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ACCEPTANCE OF COOKIES PRODUCTS SUBSTITUTE OF PURPLE SWEET FLOUR, BIT AS A FOOD CONTAINS IRON

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ABSTRACT

One of the anemia prevention programs for young women is the provision of blood-added tablets, but this program has not been running effectively. Apart from coming from primary food sources and TTD, efforts to increase iron intake can be made by consuming snacks. One of the favorite foods among young women is cookies. This study aims to analyze the organoleptic test of making cookies substituted with purple sweet potato flour and beetroot as an alternative snack to prevent anemia in adolescent girls. Experimental research with a completely randomized design consisting of three factors, namely wheat flour, purple sweet potato flour, and beetroot juice, with three treatments with a ratio of 150 gr, 100 gr, 125 gr flour, purple sweet potato flour, 50 gr, 10 gr, 75 gr, and beet juice 5 gr, 10 gr, 15 gr. 30 untrained panelists conducted this study. The sensory analysis found that formula 2 was superior, while hedonic analysis found that formula one was preferred. Cookies with purple sweet potato flour substitution with the addition of beetroot juice have significant differences in sensory characteristics (organoleptic) in terms of color, aroma, taste, and texture.

INTRODUCTION

Anemia in adolescent girls affects their reproductive health. For example, the results show that teenage girls with anemia have the potential 20,123 times to experience dysmenorrhea (pain during menstruation) compared to adolescent girls who do not have anemia (Ardianto & Elisanti, 2019).

Anemia prevention program in adolescent girls is currently a program. Puskesmas, one of them, is the supplementation of blood-added tablets (TTD) containing 60 mg of elemental iron and 400 ugs of folic acid, but this program has not been running effectively. Moreover, many teenagers do not want to drink TTD because of the bad taste and fishy smell (Permatasari, Briawan, and Madanijah, 2018).

Efforts to increase iron intake come from primary food sources, and TTD can be made by consuming interlude foods. Interlude food is a food made as a primary food companion food. One of the preferred foods among young women is cookies. Cookies are well-liked because of their excellent taste and crisp texture. In addition, cookies contain low water content, so they have storage capabilities categorized as long or long enough. Cookies can be a variety of processed foods that clinically fulfill human-specific nutrient intake because this type of food contains several energy-producing nutrients, mainly from fat and carbohydrate groups.

Cookies are processed from the dough, including wheat flour, sugar, fat, and additional optional ingredients such as milk, salt, flavoring, and other ingredients during the roasting process (Olapade & Adeyemo, 2014). One of the innovations that can be done is an iron-rich cookie formula with the essential ingredients of sweet potato flour and beetroot juice.

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Indonesia is an agrarian country, and many local foodstuffs are produced, one of which is purple sweet potatoes or kettle vine (Ipomoea batatas L.). Therefore, purple sweet potatoes have the potential as a raw material for flour. In addition, the use of purple sweet potato flour in a food product allows handling so that local ingredients can be used as a substitute for wheat flour in manufacturing processed food products (Iriyanti, 2012).

The low iron in purple sweet potato flour needs to be an additional alternative in making cookies, namely beetroot juice. Beetroot (Beta Vulgaris) has many properties and high iron and folate content.

Red beets are rich in minerals (magnesium, sodium, potassium, magnesium, iron, copper). In addition, beets also contain many antioxidants, vitamins (A, C, B), fiber, and natural colors, and many contain phenol, an antioxidant (Ingle, 2017, Black, 2012). Based on the description above, researchers want to conduct a study titled "Receiving Cookies Substitute Purple Sweet Potato Flour, Beetroot As an Interlude Food," which aims to see the acceptability of making cookies substitute purple sweet potato flour, beetroot as an interlude food.

RESEARCH METHODS

This research was conducted using an experimental design using the RAL (Complete Random Design) method (Atmadja et al., 2019) in Rawalumbu, East Bekasi. The research time is starting in November. The sample in this study was purple sweet potato flour substitute cookies, the addition of beetroot juice with 3 different formulas; (F1 = 150 gr : 50 gr : 5 gr), (F2 = 100 gr : 100 gr : 10 gr), (F3 = 125 gr : 75 gr : 15 gr). The study used untrained panelists with 30 young women with criteria for inclusion panelists, namely willing and willing to fill out questionnaire sheets and physical health. The equipment used in this study consists of three parts, namely tools for processing purple sweet potato flour substitute cookies and the addition of beetroot juice, organoleptic and hedonic test equipment. The tools used for the manufacture of purple sweet potato flour substitute cookies and the addition of beetroot juice are analytical scales, mixers, basins, wooden spoons, measuring spoons, blenders, filters, and ovens. Equipment for organoleptic and hedonic tests includes questionnaire sheets and pens. The main ingredients used are wheat flour, purple sweet potato flour, and beetroot juice. Organoleptic test data analysis uses the Paired Sample Test test to determine the difference in the average sample. For hedonic tests, use the following percentage calculations:

