F.4. INFLUENCE OF SALT ON FERMENTATION, GLUTEN STRUCTURE, AND TEXTURAL CHARACTERISTICS OF BREAD

OLGA BOESTEAN [1]*, GEORGIANA GABRIELA CODINĂ [2], CORINA CARACACI [1], IURIE RUMEUS [3], ALIONA GHENDOV-MOSANU [1]

[1] Technical University of Moldova, 168, Stefan cel Mare bd, Chisinau, Republic of Moldova
[2] "Stefan cel Mare" University of Suceava, 13 Universitatii St., Suceava, Romania
[3] Cahul University Center "Bogdan Petriceicu Hasdeu" of the Technical University of Moldova, 1 Independence Square, Cahul, Republic of Moldova
email: olga.boestean@tpa.utm.md

Abstract. Salt is considered the "soul" of bread, representing an indispensable functional ingredient in bakery, exercising rigorous control over the rheological properties of the dough and over the dynamics of the fermentation processes that define the quality of the finished product. The aim of this study was to evaluate the influence of different concentrations of sodium chloride (NaCl) on bread quality by analyzing the changes in physical, textural, and structural properties, as well as the technological behavior of both dough and the final product. Five bread samples were prepared, differentiated by their NaCl content: 0 % (control sample), 0.4 %, 0.8 %, 1.2 %, and 1.6 %. Each sample was evaluated in terms of specific volume and crumb porosity (SR 91: 2007), technological losses during baking and cooling, and textural properties (hardness, elasticity, cohesiveness, and chewiness). A Stable Micro Systems TA.HD plus C analyzer, United Kingdom, was used for texture profile analysis. Increasing NaCl concentration led to noticeable changes in bread properties: specific volume and porosity decreased with higher salt levels due to the inhibition of yeast activity and reduced gluten extensibility. The control sample showed the highest porosity (72.53 %), while salted samples ranged between 67.76 % and 72.12 %. Technological losses decreased both during baking (from 14.94 % to 14.15 %) and cooling (from 3.86 % to 2.58 %), a trend associated with improved water retention and strengthening of the gluten network in the presence of salt. Textural properties of the crumb were significantly affected: at low NaCl concentrations, hardness decreased, whereas at higher levels (1.2–1.6 %), both hardness and chewiness increased considerably, indicating the formation of a denser and more rigid internal structure. Elasticity remained constant (~1.00), while cohesiveness showed a slight decrease from 0.696 (control) to 0.651 (1.6 % NaCl sample). Salt had a substantial impact on the physical, technological, and textural properties of bread. High NaCl concentrations (>1.0–1.2 %) inhibited fermentation, reduced bread volume and porosity, and led to a denser and more rigid crumb. In contrast, moderate salt additions contributed to maintaining an optimal balance between firmness, porosity, and overall structural quality of the bread samples.

Keywords: physical properties, texture, gluten network, yeast activity, water retention.
Acknowledgments: This work was supported by a grant from the Ministry of Education and Research, CCDI-UEFISCDI, project number PN-IV-PCB-ROMD-2024-0135, within PNCDI IV and NARD, 25.80013.5107.22ROMD.