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Physical and proximate analysis of green banana cake premix flour

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Abstract. Green banana cake is a traditional cake from South Sulawesi, Indonesia. This cake is made from “Raja” banana wrapped in a mixture of wheat flour, rice flour, coconut milk, sugar, and food coloring. Weighing the raw material in making the dough of green banana cake takes approximately 30-45 minutes, therefore we need a green banana dough cake premix flour that is ready for use. The purpose of this study was to analyze the physical properties and proximate of green banana cake premix flour, premix dough and exported dough. The method used is to analyze the physical and proximate properties of green banana cake premix flour (40% wheat flour: 30% rice flour: 20% coconut milk: 10% sugar and pandanus leaves powder 0.1%), dough green banana cake premix flour after cooked at 100°C and dough green banana cake which has been exported abroad as a comparison. This study used a complete randomized design method with two replications. The results showed a physical analysis of the elasticity and hardness of the dough green banana cake premix flour and the exported dough was 193.7%; 362.8% and 2.71 N/mm²; 1.65 N/mm², respectively. The proximate content of green banana cake premix flour, premix dough and exported dough as in order were water content (6.75%; 9.39%; 7.84%), ash content (0.95%; 0.51% ; 0.24%), protein content (8.74%; 4.67%; 2.11%), fat content (8.17%; 3.07%; 0.92%), and carbohydrates (56.64%; 25.02%; 39.34%).

1. Introduction

Traditional cakes are cakes that develop in an area and serve as regional characteristics. Traditional cakes are usually made from abundant raw materials in the area. Green banana cake is one of the traditional cakes from South Sulawesi, Indonesia. This cake is usually made by the community as a daily snack or as a snack on a special event [1]. Green banana cake is made from banana which has been steamed and wrapped in a mixture of flour, rice flour, sugar, coconut milk, pandanus leaves extract and water. Green banana cake is consumed with sauce from coconut milk, sugar and rice flour [2]. The quality of the green banana cake is determined by the dough. Making the dough green banana cake takes approximately 30-45 minutes, so premix flour or ready-mixed flour the dough of green banana cake is very helpful in accelerating its serving process [3], due to weighing the ingredients does not need to be done [4]. Besides that, premix flour can guarantee uniform product quality because the accuracy of the proportion of each ingredient mixture has been measured [5].

Physical and proximate analysis of a product is one of the bases for determining the quality of the product made. There is no information about the quality of dough green banana cake, so there is no standard regarding the quality level of dough green banana cake on the market. This research will analyze the physical and proximate properties of green banana cake premix flour and the dough from



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premix flour after cooking. As a comparison, dough green banana cake that has been exported abroad will also be analyzed.

2. Materials and methods

2.1. Materials

The fresh banana “Raja”, wheat flour, rice flour, sugar, pandanus leaves powder, and coconut milk was purchased from a traditional market in Makassar, South Sulawesi, Indonesia. Reagents used were obtained from the chemical market in Makassar, Indonesia.

2.2. Methods

2.2.1. Sample preparation. Green banana cake premix flour (40% wheat flour: 30% rice flour: 20% coconut milk: 10% sugar and pandanus leaves powder 0.1%) from the best organoleptic test was prepared for analyzing. In addition, dough green banana cake premix flour and dough green banana cake that has been exported abroad as a comparison also prepare. A dough of green banana cake premix flour obtained by mixing the green banana cake premix flour with 300 mL of water for 450 g of premix flour and cooked it at 100°C for 5 minutes. While the exported dough was purchased from the market in Makassar.

2.2.2. Determination of protein. The protein of the sample was measured using the Kjeldahl method [6]. The protein expressed as the percentage of total protein.

2.2.3. Determination of carbohydrates. Luff school method was used for analyzed of carbohydrates content of the sample [6]. Carbohydrate was expressed as the percentage of carbohydrate.

2.2.4. Determination of fat. The fat content of the sample was measured by using the soxhlet method. The percentage of fat content was expressed [6].

2.2.5. Determination of Ash. The ash content of the sample was analyzed by using the dry method. The percentage of ash content was expressed [6].

2.2.6. Determination of water content. The oven method was used for the measured water content of all samples. Water content was expressed by the percentage of water content [6].

2.2.7. Determination of hardness and elasticity. Texture analyzer (TA-XT Plus) [7] was used for measured hardness and elasticity of dough green banana cake.

2.3. Statistical analysis

The experimental was designed by using factorial randomized complete random (RAL) with two replications and the data was analyzed by using analysis of variance (ANOVA), if the data is significantly different then proceed with the Duncan test using SPSS ver. 22.

