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## Analysis of liability and protein content of soybean biscuits with Ambon banana as an alternative to emergency food for the elderly

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### ABSTRACT

In disaster conditions, the elderly are vulnerable groups that require special attention. With increasing age, there is a decrease in biological function and psychological disorders. The elderly tend to have anxiety, especially during disaster conditions. This anxiety has an impact on the diet and health of the elderly. Soybean (*Glycine max* L.) flour biscuits and Ambon banana (*Musa paradisiaca* var. *sapientum* L.) flour is a food product that meets disaster emergency food requirements and food requirements for the elderly. It is appropriate to be used as an alternative disaster emergency food for the elderly. This study aims to determine the effect of the balance of the soybean flour biscuit formula Ambon banana flour on the organoleptic and protein properties. The research design used is an experimental study, with the research method used is a hedonic test for testing organoleptic properties and the Kjeldahl procedure for testing protein content. The formula of Ambon banana and soybean flour biscuits consisted of three balances, with the ratio of Ambon banana flour soybean flour (%) F1 (45:55), F2 (35:65), and F3 (25:75). From the study results, it can be concluded that there is a significant difference in the test results of organoleptic properties only for colour. Moreover, there are no significant differences in the test results of organoleptic properties, including aroma, taste, texture, and overall. In the test results of organoleptic properties, the balance (25:75) was declared superior overall. The 45:55 balance contains 8.01% protein, the 35:65 balance contains 7.23% protein, and the 25:75 balance includes 7.42%.

**Keywords:** biscuits; organoleptic; soybean flour; Ambon banana flour; elderly

### INTRODUCTION

Law of the Republic of Indonesia Number 24 of 2007 concerning disaster management states that a disaster is an unexpected event because it negatively impacts victims and the environment, such as occurrence, loss of life, suffering, property loss, and environmental damage [1]. In 2018 in Indonesia, there were 4,089 natural disasters from 01-01-2018 to 31-12-2018, with 8,439 dead and missing, 5,125 injured, 1,365,956 affected, and displaced. In 2019, 9,392 natural disasters started from 01-01-2019 until 31-12-2019, with 912 deaths, 2,712 wounded, and 5,371,845 affected and replaced. In 2020, 1,285 natural disasters started on 01-01-2020 until 04-05-2020, with 53 dead and missing, 26 injured, and 529,818 affected and missing [2]. Assistance must be given immediately to deal with the adverse effects of post-disaster, such as evacuating the victim's property and fulfilling basic needs such as feeding to prevent refugees from feeling hungry and decreasing nutritional status. The United States Agency for International Development (USAID) states that emergency food must have sufficient nutritional value, be non-hazardous when consumed, be delicious, be given equitably to refugees, and be acceptable [3]. Most emergency food aid in disaster areas still requires a cooking process, such as rice and instant noodles. In an emergency, vulnerable groups, namely pregnant women, infants, toddlers, the elderly, and people with disabilities, require special attention. The elderly are residents who have an age of 60 years [4]. In disaster conditions, the elderly are vulnerable groups that require special attention, w. With creasing age, there is a decrease in biological function and psychological disorders. The elderly tend to have anxiety, especially during disaster conditions. This anxiety impacts the diet and health of the elderly [5]. Nina et al.'s 2015 research proved that bad psychological

