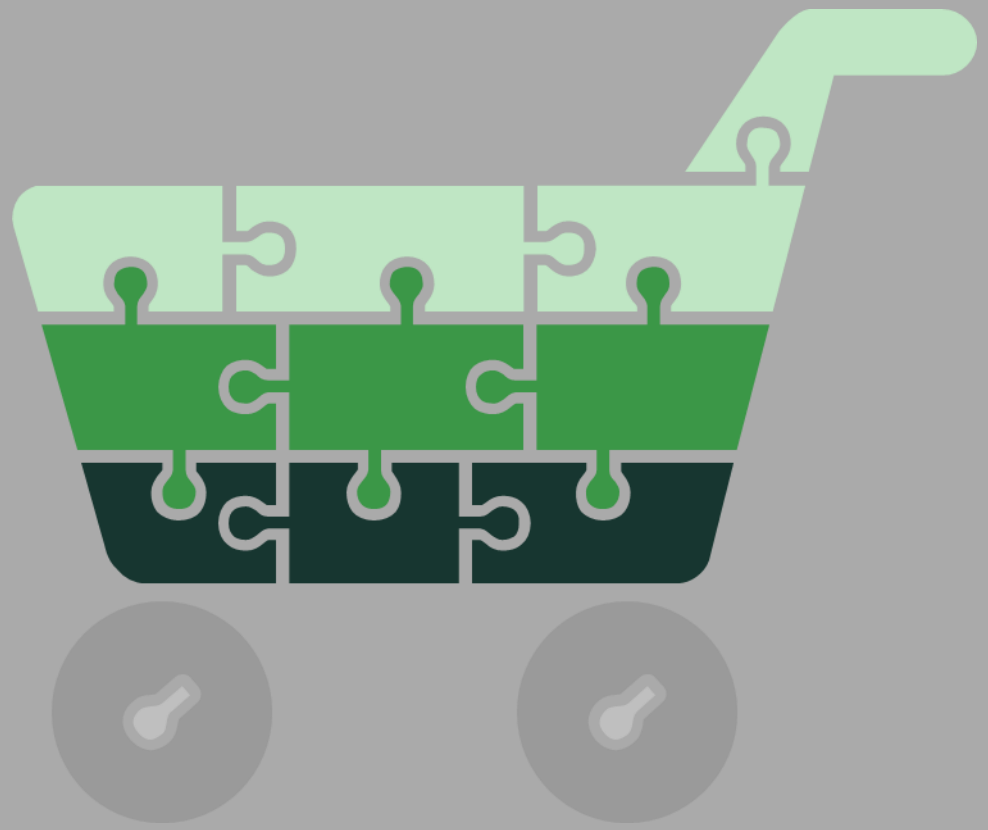
22nd October 2025

novonesis

Biosolutions to overcome textural challenges in plant-based yogurt

Indumathi KP
Applications Sr Scientist

Top purchase drivers for food



Source: Novonesis plant-based consumer study

#1 **Taste and texture**
continue to be the top priority for consumers in the food purchases

#2 **Price** and trusted **brands**
are still a high priority for consumers when determining what consumers purchase

#3 **Natural/minimal processing** and **convenience**
are key triggers for consumers when looking for healthier foods

#4 **Sustainability**
is a rising priority for consumers, but still is low on the priority lists for purchasing

novonesis

Yogurt Packaging Claims-worth paying a premium for

3 Key Areas of Emphasis

High Protein Claims

Protein is key area of need for many plant-based consumers. When looking for plant-based yogurt products high protein claims are one of the top ways to make your products stand-out in the market

Reduced Sugar Claims

Sugar remains a high priority for consumers and plant-based yogurt consumers give it even more considerations as yogurt and plant-based yogurts can have high amounts of sugar and added sugar

Healthy digestion/Fiber

Gut health and digestion are key areas of health focus for consumers and yogurt is already well-positioned in consumers' minds to support them in getting probiotics or fiber

Source: Novonesis plant-based consumer study

What consumers say

Tasted absolutely horrible. Too thick and tasted like ***gruel*** due to the high protein"

"The aftertaste is like medicine. The yogurt is ***granulated***, most likely from the protein."

"I bought this because it said "creamy". It is ***not creamy***, it is simply awful. After eating a little bit, I had a bad taste in my throat for hours."

"The pea protein in this product give this yogurt a vegetal taste. The texture is ***gritty*** and the cinnamon could be dialed down a bit."

"I couldn't get past the ***gritty texture***. If you're like me and need your yogurt to be completely smooth, I'd stay away from it."

