

Influence of Application Methods of a Whey Protein-Based Coating with Cardoon Extract on Cured Cheese Properties

Cássia H. Barbosa^{1,2}, Mariana A. Andrade^{1,3}, Sidney Tomé¹, Fernanda Vilarinho¹, Ana Luísa Fernando², Ana Sanches Silva^{4,5,6}

¹ National Institute of Health Dr Ricardo Jorge, Department of Food and Nutrition, Av. Padre Cruz, 1649-016 Lisbon, Portugal

² METRICs, Department of Chemistry, NOVA School of Science and Technology, Universidade NOVA de Lisboa, Campus de Caparica, 2829-516 Caparica, Portugal

³ REQUIMTE/LAQV, Rua D. Manuel II, Apartado 55142, Porto, Portugal

⁴ University of Coimbra, Faculty of Pharmacy, Coimbra, Azinhaga de Santa Comba, 3000-548 Coimbra, Portugal

⁵ Centre for Study in Animal Science (CECA), ICETA, University of Porto, Porto, Portugal

⁶ Associate Laboratory for Animal and Veterinary Sciences (AL4Animals), 1300-477 Lisbon, Portugal

*Corresponding Author: cassia.barbosa@insa.min-saude.pt

The application of edible coatings for cheese preservation has gained attention for maintaining its quality and enhancing its shelf life. Whey protein-based coatings, with natural extracts, can protect from moisture loss, lipid oxidation, and microbial contamination. *Cynara cardunculus* L. (cardoon) is a Mediterranean plant whose flowers are used in cheesemaking, and the leaves, the main by-product generated, are known to have an interesting polyphenol profile. This study aims to evaluate different methods of applying a whey protein-based coating incorporated with 2% cardoon leaf extract on cured cheese. The different methods involved two groups of control cheese samples: one group remained untreated, while the other group was coated without any extract. The active samples consisted of three groups of cheese samples: one was double-dipped and air-dried, another was double-dipped and dried in a flow chamber, and a third one was single-dipped and dried in a flow chamber. The samples were kept for 30 days at 30 °C. The samples were analysed for microbial contamination, moisture content, colour, and lipid oxidation. The whey protein-based coating incorporated with cardoon leaf extract had significant effects on the packed cheese. The active coating reduced microbial counts, specifically *S. aureus* and moulds and yeasts, compared to the control samples. The active coating decreased luminosity and increased the yellow-blue value.

But there was no significant difference in moisture content. The active coating provided moderate protection against lipid oxidation.

Overall, applying whey protein-based coating incorporated with 2% cardoon leaf extract appears to be an effective method to prolong the shelf life of cheese. Incorporating natural extracts into whey protein-based coating represents a natural and effective strategy to protect cheeses against microbiological contamination and oxidation. This approach enhances the quality and safety of cheese products while meeting consumer demand for natural and sustainable food preservation methods.

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