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Experimental Research for the Production of "Butter Cookies" with Red Rice Flour Substitution

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Abstract

Purpose: This study aims to examine public acceptance of butter cookies made with a partial substitution of wheat flour using brown rice flour and to identify differences in sensory attributes, including texture, color, aroma, and taste, compared to conventional butter cookies.

Methods: Method research employs a quantitative approach using hedonic tests and organoleptic tests. Data were collected through structured questionnaires distributed to the general public and expert panelists. The hedonic test was used to measure the level of consumer preference, while the organoleptic test evaluated sensory differences between conventional butter cookies and those substituted with brown rice flour.

Result: The results of the hedonic test show that butter cookies made with brown rice flour are generally well-received by consumers, with a favorable preference level. Organoleptic testing reveals significant differences in some sensory attributes, while others show no significant variation compared to the conventional recipe.

Conclusions: Butter cookies with brown rice flour substitution are acceptable to the public and have the potential to be developed as an alternative product. The substitution influences specific sensory characteristics, although not all attributes differ significantly from conventional butter cookies.

Limitations: This study is limited by the number of panelists and the scope of sensory attributes analyzed. In addition, variations in substitution ratios and long-term consumer acceptance were not explored.

Contributions: This study contributes to the development of food product innovation by providing empirical evidence on the sensory acceptance of brown rice flour as a partial substitute for wheat flour in butter cookies.

Keywords: *Butter Cookies, Hedonic Test, Organoleptic Test, Red Rice Flour*

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1. Introduction

Food is a basic need for every individual. Food serves the function of aiding growth and plays a role in protecting the body from diseases (Essa et al., 2023). The nutrition the body receives comes from food. Therefore, choosing the food products to be consumed is an important matter for the body. In managing daily meals, sometimes the main food is complemented with snacks, commonly known as 'snacking' (Leng et al., 2017). Snacks, often referred to as "snack," are not a main meal. Snacks are considered light foods that can temporarily satisfy hunger or something that can be eaten for the enjoyment of its taste (Enriquez & Gollub, 2023).

Butter cookies, or commonly known as butter biscuits, are cookies made from flour, sugar, and butter without using yeast or leavening agents. Butter cookies are categorized as dry cookies with characteristics such as a crunchy texture, a yellowish-brown color, soft dough, and high fat content (Blanco Canalis, Steffolani, León, & Ribotta, 2017). The reason butter cookies are popular as a snack is that they can be enjoyed with various types of drinks like tea or coffee, the basic ingredients contain wheat so they can serve as a temporary food filler, and they are easy to make because the ingredients are easily available (Elena, Loredana, Carmen, Elena, & Alexandra, 2021; Pasaribu et al., 2022)

Many vendors sell butter cookies in various flavors, such as vanilla and chocolate. However, most vendors use flour as the basic ingredient. An innovation and new idea for butter cookies are needed so that butter cookies can have more variations. One such innovation that is rarely found is making butter cookies from a mixture of wheat flour and red rice flour. Red rice flour is a simple processed product made from red rice. The benefits of processing flour from local food products include longer shelf life, ease of storage, practicality for product diversification, and adding value to red rice (Zheng et al., 2022). Red rice flour can be utilized in a variety of food processing, such as in dry cookies, which is still minimal, and can be used as an ingredient for products (Yee et al., 2024). One of these products is butter cookies, a sweet snack loved by the general public. Therefore, this research is expected to produce successful results in terms of texture, color, aroma, and taste of butter cookies.

1.1 Problem Statement

In this section, the problems encountered during the trial or testing process will be explained in detail, which will then be developed and verified through further testing or experimentation. This study aims to identify the potential for substituting brown rice flour in the production of butter cookies, focusing on two main issues that are often of concern in new product trials, namely public acceptance of the product and differences in the organoleptic characteristics of the product (texture, color, aroma, and taste). In line with the trend of healthier food consumption, many consumers are starting to switch to more nutritious and gluten-free alternative ingredients, such as brown rice flour. Therefore, the main issue in this study is: how acceptable are butter cookies made with brown rice flour as a substitute for wheat flour to the public? Butter cookies are a popular product due to their softness and distinctive flavor, so it is important to know whether the substitution of brown rice flour is acceptable to consumers without compromising the taste and texture they expect.

In addition, the second issue that needs to be analyzed is the significant difference in texture, color, aroma, and taste between butter cookies made with a mixture of wheat flour and brown rice flour and butter cookies made with wheat flour alone. This is important in determining the extent to which this substitution affects the organoleptic quality of the final product and whether consumers will notice a significant difference. By identifying these two issues, this study aims to provide useful information regarding the feasibility and market potential of new products that use brown rice flour as an alternative raw material.

1.2 Objectives of the Trial

The purpose of this product trial project is to investigate and obtain information about the quality and acceptance of a new product that uses brown rice flour as the main ingredient in the manufacture of butter cookies. Specifically, the purpose of this conversation can be divided into two main objectives:

1. Determining the Level of Public Acceptance of Butter Cookies Substituted with Brown Rice Flour
   The first objective is to evaluate the extent to which the public accepts butter cookies that use brown rice flour as a substitute for wheat flour. This public acceptance will be analyzed based on consumer preferences for taste, texture, and other factors that influence their decisions in choosing food products. By measuring the extent to which these butter cookies are accepted by consumers, it can be determined whether this product has broad market potential and is acceptable to various groups, both in terms of quality and health aspects. This assessment can be carried out through panel tests involving consumers from various age groups and backgrounds to obtain a more objective picture of the level of product acceptance.

2. Identifying Differences in Texture, Color, Aroma, and Taste between Butter Cookies that Use Wheat Flour and Brown Rice Flour. The second objective is to analyze the differences in organoleptic properties (texture, color, aroma, and taste) between butter cookies that use a mixture of wheat flour and brown rice flour. This analysis aims to measure whether the substitution of brown rice flour will result in significant differences in the physical and sensory qualities of the final product, which in turn may affect consumer perception. For example, will butter cookies made with brown rice flour be denser or more crumbly than butter cookies made with wheat flour? Will the color and aroma of these butter cookies be different? This study will use sensory testing methods to identify differences in these characteristics, which are important for determining whether substituting brown rice flour significantly affects product quality and whether these changes are acceptable to consumers.

