University name: Hungarian University of Agriculture and Life Sciences, Budai Campus

Programme name: MSc. Food Engineering

Institute Name: Food Science and Technology

Department Name: Bioengineering and Alcoholic Drink Technology

Specialization name: Food biotechnology

Place of thesis preparation: Budapest

Insider subject leader (name, function, name of workplace):

Dr. Erika Bujna, Associate professor, department of Bioengineering and Alcoholic Drink Technology

Kálmán Botond Süli, PhD student, department of Bioengineering and Alcoholic Drink Technology

Student author of the thesis: Ghazal Hamsho

Title of the thesis: Health benefits of fermented milk protein concentrate

Thesis summary

The investigation conducted in this thesis sheds light on the bioactive compounds in fermented milk protein concentrate (MPC), and their potential therapeutic applications. It conducted a series of experiments to analyze the bioactive properties of fermented milk protein concentrate (MPC). Initially, microorganism strains were cultured and inoculated into MPC solutions with varying glucose concentrations in all experiments except one experiment with cherry juice. Fermentation progress was monitored over 8 and 24 hours, alongside pH measurements to track acidity changes.

Through experimentation and analysis Antioxidant potential was assessed using DPPH and ABTS assays, measuring radical scavenging activity and determining IC50 values. ACE-I activity was evaluated, Antimicrobial activity was tested by culturing pathogens on agar plates and adding fermented MPC solutions.

several key findings have emerged, which contribute significantly to the understanding of functional foods and dietary strategies aimed at enhancing human health and well-being.

Firstly, the study elucidates the pivotal role of lactic acid bacteria (LAB), particularly lactobacilli, in orchestrating fermentation processes and enhancing the nutritional profile of dairy products. LAB play a crucial role in generating bioactive peptides during fermentation, which have been shown to offer a myriad of health benefits.

The investigation into antioxidant activity using both DPPH and ABTS assays reveals significant variations across different strains of lactobacilli, glucose concentrations, and fermentation times. Notably, *Lactobacillus acidophilus* LA-5 emerges as a promising strain, demonstrating enhanced antioxidant properties, particularly at higher glucose concentrations. These findings underscore the potential of fermented milk products, enriched with specific LAB strains, to serve as natural sources of antioxidants, thereby promoting health and well-being.

Moreover, the assessment of ACE-inhibitory activity highlights the potential cardiovascular health benefits associated with fermented milk protein concentrate. While *Lactobacillus acidophilus* LA-5 had minimal impact on ACE inhibition, the addition of glucose significantly enhanced ACE-I inhibitory effects. This suggests a synergistic interaction between glucose and LAB fermentation, potentially offering therapeutic benefits for cardiovascular health.

Furthermore, the evaluation of antimicrobial activity underscores the efficacy of fermented milk protein concentrate in inhibiting the growth of pathogenic microorganisms, such as *Escherichia coli, Listeria, Enterococcus faecalis* and *Enterobacter cloacae.* The findings suggest that fermentation, in combination with specific LAB strains, enhances the antimicrobial properties of dairy products, thereby contributing to food safety and public health.

In the end, the study provides insights for the development of evidence-based dietary interventions aimed at enhancing human health and well-being. underscores the importance of strain selection, glucose concentration and fermentation time in optimizing fermentation processes for the production of functional dairy products. in addition to understanding the fermentation kinetics and functional properties of different *Lactobacillus* strains.