plain sight....

*Two paths to unlocking sugar reduction, naturally*



## A range of solutions to meet your sugar reduction needs

Product	Product description	Product Category
Saphera® 2600 L	Boost sweetness and reduced added sugar by up to 30%*	Milk Yogurt Ice cream
Saphera® + TasteGem®	Boost sweetness and reduce added sugar by up to 50%*	Milk
Saphera® Fiber	Lactose sugar converted to fibre, up to 25%* total sugar reduction	Milk Yogurt Ice cream



**‘Increased  
fiber’ claim**



# It's no secret that consumers are demanding healthy dairy

Yet we also know they are scrutinizing labels more and more



**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

## Various approaches available to enrich in fiber. Some solutions may have important limitations



### Fiber ingredients

- Inulin
- Fructo-oligosaccharides
- Polydextrose
- Soluble corn fiber
- Cellulose
- High amylose starch (resistant starch 2)
- Mixed plant cell wall fibers
- Arabinoxylan
- Alginate

### Factors that influence how to produce your dairy

- **Taste**
- **Texture**
- **Consumer perception**
- Naturalness
- Regulation/labelling
- Calories
- Product availability
- Product formulation
- Cost

### Risk that consumers

- Shift to other brands
- Move away from dairy (non-dairy alternatives)
- Deciding to incorporate fiber using other means (dietary supplements)

Note: only indicates most used ingredients and hence not an exhaustive list

# How Saphera Fiber works

## Boost nutrition in-situ



Lactose

Saphera® Fiber

Beta-galactosidase Enzyme

GOS are a chain of galactose units with a terminal glucose unit

GOS are resistant to hydrolysis by digestive enzymes and thus can be claimed as a dietary fiber

# Saphera® Fiber increases fiber content while reducing sugar without adding ingredients



### Novozymes solution

- A beta-galactosidase enzyme that convert lactose contained in the milk into GOS fiber.
- The enzyme simultaneously increase fiber while reducing sugar and calories.
- It provides innovation opportunities for brands to combine fiber claims in reduced sugar product formulation.

### Differentiators


- Compared to fiber ingredient**
- Double benefit of fiber enrichment and sugar reduction
  - No negative effects on taste and texture. Reducing sugar without reducing sweetness.
  - In-situ conversion i.e. smaller ingredient list (1), simple food recipes, naturality (2)
  - Positive consumer perception of GOS
- Compared to other GOS enzymes**
- High fiber yield, stable and easy to handle solution

(1) our enzyme is applied as a processing aid and typically doesn't need to be mentioned on the final product label  
 (2) in most countries, the immediate interpretation would be that the application of enzymes as processing aids in the production of foods does not in itself restrict the use of the term 'natural'



Novozymes

All the food claims and benefits you need to keep dairy consumers healthier, an



**Improved  
texture**  
Low fat  
yogurt

# Healthy nutrition trends mean significant growth potential for low-fat yogurt



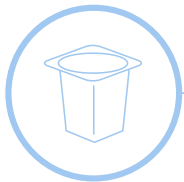
## Health consciousness is the new norm

Over **50%** of consumers believe that being healthy means eating a balanced diet, and nutrition in dairy products, esp. yogurt is highly valued



## Sensory/quality and taste drives preference

Conscious indulgence is on the rise, with consumers seeking a better eating experience, texture and mouth feel in their healthy food choices. Running consistency or whey separation on the surface of yogurt are defects adversely affecting the sensory experience.



## Clean label is preferred

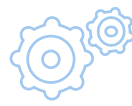
**56%** of yogurt consumers in the UK would choose a yogurt with a short ingredients list over one with a long list.

## Runny texture and syneresis are keys challenges in low-fat yogurt that require unique solutions

To create a desirable texture in low-fat yogurt stabilizers (gelatine, gums, modified starch) or skim milk powder can be used, BUT they add costs and must be labelled.



