



## Analysis of Consumer Acceptance of Three Milk Brands Using Hedonic Testing in Jember Regency

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**Abstract.** Milk is a highly nutritious food that plays an important role in meeting the nutritional needs of the community, making consumer acceptance a key factor in the success of dairy products in the market. Various brands of factory-produced liquid milk have long been available in the Indonesian market and possess different product characteristics and market positions. Therefore, a comparison of consumer acceptance based on sensory attributes is necessary to better understand consumer preferences for each brand. This study aims to analyze consumer acceptance of three brands of factory-produced liquid milk marketed in Jember Regency's modern markets based on sensory attributes. The research used a hedonic test method involving 78 untrained panelists from the general public. The samples tested consisted of three milk brands (Greenfields, Ultra Milk, and Diamond) with three flavor variants: full cream, strawberry, and chocolate. The sensory attributes observed included color, aroma, taste, and viscosity, using a five-point hedonic scale. Data were analyzed using analysis of variance (ANOVA) at a significance level of 5% and followed by Duncan's test if significant differences were found. The research findings indicate that brand variations significantly impact the aroma, taste, and viscosity characteristics in the majority of variants, whereas the effect on color is contingent upon the specific flavor variant. The Diamond sample demonstrated the highest acceptance level in the full-cream milk variant, likely due to its higher total fat content. In the strawberry milk variant, all sensory attributes were significantly influenced by brand differences, with the Greenfields sample having the highest preference level, supported by its more attractive color and balanced flavor due to its higher sugar and fat content. In the chocolate milk variant, brand differences significantly affected the color, aroma, and taste attributes, while viscosity showed no difference. Overall, sensory attributes, particularly taste and aroma, are important factors that influence consumer acceptance of dairy products.

**Keywords:** sensory evaluation, dairy products, consumer preference, organoleptic properties, milk quality.

### 1. Introduction

Milk is one of the highly nutritious food products that play an important role in meeting the nutritional needs of the community (Pratiwi *et al.*, 2020). According to Smith *et al.* (2022) milk contributes to the global supply of 28 nutrients and serves as the primary dietary source of calcium, accounting for 49% of global availability, followed by vitamin B2 (24%), lysine (18%), and dietary

fat (15%). In addition, milk provides more than 10% of the global availability of several other essential nutrients, including five indispensable amino acids, protein, vitamins A, B5, and B12, as well as the minerals phosphorus and potassium. Therefore, milk consumption is not only important for children, but also for everyone of all ages to be included as part of a balanced and highly nutritious food consumption pattern.

As public awareness of the importance of nutritional fulfillment increases, dairy products available in the market have experienced significant growth. Various milk brands available in modern markets offer a diverse range of options, including price, quality, processing methods, and flavor variations. This diversity of characteristics gives consumers many choices, but it also leads to competition among producers in attracting and retaining consumer interest and loyalty. This condition makes consumer acceptance of a dairy product a determining factor in the product's success in the market. Various brands of commercially produced liquid milk have long been available in the Indonesian market and exhibit different product characteristics and market positions. Therefore, evaluating consumer acceptance based on sensory attributes is essential for understanding consumer preferences among commercially available milk brands.

Sensory attributes of food products play a crucial role in shaping consumer acceptance, preferences, and consumption behavior (Su *et al.*, 2022; Shariati *et al.*, 2025). The sensory test is a scientific method that evaluates food products' texture, look, flavor, and scent using human senses (Destarianto *et al.*, 2017). To understand consumer responses to the characteristics of dairy products, sensory analysis is needed as a scientific method that can be used to measure, analyze, and interpret human sensory responses to the properties of food products. Through sensory analysis, consumer preferences and perceptions of a product can be objectively and systematically determined, which can then be used as a basis for quality evaluation and product development.

The hedonic test is one of the sensory analysis methods used to assess consumer preference. The hedonic test is conducted by measuring the panelists' level of liking using a specific scale, ranging from very dislike to very like. Several studies widely use this test due to its ability to describe consumer acceptance of the food products under investigation (Su *et al.*, 2022). Lim *et al.* (2022) reported that sensory analysis is widely applied in the food industry to assess product quality and consumer acceptance by evaluating attributes such as texture, taste, appearance, aroma, and flavor through the use of human senses, including sight, smell, taste, and touch. The primary ingredients of dairy products are essential in determining their sensory profiles; milk fat is known to have a significant impact on distinctive sensory qualities such as flavour, texture, taste, and scent.

