Hybrid Dairy Products: A Smooth Transition Towards a More Sustainable Food System

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TFTAK is a privately owned research organization with a mission to accelerate food and biotech innovation

Established in 2004 | Located in Tallinn, ESTONIA

Hybrid Dairy

Dairy

- Creamy texture
- Rich flavor
- High-quality protein
- Calcium, B12

Plant based

- Fibers, phytonutrients
- Lactose free, vegan
- Lower environmental impact

Hybrid dairy

- Improved nutrition
- Reduced environmental impact
- Better taste and texture
- Familiar dairy experience

Hybrid cheese technologies

Gouda-type cheese production

Plant protein: mixing with water, sterilization

Adjustment of pH

Milk pasteurization → **Addition of starter culture and rennet** → **Cutting the curd, stirring, heating** → **Whey separation, forming, pressing** → **Salting** → **Maturation**

Curd formation

Challenges

- Rennet coagulates casein
- Weaker curd structure
- Plant protein behavior

Results in:

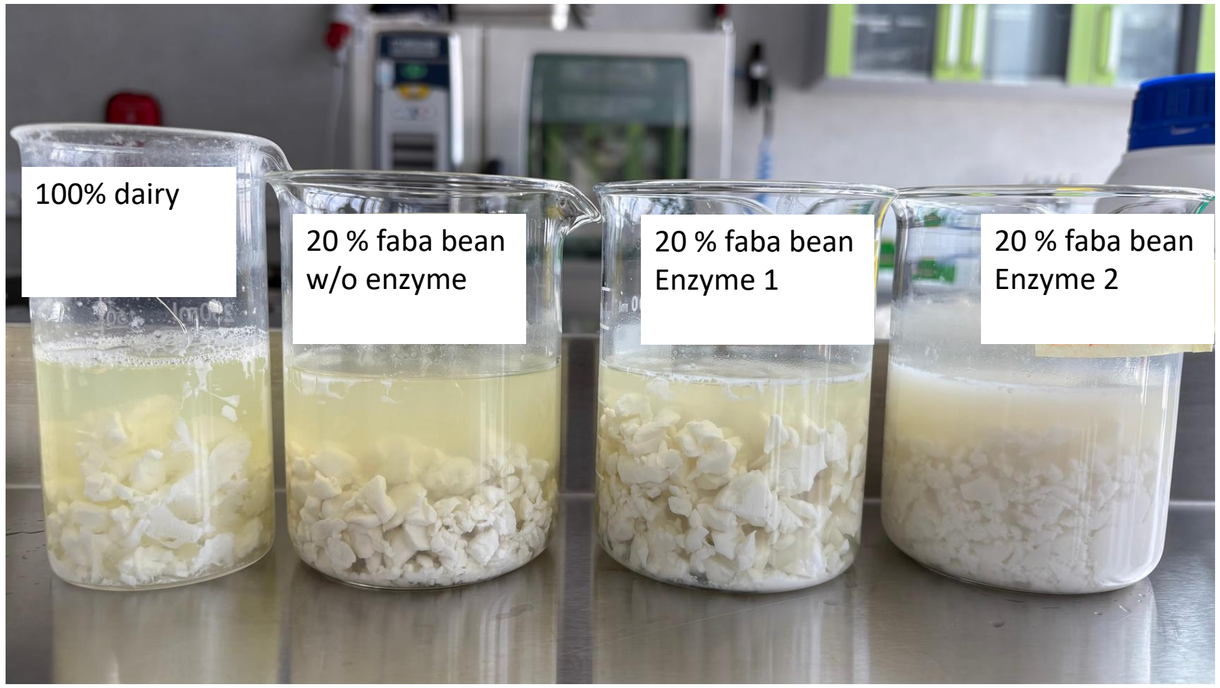
- Poor curd formation
- Lower process yield
- Textural changes
- Taste formation challenges