Overall, the purpose of this product trial is to provide a deeper understanding of the potential for substituting brown rice flour in butter cake production and how this affects consumer acceptance and product quality. The results of this study are expected to form the basis for the development of healthier and more innovative food products, as well as contribute to the food industry by introducing more nutritious alternative ingredients.

2. Literature Review and Hypothesis Development

2.1 Place and Time of the Trial

The place and time of the butter cookies product trial, covering proposal preparation, product development, product analysis, and submission of the research report draft, are as follows:

- Place: HBP Laboratory, Podomoro University
- Time: September 2022 – December 2022

2.2 Product Preparation Procedure

2.2.1 Product Preparation Method

The following steps describe the preparation of butter cookies using wheat flour and brown rice flour as the main ingredients:

1. Mix wheat flour, brown rice flour, milk powder, cornstarch, and baking powder. Stir well, sift the mixture, and set aside.
2. Cream butter, margarine, and powdered sugar until smooth. Add egg yolks and mix again until well combined. Gradually add the flour mixture while stirring until the dough is evenly mixed.
3. Transfer the dough into a piping bag, pipe the dough onto a baking tray, and bake in the oven at 160°C for 30 minutes. Remove and allow to cool.

Table 1. Ingredients list for the first trial

No	Ingredient Name	Brand	Quantity	Unit
1	Wheat Flour	Segitiga Biru	60	gram
2	Brown Rice Flour	Lingkar Organik	180	gram
3	Cornstarch	Maizenaku	20	gram
4	Milk Powder	Dancow	20	gram
5	Baking Powder	Kupu-Kupu	3	gram
6	Butter	Hollman	125	gram
7	Margarine	Palmia	40	gram
8	Powdered Sugar	Rose Brand	75	gram
9	Egg Yolk	–	2	gram

Table 1 provides a detailed description of the ingredients needed to make butter cookies with a substitution of brown rice flour, where wheat flour is used only 10%, and the remaining 90% is made up of brown rice flour. The use of brown rice flour aims to create a healthier, gluten-free alternative while imparting a richer flavor and different texture compared to traditional butter cookies made entirely with wheat flour. This dominant composition of brown rice flour is intended to produce butter cookies that are denser with a slightly nutty flavor and a distinct aroma. The substitution of wheat flour with

brown rice flour can affect the texture and softness of the cookie, so it is important to consider the correct ratio to maintain the quality of the product. While wheat flour is used in a smaller amount, it still provides some softness and stability to the dough, playing a role in giving structure and better texture.

In the preparation of these butter cookies, other ingredients such as butter, sugar, eggs, and additional components like baking powder and vanilla extract are used to create a delicious taste and perfect texture. Butter adds richness and softness to the cookie, while sugar contributes sweetness and helps achieve the desired crispness. Eggs act as a binder, keeping the dough together and adding moisture. Baking powder is needed to provide slight height to the cookies, and vanilla extract adds a pleasant aroma and distinctive flavor. Overall, the composition used in this recipe is designed to maintain the flavor and texture quality of the butter cookies, even though wheat flour is substituted with the healthier and more nutritious brown rice flour. This table provides a clear guide on the ingredients required and the role of each ingredient in creating a delicious and nutritious butter cookie.

Table 2. Ingredients list for the second trial

No	Ingredient Name	Brand	Quantity	Unit
1	Wheat Flour	Segitiga Biru	40	gram
2	Brown Rice Flour	Lingkar Organik	160	gram
3	Cornstarch	Maizenaku	20	gram
4	Milk Powder	Indomilk	20	gram
5	Baking Powder	Kupu-Kupu	3	gram
6	Butter	Hollman	125	gram
7	Margarine	Palmia	40	gram
8	Powdered Sugar	Rose Brand	75	gram
9	Egg Yolk	–	2	gram

Table 2 describes the ingredients and composition required to make butter cookies with a ratio of 20% wheat flour and 80% brown rice flour. This ratio represents a reduction in the use of wheat flour and an increase in the use of brown rice flour, aiming to create a healthier and more nutritious butter cookie while maintaining the softness and distinctive taste of traditional butter cookies. In this composition, brown rice flour plays a dominant role as the primary ingredient in the dough. Brown rice flour, known for its higher fiber content and nutritional benefits compared to wheat flour, provides health benefits such as more vitamins and minerals. The use of brown rice flour also contributes to a denser texture and a more natural, slightly nutty flavor, which differs from traditional butter cookies that tend to be lighter and more crumbly.

Although brown rice flour is the dominant ingredient, the 20% wheat flour used serves to add a bit of softness to the cookies and stability to the dough. Wheat flour helps to produce a butter cookie that has a good structure without being overly dense, allowing the cookie to remain chewy and light despite the higher proportion of brown rice flour. In addition to flour, other ingredients used in this recipe include butter, sugar, eggs, and additional components like baking powder and vanilla extract. Butter acts as the fat source, providing richness and softness to the cookies, while sugar adds sweetness and helps achieve the desired crisp texture. Eggs serve as a binder, keeping the dough together well and adding moisture. Baking powder is added to help the cookies rise slightly, giving them a lighter texture and preventing the dough from becoming too dense. Vanilla extract adds a distinctive aroma that enhances the flavor of the cookies.

With the 20% wheat flour and 80% brown rice flour ratio, the main goal is to create butter cookies that still have a delicious taste with the added benefits of brown rice flour. While the texture may differ slightly compared to traditional butter cookies made entirely with wheat flour, the final product is expected to have a well-balanced flavor, with healthier and more nutritious characteristics. This table provides a clear overview of the required ingredients and the purpose behind the composition used in making these butter cookies. The choice of a 20% wheat flour and 80% brown rice flour ratio is designed

to create a balance between delicious flavor and health, offering an alternative for consumers who want a more nutritious product without compromising the organoleptic quality (texture, flavor, aroma) of the cookie.

