

# Reduction of allergenicity of Arginine Kinase from the edible insect *Hermetia illucens* by lactic acid bacteria activity

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## Background

Concerns about population growth and climate change have led to the exploration of alternative protein sources, such as black soldier fly larvae (*Hermetia illucens*, BSF), which are rich in high-quality proteins. However, potential allergenic risks linked to insect consumption, particularly due to proteins like tropomyosin (TPM) and arginine kinase (AK), have raised concerns. Lactic acid bacteria (LAB) fermentation could be a promising solution to reduce allergenic risks. Through a proteolytic system composed of cell envelope proteinases (CEP), LAB can degrade proteins into oligopeptides, inactivating IgE-epitopes. This approach could help make the use of insects as a protein source safer and more acceptable for human consumption.



This project aims to reduce the allergenicity of AK from the edible insect *Hermetia illucens* by LAB activity.

## LAB EFFECT ON RECOMBINANT AK

### 1 GROWING CELLS

#### Electrophoretic profile

#### Microbial growth

#### CONDITIONS

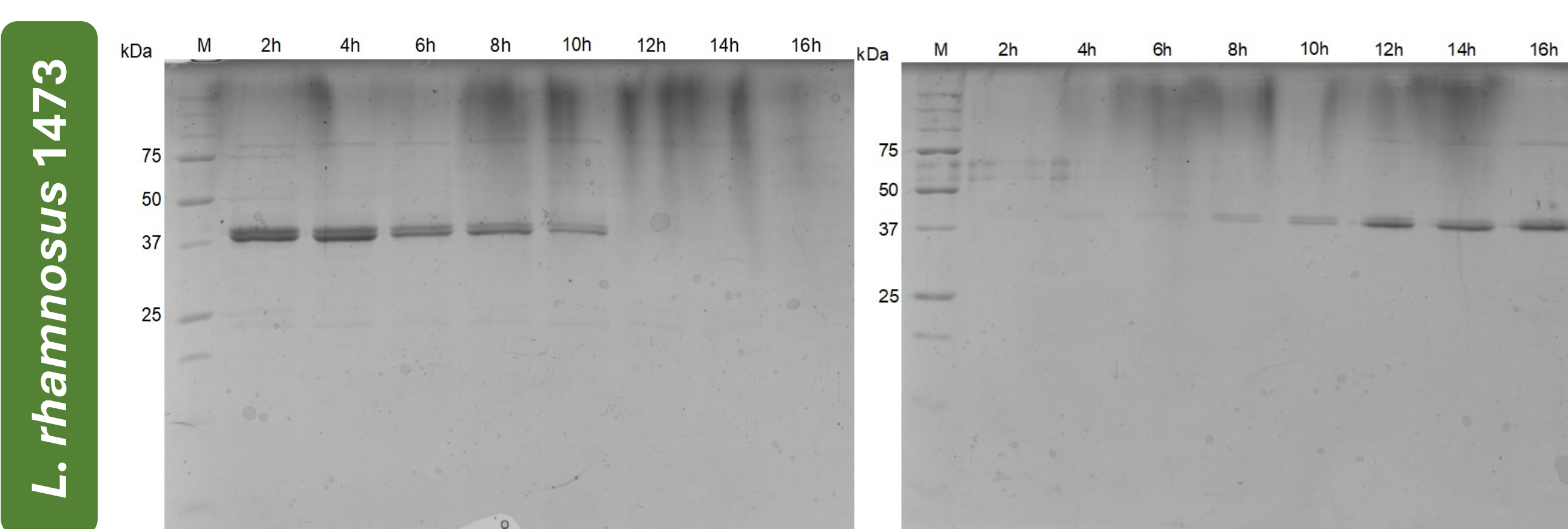
*L. rhamnosus* 1473  
*L. paracasei* 2333

