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The Innovation of Purple Sweet Potato Noodle Processing (Test of Sensory Quality Analysis)

Mahdiyah

Food and Nutrition Study Program, State University of Jakarta, Jakarta, Indonesia

Abstract

The purple sweet potatoes as local food ingredients can be used optimally for national food availability by improving the quality of purple sweet potato noodle products using the right formulations is the goal of this study. The purple sweet potato noodles were tested through sensory quality by expert panelists including color, taste, flavor, and elasticity. The substitution of wheat flour with 30, 40, and 50% of purple sweet potatoes is still considered good quality for purple sweet potato noodles. Hypothesis test results using the Kruskal–Wallis test at a significance level of α 0.05 proved that purple sweet potato noodle with a 40% substitution was the best formulation. The implication of processing purple sweet potato noodles is to reduce the dependence on imported food ingredients such as wheat flour because it is expected that some of the food ingredients used can be replaced by local food sources such as purple sweet potatoes.

Keywords: noodles, purple sweet potato, sensory quality

Corresponding Author:
Mahdiyah
mahdiyah@unj.ac.id

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1. Introduction

Most of the Indonesian people consume noodles as an alternative staple food other than rice. Indonesia is listed as the third country in the largest number of noodle consuming in the world, with 14 billion packs per year. The main ingredients in making noodles are wheat flour, water, salt, eggs, and alkaline salt [1].

The process of noodle processing is done by stages: Mixing, resting the dough, pressing the mixture, resting the dough sheet, thinning the dough sheet, cutting into strands of noodles, and boiling. In principle, noodles are classified as raw Chinese noodle, wet noodles (boiled noodle), steam, and dried noodle, and instant noodles [1, 2].

Purple sweet potato noodle processing aims to enrich the innovation of noodles using local food ingredients, improve taste, reduce dependence on wheat imports, and

better nutritional value with the advantages of fiber content, complex carbohydrates, protein, vitamin A, vitamin C, iron, and calcium [3, 4]. This innovation also follows the trend of tastes or preferences of the community, especially adolescents for various types of foods that are interesting, unique and always with changes such as sweet purple noodles without the color additive.

One important step in the processing of wet noodles is boiling, which is the process of starch gelatinization and gluten coagulation with dehydration of water which will cause noodles and elasticity to become hard and strong [1, 2].

Figure 1: Purple Sweet Potato Bulbs and Noodles.

Nutrient content of noodles depends on the type, amount, and quality of the constituent ingredients, as well as the way they are made and stored. The nutritional content of wet noodles (100 grams of ingredients) can be seen in the following table:

Table 1: Nutritional Content of Noodles.

Nutrient Content	Wet Noodle	Dry Noodle
Energy (Kal)	86,0	337,0
Protein (g)	0,6	7,9
Fat (g)	3,3	11,8
Carbohydrate (g)	14,0	50,0
Calcium (mg)	14,0	49,0
Phosphor (mg)	13,0	47,0
Iron (mg)	0,8	2,8
Water (gr)	80,0	28,6
Source: Departemen Kesehatan Republik Indonesia (2009) [5].		

2. Methods

This study uses an experimental method with the addition of purple sweet potatoes into noodle dough as much as 30%, 40%, and 50%. Furthermore, to assess wet noodles, it is carried out by sensory quality tests including aspects of color, taste, flavor, and elasticity.

Research variables are attributes or characteristics of objects that have certain variations determined by researchers from a case [6, 7]. The independent variable in this study is the addition of purple sweet potatoes that are 30%, 40%, 50%. The dependent variable of this study was the sensory quality value of purple sweet potato noodles.

