

Innovative pulse and cereal-based food fermentations for human health and sustainable diets

Innovative Faba Bean Sourdough Fermentation for the Production of Nutritious Whole Wheat Bread

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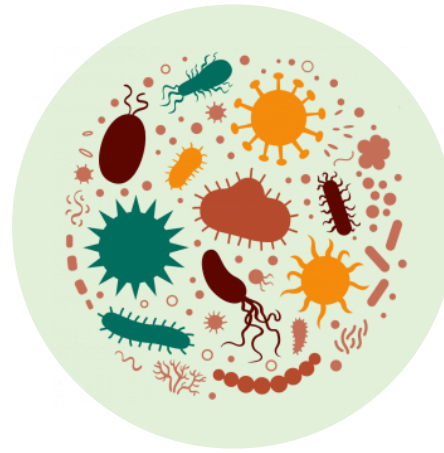
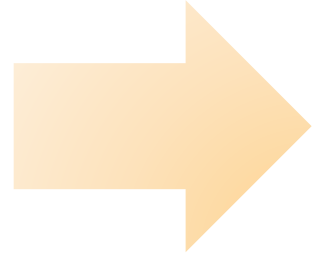
Why (fermenting) faba bean for sourdough bread?



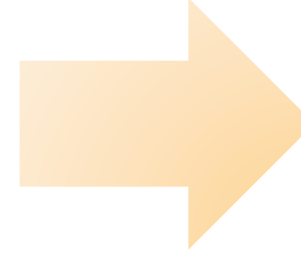
Faba beans

- ✓ High protein content (up to 35%)
- ✓ High dietary fibre content (up to 25%)

👎 Off flavours



Fermentation



Sourdough bread

- ✓ Improved nutritional quality (complementary amino acid profile to wheat)
- ✓ Improved taste

Research line on faba bean sourdough bread

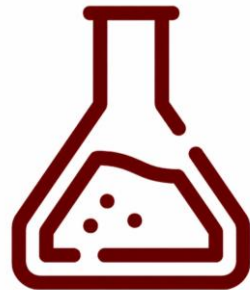
Part 1

Selection of potential beneficial **strains** for faba bean fermentations



Part 2

Faba bean **sourdough** making using selected strains



Part 3

Whole wheat **bread** making using faba bean sourdough



Part 4

Investigate impact on **health-related properties** of whole wheat-faba bread



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Part 4

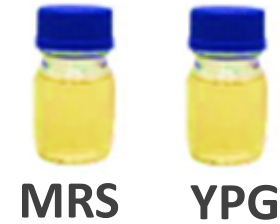
Investigate impact on health-related properties of whole wheat-faba bread



Part 1 – Screening of strains

 
n = 50 n = 14

1. Screening in **optimal growth media**



 
n = 20 n = 7

2. Screening in **faba bean-like media**



 
n = 8 n = 5

3. Screening in **faba bean flour**



Selection criteria:

- Growth parameters
- Acidification
- Metabolite production
- Nutritional properties
- Enzymatic activities

 
n = 2 n = 2

PUR-C17-01 *Companilactobacillus alimentarius*
TOPL1 *Lactiplantibacillus plantarum*
KFBY1 *Monosporozyma unispora*
KFAY2 *Saccharomyces cerevisiae*

Research line on faba bean sourdough bread

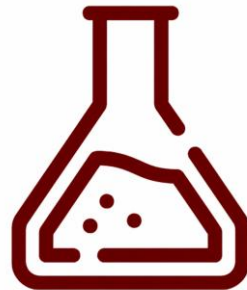
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Part 2 – Faba bean sourdough making



**Dehulled faba
bean flour**

- ❖ PUR-C17-01 *Companilactobacillus alimentarius*
- ❖ TOPL1 *Lactiplantibacillus plantarum*
- ❖ KFBY1 *Monosporozyma unispora*
- ❖ KFAY2 *Saccharomyces cerevisiae*