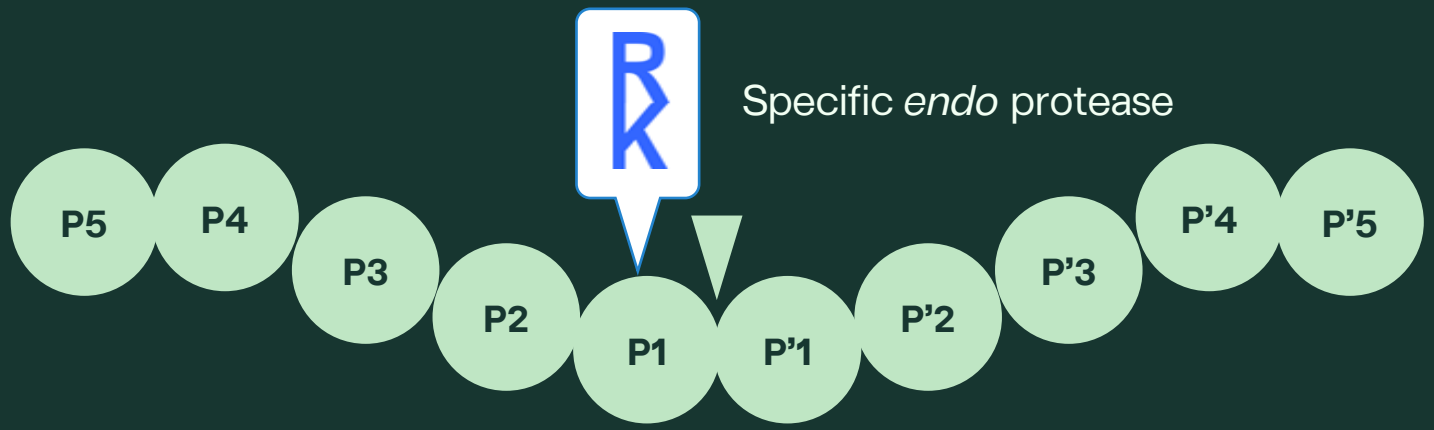
"Even blended into my smoothies it makes things ***hard to swallow***. It's ***grainy*** and has a terrible taste. I don't mind the sourness because that's what I liked about Greek yogurts, but this definitely **doesn't have the smooth texture**."

Source: Online grocery retailers product reviews

novonesis

Vertera® Smooth for a smooth high protein yogurt

Vertera® Smooth is a serine (trypsin-like) endo-protease, preferring to cleave at only 2 different, non-hydrophobic amino acids **Arginine and Lysine**

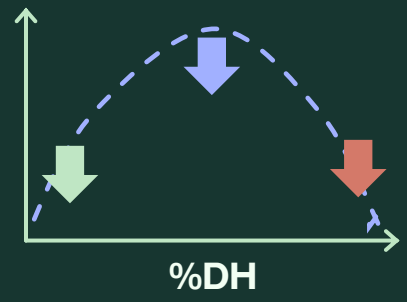


Hydrolysis is limited: few cuts,
Lower DH→ less bitter peptides without losing functionality

Some bitterness causing factors:

- Peptide hydrophobicity
- Peptide length
- Position of hydrophobic amino acids, e.g C or N-terminal
- Spatial structure
- **% Degree of hydrolysis**