Table 3. Ingredients list for the third trial

No	Ingredient Name	Brand	Quantity	Unit
1	Wheat Flour	Segitiga Biru	60	gram
2	Brown Rice Flour	Lingkar Organik	140	gram
3	Cornstarch	Maizenaku	20	gram
4	Milk Powder	Indomilk	20	gram
5	Baking Powder	Kupu-Kupu	3	gram
6	Butter	Hollman	125	gram
7	Margarine	Palmia	40	gram
8	Powdered Sugar	Rose Brand	75	gram
9	Egg Yolk	–	2	gram

Table 3 provides an in-depth look at the ingredients and composition necessary to make butter cookies using a combination of 30% wheat flour and 70% brown rice flour. This recipe reflects a balanced approach, combining the traditional properties of wheat flour with the nutritional advantages of brown rice flour. The goal of this ratio is to strike a middle ground between maintaining the traditional texture and taste of butter cookies while offering a healthier alternative by incorporating a higher percentage of brown rice flour.

Table 4. Ingredients list for the fourth trial

No	Ingredient Name	Brand	Quantity	Unit
1	Wheat Flour	Segitiga Biru	80	gram
2	Brown Rice Flour	Lingkar Organik	120	gram
3	Cornstarch	Maizenaku	20	gram
4	Milk Powder	Indomilk	20	gram
5	Baking Powder	Kupu-Kupu	3	gram
6	Butter	Hollman	125	gram
7	Margarine	Palmia	40	gram
8	Powdered Sugar	Rose Brand	75	gram
9	Egg Yolk	–	2	gram

Table 4 provides a comprehensive overview of the ingredients and composition necessary for making butter cookies with a ratio of 40% wheat flour and 60% brown rice flour. This recipe represents an even more significant shift towards healthier, fiber-rich alternatives by increasing the proportion of brown rice flour. The goal is to maintain the familiar texture of traditional butter cookies while leveraging the health benefits of brown rice flour, making it a more nutritious option for health-conscious consumers.

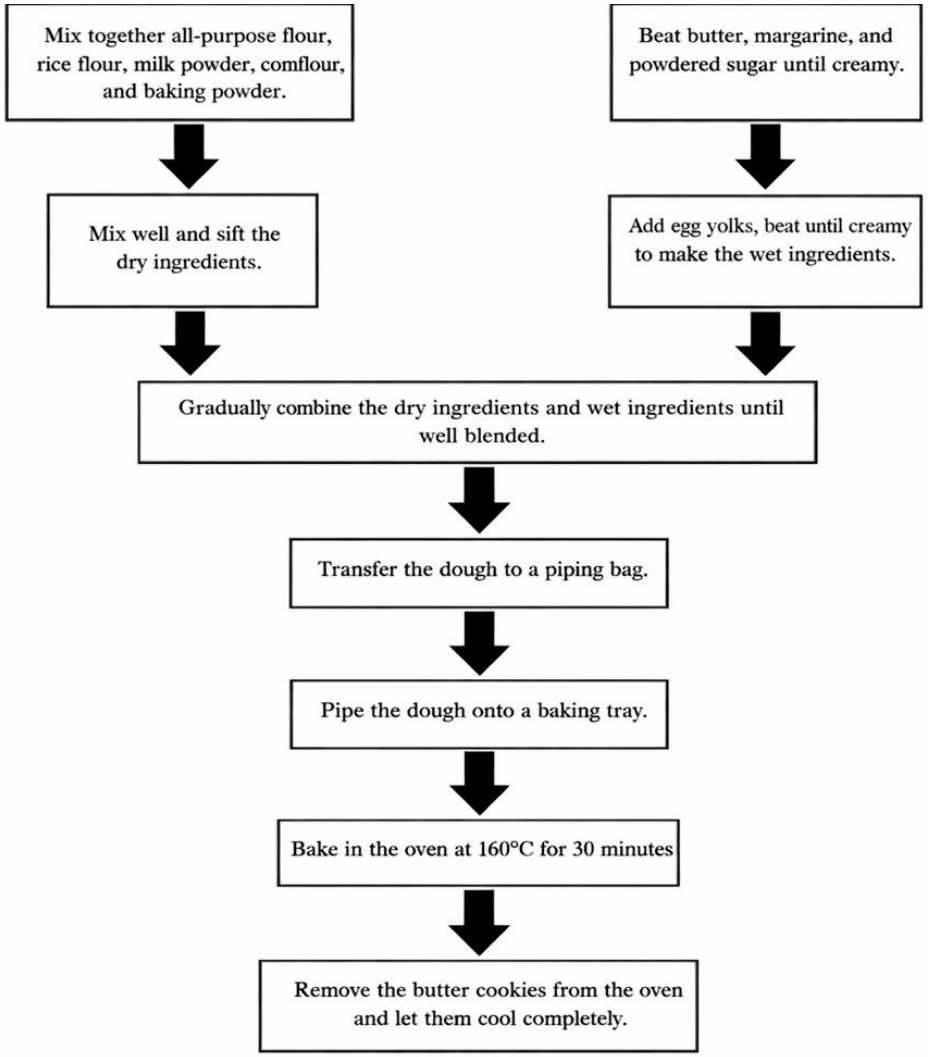

Figure 1. Flowchart of the Testing Procedure

Figure 1 show the procedure for conducting the butter cookies product trial. The following procedure was applied in conducting the butter cookies product trial:

3. Research Method

The experimental design is a treatment framework intended to address the problem formulation encountered in this product trial project. The expected benefits of the butter cookies product trial can be achieved by applying a Completely Randomized Design (CRD) (Lawless & Heymann, 2010). A Completely Randomized Design (CRD) is a research design in which treatments are randomly assigned to experimental units, with the requirement that the experimental units are as homogeneous as possible to minimize experimental error (Salman, 2024; Wachdijono & Julhan, 2019). Research using a CRD must first examine all factors and sources of variability that may cause differences. The advantages of using a CRD include the absence of restrictions on treatments and replications, ease of analysis due to unequal repetitions for each treatment, and maximum degrees of freedom for estimating experimental error (Osuagwu, Udo, & Ifeyinwa, 2024). However, its limitation lies in inefficiency when unknown external variability affects the experiment (Riadi, Rohmah Nurazizah, Wakano, & Fadilah, 2023).

