

**TITLE:** STUDY OF THE EFFECTIVENESS OF STAPHYLOCOCCINS IN BIOPRESERVATION OF MINAS FRESCAL CHEESE WITH REDUCED SODIUM CONTENT

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**ABSTRACT:**

Microbiological contaminants are the major causative agents of foodborne illnesses, especially *Staphylococcus aureus*. Bacteriocins are antimicrobial peptides or proteins ribosomally synthesized by prokaryotes that have inhibitory activity against other prokaryotes. Some bacteriocins produced by *Staphylococcus* spp., referred to as staphylococcins, have the ability to inhibit several human and animal pathogens. The objective of this study was to evaluate the staphylococcin antimicrobial activity against *S. aureus* strains isolated from food, aiming at their industrial application in biopreservation of Minas frescal cheese with a reduced sodium content. Therefore, the sensitivity of the six strains of *S. aureus*, isolated from foods in previous studies, to 12 staphylococcins was tested by the agar diffusion method. Four staphylococcins were then selected for subsequent tests: aureocin A53, lysostaphin, hyicin 3682 and Pep5. These peptides were partially purified by  $(\text{NH}_4)_2\text{SO}_4$  precipitation followed by cation exchange chromatography. The mode of action of each bacteriocin was tested against all *S. aureus* strains, aiming to investigate if they have either a bactericidal or a bacteriostatic activity. Aureocin A53, lysostaphin and Pep5 proved to exhibit a bacteriolytic activity, whereas hyicin 3682 only reduced the growth of the *S. aureus* strains. The antimicrobial activity of the staphylococcins was then tested against *S. aureus* Q1 and QJ3 in cheese matrices with different concentrations of sodium (control, a 25% reduction, and a 50% reduction) in order to evaluate their role in biopreservation of this type of food, kept under refrigeration at 4 °C, for 21 days. The results observed in samples containing a single staphylococcin were very promising, as aureocin A53 and Pep5 reduced approximately 99% and 95% of the viable cell counts, respectively. Lysostaphin caused a 99.99% reduction of the viable cell counts. The combined action of aureocin A53 and Pep5 resulted in a further reduction of one log-unit CFU/g when compared with the reduction caused by the use of either one separately. The combined action of either lysostaphin and aureocin A53 or lysostaphin and Pep5 generally resulted in a reduction similar to that observed when lysostaphin was employed singly. These results demonstrated the feasibility of implementing the use of these staphylococcins in dairy industry as food biopreservatives.

**Keywords:** *Staphylococcus aureus*, bacteriocins, staphylococcins, Minas frescal cheese, biopreservatives

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