Bitterness

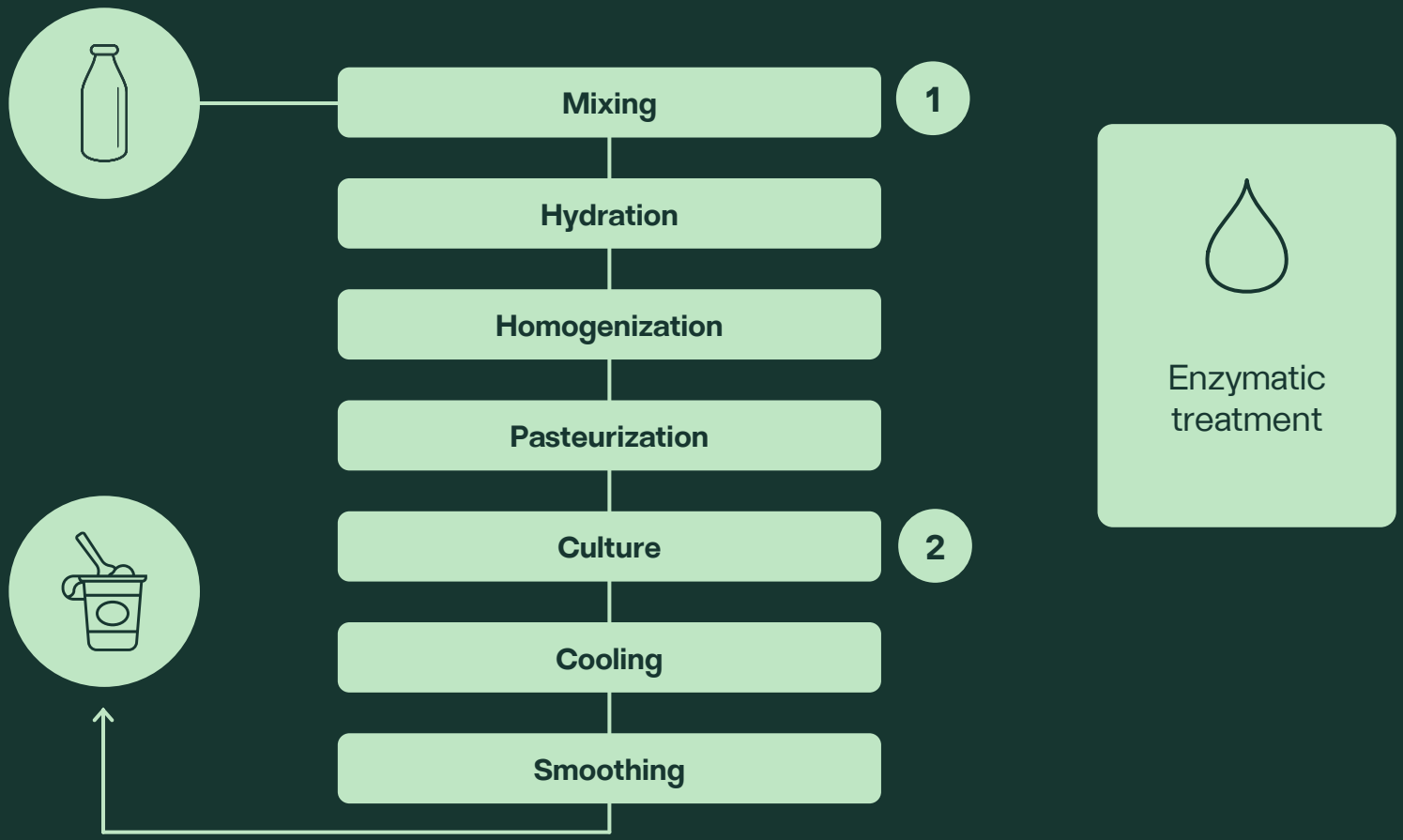


novonesis

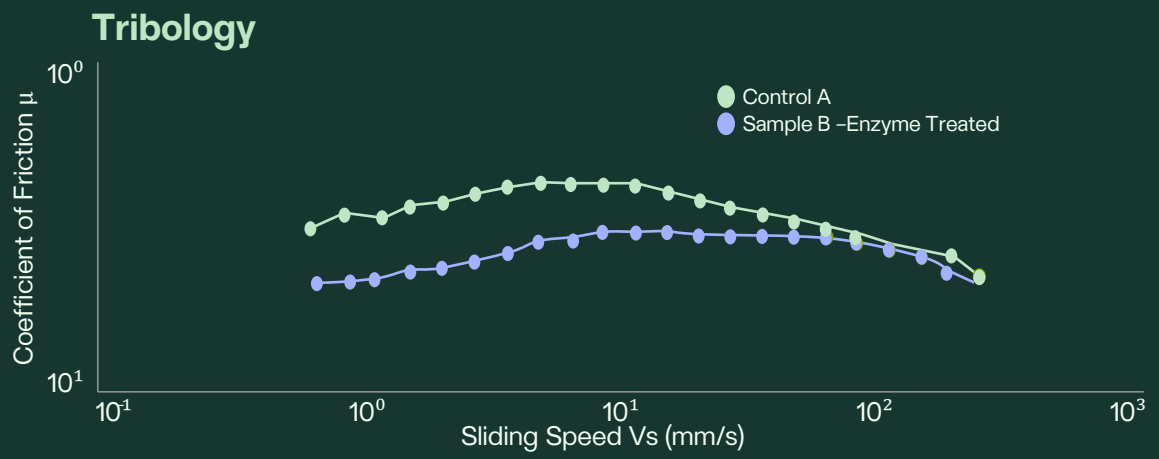
Seamless integration with existing process

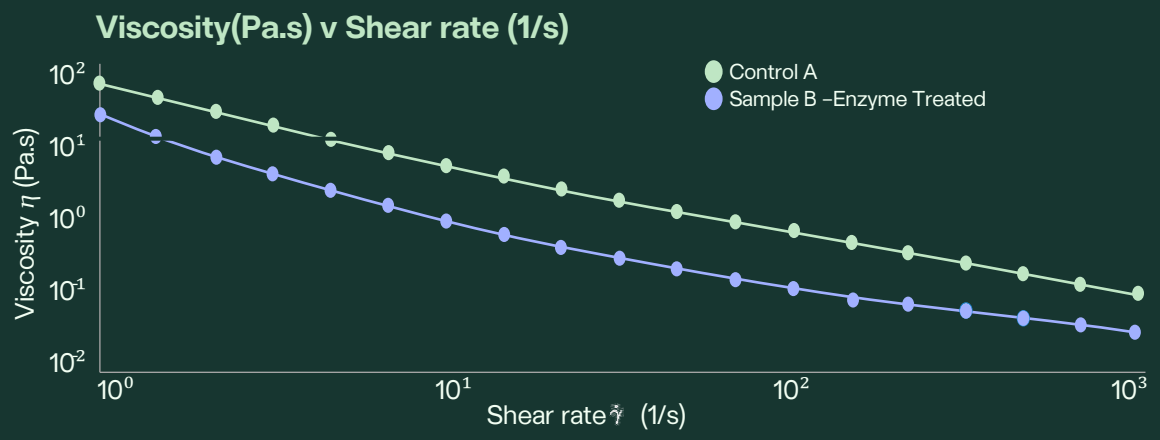
Two process options:

1. Addition of enzyme at mixing step (1h @ 50°C or overnight at 5 °C) – followed by pasteurization and acidification
2. Addition of enzyme at start of acidification (simple-no CapEx required) – enzyme works optimally at the initial pH



