April – June, 2025
Original Article
DOI: http://dx.doi.org/10.30867/action.v10i2.2435

Pages: 369 – 376

AcTion: Aceh Nutrition Journal
p-issn 2527-3310; e-issn 2548-5741

Analysis hedonic and sensory profile of gayam flour-based velva (*Inocarpus fagifer*) as a local food product inovation

Analisis hedonik dan profil sensori velva berbasis tepung gayam (Inocarpus fagifer) sebagai inovasi produk pangan lokal

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Article History:
Received: February 27, 2025; Revised: May 01, 2025; Accepted: May 21, 2025; Published: June 12, 2025.

Publisher:
Politeknik Kesehatan Aceh
Kementerian Kesehatan RI

Abstract

Velva is a cold and sweet food made from vegetable and fruit puree, in this study the making of velva was modified by using gayam flour to increase the fiber content. Gayam is a local food ingredient that is abundant and has high nutritional and fiber content. This study aimed to determine the sensory attributes that appear and the selected velva products based on panelist assessments. This study was conducted at the IPB Dramaga Campus between June and December 2024. Quantitative Descriptive Analysis (QDA) was used to assess the sensory profile, whereas hedonic testing was conducted using a survey. Panelists for the QDA analysis used trained panelists who had gone through a series of selections; thus, eight trained panelists were obtained for hedonic testing using 35 semi-trained panelists. The results of the QDA test were analyzed descriptively, and the results of the hedonic test were tested using ANOVA. Based on the analysis, the results obtained were significantly different for each sensory attribute of the velva product; the highest difference was in the taste attribute with an F value of 11,22 and a p value of 0,000. Conclusion: Sample A3K2 was a Velva product with the best sensory profile and acceptance by the respondents

Keywords: Inocarpus fagifer, Healthy snacks, local food, QDA, Hedonic test

Abstrak

Velva merupakan makanan dingin dan manis terbuat dari puree sayur dan buah, Gayam merupakan bahan pangan lokal yang melimpah dan memiliki kandungan gizi cukup baik serta memiliki kandungan serat tinggi. pada penelitian ini, pembuatan velva dimodifikasi dengan menggunakan tepung gayam untuk meningkatkan kandungan serat. Penelitian ini bertujuan untuk mengetahui atribut sensori yang muncul pada velva gayam serta mengetahui produk velva terpilih berdasarkan penilaian panelis. Penelitian ini dilakukan di Kampus IPB Dramaga pada bulan Juni-Desember 2024. Metode yang digunakan untuk menilai profil sensori adalah Quantitative Descriptive Analysis (QDA), sedangkan untuk pengujian hedonic dilakukan dengan survey. Panelis untuk analisis QDA menggunakan panelis terlatih yang telah melalui serangkaian seleksi sehingga didapatkan sejumlah 8 orang panelis terlatih, untuk uji mutu hedonik menggunakan panelis semi terlatih sebanyak 35 orang. Hasil Uji QDA dianalisis secara deskriptif dan hasil uji hedonic di uji menggunakan Anova. Berdasarkan analisis didapatkan hasil yang berbeda signifikan pada setiap atribut sensory produk velva, perbedaan tertinggi terdapat pada atribut rasa dengan nila F sebesar 11,22 dan nilai p=0,000. Kesimpulan, bahwa sampel A3K2 merupakan produk velva yang memiliki profil sensori dan penerimaan terbaik oleh responden.

Kata Kunci: Inocarpus Fagifer, Kudapan Sehat, Pangan Lokal, Uji Hedonik

Introduction

The development of the food and beverage industry has increased rapidly. DKI Jakarta and West Java Provinces in 2022 are the top two provinces in the food and beverage business (BPS, 2022). In the 2018 Riskesdas data, the prevalence of sweetened food consumption in the community in West Java was 51,1% higher than the national prevalence rate of 40,1%, while the prevalence of sweetened drink consumption was 63,91%, which is still higher than the national figure of 61,27% (Kementerian Kesehatan RI., 2018). The Central Statistics Agency (BPS) stated that 69% of Indonesians consume fast food, and West Java is the second-highest province in terms of growth in fast food outlets (BPS, 2023). Teenagers in Java and Bali prefer fast food (Briawan et al., 2023), and their high interest in consuming fast food has caused 23,2% of the Indonesian population to become obese (Kemenkes RI., 2023). Excessive sugar consumption and lack of fiber consumption are causes of non-communicable diseases, such as diabetes mellitus (Gani et al., 2023).