Recombinant AK

MRS 5:5 broth

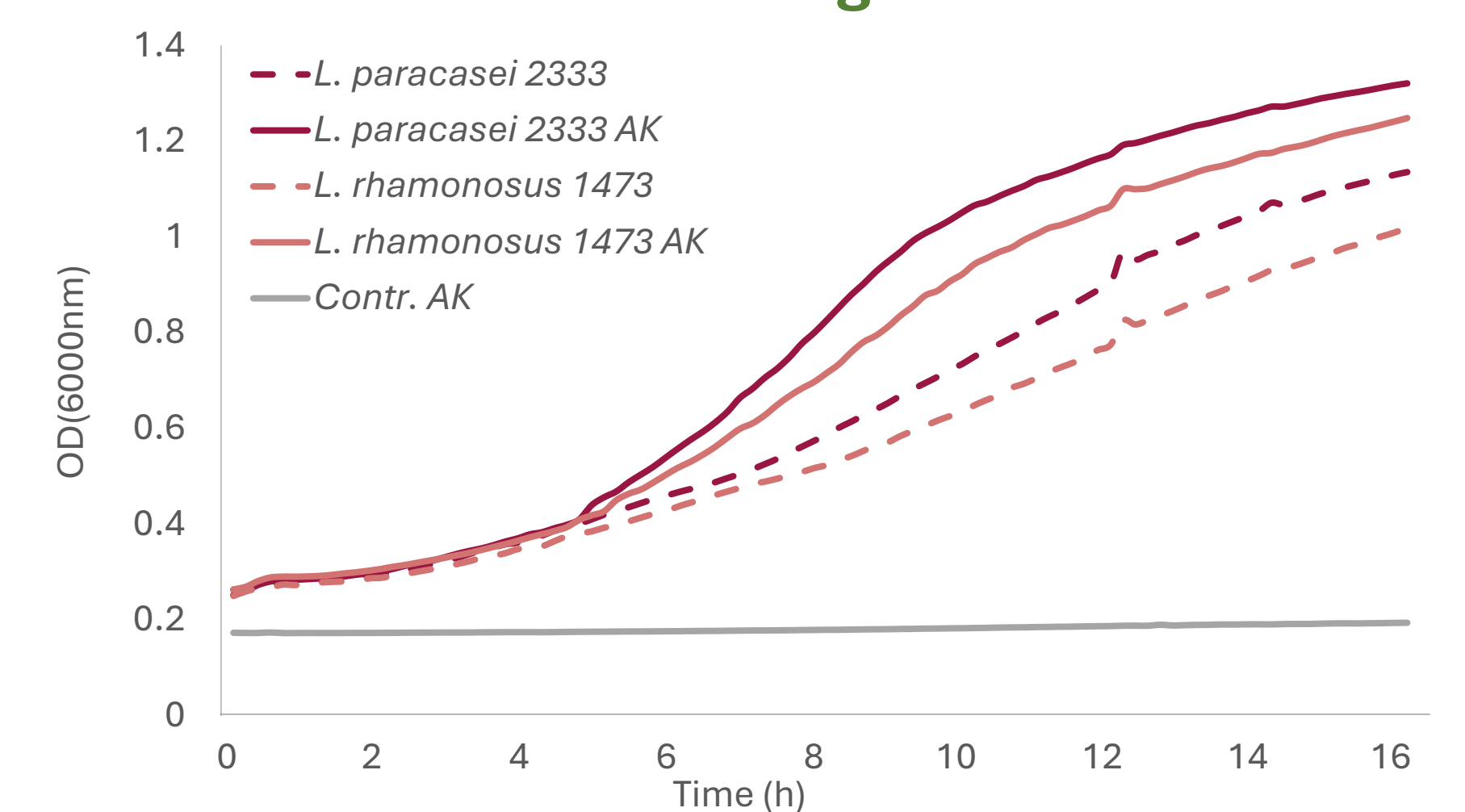
16h (samples collected every 2h)

