

The background of the slide is a top-down photograph of a healthy meal. In the center is a glass bowl filled with a pink smoothie, topped with granola, fresh raspberries, blueberries, and chia seeds. The bowl sits on a wooden cutting board. Surrounding the bowl are various items: a small white bowl of granola, a small white bowl of chia seeds with a spoon, a small glass jar of brown powder labeled "FLAX", and several small pink and yellow flowers scattered around. The entire scene is set on a wooden surface with a green cloth napkin.

# **BIOPROX offer for plant based recipes: Current range and Future Development**



**Plant based lacto  
fermented and  
probiotic trends**



**BIOPROX culture offer  
and expertise**



**Development and  
Partnerships  
opportunities**

A glass of light-colored smoothie topped with saffron, nuts, and seeds, with a bowl of mango and a pear in the background. A large blue circle is overlaid on the right side of the image.

# What's up in the plant based market

# Plant based trends: Why ?

To answer the societal questions around search for better health and the preservation of the environment

Article LSA Conso 06/2019 – Nielsen - IRI



## Ethical dilemmas

Consumers are becoming more environmentally friendly and conscious of the environmental impacts of their purchasing choices, and are avoiding dairy as a result.



## Health-conscious consumers

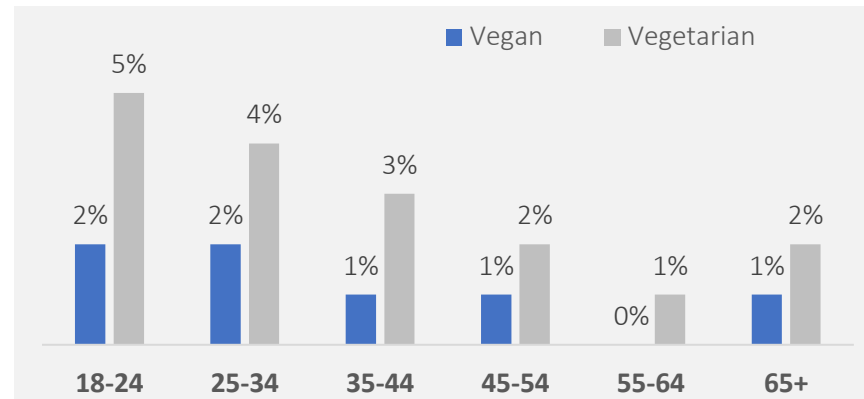
Consumers looking for plant based alternatives with high nutritional values and health benefits.

# Plant based trends: For who ?

## → For vegan and vegetarian ?

% vegan & vegetarian consumers  
per age category

→ Increasing but still limited



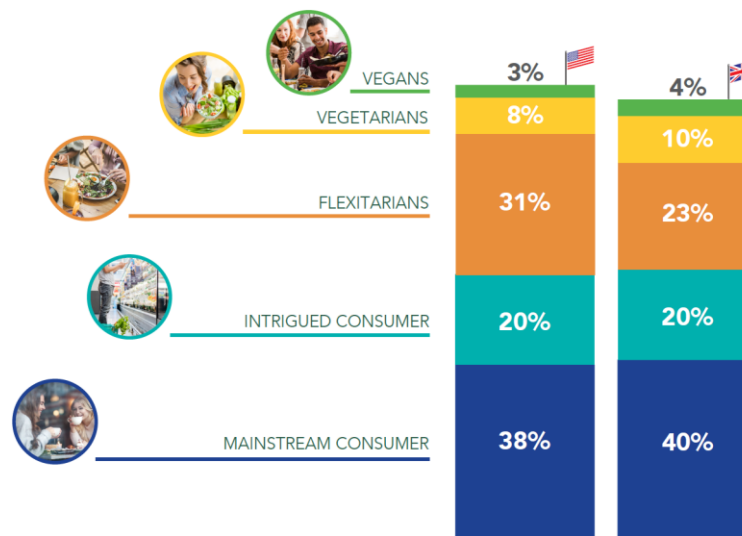
## → Objective = FLEXITARIAN & «REDUCERS»

→ Consumers and particularly millenials are **open / curious for novelty** and looking for **alternatives** to fermented products from animal origin to **reduce their impact**

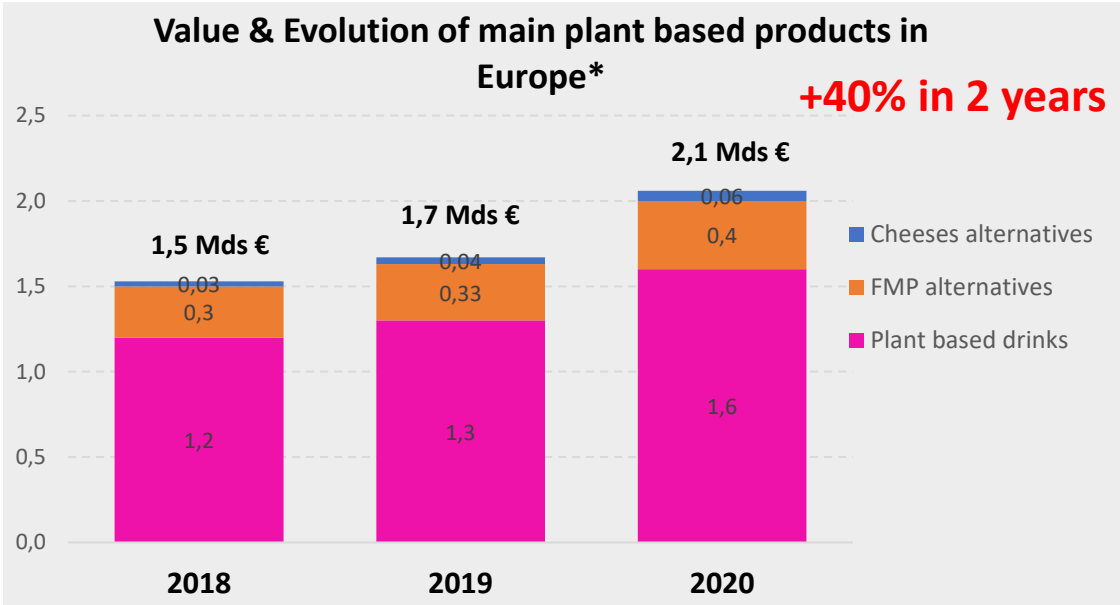
Profile of plant based alternatives  
consumers in US & UK (Proveg  
International study, 2020)



Proveg Consumer  
study 2020



# Plant based Market: Dairy Alternatives



\* Source: Smart Protein d'après Nielsen Market Track CAM 2020



# Plant based Market: «Lacto» fermented juices



→ Kombucha, Fruit Kefir, Fermented Vegetable or Fruit juices ...



**Portugal – Kombucha**  
**On line sales**

<https://gutsycaptain.shop/>



**France – Lacto-fermented vegetable juices**

<https://www.nutriform.bio/>



**France – Lacto-fermented vegetables**

<https://www.biogroupe.com/fr>



**Finland – Combinations of lacto-fermented juices**

<http://www.mozumo.fi/index.php/englis>



**France – Combinations of lacto-fermented juices**

<https://basalnutrition.com/>

## Improvement of nutritional properties with fermentation:

- Sugar reduction
- More B vitamin
- Better digestibility
- Improvement of anti oxidant properties
- Alive yeast and bacterias ...

