

AGRO  
CAMPUS  
OUEST



# Promoting cooperation between lactic acid bacteria within a community : towards new food applications



STLOpen Days  
19-21 March 2019



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## Food quality & safety



Develop safe, healthy, sustainable and hedonic fermented foods



## Animal health



Offer alternatives to antibiotic treatments (probiotics)

Promoting cooperation between lactic acid bacteria within a community : towards new food applications



## Food spoilage



Reduce health risks and food losses and waste

## Health & wellbeing



Develop functional and designer food against modern lifestyle diseases



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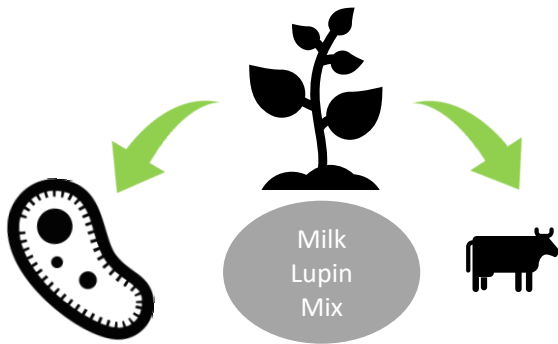
Fanny CANON



## Promoting cooperation between lactic acid bacteria within a community : towards new food applications

### Socio-economic context

Plant protein functionalities = new applications



#### Fermentation :





- Little energy required
- Nutritional quality improvement

Reduction of **animal protein** consumption

## Sustainable and healthy food mixed systems

### Scientific context

Communities are studied in several fields :

- **Bioprocesses** : Development of synthetic communities to increase yields 
- **Natural ecosystems** (intestinal, soil, oceans, lakes microbiota) : Studies of :
  - Microbial composition and its evolution 
  - Interactions between microbes and host/environment
- **Fermented food products** :
  - Sourdough and kefir → Interactions between yeasts and LAB 
  - Cheese → Rich and diverse communities 
  - Yogurt → « Model » community

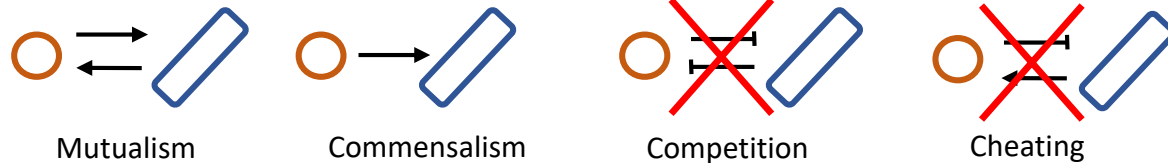
Transposition of its performances on new food matrices with other strains



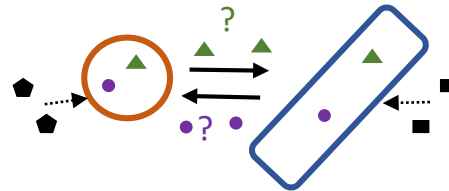
## Promoting cooperation between lactic acid bacteria within a community : towards new food applications

### Research questions

- I. What parameters **favour positive interactions** between LAB within a community ?



- II. What are the cooperation **mechanisms** ?  
What are the **molecules** exchanged during these interactions ?



- III. Have these interactions beneficial effects on the **nutritional and organoleptic properties** of a fermented milk-lupine mix ?



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Scholarship  
2018-2021



UMR INRA - Agrocampus Ouest  
Science and Technology of Milk and Eggs

Team  
Microbiology of Milk and Egg Sectors

Key words

Lactic acid bacteria  
Interactions  
Cooperation  
Cross-feeding  
Syntrophy  
Communities  
Co-culture  
lupin  
Milk



collaborators



## Promoting cooperation between lactic acid bacteria within a community : towards new food applications

### Socio-economic context

- Pulses production : + 90 % in France and EU between 2013 - 2017

Functionalities of plant proteins = new applications



**Fermentation :**  
- Little energy required  
- Nutritional qualities improvement

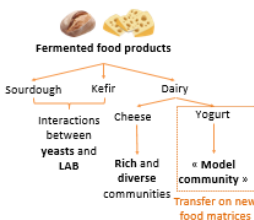
**Reduction of animal protein consumption**

Sustainable and healthy mixed food systems

### Scientific context

- Communities are studied in several fields :  
**Bioprocesses** : Development of synthetic communities to increase yields

**Natural ecosystems** (intestinal, soil, oceans, lakes microbiota) : Studies of 1) microbial composition and its evolution, 2) interactions with host/environment



### Research questions

- I. What parameters favour positive interactions between LAB within a community ?
- II. What are the cooperation mechanisms ?  
What are the molecules exchanged during these interactions ?
- III. Have these interactions beneficial effects on the nutritional and organoleptic properties of a fermented milk-lupin mix ?

### Expected results

- Association of LAB based on their metabolic complementary induces cooperative behaviour within a community
- Exchanges between LAB are partially linked with their nitrogen metabolism
- Increase in aromatic/flavour compound production
- Reduction of allergens

### Research perspectives

- Knowledge transfer to multiple raw materials
  - Development of new plant-based fermented products
  - Development of innovative functionalized fermented products