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The Level of Preference and Nutritional Content of Belitung Taro Flour Biscuits *(Xanthosoma sagittifolium L. Schott)* with the Addition of Shark Catfish Flour

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ABSTRACT

Background: Biscuits are a snack made from wheat flour. Modification of processed biscuits is by replacing wheat flour with Belitung taro flour with the addition of patin flour which aims to increase the protein content. The objective of this research describe the level of preference and nutritional content of Belitung taro flour biscuits *(Xanthosoma sagittifolium L. Schott)* with the addition of patin flour *(Pangasius sp.)*.

Research Methods: Experimental Study using 3 formulations of Belitung taro flour: patin flour, F1 = 80%: 20%, F2 = 70%: 30%, and F3 = 60%: 40%. The preference level test was carried out on 25 moderately trained panelists. Analysis of the preference level test used descriptive tests. Analysis of nutritional content in the form of protein using micro-kjehdal, fat using the Soxhlet method, carbohydrates using the method by difference, and water content using gravimetric.

Research Result: The biscuit formulation with the highest level of preference was F2 with descriptive analysis results of 71.45% using a comparison of 70% Belitung taro flour and 30% patin flour. The nutritional content of biscuits per 100 grams is 450.6 kcal energy, 8.93 grams protein, 14.5 grams fat, 70.9 grams carbohydrates and 2.1% water content.

Conclusion: The best biscuit formulation is F2 with a composition of 70 grams of Belitung taro flour and 30 grams of patin flour. The energy content of biscuits can meet 16.68% of the daily energy needs of children aged 1-3 years.

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1. INTRODUCTION

Biscuit is a type of dry cake made from hard dough, flat in shape, has a dense texture if we broke the cross-section of the pieces, and high or lowfat content (Verawati, 2018). Biscuit is a snack that widely consumed by all groups. Most biscuits on the market have a high fat content with less protein content (Ernisti, et al, 2018).

Therefore, it is necessary to add food ingredients that contain protein. Patin fish was chosen because it has a high protein content and essential amino acids compared to milk and meat protein (Wahyuningtyas, et al, 2020). However, patin has a low carbohydrate content so it is necessary to add other ingredients to increase the carbohydrate content, namely Belitung taro flour.

The choice of Belitung taro flour was made as an effort to reduce the use of wheat flour. In 2022, Indonesia has imported 9.35 million tons of wheat flour (BPS, 2023). Belitung taro tubers contain starch that is easily digested, gluten-free, and rich in vitamins (Sarwini, et al, 2021). Belitung taro flour have a carbohydrate content of 84.52% (Kasih and Murtini, 2017). However, the tubers have the disadvantage of containing calcium oxalate which cause itching, an unpleasant taste, and longer manufacturing process.

Therefore, this study intends to analyze the formulation biscuits made from Belitung taro flour biscuits (*Xanthosoma sagittifolium L. Schott*) with the addition of patin (*Pangasius sp.*) flour". The formulation was analyzed by the preference and nutritional content of the biscuits.

2. METHODS

This study used descriptive research methods using an experimental design. Experimental research aims to determine a symptom or influence that arises as a result of certain treatments. The research was carried out in January-July 2023. Product manufacturing was carried out at the Food Laboratory Nutrition Study Program Ngudi Waluyo University. The hedonic test was carried out in classroom 3.1 of the Nutrition Study Program Universitas Ngudi Waluyo. The proximate test was carried out at the Food Quality and Safety Research Institute, Soegijapranata Catholic University, Semarang.

The ingredients used were Belitung taro flour, patin flour, tapioca flour, egg yolks, margarine, powdered sugar, liquid milk, powdered milk, baking powder, baking soda, salt and vanilla. This research used 3 formulas with a ratio of Belitung taro flour: patin flour, F1 = 80% : 20%, F2 = 70% : 30%, F3 = 60% : 40%.

The process of making biscuits begins by mixing egg yolks with powdered sugar, then add margarine, milk, powdered milk, baking soda, vanilla and tapioca flour. Stir until evenly mixed and add the Belitung taro flour, patin flour, baking powder and salt. Next, leave the dough for ± 10 hours in the refrigerator. After that, take out the dough and let it rest at room temperature for 30 minutes. The dough is thinned and molded. Then, bake the dough in a preheated oven at 1500C for 15-20 minutes.

