

**ACCEPTABILITY AND CONTENT TEST OF NASTAR CAKE MODIFIED WITH RED BEAN FLOUR (PHASEOLUS VULGARIS L) AS A HIGH PROTEIN FOOD****Indah Risky Siregar^{1*}, Salianto², Rani Suraya²**

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ABSTRACT

Nastar cake is one of the pastries made from wheat flour. Nastar cake is one of the pastries that is small round, shiny surface, made of flour, margarine, refined sugar, egg yolk and filled with pineapple jam. Nastar cake with the addition of red bean flour can be put to good use as a high-protein food. This study aims to determine the effect of adding red bean flour on the test of acceptability (hedonic) and protein content in pineapple cake. This research method uses an experimental method using Complete Randomized Design (RAL), with independent variables, namely formulas with the addition of red bean flour at 0%, 50%, 75%. Variables are tied in the form of color, texture, aroma, and taste of pineapple cake. Hedonic test data was obtained from 25 untrained panelists, namely students of the UINSU Faculty of Public Health. Data analysis for the acceptability test was carried out using the ANOVA method and Duncan's follow-up test. The results of this study found that the acceptability of pineapple cake based on the assessment of color, texture, aroma, and taste that was preferred by panelists was F0 without the addition of red bean flour (control) with an average result of 4.09 (likes), while F1 with an average of 3.23 (less likes), and F2 with an average of 2.78 (dislikes). It is known based on the test results of the highest protein content found in F2 (10.03%), F1 (9.89%), and the lowest F0 (9.72%). As a high-protein food with the addition of red bean flour, it is expected to be an alternative food that is high in protein to prevent stunting.

Keywords: acceptability test; nastar cake; protein content; red bean flour

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INTRODUCTION

Nastar cake is one of the pastries made from wheat flour. pineapple is a pastry that has its origin from the words pineapple and tar in Dutch. This cake has a dense texture with a high fat content that gives it a savory taste. The ingredients in making pineapple are of course from wheat flour, refined sugar, margarine, egg yolks, and cornstarch filled with pineapple jam. The characteristics of pineapple cake include crumbs, dry, in the middle there is pineapple jam filling and generally small in shape. (Ardiningtyas et al., 2023). The characteristic of pineapple cake is that it tastes sweet, the shape is round, yellow, the texture is soft and the size is small. Nastar cake is usually served on Eid and Christmas because it tastes sweet and has a longer shelf life. Based on data from Aptindo (Indonesian Wheat Flour Producers Association), in the past 10 years, wheat consumption in Indonesia has increased on average every year by 5%. Dependence on flour needs to be reduced by utilizing local food ingredients that can enrich the active compounds in pineapple cake. (Priyatna Putra et al., 2021).

Indonesia's natural resources have the potential for diverse food availability, demanding the birth of a food development strategy directed at local ingredients that are sufficiently available in several regions to be an alternative substitute or minimize the role of wheat flour. One of the uses of potential legume foods that play a role in improving nutrition is red beans (*Phaseolus vulgaris* L). According to the Central Bureau of Statistics 2015, red bean production in Indonesia is quite high, reaching 116,397 tons in 2014. The area of red beans in 2014 was recorded at around 22,133 hectares. Red beans are known as a source of vegetable protein. In addition, kidney beans also contain carbohydrates, vitamins, minerals (Binalopa et al., 2023). One indicator of good protein quality based on the Institute of Medicine's Food and Nutrition is if the leucine content is at least 25 mg / g protein. The leucine content in red beans is as much as 76.16 mg / g protein. The protein content in 100 g of kidney beans is as much as 22.53 g. and also kidney beans are a good source of complex carbohydrates, protein, B vitamins, iron, calcium and phosphorus. Red beans are also rich in fiber and flavonoids (proanthocyanidins and isoflavones). Pradini, C. A. (2021)

Red beans (*Phaseolus Vulgaris* L) or jogo beans are not foreign food ingredients for the community. Red beans are easily found around the community both in traditional markets. In red beans in addition to high phosphorus and calcium. Besides being rich in protein, red beans are also a source of carbohydrates, minerals and vitamins. Compared to animal protein sources, the advantage of red beans is cholesterol-free, so it is safe for consumption by all groups of people of various ages. Red beans contain protein that can reduce LDL levels and help increase HDL levels (Pramita & Indrawati, 2023). Protein is one of the nutrients that is very important for the body, because in addition to functioning to produce energy in the body, it also functions as a building and regulating substance (Rahman and Naiu 2021). Protein is a component of the human diet needed as a substitute for tissues, energy supplies and versatile macromolecules in living systems. A group of vegetable proteins derived from rice, legumes, and vegetables.