Dial in viscosity and improve smoothness

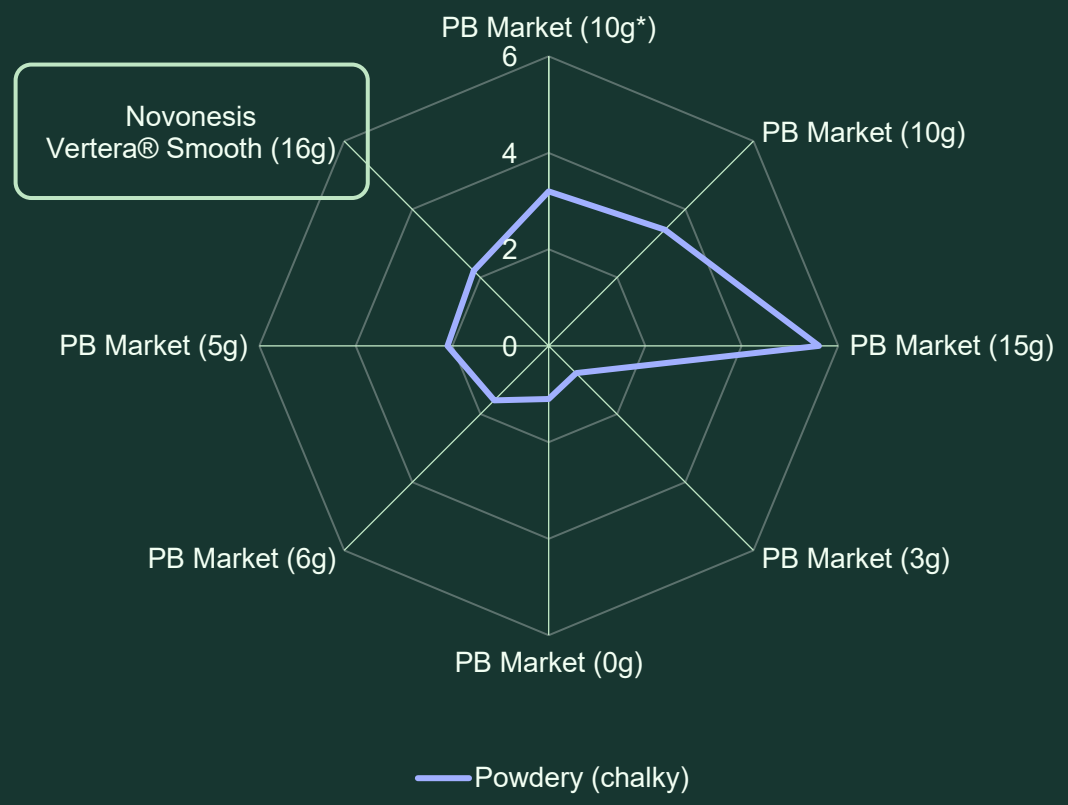




Decrease in Viscosity with Increase in Enzyme Dosage

novonesis

Use Vertera® to Boost nutrition without sacrificing texture



Nutrition Facts

servings per container

Serving size **(150g)**

Amount per serving

Calories **140**

	% Daily Value*
Total Fat 4g	**5%**
Saturated Fat 2.5g	**13%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 150mg	**7%**
Total Carbohydrate 10g	**4%**
Dietary Fiber 1g	**4%**
Total Sugars 7g	
Includes 7g Added Sugars	**14%**
Protein 16g	**23%**
Vitamin D 4mcg	20%
Calcium 257mg	20%
Iron 2mg	10%
Potassium 41mg	0%

*The % Daily Value tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Control

Enzyme treated

INGREDIENTS: Water, Pea Protein Isolate, Cane Sugar, Coconut Oil, Tapioca Starch, Tricalcium Phosphate, Pectin, Potassium Sorbate, **Vitamin K2-7**, Vitamin D3, contains less than 1% of Cultures, Flavor

* Amount of protein in grams per 150g serving

novonesis

Novonesis Biosolutions enable

- **Simple** ingredients
- Up to **16g protein** from plant-based sources
- Protein claims without compromising on **taste and texture**

novonesis

Plant-based fermented Vertera® toolbox

Taste and Texture

Robust starter cultures

ADJUNCT CULTURES:

Vertera® Boost LA
Vertera® Boost LP
Vertera® Boost LH
Vertera® Boost PA

+ Vertera® Smooth (Enzyme)

Health

The world's most-researched probiotics

Vertera® nu-trish® BY-101
Vertera® nu-trish® GY-101

ADJUNCT CULTURES:

Vertera® BB-12®
Vertera® LGG®
Vertera® L. CASEI 431®

Sustainability

Effective bioprotection

ADJUNCT CULTURE:

Vertera® FreshQ® 101

novonesis

Robust and consistent fermentation with Vertera® Harmony, Vertera® Classic, Vertera® Premium and Vertera® Vibe in oat base

Ingredients of oat base

Oat base 77% (70% water, 30% oat), water 22% and 1% sucrose

Nutritional value :

Fat	2.2%
Protein	3.5%
Carbohydrates	18 %
Sugar	13 %

Cultures:

