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Effect of the application of a galactomannan coating incorporating nisin on the growth of *Listeria monocytogenes* on Ricotta cheese

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Keywords: Edible coating, galactomannan, nisin, *Listeria monocytogenes*, Ricotta cheese

Abstract

Antimicrobial packaging, besides protecting the product from the external environment, inhibits or delays microorganism growth in foods and meets the actual demand of consumers for healthier foods, containing less additives (Lopez-Rubio, Gavara, & Lagaron, 2006).

Cheese is a ready-to-eat type of food that has been associated with foodborne listeriosis. *Listeria monocytogenes* is an important ubiquitous foodborne pathogen which may contaminate foods at pre- and post-harvest stages of production. To overcome this problem bacteriocins could be entrapped in a suitable edible coating applied to food. Nisin is an antimicrobial peptide produced by *Lactococcus lactis* subsp. *lactis*. and research studies have revealed its ability to inhibit the growth of some pathogenic bacteria (Sobrino-López, & Martín-Belloso, 2008).

The aim of this study was to evaluate the antimicrobial activity of coatings of galactomannans from *Gleditsia triacanthos* incorporating nisin against *L. monocytogenes* during storage of Ricotta cheese at 4 °C.

Three different treatments were tested: a control with no coating; a sample with coating containing no nisin and a coating with 50 IU.g⁻¹ of nisin. Samples of cheese (20 g) were immersed in 0.5 % w/v galactomannan solution containing glycerol (as plasticizer) (1.5 % v/v). To test the effectiveness of the treatments Ricotta cheese samples were surface-inoculated with a solution containing approximately 1×10⁶ CFU.ml⁻¹ of *L. monocytogenes*. Microbiological and physical-chemical parameters (color change, pH, moisture content and weight loss) were monitored over 28 days for cheese stored at 4 °C.

Among the three treatments, the combination of coating and nisin showed the best results, followed by the coating containing no nisin. Counts of *L. monocytogenes* were lower ($p < 0.05$) in nisin-containing coating than in no-coated cheese. The nisin-containing coating presented a reduction from 5.1 to 4.4 log CFU.g⁻¹ after 2 days of storage. For samples coated with nisin, reductions of 2.2 log CFU.g⁻¹ were achieved for samples after 7 days of storage.

These results suggest that the application of these coatings could be a potential food packaging solution for the release of nisin in view of the control of *L. monocytogenes* spoilage in cheese.

Lopez-Rubio, A., Gavara, R., & Lagaron, J. M. (2006). Bioactive packaging: turning foods into healthier foods through biomaterials. *Trends in Food Science & Technology*, 17, 567-575

Sobrino-López, A., & Martín-Belloso, O. (2008). Use of nisin and other bacteriocins for preservation of dairy products. *International Dairy Journal*, 18, 329–343