ANALYSIS OF NUTRITIONAL CONTENT AND ORGANOLEPTIC QUALITY OF BISCUITS SUBSTITUTING GREEN BEAN FLOUR (Vigna Radiata) AND CARROT FLOUR (Daucus Carota L.) AS A HIGH-PROTEIN SNACK FOR BREASTFEEDING MOTHERS

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ABSTRACT

Introduction. Exclusive breast milk (ASI) is breast milk given to babies from birth for 6 months without adding or replacing it with other foods and drinks except medicines, vitamins, and minerals. Breastfeeding is crucial because it is related to conditions of undernutrition and overnutrition. However, exclusive breastfeeding is not easy to do because some mothers complain that there is not enough breast milk. The solution to this problem is making high-protein foods or snacks to help increase breast milk production and maintain the quality of the mother's breast milk. One ingredient that is high in protein is green beans and carrots. So, to meet protein needs, you can make biscuits instead of green bean flour and carrot flour as an alternative snack for breastfeeding mothers. Research Objectives: This research aims to find out the effect of the substitution of green bean flour and carrot flour on the protein content and organoleptic quality of high-protein biscuits. Metode. This research used a True Experimental Design with a Completely Randomized Design (CRD), 4 treatment levels and 6 replications. The treatment applied was the ratio of wheat flour, green bean flour, and carrot flour in each treatment, namely P0 (100:0:0), P1 (70:20:10), P2 (60:10:30), P3 (50:30:20). Result&Analysis. The results showed that there was an effect of increasing the protein content in biscuits by substituting green bean flour and carrot flour, the highest value was found in the P3 treatment. The presence of a significant influence on the color, flavor, smell, and texture of the biscuits was demonstrated using the Kruskal Wallis Test ($p<0.005$) and continued with the Mann-Whitney test if it showed differences in all treatments. The best treatment is in the P1 treatment biscuit. Discussion. This research concludes that biscuits substituted for green bean flour and carrot flour influence nutrient levels, protein, and organoleptic quality. This research concludes that substitute biscuits for green bean flour and carrot flour influence protein content and organoleptic quality.

Keywords: Biscuits; Green Bean Flour; Carrot Flour; Protein; Organoleptic Quality.

1. INTRODUCTION

The movement of the first 1000 days of life (1000 HPK) or the golden period is the period starting from conception until the child is 2 years old, consisting of 270 days during pregnancy and the first 730 days of life since the baby is born. One of the programs contained in the first 1000 days of life movement is exclusive

breastfeeding to prevent nutritional problems in babies (Muthia et al., 2020).

Breastfeeding is very important because it is related to conditions of undernutrition and overnutrition. Apart from that, breast milk can reduce the risk of experiencing infectious diseases, one of which is diarrhea, the main cause of infant death, more than 50% of which is caused by low nutritional intake in babies who do not receive exclusive breastfeeding (Erlani et al., 2020).

Data from BPS (2019) shows that exclusive breastfeeding coverage in East Java is 69.72%, while exclusive breastfeeding coverage in Tuban Regency is 48.8%. This figure is still far from the national target of 100%. This shows that there are still many babies who do not receive exclusive breast milk, so efforts need to be made to accelerate breast milk production so that the coverage of babies who receive exclusive breast milk increases (Firmansyah et al., 2012).

The highest internal factor that influences mothers to stop exclusive breastfeeding is because mothers complain about not having enough breast milk, while the highest external factor is influenced by advertising and social media. So the mother stops breastfeeding and replaces it with formula milk (Ludvigsson et al., 2005).

Based on the Kemenkes RI (2013) Nutritional Adequacy Rate (AKG) in Indonesia, breastfeeding mothers need an energy of 2,650 kcal/day, greater than pregnant women who need approximately 2,430 calories/day of energy. The energy needs of breastfeeding mothers are greater because when breastfeeding a mother will produce breast milk (Yaneli et al., 2021). Alternative nutritional needs for breastfeeding mothers can be met by making food or snacks that can meet the nutritional needs of breastfeeding mothers, made from local ingredients that are easy to find and easy to carry, such as biscuits.