conditions could cause a decrease in food intake, which then causes a decrease in nutritional status [6]. Nutritional problems often experienced by the elderly are overnutrition and undernutrition [7]. Soybeans and Ambon bananas are the choices because of the nutritional content and benefits that complement each other. Soybeans are a source of vegetable protein that is useful for increasing the body's immunity, replacing damaged body cells, and most importantly, helpful in producing energy. Soybeans have functional properties and can be further processed products [8]. Bananas contain several nutrients the body needs, such as potassium which can help cell growth, control blood pressure and smooth the functioning of the nervous system. Levels of antioxidants such as vitamins A and C can increase endurance. Vitamins B can help the process of protein metabolism and the content of tryptophan (an amino acid with a natural sedative effect), which can improve mood to reduce symptoms of depression and anxiety. Bananas contain 5.8 g of fibre in 100 grams of ingredients. In addition, when combined with banana soybeans, it can cover the unpleasant smell of soybeans [9]. Biscuits are snacks made from flour, margarine/butter, with or without adding other desired food ingredients [10]. Biscuits are preferred by the elderly because they are easy to chew, small in volume, and do not aggravate the work of the canal. It is suitable for the elderly disaster emergency victims because the biscuits meet the emergency food and nutritional requirements for handling disaster conditions in the elderly [11]. Faizah's 2015 research stated that the results of the preference test on soyaba (soya-banana) cookies which included aspects of colour, aroma, crispness, and overall obtained the highest average that the panellists liked the most was the balance of Anjasmoro soybean flour 80% banana mas 20% (A2B1). The selected soyaba cookies contain 3.46% water content, 2.18% ash content, 13.57% fat content, 38.14% protein content, and 42.66% carbohydrate content. The quality analysis results show that soybeans' colour, aroma, and taste perfectly conform to consumer expectations. In contrast, the aspects of the aroma and taste of mas bananas have a poor level of conformity, and the quality of crunchiness has a fairly good level of conformity [12]. The research of Abe et al. 2017 showed a comparison of the organoleptic assessment of Ambon banana flour and plantain flour with several aspects of assessment, namely the analysis of the colour assessment of Ambon banana flour at 3.48% and plantain flour at 3.25%. Analysis of the aroma assessment, Ambon banana flour 3.41% and 3.25% plantain flour. The assessment related to the taste of Ambon banana flour is 3.28%, and plantain flour is 3.38%. Assessment related to the texture of banana flour 3.30% and plantain flour 3.12%. Based on the proximate analysis, the protein content of Ambon banana flour was 0.55%, and plantain flour was 0.66%. Ambon banana flour is superior in colour, aroma, and texture [13]. Aris Pratomo's 2013 research stated that adding Ambon banana flour to dry sponge products positively affected the panellists' preference for colour, aroma, taste, and texture [14]. Ferawati 2009, research was related to alternative emergency food. The balance selected after the organoleptic test was 25:75 (ratio of soybean flour and Ambon banana (2:3) and cassava flour ratio (1:1). Shelf life with the aspect of moisture content at 28 °C has a shelf life of 2.16 months [15], [16], [18].

Based on the description above, the authors are interested in making biscuits with a balance of soybean flour and Ambon banana flour and knowing the protein content following emergency food standards to be used as an alternative disaster emergency food for the elderly.

### **Scientific Hypothesis**

Soybean biscuits and Ambon banana could serve as alternative emergency food to provide protein needs.

## **MATERIAL AND METHODOLOGY**

### **Study Design**

The research design used is an experimental study, with the research method used being hedonic test for testing organoleptic properties.

### **Samples**

The independent variable consists of 3 balances of different Ambon banana and soybean flour that are balanced 1 (45:55), balance 2 (35:65), and balance 3 (25:75), while the dependent variables were organoleptic properties and protein content. Thirty panellists examined the hedonic test. Study this has to get agreement Commission Ethics Study Health Politeknik Kesehatan Kemenkes Bandung No. 31/KEPK/EC/XI/2020 dated November 20, 2020.

Preliminary research was conducted in January 2020 with the balance obtained from the preliminary test with three balances, namely 45%: 55%, 35%: 65%, 25%: 75%. Preliminary tests are carried out to determine the procedure for making the product and the amount of material used. The main research carried out in January-February 2021 includes making biscuits, collecting organoleptic test results and protein content, and then processing and analysing the data.

### **Chemicals**

Pasundan University provided the chemicals. All chemicals were of analytical grade quality.

**Animals and Biological Material**

The animal and biological materials were not used.