Information:
% = Percentage score
n = Number of scores obtained
N = Ideal score (highest score x number of panelists)

Table 1. Formulation of Purple Sweet Potato Flour Substitute Cookies, Beets

Material	Treatment		
	F1	F2	F3
Flour	150 gr	100 gr	125 gr
Purple Sweet Potato Flour	50 gr	100 gr	75 gr
Beetroot juice	5 gr	10 gr	15 gr

RESEARCH RESULTS

Organoleptic Test

Organoleptic tests are used to see the difference in quality based on the color, aroma, taste, and texture of purple sweet potato flour substitute cookie products with the addition of beetroot juice with formula one, namely wheat flour 150 grams, purple sweet potato flour 50 grams, and beetroot juice 5 grams, formula two namely wheat flour 100 grams, purple sweet potato flour 100 grams, and beetroot juice 10 grams, formula 3 is wheat flour 125 grams, purple sweet potato flour 75 grams, and beetroot juice 15 grams. Thirty untrained panelists perform organoleptic tests.

Based on table 2 shows that the results of the sensory test cookies substitute purple sweet potato flour with the addition of beetroot juice in the F1 sample have color (dark brown), aroma (not scented langu), taste (sweet), and texture (quite crisp), F2 has a color (dark brown), aroma (slightly scented langu), taste (sweet), and texture (crispy). F3 has a color (dark brown), aroma (slightly scented langu), taste (sweet), and texture (less crisp).

Color is one factor that determines the quality. Visually, color appears first and is sometimes very decisive, so the color is used as an essential organoleptic attribute in a foodstuff (Winarno in Asmaraningtyas, 2014). All three treatments have a dark brown color. Purple sweet potato flour substitute cookies with the addition of beetroot juice which has the highest average rating of dark brown color obtained on cookies from F3 treatment with a value of 1.3. In contrast, cookies with an average rating of soft dark brown color are obtained on cookies from the treatment of F1 and F2 with a value of 1.0. This cookie study was tested on 30 panelists, and this color test was influenced by more levels of purple sweet potato flour, in line with the results of Fajiarningsih's research (2013). Cookies made from wheat flour tend to be bright yellowish-white.

Meanwhile, cookies made from a comparison between wheat flour and purple sweet potato flour are brown. This can happen because the color of cookies can change according to the raw materials they use. The natural pigments in purple sweet potato flour play a role in color formation in cookies (Wulandari, 2017). This is in line with the results of Isnaini's research (2018) which shows that the color of cookies that tend to be darker can occur due to Maillard reactions during the process of roasting cookies (browning). The Maillard reaction is a reaction between carbohydrates that produce metolfulfural hydroxy compounds. Furfural polymerizes to form brown melanoidin compounds, the presence of a reaction between reducing sugars and amino groups at high temperatures. The smell is an assessment of odor carried out by the sense of smell, namely the nose. With an attractive aroma, it will cause the appetite of panelists to consume instant porridge. The aroma in a food product is an essential factor in determining consumer acceptance and foodstuffs' delicacy. Usually, one can judge the deliciousness or not of a food ingredient from the aroma caused (Hadi & Siratunnisak, 2016).

Cookies with the highest average assessment of langu aroma are obtained on purple sweet potato flour substitute cookies with the addition of F3 beetroot juice with a value of 1.7, which has a somewhat flavorful result. In contrast, cookies with the lowest average assessment of langu aroma are obtained on purple sweet potato flour substitute cookies with the addition of F1 beetroot juice with a value of 1.2, which has a non-flavorful result. Meanwhile, purple sweet potato flour substitute cookies with the addition of F2 beetroot juice with a value of 1.5, which has a slightly flavorful result. This cookie study was tested on 30 panelists, and the langu aroma test was influenced by purple sweet potato flour and beetroot juice.

This is in line with swat Khasanah's research (2012); the higher the use of purple sweet potato flour makes, the aroma becomes smelly of langu derived from oxidation in fat, causing the onset of hydroperoxide during the heating process. In addition, beetroot is often avoided because of the unpleasant taste caused by the unpleasant smell of langu and earthy taste (soil taste) when consumed (Rizki, 2013).