Biscuits are a snack that can be consumed by all groups, but the biscuits on the market have a high carbohydrate and fat content, so they are not suitable for consumption by breastfeeding mothers. Apart from that, biscuits on the market also rarely have a high protein and vitamin A content which can be beneficial for breastfeeding mothers, because the main ingredient in biscuits generally

uses wheat flour, so it is necessary to substitute with local raw materials as an alternative that can increase the nutritional content of biscuits (Ratnasari et al., 2015).

Indonesia has a lot of food ingredients that are beneficial for health, especially for breastfeeding mothers, including green beans and carrots. Green beans (Vigna Radiata) have 345 kcal, 62 grams of carbohydrates, 1.2 grams of fat, 22 grams of protein and 157 IU of vitamin A and carrots have (Daucus Carlota L.) 35 kcal of energy, 8.2 grams carbohydrates, 0.6 g protein, 0.1 g fat, 2,390 µg beta-carotene and 12,000 IU (Umri et al., 2017; Kumalaningsih, 2006). Amino acids in protein, one of which is tyrosine and tryptophan, can help trigger the release of prolactin and oxytocin, so protein intake is very important in increasing breast milk production (Winatasari & Mufidaturrosida, 2020). In this study, the author wanted to examine the protein content and organoleptic quality of biscuits substituted for green bean flour and carrot flour.

METHOD AND ANALYSIS

The type of research is experimental with a Completely Randomized Design (CRD) aimed at assessing a treatment or action. This research used 4 treatment levels and 6 replications. The treatment applied was the ratio of wheat flour: green bean flour: and carrot flour at each P0 (100:0:0), P1 (70:20:10), P2 (60:10:30), P3 (50: 30:20). This research was conducted in May - June 2023.

Biscuit making is carried out at the Culinary Nutrition and Food Processing Laboratory of the Nahdlatul Ulama Institute of Health Sciences, Tuban. Before the biscuit-making process, green bean flour is made which is obtained from traditional markets. The process of making green bean flour starts with sorting the green bean seeds by adding water in a container, the soaked green bean seeds are the best green beans, and then the process of stripping the skin from the green beans is carried out by soaking them for 17 hours (water 1:2) until the epidermis is visible on the surface of the water, if there is green bean skin that has not been peeled then you can peel it manually, namely using your hands until all the green beans are

completely peeled, put the green beans that have gone through the peeling process into a hollow container and then wash them with running water. and drained, dry the green beans using a cabinet dryer at a temperature of 60° C for 7 hours. Dried green beans were ground using a blender until smooth after sieving (100 mesh). Next, making carrot flour begins with selecting the best carrots (not smelly, not watery, not hollow, and intact), after the carrots are sorted, they are peeled using a peeler, and the washing process continues with running water, the clean carrots are grated and then dried using cabinet dryer temperature 45°C for 2 hours, the dried carrots are ground using a blender until smooth after sieving (100 mesh).

Biscuits are made using wheat flour, green bean flour, carrot flour, cornstarch, powdered sugar, margarine, eggs, baking powder, powdered milk, and vanilla. The way to make biscuits is to beat margarine and powdered sugar, then add eggs, powdered milk, baking powder, and vanilla and beat again until smooth, then add wheat flour, green bean flour, carrot flour, and cornstarch, then stir until smooth, after the ingredients are mixed. Everything, of the dough is weighed so that it has the same weight, the next step is to flatten the dough using a roll pin and mold it using a dry cake mold. After the dough is molded, it is baked at 180° C for 15 minutes.