The assessment of the quality of the three best formulas of purple sweet potato noodles was tested on each of 30 trained panelists. Determination of the quality test results on sensory quality noodles used a five-level Likert scale. Hypothesis testing is done using the Kruskal Wallis Test, followed by the Tuckey's Test [6] to find out the most qualified formulations including aspects of Color, Taste, Flavor,

$$K\frac{12}{n(n+1)}\left(\sum_{j=1}^{c}\frac{T_3^2}{nj}\right)-3(n+1)$$

and Elasticity. Kruskal Wallis Formula:

Tukey's Test Formula:

$$Q=\frac{X^i-X^j}{\sqrt{\frac{Rata-rata\ JK\ dalam\ kelompok}{n}}}$$

3. Results

3.1. Color

The results of the analysis of panelists' assessment of the color aspects of purple sweet potato noodles with a percentage of 30, 40 and 50 with a 5-level Likert scale, sequentially from the best to bad color quality namely dark purple, purple, light purple, brownish brown and brown.

The results of the hypothesis test analysis of the color aspects of purple sweet potato wet noodles can be seen as follows:

Table 2: Kruskal–Wallis Analysis of the Color Aspect of Purple Sweet Wet Noodles.

Purple Sweet Potatoes		N	Mean Rank	Test Statistics [a,b]		
				Chi-Square	df	Asymp. Sig.
	30%	30	29.82			
Color	40%	30	47.52	21.262	2	0.000
Purple Sweet Potatoes	50%	30	59.17			
	Total	90				

Note: [a]Kruskal–Wallis Test; [b]Grouping Variable: Percent Purple Sweet Potatoes

The mean rank value of the highest color of purple sweet potato noodles in a sequence is 50%, 40% and 30% substitution of purple sweet potato with a value of 59.17; 47.52 and 29.82.

The results of the Kruskal Wallis hypothesis test show that there are significant differences in the color of wet noodles based on the percentage of 30%, 40% and 50% purple sweet potato flour (Asymp. Sig. = 0.000). Furthermore the results of the Tukey test show:

Table 3: Tukey Analysis of the Color Aspect of Purple Sweet Wet Noodles.

Color Purple Sweet Potatoes			
Tukey HSD[a,b]			
Percent		Subset	
Purple Sweet Potatoes	N	1	2
30%	30	3.37	
40%	30		3.97
50%	30		4.27
Sig.		1.000	0.345

Note: Means for groups in homogeneous subsets are displayed; [a]Alpha = 0.05.

Tukey test results showed that there were significant differences in the color of wet noodles between 40% and 50% substitution of 30% purple sweet potato substitution respectively. While between 40% and 50% substitution there is no difference. These results are reinforced by a subset or grouping table, namely 30% substitution in different groups with a substitution of 40% and 50% purple sweet potato flour. This means that the analysis proves that the color of purple sweet potato noodles is better with a substitution of 40% and 50% purple sweet potato flour compared with a 30% substitution.

3.2. Taste

Based on the scoring score with a 5-level Likert scale, sequentially from the best to the bad taste quality, which is somewhat purple sweet potato, purple sweet potato flavor, purple sweet potato flavor, purple sweet potato flavor, and purple sweet potato flavor. The results of the evaluation of trained panelists, for treatment 30%, 40% and 50% purple sweet potato and then can be proved by the analysis of the hypothesis as follows:

The highest mean rank of wet noodle taste in the sequence is at 30%, 40% and 50% substitution of purple sweet potato flour with a value of 64.57; 48.83 and 23.10. Furthermore the results of the Tukey differentiation test show:

Table 4: Kruskal–Wallis Analysis of the Taste Aspect of Purple Sweet Wet Noodles.

Percent	Purple Sweet Potatoes	N	Mean Rank	Test Statistics [a,b]		
				Chi-Square	df	Asymp. Sig.
	30%	30	64.57			
Taste	40%	30	48.83	42.795	2	0.000
Purple Sweet Potatoes	50%	30	23.10			
	Total	90				

Note: [a]Kruskal–Wallis Test; [b]Grouping Variable: Percent Purple Sweet Potatoes

Table 5: Tukey Analysis of the Taste Aspect of Purple Sweet Wet Noodles.