# Plant based Market: Probiotic drinks

→ Non fermented



France – Apple purée @ 250 millions alive micro-organisms to support immunity  
<https://www.charlesetalice.fr/fr>



US with high levels of probiotics (LP299V & BB12) <https://goodbelly.com/>



GB with billiards of live and active bacterias  
<https://www.biomel.life/>



France - Innocent (Coca-Cola)  
Claim = 500 billions of micro organisms



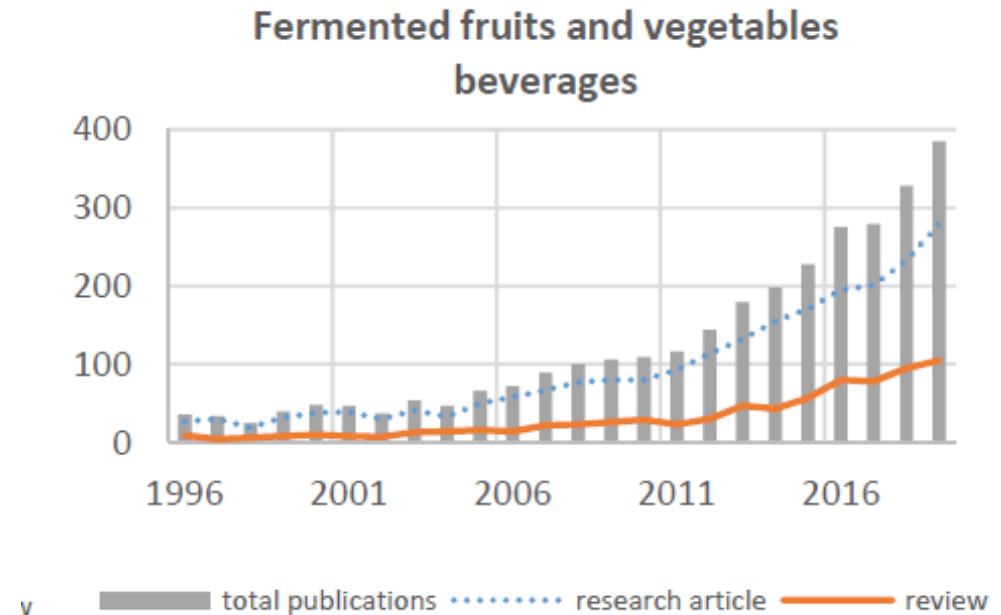
US with *Bif lactis* HN019 – 5.10E+6 cfu/mL  
<https://www.tropicana.com/products/tropicana-essentials/pineapple-mango-tep>



# Plant based Market: Which futur?

Scientific litterature on this topic is increasing

➔ Growing interest = multiplication of studies and articles related to fermented fruits and vegetables (beverages)



*Review*

## Lactic Fermented Fruit or Vegetable Juices: Past, Present and Future

Cyrielle Garcia \*, Marie Guerin, Kaies Souidi and Fabienne Remize

Qualisud, Univ La Réunion, CIRAD, Univ Montpellier, Montpellier SupAgro, Univ Avignon, 2 rue Wetzell, F-97490 Sainte Clotilde, France; marie.guerin15@gmail.com (M.G.); kaies.souidi@univ-reunion.fr (K.S.); fabienne.remize@univ-reunion.fr (F.R.)

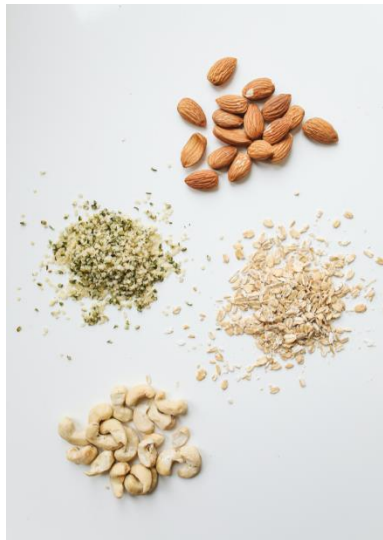
\* Correspondence: cyrielle.garcia@univ-reunion.fr; Tel.: +33-789-74-97-03

Received: 14 December 2019; Accepted: 28 January 2020; Published: 11 February 2020



Lactic fermented fruit and vegetable juices

# Conclusion



**Dairy alternative market** has developed a lot over the last years but still opportunities

**Improvement of existing recipes** (nutritional profile, sustainability, raw material origin, organoleptic profiles ...)

**Development of other applications** (fresh cheeses, spreadable, snacking drinks ...)

**Potential of Hybrid concepts**

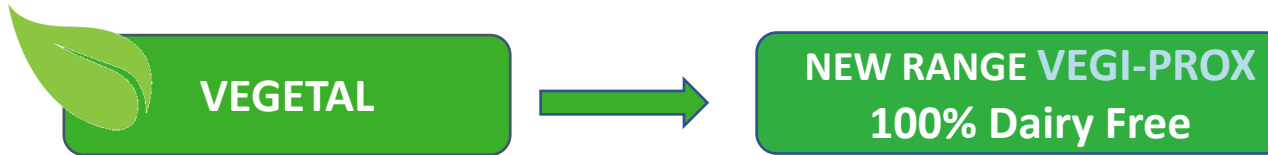
**Lacto fermented vegetables / fruits juice** are developing thanks to better consumer knowledge of fermented products benefits

High opportunities also in the **non fermented probiotic versions in the refrigerated corner**

A glass of creamy white smoothie topped with saffron strands and small brown seeds. In the background, there is a bowl of cubed mango and a whole mango. A large blue circular graphic is overlaid on the right side of the image.

**Take your benefits  
from market growth  
thanks to our Cultures  
and Concepts**

# BIOPROX OFFER FOR DAIRY ALTERNATIVES (FRESH)



## YOGHURT ALTERNATIVES

### VEGI-PROX 01 / VEGI-PROX 02

*Sc thermophilus* combination  
Mild and Texture production

### VEGI-PROX Y1

*Sc thermophilus*, *Lb bulgaricus*



## VEGETAL KEFIR

### VEGI-PROX Kefir 1 & Kefir 2

Combination of multiple strains to develop aromatic, smooth and slightly fizzy end products

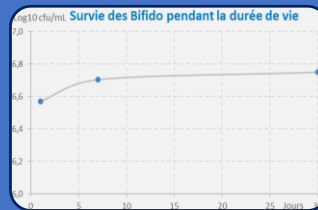
Available with and without yeasts



## PROBIOTIC RANGE

- *Lb rhamnosus* 6870
- *Lb paracasei*
- *Bf lactis* 5764
- *Lb casei*

More than 20 strains



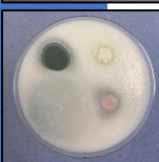
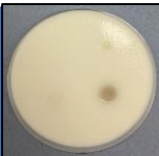
## BIOPROTECTION & AROMATIZATION