Data from 2023 show that community spending in Jember Regency on factory-produced liquid milk was recorded at Rp. 371.43 per capita per week, a very significant increase compared to the previous year's figure of Rp. 110.94 per capita per week (Darmawan, 2024). This increase indicates growth in factory-produced liquid milk consumption in the community, made possible by increased public awareness of the nutritional value of milk, changes in consumption patterns, and product accessibility in modern markets. This condition makes Jember Regency a relevant area for studying consumer acceptance of milk products.

The objective of this study is to analyze the level of consumer acceptance of three brands of factory-produced liquid milk marketed in modern markets in Jember Regency based on sensory attributes using a hedonic test, as well as to determine the level of consumer preference for each brand. The evaluation involved community members as general panelists consisting of adults who were expected to represent broader consumer preferences. Prior to conducting the hedonic test, the panelists were first selected and appointed as permanent panelists to ensure consistency and reliability in the evaluation process of the three milk brands tested. The results of this study are expected to provide empirical information regarding the level of consumer acceptance and preference for liquid milk products marketed in modern markets and to provide input for the dairy industry to support innovation in developing products that align with consumer preferences, thereby improving product quality, competitiveness, and the level of product acceptance in the market. Faria *et al.*, (2025) stated that innovation needs to be a continuous practice in the dairy industry.

## 2. Materials and Methods

### 2.1. Materials

The material used in this study was factory-produced liquid milk marketed in modern markets in Jember Regency. The samples used consisted of three brands: Diamond, Ultra, and Greenfields, each with the following flavor variations: full cream, strawberry, and chocolate, labeled as follows: A101: Greenfields brand milk, fresh milk flavor  
A202: Ultra Milk brand milk, fresh milk flavor  
A303: Diamond brand milk, fresh milk flavor  
B101: Greenfields brand milk, strawberry flavor  
B202: Ultra milk brand milk, strawberry flavor  
B303: Diamond brand milk, strawberry flavor  
C101: Greenfields brand milk, chocolate flavor  
C202: Ultra Milk brand milk, chocolate flavor  
C303: Diamond brand milk, chocolate flavor

All samples used in the study were fit for consumption, within their expiration dates, and stored according to the storage instructions on the packaging before testing.

## 2.2. Methods

This study employed a quantitative experimental approach through hedonic testing to assess consumer acceptance of commercially produced liquid milk brands marketed in modern retail outlets in Jember Regency. The research was conducted in December 2025 in Jember Regency, East Java, Indonesia. It formed part of a broader study investigating consumer preferences for dairy products available in modern retail markets. The samples comprised three widely marketed liquid milk brands, namely Greenfields, Ultra Milk, and Diamond, each with fresh milk (full cream), strawberry, and chocolate flavor variants. Sample selection was based on product availability in the market and the level of consumer consumption of liquid milk products.

Acceptance analysis (hedonic testing) was conducted to determine the public's level of preference for a product and to identify the most popular product (Usman *et al.*, 2023). The panelists selected for the study were untrained panelists (consumer panelists), drawn from the general public in Jember Regency, consisting of adults, with a total of 78 panelists.

The hedonic testing conducted included observations on the attributes of color, aroma, taste, and viscosity. The evaluation was conducted using a five-point hedonic scale, where scale 1 = strongly dislike and scale 5 = strongly like (Zhi *et al.*, 2016). Each sample presented to the panelists was coded and served randomly to minimize evaluation bias. Panelists were asked to rinse their mouths with mineral water before and between sample evaluations to avoid the influence of residual taste from previous samples (García-Gómez *et al.*, 2022).

## 2.3. Statistical Analysis

The data from the hedonic test results were analyzed using an analysis of variance (ANOVA) with a significance level of 5% ( $\alpha = 0.05$ ) to determine the influence of brands and panelists on each sensory attribute. If the ANOVA results showed a significant effect, the analysis was continued with the Duncan Multiple Range Test (DMRT) to determine the level of preference differences between brands. All data analysis was performed using SPSS 30 software.