Runny texture  
In low-fat yogurt



Syneresis (whey separation)



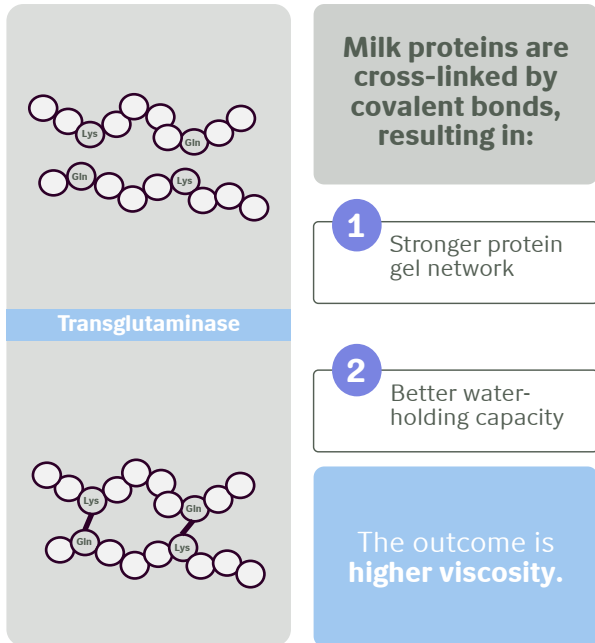
**What if you could improve the texture without compromising your clean label cost?**



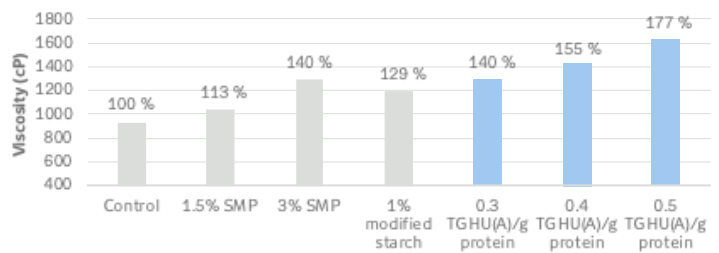
# Galaya Prime

Liquid transglutaminase solution, to help you improve texture, and creaminess in low-fat yogurts

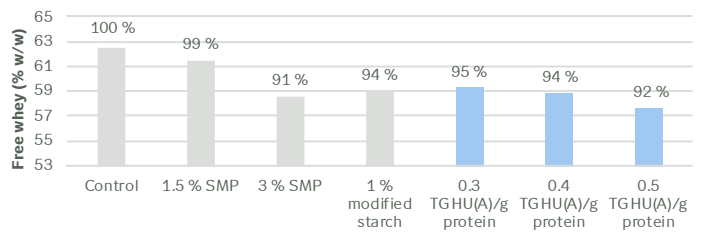
## How does Galaya® Prime work?



Increased yogurt viscosity



Reduced syneresis (whey separation)



Reduce syneresis and increase viscosity with

# Galaya® Prime

Your new easy-to-use solution for texturization



### Easy to use

- Liquid formulation
- Simple integration into the existing dairy manufacturing process
- No need to pre-dissolve
- Low dosage requirements
- Cold storage



### Label-friendly solution

- In compliance with processing aid definition



### Superior quality & safety

- High purity
- Safe in use and




### Cost-effective tool to improve texture

- Low cost-in-use

Novozymes

All the food claims and benefits you need to keep dairy consumers healthier, an

A photograph of two men playing tennis on a clay court. The man on the left is older with white hair, wearing a white polo shirt, and is smiling broadly. The man on the right is younger, wearing a blue polo shirt, and is also smiling. They are both holding tennis rackets. The background is a bright, sunny outdoor setting. A large, stylized white graphic of a tennis racket head is overlaid on the right side of the image.

