

# Exploitation of functional potential of autochthonous microorganisms from fermented foods - A focus on bioactive peptides released by fermentation -

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## OVERVIEW

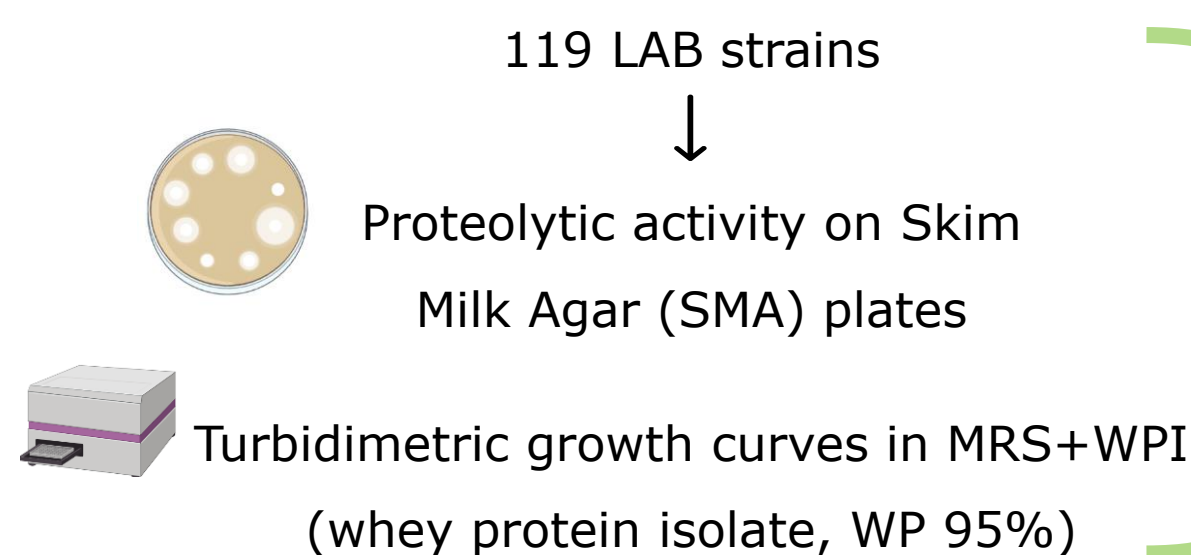
Bioactive peptides (BP) are low molecular weight aminoacidic sequences (100-3,000 Da) capable of promoting health, that can be released from the native polypeptide sequence (Olvera-Rosales et al., 2023)<sup>1</sup>. Cheese whey, although considered a waste of cheese-making, represents an interesting source of BP, that can be obtained via different ways, including fermentation, digestion, and enzymatic hydrolysis (Solieri et al., 2022)<sup>2</sup>.

## AIM

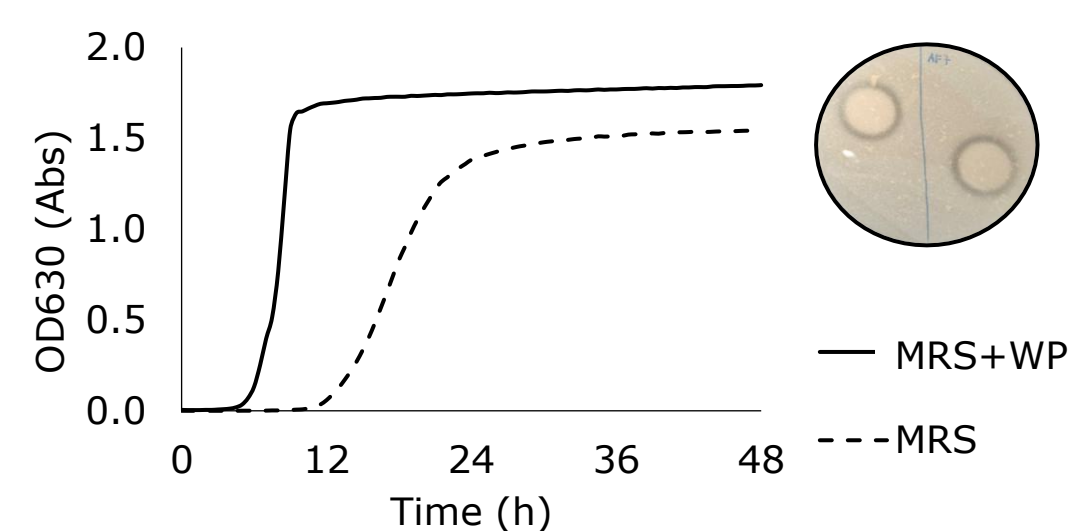
Selection of lactic acid bacteria (LAB) able to release BP from whey proteins (WP) and evaluation of the antimicrobial activity of the WP fermentates.