After conducting three replications for each treatment using standardized procedures such as consistent materials and equipment, preparation methods, and production techniques the experiment was carried out in detail (Candra, Noor, Bahit, Cahyani, & Mulyani, 2023; Dahliani, S, & Darmayanti, 2023). The experimental procedures included mixing wheat flour and brown rice flour, using various brands of brown rice flour, and subsequently evaluating the products using panelists (Khoshgozaran-Abras, Azizi,

Bagheripoor-Fallah, & Khodamoradi, 2014). Panelists are individuals or groups who subjectively assess the characteristics and quality of a product. Types of panelists include individual panelists, limited panels, trained panels, and untrained panels (Astuti & Sunarsih, 2025; Gusriani et al., 2024; Meilgaard, Carr, & Civille, 1999).

The treatment arrangement of the tested butter cookies products evaluated by panelists without manipulation is presented as follows. In this study, treatments involved mixing brown rice flour and wheat flour for butter cookies production as shown table 5 below.

Table 5. Experimental Design

Brown Rice Flour	Replication I	Replication II	Replication III
Control	P1	–	–
90%	P2	P3	P4
80%	P5	P6	P7
70%	P8	P9	P10
60%	P11	P12	P13

Table 5 show observations of the butter cookies trial results were conducted by selecting panelists who frequently consume or produce similar products. A total of 40 panelists participated in this test, which was carried out in an appropriate room under controlled conditions to prevent interference from external factors. Using organoleptic observation, which employs human senses as measurement tools, research results were obtained by providing butter cookies samples and questionnaires. The questionnaires were completed based on predefined operational definitions and measurement scales, as described below (Pareyt et al., 2009; Salman, 2024).

3.1 Hedonic Test

The hedonic test (preference test) is an evaluation in which panelists are asked to express their level of liking or disliking and indicate their preference intensity (Pareyt et al., 2009). The hedonic test assessed panelists' preference levels based on four sensory attributes of the product: color, aroma, taste, and texture as shown table 6 below (Sunaeni, Ismail, & Briliannita, 2021).

Table 6. Hedonic Test

Variable	Operational Definition	Measurement Scale
Texture	Level of preference for product texture	5 = strongly like; 4 = like; 3 = neutral; 2 = dislike; 1 = strongly dislike
Color	Level of preference for product color	5 = strongly like; 4 = like; 3 = neutral; 2 = dislike; 1 = strongly dislike
Aroma	Level of preference for product aroma	5 = strongly like; 4 = like; 3 = neutral; 2 = dislike; 1 = strongly dislike
Taste	Level of preference for product taste	5 = strongly like; 4 = like; 3 = neutral; 2 = dislike; 1 = strongly dislike

Based on table 6 the operationalization of variables used in the hedonic questionnaire, the number of panelists involved in this test was 100 individuals from the general public who had previously consumed cookies.

3.2 Organoleptic Test

The organoleptic test is an evaluation method that uses the senses of sight, smell, taste, and touch, conducted under controlled conditions involving trained laboratory panelists and prepared product samples to ensure that the results are not influenced by external factors (Zaifi, Yulastri, Fridayati, & Andriani, 2025). Examples of suitable research facilities include a kitchen for product preparation, a closed tasting room to prevent external interference, and a discussion room that supports evaluation activities (Gusriani et al., 2024). In this test, t-test theory was applied (Meirisa, Arafah, & Rakhmat, 2024).

The t-test is a partial regression coefficient test used to determine the significance of the independent variable's effect on the dependent variable, assuming other independent variables remain constant (Sugiyono, 2013). One type of t-test used to examine differences in sample means is the one-sample t-test. The one-sample t-test is a statistical analysis technique used to compare a sample mean with a population mean to determine whether a significant difference exists (Yusuf & Daris, 2019)

The formula used is as follows:

$$t = \frac{\bar{x} - \mu}{\frac{SD}{\sqrt{N}}} \quad (1)$$

Where:

- t = calculated t-value
- $\bar{x}$= sample mean
- μ= population parameter value
- SD = standard deviation
- N = number of samples

Yusuf and Daris (2019) in the organoleptic test, the attributes evaluated included texture, color, aroma, and taste, with product characteristics defined as table 7 follows.

Table 7. Organoleptic Test

Variable	Operational Definition	Measurement Scale
Texture	Level of crispiness preference	4 = very crispy; 3 = crispy; 2 = less crispy; 1 = not crispy
Color	Level of color preference	4 = golden brown; 3 = yellow; 2 = light brown; 1 = reddish brown
Aroma	Level of aroma preference	4 = buttery aroma; 3 = slightly buttery; 2 = not buttery; 1 = very non-buttery
Taste	Level of taste preference based on sweetness, saltiness, and buttery flavor	4 = very delicious; 3 = delicious; 2 = not delicious; 1 = very not delicious

Based on table 7 the operationalization of variables used in this discrimination test questionnaire, 10 panelists participated and were divided into two categories: semi-expert and expert panelists who possess in-depth knowledge of butter cookies.