25°C

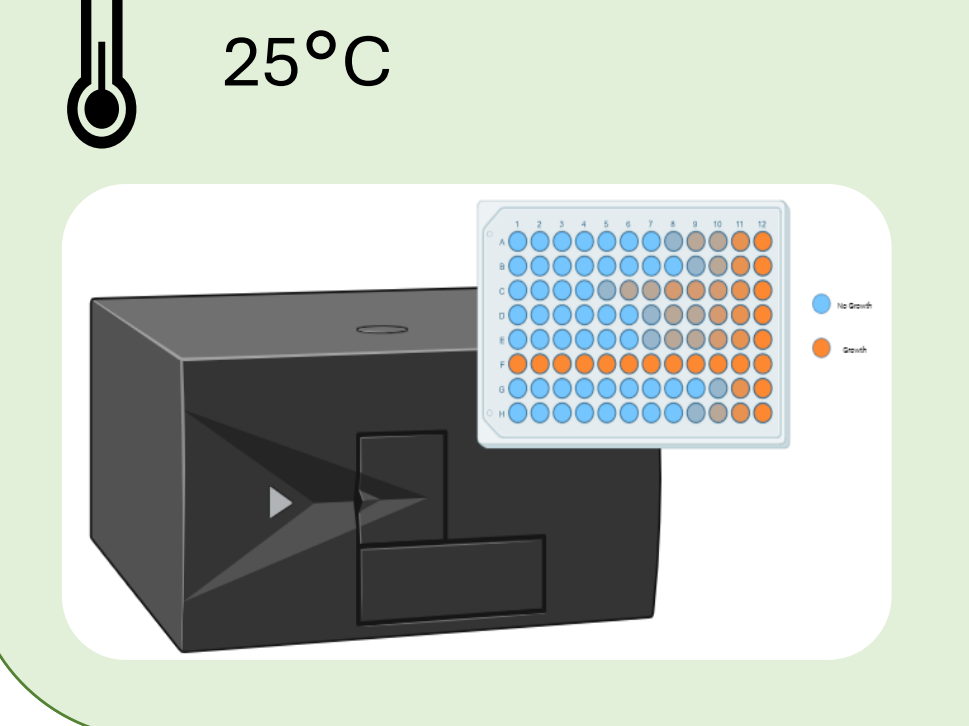


**Soluble fractions:**  
decrease in the intensity of AK band after 6h of incubation; complete disappearance after 12h.

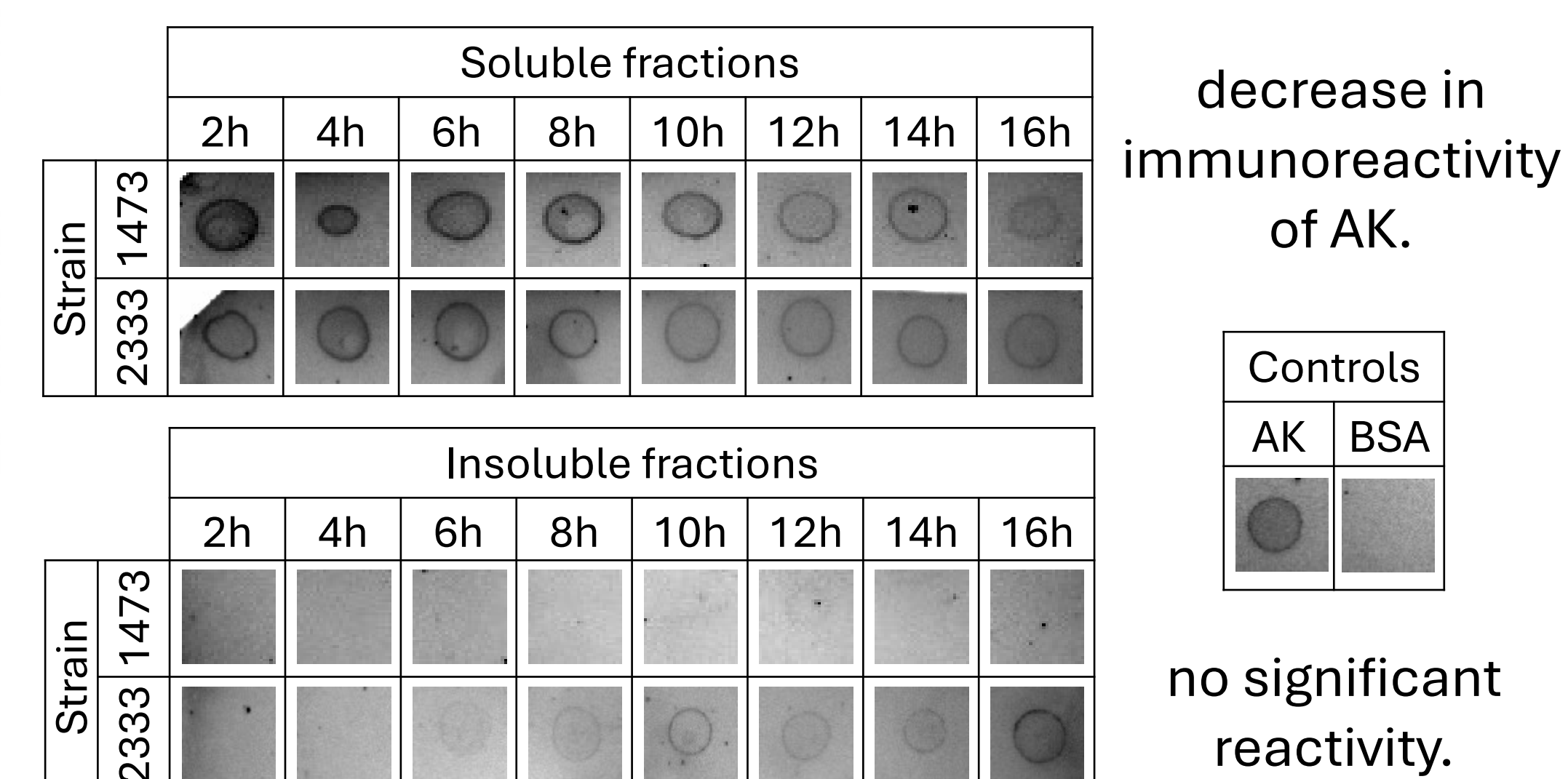
**Insoluble fractions:**  
increase in AK band starting from 6 hours of incubation.