Velva is a cold and sweet food product included in the frozen dessert product, made from a mixture of fruit or vegetables, sweeteners, and stabilizers that are then processed into puree (porridge), which is consumed in frozen form to resemble ice cream (Waliyurahman et al., 2019). The use of fruit and vegetables lowers Velva protein and fat (Manggabarani et al., 2019) but has a fairly good fiber content (Suprayatmi et al., 2017). The low protein content is caused by the use of vegetables and fruits as raw materials, where the protein content in vegetables and fruits is relatively low, but some vegetables and fruits can be a source of fiber; therefore, modifications are needed to increase the protein and dietary fiber content. Modifying velva using gayam is expected to help increase the fiber and protein content. In this study, the velva formulation used gayam as the basic ingredient, because the nutritional content of gayam that has been floured contains 74,59 g of carbohydrates, 9,49 g of protein, 3,62 g of fat and 13,79 g of dietary fiber (Rahayu et al., 2024), Apart from that, gayam also contains vitamins such as vitamin B2, B6 and fatty acids (Huml et al., 2016) so it is hoped that velva that uses gayam flour has better protein and fiber content than velva formulations that use other ingredients.

The liquid ingredients used in the Velva formulation were milk and coconut. The Velva formulation, which is added with milk, is expected to increase the protein and calcium values, which is based on the Indonesian food composition table (IFCT) Cow's milk contains 143 mg calcium/100g (Kemenkes RI., 2017). The addition of coconut milk is expected to increase the consumption of medium-chain saturated fatty acids or medium-chain triglycerides (MCT) because it is believed to have health benefits (Hewlings, 2020). One health benefit of consuming coconut milk is its ability to reduce food intake and maintain body weight (St-Onge et al., 2014).

This study aimed to evaluate the sensory attributes of gayam flour-based velva using the Quantitative Descriptive Analysis (QDA) method and to determine the best formulation based on hedonic tests by panelists. There has been no in-depth sensory study on the use of gayam flour in frozen dessert products such as velva, and the lack of exploration of local foods as an alternative functional food makes this study have the potential to be further developed to become healthier alternative snacks.

Methods

This research is an experimental laboratory research conducted in two stages, namely, the stage of sensory attribute analysis of velva gayam products using the Quantitative Descriptive Analytic (QDA) method and the stage of selecting the most preferred velva gayam product with hedonic analysis. This research has passed the ethical review at the ethics commission of the Faculty of Medicine, Sultan Ageng Tirtayasa University with number 77 / UN43.20 / KEPK / 2024.

Materials In this study, the materials needed to conduct QDA analysis and Hedonic Test have slight differences, namely in the hedonic analysis, the materials needed include Velva gayam with five formulations, Questionnaires, Mineral water; for the QDA analysis, there are additional materials, namely white bread and basic flavor solution as a reference to describe the taste of velva gayam.

The basic flavor solution consists of a sweet solution made from 2,0 grams of sugar, a sour solution made from 0,15 grams of citric acid, a salty solution made from 0,75 grams of salt or NaCl, a solution that has a bitter taste made from 0,15 grams of caffeine and a solution that has a savory taste made from 0,25 grams of Monosodium glutamate.

Tools

The equipment required to conduct the QDA and hedonic tests were velva cups and spoons, pens, paper, and a freezer to keep the velva cold. The tools used to make velva are a hand-held spatula, mixer, measuring cup, spatula, and scales.

In this study, the manufacture of Velva products was the result of a modification of the research conducted by Murni (2018), which was then formulated into five formulas with the following sample codes:

A1K2: Velva gayam made from skim milk
A2K2: Velva gayam made from thick coconut milk
A3K2: Velva gayam made from full cream milk
A4K2: Velva gayam made from medium coconut milk
A5K2: Velva gayam made from liquid coconut milk

Sensory Profile Analysis

The Quantitative Descriptive Analytic (QDA) method was used in the sensory profile analysis stage. Trained certified panelists were used for this analysis. The selection of panelists begins with screening using the inclusion and exclusion criteria determined by the researcher. The inclusion criteria were as follows: 1. Have attended QDA training, 2. There was no history of allergies or intolerance to the main ingredients of velva, consisting of milk, nuts, and coconut milk; 3. Have knowledge and liking for ice cream and its derivative products such as shorbet, velva, and gelato. The exclusion criterion was illness.

