IMPACT OF HYDROCOLLOIDS ON PARTIAL EGG REPLACEMENT IN MUFFIN TECHNOLOGY

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Introduction. Flaxseeds are a valuable source of dietary fiber, essential fatty acids, lignans, proteins, and other bioactive compounds, making them promising ingredients for the development of functional foods. Flaxseed mucilage, in particular, exhibits high water-binding, thickening, and emulsifying properties, supporting its potential use as a partial egg substitute in bakery and confectionery products [1, 2].

Materials and Methods. This study aimed to evaluate the effect of gradual egg replacement (10, 20, 30 and 40 %) with flaxseed mucilage on the rheological and quality characteristics of muffins. The mucilage was extracted by macerating flax cake, obtained after cold pressing flaxseed oil, in distilled water for 24h at a 1:20 (m/v) ratio. The muffins were evaluated in terms of specific volume, height-to-diameter ratio, texture, and crumb characteristics. Texture profile analysis was performed using a Stable Micro Systems TA.HDplus analyzer.

Results and Discussion. Results and Discussion. The results showed that partial egg replacement at levels of 10–20 % had the lowest impact on product quality, maintaining a high specific volume and a fine crumb structure. At a 30 % replacement level, the muffins retained acceptable elasticity and structural characteristics, representing a suitable balance between egg reduction and product quality. Higher replacement levels (40 %) resulted in increased batter viscosity, reduced specific volume, a denser and slightly gummy crumb, and increased firmness. Cohesiveness also decreased at replacement levels above 30 % [3].

Conclusions. The results indicate that flaxseed mucilage can effectively replace up to 30 % of the egg content in muffins while maintaining acceptable technological and textural properties. Its high water-binding capacity and functional properties make it a promising ingredient for the development of fiber-enriched and partially egg-free bakery products.

Keywords: *Flour confectionery products, crumb characteristics, flaxseed mucilage, textural properties*

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References:

1. MUEED, A; SHIBLI, S; KORMA, S.A. et al. Flaxseed Bioactive Compounds: Chemical Composition, Functional Properties, Food Applications and Health Benefits-Related Gut Microbes. *Foods*. **2022**;11(20):3307.

2. PULIGUNDLA, P.; LIM, S. Review of Extraction Techniques and Food Applications of Flaxseed Mucilage. *Foods*. **2022**, 11, 1677.

3. DI RENZO, T; TRIVISONNO, M.C.; NAZZARO, S. et al. Effect of Different Hydrocolloids on the Qualitative Characteristics of Fermented Gluten-Free Quinoa Dough and Bread. *Foods*. **2024**;13(9):1382.