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Bioprotective cultures in the cheese industry

The use of bioprotective cultures in food is not a new concept. The use of these cultures, especially lactic acid bacteria, has been used for thousands of years to protect a variety of foods of contaminants. Recently, industries have increased their interest in new cultures due to new market trends in which consumers are seeking food healthier, no added preservatives and stabilizers. The production of milk and cheese in Brazil has an important market relevance, however, the low microbiological quality of milk in the country is still a challenge because of the presence of contaminants such as pathogenic and spoilage microorganisms. Still, various methods for food preservation are applied to prevent these contaminants depending on the production process (pasteurization, ripening, fermentation, salting and chilling). However, the preservation and safety of these foods feature many critical steps to control at the farm and dairy plant levels. Given the cheese market position, industries seek to offer safety and longer shelf life dairy products, in addition to aligning with new market trends. Thus, alternatively, the use of bioprotective cultures and their metabolites are of great interest to increase shelf life and the safety of dairy products. Traditionally,these cultures can be found in milk as autochthonous, applied as starter culture, considerated a competing microbiota, they can have probiotic action and are also known for the production of various antimicrobial compounds. Based on their metabolic properties, Many species are exploited as protective, but the main ones of interest in the dairy industry are the lactic acid bacteria (LAB). LAB strains can serve to biopreserve the product due to the fermentation and reduction of pH, and consequently, the production of acids results in an extended shelf-life and enhanced safety. In addition, LAB is capable of producing organic acids, carbonyl compounds and partial hydrolysis of proteins and fats, thereby improving sensory properties. The multiplication of LAB in cheese is often accompanied with the production of texturing compounds, such as exopolysaccharides that improve the rheological properties of fermented (i.e. viscosity and texture). Moreover, LAB strains can produce antimicrobial compounds, such as bacteriocins with application in food preservation and various health-promoting compounds, such as antioxidants, bioactive peptides and vitamins. In addition to understanding which metabolites are produced by these cultures, it is also important to understand how these metabolites to do bioprotection. For example, the main mechanism of action in microrganisms elucidated for compound produced as fatty acids,

peptides and carbon dioxide is that they cause membrane destabilization; already compounds as lactic, acetic, propionic acids and some peptides interfere with the proton gradient. However, even though several mechanisms of action have already been elucidated, it is still a challenge to understand all mechanisms, since most studies involving mechanisms of action do not consider the microbial interaction and synergistic potential between these compounds in the study own food matrix. Therefore, better understanding the mechanisms of these compounds in each food and extrapolate matrix for different types of cheese is critical for the ingredient industries to be able to offer differentiated cultures with precise effects on different cheese matrices.

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