3. Results and discussion

3.1. Protein content

The protein content of green banana cake premix flour, premix dough, and the exported dough were analyzed. Figure 1 showed protein content for the treatment decreased after cooked as a dough. Premix flour has 8.74% of protein and decreased to 4.67% after cooked as a dough. And as a comparison, the protein content of the exported dough is 2.11%. A decrease in protein content is caused by the effect of heat temperature on the cooking ingredients into a dough when the dough which has protein content is heated then a denaturation process will occur. Sumardjo [8] states that protein denaturation is the process of changing molecular structure without any covalent bond

breaking. In this process, there is a breakdown of hydrogen bonds, hydrophobic interactions, salt bonds and the opening of folds of protein molecules.

A decreased protein content in dough green banana cake is also caused by the addition of water during the cooking process so that the weight of the material becomes heavier than premix flour. When protein content was tested its levels are reduced because of the increased sample weight. Based on a statistical analysis of variance showed that all treatments had a significant effect on the 5% level, and Duncan's further tests showed that each treatment is different.

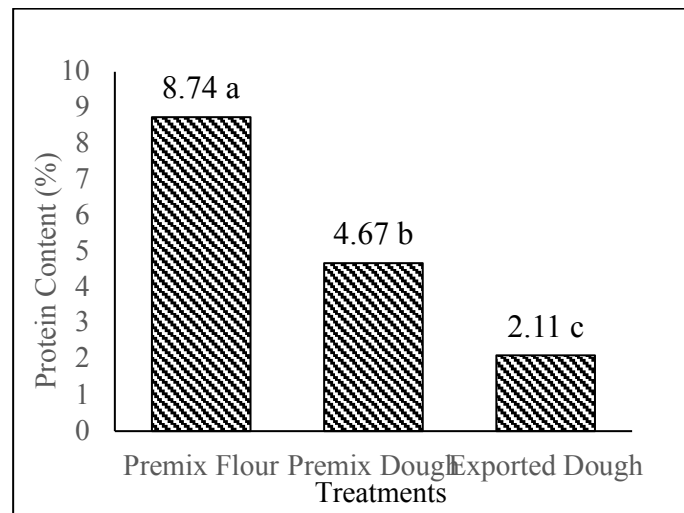


Figure 1. The protein content of green banana cake in different treatments

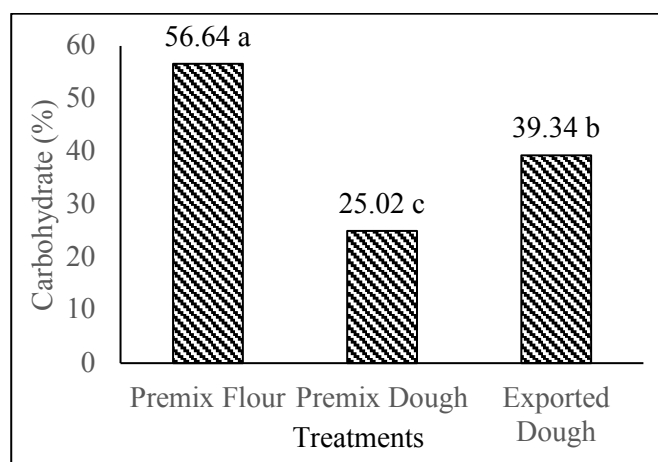


Figure 2. Carbohydrate content of green banana cake in different treatments

3.2. Carbohydrate content

The results of carbohydrate analysis based on figure 2 showed that the green banana cake premix flour has the highest carbohydrate content of 56.64%. However, after cooking, the carbohydrate of premix dough decreased to 25.02% and carbohydrate content of exported dough that is 39.34%. The cooking process causes a decrease in carbohydrate content in the dough. According to Salim and Putri [9], heat treatment can weaken amylose and amylopectin inter and intramolecular bonds, as well as amylose and amylose. Hence, the starch easily degraded and decreased carbohydrate levels. A decreased carbohydrate content is also caused by the addition of water during the cooking process so that the

weight of the material becomes heavier than premix flour. When carbohydrate content was tested, its levels are reduced because of the increased sample weight.

Results of analysis of variance showed that all treatments had a significant effect at 5% level. And based on Duncan's further tests showed that the premix flour was significantly different for each treatment.

3.3. Fat content

As shown in figure 3, fat content for premix flour is 8.17% and decreased after cooked at 100°C for 5 minutes that is 3.07% for dough premix. In addition, the exported dough has low-fat content that is 0.92%. The reduction of fat content in premix flour after cooking into the dough is caused by high temperatures treatment during processing. This is in accordance with Palupi et al. [10] which states, that fat content generally will damage after processing. The degree of fat damage varies depending on the temperature used and the length of time processing. The decrease in fat content after cooking is caused by the fat cannot stand the heat, during the cooking process the fat melts and evaporates into other components such as flavor. The addition of water in premix flour during cooking also affects the quantity of fat content in the dough of green banana cake. An amount of water increases the weight of the sample, but decrease the level of fat content. Based on a statistical analysis of variance showed that all treatments had a significant effect on the 5% level, and Duncan's further tests showed that each treatment is different.

