



# Differences in Organoleptic Properties between *Cheese Sticks* Made from Wheat Flour and Red Bean Flour (*Phaseolus vulgaris L.*)

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**Abstract.** Wheat flour contains protein, particularly gluten, which, if consumed in excess, will negatively impact the human body. Therefore, it is necessary to diversify food using other ingredients that can partially or completely replace wheat flour. One of the foods that are low in gluten is red beans. Flour made from red beans is an important source of dietary protein and provides a balanced essential amino acid profile. This study aims to determine the difference in organoleptic properties between cheese sticks made from wheat flour and red bean flour (*Phaseolus vulgaris L.*). The type of research used is quantitative research with pure experimental methods and a complete randomized design approach. A total of 30 panelists and each panelist will be given a 30-gram cheese stick. The most common way of making cheddar sticks is to set up the principal batter from wheat flour and red bean flour. At that point, the cheddar cut into stick shapes is enveloped by the base mixture, put into the beaten egg, and covered in bread flour; leave in the cooler for 10-20 minutes; then, fry it. The results of the study obtained were that there was a significant difference in organoleptic properties between cheese sticks made from wheat flour and red bean flour (*Phaseolus vulgaris L.*) to the parameters of color texture and taste in  $p$ -value (0,009; 0,006; 0,000) respectively, but no difference was found in the parameters of flavor with  $p$ -value 0.064.

**Keywords:** Cheese Stick, wheat flour, red bean flour.

## 1. Introduction

Cheese sticks are one of the snacks that generally use wheat flour [1], tapioca flour or sago flour, and cheese and eggs are added [2]. Cheese sticks are generally used as a savoury snack [3]. In addition, cheese sticks can also be substituted with certain foods to complete the adequacy of nutrients in processed foods [2], [4]. One of the food ingredients that can be substituted in making cheese sticks is red bean flour.

Red bean flour has a high protein content equivalent to green beans [5]. 100 gr of red bean flour contains 22.3 g of protein, 1.5 g of fat, and 61.2 g of carbohydrates [6]. In addition, red beans also contain anthocyanins, especially cyanidin and pelargonidin [7], so red bean flour is the best substitute for making cheese sticks to increase the nutritional value [8]. Cheese is also used as an ingredient in cheese sticks, which has beneficial nutrients because it contains nutrients that are good for the body, such as protein, fat, phosphorus, calcium, iron, riboflavin, and vitamins [9].

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The substitution of red bean flour can increase protein content [10] and fiber in making cakes or sticks [11]. The use of red bean flour as a substitute for wheat flour can increase the protein content in processed foods [12]. Red beans, which are often used as snacks, can decrease the amount of wheat flour required for preparing cheese sticks.

As reported by the Indonesian Wheat Flour Producers Association, consumption flour at Indonesia has increase. While wheat generally contains high-quality nutrients including protein, vitamins, and minerals, some people have expressed concerns with a particular flour ingredient called gluten. Currently, wheat consumption is rising more quickly than that of any other grain worldwide. Consequently, the negative effects of gluten on health are receiving greater emphasis. [13].

There is a correlation between gluten consumption and those who have celiac disease, an autoimmune disorder that affects 1% of the world's population and results in reversible inflammatory processes in the mucosa of the small intestine. Acute symptoms of the disorder include bloating, diarrhea, vomiting, nausea, and constipation. Osteoporosis, anemia, and stunted development [16] can result from the malabsorption of minerals such as calcium, vitamin D [14], iron, vitamin B12, folic acid, and zinc [15]. As an extended consequence of irritation of the intestinal tract and inflammation. Additionally, wheat flour has a glycemic index of 55–59 [17]. Red bean flour is strongly recommended as a substitute for wheat flour due to the nutritious value of red beans and a number of additional medical benefits.

According to the following description, research on the organoleptic characteristics of cheese sticks made with wheat flour and red bean flour is required to gauge the level of acceptability of cheese stick products by the general audience. color, texture, flavour, and taste are the organoleptic aspects requiring to be analyzed.