- Vertera® Premium
- Vertera® Vibe
- Vertera® Classic
- Vertera® Harmony

→ Compounding of the base

↓

→ Two-stage homogenization

↓

Pasteurization

↓

→ Fermentation

↓

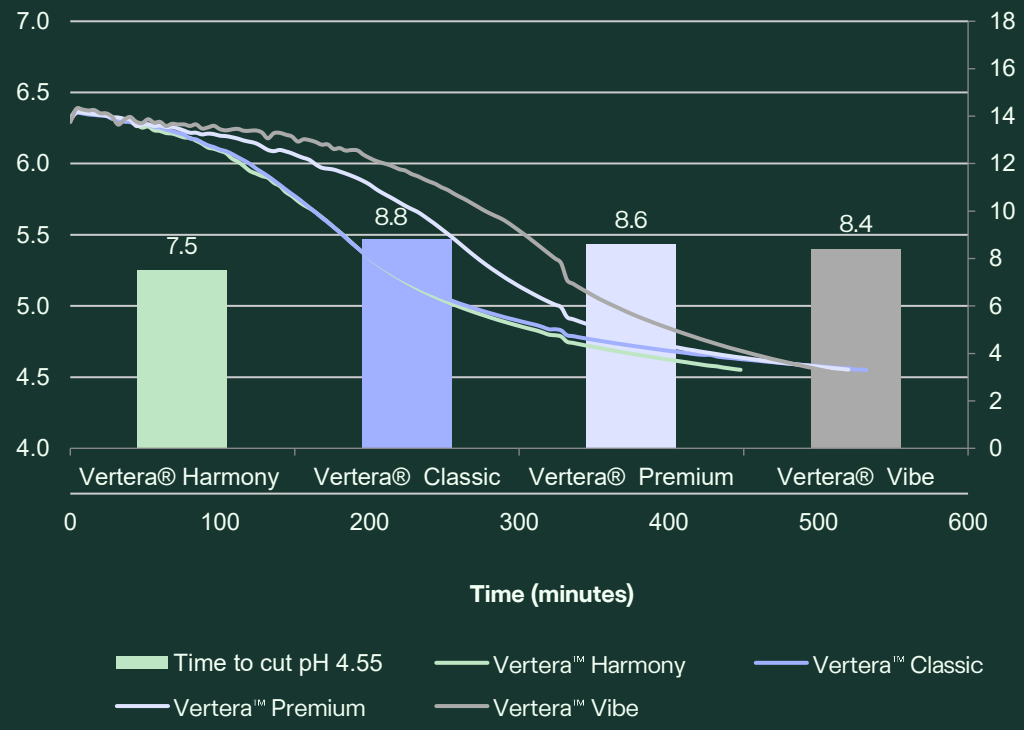
Cooling and smoothening

↓

Filling and cooling

Fermentation profile at 37 ⁰C in oat

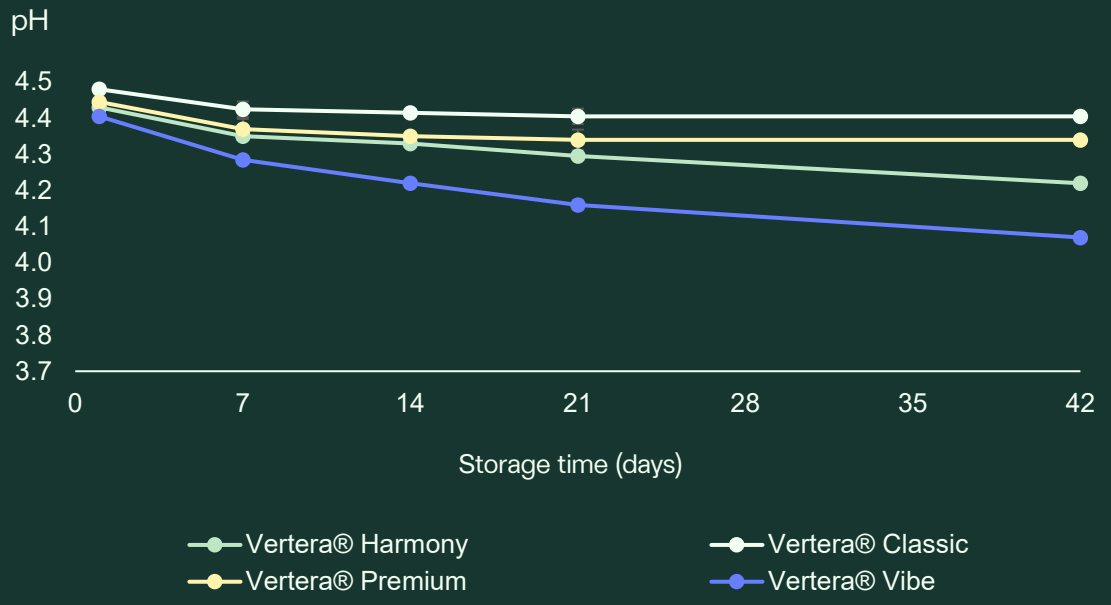
pH (left y-axis); fermentation time, hours (right y-axis)



