CHAPTER I

INTRODUCTION

1.1 Background

Noodle has been one of the main staple foods that is widely consumed in Asia, including Indonesia. Generally, noodle is made from wheat flour and water with additional of other ingredients, such as salts. Indonesia depends on wheat imports to fulfill wheat flour-based food products demands, in which 50% of the flour are consumed as noodles (Hou, 2010). According to USDA (2019), Indonesia is one of the largest importers of wheat flour worldwide, reaching 10.516 million tons in 2018/19, which is an increase of 340,000 tons from 2016/17. Hence to reduce the reliance on imported wheat flour, Indonesian food industry must begin to utilize local food commodities as an alternative for wheat flour (Abidin *et al*., 2013).

Cassava (*Manihot esculenta* Crantz) is an important commodity in developing countries. Indonesia is the fourth of the largest producers of cassava roots in the world due to the high productivity in cassava production (Abidin *et al*., 2013; Hillocks *et al*., 2002). Harvested cassavas have short shelf life of 2-3 days and will undergo postharvest deterioration. The reduced quality will limit the economic potential of cassava (Zidenga *et al.*, 2012). To extend the shelf life, cassava can be dried and processed into cassava chips, cassava flour, cassava

starch flour, and modified cassava flour (Anggraeni *et al*., 2017; Girma *et al*., 2015).

Modified cassava flour (MOCAF) has similar chemical composition of with regular cassava flour, but the former has more advantage because it has little to no cyanogen compounds and exhibits better taste and physicochemical properties, with neutral aroma (Kardhinata *et al*., 2019). MOCAF is cheaper than rice flour and has similar price as wheat flour (Anggraeni *et al*. 2017). In addition, mocaf resembles to wheat flour in terms of appearance, which is soft and white in color (Agustia, *et al*., 2019). Due to the high productivity and relatively low price, cassava can be processed into MOCAF which can potentially substitute the imported wheat flour. However, it contains low protein and does not have any gluten to give elasticity to the product (Abidin *et al*., 2013; Hou, 2010). Hence, additional ingredients such as hydrocolloids are usually added in noodle processing to improve the cooking quality, texture (elasticity and extensibility), and overall mouthfeel (Abidin *et al*., 2013; M. and Yu, 2015).

Chia seed (*Salvia hispanica* L.) is one of the most popular ingredients worldwide due to increasing shifts to healthier lifestyle. This edible seed can be used for developing functional food products as it promotes health benefits, such as reducing cholesterolemia, containing high amounts of natural antioxidants, and it is non-allergenic (Valdivia-López and Tecante, 2015; EFSA, 2009). Chia seed is a good source of dietary fiber, protein and oil, especially α-linolenic acid and omega-3 fatty acid (Coorey *et al*., 2014). Studies have shown that these chia seeds have technological functionalities such as hydrocolloids, including gel-forming,

binding, and stabilizing, similar to what gluten does in wheat-based products (e.g. baked products, noodles) which can improve the textural characteristics (Coorey *et al*., 2014; Nduko *et al*., 2018; Valdivia-López and Tecante, 2015). Hence, incorporation of chia seed powder into food formulation not only add nutritional and functional values to the food product, but also contributes to textural improvements.

1.2 Research Problem

Generally, wheat flour is used as the main component of the noodle and wheat in Indonesia is imported from other countries. Modified cassava flour (MOCAF), which derives from cassava, has the potential to be the alternative for wheat flour. There are studies on the feasibility of MOCAF in wheat-based baked products, but rarely in noodles. However, MOCAF is not a popular choice to be used in the food industry as it has less protein content and due to lack of gluten, its utilization results in a less acceptable sensory characteristics, particularly in texture. To complement the nutritional content from the cassava and to improve textural characteristics of the noodle, chia seed powder will be incorporated. Chia seed powder has the potential to act as hydrocolloid due to its gel-forming ability, which could improve textural properties of the product.

Furthermore, additional of *kansui* does not only affect in color, but can also improve the elasticity, extendability, and firmness of the noodle. The interaction between the chia seed powder and *kansui* may influence the color and textural properties of the final product. Therefore, it is important to know the right

kansui concentration incorporated to MOCAF-based wet noodle with chia seed powder addition. By replacing wheat flour with MOCAF along with addition chia seed powder and suitable *kansui* concentration, the nutritious noodle product is expected to give desirable characteristics.

1.3 Objectives

1.3.1 General Objectives

The general objective of this study was to utilize modified cassava flour and chia seed powder in the production of wet noodle.

1.3.2 Specific Objectives

The specific objectives of this research were:

1. To obtain chia seed powder from chia seed and observe its physicochemical properties.
2. To observe the effect of different wheat flour to MOCAF ratio and chia seed powder concentration to the cooking quality, textural properties of the noodles, protein content, and color.
3. To observe the effect of different concentration of *kansui* to the cooking quality, textural properties, color, and organoleptic properties of the noodles.
4. To evaluate the chemical characteristics of the best noodle formulation using proximate analysis and determine its acceptability using sensory evaluation.