3.3 Product Observation

During the product observation process, results were obtained from questionnaires completed by panelists evaluating different variables. The questionnaires used in this observation consisted of hedonic tests and organoleptic tests. In the hedonic test, the panelists selected to complete the questionnaire were 100 members of the general public who had previously consumed butter cookies. Based on the observations, it was found that each panelist demonstrated varying levels of preference due to differences in individual tastes(Nurhaedah, Irmayani, Ruslang, & Jumrah, 2023). In the organoleptic test, the selected panelists consisted of semi-expert and expert panelists. Semi-expert panelists were individuals working as chefs in restaurants or hotels who were not specifically specialized in pastry. In addition, semi-expert panelists also included a nutrition expert with knowledge of texture, color, aroma, and taste in food products. Expert panelists were defined as professional chefs working in the pastry field for a minimum of five years, with a thorough understanding of texture, color, aroma, and taste characteristics of butter cookies.

The organoleptic test was conducted by 10 expert and semi-expert panelists. The expert panelists included Chef Stella Permata (Pastry Chef, Podomoro University), Chef Rifo (Corporate Pastry Chef, Shi Shi Group), Chef Henny (Pastry Chef, Union Group), Chef Philip Walasary (Pastry Chef, Tentrem Yogyakarta), and Chef Woro Prabandari (Pastry Chef, Grand Hyatt Jakarta). The semi-expert panelists included Chef Ivan (Chef de Cuisine, Tom Aikens Langham Jakarta), Ms. Fajar (Nutrition Expert),

Chef Budi Riyanto (Bakery Pastry Chef), Chef Rafael (President of the Association of Culinary Professionals), and Chef Dedes Dwi Ratnasari (Private Chef).

Based on the SPSS data analysis, the Sig. (2-tailed) values were categorized into accepted or rejected null hypotheses (H_0) and accepted or rejected alternative hypotheses (H_a), indicating the presence or absence of differences among paired butter cookies samples 1 to 16. The hypotheses are described as follows:

H_1: There is no difference in texture between butter cookies made with 100% wheat flour and butter cookies made with 90% brown rice flour.
H_2: There is no difference in texture between butter cookies made with 100% wheat flour and butter cookies made with 80% brown rice flour.
H_3: There is no difference in texture between butter cookies made with 100% wheat flour and butter cookies made with 70% brown rice flour.
H_{04}: There is no difference in texture between butter cookies made with 100% wheat flour and butter cookies made with 60% brown rice flour.
H_5: There is no difference in color between butter cookies made with 100% wheat flour and butter cookies made with 90% brown rice flour.
H_7: There is no difference in color between butter cookies made with 100% wheat flour and butter cookies made with 70% brown rice flour.
H_8: There is no difference in color between butter cookies made with 100% wheat flour and butter cookies made with 60% brown rice flour.
H_{10}: There is no difference in aroma between butter cookies made with 100% wheat flour and butter cookies made with 80% brown rice flour.
H_{11}: There is no difference in aroma between butter cookies made with 100% wheat flour and butter cookies made with 70% brown rice flour.
H_{12}: There is no difference in aroma between butter cookies made with 100% wheat flour and butter cookies made with 60% brown rice flour.
H_{013}: There is no difference in taste between butter cookies made with 100% wheat flour and butter cookies made with 90% brown rice flour.
H_{14}: There is no difference in taste between butter cookies made with 100% wheat flour and butter cookies made with 80% brown rice flour.
H_{15}: There is no difference in taste between butter cookies made with 100% wheat flour and butter cookies made with 70% brown rice flour.
H_{16}: There is no difference in taste between butter cookies made with 100% wheat flour and butter cookies made with 60% brown rice flour.

4. Result and Discussions

This study was conducted by distributing questionnaires using the hedonic test method, which were completed by panelists. The targeted panelists were 100 members of the general public who had previously consumed butter cookies and were familiar with the product. The purpose of this study was to determine the panelists' preference levels in terms of texture, color, aroma, and taste. The main issue addressed through the questionnaire distribution was the variation in individual preferences and opinions. Therefore, the results of the questionnaire data were accumulated and summarized in tabular form as follows.

Table 8. Results of the hedonic test questionnaire (ages 15–20)

Butter Cookies	Texture	Color	Aroma	Taste
Butter Cookies (100% Wheat Flour)	4.10	4.33	4.20	4.40
Butter Cookies (90% Brown Rice Flour)	4.13	3.83	3.87	4.23
Butter Cookies (80% Brown Rice Flour)	4.00	3.93	3.97	4.40
Butter Cookies (70% Brown Rice Flour)	4.13	3.80	3.77	4.13
Butter Cookies (60% Brown Rice Flour)	4.13	3.73	4.00	4.47

Table 8 presents the results of questionnaires completed by 30 panelists. Based on the hedonic test results, respondents aged 15–20 years preferred the texture of butter cookies with 90%, 70%, and 60% brown rice flour substitution. In terms of color, respondents preferred butter cookies with 80% brown rice flour substitution. For aroma, respondents favored butter cookies with 60% brown rice flour substitution, while for taste, respondents also preferred butter cookies with 60% brown rice flour substitution.

Table 9. Result of the hedonic test questionnaire (ages 21–25)

Butter Cookies	Texture	Color	Aroma	Taste
Butter Cookies (100% Wheat Flour)	4.15	4.35	4.00	4.30
Butter Cookies (90% Brown Rice Flour)	3.62	3.50	3.83	4.05
Butter Cookies (80% Brown Rice Flour)	3.55	3.30	3.90	3.85
Butter Cookies (70% Brown Rice Flour)	3.70	3.55	3.93	3.75
Butter Cookies (60% Brown Rice Flour)	3.80	3.55	3.93	4.00

Table 9 presents the results from 40 panelists. The highest average scores for texture, color, aroma, and taste were found in butter cookies made with 100% wheat flour. However, among the substituted butter cookies, the 60% brown rice flour formulation received the highest preference for texture. In terms of color, no significant differences were found among butter cookies substituted with 90%, 80%, 70%, and 60% brown rice flour, as the brown rice flour imparted a reddish-brown color. The most preferred colors were observed in butter cookies with 70% and 60% brown rice flour substitution. For aroma, panelists preferred butter cookies with 70% and 60% brown rice flour substitution, which achieved the same average score, despite differences in ingredient proportions.

