Chapter 1

Introduction

1.1 Background

Protein is an indispensable component of a healthy diet required by the human body for growth and development with animal-based protein is considered as complete proteins and having a higher nutritional quality which are suitable for human body requirements (Arentson-Lantz et al., 2015; Elmadfa & Meyer, 2017). However, the pattern of animal-derived foods have severe consequences towards environmental sustainability (Andreoli et al., 2021). To mitigate these concerns, a transition towards lowering meat consumption is essential, which can be facilitated by various methods including change of meat-based products substitution with plant-based alternatives (Andreani et al., 2023).

Jerky is a food product made from sliced meat that has been seasoned and dried (Elvinas et al., 2022). Whereas, an analog jerky is a jerky that resembles meat or poultry jerky but does not utilize any animal protein during its processing. Analogue jerky has been developed in several studies utilizing plant materials including banana blossoms, moringa leaves and tapioca flour or white oyster mushroom powder, and also yuba film treated with transglutaminase (Elvinas et al., 2022; Jin et al., 2022; Sayuti et al., 2020; Sidup et al., 2022; Yani et al., 2024). These vegan jerky can not compete with the conventional pork jerky, especially for its protein content as it only contains approximately 10% of protein.

Soybean is one of the potential sources for plant protein which can compete with the other animal-based protein and is considered to have the highest biological value among the other plant proteins which equals to milk and egg proteins (He & Chen, 2013; Kudełka et al., 2021).

In their study, van den Berg et al (2013) mentioned the Digestible Indispensable Amino Acid Score (DIIAS) value for soybean and soy products above 100 which indicated that soy has high quality protein. One of the products derived from soy, soy protein isolate contains more than 90% of protein on its dry weight which may become a potential main ingredient in making plant-based jerky.

The techniques and processing for defatting soybean as the precursor of soy protein isolate can modify its functionality in which solvent extraction is considered as the perfect method because of its plentiful supplies, inexpensive, and high solvency power with hexane has been used most frequently in defatting soybeans due to its high yield of oil extraction (L'hocine et al., 2006; Sinha et al., 2014). However, due to the safety and environmental concerns of hexane, other methods have been considered to be an alternative including the utilization of cold press machines and replacing hexane with ethanol on the solvent extraction method. Oil extraction using a cold press machine not only preserve the nutritional compounds of soybean but also provides a high protein soy meal by-products even though approximately 7% of the oil still remains in the press cake by-products (Çakaloğlu et al., 2018; Lavenburg et al., 2021). Meanwhile, ethanol has been considered to be the alternative solvent of hexane because it is non-toxic, natural, and has the ability to extract the other polar compounds resulting in more protein concentration in the defatted soy flour (Lavenburg et al., 2021).

The effect of extraction methods towards the characteristics of defatted soy flour have not been researched extensively. Therefore, this study aims to evaluate the proximate composition and functional properties of the defatted soy flour obtained from different oil extraction methods. Additionally, the study also sought the development of plant-based jerky by combining vital wheat gluten and soy protein isolate. The utilization of vital wheat

gluten in the meat analogue product is to support the bonding capabilities between fat and water which support in the texture of the final product (Ortolan & Steel, 2017).

1.2 Objective

The research aimed to investigate the optimum oil extraction method to produce defatted soy flour with the highest protein content. Moreover, this study also explored the utilization of soy protein isolate in combination with vital wheat gluten on three different formulations for developing plant-based jerky.

1.3 Hypothesis

The hypothesis for this project are divided into 2 as listed below:

1.3.1 Defatted Soy Flour

H0 = There is no significant difference in the proximate composition and functional properties of defatted soy flour made from different oil extraction methods.

H1 = There are significant differences in the proximate composition and functional properties of defatted soy flour made from different oil extraction methods.

1.3.2 Plant-Based Jerky

H0 = There is no significant difference in the physicochemical and sensory properties of plant-based jerky made using three formulations compared to pork jerky.

H1 = There are significant differences in the physicochemical and sensory properties of plant-based jerky made using three formulations compared to pork jerky.