Quality and Durability of Agricultural and Food Stuffs

https://sanad.iau.ir/Journal/qafj/Article/915899

The effect of mixing strong and weak flour on the rheological and quality index of flour and bread production

Hasan Guran, Sakine Vaseghi*, Maryam Valinejad

Department of Agriculture and Natural Science, Savadkooh Branch, Islamic Azad University, Savadkooh, Iran

*Corresponding Author: vaseghi_s76@yahoo.com

Received: 31/10/2023, Accepted: 24/12/2023

Extended Abstract

Introduction: Flour and bread are staples in the Iranian diet, making up a significant portion of daily nutrition. However, one of the persistent challenges in the flour and bread industry in Iran is the quality of locally produced wheat, which often results in weaker flour with suboptimal characteristics. This issue impacts bread quality and shelf life, making it essential to explore solutions like flour blending to improve the overall quality. The aim of this study was to investigate the effect of mixing strong and weak wheat flours in different proportions and assess their impact on various rheological and quality indices of flour and bread.

Methods: In this study, wheat flour samples were obtained from two distinct varieties: the Sardari wheat (weak flour) and the 19-80N variety (strong flour). The flour from these varieties was mixed in varying ratios (20:80, 30:70, 50:50, 70:30, and 80:20) to create five distinct blends. The resulting flour samples were tested for several rheological and quality indicators, including wet gluten percentage, dry gluten percentage, gluten index, Zelny test, falling number, ash percentage, moisture percentage, and protein content. Image processing techniques were also employed to measure the color of the flour. After the flour blends were prepared, bread was baked using each flour mixture, and sensory tests were conducted to evaluate the bread's texture, aroma, chewability, porosity, and color. Statistical analyses were performed using SPSS software, with Duncan's test applied for comparison of the means at a 95% confidence level.

Results: The results showed significant differences in the rheological and quality indices depending on the flour blend. Specifically, the treatment with 30% strong flour and 70% weak flour exhibited the highest values across all indices, including gluten content, gluten index, falling number, and other sensory characteristics like texture, aroma, chewability, and porosity of the bread. This blend also showed a higher color quality when compared to other mixtures. Interestingly, there was no significant difference between this blend and those with higher proportions of strong flour, suggesting that the 30% strong flour to 70% weak flour mixture is optimal. Additionally, the study highlighted that mixing the two flours could improve the weak flour's overall quality, making it more suitable for bread production.

Discussion: The findings of this study are consistent with previous research on the importance of wheat variety and flour blending in improving bread quality. The study confirms that the blending of weak and strong flours is an effective method to enhance both the rheological properties of the flour and the sensory characteristics of the bread. The increase in gluten content and the improvement in other quality indices suggest that the proportion of strong flour plays a crucial role in enhancing the overall flour and bread quality. The results align with previous studies, which found that a combination of flours with different protein contents can yield better baking performance, improved texture, and longer shelf life of bread. Moreover, the study emphasizes the practicality of flour mixing in addressing the problem of weak local wheat varieties in Iran. Flour mixing is a cost-effective and efficient solution that can mitigate the impact of poor-quality wheat on bread production. It also provides a simple and scalable approach for improving product quality in bakeries without the need for significant technological advancements or investments in new equipment.

Conclusion: In conclusion, the blend of 30% strong flour and 70% weak flour demonstrated the best results across multiple quality indicators, including both the rheological properties of the flour and the sensory attributes of the bread. This blend can be considered as the optimal mixture for producing high-quality bread. These findings have practical implications for improving the quality of bread in regions with limited access to strong wheat varieties. Flour blending offers an effective solution to mitigate the impact of weak wheat varieties and can contribute to the enhancement of bread production in Iran and similar regions facing similar challenges in wheat quality.

Keywords: Flour quality, Flour mixing, Weak flour, Strong flour