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Development of alginate-based antimicrobial edible coating to improve the physicochemical, microbiological and sensory attributes of cheese

M.P.G. Vanniarachchy*, K.G. Kaushani and I. Wijesekara

Department of Food Science and Technology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Gangodawila, Nugegoda, Sri Lanka

Cheese is an extremely perishable food product that needs proper packaging to minimize the contamination with spoilage microbes, and the development of the unpleasant appearance, off-odors, which leads to deterioration. In this research, a seaweed-based edible antimicrobial coating was developed using alginate extracted at the laboratory from *Sargassum* sp. as the main ingredient, glycerol as the plasticizer, cinnamon (*Cinnamomum zeylanicum*) essential oil (CEO) as the antimicrobial agent, distilled water as the solvent, and calcium chloride (5% w/v) as the cross-linking agent to enhance the physicochemical, microbiological, sensory attributes of processed cheese. The effectiveness of edible coatings on cheese was evaluated throughout 40 days of storage. Four types of alginate-based coatings were developed as solution 1; 1% (w/v) alginate and 0.25% (w/v) glycerol, solution 2; 1% (w/v) alginate, 0.2% (w/v) CEO, and 0.25% (w/v) glycerol, solution 3; 2% (w/v) alginate and 0.5% (w/v) glycerol, and solution 4; 2% (w/v) alginate, 0.2% (w/v) CEO, and 0.5% (w/v) glycerol. Subsequently, microbiological (counts of total mesophilic aerobic bacteria, yeasts, molds, and coliforms), sensory, and physicochemical properties (moisture, weight loss, pH, hardness, colour change, fat content) of alginate solution-coated cheese obtained at 0, 10, 20, and 40 days of storage at 10 °C and 85% relative humidity were compared with those of CEO-coated and uncoated cheese. Cheeses coated with antimicrobial solution-4 exhibited a decreased loss of moisture, weight, change in pH, hardness, colour, and fat content compared to other coated and uncoated cheeses. Solution 4-coated cheeses obtained the highest acceptability score for all attributes (odor, colour, surface shininess, hardness, taste, and overall acceptability) in sensory analysis, and it was the most successful in preventing the growth of coliforms while maintaining the yeasts, molds, and total mesophilic aerobic bacteria counts in accepted safe levels throughout the storage. Based on physicochemical, microbiological, and sensory attributes, solution-4 (2% (w/v) alginate, 0.2% (w/v) CEO, and 0.5% (w/v) glycerol), which exceeded the performance of uncoated cheese was selected as the best formulation for antimicrobial coating preparation.

Keywords: Alginate, antimicrobial edible coating, cinnamon essential oil, *Sargassum* sp.

E-mail: mihiripg@sjp.ac.lk