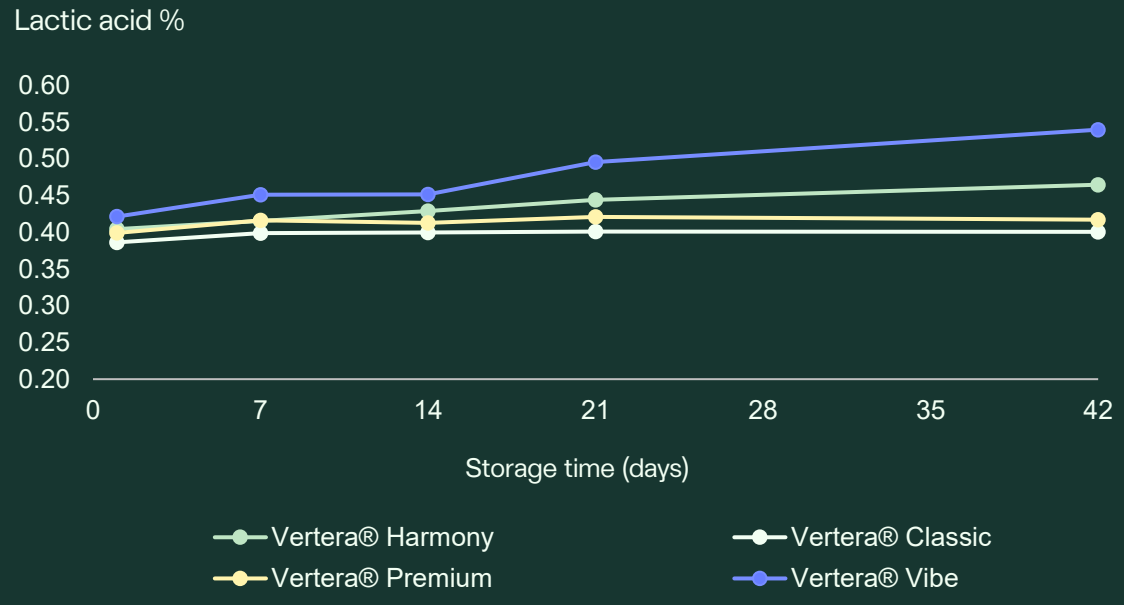
novonesis

Post-acidification and titratable acidity of Vertera® Harmony, Vertera® Classic, Vertera® Premium and Vertera® Vibe in oat base

Post acidification at 6 °C in oat



Titratable acidity in oat

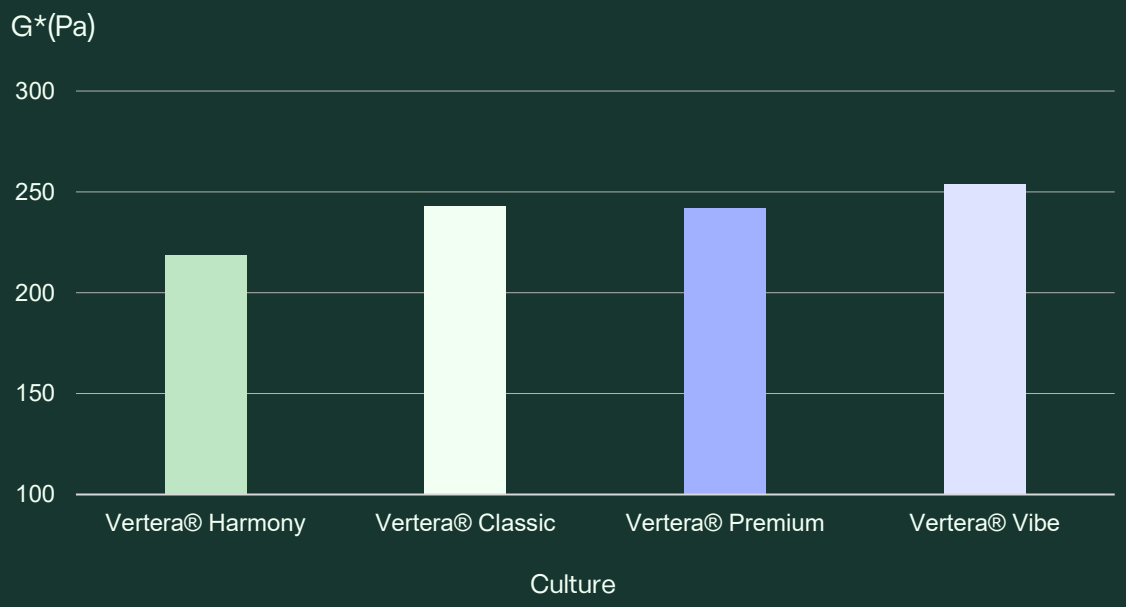


- **Stable post-acidification** and **titratable acidity** throughout shelf life with both **Vertera® Premium** and **Vertera® Classic** cultures
- Drop of pH up to 4.0 for Vertera™ Vibe and Vertera™ Harmony through shelf life

