

CHAPTER I

INTRODUCTION

1.1 Background of the Study

In recent years, the demand for plant-based alternatives to animal-derived products has grown significantly due to rising health consciousness, environmental awareness, and dietary restrictions such as lactose intolerance and veganism. One area gaining increasing attention is the development of dairy-free cheese alternatives, particularly hard cheeses like Parmesan, which are traditionally made from animal milk. Vegan Parmesan cheese offers a healthier, cholesterol-free, and sustainable alternative while maintaining the familiar savory and umami-rich flavor profile that consumers desire.

Tempeh, a traditional Indonesian fermented soybean product, presents a promising base ingredient for plant-based cheese innovation. Made by fermenting cooked soybeans with *Rhizopus oligosporus* mold, tempeh is rich in high-quality plant protein, dietary fiber, B-complex vitamins, and essential minerals such as calcium, phosphorus, and iron. The fermentation process enhances the nutritional value and digestibility of soybeans, introducing beneficial bioactive compounds that contribute to its health-promoting properties (Tahir et al., 2018). The fermentation process not only enhances the nutritional value and digestibility of soybeans but also introduces a savory, nutty flavor that aligns well with the umami characteristics of Parmesan cheese.

According to Ahnan (2024), the fermentation process involved in tempeh production significantly reduces anti-nutritional factors such as phytic acid, thereby improving mineral bioavailability. Furthermore, as noted by Dajani et al. (2021), tempeh is considered a functional food due to its potential probiotic activity and antioxidant properties.

Tempeh is also a locally available and culturally significant food in many regions, including Southeast Asia, making it a strategic ingredient for local food diversification and sustainable food system development. By utilizing tempeh in the creation of a vegan Parmesan cheese, this innovation not only caters to the growing vegan and health-conscious markets but also promotes the utilization of traditional foods in modern applications.

The development process will focus on formulating the right combination of seasonings, fermentation time, drying, and textural adjustments to create a shelf-stable, flavorful, and nutritionally rich vegan cheese. Emphasis will also be placed on preserving protein content and enhancing umami through natural flavor enhancers such as nutritional yeast and fermented seasonings. This approach supports a healthier and more inclusive food culture while strengthening the role of local ingredients in product innovation.

1.2 Objectives of the Study

The objectives of this study are as follows:

1. To analyze the nutritional content of tempeh as the primary base for vegan Parmesan cheese, focusing on protein, dietary fiber, vitamins, minerals, and bioactive compounds enhanced through fermentation.
2. To innovate and optimize the formulation and production process of vegan Parmesan cheese using tempeh, including fermentation control, seasoning, textural modification, and preservation techniques to maximize nutritional value, sensory appeal, and shelf stability.