Nutrition problems in Indonesia and developing countries in general are still dominated by malnutrition or malnutrition problems. Nutritional problems are rooted in the availability, distribution, and affordability of food, poverty, education, knowledge, and community behavior. Lack of protein intake is one of the causes of stunting. Based on data from the Indonesian Nutritional Status Survey (SSGI) in 2022, the prevalence of stunting in Indonesia decreased by 2.8% points compared to 2021 from 24.4% to 21.6%. Stunting is caused by lack of energy and nutrient intake. One way to overcome is by providing food by increasing protein intake and improving the composition of foods that contain high vegetable protein, namely nuts. One of the agricultural products that contains high protein and can be used is from red beans for combination in making pineapple cakes (Ardiningtyas et al., 2023).

Specific nutritional interventions that are directly related to the nutritional status of toddlers are the fulfillment of dietary intake. Feeding toddlers plays an important role in preventing malnutrition in toddlers. Food should be given in appropriate portions, frequency, and nutrition (Herman et al., 2023). The main interventions carried out in preventing stunting are through the fulfillment of maternal nutrition during pregnancy and the fulfillment of toddler nutrition during the First 1,000 Days of Life (HPK) through the provision of vegetable protein supplements (Mulyani et al., 2022) From the description of the background above, so researchers want to try to develop a pastry product formula, namely pineapple cake with the use of red bean flour. Making pineapple cake on the composition of nutrients and their acceptability based on indicators of color, taste, aroma, and texture. So that it can provide information to the public about the diversification of a product from red beans which has only

been consumed as a vegetable. In addition, as an alternative to processing red beans as a high-protein food. After getting a good pastry formula, it will then be tested to see the assessment and acceptability. The purpose of this study was to measure the effect of adding red bean flour on organoleptic tests (color, texture, aroma, taste) on pineapple cake, and also see the effect of adding red bean flour on the protein content of each formula, so that the addition of red bean flour is expected to be an alternative high-protein food to prevent stunting for mothers under five.

METHOD

This type of research is quantitative research. The design of this study used an experimental method, using Complete Randomized Design (RAL). The product formula consists of 3 treatment levels, each 3 times the treatment, namely: F0 = substitution of 0% red bean flour, 100% wheat flour; F1 = substitution of red bean flour 50%, wheat flour 50%; F2 = substitution of red bean flour 75%, wheat flour 25%. The research was conducted in three ways, namely the product development stage, namely making pineapple cake and pineapple jam, acceptability test, and nutritional content test. The research conducted was making pineapple cakes with red bean flour to untrained panelists. This research will be conducted on February 25, 2024. The process of making pineapple cakes and pineapple jam is carried out at the researchers' boarding house (Pandia boarding house, Jl. Kampung Tengah Golf Course, Tuntungan) while nutritional content research is carried out at BARISTAND (Medan Industrial Standardization and Services Center). The tools used in this study were digital scales, containers, stirring spoons, baking sheets, ovens. The raw materials in making pineapple, namely wheat germ, red bean flour, egg yolk, margarine, refined sugar, milk powder, cornstarch and pineapple jam are weighed according to a predetermined formula. The formula of pineapple cake can be seen in the Table

Table 1.
Formula Nastar Cake Comparison of Wheat Flour with Red Bean

Composition	Treatment		
	P0	P1	P2
Flour	250 gr	125 gr	62,5 gr
Red bean flour	0 %	125 gr	187,5 gr
margarin	150 gr	150 gr	150 gr
Refined sugar	75 gr	75 gr	75 gr
Susu bubuk	26 gr	26 gr	26 gr
Yolk	2	2	2
cornflour	20 gr	20 gr	20 gr
Pineapple jam	3 gr	3 gr	3 gr