### VEGI-PROX RP80

Combinaison de *Lb rhamnosus*, *Lb plantarum*  
Development of creamy flavor (and bioprotective performance)

### VEGI-PROX *Lb casei*

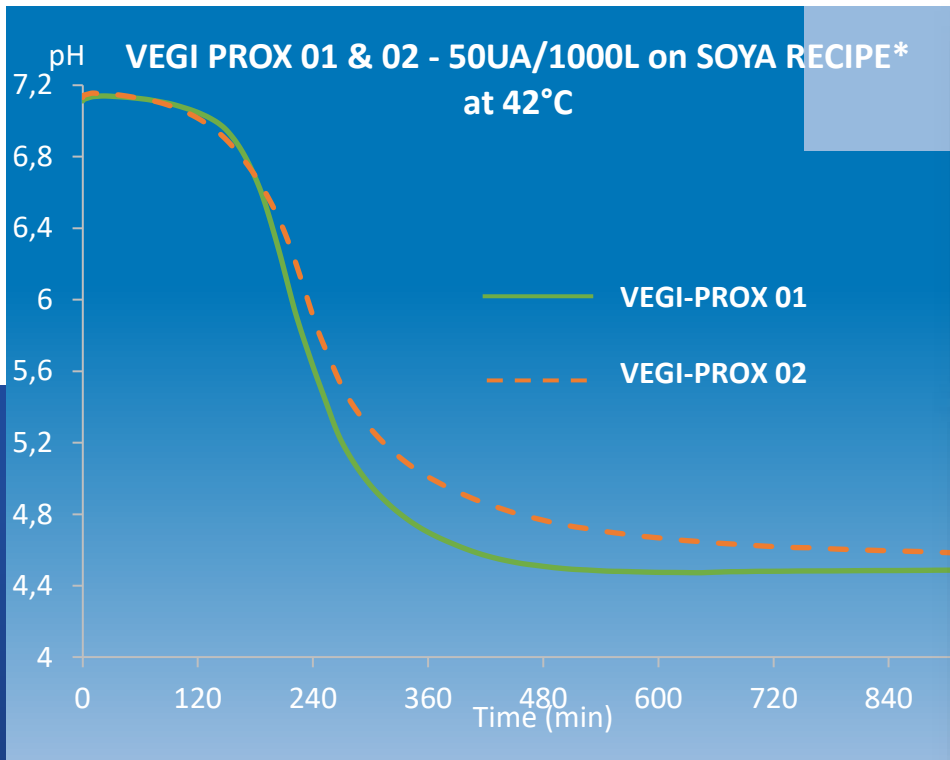
*Lb casei* developing mild and delicate creamy flavor



# VEGI-PROX OFFER FOR DAIRY ALTERNATIVES



**VEGI-PROX® 01 & VEGI-PROX® 02** → New cultures for optimal fermentation of multiple plant based recipes (**SOYA**, oat, sunflower, almonds, nuts...)



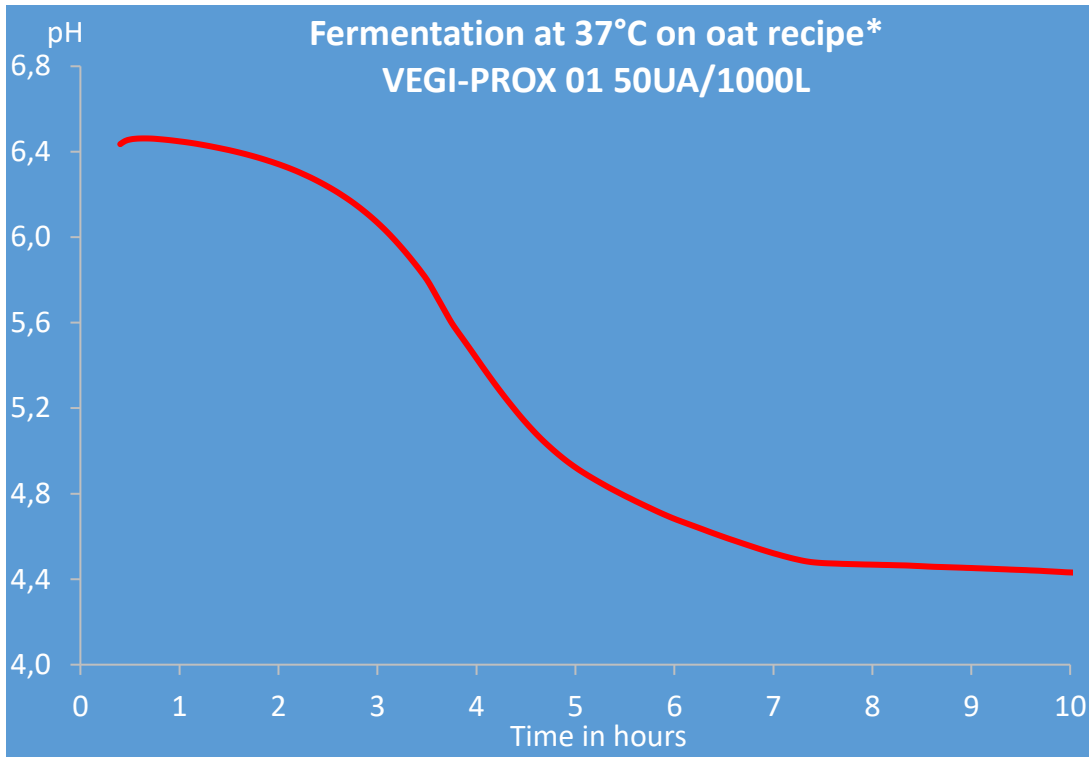
**Sensory profile:** High, smooth and short texture, creamy mouthfeel

\* Fat=2,6% & Proteins=3,9%

# VEGI-PROX OFFER FOR DAIRY ALTERNATIVES



**VEGI-PROX® 01 & VEGI-PROX® 02** → New cultures for optimal fermentation of multiple plant based recipes (soya, **OAT**, sunflower, almonds, nuts...)



**Sensory profile:** High, smooth and short texture, creamy mouthfeel and mild flavor

\* Fat=1,2% & Proteins=2,4%

# VEGI-PROX OFFER FOR DAIRY ALTERNATIVES



## Performances of VEGI-PROX series on rice milk

| Ingredient                        | Quantity (%) |
|-----------------------------------|--------------|
| Concentrated rice juice (Frulact) | 40           |
| Lupin flour                       | 3            |
| Coconut milk                      | 12           |
| Water                             | 45           |