## 3. Result and Discussion

The panelists involved in this study were members of the general public (untrained panelists) who regularly consume liquid milk and represent potential consumers in the market. The use of untrained panelists aimed to obtain a realistic assessment of product liking and acceptance based on actual consumer perceptions. However, compared with trained panelists, untrained panelists have several limitations, as their evaluations tend to be more subjective and may be influenced by personal preferences, previous consumption experiences, habits, and individual conditions during

the evaluation process. Nevertheless, the use of general consumers as panelists was appropriate for the purpose of this study, which was to assess consumer liking and acceptance of commercially available liquid milk products.

### 3.1. Results of Hedonic Test for Fresh Milk Variant

Table 1 the analysis results show that the three milk brands observed have a significant effect on the aroma, taste, and viscosity attributes (Sig. < 0.05), while for the color attribute, the fresh milk variant in samples A101, A202, and A303 showed no significant difference.

Table 1. Analysis of Variance Results for Hedonic Test of Fresh Milk Variant.

Attribute	Source	df	F statistic	Sig.
Color	Sample	2	0.982	0.377
	Panelist	75	2.082	0.000*
Aroma	Sample	2	3.821	0.024*
	Panelist	75	2015	0.000*
Taste	Sample	2	5.699	0.004*
	Panelist	75	3.844	0.000*
Viscosity	Sample	2	8.021	0.000*
	Panelist	75	1.976	0.000*

Description: \* has a real impact on  $\alpha = 0.05$ .

Table 2, all samples were in the same subset column with an average value of 3.39 for A101, 3.30 for A202, and 3.46 for A303. This result is supported by visual observation, where all three samples exhibited a relatively homogeneous yellowish-white color without any noticeable differences in intensity or brightness. This color uniformity indicates that brand differences do not significantly affect the panelists' perception of color, which is likely due to the common characteristics of fresh milk with relatively uniform fat content, causing it to reflect light evenly.

Table 2. Duncan's Test Results for Fresh Milk Variant.

Attribute	A101	A202	A303
Color	3.39 <sup>a</sup>	3.30 <sup>a</sup>	3.46 <sup>a</sup>
Aroma	2.93 <sup>a</sup>	2.74 <sup>a</sup>	3.09 <sup>b</sup>
Taste	2.78 <sup>a</sup>	2.75 <sup>a</sup>	3.09 <sup>b</sup>
Viscosity	2.87 <sup>a</sup>	3.01 <sup>a</sup>	3.29 <sup>b</sup>

Description: Different letters on the same line indicate significant differences based on the Duncan test ( $\alpha = 0.05$ ).

For the aroma attribute, A303 had the highest level of preference and was significantly different from A202, while A101 and A202 were not significantly different from A202, which had the lowest level of preference.

Sample A303 received the highest scores for taste and viscosity, which were significantly different from A101 and A202, while A202 had the lowest scores. The high acceptance of A303's taste is likely related to its highest total fat content, as indicated in the nutritional information on the product packaging, since milk fat acts as a flavor carrier. Milk fat is a key factor influencing the sensory characteristics of cheese, as it contributes significantly to the formation of diverse flavor compounds (Yoo & Lee, 2024). Milk fat is a key nutrient in milk that plays an important role in flavor development (Christi *et al.*, 2022). Differences in fat content can affect the

appearance of umami in milk, resulting in a more harmonious and preferred flavor profile among panelists. Conversely, samples with lower fat content tend to produce less complex and less intense flavors, potentially decreasing panelists' liking of the product.

### 3.2. Results of Hedonic Test for Strawberry Variant

Table 3 shows the results of the hedonic test showed a significant effect (Sig. < 0.05) on the attributes of color, aroma, taste, and viscosity of strawberry-flavored milk. This indicates that differences in brand and product composition between brands result in distinct sensory characteristics that can be perceived by panelists. Panelist factors also showed a significant influence on most attributes, reflecting differences in preferences and sensitivity among panelists in evaluating the products.