Belitung taro flour biscuits with the addition of patin flour with 3 different formulas were tested for the level of favorability of 25 slightly trained panelists, namely students of the Nutrition Study Program Universitas Ngudi Waluyo. The preference level test includes indicators of taste, color, aroma and texture with a score assessment using 5 scales, namely 1 = Don't like it, 2 = Somewhat like it, 3 = Like it, 4 = Like it a lot, 5 = Like it very much (Zhi, Zhao, Shi, 2016). Determining the best biscuit formula based on the results of the preference level test will be tested for nutritional content.

The nutritional content test analysis carried out is water content, ash content, protein content, fat content and carbohydrate content. Analysis of protein content using the Kjedhal

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method, fat content using the Soxhlet method, carbohydrate content using the method by difference, and water content using the gravimetric method.

3. RESULTS AND DISCUSSION

3.1. Preference Test and Nutritional Content of Balitung Taro and Patin Flour Biscuit

Table 1. Percentages of Taste Panelist's Preferences

F	Don't like (1)			Somewhat like it (2)			Like it (3)			Very like a lot (4)			Like it very much (5)			Total		
	n	N	%	n	N	%	n	N	%	n	N	%	n	N	%	n	N	%
F1	0	0	0	3	6	4.8	11	33	26.4	7	28	22.4	4	20	16	25	87	69.6
F2	0	0	0	1	2	1.6	6	18	14.4	13	52	41.6	5	25	20	25	97	77.6
F3	0	0	0	3	6	4.8	10	30	24	10	40	32	2	10	8	25	86	68.8

The highest total percentage value of panelists' liking for the taste of Belitung taro flour biscuits with the addition of patin flour was obtained by F2, namely with a ratio of 70% Belitung taro flour and 30% patin flour. Meanwhile, the lowest value was obtained by F3 with a ratio of 60% Belitung taro flour and 40% patin flour. According to the panelists, F2 has a more acceptable taste, not too sweet, and the distinctive taste of patin flour and Belitung taro flour is not too pronounced. This is different from F1 which has a higher ratio of Belitung taro flour (80%), resulting in a more dominant distinctive taste of Belitung taro. This is in line with research by Tidore (2017) which shows that the more addition of Belitung taro flour to biscuits will result in a lower average score of panelists' liking for the taste because the taste of Belitung taro flour is too pronounced.

Table 2. Percentages of Color Panelist's Preferences

F	Don't like (1)			Somewhat like it (2)			Like it (3)			Very like a lot (4)			Like it very much (5)			Total		
	n	N	%	n	N	%	n	N	%	n	N	%	n	N	%	n	N	%
F1	0	0	0	0	0	0	16	48	38.4	7	28	22.4	2	10	8	25	86	68.8
F2	0	0	0	2	4	3.2	12	36	28.8	10	40	32	1	5	4	25	85	68
F3	0	0	0	7	21	16.8	4	36	28.8	5	20	16	1	5	4	17	82	65.6

According to Anugrah (2020), the color of food plays an important role in the appearance of food because it is the first stimulus to a person's sense of sight. Based on Table 4.2, the total percentage of panelists' preferences for color is 65.6%-68.6%. The highest value was obtained by F1 with a ratio of 80% Belitung taro flour and 20% patin flour, namely 68.6%. The lowest value for the total percentage of panelists' preferences for color was obtained by F3 because it had the addition of the most patin flour compared to the other two formulations, namely 40%. In line with Ernisti's (2018) research, which states that the more patin flour you add, darker brown biscuits will be produced. In addition, the color indicator is influenced by the mailard reaction that occurs during the roasting process. The Maillard reaction is a reaction that occurs between the amino groups contained in proteins and the carboxyl groups in sugar (Wicaksana, 2019).

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Table 3. Percentages of Aroma Panelist's Preferences

F	Don't like (1)			Somewhat like it (2)			Like it (3)			Very like a lot (4)			Like it very much (5)			Total		
	n	N	%	n	N	%	n	N	%	n	N	%	n	N	%	n	N	%
F1	0	0	0	1	2	1.6	15	45	36	9	36	28.8	0	0	0	25	83	66.4
F2	0	0	0	2	4	3.2	14	42	33.6	7	28	22.4	2	10	8	25	84	67.2
F3	0	0	0	7	14	11.2	11	33	26.4	7	28	22.4	0	0	0	25	75	60

In Table 3, the highest value for the total percentage of panelists' liking for the aroma of Belitung taro flour biscuits with the addition of patin flour was obtained by F2, namely with a ratio of 70% Belitung taro flour and 30% patin flour with a total value of 67.2%. Meanwhile, the lowest value was obtained by F3 with a ratio of 60% Belitung taro flour and 40% patin flour with a total value of 60%. This shows that the higher the addition of patin flour, the stronger the distinctive aroma of patin will produce. In accordance with the opinion of Ernisti (2017) who stated that the higher the addition of patin flour, the smaller the preference value for the aroma of biscuits. According to Aini (2021), the aroma of biscuits is formed when baking. However, during roasting the volatile compounds evaporate so that the aroma of the basic ingredients is mostly lost due to cooking (Febrianto, et al, 2014).