The percentage (%) of the ingredients above is calculated based on the treatment of wheat flour with kidney beans (primary data) The initial stage carried out in the process of making pineapple cake is to add margarine, egg yolks and refined sugar mixed until smooth by stirring until smooth. Next, wheat flour is added, and red bean flour according to the treatment and milk powder. After that, the dough is kneaded until smooth. The dough that has been smoothed weighs as much as 10 g and is shaped round to resemble a ball with a diameter of 2 cm, and flattened in the middle. The flat dough was added with pineapple jam filling as much as 3 g per one pineapple cake and the dough was rounded again. Next, smeared egg yolk as much as 1 g on its surface. The smeared dough is placed on a baking sheet and baked in the oven at 1350 C for 30 minutes. After cooking, the pineapple cake is cooled first before being put in a closed container. While in making pineapple jam the initial stage is carried out, namely the pineapple is peeled, cut and blended without using water, the next process is pour the results of the pineapple fruit in the blender into the pan and then heat it in a small fire.

Add 7 spoons of refined sugar as a sweet taste, add a little cinnamon, then stir until thickened and cook until it becomes jam, then cool. Samples of pineapple cake products were given to panelists to conduct acceptability tests used were hedonic tests that were assessed in terms of taste, aroma, color, and texture. Giving a favorability test form is carried out by filling in the biodata before doing the favorability test. The untrained panelists of this research were 25 panelists from the Faculty of Public Health UIN North Sumatra. Panelists were given pineapple cake products with three treatments P0, P1, P2. A favorability test was carried out by giving 1-5 scales, namely 1= Very Dislike, 2=Dislike, 3= Less like, 4=Like, and 5=Very Like The data obtained from the hedonic test method are then averaged (Mean) to find the best formula from the three levels of treatment. Then the test result data is processed using the One-Way ANOVA statistical test, if there are significant results in the modification of red bean flour, further tests are carried out in the form of the Duncan test to see the difference.

RESULTS

Table 1.

Average Favorability Test the acceptability of red bean flour pineapple cake

Parameter	F0	F1	F2
Color	4.16	3.28	2.96
Texture	3.80	2.88	2.40
Aroma	4.08	3.60	2.92
Taste	4.32	3.16	2.84
Rata-rata	4.09	3.23	2.78

Tabel 1. Showed that the panelists' response to the favorability level of red bean flour pineapple cake from the most preferred color, texture, aroma, and taste was F0 (*Control*). However, between the two treatments with the addition of red bean flour (F1 and F2) obtained the highest average level of preference for color, texture, aroma, and taste at F1 (red beans 50%) with a value of 3.23 (less like) compared to F2 (red beans 75%) with a value of 2.78 (dislike).

Table 2.

Anova Test Results of the effect of red bean flour on the Color, Texture, Aroma, Taste of pineapple cake α 0.05.

Paramats	P Value	F count	Notasi
Color	0.000	15.323	S
Texture	0.000	14.094	S
Aroma	0.000	11.833	S
Taste	0.000	14.322	S

Table 2. Above the results of the Anova test show that the substitution of red bean flour has an effect on pineapple cake with a significant level of 0.000 (below α 0.05) which means that the hypothesis is accepted. It was concluded that the substitution of red bean flour nastar cake had a real (significant) effect on color, texture, aroma, and taste. To determine the difference in color, texture, aroam and taste in pineapple cake, further tests must be carried out using the Duncan test.

Table 3.

Duncan's further test results on Color, Texture, Aroma, and Taste

Parameters	F0	F1	F2
Color	4.16a	3.28b	2.96b
Texture	3.80a	2.88b	2.40b
Aroma	4.08a	3.60b	2.92c
Taste	4.32a	3.16b	2.84b

Table 3. The results statistically obtained Duncan's test value that there are differences in subset values that show the level of formula differences in color, aroma, and taste in (F1 and

F2) the same as the treatment (F0) which does not exist at all using red bean flour. While in pineapple cake, each formula has a different aroma.