Table 10. Results of the hedonic test questionnaire (above 25 years old)

Butter Cookies	Texture	Color	Aroma	Taste
Butter Cookies (100% Wheat Flour)	4.03	3.97	3.90	4.00
Butter Cookies (90% Brown Rice Flour)	3.90	3.73	3.76	4.10
Butter Cookies (80% Brown Rice Flour)	3.93	3.80	3.83	3.90
Butter Cookies (70% Brown Rice Flour)	3.97	3.63	3.73	4.00
Butter Cookies (60% Brown Rice Flour)	3.93	3.67	3.67	4.13

Table 10 shows results from 30 panelists aged over 25 years. Based on the hedonic test, respondents preferred the texture of butter cookies with 70% brown rice flour substitution. For color and aroma, respondents preferred butter cookies with 80% brown rice flour substitution, while for taste, respondents preferred butter cookies with 60% brown rice flour substitution. The taste of substituted butter cookies varied due to differences in the proportion of brown rice flour used. Overall, it can be concluded that, in terms of taste, panelists tended to prefer butter cookies with 90% brown rice flour substitution.

The next stage of the research involved the organoleptic test method, in which panelists were categorized into semi-expert and expert groups. The key difference between this and the hedonic test lay in the more specific research variables, as these panelists possessed a deeper understanding of butter cookies and were capable of distinguishing detailed sensory attributes. The questionnaire data were then analyzed using SPSS to obtain more precise and detailed results. The following are the SPSS results from the organoleptic tests conducted with semi-expert and expert panelists.

Table 11. Paired Sample Test Results (Texture) – Organoleptic Test

Paired Samples Test (Texture)					
		95% Confidence Interval of the Difference	t	df	Sig. (2-tailed)
		Upper			
Pair 1	Control Butter Cookies Texture – 90% Brown Rice Flour Texture	0.65243	1.000	9	0.343

Pair 2	Control Butter Cookies Texture – 80% Brown Rice Flour Texture	0.64555	1.964	9	0.081
Pair 3	Control Butter Cookies Texture – 70% Brown Rice Flour Texture	0.65243	1.000	9	0.343
Pair 4	Control Butter Cookies Texture – 60% Brown Rice Flour Texture	0.90018	1.000	9	0.104

Based on the data presented in Table 11 and the SPSS results, it can be concluded that the null hypotheses H_{01} (Sig. = 0.343), H_{02} (Sig. = 0.081), H_{03} (Sig. = 0.343), and H_{04} (Sig. = 0.104) all have p-values greater than 0.05. These results suggest that there are no statistically significant differences in texture among the butter cookies.

Therefore, butter cookies produced by substituting wheat flour with 90%, 80%, 70%, and 60% brown rice flour do not show significant differences in texture. This suggests that, in terms of texture, brown rice flour can replace wheat flour. It can be concluded that butter cookies with 90%, 80%, 70%, and 60% brown rice flour substitution have a crispy texture comparable to the control butter cookies.

Table 12. Paired Sample Test Results (Color) – Organoleptic Test

Paired Samples Test (Color)					
		95% Confidence Interval of the Difference	**t**	**df**	**Sig. (2-tailed)**
		Upper	**1.784**	**9**	**0.108**
Pair 5	Control Butter Cookies Color – 90% Brown Rice Flour Color	2.04109	1.784	9	0.108
Pair 6	Control Butter Cookies Color – 80% Brown Rice Flour Color	1.99012	1.868	9	0.095
Pair 7	Control Butter Cookies Color – 70% Brown Rice Flour Color	1.95381	2.372	9	0.042
Pair 8	Control Butter Cookies Color – 60% Brown Rice Flour Color	1.85567	1.714	9	0.121

Based on the data presented in Table 12 and the SPSS results, it can be concluded that the null hypotheses H_{05} (Sig. = 0.108), H_{06} (Sig. = 0.095), and H_{08} (Sig. = 0.121) all have p-values greater than 0.05, indicating that there are no significant differences in color among the butter cookies. However, H_{07} (Sig. = 0.042), with a p-value below 0.05, indicates a significant difference in color. Therefore, it can be concluded that butter cookies with 90%, 80%, and 60% brown rice flour substitution exhibit a color similar to the control butter cookies, described as golden brown. In contrast, butter cookies with 70% brown rice flour substitution display a color that differs from the control, described as light brown.

Table 13. Paired Sample Test Results (Aroma) – Organoleptic Test

Paired Samples Test (Aroma)					
		95% Confidence Interval of the Difference	**t**	**df**	**Sig. (2-tailed)**
		Upper			
Pair 9	Control Butter Cookies Aroma – 90% Brown Rice Flour Aroma	1.00324	1.500	9	0.168
Pair 10	Control Butter Cookies Aroma – 80% Brown Rice Flour Aroma	1.40800			
Pair 11	Control Butter Cookies Aroma – 70% Brown Rice Flour Aroma	1.30486	1.000	9	0.343
Pair 12	Control Butter Cookies Aroma – 60% Brown Rice Flour Aroma	1.52946	1.909	9	0.089

Based on the data presented in Table 13 and the SPSS results, it can be concluded that the null hypotheses H_{09} (Sig. = 0.168), H_{010} (Sig. = 0.244), H_{011} (Sig. = 0.343), and H_{012} (Sig. = 0.089) all have p-values greater than 0.05, indicating that there are no statistically significant differences in aroma among the butter cookies. Therefore, it can be concluded that butter cookies with 90%, 80%, 70%, and 60% brown rice flour substitution retain a slightly buttery aroma, similar to that of the control butter cookies.

