CHAPTER I

INTRODUCTION

1.1 Background

Bread is a universally accepted staple food. It is a good source of macronutrients and micronutrients that are essential for human health (Ibrahim *et al*., 2015). Bread products are made through a fermentation process carried out by yeast and baked. Pan bread, also referred to as loaf bread or white bread, is a type of bread without the addition of flavorings nor other ingredients (Ishida and Steel, 2014). The main ingredient of a pan bread is wheat flour, which is an imported product. According to *Asosiasi Produsen Tepung Terigu Indonesia* (APTINDO), the import of wheat flour increased 25% in four years, resulting in an import of 8.1 million tons in 2016. The increase of wheat flour imports over the years have made Indonesia to become dependent on other countries because it is not accompanied with the utilization of potential local crops (Yanuarti and Afsari, 2016). Therefore, one of the alternatives to minimize this problem is by developing flour from potential local crops and eventually substituting it.

Sweet potato is considered to be one of the most distributed root crops that ranks seventh most important food crop in the world and fourth in tropical countries. It is non-seasonal and has a shorter growth period compared to other crops. In addition, sweet potato is also rich in nutrients such as carbohydrate, beta-carotene, dietary fiber, vitamin C, vitamin B_6, anthocyanin, total phenolic, flavonoid antioxidant, calcium, manganese, and potassium. Despite these positive features

offered by sweet potato, it has not been utilized maximally in the food industry (Ayo-Omogie, 2020). Data shows that in 2018, 19,341,233 tons of sweet potatoes were produced with 243.91 quintal/hectare of productivity (Kementerian Pertanian Republik Indonesia, 2018). However, sweet potatoes are perishable, thus processing it into flour makes it more shelf stable and practical to use.

The partial substitution of wheat flour with sweet potato flour will reduce the gluten content of pan bread. Whereas, gluten is responsible for the structure of the bread one of which is by trapping gases produced, thus responsible for the volume of pan bread. Consumers often perceive volume of pan bread as an indication of value for money, where more aerated and voluminous bread is perceived as better value. These are reasons why volume of bread is an important quality parameter to pan bread producers and have been widely studied (Trinh *et al*., 2016). Since partially substituting wheat flour with other types of flour leads to the lack of gluten and a decrease in bread volume and structure, modification is needed.

Heat-moisture treatment (HMT) is a starch modification method that is done by heating the starch at a certain moisture level. HMT is expected to improve the swelling ability of pan bread due to the change of starch crystallinity after HMT modification. By the partial substitution of wheat flour with heat-moisture treated sweet potato flour, pan bread is expected to have better physicochemical and organoleptic characteristics that are acceptable for the prospective consumer.

1.2 Research Problem

One of the most important characteristic of pan bread is the volume, as it is the key aspect to consumers preference. Therefore, bread producers are interested in increasing the volume of bread using the same amount of ingredients. Previous study by Julista (2020) has proven that the partial substitution of wheat flour with heat-moisture treated sweet potato flour can improve the physicochemical and organoleptic characteristics of pan bread, especially volume, at the ratio of 90:10. However, 10% substitution with sweet potato flour may not be significant. Therefore, this research was done to investigate the possibility of increasing the ratio of substitution by finding the most suitable HMT time and temperature of sweet potato flour. This research was also done to investigate the use of partial substitution to improve pan bread formulation.

1.3 Objectives

1.3.1 General Objectives

General objectives of this research were to study the use of heat-moisture treated sweet potato flour as a substitute of wheat flour on the physicochemical and organoleptic characteristics of pan bread; and to select pan bread with best formulations.

1.3.2 Specific Objectives

Specific objectives of this research were:

1. To prepare sweet potato flour modified with heat-moisture treatment (HMT).

2. To determine effect of HMT time and temperature on sweet potato flour characteristics (swelling power, solubility, and lightness); and to select best treatments.
3. To determine effect of ratio of HMT treated sweet potato flour to wheat flour on physicochemical and organoleptic characteristics of pan bread; and to select pan bread with best ratios in the formulations.