Tabel 4.
Protein Content Result

Parameter	Unit	P0	P1	P2	Metode Uji
Protein	%	9,72	9,89	10,03	SNI 01-2891-1992

Table 4. Shows that the highest protein content is found in F2 (10.03%) then F1 (9.89%) while the lowest protein content is found in F0 (9.72%).

Table 5.
Anova Test Results Protein Content α 0.05

ANOVA Test Results Protein Content & 0.05							
Component	Protein content results						P value
	P0		P1		P2		
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	0.000
Protein Content	9.72	0.000	9.89	0.000	10.03	0.000	

Tabel 5. It is known that the protein content of each formula has different protein levels, which shows the effect of giving red bean flour on protein levels with a pvalue of 0.000 (below α 0.05)

Table 6.
Duncan's Advanced Test Results

Treatment	Protein Up	1	2	3
F2	9.7200	a		
F1	9.8900		b	
F0	10.0300			c
Say				

Tabel 6. The results statistically obtained Duncan's value that there is a difference in the location of the column that shows the level of difference in F0, F1, and F2 and the results of the formula show differences in protein levels.

DISCUSSION

Uji organoleptik

Organoleptic test is a subjective test to determine the level of acceptance of likes or dislikes in a product, especially in food products. Panelists' assessment of pineapple cake color had an average level of liking on F0 with no addition of red bean flour (*control*) with a value of (4.16) namely like, while F1 with the addition of 50% red bean flour had an average level of liking for color which was (3.28) which was less like, while in F2 with the addition of red bean flour by 75% had an average level of liking (2.96) which was dislike. The ANOVA test results related to the effect of red bean flour on the color of pineapple cake showed a signification level of 0.000 ($p < 0.05$). continued with Duncan's test showing that for F0 there is no addition of red bean flour in contrast to F1 and F2 treatment which has the addition of red bean flour and will differ in terms of color of pineapple cake. Based on these results, the hypothesis that states that the addition of red bean flour affects the color of pineapple cake is accepted. This is related to the brownish color produced by red bean flour is not much different in the formula. The resulting color is getting browner along with the increasing proportion of red bean flour in pineapple cake. In the process of making cakes, there will be a *maillard* reaction process that can be caused by the carbohydrate and protein content in red beans. So that the nastar cake with the addition of red bean flour will produce more dark colors (kurnianingtyas, et al 2020).

The assessment of pineapple cake texture has an average value of F0 (3.80) which is less like, while the average in F1 treatment is (2.88) which means dislike, while in F2 treatment has an average value (2.40) which is dislike. The results of the ANOVA statistical test related to the effect of red bean flour substitution showed a significance level of 0.000 ($p < 0.05$). Thus, the hypothesis stating that the substitution of peanut flour has an effect on the texture of pineapple cake is accepted. The results statistically obtained Duncan's test value that there is a difference in the location of the subset value column which shows the level of difference in treatment between (F1 and F2) with (F0) that does not use red bean flour. This shows that the more red bean flour is added, the less people like the texture (Damayanti S, 2020).

The aroma of food determines a lot of delicacy in food. Aroma has more to do with the five senses, namely the nose (Fitriani et al., 2022). Panelists' assessment of aroma had an average value of F0 (*contro*) which is (4.8) which is like, while F1 with the addition of 50% red bean flour has an average value (3.60) which is less like, while F2 with the addition of 75% red bean flour has an average value of (2.92) which is dislike. So that the best formula liked by many panelists is F0. This is because red beans have a langu aroma, which in this study panelists did not like the typical red beans (Agusta et al., 2020). Research (Verawati, et al. 2019), namely the Effect of Red Bean Flour Substitution on Pie Skin Quality The results of more and more research are the Effect of Red Bean Flour Substitution on Pie Skin Quality. The results showed that the more red bean flour was added, the level of preference of panelists also decreased. This happens because red beans have a distinctive aroma, namely langu aroma. The results of the ANOVA test related to the effect of red bean flour on the color of pineapple cake showed a level of significance of 0.000 ($p < 0.05$) which means there is an influence. The results statistically obtained Duncan's test value that there is a difference in the location of the subset value column which shows the level of difference in treatment between F0, F1, and F2 and the results from Duncan show that there is a difference in the aroma of each formula.