50:50 mixture of
dehulled faba bean
flour and water
with 1% inoculum

Reference strains



L. plantarum LMG S-33253
S. cerevisiae baker's yeast

Reference sourdough

Innovative strains



TOPL1
KFBY1

SD 1



TOPL1
KFAY2

SD 2



PUR-C17-01
KFBY1

SD 3

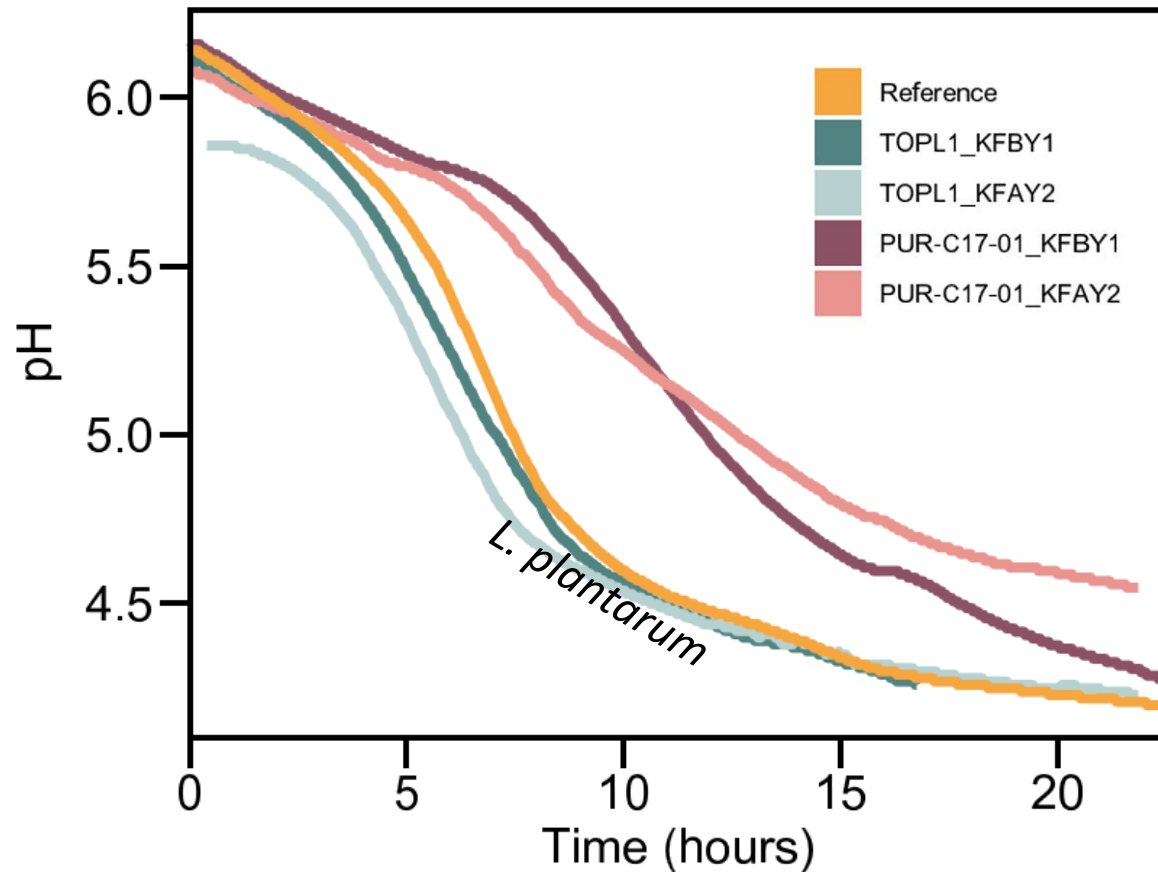


PUR-C17-01
KFAY2

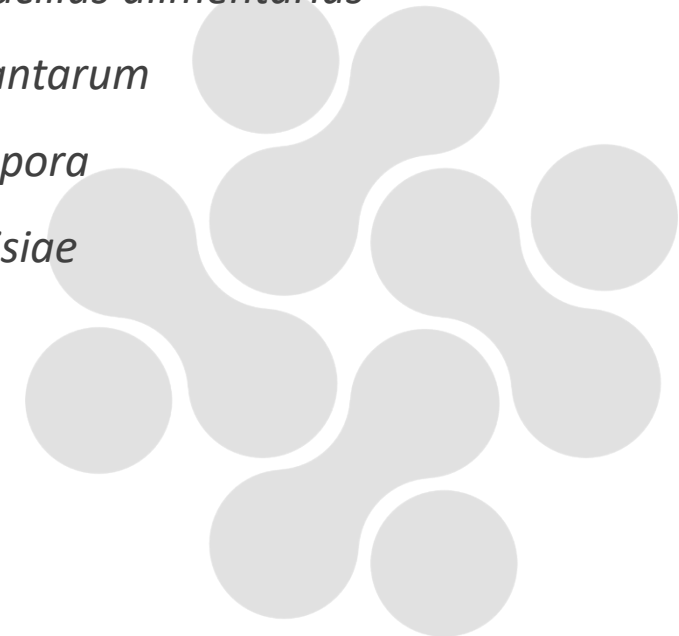
SD 4

Part 2 – Faba bean sourdough making

Acidification



- ❖ PUR-C17-01 *Companilactobacillus alimentarius*
- ❖ TOPL1 *Lactiplantibacillus plantarum*
- ❖ KFBY1 *Monosporozyma unispora*
- ❖ KFAY2 *Saccharomyces cerevisiae*