Taste Purple Sweet Potatoes				
Tukey HSD[a,b]				
Percent		Subset		
Purple Sweet Potatoes	N	1	2	3
50%	30	2.57		
40%	30		4.03	
30%	30			4.57
Sig.		1.000	1.000	1.000

Note: Means for groups in homogeneous subsets are displayed; [a]Alpha = 0.05.

Tukey analysis shows that there is a significant difference in noodle taste between each formulation. This result is reinforced by a table of subsets that classify each formulation of 30%, 40% and 50% purple sweet potato noodles in different groups. This means that the results of the analysis prove that the taste of purple sweet potato noodles is better with 30%, 40% and 50% purple sweet potato substitution.

3.3. Flavor

The flavor of purple sweet potato noodles is rated at 5-level Likert, sequentially from the score of the best to bad flavor quality, which is somewhat sweet purple, sweet purple, not purple sweet potato, very purple and very sweet purple sweet potato. The results of the analysis of hypothesis testing aspects of the flavor of purple sweet potato wet noodles can be seen as follows:

The mean rank of the highest flavor of wet noodles in the sequence is at 30%, 40% and 50% substitution of purple sweet potato flour with values of 66.73, 44.43 and 25.33. Furthermore the results of the Tukey test show:

Table 6: Kruskal–Wallis Analysis of the Flavor Aspect of Purple Sweet Wet Noodles.

Percent	**Purple Sweet Potatoes**	N	Mean Rank	**Test Statistics** [a,b]		
				Chi-Square	df	Asymp. Sig.
Flavor	30%	30	66.73			
Purple Sweet Potatoes	40%	30	44.43	42.678	2	0.000
Noodles	50%	30	25.33			
Total		90				

Note: [a]Kruskal–Wallis Test; [b]Grouping Variable: Percentage Ubi Ungu.

Table 7: Tukey Analysis of the Flavor Aspect of Purple Sweet Wet Noodles.

Flavor Purple Sweet Potatoes Noodles				
Tukey HSD[a,b]				
Percent		Subset		
Purple Sweet Potatoes	N	1	2	3
Noodles				
50%	30	2.73		
40%	30		3.80	
30%	30			4.60
Sig.		1.000	1.000	1.000

Note: Means for groups in homogeneous subsets are displayed; [a]Alpha = 0.05.

Tukey test results showed that there were significant differences in noodle flavor between the formulations of purple sweet potato 30%, 40%, and 50%, with a table of subset found in different groups.

This means that the results of the analysis prove that the flavor of purple sweet potato noodles is better sequentially is wet noodles with a substitution of 30% and 40% and 50%.

3.4. Elasticity

Based on the scoring score with a 5-level Likert scale, sequentially from the best to the bad elasticity is chewy, slightly springy, very chewy, not springy and not very elastic. The results of an assessment by panelists were somewhat trained, for formulations of 30%, 40%, and 50% purple sweet potato and could then be proved by analysis of the hypothesis using the Kruskal-Wallis test. The results of the hypothesis test analysis of the elasticity of purple sweet potato noodles can be seen as follows:

Table 8: Kruskal-Wallis Analysis of the Elasticity Aspect of Purple Sweet Wet Noodles.

Percent	**Purple Sweet Potatoes**	N	Mean Rank	**Test Statistics** [a,b]		
				Chi-Square	df	Asymp. Sig.
	30%	30	43.90			
Elasticity	40%	30	56.17			
				9.928	2	0.007
Purple Sweet Potatoes	50%	30	36.43			
Total		90				

Note: [a]Kruskal–Wallis Test; [b]Grouping Variable: Percent Purple Sweet Potatoes.

The results of the Kruskal-Wallis hypothesis test showed that there were significant differences in the elasticity of wet noodles based on the percentage of 30%, 40% and 50% purple sweet potato flour (Asymp. Sig. = 0.007). The highest purple sweet potato noodle formula with the highest elasticity quality is 40%, 30% and 50% purple sweet potato with values of 56.17, 43.90 and 36.43.