**Instruments**

The distillation apparatus, Kjeldahl flasks.

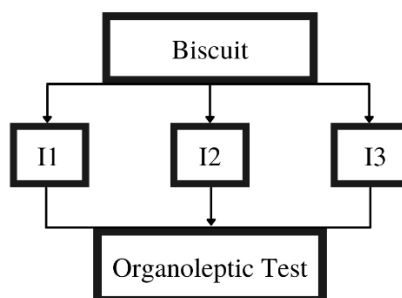
**Laboratory Methods**

To analyse protein content, we used Micro Kjeldahl method [29]. Repeated analysis of Each Formula was examined three times by Micro Kjeldahl Method. Weighing samples that have been mashed as much as 1 g. Filling the sample into a Kjeldahl flask. Weighing 7 g K<sub>2</sub>SO<sub>4</sub> and 0.8 g CuSO<sub>4</sub>. Addition of 7 g K<sub>2</sub>SO<sub>4</sub> and 0.8 g CuSO<sub>4</sub> to the Kjeldahl flask containing the sample. The addition of 12 mL of H<sub>2</sub>SO<sub>4</sub> solution was carried out in a fume hood. The destruction process was carried out in an acid chamber by heating the sample in the Kjeldahl flask using an electric stove until it turned turquoise green. Cooling the Kjeldahl flask by allowing it to stand for 20 minutes. Add 25 mL of distilled water into the Kjeldahl flask containing the sample. Add 50 ml of 40% NaOH and a few grains of boiling rock into the Kjeldahl flask containing the sample. The addition of 30 mL of H<sub>3</sub>BO<sub>3</sub> into the Erlenmeyer with 3 drops of BCG-MR indicator to capture the distillate from the distillation results. Distillation apparatus. The distillate obtained from the distillation was titrated using a standard solution of 0.1 N HCl until the colour of the solution changed to light pink.

**Calculation:** % Crude protein = % N x protein conversion factor [28].

**Description of the Experiment**

**Biscuit preparation:** Preliminary research was conducted in January 2020 with the balance obtained from the preliminary test with three balances, namely 45%: 55%, 35%: 65%, 25%: 75%. Preliminary tests are carried out to determine the procedure for making the product and the amount of material used. The main research carried out in January-February 2021 includes making biscuits, collecting organoleptic test results and protein content, and then processing and analysing the data. In this study, three treatment groups were carried out. Each treatment for organoleptic testing was carried out once and 3 times for protein content testing.



**Figure 1** Biscuit organoleptic test scheme. Note: I1: Biscuit sample with a balance of 45%:55%, I2: Biscuit sample with a balance of 35%:65%, I3: Biscuit sample with 25%:75% balance.

Knowing substance biscuit protein nutrition on each balance with Kjeldahl method in the laboratory University Pasundan. In connection with the COVID-19 pandemic, the hedonic test was carried out from the home of each panellist. Then the panellists sent the results of the hedonic test through the prepared google form.

Randomization in this study was done by pressing the SHIFT Ran# 1000 button and then getting the numbers sequentially from the smallest number to the most significant number and ranking.

**Number of samples analyzed:** we analyzed 30 samples.

**Number of repeated analyses:** Protein analyses were conducted in triplicate analysis.

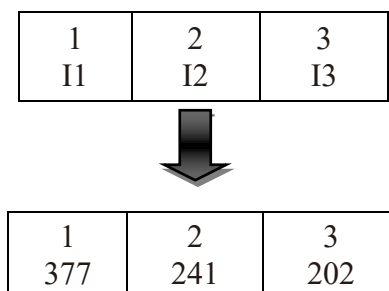
**Number of experiment replication:** 2 times.

**Design of the experiment:**

**Table 1** Randomization of experimental units.

No	Random Number	Ranking	Treatment
1	377	1	I1
2	241	2	I2
3	202	3	I3

Then a plan for the experimental organoleptic unit was made and listed in Figure 2 below.



