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Product Innovation of Gluten-Free Palm Cheese Cookies Based on White Sorghum Flour (Shorghum bicolor (L.) Moench)

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Abstract

This study aims to determine the formula of gluten-free Palm Cheese Cookies with white sorghum flour substitution, the level of liking and nutritional content as well as the selling price. The underlying reason for this research is to find a healthy, gluten-free snack that tastes good while being liked by various groups. Excessive consumption of gluten will cause many health problems. The ingredients used were white shorghum flour, wheat flour (as a comparison), various kinds of cheese (edam, permesan, cheddar), powdered sugar, butter and palm sugar. The research method used was Research & Development (R & D) which was carried out in four stages (4D) namely define, design, develop, disseminate. The sensory test results by the design stage panellists showed that the most suitable white sorghum flour substitution was the development product II with 75% substitution, but to adjust to the research objectives, the development product with 100% substitution was used. From the sensory test, the degree of acceptance between 75% and 100% substitution was not far apart and both were acceptable to the panellists. The overall average of the characteristics shows 3.5 which means that the 100% White Sorghum Flour Substitution Palm Cheese Cookies product is in the category of somewhat preferred tends to be liked by semi trained panellists or limited panelists. The nutritional content of 100% White Sorghum Flour Substitution Palm Cheese Cookies per 100 grams of material consists of protein 6.714 g, fat 26.36 g, carbohydrates 56.074 and energy 483.025 cal/100 g of product. Palm Cheese Cookies Substituted with 100% White Sorghum Flour can be categorised as a fibre source gluten-free snack because it contains a total dietary fibre of 5.028 g fibre /100 g. Therefore, Palm Cheese Cookies Substituted with 100% White Sorghum Flour can be recommended as a healthy gluten-free snack while rich in fibre.

Keywords: *White Sorghum Flour, Nutritional Content, Palm Cheese Cookies, Gluten-free, FibreKata kunci*

Introduction

Nowadays we need to maintain a diet so that the body gets the right nutritional intake. Many foods contain substances that are very harmful if consumed in large quantities, one of which is gluten. Gluten is a protein contained in wheat flour which consists of two types of protein, gliadin and glutenin. Gluten contains a peptide, a type of protein that can reduce immunity, especially affecting people with obesity, chronic fatigue and digestive disorders. According to some experts, there are many impacts when consuming too much food that contains a lot of gluten, including indigestion, malnutrition, stomach

disorders, throat infections, allergies, shortness of breath. While obesity itself can lead to other diseases such as diabetes and heart disease. As the need for gluten-free diets increases, the popularity of gluten-free food products is on the rise. Gluten is a vegetable protein found in wheat. For the body, gluten functions like protein.

As the function of protein in general is to maintain body cells, build cells and replace damaged body cells. In food products, gluten acts as an adhesive that helps keep food stuck together and maintain the shape of the food. Because of these functional properties, many processed foods use ingredients that contain high levels of gluten. On the other hand, not everyone can consume gluten. People who have a digestive system that cannot accept gluten such as gluten intolerance and people with autism are strongly encouraged to take a gluten-free diet (Tarigan, and friends, 2019).

In addition, gluten is also a dangerous ingredient for people with celiac disease. This disease causes damage to the lining of the small intestine, thus disrupting the absorption of nutrients such as calcium, folic acid, iron and vitamins (A, D, E, K) (Shewry, 2019 & Verma, 2021 in Adnan Nur Avif and friends 2022). Wheat flour besides containing gluten also contains glucose and a high glycemic index, making it unsuitable for consumption by diabetics (Ijarotimi et al., 2021 in Adnan Nur Avif, et al. 2022). Therefore, several studies have developed alternative gluten-free food ingredients to replace wheat (Kumara & Purwani, 2017: Arzaqina et al., 2021; Meisara et al., 2021 in Adnan Nur Avif, et al, 2022).

Over the decades, interest in developing gluten-free products has increased due to the gluten-free diet trend followed by many individuals, including those with gluten intolerance (Sarwono, 2022). For people with autism, a gluten-free and casein-free diet is highly recommended. Foods that contain casein (milk protein) and gluten (wheat protein) can cause allergies and reduce the health of people with autism (Winarno, 2013 in Tarigan 2019).

So based on the description above, it's hard to start implementing a healthier diet by reducing foods that contain gluten. If you can't eliminate gluten altogether, at least you can reduce or limit the consumption of foods that contain gluten.