AK leads to an increase in LAB growth; decrease of AK solubility starts at the beginning of the LAB exponential phase and is completed at the end.



#### IgE-Dot Blot assays



The results show how LAB activity induces AK precipitation obtaining aggregates with reduced IgE cross-reactivity.

### 2 NON-GROWING CELLS

#### Electrophoretic profile

#### IgE-Dot Blot assays

#### CONDITIONS

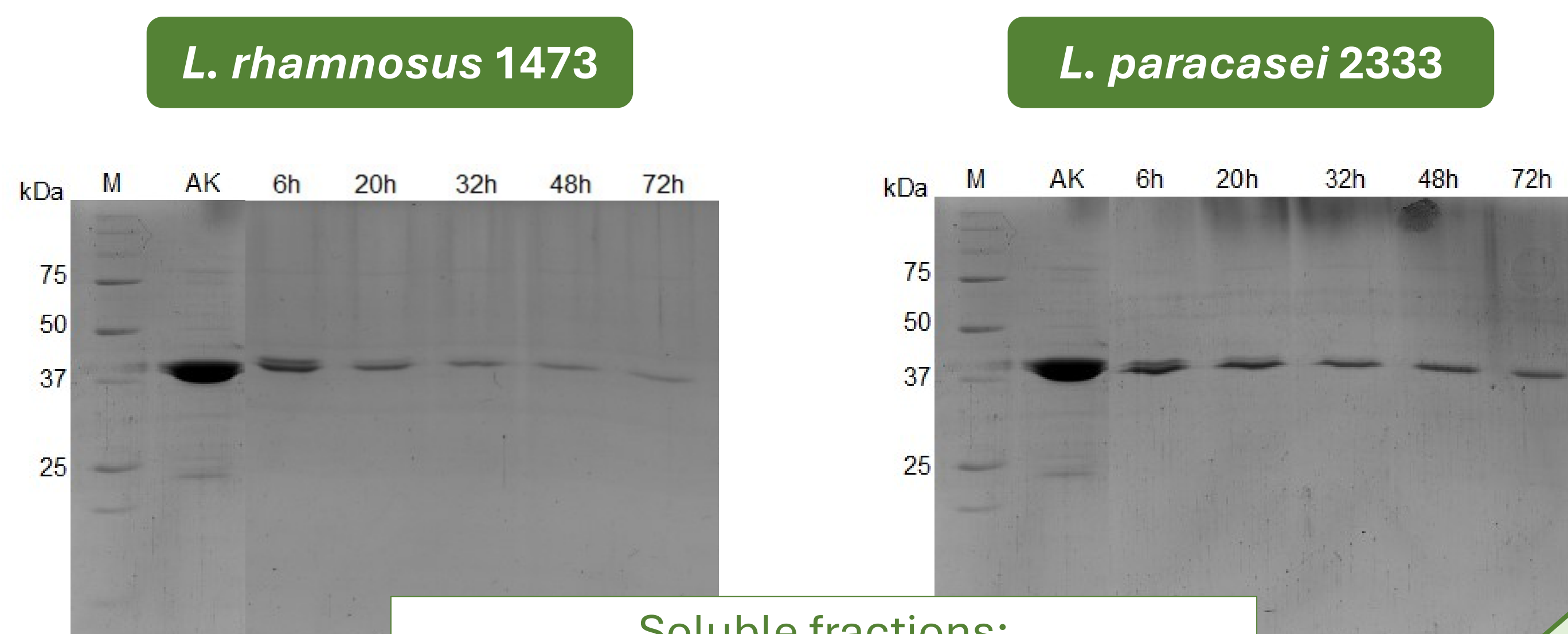
*L. rhamnosus* 1473  
*L. paracasei* 2333

