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To Determine the Effect of Processing Methods on the Protein Content of Soy Milk

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Abstract: Soymilk is a plant based drink product by soaking and grinding soybeans, boiling the mixture, and filtered out remaining particles. it is a stable emulsion of oil, water and protein. it original foam is an intermediate product of the manufacture tofu. This has therefore, encouraged the household production of soymilk Soy milk, a derivative of soybean, is an alternative to dairy beverage, but its acceptability is limited worldwide due to unpleasant beany flavor. The obstacle in the manufacture of soy milk is the beany flavor that derives from the soybean. Various soy milk processing technologies are used to eliminate the beany flavor, including soaking soybeans before grinding, peeling the soybean skin, heating, and giving them flavor. The objectives of this study were to determine the protein content of soy milk by various processing methods; The results showed that the processing method using soybean skin and without hot water soaking had the highest soy milk protein content of 2.40%, while the lowest was in the processing method skinless soybean and hot water soaking of 1.33%.

Keywords: soymilk, soybean processing, protein content, beny flavor, dairy alternative etc.

1. Introduction

Soybeans are food ingredients in the form of whole grains that are high in protein. Protein in soybeans reaches 35%, and soybean varieties reach 40 - 43% which is much higher than other legumes [1, 2]. Soybeans also contain nutrients needed by the body, such as minerals, fiber and vitamins [3]. Soybean skin contains high fiber and protein, so soybean skin can be used as quality food products and have better economic value [4]. Soybeans are widely used as raw materials in the manufacture of tempeh, tofu, yogurt and soy milk because it contains many nutrients [5]. One of the processing of soybean seeds is soy milk. Soy milk is a highly nutritious drink because of its protein content equivalent to cow's milk and also contains carbohydrates, calcium and phosphorus [6]. The obstacle in the manufacture of soy milk is the beany taste due to the lipoxygenase enzyme in soybeans [7]. If the soy milk is made in a bad way, the soy milk produced has a beany smell that comes from the soy raw material used. Many factors affect the quality of soy milk, such as the soaking conditions of soybean seeds, storage and enzymes present in soybeans [8]. Various soy milk processing technologies are used to eliminate beany flavor, including soaking soybeans before grinding, peeling the soybean skin, heating and imparting the taste. Soaking soybeans are an important step in the manufacture of soy milk [9]. According to Ismayasari et al. (2014), one way to get rid of the beany flavor and bitter taste of soybeans is by heating [10]. Soaking soybean seeds in hot water at 700 C can deactivate lipoxygenase, which causes beany flavor in soybeans [11, 12]. According to Santoso (2009), the beany flavor of soy milk can be disguised by adding flavors such as vanilla, pandan, chocolate, mocha, and cinnamon [13]

Based on the description above, the research problem is formulated whether there is an effect of several processing methods on the quality of soy milk in terms of protein.

2. Material and Methods

2.1. Materials

The raw materials used in this study were imported soybeans obtained from the Ciruas market, Serang - Banten. Other ingredients used are hot water, sugar, vanilla flavor, coffee and cocoa powder. The equipment used includes basins, pans, trays, stoves, and scales.2.2. Procedure The following is the procedure of making soymilk

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Figure 1: Flow Diagram of the process of making soy milk by various processing methods

3. Result and Discussion

3.1 Protein of soy milk

Soy milk is a source of protein so it can replace protein sources from cow's milk [14]. The protein content of soy milk using the soybean seed treatment method and soaking can be seen in table 1.

 Table 1: Effect of processing methods on soy milk protein content.

Processing Method	Protein (%)
Control	1.91
Skinless and without hot water soaking	2.30
Skinless and with hot water soaking	1.33
With skin and without hot water soaking	2.40
With skin and with hot water soaking	2.02

The result of protein content analysis showed that the highest protein content of soy milk was found in treatment that used skin and without hot water soaking was 2.40%, while the lowest protein content was skinless with hot water soaking of 1.33%. From some of the protein content of soy milk produced, it has met the soybean quality standard 01 - 3830 - 1995, which is 2%. The protein content of soy milk is influenced by soybean seed treatment and soaking treatment. The method of using skin and without hot water soaking is higher than other treatments because the soybeans used still have a skin where the skin soybean still contains 17.98% crude protein, 5.5% crude fat and 24.84% crude fiber [15]. Soybean skin contains high fiber and protein, so soybean skin

can be used as quality food products and have better economic value [4]. Astawan *et al.* (2013) reported that

the mineral content of soy is mostly found in the soybean skin [16].

In general, the heating process of food can reduce the mineral content of these materials. The mineral content of a food can be damaged during the heating process because minerals are very sensitive to pH, oxygen, light, and heat [17]. In addition, protein content, which is an important factor in the content of an ingredient, also decreases when it is heated.

The protein content in soybeans can be maintained a little by not soaking in hot water. Soaking in hot water causes protein to dissolve easily in water because protein cannot withstand heat. This is in accordance with the opinion of Meisara and Nurhidajah (2012) that protein content can dissolve in water at a temperature of 38 - 75 oC [18]. And supported by Li et al. (2019); Pan and Tangratanavalee (2003); Pagara (2011), that soaking at high temperatures can cause protein loss into water [9, 19, 20].

4. Conclusions

The conclusions that can be drawn from this research are as follows:

The processing method using soybean skin and without hot water soaking has the highest soy milk protein content of 2.40% while the lowest is the processing method skinless and hot water soaking of 1.33%.

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