

Chapter 1

Introduction

1.1 Background

Meatballs are a widely consumed meat product valued for their convenience, versatility, and sensory appeal (Laksanawati et al., 2024). In Indonesia, bakso holds significant cultural and economic importance as a staple street food, with an estimated annual consumption exceeding 2 million tons (Ministry of Trade Indonesia, 2023). However, traditional bakso production faces challenges in maintaining consistent quality due to variations in raw materials (e.g., low-grade meat cuts, excessive filler ingredients) and inadequate preservation techniques (Rahman et al., 2023). These factors contribute to rapid texture degradation and microbial spoilage, limiting shelf life to just 2–3 days under refrigerated conditions (Saputra et al., 2022). The incorporation of TGase offers a promising solution, as demonstrated in similar meat products like sausages and surimi, where it improved gel strength by 30–40% (Fu et al., 2023). For bakso, which relies heavily on myofibrillar protein networks for its characteristic "bouncy" texture, TGase could mitigate quality inconsistencies while reducing reliance on STPP as an additive that increases the for health concerns (Wijaya & Huda, 2023).

Additionally, challenges such as texture deterioration and limited shelf life often affect their quality and consumer acceptance. In recent years, the application of food enzymes, particularly transglutaminase (TGase), has gained attention for its ability to improve the functional properties of meat products. TGase catalyzes the cross-linking of proteins, leading to enhanced texture, stability, and water retention (Akbari et al., 2021). While previous studies have explored the physicochemical effects of TGase in meat products, there is a need for comprehensive research focusing on its impact on the sensorial properties and shelf life of meatballs, which are critical factors influencing consumer preference and marketability (Chen et al., 2023).

This study aims to investigate the addition of TGase enzyme to enhance the quality of meatballs, with a specific focus on sensorial properties and stability testing. Sensorial attributes such as appearance, texture, flavor, aroma, color, and aftertaste play a pivotal role in determining consumer satisfaction, while stability testing ensures the product's safety and stability over time (Trespalacios & Pla, 2007). By evaluating the effects of TGase on these aspects, this research seeks to provide valuable insights into optimizing meatball formulations for improved quality and stability over time. The findings will contribute to the development of high-quality meat products that meet consumer expectations and address industry challenges related to product stability and sensory appeal.

1.2 Objective

The objective of this study is to adjust and optimize the formulation of beef-chicken meatballs by adding transglutaminase enzymes, with the aim to enhance the sensory properties and stability of the meatballs.

1.3 Hypothesis

1. H0: There is no significant difference between beef meatballs made with STPP and STPP + transglutaminase enzyme in the sensory characteristics and stability testing (color, hardness, springiness, and moisture content)
2. H1: There is a significant difference between beef meatballs made with STPP and STPP + transglutaminase enzyme in the sensory characteristics and stability testing (color, hardness, springiness, and moisture content)