Taste is the leading factor in food is accepted or rejection by consumers. According to Rampengan in Alyanti et al. (2017), the taste in food consists of three components: smell, taste, and mouth stimulation. Purple sweet potato flour substitute cookies with the addition of beetroot juice which has the highest average sweet taste assessment, obtained F1 and F3 cookies with a value of 2.9, while those with the lowest average sweetness rating obtained F2 cookies with a value of 2.6. In the study, cookies substituted with purple sweet potato flour with the addition of beetroot juice were tested on 30 panelists. This taste test was influenced by the concentration on the amount of wheat flour and purple yam flour. The taste of cookies is influenced by other raw materials such as wheat, sugar, margarine, butter, egg yolk, and milk which can affect the taste of cookies. One of the functions of granulated sugar is to provide a sweet taste (Sutomo, 2012). Dwiyani's research results (2013) in making biscuits with the addition of more proportions of purple yam flour make the taste of biscuits bitter due to compounds such as phenolic compounds and alkaloids.

The texture is a pressure sensor that can be observed with the mouth (at the time of being bitten, chewed, and swallowed) or differences with fingers. Each shape in food has its texture properties depending on the physical condition, size, and shape of the cells it contains; the assessment can be hardness, elasticity, or crispness (Karim, 2013 in Tapestry et al., 2018). Of the three treatment cookies, substitute purple sweet potato flour with the addition of beetroot juice has a different texture. The treatment of F1 with a value of 3.0 has a moderately crisp cookie result. The treatment of F3 with a value of 1.9 has a less crisp cookie result. The texture of purple sweet potato flour substitute cookies with the expected addition of beetroot juice is crispy. The average assessment of the texture of cookies has a different texture with each treatment.

This is because comparing formulations with the addition of high purple sweet potato flour affects the fault power value. Broken power is related to the amylose content. The increase in amylose is directly proportional

to the increase in purple sweet potato flour in cookies. According to Wulandari's research (2017), there is a positive relationship between texture and amylose levels. The higher the amylose levels can cause the texture to become more challenging because amylose has the property of not quickly absorbing water, which can affect the texture produced. The crispness of cookies is also influenced by other ingredients, namely margarine and egg yolk. Margarine has a role in enlarging the volume so that the stability of the texture of cookies becomes better (Isnaini, 2018). This is in line with Mayasari's research (2015). Cookies with a more significant proportion of purple sweet potato flour result in crisper cookie products. This can happen because purple sweet potato flour is high in starch content that can bind water during the gelatinization process so that cookies become crispy after the oven.

Organoleptic Quality Analysis

The difference in organoleptic quality is carried out using the Paired Sample Test statistical test. The purpose of the Paired Sample Test statistical analysis is to determine if there is a noticeable difference between the three samples. In the results of organoleptic tests, obtained data has different variant analyses.

Samples of F2 – F3 and F3 – F1 cookies substitute purple sweet potato flour with the addition of beetroot juice give a noticeable influence on color. F1 – F2 and F3 – F1 samples significantly influence the aroma. The F1 – F2 and F2 – F3 samples visibly influenced taste. All three formula samples visibly influenced the texture expressed, with the analysis results showing a p-value(0.000) < 0.05.

Hedonic Test

Hedonic test or favorability test against purple sweet potato flour substitute cookies with the addition of beetroot juice using panelists as many as 30 untrained people. The aspects assessed are taste, color, aroma, and texture. The results of the hedonic test or the full favorability test can be seen in table 3.

The analysis of the results of the hedonic test conducted by 30 untrained panelists obtained the highest average favorability rate in the F1 sample with a percentage of favorability rate of 94.8% of the 30 panelists with the criteria of especially likes. Formula 1 uses 150 gr wheat flour, 50 gr sweet potato flour, and the addition of 5 gr of beetroot juice so that it has a sweet taste, a fairly crisp texture, not flavorful langu, and a dark brown color that panelists can accept.

From the results obtained, the F1 cookies have the most preferred color for the panelists: dark brown. Food color is accepted from natural pigments or added dyes. Biological stains include pigments in food and pigments formed on heating, storage, or cooking (Anova and Kamsina, 2013). This is in line with the results of Koeswardhani's research (2016) the process of a food product becoming browned after heating (dioven) is called non-enzymatic browning or often called a maillard reaction. . From the hedonic test panelists liked the aroma on F1 cookies showed the aroma of purple sweet potato flour subtitute cookies and the addition of unscented beetroot juice langu. Aroma is the smell of food products, odor itself is a response when volatile compounds of a food enter the nasal cavity and are felt by the olfactory system.