- VEGI-PROX 01 5U/100L
- VEGI-PROX 01 5U/100L + Lb casei @ 10E+7 cfu/mL
- VEGI-PROX 01 5U/100L + VEGI-PROX RP80 3D/100L

## Exemple of Recipe & Process

Concentrated rice juice + Lupin flour + Coconut milk + Water

Mixing for 30 min at 60°C

Heating 90°C – 30 min

VEGI-PROX

Fermentation at 42°C until pH4,80

Smoothening and Cooling

Filling and Storage

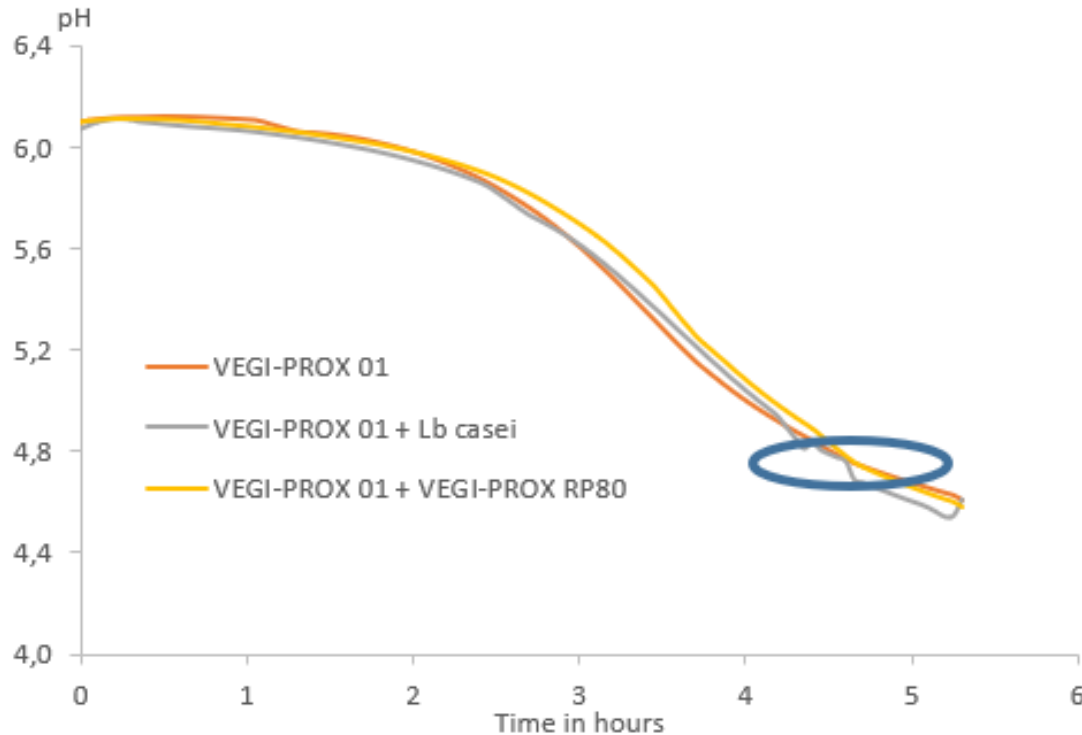
|        | Fat | Proteins | Carbohydrates | Sugar |
|--------|-----|----------|---------------|-------|
| g/100g | 2,5 | 2,1      | 12,6          | 5,1   |

# VEGI-PROX OFFER FOR DAIRY ALTERNATIVES



## Performances of VEGI-PROX series on rice milk

### Fermentation profile at 42°C



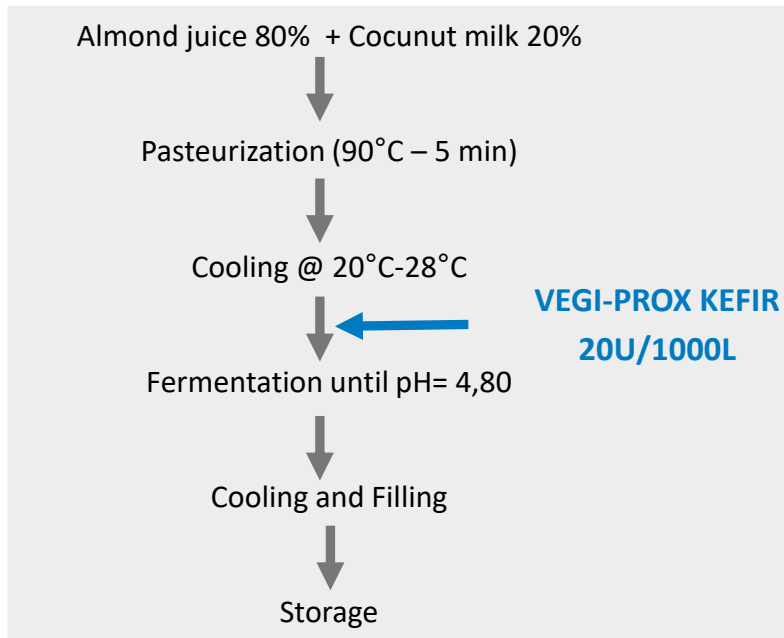
- Time to reach pH 4.80 = 4h30
- No differences between the different combinations
- In this recipe the texture remains liquid and flavour profile pleasant and round

# VEGI-PROX OFFER FOR DAIRY ALTERNATIVES

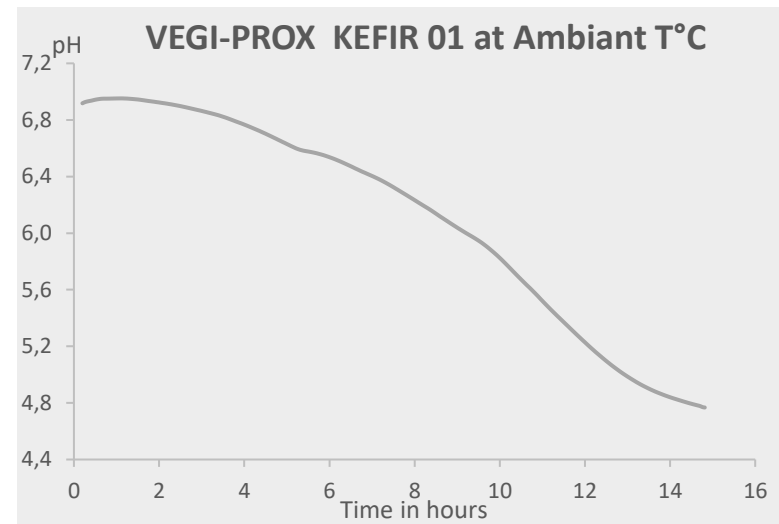


## New concept for ALTERNATIVE KEFIR with VEGI-PROX KEFIR 01 & 02

### Exemple of Recipe & Process



- Combination of multiple LAB strains
- Delivering fresh and creamy flavor
- Variation with Yeast available (KF 01)