Eight trained panelists were obtained based on the screening results according to Heymann et al. (20the 12) To conduct QDA analysis only 8-10 trained requiredsts were needed. Trained panelists are panelists with high sensitivity to the sensory attributes being tested. According to the National Standardization Agency, trained panelists are able to detect sensory attributes better than general or less-experienced panelists.

The selected panelists will then conduct a Focus Group Discussion (FGD) stage, where at this stage, the panelists will determine the assessment scale and the detected sensory attributes, and the panelists agree on an assessment scale starting from number 1 for the assessment of attributes that have the lowest intensity level and number 10 for attributes that have the highest intensity. FGD is carried out for one hour, During the discussion, the panelists will identify what attributes are detected, and if there is a difference, a second identification will be carried out so that all panelists agree on what attributes have been detected. This was performed to minimize bias. After agreement was reached, the assessment process was continued.

Hedonic Analysis

Hedonic analysis was conducted to determine the level of panelists' preference for the velva gayam product, based on hedonic quality analysis, and the most preferred velva product was selected. The panelists used in this study were semi-trained panelists, with a sampling method using quota sampling. The panelists used in this study were aged 17-45 years, experienced in participating in hedonic tests, and living in the research location area.

This study used 35 semi-trained panelists were included in the study. The selection of panelists was carried out by applying the following inclusion criteria: 1) panelists did not have allergies to components contained in velva gayam, 2) panelists were not sick, and 3) they were willing to be present during the test. On the day of testing, the panelists were asked to stop consuming food or drinks that had too strong a taste. Hedonic assessment includes Aroma, Taste, Texture, Mouthfeel and Aftertaste of velva gayam products. A scale of 1 is given for attributes that are very disliked, and a scale of 5 is given for attributes that are most liked.

Data Analysis

The data obtained in this study will be quantitatively descriptive, and QDA data will be presented in the form of a spider web to determine the distribution of panelists'

assessments of the sensory profile of the velva gayam. The hedonic analysis data will be presented in the form of different test results using Tukey's post-hoc ANOVA to determine whether there is a difference in taste for each velva gayam formula. The preferred Velva product was then selected. Data analysis was performed using SPSS 20 software.

Result and Discussion

Velva is a cold food derived from ice cream, which is made from fruit or vegetable puree, with added sweeteners and stabilizers (Sakawulan et al., 2014), and contains less fat (Mega et al., 2019) and more fiber (Isnaini et al., 2022). Before the Velva product is consumed by the wider community, sensory profile analysis and hedonic analysis are first carried out to determine whether the Velva Gayam product is acceptable to the community.

Quantitative Descriptive Analysis

Based on the panelists' assessment of the five velva gayam formulas, several main sensory attributes were detected, including aroma, texture, appearance, taste, and mouthfeel. Aroma is a sensory attribute obtained when the sense of smell is exposed to an odor or fragrance. The aroma attributes that appear in velva gayam are coconut milk, milk, sweet, and peanut aroma, the distribution of which is shown in Figure 1.

According to Goff and Hartel (2013), the use of liquid ingredients in frozen food affects the aroma of the product. The aroma of milk was found in velva products with samples A1K2 and A3K2, while in samples A2K2, A4K2, and A5K2, the aroma detected was the aroma of coconut or coconut milk; for the aroma of nuts, it was only detected in sample A1K2; the sweet aroma was detected in sample A2K2 because it has a thicker coconut milk content, so the aroma of coconut smells was strong and the rancid aroma was also detected in the velva sample that uses coconut milk, but it smells the strongest in velva with sample code A4K2. The rancid aroma detected comes from velva products that use coconut milk diluents, where the fairly high fat content in coconut milk makes velva products more easily oxidized, resulting in a slightly rancid taste (Liu et al. 2021).