Based on the taste of pineapple cake, F0 has an average value of (4.32), which is like, while F1 has an average value of (3.16), which is less like, while F2 has an average value of (2.84), which is dislike. So that the best treatment that many panelists like, namely the F0 treatment. This is because the more red bean flour is used, the panelists' preferences will decrease. This is reinforced by research by Rahmawati et al., 2014 that the starch content in red bean flour is amylose, causing an unpleasant taste in red bean flour when consumed. Rosyidi & Widyastuti (2014) stated that the taste of food ingredients can come from the food itself, but if you have obtained a formula, the taste can be influenced by the ingredients added. It can be concluded that the addition of red bean flour that is too high can make the taste of pineapple cake change. Food products in general do not only have one taste but a combination of various kinds of integrated flavors. Taste is the perception of taste cells which includes salty, sweet, sour, and bitter tastes caused by ingredients dissolved in the mouth (Rohmah A. N, 2020).

Protein Content

Based on the results of the study, it can be seen from the results of laboratory tests with the SNI 01-1891-1992 Test method obtained with the highest protein content results in F2 treatment. from the statistical results of protein levels using the ANOVA test α 0.05 and continued the Duncan test and obtained $P < 0.05$, which shows there is a significant real influence which means there is an effect of giving red bean flour on protein levels in nastar cake. This causes that the more red bean flour is added, the protein content will also increase. Protein content with modified red bean flour with the most formulation using red bean flour,

namely F2 (75%) gets a protein content of 10.03%. The high and low protein content is influenced by the content of red bean flour and wheat flour in the formulation of pineapple cake. The increase in protein content in pineapple cakes shows that all pineapple cakes can be considered a good source of protein because based on SNI 01-2973-2011, the protein content is at least 5%. The increase in protein levels in the F1, F2 formula added with red bean flour is caused by the high levels of protein in red beans. The increase in nutritional content in peanut pineapple cake is also seen in the amino acids, because the addition of peanut flour increases the content of limiting essential amino acids (Lysin, Thrionin, Trptofan) without decreasing the amino acid content of sulfur. (Firdaus et al., 2024) This affects the protein content in formulas with a combination of wheat flour and sorghum flour having high protein levels as in F1 and F2 formulas. Processing red beans into flour that is processed and combined with wheat flour and other additives in some studies shows the more red bean flour, the higher the protein content. Red bean flour has a higher protein content than wheat flour with a protein content in red bean flour of 23.1 grams (Salsabila et al., 2023).

Stunting is a nutritional problem that can increase mortality and morbidity in children. In addition, stunting also affects mental development and decreased intellectual capacity (Yunianto et al., 2020). Protein intake is one of the factors causing stunting in toddlers. Toddlers who are stunted have low protein intake compared to toddlers who are not stunted. Previous research showed that giving recovery PMT for 3 months had no effect on improving normal nutritional status by giving per day 40 g with a protein content of 3.2-4.8 g (Putri & Mahmudiono, 2020). Therefore, the development of red bean flour pineapple cake products as a food supplement that is high in amino acid protein can be an alternative to overcome the problem of stunting in mothers and toddlers. (Darawati et al., 2021)

CONCLUSIONS

The conclusion of this study is that it is known that the acceptability of pineapple cake based on the assessment of color, texture, aroma, and taste that is preferred by panelists is F0 (Without the addition of red bean flour) with an average result (4.09) which means (like), while based on F1 assessment with 50% red bean flour with an average result of the favorability test which is (3.23) which means (less like), while in F2 with the addition of red bean flour 75% with an average yield (2.78) which means (dislike). Obtained based on the results of laboratory tests on pineapple cakes that have the highest protein levels are F2 (10.03%), F1 (9.89%), and the lowest F0 (9.72). The suggestion for this research is that further development research needs to be carried out further regarding the community's acceptance of red bean flour substitute pineapple cake, and as a high-protein food with the addition of red bean flour, it is expected to be an alternative high-protein food to prevent stunting by educating products to the community, especially to mothers of toddlers about the importance of high-protein feeding.

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