1.1 Background

Indonesia is a country rich in natural resources yet there are some nutrition related health problem arising among Indonesia people, such as protein and vitamin A deficiency. This problem is related to the poor economical status of the people which cause them to not able to fulfill their nutrition need due to the increasing price of related commodity. Milk and egg are food high in protein, yet the price is getting more expensive nowadays. According to Ratri (2013), price of milk in Indonesia increase about 15% annually, affected by the increasing of milk price in the world. Soy milk, as the alternative for a cheaper protein food source, face some difficulties such as the increasing price of soybean, the lack in vitamin A and beany flavor. Beany flavor in legume is caused by the lipoxygenase-mediated conversion of lipids which produce lipohydroperoxides and their subsequent degradation which responsible to the off flavor recognized as beany flavor (Rackis et al, 1979).

Apart of soybean, there are various nutritious legumes which easily grow in Indonesia yet the utilization of those legumes is still underdeveloped as food. Winged bean (Psophocarpus tetragonolobus L) and jack bean (Canavalia ensiformis) are nutritious seed which commonly planted in Indonesia. Those seed are usually thrown away or used as plant seed. Winged bean and jack bean
contain complete essential amino acid just as soybean, and they even have a higher proportion for some amino acids (Kapsiotis, 1968; Sridhar and Seena, 2006; Heuzé and Tran, 2013). However, both beans contain some antinutrient and beany flavor thus need special treatment to eliminate them.

Pumpkin is a nutritious fruit which commonly found in all over the world, especially in an agriculture country like Indonesia. Some people do not like to consume pumpkin prior to its sulfury green taste (Rovira, 2008). However, pumpkin contains high amount of antioxidant and mineral, especially pro-vitamin A. Although carrot and sweet potato are containing higher carotenoid than pumpkin, but pumpkin has potential to be utilized as it also contain high amount of carotenoid and carbohydrate (Conte Jr., 2012). Carotenoid in pumpkin can reduce the lipoxygenase activity in legume which contribute to beany flavor present in legume (Chedea and Jisaka, 2011). Thus, by mixing legume milk with pumpkin juice, it was expected that the beany flavor could be decreased so that the acceptability of legumes milk and pumpkin juice beverage increase. Optimization of legumes milk pumpkin juice was important so that the resulted beverage could fulfill the standard for both soy beverage and fruit juice.

1.2 Research Problem

Winged bean and jack bean are underutilized legumes which grown in Indonesia. Together with soybean, winged bean and jack bean have limited application due to their undesirable beany flavor in spite of their high content of protein. The addition of pumpkin was done because it has a high content of
carotenoid which can decrease beany flavor due to its inhibition of lipoxygenase and act as a good source of vitamin A in the resulted beverage.

1.3 Objective

1.3.1 General Objective

The general objective of this research was to formulate legumes milk enriched with pumpkin juice which is rich in nutrient and having acceptable sensory quality. The formula are consist of soy milk, winged bean milk, jack bean milk and pumpkin juice. Addition of pumpkin was expected to decrease the beany flavor and increase the nutritional content, especially vitamin A, of the legume milk, with addition of reaching the desirable sensory quality of the final product.

1.3.2 Specific Objective

The specific objective of this research was to optimize the ratio of winged bean milk, jack bean milk, soy milk and pumpkin juice in mixed legume milk based fruit juice beverage which can be claimed as a good source of vitamin but still having good sensory acceptability.