Gluten-free food was originally intended for people who have intolerance to gluten or better known as celiac disease. Celiac is an autoimmune pathology associated with a permanent intolerance to a protein called gluten to which the immune system responds abnormally, resulting in damage to the small intestine. Although celiac is incurable, the main treatment for this pathology is to follow a diet without all cereal grains and their derivatives to prevent intestinal damage (Magistris et al, 2017 in Neza 2022). In the last decade, the trend of demand for gluten-free products has increased dramatically, not only in the celiac community (Rubio-Tapia et al, 2012 in Neza 2022).

Although there are no accurate research results, non-gluten foods are believed to be healthier. The current trend of labelling ‘gluten-free’ has increased sales for many brands of food products. Gluten-free food products in the market have dramatically increased by 63% in the last two years (Navarro, 2016 in Neza 2022). In Indonesia itself, many consumers without gluten intolerance have the perception that gluten-free means the product is generally healthy and can contribute to health. Consumers perceive that gluten-free foods can help with weight loss (Dunn et al, 2014 in Neza 2022) and increase energy intake (Navarro, 2016 in Neza 2022).

Research shows that consumers favour products with health claims (Khurshid et al, 2013 in Neza 2022) especially among millennial generation consumers or young people born after 1980. The increasing attention of millennial consumers towards healthy (Rezai et al, 2012 in Neza 2022) and sustainable food (Vermeir & Verbeke, 2006 in Neza 2022) spurs the food industry to position gluten-free food products as healthy food.

One example of a local gluten-free ingredient that can be used as a substitute for staple foods, has a carbohydrate content equivalent to rice and wheat, namely Shorgum (Shorgum spp.), which can be made into flour first. The replacement of ingredients with local food ingredients is intended to introduce local food ingredients to the wider community who may not know the benefits of shorghum and introduce gluten-free local food ingredients as a substitute for wheat flour as a basic ingredient for making various foods.

The author's reason for choosing shorghum, especially the White Shorghum variant (*Sorghum bicolor (L.) Moench*) as the main ingredient to replace wheat flour in product innovation this time is not only to raise the value of shorum itself but also because shorghum is a gluten-free commodity, so it is in accordance with the author's aim to make gluten-free food innovations that will benefit certain people who need a gluten diet, which is caused by various reasons such as auitism sufferers, people who are intolerant to gluten, people who experience health problems and suffer from various diseases when consuming foods containing gluten.

The product chosen by the author in the substitution of white shorghum flour this time is Palm Cheese Cookies. The reason for choosing the Palm Cheese Cookies product is because currently this product tends to be popular with delicious flavours with a combination of sweet savoury taste, aroma and very strong cheese taste. This product is now relatively popular with various groups from small children to the elderly. Based on observations in recent years, this food has become a new idol during Eid al-Fitr replacing the popularity of pineapple tarts and snow princesses and is often also used as a delivery or souvenir on ordinary days and luxurious and elegant hampers during holidays.The making of Palm Cheese Cokiees products with the substitution of white shorghum flour is not difficult.

The ingredients for making Palm Cheese Cookies are almost the same as the ingredients for making cookies in general. What slightly distinguishes is the addition of several kinds of cheese to the Palm Cheese Cookies dough and palm sugar sprinkles as toppings. The shape of Palm Cheese Cookies is generally round, but there are also those who are creative in other forms, for example elongated round (oval), or flat round.

The White Shorghum Flour Palm Cheeses Cookies developed by the author are oval-shaped with an average weight of 7 grams, brown in colour with the appearance of palm sugar sprinkles attached to the surface of the cookies, crispy and crunchy texture on the outside and very soft on the inside, leaving a very delicious taste in the mouth after eating, sweet-savoury taste with a very strong and delicious cheese flavour or aroma because they are made from 3 kinds of cheese, namely parmesan cheese, edam cheese and cheddar cheese which are baked for a few minutes. The aroma is very fragrant and the appearance is luxurious and elegant. Presentation can be in a tightly closed jar. The Palm Cheese Cookies product is a contemporary snack that is popular and has become a new idol in various circles, especially during festive events and in this study a snack was made that has the advantage of being gluten-free with the substitution of White Shorghum flour.

Materials and Tools

The raw materials used in this study were wheat flour (low/medium protein), white shorghum flour, butter/margarine/butter, powdered sugar, eggs, milk powder, cheese (cheddar/chicken/order), cornstarch (for reference products), baking powder and palm sugar sprinkles. The tools used in making Palm Cheese Cookies include mixers, basins, bowls, aluminium containers, spoons, spatulas, ovens, tongs, scales. Product testing materials and tools include cups, glasses, water, stationery, test forms at all stages of development, and chemical laboratory test equipment.