Table 14. Paired sample test (flavor) – organoleptic test

Paired Samples Test (Flavor)					
		95% Confidence Interval of the Difference	t	df	Sig. (2-tailed)
		Upper			
Pair 13	Butter Cookies Flavor Control - Brown Rice Flour Flavor 90%	0.65243	1.000	9	.343
Pair 14	Butter Cookies Flavor Control - Brown Rice Flour Flavor 80%	0.87703	3.000	9	.015
Pair 15	Butter Cookies Flavor Control - Brown Rice Flour Flavor 70%	0.87703	3.000	9	.015
Pair 16	Butter Cookies Flavor Control - Brown Rice Flour Flavor 60%	0.76941	2.449	9	.037

Based on the data presented in Table 14 and the SPSS results, it can be concluded that H_{013} (Sig. = 0.343), with a p-value greater than 0.05, indicates that there is no significant difference in taste between the control butter cookies and the butter cookies substituted with 90% brown rice flour. However, H_{014} (Sig. = 0.015), H_{015} (Sig. = 0.015), and H_{016} (Sig. = 0.037), with p-values below 0.05, indicate that there are significant differences in taste. Therefore, it can be concluded that butter cookies with 90% brown rice flour substitution have a taste comparable to the control butter cookies, described as very delicious, while butter cookies with 80%, 70%, and 60% brown rice flour substitution exhibit tastes that differ from the control, described as delicious.

5. Conclusions

5.1 Conclusion

Based on the hedonic test results, the preferences of respondents varied by age group. For respondents aged 15–20 years, panelists preferred the texture of butter cookies with 90%, 70%, and 60% brown rice flour substitution. In terms of color, butter cookies with 80% brown rice flour substitution were preferred. For aroma and taste, respondents favored butter cookies with 60% brown rice flour substitution. Respondents aged 20–25 years preferred the texture of butter cookies with 60% brown rice flour substitution. For color, both 60% and 70% brown rice flour substitutions were preferred. Aroma preferences were similar, with respondents favoring butter cookies with 60% and 70% brown rice flour substitution. For taste, 90% brown rice flour substitution was preferred. Respondents aged above 25 years preferred the texture of butter cookies with 70% brown rice flour substitution. In terms of color and aroma, butter cookies with 80% brown rice flour substitution were preferred. For taste, butter cookies with 60% brown rice flour substitution were preferred.

The study also found that there were no significant differences in texture among butter cookies substituted with 90%, 80%, 70%, and 60% brown rice flour, suggesting that brown rice flour can replace wheat flour in terms of texture. For color, butter cookies with 90%, 80%, and 60% brown rice flour substitution showed no significant differences, indicating that they can replace wheat flour. However, butter cookies with 70% brown rice flour substitution showed a significant difference, meaning they cannot fully replace wheat flour in terms of color. As for aroma, there were no significant differences among butter cookies substituted with 90%, 80%, 70%, and 60% brown rice flour, suggesting that brown rice flour can replace wheat flour in terms of aroma. Regarding taste, butter cookies with 90% brown rice flour substitution showed no significant difference, indicating they can replace wheat flour,

while those with 80%, 70%, and 60% brown rice flour substitution showed significant differences, meaning they cannot fully replace wheat flour in terms of taste.

5.2 Research Limitations

This study is subject to several limitations. First, the number of panelists involved in the sensory tests may not fully represent the diversity of the general population, potentially limiting the generalizability of the findings. Second, the study focused on only four sensory attributes (texture, color, aroma, and taste), and thus other sensory characteristics or quality parameters, such as mouthfeel or nutritional content, were not evaluated. Furthermore, the study did not explore long-term consumer acceptance or shelf-life stability of butter cookies with brown rice flour substitution. Finally, variations in the substitution ratios of brown rice flour were not tested beyond the selected levels, which may have affected the comprehensiveness of the results.

5.3 Suggestions and Directions for Future Research

Based on the findings of this study, it is suggested that food producers and manufacturers consider using brown rice flour as a viable alternative to wheat flour in butter cookie production, particularly for health-conscious consumers seeking gluten-free or nutritionally enriched options. For product development, focusing on a 60% substitution of brown rice flour may offer a favorable balance in terms of texture, aroma, and taste. Additionally, educating consumers about the benefits of brown rice flour in baked goods may increase acceptance and demand for these alternative products. Further studies are recommended to expand the scope of research by exploring a wider range of substitution ratios for brown rice flour to identify the most optimal formulation for butter cookies. Additionally, the use of different types of rice flour, such as white rice flour or specialty rice varieties, could be investigated to examine their impact on sensory attributes and consumer acceptance. Longitudinal studies should also be conducted to assess long-term consumer acceptance of brown rice flour-substituted butter cookies, as well as their market potential. Finally, future research could incorporate a broader range of sensory attributes, including texture and mouthfeel, which were not included in this study.

References

Astuti, S., & Sunarsih, E. (2025). Literature study: Use of Sungkai Leaf and Virgin Coconut Oil (Vco) in soap making. *Jurnal Ilmiah Pertanian dan Peternakan, 2*(1), 59-72. doi:https://doi.org/10.35912/jipper.v2i1.5317

Blanco Canalis, M. S., Steffolani, M. E., León, A. E., & Ribotta, P. D. (2017). Effect of different fibers on dough properties and biscuit quality. *Journal of the Science of Food and Agriculture, 97*(5), 1607-1615. doi:https://doi.org/10.1002/jsfa.7909

Candra, H., Noor, S., Bahit, M., Cahyani, R., & Mulyani, D. (2023). Application of The Completely Random Design Statistics Method For Analysis of Different Filter Types In Fresh Water Fish Pool Water Recirculation System. *International Journal of Science, Technology & Management, 4*(5), 1197-1205. doi:https://doi.org/10.46729/ijstm.v4i5.933

Dahliani, L., S, S., & Darmayanti, R. (2023). A Completely Randomized Design (CRD) for Tomato Plant Growth and Production on Different Planting Media. *Assyfa Journal of Farming and Agriculture, 1*(1), 08-13. doi:https://doi.org/10.61650/ajfa.v1i1.270

Elena, P. M., Loredana, U. E., Carmen, M. A., Elena, P. E., & Alexandra, J. (2021). Consumer preferences and expectations. *Trends in Wheat and Bread Making, 11*(1), 431-458. doi:https://doi.org/10.1016/B978-0-12-821048-2.00015-5