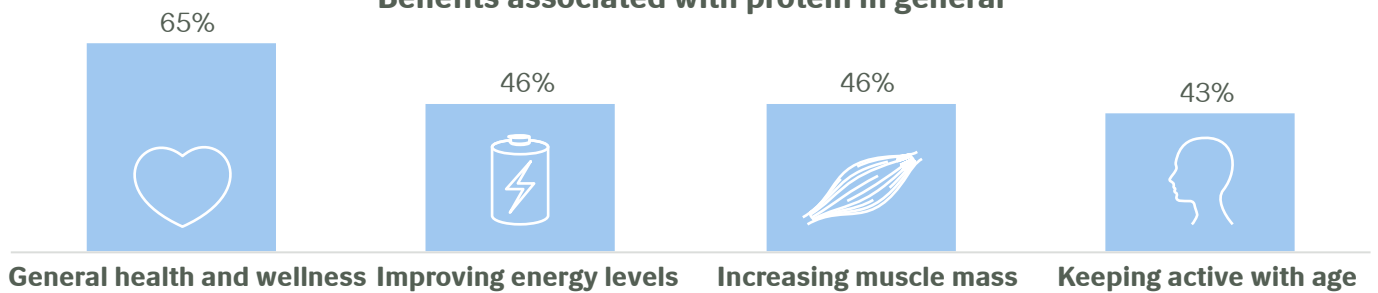
**Better  
tasting whey  
protein  
hydrolysates**



# Protein enriched beverages go mainstream as consumers look to boost overall health and well-being

According to consumer survey by FMCG Gurus\*, approx. 45% said that they would like to increase protein content in their diets

## Benefits associated with protein in general



In the same consumer survey, ~41% buyers of sports nutrition products were **health-conscious consumers** who bought the products to help them get through everyday life and to boost health

## But new product development for functional protein beverages must meet the demands of this wider consumer base



Visual appearance: improved clarity, less turbidity



Clean (and shorter) label



Taste: less bitter



Convenience: shelf-stable beverages

# Today protein ingredient requirements in ready-to-drink beverages cannot always be met by dairy proteins

# What if you could deliver better WPH for the growing market of Ready-To-Drink high protein beverages

With Formea Prime you get the best solution for RTD shelf-stable high protein, neutral pH beverages:

## Stability

- Ready-To-Drink high protein shelf-stable beverages can have challenges related to whey protein stability which impacts clarity in the final product

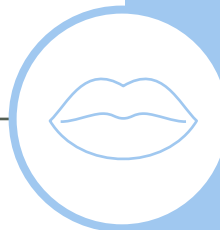


## Shelf-life stable and clear

- Peptides generated that do not aggregate or gel

## Bitterness

- Hydrolyzing whey protein with a **protease** is an option but has the drawback of generating bitterness

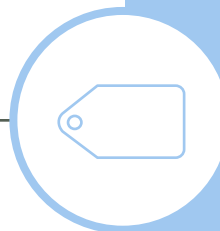


## Minimal bitterness

- Low degree of hydrolysis; non bitter peptides generated during hydrolysis

## Clean label concerns

- Beverage producers often need to use ingredients to mask bitterness, but this can add cost, have label implications, and create other formulation challenges