Methods

This research uses a research and development (R & D) design method with a 4D model consisting of define (needs analysis), design (planning), development (development), disseminate (dissemination). The Define stage aims to determine 1 selected reference recipe. The steps of the define stage are the description of the reference product in terms of sensory and nutritional value, recipe literacy from references so that 3 reference recipes are obtained, 3 reference recipes are tested equally, 3 reference products are tested simultaneously with the panelists of the supervisor and other students in one guidance or other trained panelists (3-5 people) so that 1 reference recipe is selected.

The next stage is the design stage, the aim at design is to determine the best 1 recipe for product development. The steps of the design stage are literacy of development product recipes from references, designing 3 development product recipes based on the selected reference recipe, testing 3 development product recipes and 1 reference recipe simultaneously, sensory testing of 3 development products and 1 reference product simultaneously with panelists of supervisors and other students in one guidance or other trained panelists (3-5 people) so as to obtain 1 selected development product recipe. At this stage, modifications were made to the Palm Cheese Cookies formula by substituting 50%, 70% and 100% white shorghum flour.

The next stage is the development stage by conducting product validity tests. The objectives of the development stage include determining the presentation technique (garnish, plating, and packaging) on the development product from the design stage. At this stage, the selling price calculation and laboratory tests were also carried out on the selected development products. The laboratory analysis included proximate analysis (water content, ash content, protein, fat, energy) and fibre.

The last stage is disseminate by conducting a taste test conducted by 30 semi-trained panelists by providing test forms to assess colour, aroma, taste, texture and overall. After this, it is continued with a minimum of 60 panellists during the exhibition.

Process of Making White Shorghum Flour Palm Cheese Cookies

The process of making Palm Cheese Cookies begins with weighing the ingredients according to the measurements. After weighing the exact ingredients needed, the next step is to mix butter / margarine, powdered sugar, and egg yolks then beat with a mixer until white for approximately 3-4 minutes. The next step is to add the dry ingredients (flour, white shorghum flour, milk powder and baking powder) and mix until smooth with a spatula or manually by hand. Next is rounding the dough with a weight of 7 grams, then put it in a container filled with palm sugar, roll the dough balls until the surface is covered with palm sugar. The next step is the preparation on a baking sheet covered with baking paper first. Preheat the oven for 10-15 minutes at 150 ° C, bake Palm Cheese Cookies for 30 minutes or adjust to each oven. After cooking, cool and ready to be served or packaged.

Data Analysis

The data analysis method is carried out to determine whether the product results are acceptable or not by the community. The test or assessment was carried out in several stages according to the research stages of Research & Development (R & D). The assessment was carried out by trained panellists, semi-trained panellists and untrained panellists on each product with a form of preference sheet as a reference for product assessment. Product assessment consists of several aspects, namely organoleptic (colour, aroma, taste and texture), then the data from product testing results are analysed descriptively qualitative and quantitative.

The level of panelist preference for Palm Cheese Cookies products is obtained through an organoleptic test assessment by assessing 5 indicators, namely, colour, aroma, taste, texture and overall

through a score sheet, the panelist's answer to the score sheet on the organoleptic test assessment uses answers (really like, like, kind of like, and dislike and really dislike) which are expressed using answer categories**.**

Results and Discussion

Define Stage

In the define stage, the thing that is done is to determine the product and reference recipe.

Table 1.Formula 3 reference recipe for Palm Cheese Cookies

No	Ingredient Name	R1 (Reference Recipe 1)	R2 (Reference Recipe 2)	R3 (Reference Recipe 2)
1	Gold Bullion (butter + Margarine)	112,5 g	200 g	-
2	Margarine	-	-	200 g
2.	Wheat flour	225 g	250 g	260 g
3.	Maizena flour	-	30 g	-
4.	Whole Egg	½ grain	-	-
5	Egg Yolk	½ grain	1 grain	1 grain
4.	Cheese Permesan	15 g	-	-
5.	Lung Cheddar Cheese	25 g (oven 10 minutes)	75 gr	70 g
6.	Edam cheese	12.5 g	-	-
7.	Fine Sugar	50 g	30 g	30 g
8	Milk Powder	10 g	30 g	30 g
9.	Baking Powder	1 g	-	2 g
10.	Palm Sugar (Sprinkle)	100 g	50 g	100 g

Description=

R1= Reference Recipe 1, by Dina Skanica Revised_Heni

R2= Reference Recipe 2, by Naqiyyah~ @Naqiyyah99 -Cookpad

R3= Reference Recipe 3, imaimey_ @dapur_imaimey -Cook pad

The three reference products were sensory tested by 1-2 lecturers and 2-3 trained panellists.