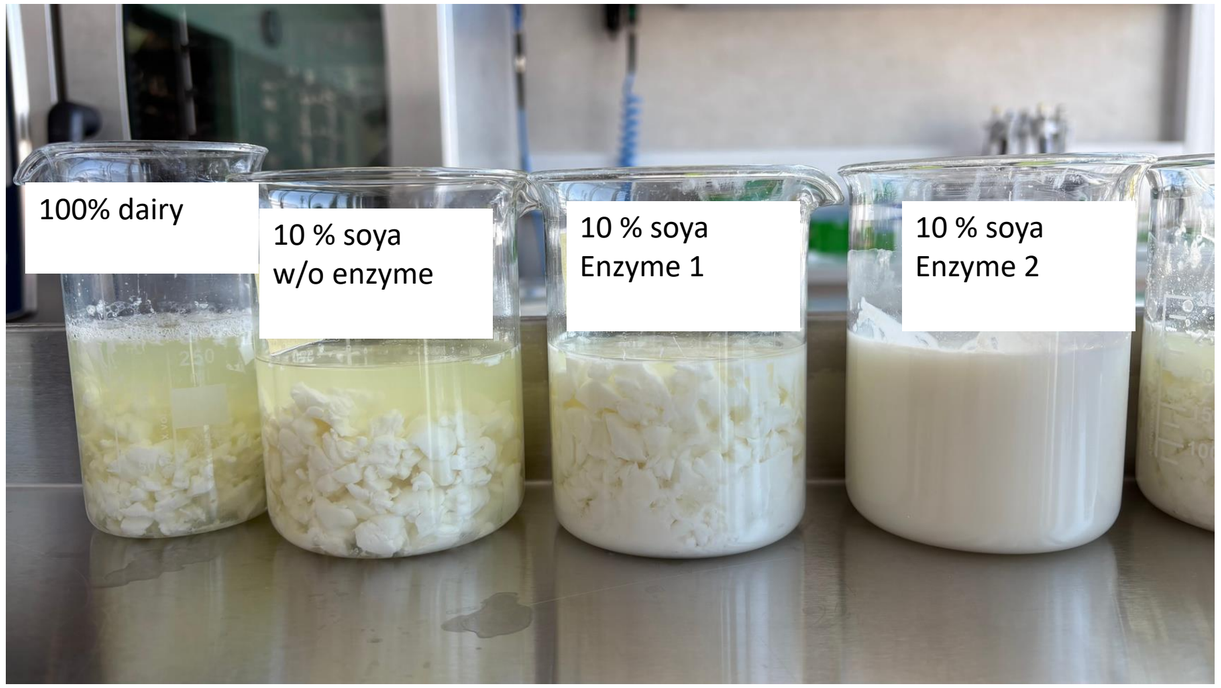
Curd formation

Solutions

- Heat, acid, or salts to help plant proteins coagulate
- Using enzymes e.g. transglutaminase
- Gelling before application
- Selection of plant protein based on techno-functional properties