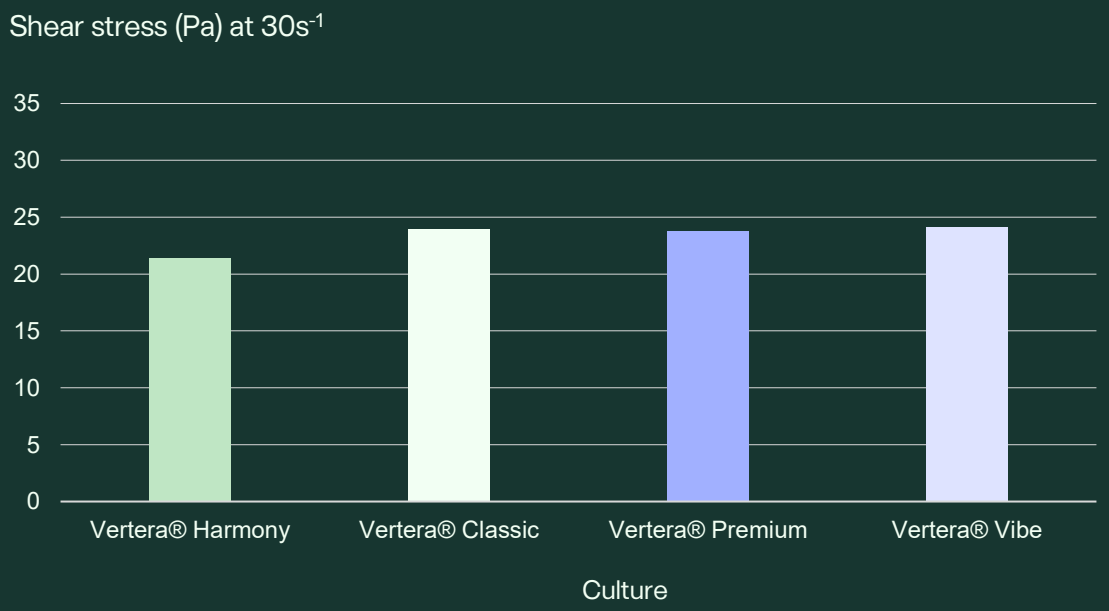
novonesis

Rheological characterization of Vertera® Harmony, Vertera® Classic, Vertera® Premium and Vertera® Vibe in oat base

Gel firmness (G*) in oat



Mouth thickness (shear stress at 30s^{-1}) in oat

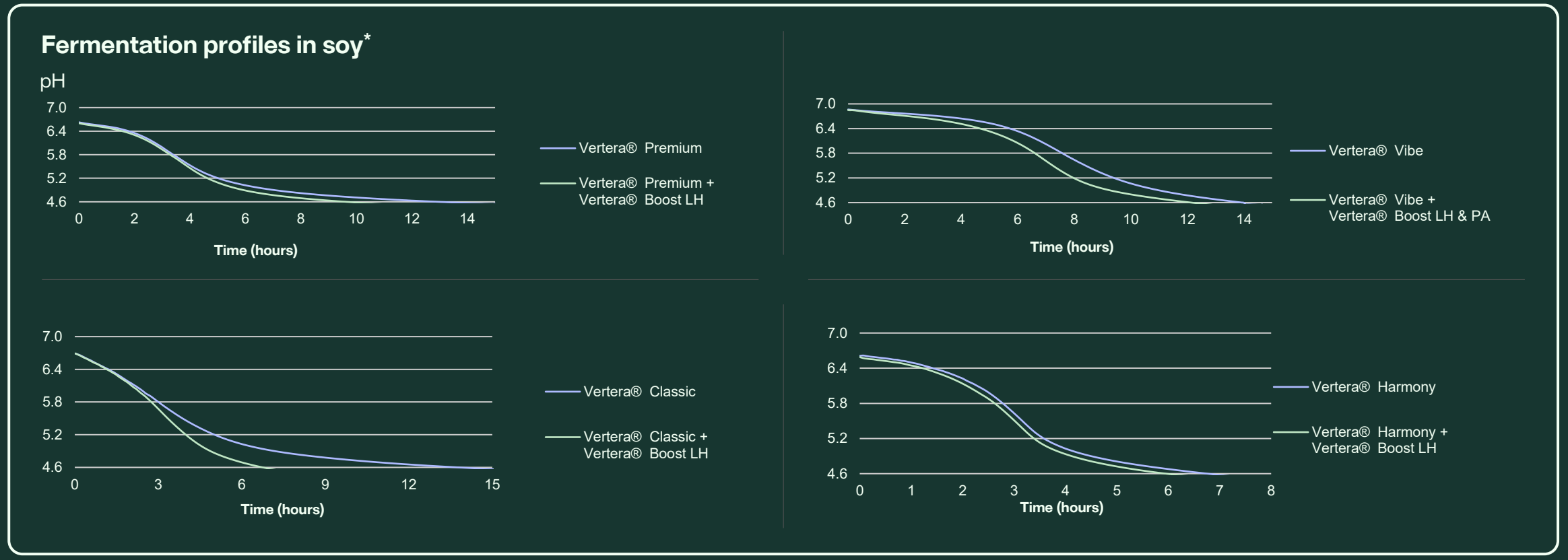


- **Higher gel firmness** (G*) with **Vertera® Vibe** cultures followed by **Vertera® Premium and Vertera® Classic**
- **Higher mouth thickness** (shear stress) with **Vertera® Vibe, Vertera® Premium and Vertera® Classic** cultures