## EXPERIMENTAL DESIGN AND RESULTS

### 1. SCREENING OF LAB BASED ON PROTEOLYTIC ATTITUDE AND ABILITY TO GROW IN PRESENCE OF WP



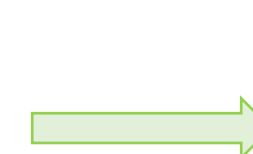
43 out of 119 LAB tested showed proteolytic activity by qualitative analysis onto SMA plates and some of them also displayed good vitality in MRS+WPI.



### 2. WHEY MEDIUM FERMENTATION AND PEPTIDE RELEASE

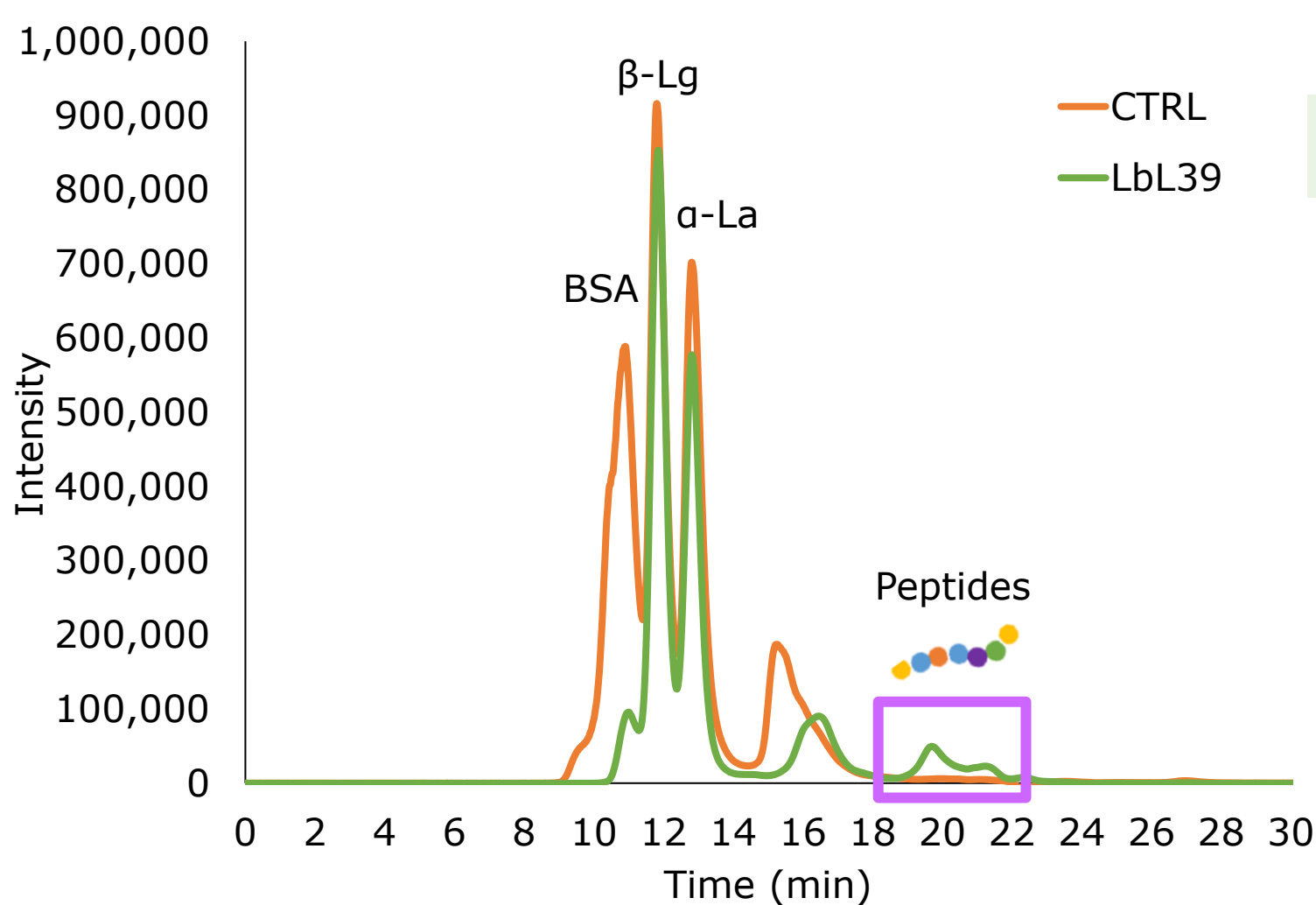


72h-fermentation in whey medium (WPC80 (whey protein concentrate; 80% WP) 15 g/L and lactose 50 g/L)



Evaluation of peptide release ability through SE-HPLC

HPLC analysis showed that the amount of native BSA,  $\alpha$ -La, and  $\beta$ -Lg was reduced after fermentation in all the samples and some of them were able to release peptides.