Table 2. Average Sensory Test Results of the Define stage from the 5 Trained panellists

Sensory properties	Mean value		
	R1	**R2**	**R3**
Shape	4,6	4	3,2
Size	4,6	3,4	3,8
Colour	5	3,8	3,6
Aroma	4,8	4,2	4,2
Flavour	5	3,6	3,2
Texture	4,8	3,4	3,4
Overall	5	3,5	3,25

From the table above, it can be concluded that R1 (reference product 1) obtained the highest number in all parameters observed, namely shape, size, colour, aroma, taste, texture and overall properties, while R2 (reference product 2) ranked 2nd and R3 (reference product 3) ranked 3rd. Based on this data, it can be obtained that the selected reference product is R1 (reference recipe 1).

Design Stage

This stage is an advanced stage of the define stage, where the selected recipe from the define stage is then substituted with local food ingredients, namely white Shorghum flour. In making Palm Cheese Cookies, the substitutions used were 50%, 75%, and 100% white sorghum flour. The product results at the design stage were then sensory tested by 1 or 2 lecturers (experts) and 2-3 trained panellists. Based on the sensory test results of 5 trained and semi trained panellists, it will be analysed to determine the Selected Development Recipe.

Table 3. Selected Reference Recipe and 3 Development Recipes

No	Ingredient Name	R1 (Selected Reference Recipe)	F1 (Development Recipe 1) (50% Substitution)	F2 (Development Recipe 2) (75% Substitution)	F3 (Development Recipe 3) (100% Substitution)
1	Gold Bullion (butter + Margarine)	112,5 g	112,5 g	112,5 g	112,5 g
2	Wheat flour	225 g	112,5 g	56,25 g	-
3	White Shorghum Flour	-	112.5 g	168,75 g	225 g
3.	Whole Egg	½ Egg	½ Egg	½ Egg	½ Egg
4,	Egg Yolk	½ Grain	½ Grain	½ Grain	½ Grain
5.	Cheese Permesan	15 g	15 g	15 g	15 g
6.	Cheddar Cheese grated	25 g (oven oven 10 minutes)	25 g (oven 10 minutes)	25 g (oven 10 minutes)	25 g (oven 10 minutes)
6.	Edam cheese	12.5 g	12.5 g	12.5 g	12.5 g
7.	Fine Sugar	50 g	50 g	50 g	50 g
8	Milk Powder	10 g	10 g	10 g	10 g
9.	Baking Powder	1 g	1 g	1 g	1 g
10.	Palm Sugar (Sprinkle)	100 g	100 g	100 g	100 g

Description=

R1 = Selected Reference Recipe, Recipe from Dina_Skanica Revised Heni

F1 = Recipe Development 1, 50% White Shorghum flour substitution

F2 = Development Recipe 2, 75% White Shorghum flour substitution

F3 = Development Recipe 3, 100% White Shorghum flour substitution

These development products as in the define products will be sensory tested by 1-2 expert lecturers and 2-3 trained panellists to be rated. The assessment is compared with the selected reference product which is used as a control, so that a development product will be obtained that is close to the properties or characteristics of the reference product. The results of the assessment by 5 panellists can be seen in the following table.

Table. 4, Sensory Test Results at the Design stage

Sensory properties	Mean value			
	R1	**F1**	**F2**	**F3**
Shape	4,6	4,4	4,6	4,6
Size	4,8	4,2	4,8	4,6
Colour	4,8	4,2	4	4
Aroma	4,8	3,8	4,2	3,8
Flavour	4,8	3,6	4,8	4
Texture	4,6	4	4,6	4,4
Overall	4,8	3,8	4,6	4
Average	4,74	4,00	4,51	4,20