Recombinant AK

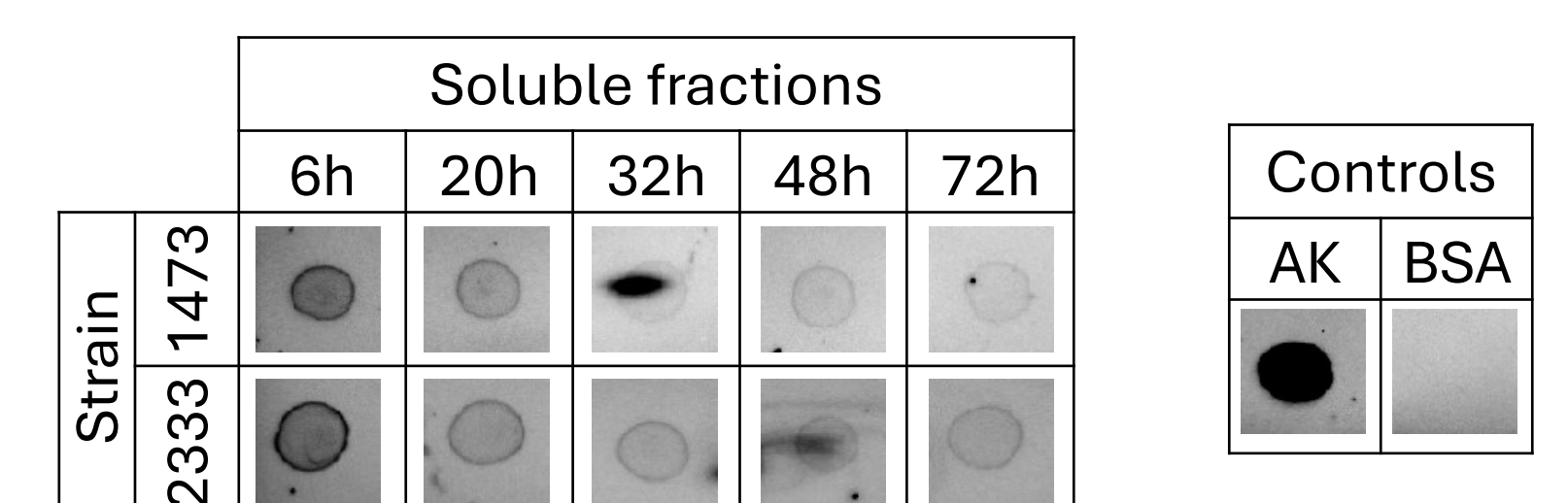
NaPO<sub>4</sub> + CaCl<sub>2</sub> solution

72h (samples collected at 6-20-32-48-72h)