**Figure 2** Organoleptic experiment unit plot.

Primary data were obtained from organoleptic test results by 30 moderately trained panellists for one test. Preliminary data on protein content was obtained from test results with three repetitions of observations for each treatment. He analysed the organoleptic data from the SPSS 15 program, namely the normality first test. The normality test used was Shapiro Wilk. If the Kruskal Wallis test is significant, the Mann-Whitney test continues.

**Statistical Analysis**

Significant differences ( $p < 0.05$ ) in the colour aspect of the biscuit were evaluated by the Kruskal Wallis test and continued by the Mann-Whitney test. The ANOVA test evaluated significant differences ( $p < 0.05$ ) in the protein content of the biscuit. This Statistical Analysis was calculated using SPSS 15 program.

**RESULTS AND DISCUSSION**

The biscuit balance in this study used a modified recipe based on the recommendation of emergency food nutritional value, where 10% was the provision of nutritional value for snacks or food consumed between main meals. In this study, the sample used was the balance between soybean flour and banana flour of 45%: 55%, 35%: 65%, and 25%: 75%. The ingredients that follow the percentage ratio are only soybean flour and Ambon banana flour. In contrast, other ingredients include egg yolks, liquid milk, baking powder, vanilla powder, salt, powdered sugar, cake ammonia, margarine, and food colouring using the same weight in each balance. The total weight of the ingredients of soybean flour and Ambon banana flour follows the weight of the ingredients in the original recipe is 100 grams; this aims to see a significant difference between the balance of soybean flour and banana flour on biscuits. The resulting Ambon banana and soybean flour biscuits are flat and round. Every 100 grams balance biscuit yields as much as 85%. Biscuits have a brownish colour. When biscuits added more banana flour, more panellists preferred the colour. The smell of biscuits gives rise to the distinctive aroma of biscuits. The texture of the resulting biscuit is soft, but its crunchiness and breaking power do not resemble the biscuits on the market. Various types of the resulting biscuits could see in Figure 3, below this:



**Figure 3** Biscuits made from soybean flour with Ambon banana flour.

**Influence Balance to Nature Organoleptic Biscuits Flour Peanut Soya Bean Flour Ambon Banana**

Test organoleptic done for knowing level favourite to biscuits food emergency. Based on results testing from third balance by 30 panellists instead trained seen from whole indicators (colour, aroma, taste, texture, and overalls). The average result shows that the panellists own Mark's different likes from the three different sample balances. That formula are 45% : 55% (I), 35%: 65% (II), 25%: 75 % (III). The data can be seen in Table 2 below this:

**Table 2** Distribution frequency likeness rating to colour, aroma, taste, texture, and overall.

Formula (%)	Liked Level	Colour		Aroma		Flavour		Texture		Overall	
		n	%	n	%	n	%	n	%	n	%
45:55	Very no like	0	0	0	0	1	3.3	0	0	1	3.3
	Not like	2	6.7	0	0	4	13.3	6	20.0	0	0.0
	Neutral	16	53.3	12	40.0	10.0	33.3	10	33.3	12	40.0
	Like	12	40.0	12	40.0	11	36.7	9	30.0	15	50.0
	Very like	0	0	6	20	4	13.3	5	16.7	2	6.3
35:65	Very no like	0	0	0	0	0	0.0	0	0	0	0.0
	Not like	0	0	1	3.3	2	6.7	6	20.0	2	6.7
	Neutral	13	43.4	9.0	30.0	9.0	30.0	11	36.7	11	36.7
	Like	14	46.7	15	50.0	16	53.3	12	40.0	15	50.0
	Very like	3	10.0	5	16.7	10	10.0	1	3.33	2	6.7
25:75	Very no like	0	0	0	0	0	0.0	0	0.0	0	0.0
	Not like	0	0	3	10.0	4	13.3	5	16.7	0	0.0
	Neutral	9	30.0	8.0	26.7	6.0	20.0	15.0	50.0	8	26.7
	Like	16	53.3	16	53.3	16	53.3	7	23.3	21	70.0
	Very like	5	16.7	3	10.0	4	13.3	3	10.0	1	3.3