Description=

R1 = Selected Reference Recipe, Recipe from Dina_Skanica Revised - Heni

F1 = Recipe Development 1; 50% White Shorghum flour substitution

F2 = Recipe Development 2; 75% White Shorghum flour substitution

F3 = Recipe Development 3; 100% White Shorghum flour substitution

Form the data above, it can be seen that development product II with 75% white sorghum flour substitution ranks first with an average number for all observed parameters of 4.51 (exceeding number 4, the meaning of number 4 is appropriate). The second place is occupied by the development product III with 100% white sorghum flour substitution with an average value of the observed parameters of 4.2, while the third place is occupied by the development product I with 50%/ white sorghum flour substitution. For the overall properties, the first place was also occupied by development product II with an average value of 4.6, followed by development product III with an average number of 4.0 and development product I with an average number of 3.8. Based on these results, the development product II (with 75% wheat flour substitution) should have been used as the selected development product. However, we return to the original purpose of this research, which is to create innovative gluten-free food products. If we continue to use development product II, it means that the purpose of this research is not achieved because development product II still uses 25% wheat flour, which means it still contains gluten. Based on this consideration and looking at the sensory test data of the panellists above, the author decided that the selected development product was development product III with 100% white sorghum flour substitution.

From the sensory test data at the design stage, the development product III with 100% white sorghum flour substitution is relatively suitable or acceptable when viewed from the average number of 5 parameters observed, all above 4 namely colour, shape, size, taste and texture, only one parameter whose average value is below 4 namely the aroma parameter with an average value of 3.8. After obtaining the selected Development Product, namely Development Product III (100% White Sorghum flour substitution), it was immediately continued to the development stage.

Development Stage

At this stage the product is made in accordance with the design and tested through expert panellist tests (supervisory lecturer team) to get a response and product evaluation. At the develop stage is validation by two nutrition and food expert lecturers once to 2 times and designing packaging at this stage, explaining the packaging carried out and the reasons, and the selling price of the product and continued laboratory testing. At the first validation stage, basically the selected development product White Sorghum Flour Palm Cheese Cookies (100% White Sorghum Flour substitution) was acceptable and asked to immediately design the packaging.

The following is a picture of the selected development product along with the packaging and label and the selected reference product along with its label as a control or comparison.

Figure 1.Selected reference products and selected development products in packaging
(Image source: personal collection)

Description: The left picture is the selected reference product, the right is the selected development product

Figure 2. Palm Cheese Cokies Selected reference recipe

Figure 3. Palm Cheese Cokies Selected development

After calculating the selling price, the price of Palm Cheese Cookies of the selected development product per piece is IDR 875, if sold in a 600 ml tube jar, the price is IDR 35,000.

At this stage, laboratory tests were also carried out to determine the nutritional and fibre content of palm cheese cookies with 100% white shorghum flour substitution. Laboratory tests were carried out by Chemix Pratama Semarang on 6 May 20224 with Test Number 006/CMP/005/2024t).

The laboratory test results are as follows: Palm Cheese Cookies products with 100% white sorghum flour substitution have a lot of nutritional content including protein, fat, carbohydrates, crude fibre, insoluble food fibre, and soluble food, total food fibre. Ash content, water content and energy. From the above data after averaging from replicates 1 and 2, the following data were obtained, The nutritional content of Palm Cheese Cookies per 100 grams of material consists of protein 6.714 g, fat 26.36 g, carbohydrates 56.074 and energy 483.025 cal/100 g of product. Palm Cheese Cookies Substituted with 100% White Shorghum Flour can be categorised as a fibre source gluten-free snack because it contains a total dietary fibre of 5.028 g fibre /100 g (Source Laboraorium Chem-Mix Pratama Semarang) While the results of the analysis of Nutritional Value Information which was also carried out at the Chem-Mix Pratama Semarang Laboratory on the same date and number as above obtained the following results: in each piece of Palm Cheese Cookies weighing 7 grams contains total energy (calories as much as 484 cal, energy from fat as much as 17 cal, total fat as much as 2 grams (7% Nutritional Requirement Figures,) protein 5 grams (2% Nutritional Requirement Figures), total carbohydrates 5 grams (7% Nutritional Requirement Figures) and 0.4 grams of dietary fibre. The Nutritional Requirement Figures percentage is based on an energy requirement of 2000 kcal.