Tuckey's differentiation test is then performed to determine the formula that has the best elasticity, as follows:

Table 9: Tukey Analysis of the Elasticity Aspect of Purple Sweet Wet Noodles.

Tukey HSD[a,b]			
Percent		**Subset**	
Purple Sweet Potatoes	**N**	**1**	**2**
50%	30	3.77	
30%	30	4.07	4.07
40%	30		4.53
Sig.		0.384	0.103

Note: Means for groups in homogeneous subsets are displayed, [a]Alpha = 0.05.

Tukey test results showed that there were significant differences in the texture of wet noodles between each 40% substitution of 50% purple sweet potato substitution. While between 30% substitution and 50% purple sweet potato on wet noodles, there was no difference. These results are reinforced by a subset or grouping table, which is a formulation of 30% and 50% found in different groups with 30% and 40% purple sweet potato noodles.

4. Discussion

The results of the Kruskal Wallis hypothesis test showed that there were significant differences in the color of wet noodles based on 30%, 40%, and 50% substitution rates for purple sweet potato flour (Asymp. Sig. = 0.000). These results are reinforced by a subset or grouping table, namely 30% substitution in different groups with a substitution of 40% and 50% purple sweet potato flour. The results of this analysis prove that the color of purple sweet potato noodles is better with a substitution of 40% and 50% purple sweet potato flour compared with a 30% substitution. The red and purple contents of purple sweet potato are anthocyanins compounds. The form of anthocyanin which is mostly contained in purple sweet potatoes is a form of cyanide and peonidin which are mostly in acylated form. The realized anthocyanins are relatively more stable when compared to non-acylated anthocyanins. This is what produces anthocyanins from purple sweet potatoes with great potential as a source of natural dyes.

The results of the Kruskal-Wallis hypothesis test showed that there were significant differences in wet noodle taste based on 30%, 40%, and 50% purple sweet potato substitution percentage (Asymp. Sig. = 0.000). The Tukey test shows that there is a significant difference in noodle flavor between each formulation. This result is reinforced by a table of subsets that classify each formulation of 30%, 40%, and 50% purple sweet potato noodles in different groups. This means that the analysis proves that the taste of purple sweet potato noodles is better in the formula 30%, 40%, and 50% purple sweet potato. This difference in taste is because sweet potatoes contain several types of sugars such as oligosaccharides.

The results of the analysis on the flavor aspect of purple sweet potato noodles are reinforced by a subset or grouping table, namely 30% formulation in different groups with 40% and 50% purple sweet potato. This analysis shows that the flavor in purple sweet potatoes affects the flavor of noodle products produced. Sequentially the quality of the flavor of noodles is at the formula 30%, 40% and last 50%.

The test results showed that there was an effect of different formulas on the elasticity of purple sweet potato noodles. The highest purple sweet potato noodle formula with the highest elasticity quality is 40%, 30% and 50% purple sweet potato with values of 56.17, 43.90 and 36.43. However, Tukey's analysis proved that the elasticity of purple sweet potato noodles was better in the 40% formula compared to the 30% formula and 50% purple sweet potato.

In general, based on the results of sensory quality testing of the four aspects of color, taste, flavor and elasticity, the product that has the best quality by consumer assessment is a formula with a percentage of 40% purple sweet potato.

5. Conclusion

The results of the study proved that the addition of purple sweet potato to the noodle formula was considered to have met the quality standards through sensory quality testing. Of the three types of formulas studied, namely 30%, 40% and 50%, the results of hypothesis testing using the Tuckey test at a significant level α 0.05, it is known that there is a significant effect of adding purple sweet potatoes to the noodles including aspects of color, taste, flavor, and elasticity. In general, based on the results of the sensory quality test using the Tukey multiplier test, showed that noodles with 40% purple sweet potato addition were the most quality products based on consumer assessment using sensory quality analysis. The results of this study show positive contributions to support government programs in optimizing the use of local purple sweet potato food ingredients.

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