## Cleaner label

- No added ingredient to mask bitterness



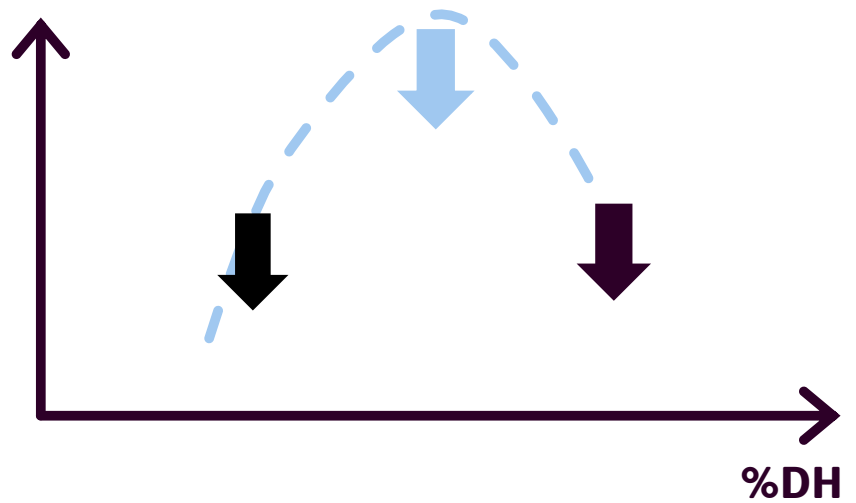


# Formea Prime eliminates bitterness because of its unique specificity

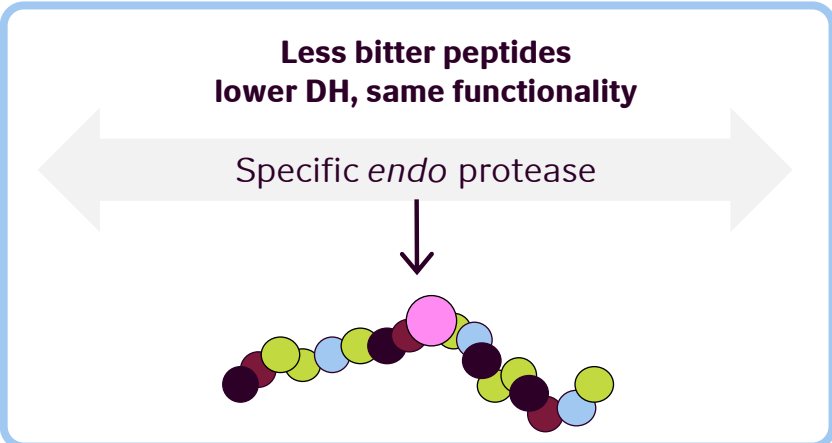
**Bitterness is caused by several factors such as:**

- Peptide hydrophobicity (Q-score)
- Peptide length
- Position of hydrophobic amino acids, e.g C or N-terminal
- Spatial structure