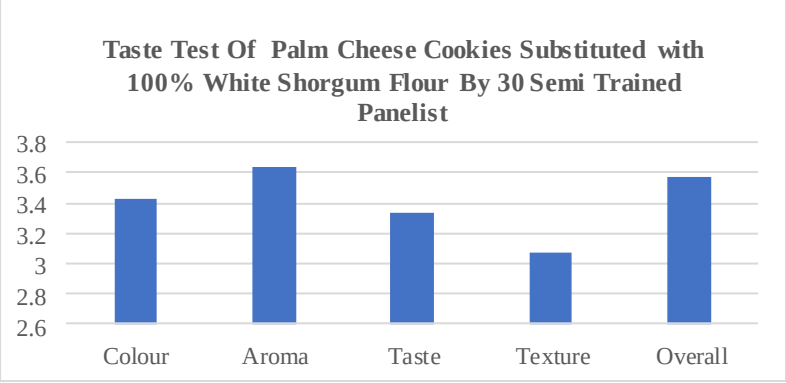
Disseminate Stage

Palm Cheese Cookies products after going through validation at the develop stage are continued with a limited scale panellist test. Selected Palm Cheese Cookies Development Products were then tested on semi trained panellists. This assessment aims to get assessments and comments from several people. The comments obtained are used as a reference in improving the product which will be tested at the fondness test stage.

1. **Product Sensory Test (Limited Panelist Test/semi-trained panelists)**

At this stage a limited scale panellist test will be carried out with 30 semi trained panellists. In this panelist test process, each panelist will get a product sample and paper form, then the product is analyzed and the results are entered into the assessment column on the paper form which includes shape, size, colour, aroma, texture, taste using a numeric scale of 1, 2, 3, 4, and 5 with variable information, namely (1) very disliked, (2) disliked, (3) somewhat liked (4) liked (5) very liked, the numeric can be marked (tick = √) by the panelist. The following are the results of the liking test of 30 semi trained panellists of Palm Cheese Cookies products with 100% White Shorghum flour substitution.The following is a graph of the results of the liking test of 30 semi trained panellists on selected development products (100% White Shorghum Flour substitution)

Figure 4.
Graph of 30 panellists' favourability test on selected development products



From the graph and summary of the preference test data, the average color parameter is 3.43 (category slightly liked tends to be liked), the average aroma parameter is 3.63 (category slightly liked tends to be liked), the average taste parameter is 3.33 (category slightly liked tends to be liked), the average texture parameter is 3.06 (category slightly liked) and the overall characteristic parameter is 3.56 on average (category slightly liked tends to be liked). From the overall characteristic/characteristic parameters, an average of 3.56 was obtained, which means that the Palm Cheese Cookies product substituted for 100% White sorghum flour in the slightly liked category tends to be liked by 30 semi-trained panelists.

2. **Follow-up**

After the preference test stage on semi-trained panelists on a limited scale, the next step is a general panelist preference test of at least 60 people which will be carried out during the exhibition. Based on the results of the limited scale 30 panelists' preference test, the results showed that the newly selected Palm Cheese Cookies product development was in the slightly preferred category, tending to be preferred, so action needs to be taken so that in the next stage, namely the exhibition, the preference test results will increase to preferred or very preferred. Perhaps by adding certain substances to cover the aroma of white sorghum flour which is rather unpleasant, for example by adding vanilla or other ingredients.

Conclusion

The selected formula in making gluten-free Palm Cheese Cookies is to use 100% white sorghum flour substitution. In its presentation using a tightly closed airtight jar equipped with a label. The limited panelist acceptance of 30 semi-trained panelists on the White Sorghum Flour Palm Cheese Cookies product on all observed parameters showed a slightly preferred category tending to be preferred. From the overall average characteristics, an average of 3.5 was produced, which means that the Palm Cheese Cookies product is a selected development product in the slightly preferred category tending to be preferred by semi-trained panelists or limited limited panelists. Therefore, action is needed so that at the time of the exhibition during the preference test it increases to the preferred or very preferred category by adding certain ingredients that can cover the shortcomings of white sorghum flour, especially in aroma, for example by adding vanilla. The 100% white sorghum flour substitute Palm Cheese Cookies product has good nutritional content. Nutritional content of Palm Cheese Cookies per 100 grams of ingredients consists of 6.714 g of protein, 26.36 g of fat, 56.074 carbohydrates and 483.025 cal/100 g of product energy. Palm Cheese Cookies White Shorghum Flour Substitute can be categorized as a gluten-free snack source of fiber, because it contains a total of 5,028 g of fiber/100 g. Each 7-gram Palm Cheese Cookie contains total energy (calories of 484 cal, energy from fat of 17 cal, total fat of 2 grams (7% Nutritional Requirement Figures). 5 grams of protein (2% Nutritional Requirement Figures), total carbohydrates of 5 grams (7% Nutritional Requirement Figures) and 0.4 grams of dietary fiber. The Nutritional Requirement Figures percentage is based on an energy requirement of 2000 kcal. Based on the data above, this product is highly recommended for people or certain people who are on a gluten diet or people with certain health problems

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