# Impact of pediococci on the amino acid profile of a cheese with propionic acid fermentation

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## Introduction

*Pediococcus pentosaceus* and *Pediococcus acidilactici* are regularly found in the nonstarter population of raw milk cheeses at the end of ripening. They are known to contribute to the ripening process by their ability to degrade amino acids resulting in important precursors for flavor compounds. In this study, we determined the impact of the two species on the amino acid profiles of a cheese with propionic acid fermentation.

## Material and Methods

Strains of the two mentioned pediococci species were applied as single or mixed cultures **Pep1** (*P. pentosaceus* FAM 19132 & FAM 19144), **Pep2** (*P. pentosaceus* FAM 18321) and **Pac1** (*P. acidilactici* FAM 20063 & FAM 13473) with two different *Propionibacterium freudenreichii* cultures in a full factorial experiment. In total, 16 cheeses were produced covering all possible combinations of the cultures.

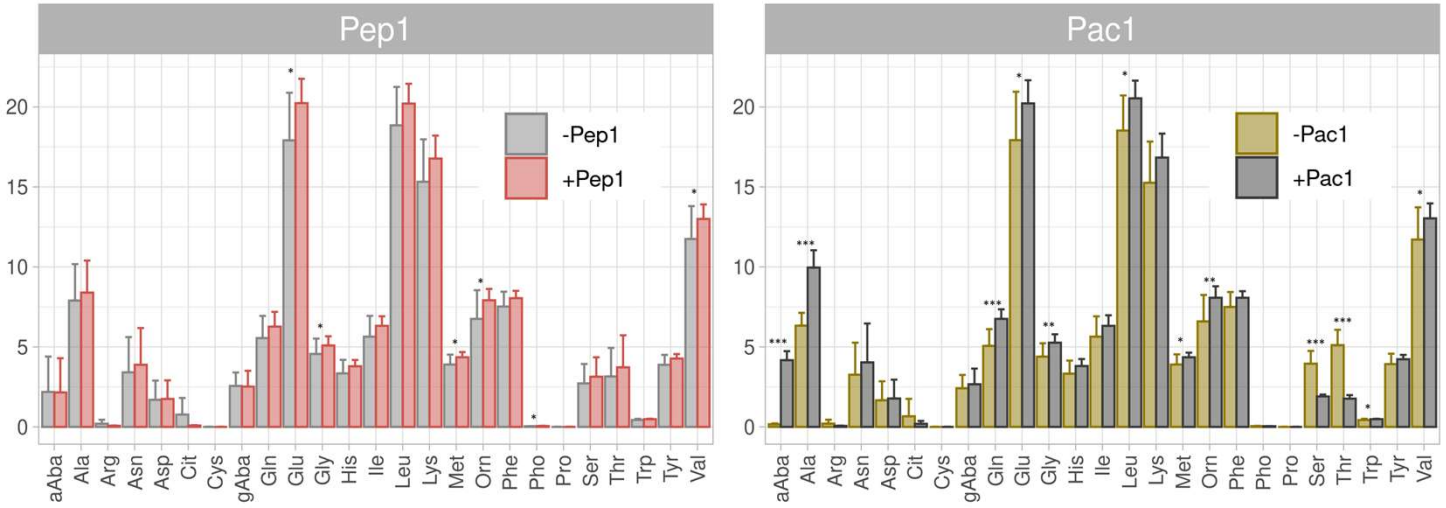


**Figure 1:** Amino acid profile (mmol·kg$^{-1}$) of the cheeses with **Pep1** (left) and **Pac1** (right). (N = 8, Pro n.d.)

## Results and Discussion

**Pep1** had a significant impact on proteolysis in cheese by increasing the total amount of free amino acids, thus leading to higher amounts of the amino acids originating from casein (Figure 1). There was one exception, Arg, whose content was low in all cheeses because of an active arginine deiminase pathway in all three *Pediococcus* cultures. Therefore, the correlation between Orn and Arg was highly negative (Figure 2). Although *P. pentosaceus* exhibits serine dehydratase activity in vitro, no effect on Ser degradation was found in cheese.
For **Pep2**, no relevant effects could be observed (data not shown).

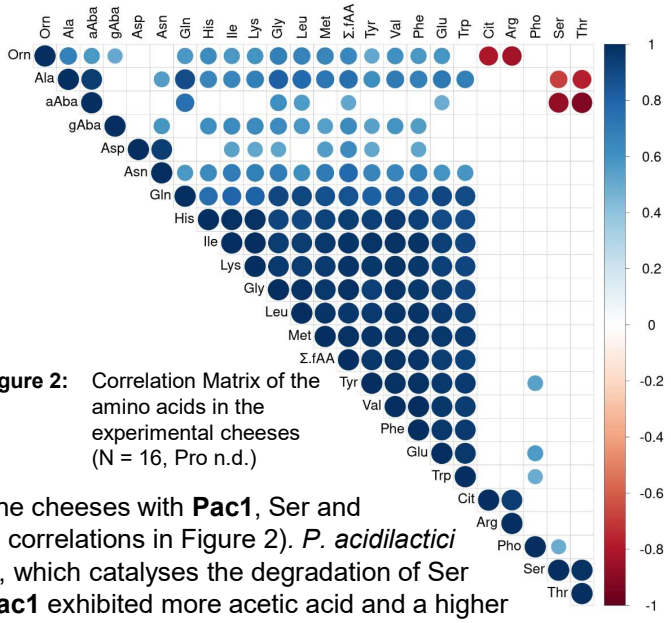


**Figure 2:** Correlation Matrix of the amino acids in the experimental cheeses (N = 16, Pro n.d.)

**Pac1** proved to have an active amino acid degrading ability; in the cheeses with **Pac1**, Ser and Thr had been converted to Ala and αAba (Figure 1 and negative correlations in Figure 2). *P. acidilactici* had previously been shown to possess a threonine dehydratase, which catalyses the degradation of Ser and Thr to pyruvate. The ripened cheeses with the addition of **Pac1** exhibited more acetic acid and a higher eye volume. This is probably a result of higher contents of Ala, which can be metabolised by *P. freudenreichii*.

**Summary**
The two cultures **Pep1** (*P. pentosaceus*) and **Pac1** (*P. acidilactici*) had a significant impact on cheese ripening:
- **Pep1** increased overall proteolysis
- **Pac1** converted serine and threonine to alanine and α-aminobutyric acid. The amount of acetic acid and the eye volume in cheese were increased.

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