## Bitterness

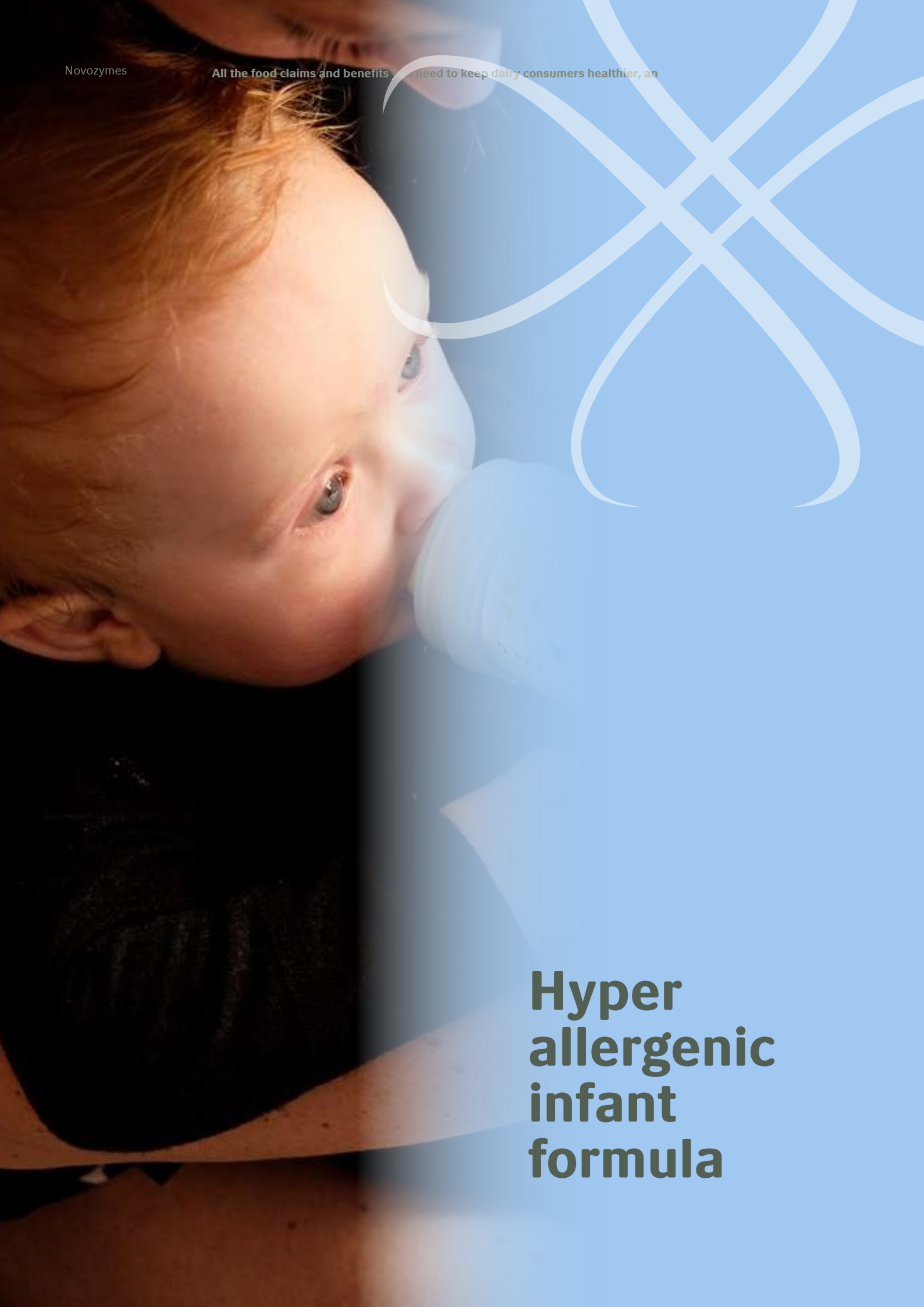


## Bitterness can be reduced by:



Novozymes

All the food claims and benefits you need to keep dairy consumers healthier, an

A close-up photograph of a baby with red hair drinking from a white bottle. The image is overlaid with a semi-transparent blue area on the right side, which contains white decorative lines forming a stylized, overlapping circular pattern. The text is positioned in the bottom right corner of this blue area.

# Hyper allergenic infant formula



# Hypo-allergenic (HA) milk formula ensures essential nutrients to high-risk infants



First-life-stage infants are dependent on milk



Milk is only protein source in early life stages



Allergic reactions to milk proteins sometimes occur



HA milk formula growing at **5.4%** globally



Highest growth rates are in emerging markets  
*High single digit growth*



Increasing demand for halal and kosher certified products  
*Muslim and Jewish populations to be **1/3** of the population by 2060*



# Today's solutions do not meet market demands and add complexity in your supply chain

The majority of today's HA products are made with animal-based trypsin preparations