Curd formation





Curd formation

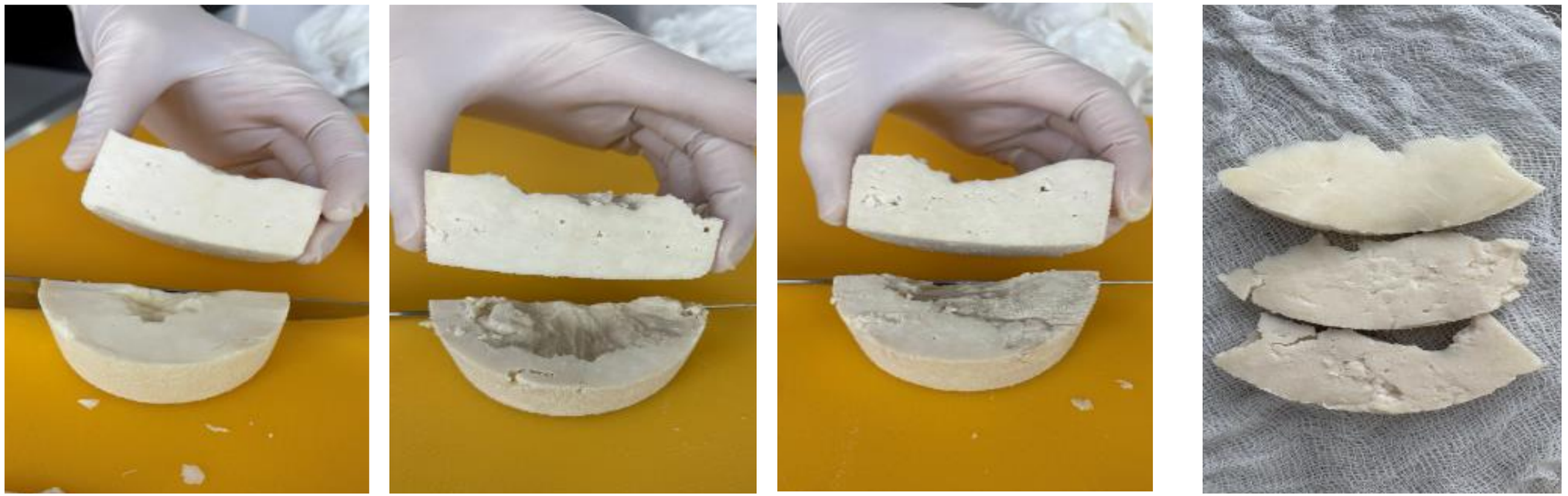
0%

20%

30%

Appearance after 14 days maturation period

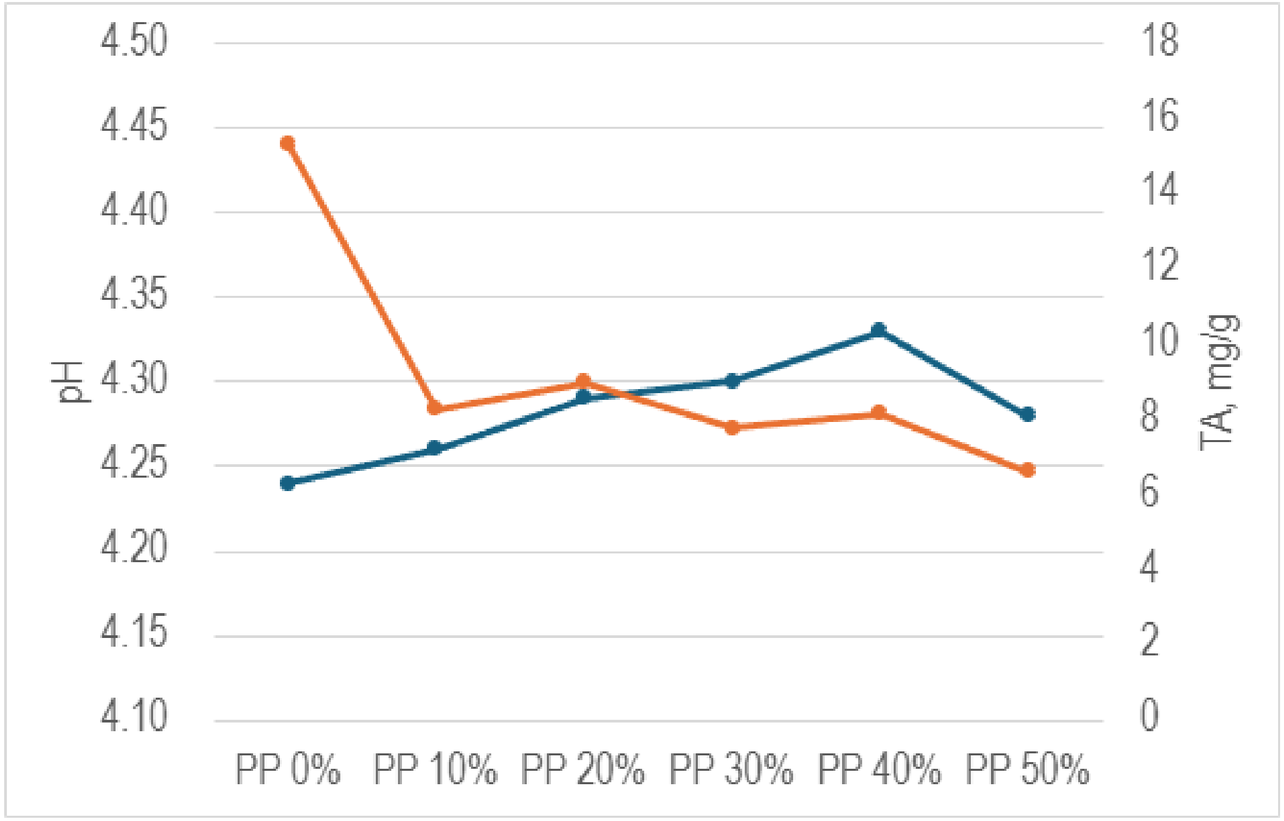
0% **20%** **30%**



FERMENTATION

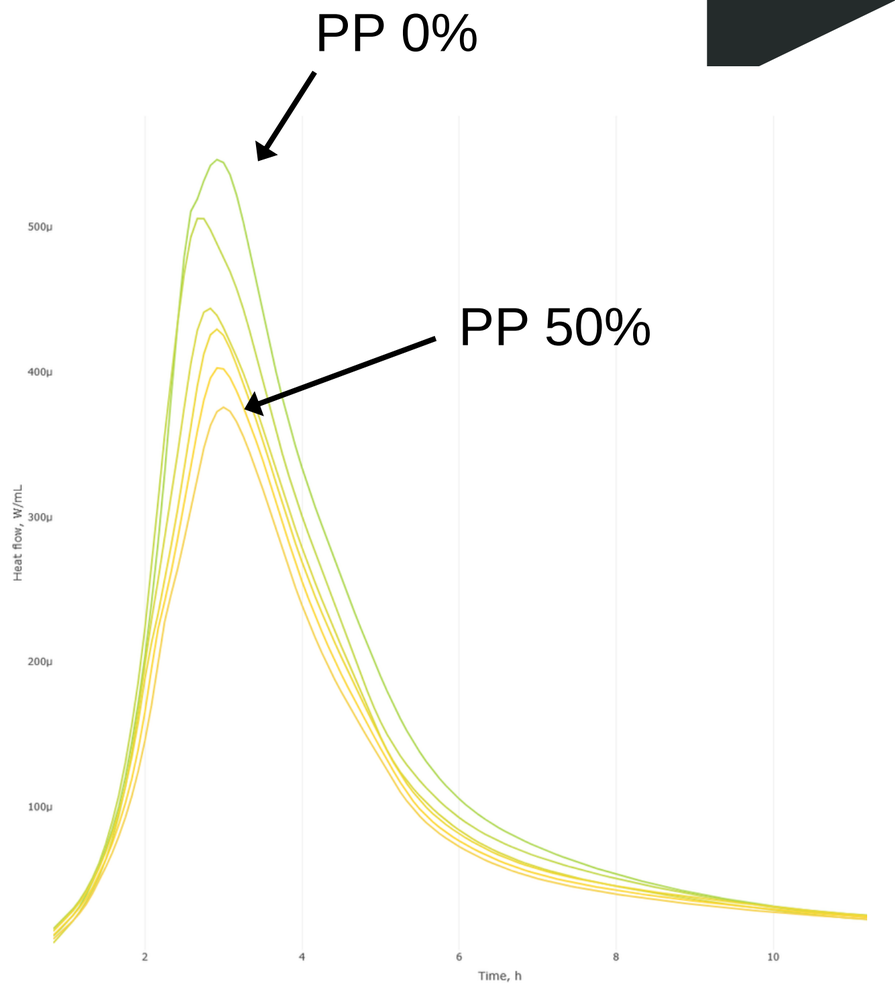
Fermentation behavior

SC:: *Streptococcus thermophilus, Lactobacillus bulgaricus*



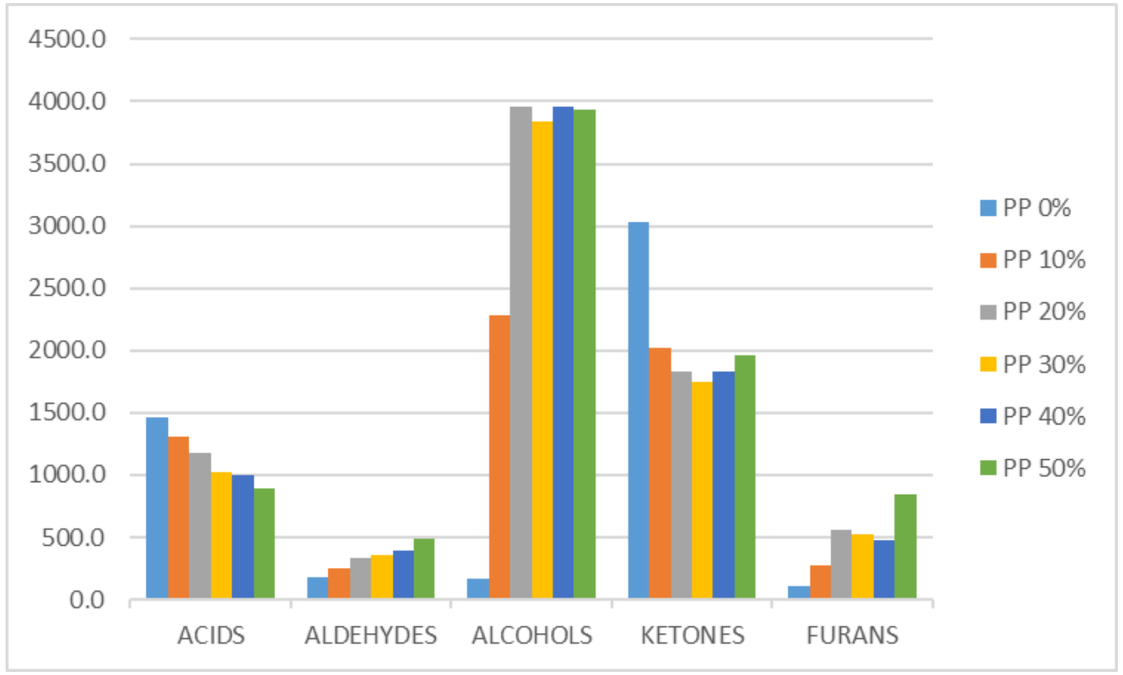
Perceived sourness