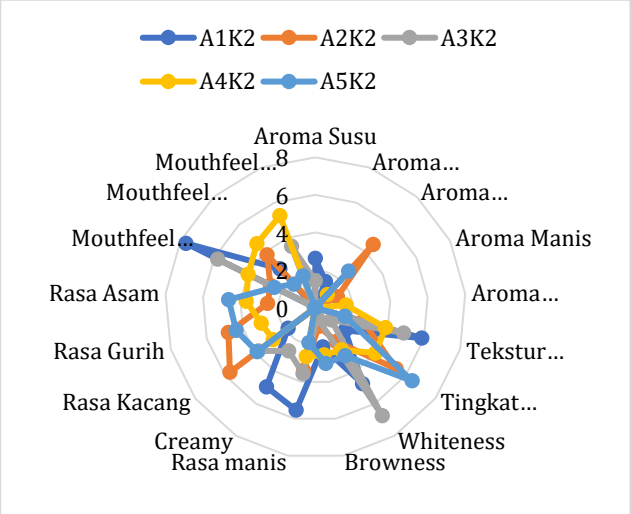

Figure 1. Velva Gayam QDA score

The next sensory attribute is the texture of the velva gayam. The texture category is a description of the quality of touch to a surface, and the texture attributes detected from the Velva product are sandy and density or ease of scooping. Based on the results of the panelist assessment, Velva with the sample code A1K2 had a sandy texture with the highest value. A sandy texture is obtained because the velva gayam product uses gayam flour, which contains high fiber, where the addition of ingredients containing high fiber can affect consumer acceptance in terms of texture and taste (Muhandri et al., 2018), whereas for the density level, the A5K2 velva sample has the highest density level. The results of the panelist texture analysis are shown in Figure 1. The density level of the A5K2 velva product is considered to have a high density level, this is due to the high fat content in the velva sample that uses coconut milk which increases the viscosity of the velva porridge, making it difficult for air to enter and the velva dough is difficult to expand (Jumiati et al., 2015).

The next assessment was the appearance of the gayam velva, which agreed that the gayam velva had a white and brown appearance. The appearance of the gayam velva can be seen in Figure 1, The velva sample that has the highest level of brightness (whiteness) is the velva with sample code A3K2, while the velva with sample code A5K2 has the highest level of brownness.

Another sensory profile detected is taste, which includes several taste attributes detected by the panelists, such as peanut, sweet, sour,

creamy, and savory flavors. The peanut flavor obtained in each sample was the taste of the floured gayam. Gayam is a typical Indonesian food ingredient originating from the legume family. Gayam flouring is carried out from dried gayam seeds, ground, and sieved to a certain level of fineness (Rahayu et al., 2024).

Figure 1 shows that each velva has advantages in each taste attribute, such as velva with sample code A1K2 having the highest value for creamy and sweet taste, because velva with coconut milk as a diluent has a different fat and protein content than milk, where the fat content in coconut milk is higher than that in milk and has a lower protein content (Kemenkes, 2017). The creamy taste attribute is obtained from the foaming and binding processes carried out by proteins, so that the lower protein content in coconut milk affects the creamy taste of velva, which uses coconut milk as a liquidizer (Goff & Hartel, 2013). The velva sample with code A2K2 had the highest value for savory and peanut flavors, while the sour taste was felt more strongly in the velva with sample code A5K2.

The last sensory attribute detected by the panelists was mouthfeel. There were 3 mouthfeel attributes were successfully identified by the panelists: sandy, fatty, and rancid mouthfeel. Mouthfeel is a term used to describe the sensation experienced by the mouth and tongue when consuming food or drinks. Sandy mouthfeel was felt most strongly on velva with sample code A1K2, while fatty and rancid mouthfeel was felt most strongly on velva with sample code A4K2. Mouthfeel on sample A1K2 felt more sandy compared to sample A4K2 because the difference in liquid ingredients used, the viscosity level of the liquid ingredients, and the fat content in the ingredients used in sample A4K2 helped provide a creamier and softer effect (Penprapai & Intharit, 2017). Figure 1 shows the value of each velva sample for the mouthfeel sensory attributes.

Hedonic Analysis

A hedonic analysis was conducted to determine the level of respondents' preference for the taste of velva products. The tastes assessed include taste, aroma, texture, color, mouthfeel, aftertaste, and panelists were asked to choose the most preferred velva product. Based on the results of the statistical analysis of velva gayam which has the highest level of preference chosen by the panelists both from the attributes of taste, aroma, color, texture, mouthfeel and aftertaste and the overall assessment is velva gayam with sample code A3K2, while velva with sample code A4K2 is the one that is not preferred by panelists. This difference is shown in Fig. 2.