Enriquez, J. P., & Gollub, E. (2023). Snacking Consumption among Adults in the United States: A Scoping Review. *Nutrients, 15*(7), 1-19. doi:https://doi.org/10.3390/nu15071596

Essa, M. M., Bishir, M., Bhat, A., Chidambaram, S. B., Al-Balushi, B., Hamdan, H., . . . Qoronfleh, M. W. (2023). Functional Foods and their Impact on Health. *Journal of Food Science and Technology, 60*(3), 820-834. doi:https://doi.org/10.1007/s13197-021-05193-3

Gusriani, I., Astuti, S. D., Pato, U., Ruriani, E., Lalel, H. J., Anis, U., . . . Nofreeana, A. (2024). Ilmu Bahan Pangan: CV HEI Publishing Indonesia. Nomor IKAPI.

Khoshgozaran-Abras, S., Azizi, M., Bagheripoor-Fallah, N., & Khodamoradi, A. (2014). Effect of brown rice flour fortification on the quality of wheat-based dough and flat bread. *Journal of Food Science and Technology, 51*(10), 2821-2826. doi:https://doi.org/10.1007/s13197-012-0716-x

Lawless, H. T., & Heymann, H. (2010). *Sensory evaluation of food: principles and practices*: Springer Science & Business Media.

Leng, G., Adan, R. A., Belot, M., Brunstrom, J. M., De Graaf, K., Dickson, S. L., . . . Preissl, H. (2017). The determinants of food choice. *Proceedings of the Nutrition Society, 76*(3), 316-327. doi:https://doi.org/10.1017/S002966511600286X

Meilgaard, M. C., Carr, B. T., & Civille, G. V. (1999). *Sensory evaluation techniques*: CRC press.

Meirisa, D., Arafah, E., & Rakhmat, A. (2024). Analisis Faktor Pendorong dan Penarik yang Mempengaruhi Keputusan Konsumen Membeli Produk Pertanian di Modern Market Kota Palembang. *Jurnal Ilmiah Pertanian dan Peternakan, 2*(1), 9-21. doi:10.35912/jipper.v2i1.2689

Nurhaedah, N., Irmayani, I., Ruslang, R., & Jumrah, J. (2023). Analisis Pendapatan dan Tingkat Kesejahteraan Rumah Tangga Petani Bawang Merah di Kelurahan Mataran Kecamatan Anggeraja Kabupaten Enrekang : Cofee Farmers. *Jurnal Ilmiah Pertanian dan Peternakan, 1*(1), 9-18. doi:https://doi.org/10.35912/jipper.v1i1.1966

Osuagwu, Udo, C., & Ifeyinwa, M. H. (2024). Comparative Evaluation of Completely Randomized Design, Randomized Complete Block Design, and Latin Square Design: A Simulation Study. *International Journal of Scientific Research in Multidisciplinary Studies, 10*(11), 75-81.

Pareyt, B., Talhaoui, F., Kerckhofs, G., Brijs, K., Goesaert, H., Wevers, M., & Delcour, J. A. (2009). The role of sugar and fat in sugar-snap cookies: Structural and textural properties. *Journal of food engineering, 90*(3), 400-408. doi:https://doi.org/10.1016/j.jfoodeng.2008.07.010

Pasaribu, A. A., Pranita, M., Amalia, A., Lubis, A. K. P., Turrahmah, M., & Malik, A. M. M. (2022). *Pengolahan Bahan Pangan Lokal untuk Mengatasi Masalah Gizi*: Merdeka Kreasi Group.

Riadi, S., Rohmah Nurazizah, G., Wakano, D., & Fadilah, R. (2023). Effect of Urea Application on Corn Productivity: A Meta-Analysis. *Jurnal Ilmiah Pertanian dan Peternakan, 1*(1), 27-34. doi:https://doi.org/10.35912/jipper.v1i1.2567

Salman, I. N. (2024). Analysis of acceptance and use of the agree mart mobile groceries marketplace application using the UTAUT-3 Model in Indonesia. *Jurnal Ilmiah Pertanian dan Peternakan, 2*(1), 23-45. doi: https://doi.org//10.35912/jipper.v2i1.5311

Sugiyono, D. (2013). Metode penelitian pendidikan pendekatan kuantitatif, kualitatif dan R&D.

Wachdijono, W., & Julhan, R. (2019). Analysis of fishery agroindustry profit opportunity in Gebang Sub-district, Cirebon Regency, West Java. *8*(1), 27-40 doi:https://doi.org/10.21776/ub.industria.2019.008.01.4

Yee, L., Ibrahim, S., R, M., Abdul Aziz, A. H., Kobun, R., Pindi, W., . . . Mamat, H. (2024). Quality Characteristics of Cookies Made with Red Rice Flour Composite Flour. *Akademik Gıda, 22*(4), 253-261. doi:https://doi.org/10.24323/akademik-gida.1609371

Yusuf, M., & Daris, L. (2019). *Analisis data penelitian: teori & aplikasi dalam bidang perikanan*: Pt Penerbit Ipb Press.

Zaifi, H., Yulastri, A., Fridayati, L., & Andriani, C. (2025). Karakteristik Sensori dan Penerimaan Panelis terhadap Keripik Berbahan Dasar Kulit Singkong. *Jurnal Teknologi Pangan dan Hasil Pertanian, 20*(1), 43-53. doi:https://doi.org/10.26623/jtphp.v20i1.12083

Zheng, R.-l., Ren, T., Niu, C.-t., Zheng, F.-y., Wang, J.-j., Liu, C.-f., & Li, Q. (2022). Anthocyanins composition and antioxidant activity of purple rice and color degradation under sunlight exposure of purple rice wine. *Journal of Food Measurement and Characterization, 16*(3), 1889-1900. doi:https://doi.org/10.1007/s11694-022-01285-6