## **2. Research Methods**

### **2.1. Type of Research, Place and Time**

This research is true experimental with a complete randomized design that consists of a single factor of wheat flour and red bean flour. This study includes three steps. The first is made of cheese sticks composed of beans red flour (*Phaseolus vulgaris* L.) and wheat flour. Two distinguished compositions of cheese sticks were made: 100% wheat flour (P1) and red bean flour (P2) 100%. Organoleptic testing techniques' second step and the thirdly, which involve product presentation, are connected to organoleptic testing. Four aspects are evaluated in an organoleptic assessment: colour, flavour, texture, and taste [18].

Thirty of the participants evaluated the cheese stick items. Cheese stick items are seen and tasted as part of the assessment process. Panelists complete the accompanying assessment forms concurrently. In 2023, this study will be conducted at the Halu Oleo University, Kendari's Culinary Laboratory, Faculty of Public Health. Mann Whitney test was used to examine the data.

### **2.2. Tools and Materials**

Twenty-centimeter aluminum pans, digital scales, gas burners, plastic basins, aluminum spoons, cutting boards, knives, medium glass plates, measuring cups, and square baking sheets were among the equipment utilized in the study. Wheat flour and red bean flour were the primary materials employed in this investigation. Mozzarella

cheese, eggs, bread flour, margarine, cooking oil, and water are the supplementary ingredients.

### 3. Results

The results of this research were measured based on the acceptability of cheese sticks P1 and P2 that had been made previously. The quality of P1 and P2 is based on organoleptic tests from the panelists. In detail, the results are described below.

#### 3.1. Organoleptic Properties of *Cheese Stick*

The summary of the inquiry comparing cheese sticks-based wheat flour and red bean flour was shown in Table 1.

**Table 1.** Analysis of *Cheese sticks* made from wheat flour and red bean flour.

Organoleptic parameters		$\rho$ – Value
Colour	*	0,009
Flavour	nd	0,064
Texture	*	0,006
Taste	*	0,000

Description: \* = with significant difference  
nd = no significant difference

According to the consequences of the change examination in table 1, it is realized that making with various of flour impacts organoleptic properties, specifically variety, texture and taste. However, no significant difference the smell of the cheese sticks. This condition demonstrates that treatment with various of flour influences the organoleptic properties of cheese sticks, such as colour, texture and taste.

#### Colour

The results of the Mann-Whitney test indicate that there is a significant difference in the level of preference for the color parameters of *Cheese Stick* made from red bean flour and wheat flour with a value of  $\rho < 0.05$  ( $\rho = 0.009$ ). The results of the panelists' assessment of color parameters shown in table 2.

**Table 2.** Average Results of Organoleptic Assessment of *Cheese Stick Color*

Treatment	Average Color of Cheese Stick	Category
P1	3.50 $\pm$ 0.435 <sup>a</sup>	Liked
P2	3.08 $\pm$ 0.644 <sup>b</sup>	Liked

Note: a.b = comparable letter documentation demonstrates no significant difference in the Mann-Whitney test in 5% level.

Table 2 shows the typical worth of the variety boundaries appraised by specialists for P1= 3.50 and P2 = 3.08 with the preferences classification. It can be compassed that although there are differences in color for cheese sticks made from wheat flour and red bean flour, they both get a like category assessment by the panelists.

## Flavour

The examination results for the flavour boundary showed that the worth of  $p > 0.05$  ( $p = 0.064$ ) and that means that there is no tremendous distinction in the smell class between cheese sticks produced using wheat flour and red bean flour. The consequences of the specialists' appraisal of flavour boundaries shows in Table 3.

**Table 3.** Average Results of Organoleptic Assessment of Cheese Stick Flavour

Treatment	Average Color of Cheese Stick	Category
P1	3.28 ± 0.449 <sup>a</sup>	Liked
P2	3.50 ± 0.394 <sup>a</sup>	Liked

Note: a.b = Similar letter notation indicates no real difference in the Mann-Whitney test level having a value of 5%.

Table 3 indicates that the participants average value for the flavour characteristic on the cheese stick is 3.28 for P1 and 3.50 for P2, depending on the liking category. Therefore, it might be said that even if the mean ratings of the two treatments differed, the participants evaluated the cheese sticks made with wheat flour and red bean flour in the category of likes.

## Texture

Based on the results of the Mann-Whitney test for the texture category, it is known that there is a significant difference in the texture of cheese sticks made from wheat flour and red bean flour with a value of  $p < 0.05$  ( $p = 0.006$ ). The results of the panelists assessment of the texture of cheese sticks can be seen in Table 4.