Table 2 shows as many as 53.3% of panellists like 25:75 balance, 53.3% of panellists like 25:75 balance, 53.3% of panellists love the sense of balance between 35:65 and 25:75, 40% of panellists like 35:65 balance, 70% panellists like 25:75 balance. Results test hedonic has done, the average value of colour, aroma, taste, texture, and biscuit overalls flour soybean and banana Ambon as seen on Table 3 below this:

**Table 3** Results analysis Kruskal Wallis difference balance flour peanuts soya bean flour Ambon banana.

Balance	n	Colour		Aroma		Flavour		Texture		Overall	
		median	p-value	median	p-value	median	p-value	median	p-value	median	p-value
45:55	30	3.33		3.80		3.43		3.43		3.56	
35:65	30	3.66	0.016	3.80	0.777	3.66	0.539	3.26	0.752	3.56	0.422
25:75	30	3.86		3.63		3.66		3.26		3.76	

Based on the results of statistical tests, there are significant differences in the colour aspect of the biscuits. At the same time, statistical tests for aroma, taste, texture, and overall aspects showed no significant differences.

**Table 4** Results analysis of protein content between balance biscuits flour peanut soya bean flour Ambon banana.

Balance	Protein Content (%)
45:55	8.01
35:65	7.23
25:75	7.42

Based on Table 4 shows the balance of soybean flour biscuits. Ambon banana flour 45:55 has a protein content of 8.01%, the balance of soybean flour biscuits: Ambon banana flour 35:65 has a protein content of 7.23%, and the balance of Soybean flour biscuits: Ambon banana flour 25:75 has a protein content of 7.42%. The balance of soybean flour biscuits: Ambon banana flour 45:55 is a balance that has the highest protein content among other balances.

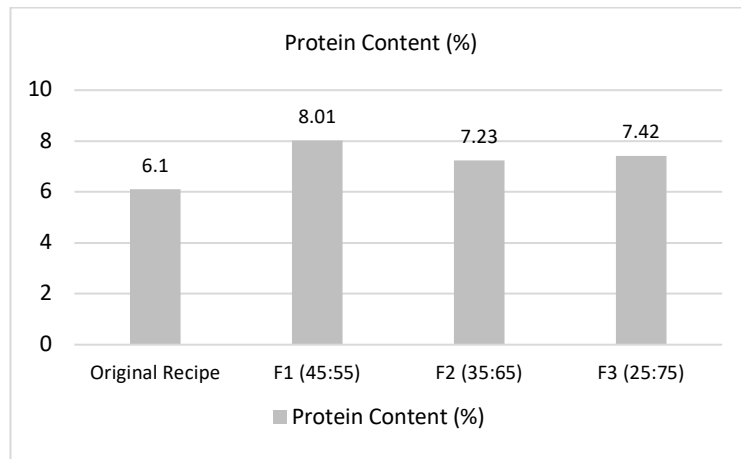


Figure 4 Compare protein content of original recipe with biscuits of soybean flour and ambon banana flour.

Based on chart 1 comparing the protein content of the original biscuit recipe with biscuits of soybean flour and Ambon banana flour for every 100 grams of the product, the original recipe contained 6.1%. In contrast, the ratio of 45:55 contained 8.01% protein, 35:65 comprised 7.23%, and 25:75 contained 7.42%. Therefore, the new formula has a higher protein content than the original recipe.

Table 5 Result Analysis ANOVA difference balance Addition of soybean flour and banana flour.

