

ABSTRACT

In the Indonesian food industry, particularly in traditional meatball production, the application of transglutaminase (TG) enzyme remains relatively uncommon. TG is known for its ability to promote protein cross-linking, which can improve texture, moisture management, and overall product quality in various meat systems. However, its potential benefits in beef–chicken meatball formulations have not been extensively studied in this context. This study aimed to improve the physicochemical properties of beef-chicken meatballs by incorporating transglutaminase (TG), an enzyme that promotes protein cross-linking, thereby enhancing texture and water retention. Meatballs were formulated with 0% (control), 0.3%, and 0.5% TG, and evaluated for texture, moisture content, color, and water absorption. The addition of TG significantly improved textural properties compared to the control. Although moisture content differences were not statistically significant, TG-treated samples showed a numerical increase in moisture absorption. Most notably, TG significantly reduced water absorption during boiling, indicating improved gel stability and reduced starch swelling. Color analysis also revealed that TG enhanced redness and reduced lightness, likely due to improved pigment retention and denser protein structure. These results suggest that transglutaminase is effective in optimizing meatball texture, moisture management, and visual appeal. The enzyme's ability to improve product consistency and structural integrity offers practical benefits for small-scale producers. This study supports the use of TG as a functional ingredient in meatball production, especially in mixed-meat formulations, and provides a scientific basis for improving artisanal food products.

Keywords: *Beef–chicken meatballs, Meatballs, Mixed-meat formulation, Protein cross-linking, Texture, Transglutaminase, Water absorption*