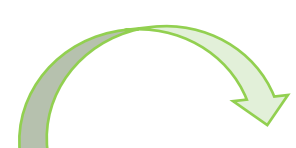


Strain	Species	Peptides release (%)
LbL2	<i>Lb. delbrueckii</i> subsp. <i>delbrueckii</i>	11.53
LbL14	<i>Lb. delbrueckii</i> subsp. <i>delbrueckii</i>	9.80
LbL12	<i>Lb. delbrueckii</i> subsp. <i>delbrueckii</i>	9.41
LbL33	<i>Lb. delbrueckii</i> subsp. <i>lactis</i>	8.76
LbL9	<i>Lb. delbrueckii</i> subsp. <i>bulgaricus</i>	7.77
AF43	<i>Lb. paracasei</i>	7.73
LbL38	<i>Lb. delbrueckii</i> subsp. <i>delbrueckii</i>	7.46
LbL39	<i>Lb. delbrueckii</i> subsp. <i>delbrueckii</i>	7.33
LbL37	<i>Lb. delbrueckii</i> subsp. <i>lactis</i>	6.50
A2	<i>Enterococcus malodoratus</i>	6.42
LbL43	<i>St. macedonicus</i>	3.63
297	<i>Lb. plantarum</i>	3.40

### 3. ANTIMICROBIAL ACTIVITY



Turbidimetric growth curves



Cell-free supernatant



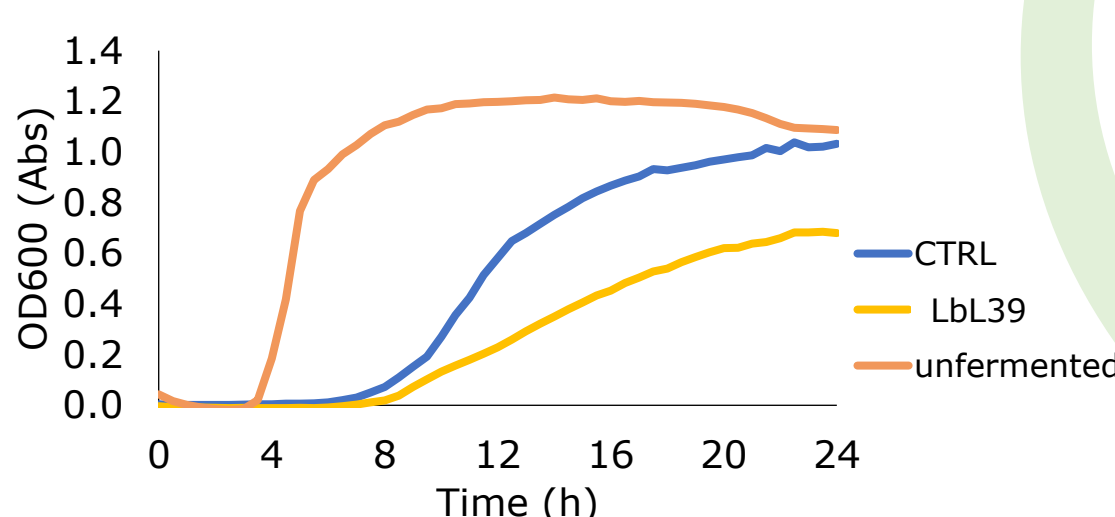
#### Microbial targets

- ✓ *Enterococcus (faecium, durans)*
- ✓ *Escherichia coli*
- ✓ *Listeria monocytogenes*
- ✓ *Salmonella enterica*
- ✓ *Staphylococcus aureus*
- ✓ *Pseudomonas fluorescens*

All samples exhibited antimicrobial activity against at least one microbial target. *L. monocytogenes* was the most affected.

Sample	lag (h)	v <sub>max</sub> (logOD/h)	OD <sub>max</sub> (Abs)
CTRL	7.11 ± 0.11	0.31 ± 0.01	1.05 ± 0.01
fermentate LbL39	7.31 ± 0.58	0.05 ± 0.01 ↓	0.69 ± 0.06 ↓
unfermented	3.47 ± 0.01	0.45 ± 0.04	1.20 ± 0.06

Microbial target: *L. monocytogenes*



## CONCLUSIONS

The results lay the basis for the exploitation of selected strains as new antimicrobial-peptide producers in functional foodstuff. Future research will aim to identify the released peptides and investigate other bioactive properties of the fermentation products.

#### REFERENCES

- <sup>1</sup> Olvera-Rosales, L. B., et al., (2023). *Critical Reviews in Food Science and Nutrition*  
<sup>2</sup> Solieri, L. et al., (2022). *Process Biochemistry*