Table 3. Analysis of Variance Results for Hedonic Test of Strawberry Variant.

Attribute	Source	df	F hitung	Sig.
Color	Sample	2	65.924	0.000*
	Panelist	75	0.711	0.950
Aroma	Sample	2	17.845	0.000*
	Panelist	75	1.417	0.037*
Taste	Sample	2	12.666	0.000*
	Panelist	75	1.919	0.000*
Viscosity	Sample	2	12.464	0.000*
	Panelist	75	1.915	0.000*

Description: \* has a real impact on  $\alpha = 0.05$ .

Table 4 for the color attribute, Duncan's post-hoc test showed that sample B101 had the highest level of preference, followed by B303, while B202 received the lowest score. These results align with visual observations of the samples, where the strawberry milk color in B101 appeared brighter and more vibrant than in B202 and B303, giving the impression of a more realistic and fresh strawberry flavor, making it more appealing to the panelists. Conversely, sample B202 showed the washed-out color compared to the other samples, which is suspected to have reduced visual appeal and influenced the panelists' perception of product quality, as overly pale colors are often associated with less pleasant taste or low flavoring content. Meanwhile, sample B303 had a color intensity between B101 and B202, resulting in consumer preference levels also being in the middle. Color is an important attribute in food. Even if a food has high nutritional value, excellent taste, and texture, consumers tend to consider color as an initial assessment of whether the product is good or not. They are reluctant to consume it if the displayed color is unattractive or does not match the expected color characteristics (Widyananda *et al.*, 2022). Therefore, the color brightness of the strawberry-flavored milk variants between brands in this study became an initial factor that played an important role in determining the panelists' level of preference.

For the aroma attribute, B101 received the highest preference score, followed by B202, while B303 had the lowest aroma preference level. This indicates that the strawberry-flavored milk

aroma in B101 was more preferred, likely due to its stronger and more distinctive aroma character. The aroma of milk is influenced by its fatty acid content, with a high fat content playing an important role in forming and strengthening the characteristic aroma of milk (Christi *et al.*, 2022).

Table 4. Duncan's Test Results for Strawberry Variant.

Attribute	B101	B202	B303
Color	3.89 <sup>c</sup>	2.42 <sup>a</sup>	3.25 <sup>b</sup>
Aroma	3.72 <sup>b</sup>	3.22 <sup>a</sup>	3.01 <sup>a</sup>
Taste	3.93 <sup>c</sup>	3.67 <sup>b</sup>	3.32 <sup>a</sup>
Viscosity	3.21 <sup>a</sup>	2.70 <sup>a</sup>	3.07 <sup>a</sup>

Description: Different letters on the same line indicate significant differences based on the Duncan test ( $\alpha = 0.05$ ).

Regarding the taste attribute, there were significant differences between brands, with sample B101 receiving the highest preference level, followed by sample B202, while sample B303 had the lowest preference level. The high acceptance of B101 by the panelists was influenced by the more balanced strawberry milk flavor. Taste is a crucial aspect of food quality control because it is formed by a combination of various taste elements. Adding strawberry fruit paste has been proven to significantly improve the flavor (Rati *et al.*, 2018). Additionally, the total sugar and fat content is higher, as stated on the packaging's nutritional information. Higher sugar content contributes to enhancing the perception of sweetness, while fat acts as a flavor carrier, increasing the intensity and stability of the taste and providing a better creamy sensation. The combination of higher sugar and fat content resulted in a more harmonious flavor profile, leading to higher panelist acceptance of product B101 compared to other brands.

Regarding the viscosity attribute, B101 had the highest preference value, while B202 had the lowest. This difference indicates that the viscosity level more suitable to the panelists' expectations contributed to the product's preference level.