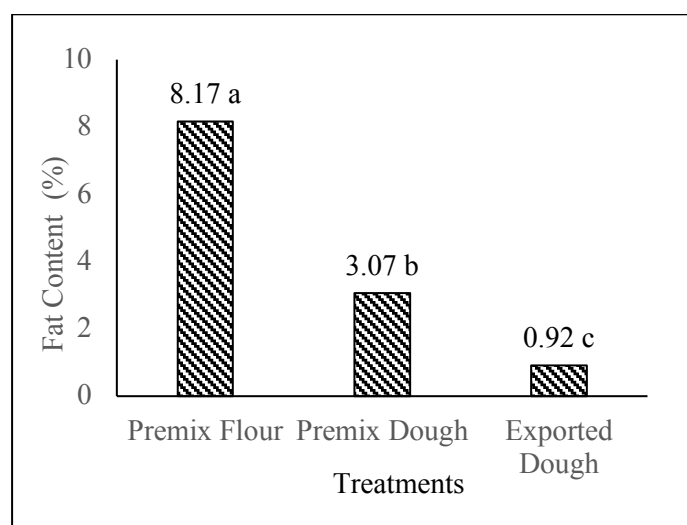


Figure 3. The fat content of green banana cake in different treatments

3.4. Ash content

As shown in figure 4, the premix flour of green banana cake has higher ash content than premix dough and exported dough. Ash content of premix flour decreased from 0.95% to 0.51% after cooking for 5 minutes at 100°C. And as a comparison, an ash content of exported dough that is 0.24%. This is because the cooking process affects the ash content of the food. According to Sundari et al. [11] which states, that the cooking process can decrease and increase the ash content of the fresh material. High ash content indicates high mineral content in a food ingredient.

A decreased ash content is also affected by the addition of water in premix flour during the cooking process. The addition of water in premix flour will increase the weight of the dough, hence when ash content was analyzed, its levels are reduced because of the increased sample weight. Results of analysis of variance showed that premix flour, premix dough, and exported dough treatments had a significant effect on the 5% level, and Duncan's further tests showed that each treatment is different.

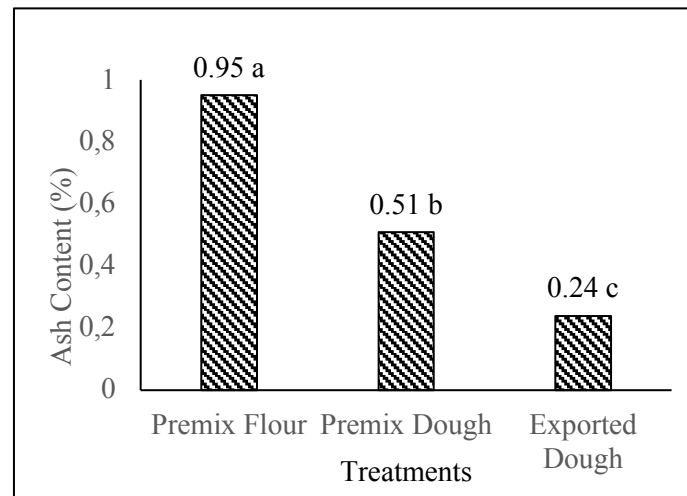


Figure 4. Ash content of green banana cake in different treatments

3.5. Water content

Water is an important component of food. All food ingredients contain different amounts of water. The results of the analysis of water content in premix flour, dough premix, and exported dough can be seen in figure 5. The water content of premix flour is lower than the dough of green banana cake, due to an amount of water is added in premix flour during dough cooking process. The water content of wheat flour according to USDA [12] was 12.42% and the water content of rice flour according to the Ministry of Health [13] was 12%.

