TITLE: Microencapsulation of enterocin in whey for food biopreservation

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ABSTRACT:

Enterocins are antimicrobial peptides produced by the genus *Enterococcus* and have a wide spectrum of inhibition against potentially pathogenic bacteria, including those carried by food. However, the interrelationship between enterocin and the food matrix can interfere with the bactericidal action of the peptide. Thus, microencapsulation has been an alternative for this purpose. Given the above, the objective of this work was to microencapsulate the enterocin produced by *Enterococcus durans* MF5 using whey as an encapsulating agent. The whey was prepared at a concentration of 10% with the addition of 1 and 5% lyophilized enterocin. The material was subjected to the *spray dryer* process, and tests were performed to determine the antimicrobial activity of the encapsulated material against the bacteria *Salmonella Typhimurium*, *Escherichia coli*, *Pseudomonas* sp, *Staphylococcus aureus*, *Listeria monocytogenes*, *Listeria innocua,* and *Listeria ivanovi*. The microencapsulation yield was 31.66% and 34.16% for concentrations of 1 and 5% of enterocin, respectively. There was no significant difference between the antagonistic action of the concentrations of 1 and 5% of enterocin, and the encapsulated enterocin was efficient for up to 12 hours of co-culture with *Listeria* sp cells. It is also noteworthy that the encapsulated enterocin showed values of 6000 $UA.mL^{-1}$, being higher than the values of pure enterocin. The damage caused to the cell wall of the target bacteria was analyzed by Scanning Electron Microscopy (SEM). The characterization of the particles obtained was carried out employing Fourier Transform Infrared Spectroscopy (FTIR) and Differential Scanning Calorimetry (DSC). The FTIR results showed the interaction between enterocin and whey by reducing the intensity of the band corresponding to the β-pleated structure of whey protein, which encapsulation led to a modification of the protein structure. In the thermal analysis, greater thermal stability of the encapsulated enterocin was observed. In conclusion, it was found that enterocin microencapsulation had a satisfactory yield, and that encapsulation potentiates its antimicrobial power, thus enterocin microencapsulation is a fully applicable technique.

Keywords: *Enterococcus E durans*. Bacteriocin. Spray dryer. Food pathogens.

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