Table 5. Analysis of Variance Results for Hedonic Test of Chocolate Variant

Attribute	Source	df	F-value	Sig.
Color	Sample	2	16.529	0.000*
	Panelist	75	1.282	0.104
Aroma	Sample	2	9.662	0.000*
	Panelist	75	1.829	0.001*
Taste	Sample	2	15.508	0.000*
	Panelist	75	2.205	0.000*
Viscosity	Sample	2	2.039	0,134
	Panelist	75	1.911	0,000*

Description: \* has a real impact on  $\alpha = 0.05$

### 3.3. Results of Hedonic Test for Chocolate Variant

Table 5 the test results show that brand variants have a significant effect on consumer preference for milk color, aroma, and taste attributes (Sig. < 0.05). Table 6 for the color attribute, the three brands showed differences in panelist preference levels, with C303 having the highest preference value, followed by C202 and C101 being the lowest. Based on visual observation, C101 milk appears to have a paler and less intense brown color compared to the other samples, giving

the impression of a more diluted drink or one with lower cocoa intensity, potentially reducing its visual appeal to the panelists. C202 exhibits a more homogeneous and slightly more intense brown color than C101, suggesting better quality and increasing panelist preference, although it is not the most preferred. Meanwhile, C303 milk displays the darkest and most uniform brown color, reflecting a higher cocoa color intensity and a richer, higher-quality product impression, which aligns with the hedonic test results showing the highest color preference for that brand.

Table 6. Duncan's Test Results for Chocolate Variant

Attribute	C101	C202	C303
Color	3.04 <sup>a</sup>	3.31 <sup>b</sup>	3.73 <sup>c</sup>
Aroma	3.30 <sup>b</sup>	3.32 <sup>b</sup>	2.85 <sup>a</sup>
Taste	3.59 <sup>c</sup>	3.23 <sup>b</sup>	2.85 <sup>a</sup>
Viscosity	3.27 <sup>a</sup>	3.43 <sup>a</sup>	3.47 <sup>a</sup>

Description: Different letters on the same line indicate significant differences based on the Duncan test ( $\alpha = 0.05$ ).

The aroma attribute shows a tendency for differences in preference levels between brands, with the highest value obtained for sample C202, which is significantly different from C101 and C303, and the lowest preference level for sample C303. This suggests that the panelists prefer the intensity and character of certain brands' aromas more. The taste attribute shows that C101 has the highest level of preference and is significantly different from C202 and C303, with C303 having the lowest level of preference. For the viscosity attribute, C303 also shows the highest preference value, although it does not show a significant difference from C202 and C101, and C101 has the lowest level of preference. Texture is especially important because it has a strong impact on consumer perception and overall product quality (Pădureț, 2025).

#### 4. Conclusion

The research results show that brand differences significantly affect the sensory characteristics of milk, particularly for aroma, taste, and viscosity attributes, while the impact on color attributes depends on the flavor variant. In fresh milk variants, brand differences do not significantly affect color, but they do significantly affect sensory tests for aroma, taste, and viscosity, with sample code A303 showing the highest level of panelist acceptance. This is likely due to its higher total fat content compared to other brands. In strawberry milk variants, all sensory attributes are significantly influenced by brand differences, with sample B101 having the highest level of preference, supported by its more attractive color, more distinctive aroma, and better taste balance due to higher sugar and fat content. Meanwhile, in chocolate milk variants, brand differences significantly affect color, aroma, and taste sensory tests but do not significantly affect viscosity testing. The color characteristics and cocoa flavor intensity are likely the main factors in panelist acceptance. These findings suggest that consumer preferences for liquid milk are influenced not only by the sensory characteristics of the product but also by other factors beyond

sensory attributes. Therefore, future studies should investigate the effects of nutritional composition, price, packaging, brand image, and consumer purchasing behavior to provide a more comprehensive understanding of the factors that influence consumer acceptance and purchasing decisions regarding liquid milk products.

### Abbreviations

DMRT	Duncan Multiple Range Test
ANOVA	Analysis of Variance

### Data Availability Statement

Data will be made available on request

### Credit Authorship Contribution Statement

**Helda Jaya Puspita:** article draft writing, data analysis, resources. **Rini Hardiyani:** Supervision, validation. **Rallyanta Tarigan:** Supervision, validation. **Amalia Malik:** Supervision, validation. **Canggih Nailil Maghfiroh:** Supervision, validation

### Declaration of Competing Interest

The authors of this manuscript declare that there are no conflicts of interest or competing interests.

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