	Sum of Squares	df	Mean Square	F	Sig
Between Group	0.993	2	0.496	4963.000	0.000
Within Group	0.001	6	0.000		
Total	0.993	8			

Based on table 5, the ANOVA one-way ANOVA test results one-way ANOVA test results, there are significant differences in the addition of soybean flour and banana flour that affect the protein content of biscuits ( $p = 0.000$ ). Biscuits food emergency is product biscuits made from flour peanut soya bean, and flour banana Ambon has substance nutrition good especially substance nutrition macro protein. The primary research was carried out in two stages, the first stage was testing the organoleptic properties with a hedonic test, and the second stage was testing the protein content. The first stage of testing for organoleptic properties was carried out on February 14, 2021, involving 30 moderately trained panellists who were students of Semester 6 and 8 of the Politeknik Kesehatan Kemenkes Bandung, Nutrition, and Dietetics Study Program. In connection with the Covid-19 Pandemic conditions, samples were delivered to the panellists' homes, and hedonic tests were carried out from panellists' homes. The hedonic test results were sent online via google-form. The second stage of protein content testing was carried out from February 15 to March 2, 2021, at the Food Lab at Pasundan University.

Test hedonic for knowing level favourite panellist to colour, aroma, taste, texture and overall biscuits. Food colour is the main attraction that will be judged by the panellists first by the sense of sight. Food is interesting not only because of its taste but also its appearance. If the display is not attractive, consumers will not be interested in tasting it [22].

The desired colour of the biscuit is brown. The brown colour comes from the Maillard reaction between the amino acid lysine (found at the highest levels in soybean) and the reducing sugar syrup [28]. In addition, the baking process can affect the colour of the biscuits by considering the temperature time and affecting the colour of baked biscuits using an oven by paying attention to the right time and temperature. It can extend the shelf life of food products because it can remove anti-nutritional substances, stop the growth of microorganisms, and optimise the digestibility of nutrients [19]. Based on the results of the organoleptic test, the average panellists' ratings ranged between (neutral)-and (like). However, the balance of 25:75 has the highest average level of liking, with a like statement. The level of liking is estimated because, at the 25:75 balance, the addition of banana flour is more than the other balance. Banana flour can produce the colour of food products that panellists like. In line with Setyadi's research, adding Ambon banana flour with the right roasting time can produce a preferred product [19]. Furthermore, based on the research of Abe et al. 2017, the Ambon banana has the advantage of making products with good colour, aroma, and texture [13].

The results of the Kruskal Wallis test showed that adding soybean flour to Ambon banana flour had a significant effect on the panellist's level of assessment of the colour of the biscuits produced. Then a follow-up test was

carried out with Man Whitney, and it was found that there was a significant difference ( $p=0.016$ ) between the 45:55 balance and the 25:75 balance.

Aroma is the smell caused by stimuli captured by the sense of smell, by the olfactory nerves in the nasal cavity when food enters the mouth [22]. The smell received by the sense of smell can be in the form of a fragrant aroma, not a strong scent, aromatic, and charred [23].

Based on the results of the organoleptic test, the panellists, on average, said they liked the smell of biscuits. The smell is thought to be due to soaking soybeans for 30 minutes, removing soybean husks roasting soybean flour, filtering soybean flour, adding vanilla and margarine to the dough, and successfully eliminating the unpleasant odour that the researchers did not like. Soybeans have a distinctive unpleasant odour caused by volatile compounds formed by fatty acids hydrolysed by the lipoxygenase enzyme [24]. However, the unpleasant smell can be reduced by heating and modifying pH [17]. In addition, the aroma of these emergency food biscuits can be influenced by vanilla and margarine. However, the organoleptic properties test results were not in line with Pratama and Ayustaningwarno [27] who stated that adding Ambon banana flour had a good effect on food products. The Ambon banana flour is thought to be because humans have different sensitivity levels, while the sense of smell is more easily affected by the surrounding environment than sight [23]. The sensitivity levels could be one of the causes of the organoleptic test results because the organoleptic test was carried out from the panellist's house without the researcher's supervision. Another cause is because Ambon banana flour is obtained from a third party, so efforts to maintain Ambon banana flour quality are beyond researchers' reach. The maturity level of Ambon banana influences the quality of Ambon banana flour as raw material and the process of making Ambon banana flour [23].