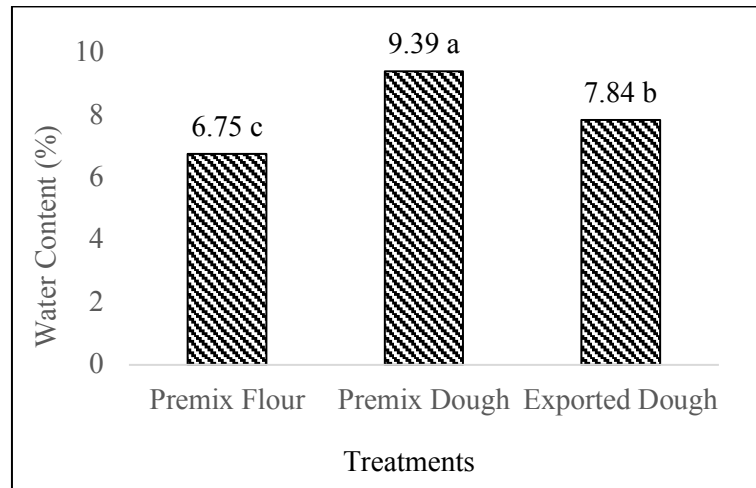


Figure 5. The water content of green banana cake in different treatments

3.6. Hardness level

Hardness is one of the parameters in determining food texture. Hardness is defined as the absolute peak (maximum force), which describes the force of the probe to suppress the dough of a green banana cake, the higher peak of the curve, the more hardness of the dough.

Figure 6 showed the hardness value in premix dough is 2.71 N/mm² and exported dough is 1.65 N/mm². The result indicates that premix dough more hardness than exported dough. Dough green banana cake is made from wheat flour that contains protein. The protein can affect the level of hardness of the dough. Accordance with Fellows [14,15] states, that the texture can be influenced by the ratio of amylose from the flour or starch used. High amylose content causes suspension of starch

requires a short time to retrograde. Change in texture was also caused by loss of water or fat content, rupture of emulsions, carbohydrate hydrolysis, and protein coagulation.

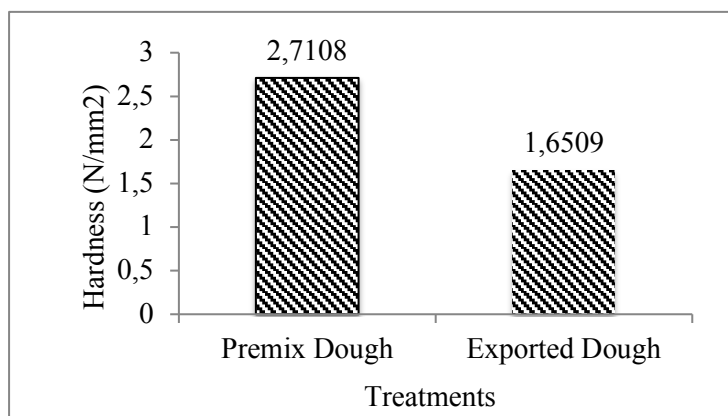


Figure 6. The hardness level of premix dough and exported dough

3.7. Elasticity level

The product texture is an important parameter for various types of products. The texture is one of the factors that determine the quality of food products. One of them is elasticity which describes the reaction of the material when it is subjected to force. According to Rosenthal [16], elasticity is the rate at which an object returns to its original shape after a deformation occurs.

Figure 7 showed the elasticity value of premix flour is 193.7% and the exported dough is 362.8%. The result indicates exported dough is more elastic than premix flour. The water content can affect the elasticity of dough green banana cake. This is in accordance with Matz [17] which states, that the higher the water content of food material, the texture will be softer. In addition, the protein content also determines the texture of the dough. According to Soeparno [18], the texture is highly dependent on protein components that are bound to food. And Ikram and Ismail [19] stating, that steaming causes the protein to dissolve in the streaming media so that foodstuffs produce good texture.

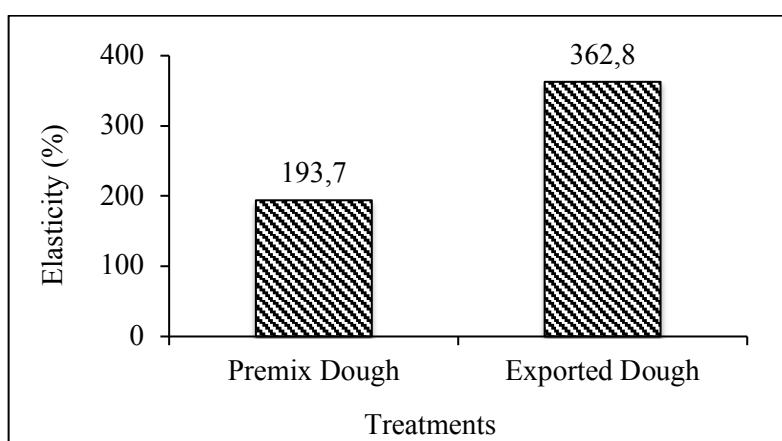


Figure 7. Elasticity level of premix dough and exported dough

4. Conclusions

All parameters of proximate analysis in premix flour decrease after cooking at 100°C (premix dough) for 5 minutes. Premix dough has a higher protein, fat and ash content than exported dough, but lower in carbohydrate content. In addition physical analysis showed exported dough has elasticity level higher and lower of hardness than premix dough.

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