The organoleptic quality test to determine the level of panelists' liking for biscuits with the substitution of green bean flour and carrot flour uses a hedonic test with four hedonic scales, namely 1= Don't like, 2=Alike, 3=Like, 4=Very Like. The liking level assessment was carried out on 30 panelists in the classrooms of the Nahdlatul Ulama Institute of Health Sciences, Tuban. Analysis of the nutritional content of biscuits was carried out at the Chemistry Laboratory, Faculty of Science and Mathematics, Satya Wacana Christian University. Protein content was measured using the Kjeldahl method, water content using the moisture balance method, and ash content using the furnace method.

Data analysis in this study used a statistical computer program with SPSS 23.0 for Windows software. In this study, data from organoleptic

quality analysis and protein content were processed using Kruskal Wallis. Kruskal Wallis test to determine differences between treatment groups (P0, P1, P2, P3). After it is known that there are differences in the organoleptic tests for the quality of color, flavor, smell, and texture, the Mann-Whitney test is continued.

2. RESULT AND DISCUSSION

Biscuit Content Analysis

Table 1. Results of Biscuit Content Analysis

Formula	Proteins (gr)	Water content (%)	Ash content (%)
P0	6,24	2,61	0,94
P1	6,72	4,29	1,89
P2	6,30	7,25	1,91
P3	7,43	6,45	2,17

(Source: Primary Data, 2023)

1. Proteins Level

Based on Table 1, biscuits with substitution of green bean flour and carrot flour have higher protein content than biscuits without substitution. Biscuits without substitutions are around 6.24 gr/100 gr. The highest biscuits were obtained in the P3 treatment with 50% wheat flour substitution, 30% green bean flour, and 20% carrot flour, namely 7.43gr/100 gr. This is because the protein content of the biscuits increases as the addition of green bean flour and carrot flour increases.

2. Water Content

Based on Table 1, biscuits substituted for green bean flour and carrot flour have a higher water content than biscuits without substitution. The moisture content of biscuits without substitutions is around 2.61 gr/100 gr. The highest water content was obtained in treatment P2, substituted for 60% wheat flour, 10% green bean flour, and 30% carrot flour, namely 7.25 gr/100 gr.

3. Ash content

Based on Table 1, biscuits substituted for green bean flour and carrot flour have a higher ash content than biscuits without substitution. The ash content of biscuits without substitution is 0.94 gr/100gr. The highest ash content was obtained in the P3 treatment, substituted for 50% wheat flour, 30% green bean flour, and 20% carrot flour, namely 2.17 gr/100gr. This is because the ash content of the biscuits increases as the addition of green bean flour and carrot flour increases.

Organoleptic Quality

1. Flavor

A very important and influential factor in determining consumer decisions in accepting or rejecting a food product is the flavor parameter. The results of the analysis test using the Kruskall-Wallis test in the flavor category produced the values shown in Table 2.

Table 2. Kruskall-Wallis Flavor Test Results

Parameter	Treatment	N	Mean	SD	*P Value*
Flavor	P0	30	3.83	0.379	0.000
	P1	30	3.87	0.346	
	P2	30	2.57	1.040	
	P3	30	2.47	0.730	

(Source: Primary Data, 2023)

Based on the Kruskall-Wallis test, it is known that the comparison of the formulations of wheat flour, green bean flour, and carrot flour on the acceptability of the flavor of biscuits there is a significant difference in all biscuit formulations, and the value obtained is (P Value = 0.000<0.05). This shows that the flavor of each treatment has a very significant difference in the flavor of the biscuits produced. Based on the results of this study, show that the ratio of green bean flour and carrot flour is the highest, and it has the lowest level of flavor preference, this is because the resulting flavors collide with each other between green bean flour and carrot flour because they both have a dominant flavor, so can reduce the level of panelists' liking for the flavor of biscuit products.

2. Color

Flavor is color which is a characteristic that determines consumer acceptance or rejection of a product. The results of the analysis test using the Kruskall-Wallis test in the color category are shown in Table 3.

