CHAPTER I
INTRODUCTION

1.1 Background

Noodle is wheat-based product that is originated from China and currently is highly consumed by people in Asia including Indonesia. According to BSN, (2015), dry noodle is a food product made from wheat flour with or without addition of food additive that has undergo mixing, sheeting, slitting, steaming, cutting in form of noodle strands and can be dried through air dry or fried. Noodle has unique characteristics such as its viscoelasticity, extensibility, springiness, cohesiveness, water and oil holding capacity. This shape is obtained due to the presence of gluten in wheat flour. Other elements that also play roles in noodle characteristics are proteins, starch granules and entrapped air (Hui and Sherkat, 2005). According to Ding and Yang (2013), some additives might be added into noodle to improve the processing and mechanical performance of the flour such as additional of hydrocolloid in noodle that can improve textural properties such as hardness, gumminess, cutting force and chewiness in noodle (Rafiq *et al*., 2016). Protein also affects the color, water activity of the dough, cooking properties such as cooking time, cooking loss, and textural properties of noodle such as tension and firmness (Wang *et al*., 2004).

Noodle analogue is a noodle made from other non-wheat flour as the material that has gone through the same process of noodle making and has meet the

required standard of noodle. Noodle analogue has the same appearance with the noodle from wheat flour. Ingredients that can be used to make noodle analogue are rice, cassava, corn flour, and other sorghum flour. Although, rice flour is best used as the replacement for wheat flour because of its small granules sizes that is important in textural properties of noodle and less sticky when it is cooked compared to other flours (Purwandari *et al*., 2014).

Rice flour is flour made from rice and commonly can be obtained from various types of rice such as white rice and brown rice. White rice can be divided into waxy rice flour and non-waxy rice flour. Rice is a staple food in Indonesia and is also widely planted in Indonesia. The replacement of wheat flour in noodle with locally produced flour such as rice flour is expected to be able to reduce the dependence in imported wheat flour. Aside from reducing the dependence on imported wheat flour, the use of rice flour in noodle making is also expected to be able to reduce the gluten in noodle product. Consumption of gluten in wheat flour is not recommended for people that has autism and celiac diseases. Hence, replacement of wheat flour with rice flour is also expected to help people with celiac and autism disease. Gluten is a protein that is commonly found in cereal grains such as wheat flour. This type of protein helps food to maintain the shape of noodle as gluten works to hold the food together and gives stretchy properties to noodle. However, due to the absence of gluten, noodle that is made from rice flour has less chewy texture and more rigid texture (Ghosh *et al*., 2019).

Hydrocolloid is hydrophilic polymers which is commonly used for improving food quality, such as guar gum that is obtained from the endosperm of *Cynamopsis tetragonolobus*. Hydrocolloid improves the texture of food product by increasing the viscosity, texture, mouth-feel and sensory properties in noodle products. According to Kaur *et al.* (2015), guar gum has been widely used in starch-based products especially in gluten-free products to improve stability, water holding capacity, and modify texture.

Egg is one of the mammalian proteins which has been widely use as additives in food product. The additional of egg in noodle is done to protect the structure of the noodle, hence the noodle will have higher elongation. Egg albumin improves cooking quality of noodle, maintain firmness, and strengthens the starch network during cooking. Egg yolk also has the ability to give yellow color to the noodle and contains lecithin which can act as an emulsifier. Egg also has other advantageous effect when added into food product such as enhancing the nutritional value in noodle (Khouryieh *et al*., 2006). According to Wijaya (2013), addition of 4.5% of egg in noodle made from cassava and purple sweet potato resulted in noodle with yellow color and chewy texture. Addition of egg is also shown to reduce cooking loss in noodle.

Additional of hydrocolloid, i.e. guar gum in noodle analogue using rice flour making were done in this research to fix the textural characteristics of noodle analogue. Egg also was also used in this research to fix the textural characteristics of noodle analogue that was made from rice flour.

1.2 Research Problem

Wheat flour is commonly used in noodle making due to the gluten content in the wheat flour which provides good extensibility in noodle. The absence of gluten in non-gluten noodle adversely affects the characteristics of the noodle. According to Palvecino *et al* (2017), a the use of gluten free in pasta tends to create sticky texture which is caused by the higher cooking loss. It is also mentioned by Jeong *et al* (2017), the use rice flour as the main ingredients is lack of gluten content, making the noodle to be less chewy, adhesive, and easy to break compared to wheat based noodle.

Previous research by Kraithong *et al* (2019), has stated that addition of hydrocolloid such as guar gum can improve the noodle characteristic compared to other hydrocolloid when it is compared in the same amount of concentration. Guar gum improves the noodle water absorption, tensile strength, elongation and adhesiveness of the noodle. Protein content in egg also proven to enhance the non-gluten based noodle by acting as a protein source that can help to decrease the cooking loss and texture of noodle. Hence, addition of hydrocolloid such as guar gum and egg as protein is required to improve the textural properties of noodle analogue made from rice to mimic the textural properties of wheat noodle. However, based on the previous researches, it has not been further studied on the appropriate concentration of guar gum and egg in noodle to obtain the best characteristic in noodle analogue from rice flour. Therefore, the concentration of

guar gum and the concentration of egg were determined in order to improve the textural and physical qualities of noodle analogue.

1.3 Objectives

The objectives of this research were divided into two, those were general objective and special objectives.

1.3.1 General Objective

The general objective of this research was to utilize rice flour as the main ingredients with guar gum and egg addition in noodle analogue making.

1.3.2 Special Objectives

The special objectives of this research were:

1. To determine the best guar gum concentration to produce best characteristic in noodle analogue made from rice flour based on its sensory properties, cooking loss, water absorption, and textural properties.

2. To determine the best concentration of egg that produces best characteristic in noodle analogue made from rice flour based on its sensory properties, cooking loss, water absorption, and textural properties.

3. To compare the characteristics between selected noodle analogue to commercial wheat-based dry noodle.