Table 4. Percentages of Texture Panelist's Preferences

F	Don't like (1)			Somewhat like it (2)			Like it (3)			Very like a lot (4)			Like it very much (5)			Total		
	n	N	%	n	N	%	n	N	%	n	N	%	n	N	%	n	N	%
F1	0	0	0	2	4	3.2	8	24	19.2	12	48	38.4	3	15	12	25	91	72.8
F2	0	0	0	2	4	5	10	30	24	10	40	32	3	15	12	25	89	73
F3	0	0	0	3	6	4.8	13	39	31.2	7	28	22.4	2	10	8	25	83	66.4

Biscuits that are considered good have a texture that breaks easily (brittle) if the biscuit is pressed with your finger (Handayani, 1987 in Aini, 2021). Based on Table 4.4, the highest value was obtained for F2 with a ratio of 70% Belitung taro flour and 30% patin flour, namely 72.8%. According to the panelists, the texture of the biscuits in F2 is close to that of crispy commercial biscuits. The lowest value for the total percentage of panelists' preferences for aroma was obtained by F3 because it had the addition of more patin flour than the other two formulations, namely 40%, which means the biscuits had a hard texture. In accordance with the opinion of Sari, et al (2016), the factor that influences the texture of biscuits is the protein content of the ingredients. The higher the protein content in the ingredients, the harder the biscuit texture will be.

3.2. Nutritional Content of Selected Biscuit (F2)

Table 5. Nutritional Content of Selected Biscuit (F2) Per-100 gram

Parameter	Scale	Result			Mean
		1	2	3	
Energy (Kkal)	Kkal	448,2	452,4	451,2	450,6
Protein	Gram	8,9	9,2	8,7	8,93
Lipid	Gram	13,8	15,04	14,8	14,5
Carbohydrate	Gram	72,1	70,08	70,8	70,9

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a. Protein

Based on the results of analytical tests carried out with 3 repetitions, the protein content contained in Belitung taro flour biscuit products with the addition of patin flour has an average of 8.93 grams. According to the POM (2022), biscuits have a serving size of 15-50 grams. Therefore, the nutritional content of Belitung taro flour biscuits with the addition of patin flour with a serving size of 50 grams contains 4.46 grams of protein. Based on the 2019 AKG, Belitung taro flour biscuits with the addition of patin flour can meet 22.32% of the daily needs of children aged 1-3 years.

b. Lipid

Based on the results of analytical tests carried out with 3 repetitions, the fat content contained in Belitung taro flour biscuit products with the addition of patin flour has an average of 14.5 grams. Based on the 2019 AKG, the fat requirement for children aged 1-3 years is 45 grams, so Belitung taro flour biscuits with the addition of patin flour can fulfill 13% of the daily fat requirement for every 50 g serving.

c. Carbohydrate

The carbohydrate content in Belitung taro flour biscuit products with the addition of patin flour has an average of 70.9 grams. Based on the 2019 AKG, the carbohydrate requirement for children aged 1-3 years is 215 grams, so Belitung taro flour biscuits with the addition of patin flour can fulfill 16.4% of daily carbohydrate requirements for every 50 g serving.

d. Energy

The results of the analysis of protein, fat and carbohydrate nutrients can be converted into energy. Based on the average results of protein, fat and carbohydrate nutritional analysis tests, the energy content of Belitung taro flour biscuits with the addition of catfish meat flour is 450.6 calories/100 grams. The energy content of biscuits can meet 16.68% of the daily energy needs of children aged 1-3 years for every 50 g serving (AKG, 2019).

4. CONCLUSION

The best biscuit formulation is F2 with a composition of 70 grams of Belitung taro flour and 30 grams of patin flour. The energy content of biscuits can meet 16.68% of the daily energy needs of children aged 1-3 years.

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