The results of the Kruskal Wallis test showed that adding soybean flour to Ambon banana flour did not significantly affect the panellists' assessment of the aroma of the biscuits produced ( $p = 0.777$ ).

Taste arises from food that is captured by the sense of taste. Taste is an essential factor in determining the decision for consumers to accept or reject a food or food product [21]. The taste captured by the sense of taste can be influenced by proton donors who give rise to a sour taste, inorganic salts, which give rise to a salty taste, and organic compounds, which give rise to a sweet taste [19]. The desired taste is sweetness. The sweet taste of biscuits is obtained from powdered sugar and banana flour.

Based on the results of the organoleptic test, the average rating ranged between (neutral)-and (like). The balance of 35:65 and the balance of 25:75 have the same intermediate level of preference. This thought is because banana flour gives a sweet taste to a balance of 35:65 and 25:75, more than the 45:55 balance. In addition, the sweet taste of biscuits is also influenced by the added powdered sugar. The results of the Kruskal Wallis test showed that adding soybean flour to Ambon banana flour did not significantly affect the level of panellists' assessment of the taste of the biscuits produced ( $p = 0.539$ ).

The texture is the pressure that can be observed (eyes), bitten, chewed, and swallowed (mouth), and by touch with the ring finger [22]. Several factors affect the texture of food: water content, the addition of fat source raw materials, and the flexibility formed from the increase in gelation ability due to protein [24]. The desired texture is a texture that contributes to the level of the crispness of the biscuits, so margarine is added, and foods containing protein such as soybean flour, Ambon banana flour, wheat flour, and eggs are added. With the addition of these food ingredients, it is expected to produce a product texture favoured by panellists and increase the nutritional content of biscuits. Based on the results of the organoleptic test, the average rating given by the panellists was neutral. The results of the Kruskal Wallis test showed that adding soybean flour to Ambon banana flour did not significantly affect the level of panellists' assessment of the texture of the biscuits produced ( $p = 0.752$ ). The results are thought to be because the biscuits are still not thin and crunchy. Some panellists stated that biscuits weighing 15 grams/piece were still too thick. Researchers are worried that if the biscuits are made too thin, the number of biscuits given to meet nutritional needs will increase.

Overall, assessing the organoleptic properties (taste, colour, aroma, and texture) shows the response of the sense of sight, taste, smell, and touch [20]. Based on the results of the organoleptic test, the panellists gave an average rating of liking for the overall biscuit. The initial process of making biscuits to distribution can affect the widespread biscuit. Overall, the balance of 25:75 is the balance that has the highest average value. Based on calculations from the Indonesian Food Composition Table TKPI per 100 g biscuits, the 45:55 balance contains 18.9 grams of protein. The 35:65 balance contains 15.6 grams of protein, and the 25:75 balance contains 12.3 grams. The overall aspect of the 45:55 balance has an average score of 3.56 for the panellists, the 35:65 has an average score of 3.56 for the panellists, and the 25:75 has an average score of 3.76. So, the 25:75 balance is an overall superior balance. In the Kruskal Wallis test,  $p > 0.05$  (0.422), which means that there is no significant difference in organoleptic properties based on the overall organoleptic aspects between the three balances of soybean flour, Ambon banana flour.

The results of the protein content test using the Kjeldahl method showed that the ratio of 45:55 contained 8.01%

protein, 35:65 contained 7.23%, and 25:75 contained 7.42%. It is observed that the 25:75 balance has a higher protein content than the 35:65 balance, while the 35:65 balance should have a higher protein content than the 25:75 balance because of more soybean flour. It can happen because the cooking process is too high and can cause damage to the protein content [25].