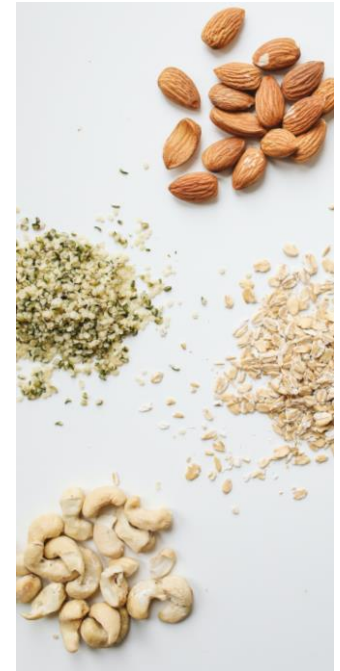
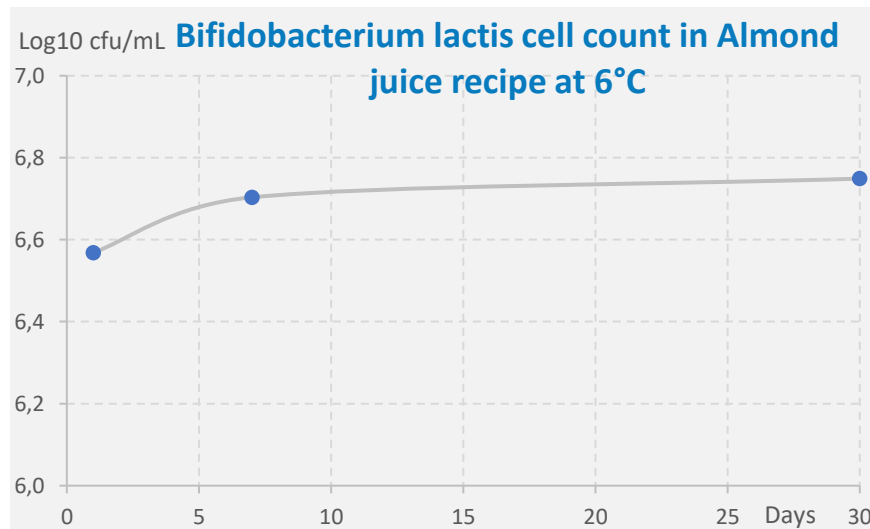


| Alternative kefir | Fat | Proteins | Carbohydrates | Sugars |
|-------------------|-----|----------|---------------|--------|
| g/100g            | 6,7 | 1,3      | 4,0           | 3,56   |

**Sensory profile:** Fluid, fresh flavor and round pleasant flavour

## Characteristics & Benefits

- 100% vegan strain
- Very stable strain in different plant based recipes during shelf life (6°C)
- Breast milk origin
- Going through gastro intestinal tract & anti inflammatory potential\*



\* Strain studied regarding impact on Crohn disease by Institut Pasteur (Lille – France).  
Article published in Nature Research in 2020

# BIOPROX OFFER FOR DAIRY ALTERNATIVES (CHEESES)



VEGETAL



NEW RANGE VEGI-PROX  
100% Dairy Free

## ACIDIFICATION AND TEXTURATION

VEGI-PROX 01 / VEGI-PROX 02

*Sc thermophilus* combination

### ACIDIFICATION (OVERNIGHT)

*Lb plantarum*, *Pedicoccus acidilactici*...

*Lc lactis ssp lactis*

## SURFACE & RIPENING

AROMA-PROX DH & CU

Yeasts

AROMA-PROX GC range

*Geotrichum candidum*



## AROMATIZATION

VEGI-PROX RP80

Combination of *Lb rhamnosus*, *Lb plantarum*

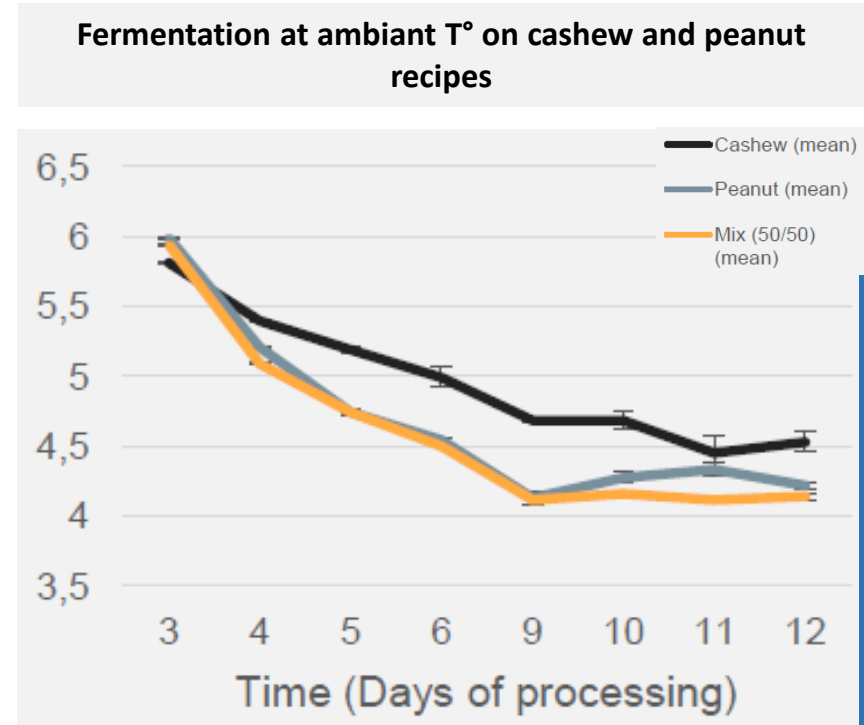
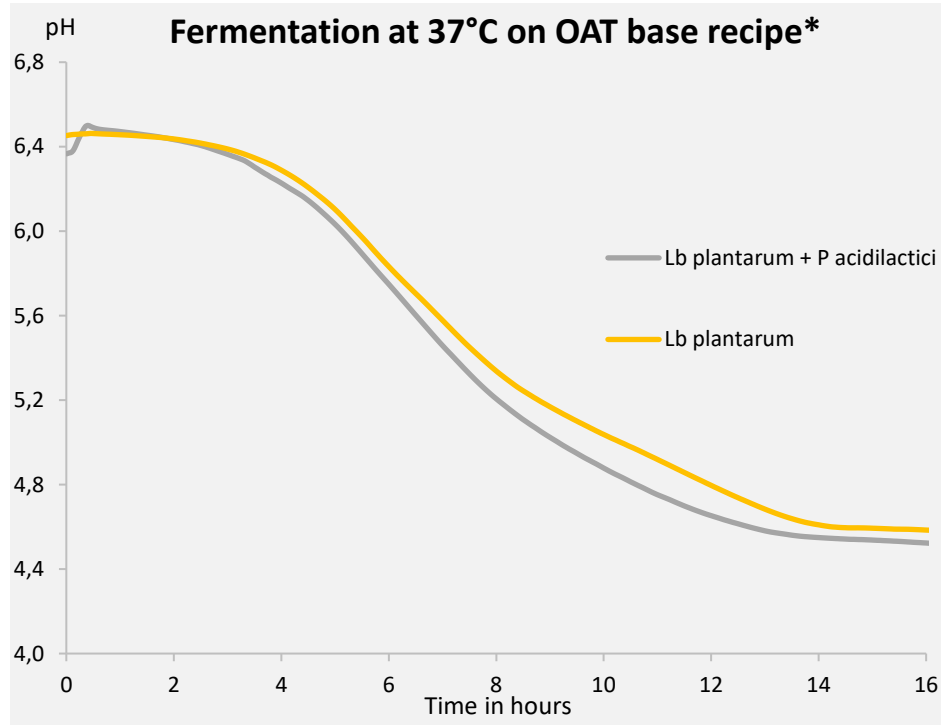
Creamy flavor development



# VEGI-PROX OFFER FOR DAIRY ALTERNATIVES



VEGI-PROX® cultures performances on different plant based recipes (oat, cashew, peanut)



\* Fat=1,2% & Proteins=2,4%



# BIOPROX OFFER FOR LACTO FERMENTATION OF FRUITS & VEGETABLES (JUICES, PURÉES)



## ACIDIFICATION AND AROMATIZATION

Selected cultures able to develop even in recipes with low pH start and produce specific flavor profiles

VEGI-PROX *Lb plantarum*, *Lb rhamnosus*, *Lb casei*, *Lb paracasei*...

