Chapter 1

Introduction

1.1 Background

Meat consumption plays an important role in human diets since it is a source of beneficial nutrients, however excessive meat consumption has been associated with adverse health effects such as cardiovascular disease, cancer, and diabetes (Geiker et al., 2021). In addition, the meat industry significantly contributes to environmental concerns. According to Ozuesen and Turp (2025) the meat industry is responsible for 14.5% of global greenhouse gas emissions and 29% of global water usage and could lead to negative environmental impact if the production were excessive. There has been an increase in meat alternative production and consumption due to concerns about health and environmental aspects. As a result, research on meat alternatives, plant-based products, and meat analogues has expanded to develop products that could mimic the sensory, nutritional, and functional properties of conventional meat while offering improved sustainability and potential health benefits (Furnols, 2023).

The development of meat analogue has become a promising strategy to address nutritional and sustainability challenges. Meat analogs are developed to be able to resemble conventional meat in terms of nutritional value, taste, and texture, while offering clear environmental benefits, such as lower greenhouse gas emissions, reduced land and water use, and less waste generated during production (Jafarzadeh et al., 2024). Previous research has defined meat analogue as a product that could mimic meat's texture by using non animal protein such as soy, pulses, cereals, fungi, and microalgae (Nowacka et al., 2023). Recent progress in food science and processing technologies has facilitated the use of alternative protein sources, such as plant based, fungi, and fermentation-derived proteins. Technologies such as high moisture extrusion, shear cell processing, and spinning have helped plant based meat to mimic the texture and quality of real meat. However, this technology still needs

improvement in order to fully match conventional meat. These innovations have improved the texture, functionality, and taste of meat analogues, making them more acceptable to consumers and more suitable as alternatives to conventional meat products (Ishaq et al., 2022).

In recent years, a large proportion of chicken meat consumption has shifted toward fast-food and ready-to-eat products, particularly chicken nuggets, driven by their convenience, affordability, minimal preparation requirements, and extended shelf life under frozen storage (Abd-El-Aziz et al., 2021). Although chicken nuggets are highly consumed, it is high in fat content, low in fiber, and high amount of sodium content that could lead to several health concerns such as obesity, cardiovascular disease, and high blood pressure (Miao et al., 2023; Barros & Trindade, 2023). In this context, the use of mycoprotein as a partial or complete replacement for chicken meat is a promising alternative to reformulate nugget products.

Mycoprotein provides high-quality protein, a balanced amino acid composition, substantial dietary fiber, and low levels of saturated fat, making it nutritionally better compared to conventional chicken meat (Derbyshire, 2022). In addition, its naturally fibrous structure and favorable functional properties enable it to replicate the structural and textural functions of meat within nugget systems (Chen et al., 2026). Although mycoprotein has been widely studied as a sustainable alternative protein and used as a meat substitute in products such as sausages, its application in chicken nuggets is still limited. A study done by Shahbazpour et al. (2021) exhibits the ability of mycoprotein to be incorporated into sausage to improve its nutritional properties by increasing the protein content while reducing the lipid content. Additionally Hashempour-Baltork et al. (2024) research has also used mycoprotein to substitute beef in burger and it has shown that mycoprotein exhibits the ability to enhance its health and nutritional properties with lower lipid content although the structural properties of the burger were reduced. There is still a low amount of research that covers substituting mycoprotein for chicken meat in nugget formulation. Research on mycoprotein is more commonly conducted in sausage products because the formulation matrix is simpler compared to nugget products which require stronger gel formation and

structural stability. Incorporating mycoprotein into chicken nuggets may enhance nutritional quality by increasing protein and dietary fiber content while supporting more sustainable food production. Therefore, evaluating mycoprotein incorporation effects on physicochemical and sensory properties is necessary to ensure consumer preference.

1.2 Objective

This study aims to evaluate the use of mycoprotein as a partial or complete substitute for chicken meat in nugget formulations by assessing its effects on physicochemical, sensory, and nutritional properties through texture measurement, color analysis, cooking loss, sensory evaluation, and proximate analysis.

1.3 Hypothesis

H_0 (null hypothesis) : There is no significant difference in physicochemical, sensory, and nutritional properties among chicken nugget formulations containing varying levels of mycoprotein

H_1 (alternative hypothesis) : There is a significant difference in physicochemical, sensory, and nutritional properties among chicken nugget formulations containing varying levels of mycoprotein.