Table 3. Kruskall-Wallis Color Test Results

Parameter	Treatment	N	Mean	SD	*P Value*
Color	P0	30	3.80	0.407	0.000
	P1	30	3.77	0.430	
	P2	30	2.80	0.997	
	P3	30	2.53	0.937	

(Source: Primary Data, 2023)

Based on the Kruskall-Wallis test, it is known that in the comparison of the formulations of wheat flour, green bean flour, and carrot flour on the color acceptability of biscuits, there is a significant difference in all biscuit formulations, and the value obtained is (P Value = 0.000<0.05). This shows that the color of each treatment has a very significant difference in the

color of the biscuits produced. Based on the results of this research, the more green bean flour and carrot flour are substituted, the more it affects the color of the biscuits. The darker the color of the biscuit, the lower the level of panelists' preference for the color, because in general panelists prefer products with lighter colors.

3. Smell

One way to test food preferences can be done by testing the smell. The results of the analysis test using the Kruskall-Wallis test in the smell category produced the values shown in Table 4.

Table 4 Kruskall-Wallis Smell Test Results

Parameter	Treatment	N	Mean	SD	*P Value*
Smell	P0	30	3.77	0.765	0.000
	P1	30	3.40	0.724	
	P2	30	2.50	0.777	
	P3	30	2.70	0.750	

(Source: Primary Data, 2023)

Based on the Kruskall-Wallis test, it is known that there is no significant difference between the formulations of wheat flour, green bean flour, and carrot flour regarding the acceptability of the smell of biscuits in all biscuit formulations, and the value obtained (P Value = 0.000<0.05). This shows that the smell of each treatment has very significant differences in the smell of the biscuits produced. This is because the smells are both strong, namely the smell of carrots and green beans which dominate each other, so that the panelists' acceptance of the smell decreases.

4. Texture

Each food has its texture depending on its physical condition, size, and shape. The results of the analysis test using the Kruskall-Wallis test in the texture category produced the values shown in Table 5.

Table 5 Kruskall-Wallis Texture Test Results

Parameter	Treatment	N	Mean	SD	*P Value*
Texture	P0	30	3.43	0.817	0.000
	P1	30	3.47	0.681	
	P2	30	2.33	0.959	
	P3	30	3.00	1.017	

(Source: Primary Data, 2023)

Based on the Kruskall-Wallis test, it is known that the comparison of the formulations of wheat flour, green bean flour, and carrot flour on the texture acceptability of biscuits has a significant difference in all biscuit formulations, and the value obtained is (P Value = 0.000<0.05). This shows that the texture of each treatment has very significant differences in the texture of the biscuits produced. Based on the

results of this research, the more carrot flour is substituted, the more it affects the texture of the biscuits. The softer the biscuit texture, the lower the panelists' preference for texture, because in general panelists prefer the crunchier texture of biscuit products.

DISCUSSION

Biscuit Content Analysis

1. Proteins level

The proteins content in green beans is much higher than in wheat flour. The protein content per 100 grams of green beans is 22 grams, whereas in 100 grams of wheat flour, there is only 9.0 grams of protein (Kementerian Kesehatan et al., 2017). This is why the addition of green bean flour can affect the protein content of a food product (Kumalaningsih, 2006). This research is in line with research by Anggraeni et al (2021) that the use of green bean flour in biscuits produces a higher protein content compared to biscuits made from wheat flour alone.

2. Water Content

Green beans and carrots have quite high water and fiber content, this can influence the process of making green bean flour and carrot flour because the water content bound to the fiber is not easily released even though it has gone through the heating process (Sidabutar et al., 2013). This research is in line with research by Munawwarah (2017) which used a similar ingredient, namely carrot flour. In his research, it was stated that the more carrot flour was used, the more water content in carrot donuts increased.

