

CHAPTER I

INTRODUCTION

1.1 Introduction

Noodle is one of the most popular dishes across the world. Asian oriental noodles are used to describe noodles which comes from Eastern, Southeastern or Asia Pacific countries. One of the differences they have with noodles that come from the West is that pasta uses durum wheat flour. Noodles vary greatly in size, shape, color, ingredient, chemical property and how they make it. While noodles commonly use wheat flour, Asian noodles also uses other materials such as rice flour and other starch materials to substitute wheat flour (Hui, 2006).

Sorghum is a type of cereal originating from Northeastern Africa and is one of the largest produced cereal crops. Due to their ability to adapt in various kinds of environments, they are widely grown in tropical and subtropical regions and are used to make staple foods such as bread and porridges, making them an important source of energy. Sorghum is also widely cultivated in Indonesia, often found in several regions such as Central Java and East Java. It is gluten free and a rich source of nutrients as well as diverse phenolic compounds content makes them a promising food source for people with gluten intolerance (Dewi and Yusuf, 2017; Xiong *et al.*, 2019).

Sorghum has been shown to have potential to be used in making noodles. A study done where starch extracted from different genotypes of sorghum was used to make noodle, the starch in noodle was found to function in the network which maintains the noodle's structure during cooking. The noodles had good

elasticity like potato starch noodles and cooking losses have been shown to be low in certain genotypes like Kasvikisire. The noodles also show a glossy appearance and gives either a white or different shade of pink appearance. However, the noodles require to be presoaked first before cooking otherwise they would disintegrate before they are fully cooked. This makes it harder for consumers as it takes more time compared to cook compared to dried wheat noodles (Beta and Corke, 2001).

Rice flour is made from grinding rice and are used in various food products such as bread, baby foods and extrusion-cooked products. Rice flour has been widely used as a gluten-free wheat substitute for gluten-intolerant patients. Their bland taste, white color, digestibility, and hypoallergenic properties make them a suitable cereal grain flour for gluten-free products. While they have poor functional properties, hydrocolloids such as xanthan gum and CMC have been used as gluten substitutes in rice flour breads to help form the viscoelastic dough necessary for proofing (Hui, 2007).

Hydrocolloid is a term used to describe a range of polysaccharides and proteins that is used for their functions, such as thickening, gelling, stabilizing foams and emulsions. They can come from plants, microbes or animals. They are used widely in the food industry to improve the properties of their food products (Phillips and Williams, 2009).

Konjac flour mainly contains glucomannan, a reserve polysaccharide of konjac which is also a water-soluble hydrocolloid available in other plants such as aloe vera seeds, lilies and orchid bulbs. They are obtained by cutting, drying,

crushing and sieving the tubers of the *Amorphophallus konjac*, which are cultivated as a vegetable in areas such as Thailand, China, Korea and Japan. Konjac glucomannan is authorized as a thickening additive in Europe as E425 (ii). Konjac glucomannan have been used in many food products such as noodles and spaghettis, often used as an anti-obesity agent and increasing satiety. It has been shown to improve the properties of noodle's texture and organoleptic properties, cooking yield, and decrease cooking loss (Srednicki and Borompichaichartkul, 2020; Behera and Ray, 2016; Zhou *et al.*, 2013).

Noodles in Indonesia are largely made from wheat flour as they are found to be most preferred by consumers. However, wheat is largely imported from other countries as they are not cultivated in Indonesia. Using alternatives such rice and sorghum that are cultivated largely in Indonesia, it is hoped that they can replace wheat-based noodle by consuming a noodle analogue from sorghum and rice instead. In this research it is expected that sorghum-rice noodle analogue with konjac glucomannan would create a similar texture to wheat noodle. Therefore, it could be consumed as an alternative to wheat-based noodle.

1.2 Research Problem

Sorghum flour has been increasing in use to make gluten-free noodles, often incorporating it with wheat or other starches and additives. Sorghum based noodles have good protein digestibility and total phenolic content. Their high nutritional content makes it beneficial to create a balanced nutrition. However due to their lack of gluten, gelatinization becomes an important factor as the

gelatinized starch forms the structural network in the noodle. Sorghum based noodles have higher cooking loss and becomes sticky when cooked, as well as lower firmness due to their non-structuring proteins in the network. The high phenolic acid components in sorghum causes the noodles to be perceived as bitter, therefore incorporating other ingredients often help improve the sensory profile. Addition of rice flour may help improve the sensory properties of sorghum noodles as well as the textural properties in sorghum noodles as rice-based noodles have been shown to have bland taste and high acceptance to customers. Addition of konjac glucomannan have been shown to reduce the cooking loss and increase the water absorption of noodles as well as improving important textural properties of noodles such as hardness, firmness and tensile strength (Palavecino *et.al.*, 2020; Low *et al.*, 2019; Zhou *et al.*, 2013).

Due to the high consumption in wheat-based food such as noodles, Indonesia has been gradually increasing the wheat import quantity over the years. Wheat is not locally grown in Indonesia, which means that Indonesia must continuously import wheat grains and mill it locally to fulfill the people's need for wheat flour to produce various wheat-based products. On the other hand, sorghum and rice are locally grown in Indonesia, making them easily accessible for the people and securing Indonesia's food self-sufficiency. By turning rice and sorghum into a popular product such as noodle, it is hoped that they can replace the people's dependence on wheat with sorghum as the main grain source. However, hydrocolloid should also be added to help improve the textural

properties which includes hardness and tensile strength of the noodle analogue to help increasing the consumers' acceptance.

1.3 Objectives

1.3.1 General objective

The general objective of this research was to make noodle analogue made from sorghum flour and rice flour with konjac glucomannan as the hydrocolloid.

1.3.2 Specific objectives

1. To determine the effect of ratio between sorghum flour and rice flour in noodle analogue making based on sensory, cooking loss, water absorption and textural properties.
2. To determine the effect of konjac gum concentration on sorghum-rice noodle analogue characteristics based on sensory, cooking loss, water absorption and textural properties.
3. To compare the characteristics between the best sorghum-rice noodle analogue and the commercial wheat-based dry noodle.