**Table 4.** Average Results of Organoleptic Assessment of Cheese Stick Texture

Treatment	Average Color of Cheese Stick	Category
P1	3.43 ± 0.410 <sup>a</sup>	Liked
P2	2.98 ± 0.688 <sup>b</sup>	Liked

Note: a.b = Similar letter notation indicates no significant difference in the Mann-Whitney test level having a value of 5%.

In Table 4, panelists assessed the average value for the cheese stick texture parameter in the category of likes at P1 = 3.43 and P2 = 2.98. Based on the evaluation findings, it can be inferred that every panelist offered ratings in the category of loving the texture of cheese sticks produced from wheat flour and red bean flour despite panelist disparities in values.

## Taste

The analysis results for the taste parameters indicated that the taste category of cheese sticks made with wheat flour and red bean flour differs significantly, with a value of  $p > 0.05$  ( $p = 0.000$ ). Table 5 displays the findings of the panelists' evaluation of the flavor parameters.

**Table 5.** Average Results of Organoleptic Assessment of Cheese Stick Flavour

Treatment	Average Color of Cheese Stick	Category
P1	3.17 ± 0.240 <sup>a</sup>	Liked
P2	3.57 ± 0.254 <sup>b</sup>	Most liked

Note: a,b = Similar letter notation indicates no real difference in the Mann-Whitney test level having a value of 5%.

As shown in Table 5, the average value for the texture parameter of cheese sticks rated by panelists was P1 = 3.17 with the likes category and P2 = 3.57 with the most likes category. Based on the evaluation discoveries, it can be inferred that both panelists were offered a rating in the category of preferring the flavor of cheese sticks prepared with wheat flour and red bean flour despite the variations in values.

## 4. Discussion

### 4.1. Color

It is known that wheat flour and red bean flour have differences in colour visual of cheese stick. Where cheese stick which is made from wheat flour is golden yellow while cheese stick which is made from brownish-yellow red bean flour. The brown color comes from the peel of the red beans which contains anthocyanins [19]. The colour of the food is an initial assessment of the appearance of a food dish. Colour and appearance are visual descriptions of the state of a food that causes panelists to be interested and like a product [20]. The color contained in a food comes from a certain number of pigments found in these ingredients [21].

Wheat flour produces golden yellow cheese sticks because the initial color of wheat flour is white. After being fried, the golden yellow and brighter color of the cheese sticks is produced. At cheddar stick based red bean flour produces cheddar stick which is earthy yellow in variety brought about by the underlying shade of red bean flour is dull red so that cheddar stick, and subsequent to going through the broiling system obtains a caramel yellow tone. Red bean flour's presence of methyladin compounds, which have the potential to darken the color [22].

Considering the fact that colored cheese sticks even though the outcomes varied, judges provided evaluations of both cheese sticks It appears in the "likes" section. The panel of panelists gave cheese sticks produced with red bean flour the lowest grade of 3.08 and cheese sticks made with wheat flour the best rating of 3.50. Research conducted by Rahmawati and Indrawati (2023) shows that the average value of giving red bean flour to snack bars is lower, which is as much as 4.25±1.291 [23]. This is also in line with research conducted by Janggat, et al (2022) which states that the acceptability for color parameters on a given stick is more (75%) red bean flour has the lowest average value because it produces a reddish-brown color [24].

The panel of reviewers given cheese sticks produced from red bean flour a low score for color criteria because there are people who prefer subdued, muted hues to bold, dark ones. The reddish colour of red bean flour influences the colour of the product it is used to make; the more red bean flour is used, the deeper the final product's colour [24].

#### 4.2. Flavour

The wheat flour and red bean flour have no difference in the Flavour of cheese stick. This is due to the use of other ingredients in produce cheese sticks, such as cheese, creating a distinctive cheese stick flavour and tends to dominate, certain the flavour of cheese. The flavour and consistency of an ingredient greatly affect the taste produced from the material because it can affect the speed of stimulation of salivary glands. The Flavour formed is the result of the interaction of various ingredients added in making cheese sticks and various reactions during the processing process occur, so that the assessment results show that the panelists like the flavour of the cheese stick of the two treatments, then cheese sticks that use wheat flour and red bean flour are still in the like category, The average value of the panelists assessment of the flavour Cheese sticks are 3.28 to 3.50. The panellists rated the procedure involving wheat flour the lowest (3.28), dropping into the “like” group, and the treatment utilizing red bean flour the highest (3.50), also putting into the same category.