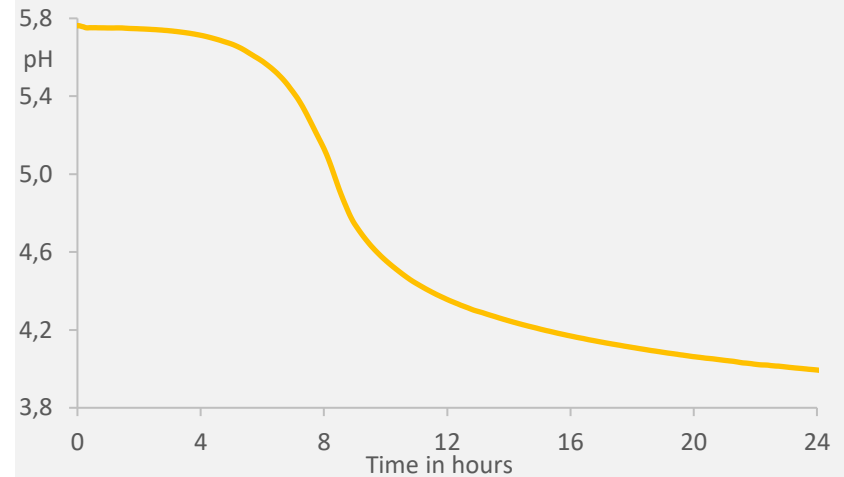


## AROMATIZATION & FIZINESS

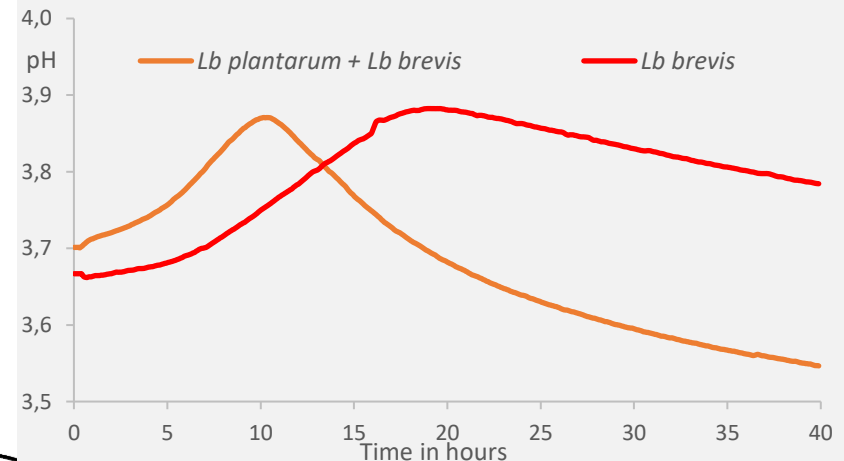
Selected cultures with light acidification and slight sparkling profile

VEGI-PROX *Lb brevis*, *Lb fermentum*, *Ln mesenteroides*, *Saccharomyces boulardii*...

Carrot Juice fermentation at 34°C with VEGI-PROX *Lb plantarum*



Multifruit Juice fermentation at 30°C with VEGI-PROX *Lb brevis* & *Lb plantarum* + *Lb brevis*

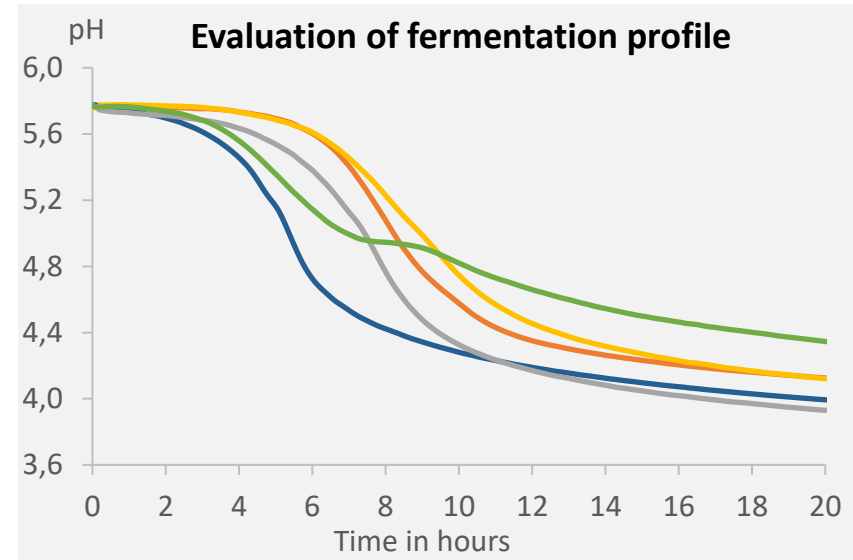


# BIOPROX OFFER FOR LACTO FERMENTATION OF PLANT BASED RECIPES

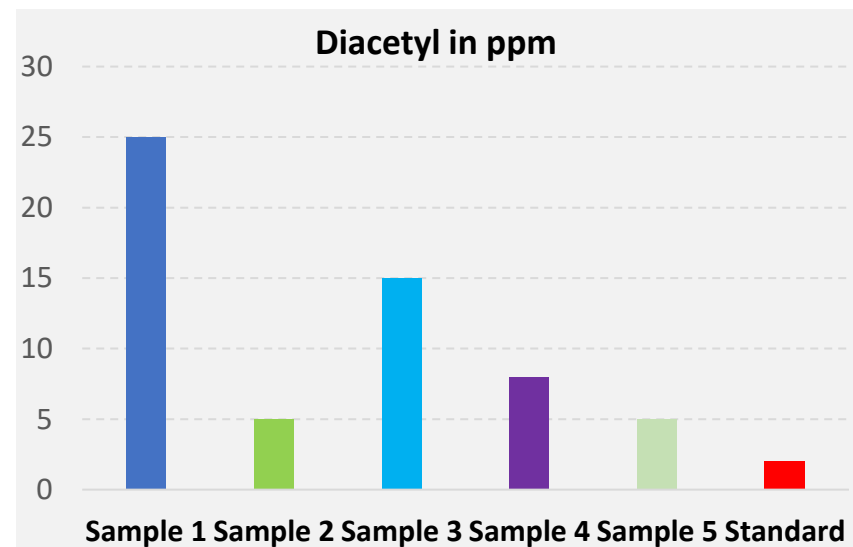
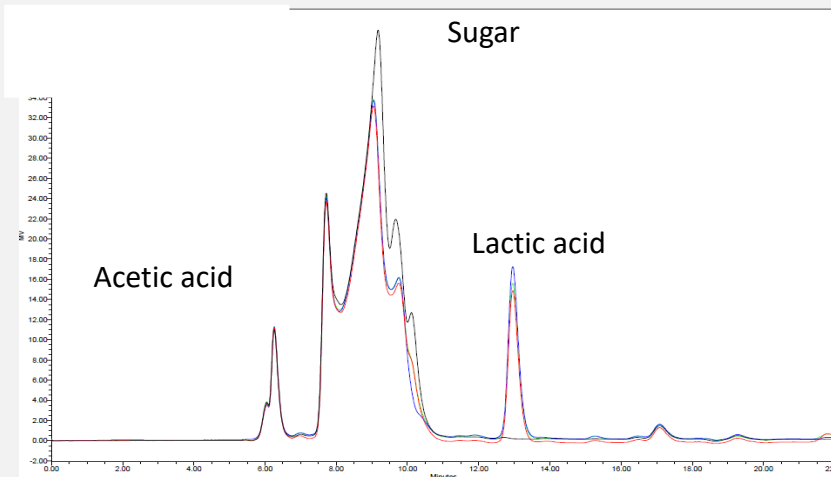


