

Development and Characterization of a Functional Probiotic Chocolate Spread Using an Innovative Processing

Ayesha Mazhar*.

*E-mail: ayeshamazhar586@gmail.com

ABSTRACT

In order to improve both nutritional quality and consumer acceptance, the study concentrated on the creation and characterization of a functional probiotic chocolate spread utilizing a novel processing method. The demand for functional foods, which offer health advantages beyond basic nutrition, has increased as consumers have become more conscious of the significance of eating healthily and preventing disease. In this regard, the study investigated how to improve the probiotic content and overall bioactive profile of a chocolate spread by adding yogurt powder and hazelnuts. Hazelnuts provided vital elements like healthy fats, vitamins, and minerals, while yogurt powder provided probiotics, which are known to enhance intestinal health. Combining these ingredients produced a value-added product enhanced with probiotics and phenolic compounds, which may have health advantages and serve as a better substitute for traditional chocolate spreads, which are usually heavy in sugars and saturated fats.

Keywords: Jensen Inequality, Concave Utility, Convex Analysis, Expected Utility, Risk Aversion.

INTRODUCTION

The demand for functional foods that offer advantages beyond basic nutrition has increased as consumers' understanding of (Manshin *et al.*, 2025) illness prevention and healthy eating has expanded (Lee *et al.*, 2021). Despite their popularity, chocolate spreads are frequently heavy in sugar and saturated fat. The goal of this study was to increase the probiotic content and bioactive components in chocolate spread by adding yogurt powder and hazelnuts (Gezgin *et al.*, 2020). Hazelnuts gave vital lipids, vitamins, minerals, and antioxidants, while yogurt powder provided microorganisms that support digestive health. The goal of this combination was to provide a value-added product with health benefits without sacrificing aesthetic attractiveness (Ali *et al.*, 2023).

METHODOLOGY

The following raw materials were obtained locally in Karachi: water, icing sugar, milk powder, cocoa powder, coconut powder, hazelnuts, coconut oil, vanilla essence, citric acid, and salt. We bought dried yogurt online and pounded it into a fine powder. After 15 minutes of heating the mixture of water, milk powder, icing sugar, and coconut powder to 100°C, yogurt powder and additional ingredients were added. Consumer panels assessed the final product's probiotic viability, phenolic content, nutritional makeup, and sensory qualities (taste, texture, and general acceptance) while it was kept in sealed containers.

RESULT

The probiotic activity and nutritional content of the chocolate spread were greatly increased by the addition of yogurt powder and hazelnuts (Mukherjee *et al.* 2024). While a tiny bit of honey decreased refined sugar and dietary fiber aided in digestion, cocoa's health advantages were enhanced by its antioxidants and phenolic components. Customers found it to have a pleasant flavor and a smooth, creamy texture, which made it highly acceptable.

CONCLUSION

The developed probiotic chocolate spread offers a simple and delightful approach to incorporate probiotics into the regular diet by fusing health advantages with aesthetic appeal. It exhibits great promise in the functional food industry for people who are health-conscious and shows how cutting-edge ingredients and manufacturing may make conventional confections healthier substitutes.

REFERENCES

1. Manshin, D., Kuntsova, M., Shilenko, A., & Andreeva, A. (2025). Probiotic yeast *Saccharomyces cerevisiae* var. *boulardii* properties and peculiarities of use in functional foods development. *Functional Foods in Health and Disease*, 15(5), 296–315. <https://doi.org/10.31989/ffhd.v15i5.1482>
2. Lee, C. S., *et al.* "Lactobacillus-fermented milk products attenuate bone loss in an experimental rat model of ovariectomy-induced post-menopausal primary osteoporosis." *Journal of applied microbiology* 130.6 (2021): 2041-2062.
3. Gezgin, Zafer, Tung-Ching Lee, and Qingrong Huang. "AFM imaging of extracellular ice nucleators." *Journal of Food Science* 85.10 (2020): 3355-3362.
4. Ali, Anwar, *et al.* "Optimization of spray dried yogurt and its application to prepare functional cookies." *Frontiers in nutrition* 10 (2023): 1186469.
5. Mukherjee, Paromita, Souvik Tewari, and Anindita Ray Chakravarti. "Development of novel non-dairy synbiotic chocolates for promoting desirable gut microbiome."