The members of the panel preferred the fragrance of the cheese stick out of the two treatments, according to the assessment findings. Nonetheless, the flavour of the cheese sticks created with red bean flour often receives good marks from the judges. This is a result of the robust, unique flavour of red bean flour. If customers find the flavour to be acceptable or enjoyable, the dish is considered to be of appealing and delicious quality [21]. Research conducted by Nurlina et al (2015) shows that consumers prefer foods that have a distinctive Flavour [25]. In addition, research conducted by Sumarjo et al (2023), it is known that brownies with the addition of 70% red bean flour are preferred by panelists because they have a distinctive flavour and increase appetite [26].

#### 4.3. Texture

There is a difference in texture between cheese sticks made from wheat flour and red bean flour. Where cheese stick which is made from wheat flour produces a texture cheese stick which is softer whereas cheese stick which is made from red bean flour produces a texture cheese stick which is a bit dry. The soft texture of flour-based cheese sticks is influenced by gluten content. The advantages of gluten include binding and elasticizing the dough, making it easier to shape [27]. Wheat flour contains gluten, which causes food items manufactured from wheat to be more easily expanded and chewy [28]. While cheese stick which is made from red bean flour produces a texture cheese stick which is a bit dry because it does not contain gluten at all. Hence the texture cheese stick produced drier than Cheese Stick which uses wheat flour so it is less preferred by panelists.

Due to the absence of gluten in red bean flour, the bonding of the net structure The resultant cheese stick is less crispy y brittle because what is created is weaker as a result of the decreased gluten protein concentration [29]. According to research by Ardiansyah (2020), panellists dislike crumbly cookies, which is reason additional red bean flour added to pastries has this effect [30]. This is according to research that indicates bread’s texture quality declines as red bean flour replacement increases [31].

The bite of the cheese sticks may have an impact on the panelists’ preferred texture. The average evaluation of panellists indicated a preference for cheese stick textur prepared from wheat flour and red bean flour, which was based on results of organoleptic tests for texture criteria. The panellists’ average evaluation score ranged from 2.98 to 3.40. Red bean flour-based cheese sticks had the lowest panellist score of

2.98 for texture, although the sticks were nonetheless categorized as in the same category. The maximum value for wheat flour-made cheese sticks is 3.40. Based on the evaluation's findings, it can be said that the panellists preferred the two treatments cheese sticks textures.

#### 4.4. Taste

To sum up, the organoleptic qualities of cheese sticks taste different when made with red bean flour and wheat flour. The participants' average rating of the flavour of a cheese stick ranged from 3.17 to 3.57. With a score of 3.17, all of the panelists' evaluations of sticks of cheese set up with wheat flour fell into the similar group. The study participant rates cheese sticks made with red bean wheat as likes and highly admiration. With a score of 3.57, a total of three of the thirty panelists said they liked it, while the other twenty-seven said they admired it highly lot. Based on the panelists' evaluations a number of parts, such as the ingredients and cooking method, influence food flavor [32]. Methods for cooking cheese stick to the oil absorbed during the frying process; it provides an easy and savory flavor [33]. A flavor evaluation also considers the ingredients in addition to the cooking method. Based on the findings of panelist discussions about the flavor of cheese sticks, they incorporate red bean and wheat flour. The addition of cheese modifies the flavor. It is in line with Trisyani et al. (2021), who figured out that the taste of cheese sticks is influenced by its inclusion, in addition to flour [34]. In addition, research conducted by Perwita et al. (2021) stated that the participants embrace the reliable and distinctive taste of red beans, which becomes more noticeable with the more red bean flour proportions in the food [29]. Taste is often still cited as the most significant component affecting panelists' rating of a particular meal type during studies of food preferences [35].

## 5. Conclusion

The conclusions of the research are as follows:

1. There are variations in organoleptic characteristics, including color, texture and taste, between Cheese Sticks using wheat flour and red bean flour (*Phaseolus vulgaris* L.).
2. There were no observable differences in the organoleptic characteristics smell between Cheese Sticks using wheat flour and red bean flour (*Phaseolus vulgaris* L.).

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