CHAPTER I
INTRODUCTION

1.1 Background

Breakfast is the most important meal of the day. It influences how we perform physically and mentally for the day by providing the body with energy. A breakfast high in carbohydrate or protein is suggested since both are easier to be converted into energy, compared to fat. A low calorie breakfast, or even no breakfast at all will result in poor performance during physical activities (Ivy, 2016). Unfortunately, although many health articles emphasize on the importance of breakfast, many people still choose to skip breakfast. In the past 25 years, consuming breakfast has declined in all age groups (Nicklas *et al*., 2004). The common excuses for skipping breakfast usually ranges from having no time no to prepare and/or eat the meal, having no appetite in the morning to dieting reasons.

A high fat breakfast increase oxidative stress in metabolic syndrome (Devaraj *et al*., 2008). Meanwhile, Pasman *et al*. (2003) conducted a study comparing two different breakfasts, one high in simple carbohydrate while the other is high in complex carbohydrate. The study showed that consuming high complex carbohydrate breakfast is more favorable, as it has higher degree of satiation and lower perception of fatigue after the meal. Additionally, Blom *et al*. (2006) found that high protein breakfast decreased the concentration of ghrelin, a hormone that increase appetite, more strongly than a high carbohydrate breakfast. Thus, a person would feel more satiated when consuming a high protein breakfast.

Therefore, a healthier breakfast meal is needed, as it is beneficial for physical and mental health of the body.

Kementerian Kesehatan Republik Indonesia (2014) recommended a daily healthy diet, comprised of ample amount of vegetable and fruit, high protein food, various grains as well as dairy product. Meanwhile, the consumption of salt, sugar and fat should be limited. The habit of eating breakfast is also suggested as breakfast provides the body with nutrients and energy needed for daily activities. However, people might not be able to fulfill all the needed nutrition during breakfast due to the reasons stated above. In order to fulfill such requirements, breakfast as the first meal of the day does not only need to be nutritious but convenient as well.

Legumes have the potential to be consumed as a healthy breakfast. Legumes can be defined as the fruit or seed of leguminous plant, which are commonly used as food and classified as Leguminosae family. Legumes are great sources of complex carbohydrates, protein, fiber and various minerals. Examples of legumes are soybeans, peanuts, kidney beans, mung beans, peas, lentils and black beans (Brown, 2011). Kidney bean (*Phaseolus vulgaris* L.) is considered as one of the most nutritious dried beans. For example, according to USDA (2016), cooked kidney beans contains sufficient amount of protein (8.67 g/100 g of cooked beans), carbohydrate (22.8 g/100 g), fiber (7.4 g/100 g) and various minerals, with low total lipid (0.50 g/100 g) and sugar (0.32 g/100 g). Meanwhile, boiled mung beans are comprised of protein (7.02 g/100 g of cooked beans), carbohydrate (19.15 g/100 g), fiber (7.6 g/100 g), as well as minerals such as potassium, phosphor and magnesium.

Although legumes are rich in nutrients, not all of these nutrients can be utilized completely, due to the presence of antinutrients. These antinutrients may reduce the bioavailability of the nutrients inside the legumes and even cause harmful effect towards the body (Yasmin *et al*., 2008). Hence, proper processing method must be applied to reduce the content of anti-nutritional factors of the beans.

With proper processing method to reduce the antinutrient content, kidney beans and mung beans have a potential to be developed into a nutritious breakfast beverage. However, there are little to no scientific articles, which utilized legumes as a potential healthy breakfast beverage. Hence, the purpose of this research is to utilize kidney beans and mung beans into a healthy breakfast beverage, with adequate nutrient content and sensory acceptability.

1.2 Research problem

Kidney beans and mung beans have been consumed for a long time in Indonesia. However, the utilization of these beans, especially kidney bean is still limited. Although the nutrient content of these beans are quite high, the availability is restricted is due to the presence antinutritional factors. In order to increase the nutrient availability, the antinutritional factor must be reduced and certain processing methods can be implemented to inactivate the antinutrients. Therefore, a suitable method is required to decrease the antinutrient content of mung beans and kidney beans before further processing. And, in order to fully utilize the beans, a proper formulation of kidney beans to mung beans ratio is

required in the making of breakfast beverage with adequate nutrient content and acceptable sensory palatability.

1.3 Objectives

1.3.1 General objectives

The general objective of this research was to utilize kidney bean and mung bean into a breakfast beverage with adequate nutrient content and acceptable sensory characteristics.

1.3.2 Specific objectives

The specific objectives of this research were:

1. To investigate the effect of different cooking methods (boiling and steaming) and germination towards the anti-nutritional factors of kidney bean and mung bean.
2. To investigate the effect of kidney bean to mung bean ratio towards the physical characteristic of breakfast beverage.
3. To investigate the effect of kidney bean to mung bean ratio towards the sensory acceptability of breakfast beverage.