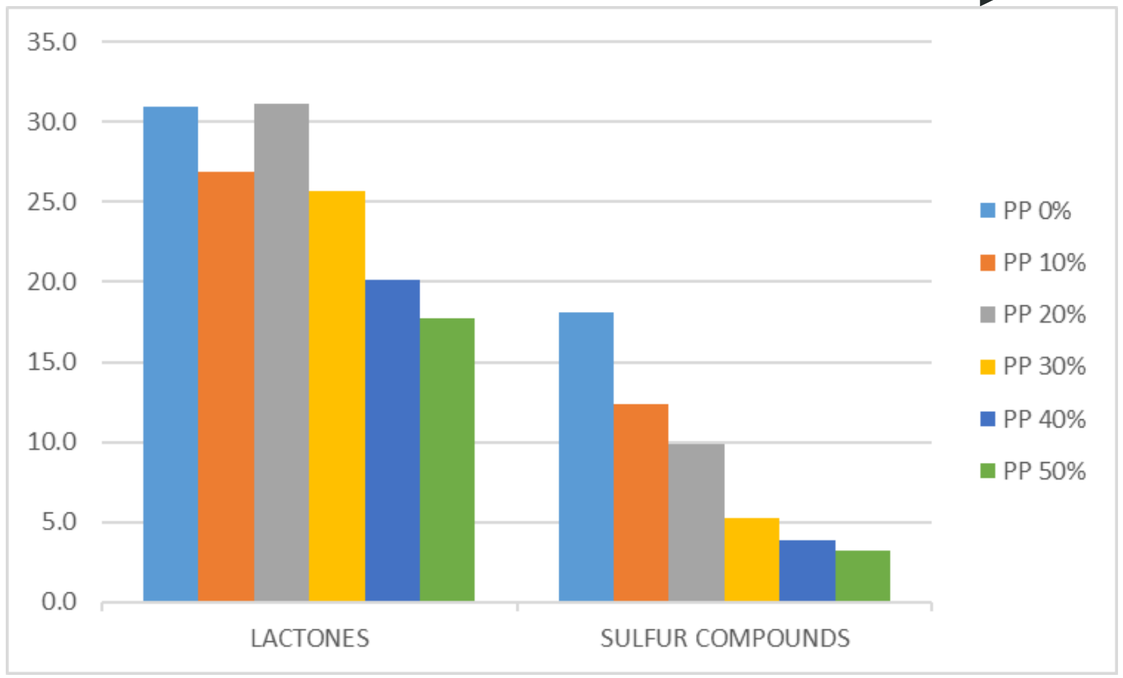
3.13	2.44	2.25	2.44	2.13	2.06



Differences in volatile profiles

Milk and faba bean protein mixtures after fermentation

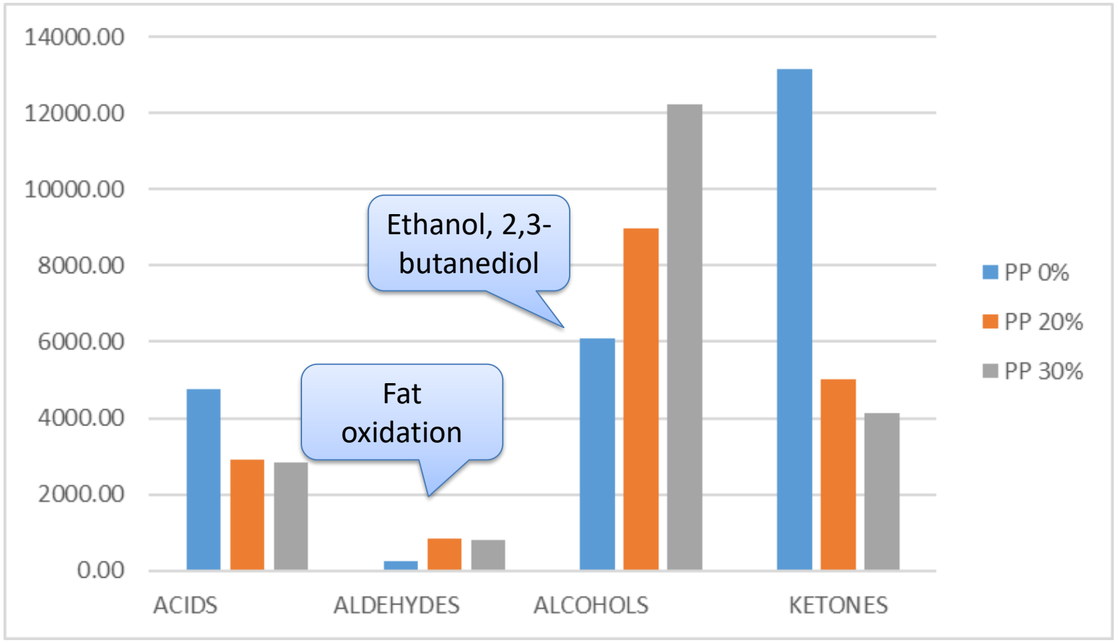


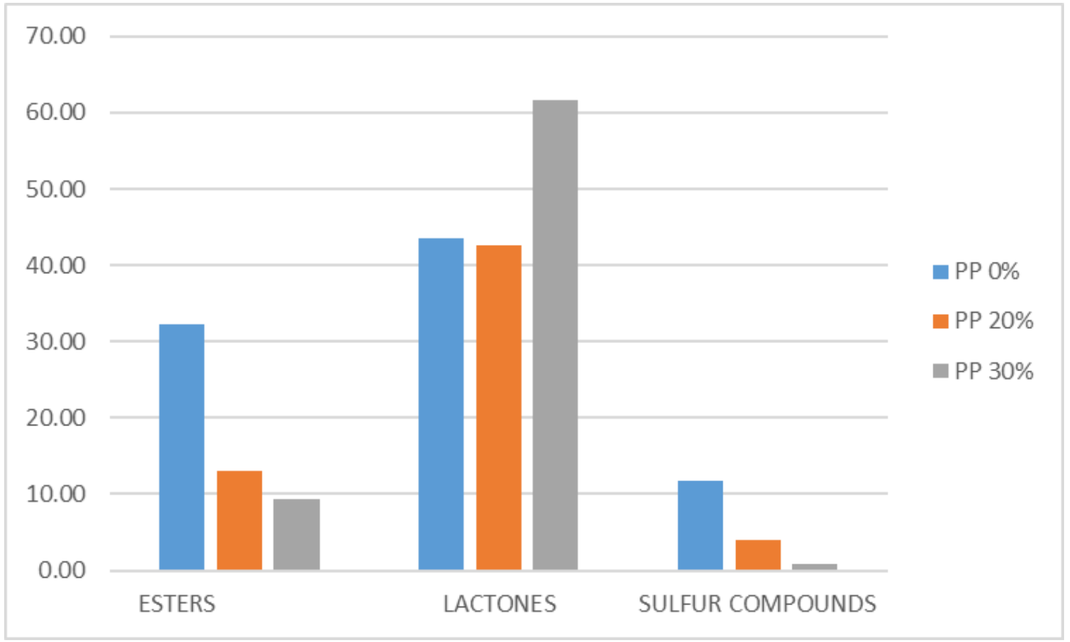


	PP 0%	PP 10%	PP 20%	PP 30%	PP 40%	PP 50%
2,3-Butanedione	260.8	260.6	232.1	245.2	283.8	320.1
Acetoin	10836.0	935.5	656.7	567.2	504.9	488.8

Differences in volatile profiles

Cheese after 2 months maturation





	PP 0%	**PP 20%**	**PP 30%**
2,3-Butanedione	952	540	307
Acetoin	10836	3096	329

Take home messages!

- Hybrid dairy can bring extra benefits from the environmental, nutritional and economical point of view.

- Success in hybrid dairy hinges on overcoming sensory and technical hurdles to deliver products that rival conventional dairy in taste, texture, and safety.

- Simply blending ingredients is insufficient; careful formulation and processing are needed to optimize sensory attributes and stability, including:

  - *Selection of starter cultures*
  - *Techno-functionality and taste properties of plant protein products*
  - *Optimizing coagulation processes*
  - *Shelf-life and stability*

Thank You!

Visit our booth F7
for tasting!

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