## Support in the development & positioning of finished products

- Strains screening on your recipes
- Optimization of fermentation parameters
- Characterization of end product characteristics (sugar consumption, flavor production, sensory)



## Sugar consumption and organic acid production (HPLC)



# Ongoing developments & Partnership opportunities

# ONGOING DEVELOPMENTS: FRIEND PROJECT



## WINNER OF THE BPI FRANCE INNOVATION COMPETITION



FRIEND is a 2 year innovation project. It is carried by the BIODIS SME, winner of the Innovation competition as part of the Future Investments Program coordinated by BPI France.

Total cost = 979,7 K€



Isolation and selection of **lactic acid bacteria from plant** (fruits and vegetables) marketable as:

- Lactic cultures with technological properties toward lacto fermentation of fruits / vegetables juices and improvement of the nutritional quality of end products
- Ingredient to be used in food supplement with probiotic benefit

**FRIEND** is bringing value to plant based products thanks to fermentation with selected lactic acid bacterias from plant based origin improving the original nutritionnal and organoleptic profiles of the end product.



# FRIEND OBJECTIVES

## Dairy Alternatives

- Lactofermentation
- Improvement of organoleptic profile (flavor, texture)
- **Nutritional benefits:**
  - ✓ Improvement of certain mineral bioavailability
  - ✓ Live and active flora

## Fruit / Vegetables

- Lactofermentation
- Bioprotection
- Innovative organoleptic profile (flavor, gaz...)
- **Nutritional benefits :**
  - ✓ Sugar reduction
  - ✓ Live and active flora
  - ✓ Polyphenols with better absorption

## Food supplement

- Probiotic
- **Nutritional benefits:**
  - ✓ Lipids metabolism
  - ✓ Anti inflammatory action

- Experience in the screening of specific strains with plant based origin
- Skills regarding control and optimization of culture conditions of fermentation
- Expertise in the determination of strains probiotics properties
- High stability of the end products during shelf life
- Partnership with different dairy schools to multiply the application possibilities



## CONCLUSION



BIOPROX helps you develop and produce the right **DAIRY ALTERNATIVES** (fermented, non fermented) thanks to:

- ✓ **Complete range of cultures for fermentation of multiple plant based recipes**
- ✓ **Range of cultures selected for their texturation, flavor development & nutritional benefits properties**
- ✓ **Large range of dairy free probiotics with high stability into the end product during shelf life**
- ✓ **Experience in different applications and recipes**

BIOPROX helps you develop and produce the right **LACTO-FERMENTED VEGETABLE** (and fruits) juices recipes thanks to:

- ✓ **Well characterized performances in application & efficient strains of *Lactobacillus sp* (*Lb plantarum*, *Lb casei*, *Lb rhamnosus*...)**
- ✓ **Experience in different applications and recipes**
- ✓ **Support in specific screenings**

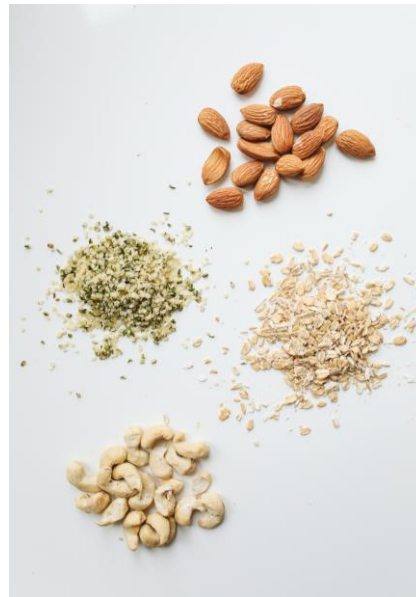
More to come regarding anti oxidant and possible other probiotic properties thanks to FRIEND project

# THANKS

FOR YOUR ATTENTION

# Additional slides

- BIOPROX range details
- BIOPROX concepts in dairy alternatives
- BIOPROX competences in R&D and production



# BIOPROX OFFER



| Product code | Denomination          | Packaging  |
|--------------|-----------------------|------------|
| 644094       | <b>VEGI-PROX 01</b>   | 10UA, 20UA |
| 644230       | <b>VEGI-PROX Y1</b>   | 20UA, 50UA |
| 644294       | <b>VEGI-PROX 01</b>   | 10UA, 50UA |
| 644273       | <b>VEGI-PROX K01</b>  | 20UA       |
| 644143       | <b>VEGI-PROX RP80</b> | 30D        |

| Product code | Denomination                                | Rk                                                                          |
|--------------|---------------------------------------------|-----------------------------------------------------------------------------|
| 643748       | <b><i>Lb brevis 5542</i></b>                | Heterofermentative (lactic acid, acetic acid or ethanol and CO2 production) |
| 620174       | <b><i>Ln mesenteroides 1501</i></b>         |                                                                             |
| 643749       | <b><i>Lb fermentum 6529</i></b>             |                                                                             |
| 643696       | <b><i>Lb fermentum 6187</i></b>             |                                                                             |
| 643509       | <b><i>Lb plantarum 1096</i></b>             | Facultatively heterofermentative (mainly lactic acid p°)                    |
| 643588       | <b><i>Lb casei 5773</i></b>                 |                                                                             |
| 643649       | <b><i>Pediococcus acidilactici 6314</i></b> |                                                                             |

| Code   | Culture                      | Composition                                       | New name                                 |
|--------|------------------------------|---------------------------------------------------|------------------------------------------|
| 643582 | <b><i>Bf. lactis</i></b>     | <i>Bifidobacterium animalis subsp lactis 5764</i> |                                          |
| 643556 | <b><i>L. paracasei</i></b>   | <i>Lactobacillus paracasei 5452</i>               | <i>Lacticaseibacillus paracasei 5452</i> |
| 643673 | <b><i>L. acidophilus</i></b> | <i>Lactobacillus acidophilus 6307</i>             |                                          |
| 643583 | <b><i>L. johnsonii</i></b>   | <i>Lactobacillus johnsonii 5467</i>               |                                          |
| 643774 | <b><i>L. rhamnosus</i></b>   | <i>Lactobacillus rhamnosus 6870</i>               | <i>Lacticaseibacillus rhamnosus 6870</i> |