37°C



**Soluble fractions:**  
decrease of AK band was observed.

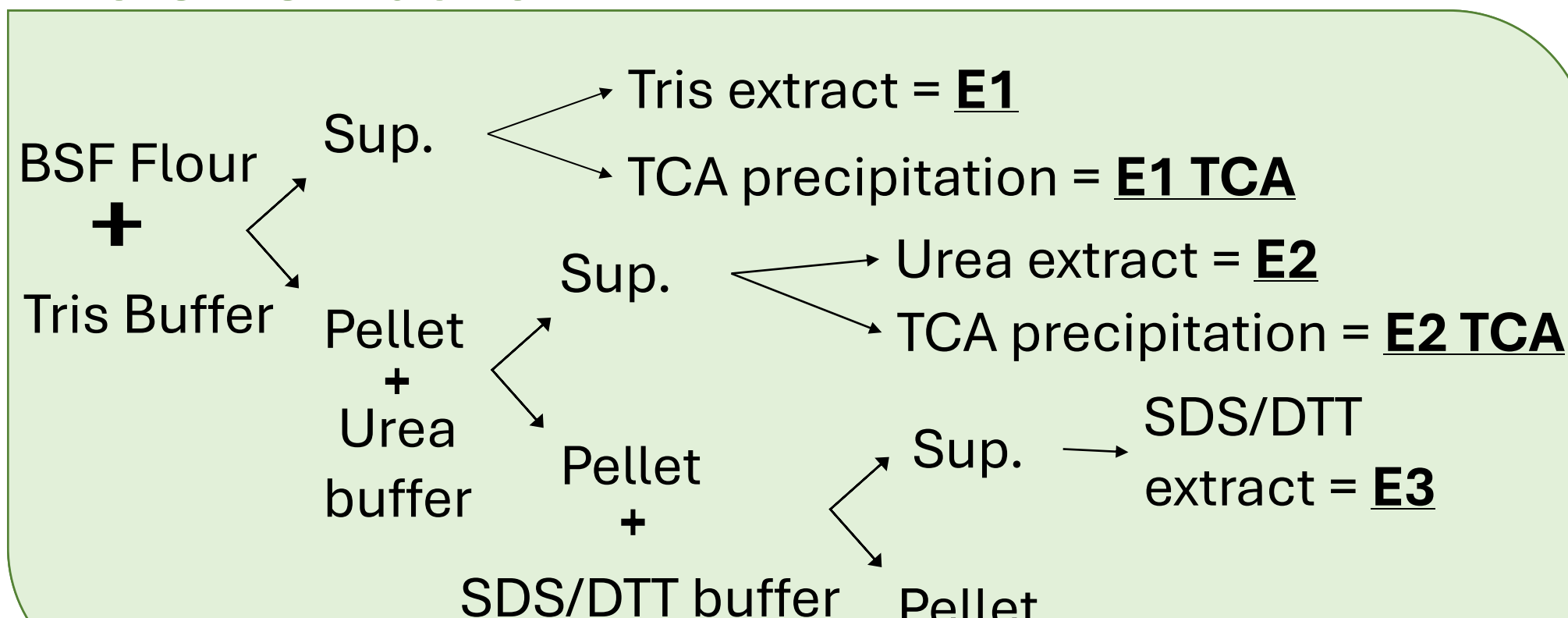


**Soluble fractions:**  
significant decrease of IgE reactivity.

The results show a significant decrease of IgE reactivity for the AK, LAB strains probably lead to its degradation.