Volatile compounds get into the nose when humans breathe or inhale them but can also enter from the back of the throat during a person's meal. In addition, aroma compounds play an essential role in producing flavorings used in the food service industry to improve taste and generally increase the attractiveness of such food products (Antara & Wartini, 2014). This is in line with Sulistiyo's research (2015) allegedly because panelists tend to dislike the smell of langu on F2 and F3 cookies, which are thought to be caused by the moisture content of purple sweet potatoes. Sweet potatoes have a reasonably high water content, so the dry ingredients are relatively low. Purple sweet potatoes are known to have a distinctive aroma (langu), so they can affect the reception of panelists. The pungent aroma of purple sweet potatoes leads to a decrease in the reception power of panelists. The aroma of langu can be caused by the degradation of anthocyanin pigments in the drying process (Salma et al., 2018). The aroma of langu in purple sweet potatoes can also come from fat oxidation so that hyperoxide compounds are formed (Nintami & Rustanti, 2012). This is also in line with the research of G, Petriana., et al. (2012). The more beetroot juice is added, the more disliked by panelists. This is due to the smell of soil.

The texture is a characteristic of an ingredient as a result of a combination of several physical properties that include size, shape, quantity, and elements of material form that can be felt by the senses of touch and taste, including the senses of mouth and sight (Midayanto & Yuwono, 2014). From the results of the hedonic test, the texture of each sample has a difference, and this is because they use of wheat flour and purple sweet

potato flour is different, which makes the texture different. The greater the addition of purple sweet potato flour, the more significant the decrease in gluten content in the dough, and vice versa. The greater the addition of wheat flour, the more gluten content in the dough. F1 cookies have the most preferred hedonic value because the wheat flour used is higher so that it contains high protein in the form of gluten. Gluten is a specific protein and contains gliadin and glutenin, which form an elastic and fluffy dough to make the product in the mouth feel soft and not hard (Andarwulan et al., 2011).

The taste resulting from purple sweet potato flour substitute cookies and the addition of beetroot juice is acceptable to panelists because it produces a sweet taste. The most preferred taste in obtained purple sweet potato flour substitute cookies and the addition of F1 and F3 beetroot juice with a value of 2.9, while the lowest (least preferred) rating on taste was obtained in F2 cookies with a value of 2.6. In F2, it gives rise to a bitter aftertaste, so the panelists dislike it less. Aftertaste Bitters that appear in line with Dwiyani's research (2013) in biscuit making with more purple yam flour make the taste of biscuits bitter due to the presence of compounds such as phenolic compounds and alkaloids.

Table 2. Organoleptic Test Results

Sample	Average Organoleptic Test Results							
	Colour	**Description**	**Aroma**	**Description**	**Taste**	**Description**	**Texture**	**Description**
F1 (150 gr Wheat Flour, 50 gr Purple Sweet Potato Flour, 5 gr BeetRoot Juice)	1,0	Dark brown	1,2	Unscented langu	2,9	Sweet	3,0	Quite Crispy
F2 (100 gr Wheat Flour, 100 gr Purple Sweet Potato Flour, 10 gr BeetRoot Juice)	1,0	Dark brown	1,5	Slightly scented langu	2,6	Sweet	3,6	Crispy
F3 (125 gr Wheat Flour, 75 gr Purple Sweet Potato Flour, 15 gr BeetRoot Juice)	1,3	Dark brown	1,7		2,9	Sweet	1,9	Less Crispy

Table 3. Hedonic Test Results

Sample	Average Aspects				Total Percentage	Category
	W	**A**	**R**	**T**		
F1 (150 gr Wheat Flour, 50 gr Purple Sweet Potato Flour, 5 gr BeetRoot Juice)	3,9	3,7	4,1	3,6	94,8	Very Liked
F2 (100 gr Wheat Flour, 100 gr Purple Sweet Potato Flour, 10 gr Beetroot Juice)	3,7	3,3	3,5	3,6	87,7	Very Liked
F3 (125 gr Wheat Flour, 75 gr Purple Sweet Potato Flour, 15 gr BeetRoot Juice)	4,0	3,5	3,8	3,5	92,3	Very Liked

CONCLUSION

The power of receiving purple sweet potato flour substitute cookies and beetroot as a distraction in terms of aspects of color, aroma, taste, and texture is preferred by panelists in formula 1. However, for further research, modifications are needed back to the purple sweet potato flour substitute cookie formula with the addition of beetroot juice to see a significant difference between each formula.

SUGGESTION

Further research is needed in the form of interventions to provide these cookies to prove the benefits of their iron content.

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