# Probiotic range 100% VEGETARIAN COMPATIBLE



- Range of more than 20 strains grown on media without allergens
- Strains genetically characterized and antibiotic resistance patterns known
- Resistance to gastro intestinal conditions

## *Lactobacillus*

|                        |                       |
|------------------------|-----------------------|
| <i>Lb. acidophilus</i> | <i>Lb. johnsonii</i>  |
| <i>Lb. brevis</i>      | <i>Lb. lactis</i>     |
| <i>Lb. casei</i>       | <i>Lb. paracasei</i>  |
| <i>Lb. crispatus</i>   | <i>Lb. plantarum</i>  |
| <i>Lb. fermentum</i>   | <i>Lb. reuteri</i>    |
| <i>Lb. gasseri</i>     | <i>Lb. rhamnosus</i>  |
| <i>Lb. helveticus</i>  | <i>Lb. salivarius</i> |
| <i>Lb. jensenii</i>    |                       |

## *Bifidobacterium*

*Bf. adolescentis*  
*Bf. bifidum*  
*Bf. breve*  
*Bf. infantis*  
*Bf. lactis*  
*Bf. longum*



- Production of tailor made strains (know how)
- Application of advanced technics to check strain purity
- Development of new tests and new strains more documented and with great stability.

Thanks to our latest cultures development

3 concepts 100% vegetal or mixes offering improvement regarding :

- Nutritional profile
- Sensory profile
- List of ingredients to have 100% natural formulations
- Sustainability profile

1

Drink **100% plant based** not fermented containing **probiotic strain** known for **its gut health** benefits

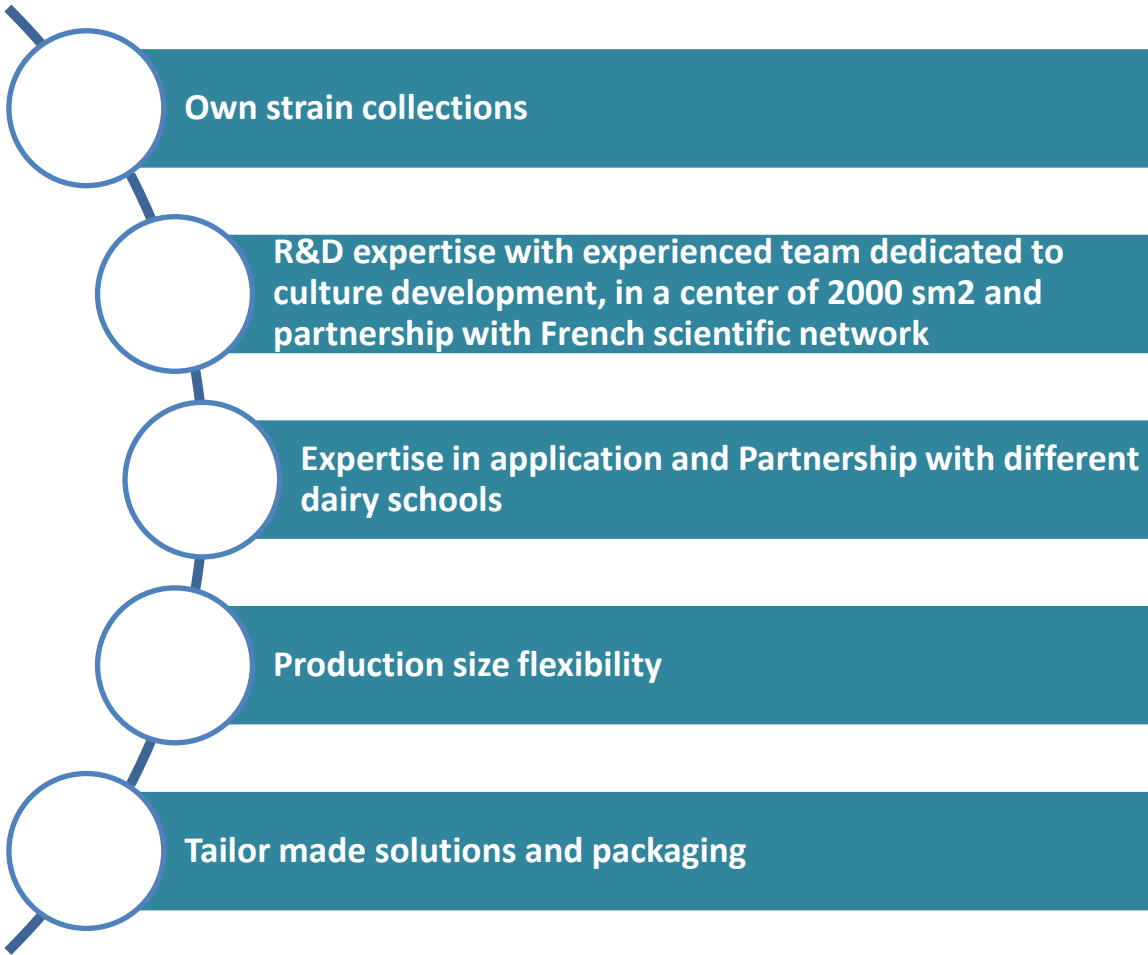
2

'Speciality' **100% plant based** fermented **100% natural** thanks to a combination of **lactic acid bacteria with texturizing properties 100% DF**

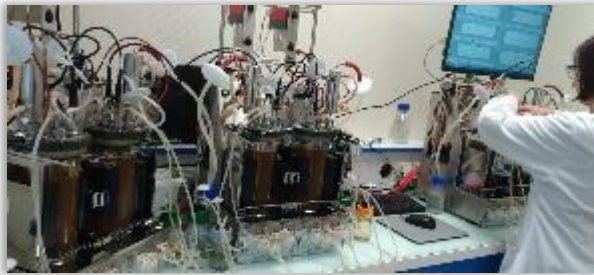
3

**Hybrid specialty** fermented **100% natural** thanks to a combination of **cultures with texturizing properties**

# BIOPROX assets for developping original solutions for plant based fermentation



# Our study and Discover Center



## In numbers

- **+ 10% of turnover** invested in R&D
- **17 doctors, engineers & technicians** dedicated to the development of cultures and technical support
- May 2020 : **1000 m2 extension** of the R&D Centre
- **Partnership with the French scientific network**

## Technical support & dedicated services

- **High level of responsiveness** appreciated by our customers.
- **Personalized analysis** and development of **tailor-made solutions**.
- **Considerable technical expertise** (from fermented milk to matured cheese).
- **Toll manufacturing contract**.

Production capacity

**+€ 13 M**

invested over the  
past

**10 years**

# Our production sites



- ✓ Scientific **reliability**
- ✓ **Quality**
- ✓ **Diversification**
- ✓ **Flexibility** and **adaptability**
- ✓ Sustainable and natural biotechnological solutions
- ✓ Collection of **strains**
- ✓ Selection and identification
- ✓ **Improvement** of the technological process
- ✓ Development of **new products**

Perros-Guirec (22)

Noyant (49)



8

Lyophilizers



## Fermentation and Lyophilisation



3

Fermenters