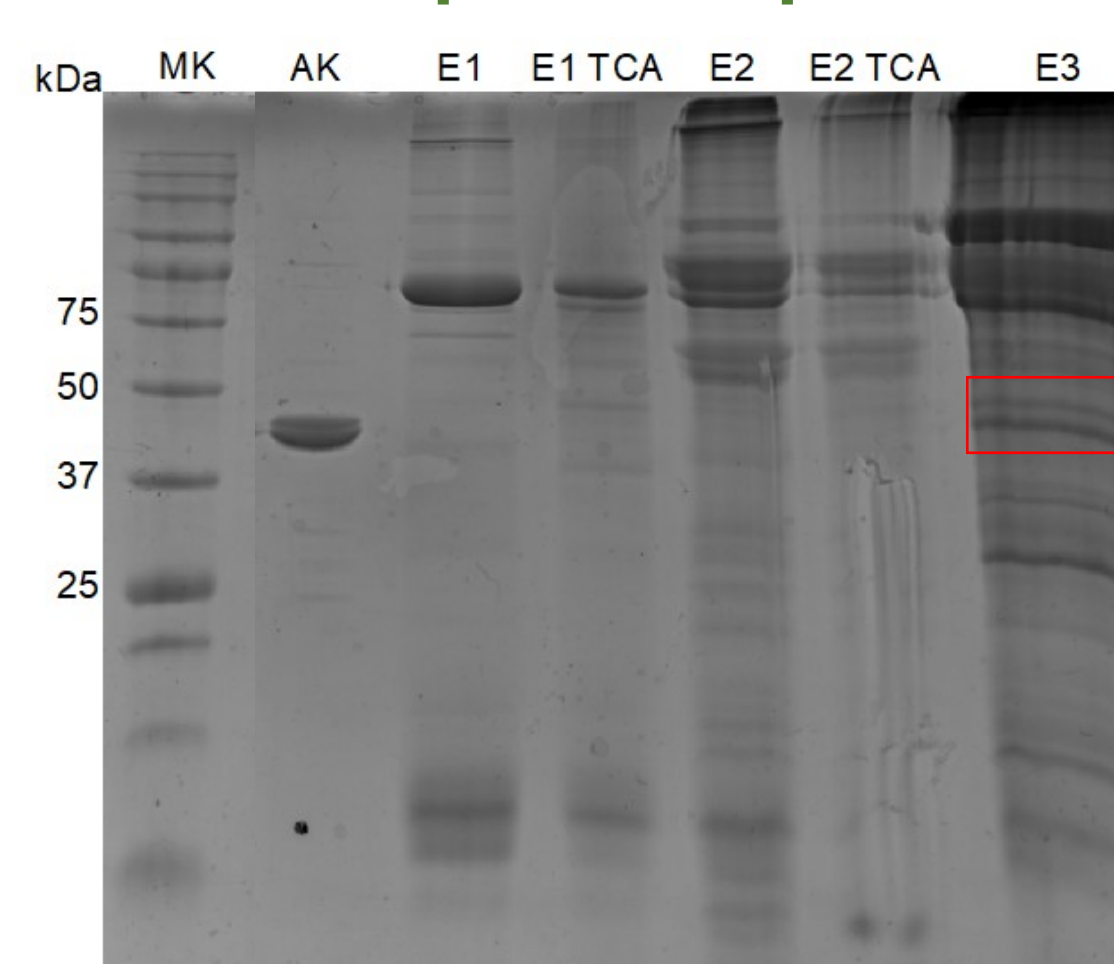
## BSF FLOUR

### Protein extraction

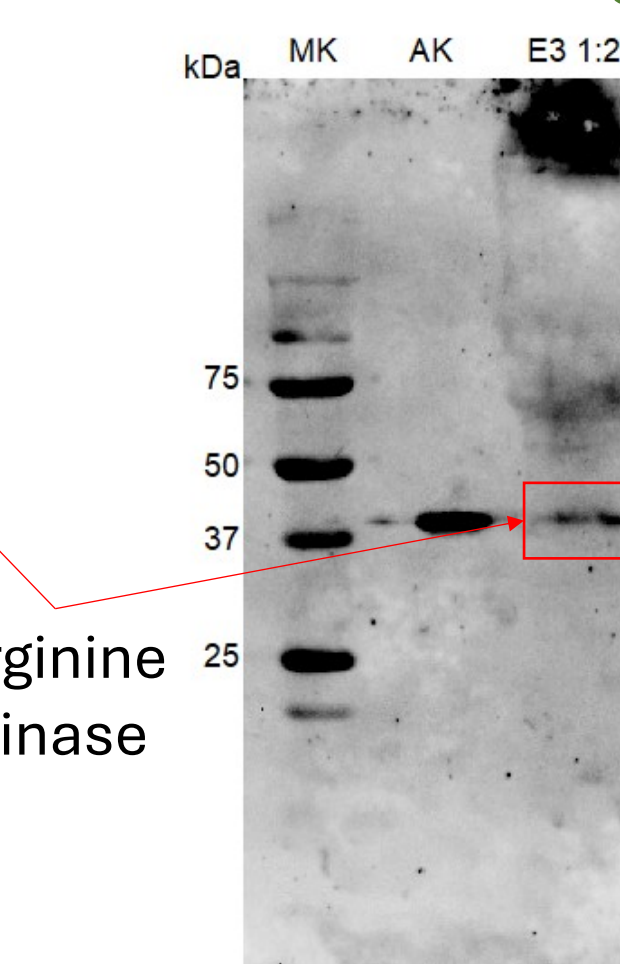


### PRELIMINARY RESULTS

#### Electrophoretic profile



#### Western blot IgG



## CONCLUSIONS

Overall, these results indicate that LAB could represent a valid tool against AK allergen. However, to verify their activity on AK in the food matrix, the tests will be repeated by using BSF flours applying the best conditions that induce the mitigation of AK IgE-reactivity.