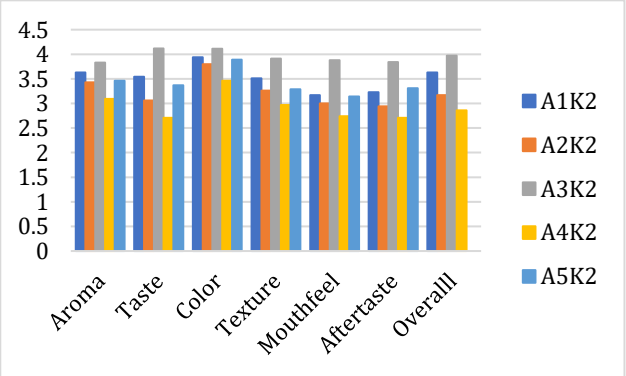

Figure 2. Velva Gayam hedonic score

In Table 1, it can be seen that each sensory attribute in each velva sample had a significant difference. The F value shows the difference between the sample groups compared with the variation within the group. It can be seen that the taste attribute has the first largest difference, which is 11,22, so it can be said that according to the panelists, velva gayam is the most different in taste attributes. In terms of taste attributes, the panelists stated that the samples had different tastes. This difference is caused by the different types of diluents; therefore, it is easy to recognize the difference.

Velva has a sweet and fresh taste because it is made from fruit; however, in this study, the panelists said that velva tends to have a sweet and savory taste, which appears because of the use of gayam flour, where gayam is included in the legume group, which has a savory taste and aroma typical of nuts (Setyowati, 2015). The use of coconut milk and milk as diluents adds flavor to gayam velva. In addition to making a difference in the taste of the velva, the diluent used also has an impact on the aftertaste felt, where the panelists stated that the aftertaste felt was rancid, where in samples A2K2, A4K2 and A5K2 a rancid aftertaste was found, while in samples A1K2 and A3K2 it was not. A rancid aftertaste was found in velva that used coconut milk as a liquid ingredient, because coconut milk contains higher fatty acids than milk, causing velva that uses coconut milk to be more easily oxidized and causes a rancid aftertaste (Ariningsih et al., 2021).

In terms of color attributes, the panelists stated that there was almost no difference between the velva samples because all the products were white in color. The vegetable fat and protein content in milk and coconut milk made velva tend to have a whiter color (Bijl et al., 2019); (Fuangpaiboon & Kijroongrojana, 2017); however, several panelists explained that velva with codes A2K2, A4K2, and A5K2 changed to a slightly darker color after the packaging was opened. This color difference is caused by the liquid material used, where in samples A2K2, A4K2, and A5K2 using coconut milk as a diluent, the fat content in coconut milk is higher, and when the fat is oxidized, it can cause the color of the velva to become darker (Wulandari et al., 2017).

Table 1. Sensory attribute analysis

Attributes	F-value	P-value
Aroma	4,90	0,00091
Taste	11,22	0,00000
Color	3,75	0,00597
Texture	6,13	0,00012
Mouthfeel	8,58	0,00000
After Taste	10,26	0,00000
Overall	9,48	0,00000

The limitation of this study is that the measurement of sensory attributes relies on perception between panelists, so the assessment is greatly influenced by the sensitivity of the panelists to the perceived sensory attributes. The assessment of color and texture attributes was based only on the visualization assessment carried out by the panelists.

Conclusion

Based on QDA analysis, the sensory attributes detected in the velva gayam product were aroma, taste, texture, color, mouthfeel, and aftertaste. In the hedonic analysis, there were differences in the level of preference between the respondents in terms of taste and aftertaste attributes. Based on the results of the respondents' assessment, it can be concluded that the best velva formulation that was most preferred by the panelists was velva with the sample code A3K2. Thus, the A3K2 velva product can be used as a standard formulation if velva product development is desired in the future.

Acknowledgments

Our gratitude goes to the Ministry of Research, Technology, and Higher Education for funding this research through a doctoral dissertation research grant with contract number 027/E5/PG.02.00.PL/2024, and derivative contract number 22107/IT3.D10/PT.01.03/P/B/2024. We also thank IPB University for providing facilities during this research.

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