3. Ash Content

Mung bean flour can increase the ash content in food because the ash content contains minerals that remain after the food is burned at very high temperatures. The ash content includes trace minerals such as calcium, magnesium, sodium, potassium, phosphorus, and other elements. Mung beans contain many minerals that contribute to the ash content in mung bean flour. This mineral is naturally present in green beans and will remain in the flour even after going through the milling process (Halim, 2016). This research is in line with research by Ratnasari et al (2015) who used a similar ingredient, namely green bean flour. In their research, it was stated that the ratio of

more green bean flour compared to less pumpkin flour resulted in increased ash content, and vice versa. The ratio of more pumpkin flour to less green bean flour results in lower ash content.

Organoleptic Quality

1. Flavor

Green bean flour and carrot flour can influence the flavor of biscuits because they both have distinctive flavor and smell characteristics that come from the food they come from. Green beans have a distinctive and sweet flavor, while carrots have a sweet and fresh flavor, if not made well this flavor combination can flavor strange or not blend in biscuits. So the use of green bean flour or carrot flour in making biscuits will affect the flavor of the resulting biscuits (Loveitasari et al., 2021).

This research is in line with previous research which used green bean flour and carrot flour as basic ingredients which was carried out by Loveitasari et al (2021) explaining that the formula most preferred by panelists was the P2 formula with a low ratio of green bean flour and carrot flour, the higher the addition of flour. green beans and carrot flour, the panelists' level of preference for the flavor of cookies in formula P1 decreases.

2. Color

The brownish color that occurs in biscuits is caused by the Maillard reaction, which is the result of non-enzymatic browning between amino acids and reducing sugar groups in a hot atmosphere during the baking process. The more the color of the biscuit changes, the more the panelists' liking for the color decreases. Because panelists generally prefer products with lighter colors, the level of acceptance will be higher for light-colored products compared to dark-colored ones (Winarno, 1984).

This research is in line with previous research which used green bean flour and carrot flour as basic ingredients which was carried out by Loveitasari et al (2021) explaining that the formula that the panelists liked the most was the P0 formula because the cookies in P0 had a brighter color compared to the color of the substituted cookies. will tend to be darker.

3. Smell

Green beans and carrots contain different nutritional substances, including smell compounds that can affect the smell of biscuits. One of them is that green beans contain compounds such as aldehydes and ketones which give them a distinctive smell, while carrots contain compounds such as carotenoids which give them a distinctive smell and color. During the biscuit-making process, the smell compounds in green beans and carrots can undergo chemical reactions with other compounds in the biscuit dough (Antara & Wartini, 2015).

This research is in line with previous research which used green bean flour and carrot flour as basic ingredients which was carried out by Loveitasari et al (2021) explaining that the formula that the panelists liked the most was the P2 formula because cookies have a distinctive smell of green bean flour, so the resulting cookie smell more interesting compared to P0.

4. Texture

Carrot flour has a higher fiber and water content than wheat flour. Fiber can absorb air and affect the texture of the dough. The presence of fiber in carrot flour can slow down the roasting process (Kristiana, 2017). Changes in biscuit texture can also be influenced by various factors, one of which is that the water content in the biscuit dough can influence changes in texture. If the water content is too high, the resulting biscuits will become soft or soft. On the other hand, if the water content is too low, the resulting biscuits will be dry and brittle. So the texture of the biscuit (Hardianti et al., 2018).

This research is in line with previous research which used green bean flour and carrot flour as basic ingredients which was carried out by Loveitasari et al (2021) explaining that the formulas that the panelists liked the most were the P0 and P2 formulas because the cookies produced had a texture with a similar level of crispness so that much liked by the panelists.

3. CONCLUSION

Based on the results and discussion, it can be concluded that there is a difference between the protein content and organoleptic

quality of biscuits substituted with green bean flour and carrot flour compared to biscuits without substitutes. The higher addition of green bean flour and carrot flour will increase the protein content and affect the organoleptic quality assessment of the biscuits

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