Rheology measurements at day 7

Vertera® Boost reduces time to cut pH, even in bases with carbon or nitrogen/micronutrient limitations

CREAMY TEXTURE



FLAVOR INTENSITY

*Examples in different soy bases

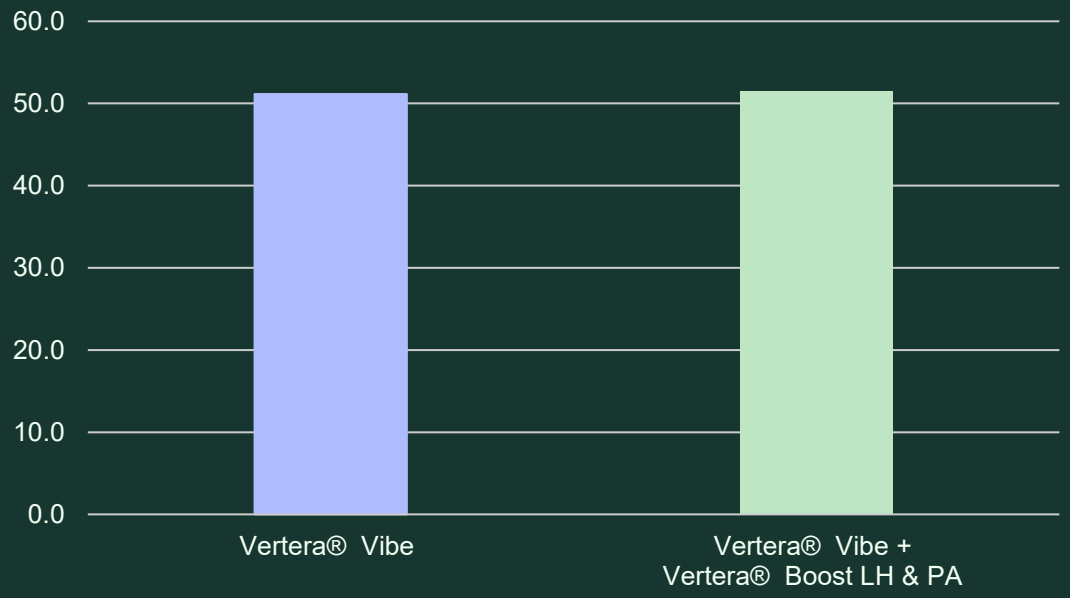
novonesis

With Vertera® Boost, texture is maintained

Vertera® Boost increases fermentation speed without reducing the texture produced by Vertera® starter cultures

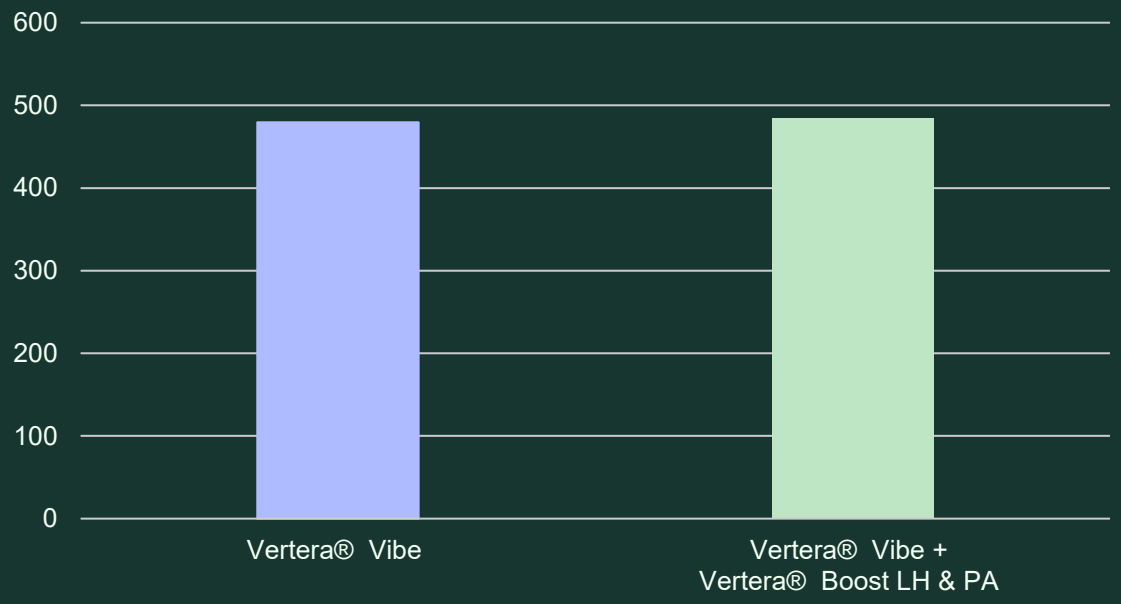
Mouth thickness in soy

Shear Stress (Pa) at 30.2 s^{-1}



Gel firmness in soy

G* (Pa)



Example of texture development in soy

Optimize with Vertera®

- Vertera® cultures offer **great performance** across **different plant bases**
- Mix and match with **Vertera® Boost** cultures to **optimize** and **differentiate**

Questions

thank you

novonesis