Research line on faba bean sourdough bread

Part 1

Selection of potential beneficial **strains** for faba bean fermentations



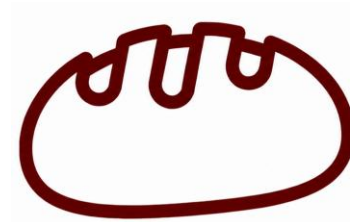
Part 2

Faba bean **sourdough** making using selected strains



Part 3

Whole wheat **bread** making using faba bean sourdough

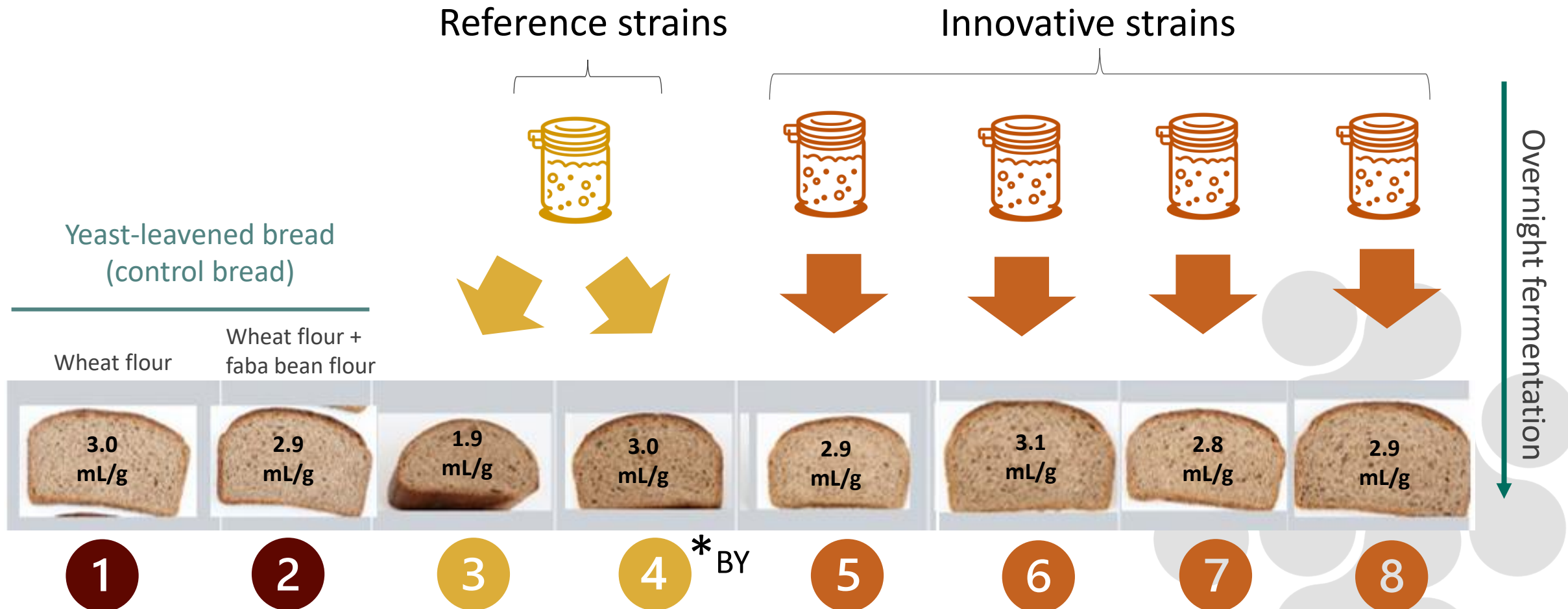


Part 4

Investigate impact on health-related properties of whole wheat-faba bread



Part 3 – Faba bean-based sourdough whole wheat bread



Sensory analysis:

Decrease in the **beany** taste and increase in the **acid, fruity** taste.

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Faba bean **sourdough** making using selected strains



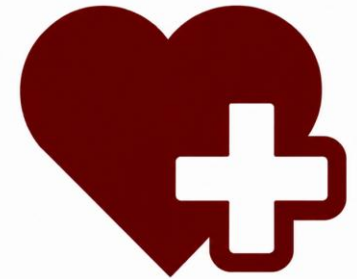
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Whole wheat **bread** making using faba bean sourdough



Part 4

Investigate impact on **health-related properties** of whole wheat-faba bread

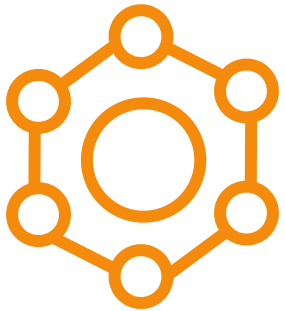


Part 4 – Health-related properties



Small decrease in *in vitro* **starch digestibility** in all sourdough breads compared to yeast-leavened breads

No differences in *in vitro* **protein digestibility** across different breads despite **higher free amino acid content** in sourdough breads



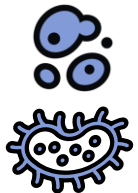
Strongest **fructan decrease** in bread containing sourdough prepared with classic baker's yeast



Faba bean sourdough fermentation enables the production of nutritious whole wheat bread with good technofunctional properties and taste



Faba bean sourdough addition impacts some health-related properties of whole wheat bread



Some properties are also dependent on the microbial composition

Acknowledgements



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