Broad spectrum microbial solution are used to address halal markets



## Unsuitable sourcing

Unsuited for Halal markets and consumers



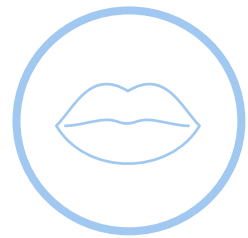
## Price Fluctuations

Due to virus outbreaks and limited resources



## Tight Requirements

Documentation on the origin of glands and limitations on sources



## Bitter taste

]Bitter taste due to low enzyme specificity

# What if you could have a microbial solution...



## Suited for everyone

*Designed for all babies, despite provenance and religion*



## Good tasting

*To ensure the correct protein intake*



## Cost stable

*Not subjected to ingredient price fluctuations and tight requirements*

# Introducing a unique innovation: **Novozymes Formea®**

A microbial trypsin/chymotrypsin solution designed for infant formula producers

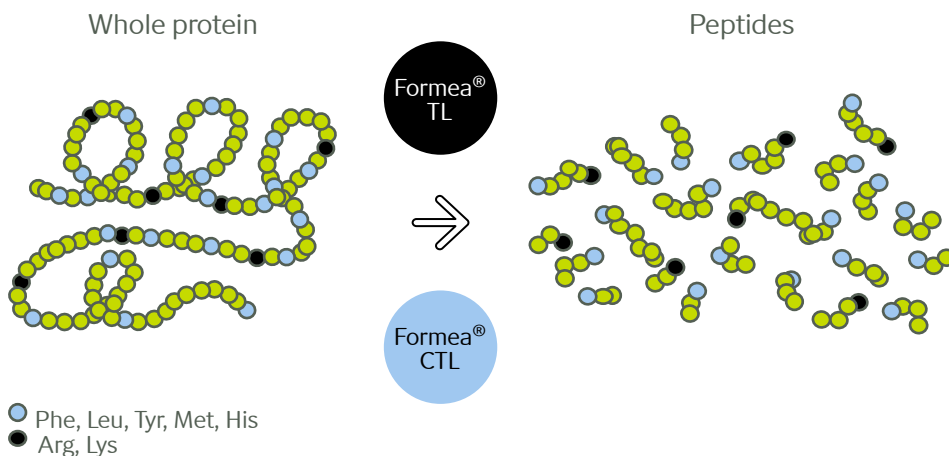
- A microbial trypsin/chymotrypsin solution designed for infant formula producers providing a great peptide profile
- Two individual components (Formea® TL and CTL) allowing for full flexibility to create the best profile for your milk formula
- Eliminates natural variations and deliver consistent quality suited for infants across the world

## Highly flexible

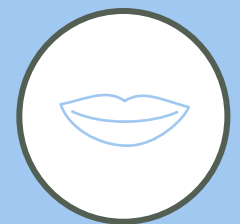
Two individual components to create the best profile for your milk formula

## Consistent

Eliminates natural variations. Deliver consistent quality suited for infants across the world



**Halal and Kosher certified**



**Good tasting**



**Free from additives and preservatives**



**Cost stable**

# The complete Novozymes dairy portfolio

Application	Product	Description	Packaging (KG)	Enzyme type
Low lactose and sugar reduction	Saphera® 2600 L	Highly versatile lactase with highest purity for all dairy application	5,25,1100	Bacterial Lactase
	Saphera® 900 LS	Sterile lactase version for use in in-line dosing systems	5.7 and 11.4	
	Saphera® Fiber L	Lactase variant for in-situ GOS fiber generation and sugar reduction	5,25,1100	
	Lactozym Pure® 6500 L	Highly pure lactase suitable for organic dairy	5,25,1000	Yeast Lactase
	Lactozym Pure® Conc G	Granulated lactase available for specialty applications (including Infant Formula)	5	
Dairy protein hydrolysis	Formea® CTL 300 BG	Kosher/Halal certified microbial based Trypsin and Chymotrypsin for hyper allergenic infant formula	10	Microbial trypsin
	Formea® TL 1200 BG			
	Formea® Prime	Highly specific protease for production of non-bitter dairy proteins	5,25	Protease
	Alcalase® Conc BG	Hydrolyzing dairy proteins to improve functional properties	10	
	Neutrase® Conc BG		10	
	Flavourzyme® Conc BG	Improving the taste of hydrolyzed dairy protein	15	
Texture improvement	Galaya® Prime	Reduce syneresis and increase viscosity in low fat yogurt. Increase yield in white brine cheese	5,25,1100	Transglutaminase
Cheese flavors	Palatase® 20000 L	Developing distinct cheese flavors	5,25,1100	Lipase
	Flavourzyme® 1000 L		25,1100	Aminopeptidase



# Make Novozymes your trusted innovation partner

Novozymes is your trusted partner and all-rounded enzyme supplier for dairy with best-in-class capabilities and the broadest portfolio in the industry, including enzymes with unique functionalities and enzymes suitable for organic production.

- ✓ Superior know-how in technical implementation
- ✓ Reliable supply chain with state of the art production facilities in four continents
- ✓ Best in class industrial microbial enzymes with consistent product quality, yielding superior performance compared to animal and plant-based enzymes
- ✓ All our enzymes have gone through the strictest safety and quality testing
- ✓ Our enzymes can help reduce the CO2 footprint of final products



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.

## Novozymes A/S

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