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WPI active edible coatings to prevent cheese color defects

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Cheese is a type of food that has been used over time as a way of preserving milk. It is a popular food because of its excellent versatility and palatability. All around the world a huge variety of cheeses, flavors, and shapes can be found. This food product depends on the culture and available resources of each region. In 2021, global cheese production amounted to about 21.86 million metric tons¹. The European Union was by far the top producer of cheese worldwide, with a production volume of around 10.35 million metric tons of cheese that year¹.

Color is one of the most important attributes that will be first seen by consumers before eating the cheese and is a primary consideration of consumers when making purchasing decisions. The color is also an indicator of the cheese quality with attributes such as flavor, safety, and ripeness.

Cheese is a living food, considered as a bio complex ecosystem colonized by a diverse group of microorganisms, known as cheese microbiota, by raw milk, starter, and adjunct cultures. These microorganisms are the main contributors to the perceived sensory attributes of different cheeses due to their complex interaction with milk proteins, carbohydrates, and fats that occur mainly in an important technological process in cheese making, known as ripening. Cheese ripening is a complex phenomenon involving several biochemical reactions. Proteolysis is the most important multi-step, biochemical event in cheese ripening. It accounts for the development of several organoleptic features, encompassing both flavor and texture. High proteolysis resulted in a high free amino acid content, which has been described as a substrate for cheese color defects (blue, pink, and brown).

For some years now, cases of color defects in cheeses surfaces have been reported in the literature. Sporadic inconsistencies in cheese appearance may result in a downgrading of cheese and a consequential economic loss to producers².

To control the appearance of fungi and other bacteria of the genus *Pseudomonas* spp, edible films/coatings have been developed as active packaging that can contain various compounds to extend the shelf life of cheese without compromising the organoleptic characteristics of the cheese.

Thus, the objective of this work was to study several formulations based on whey protein isolate³. We used organic acids (lactic and citric) as antibacterial agents, nisin as anti-listeria, and natamycin as an antifungal agent in various formulations. We also used melanin produced by *Pseudomonas putida* ESACB 191², as a colorant and antioxidant to develop a new line of edible coatings. Physico-chemical characterization of the edible coatings was performed FTIR-ATR analysis and various rheological parameters such as tensile stress, extensibility, and water vapor permeation. The main objective of this study is to select the best formulation to be applied to the cheese and prevent color defects during cheese maturation and shelf life.

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