However, temperatures above 100 °C and below 180 °C can remove anti-protein substances such as antitrypsin (antiprotease) 90% during the processing, interfering with protein function by binding and precipitating protein. In addition to heating, the 300-minute soaking process can remove anti-protein substances such as phytic acid and tannins because of their water-soluble properties [26]. Apart from the processing process, other causes could be unexpected during the protein content test because a third party carried out the protein content test, which was beyond the researcher's reach.

Fifteen grams of protein is a daily protein intake requirement that must be fulfilled through 3 snacks during a disaster emergency [11]. Compared with the calculation of protein content from TKPI, per 100 grams of biscuits, the 45:55 balance reaches 126% of the need, the 35:65 balance reaches 104% of the requirements, and the 25:75 balance reaches 83% of the condition. Meanwhile, compared with the results of the protein content test using the Kjeldahl method per 100 grams of biscuits, the 45:55 balance reached 53.4% of the requirement, and the 35:65 balance reached 48% of the need, and the 25:75 balance reached 49% of the condition.

The 45:55 balance is the balance that has the highest protein content due to the addition of more soybean flour than the other balances. The comparison between the calculation of protein content from TKPI and the protein content test using the Kjeldahl method is much smaller. This difference is because the foodstuff protein content will be reduced before processing due to heating [25].

Based on comparing the protein content of the original recipe biscuit with soybean flour and Ambon banana flour, the new formula has a higher protein content than the original recipe. The protein content of the original recipe is 6.01%. At the same time, the biscuits of soybean flour and Ambon banana flour for every 100 grams of the product, the ratio of 45:55 contained 8.01% protein, 35:65 comprised 7.23%, and 25:75 contained 7.42%. Based on comparing the protein content of biscuits with soybean flour, Ambon banana flour, and SNI 2973-2011 regarding biscuit quality standards, biscuits must contain at least 5% protein for every 100 grams of the product. Therefore, the 45:65 balance, 35:65 balance, and 25:75 balance have met the biscuit quality requirements.

The Kruskal Wallis test results showed that adding soybean flour to Ambon banana flour significantly affects the protein content ( $p = 0.000$ ). Therefore, soybean biscuits and Ambon banana could serve as alternative emergency food to provide protein needs supported by the fulfilment of protein adequacy for snacks and according to SNI 2973-2011 standards. The serving size of Ambon banana and soybean flour biscuits for a day with a frequency of eating three times, divided into morning, afternoon, and evening snacks, is 200 grams. Two hundred grams of biscuits is equivalent to 13 biscuits. Two hundred grams of biscuits can meet 30% of the daily adequacy's nutritional adequacy. 30% is the percentage of nutritional adequacy from 3x snacks.

To provide nutrition intake, the biscuit should be kept with the proper packaging. Based on Romani's research in 2014, the best packaging for the biscuit is multilayer polymeric materials without influencing the overall quality of the product during storage [26]. The storage time would be 2 months and 16 days; based on Ferawati's research, the shelf life of a biscuit is 2 months and 16 days, so the biscuit's best before date is 2 months and 16 days [15].

This product will be recommended to the Indonesian Health Ministry as emergency food for the elderly. Then the Health Ministry can collaborate with the food industry to produce the biscuit. In advance, the product would have HACCP or ISO 22000 specifications. However, the biscuit should have an affordable price. The price for one biscuit serving is IDR 5400,00.

## CONCLUSION

Based on the organoleptic properties test results, the panellists gave an average rating of liking for the overall biscuit. But the 25:75 balance is the most preferred overall. The protein content in 100 grams of F1, F2, and F3 biscuits is 8.01%, 7.23%, and 7.42%. There are significant differences in the biscuits' colour aspect on statistical tests ( $p = 0.000$ ). At the same time, statistical tests for aroma, taste, texture, and overall aroma, taste, texture, showed no significant differences ( $p < 0.05$ ). Based on the result of statistical tests, there are significant differences in the addition of soybean flour and Ambon banana flour biscuits that affect the protein content for emergency food.



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