

PHYSICAL AND ORGANOLEPTIC CHARACTERISTICS OF MILK YOGHOURT COW WITH ADDITION LEAF Pandanus FRAGRANT (*Pandanus*) *Amaryllifolius*)

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Abstract

Yogurt is a fermented milk product with high nutritional value and is popular with the public. The addition of pandan leaf extract (*Pandanus amaryllifolius* Roxb.) can enhance the flavor and provide a natural aroma and color to yogurt. This study aims to determine the effect of adding pandan leaf extract on the physical and organoleptic characteristics of yogurt and to improve the knowledge, skills, and attitudes of Women Farmers Groups (KWT) through extension activities. The study used a Completely Randomized Design (CRD) with four treatments: P0 (without the addition of pandan leaf extract), P1 (10%), P2 (13%), and P3 (16%). The parameters observed included color, taste, aroma, and texture through organoleptic tests. The data were analyzed using analysis of variance (ANOVA), while the effectiveness of the extension was evaluated through pre-test and post-test on 25 members of the Bunga Mawar Women Farmers Group (KWT) in Timbuseng Village, Pattallassang District, Gowa Regency. The results showed that the addition of fragrant pandan leaf extract had a very significant effect ($P < 0.01$) on the physical and organoleptic characteristics of yogurt. Treatment P0 produced the highest scores in color (4.00), taste (3.07), and aroma (2.93), while the best texture was obtained in treatment P2 (3.53). The addition of fragrant pandan leaf extract in high concentrations caused a change in color to a greener color, decreased acidity levels, affected the distinctive aroma of yogurt, and decreased texture stability at the highest concentration. The results of the extension evaluation showed an increase in knowledge from 65.8% to 93%, skills from 50.2% to 81.8%, and attitudes from 62.6% to 84.4%, with an extension effectiveness rate of 66.3%, which is considered effective.

Keywords : *Pandanus leaves, Physical characteristics, Organoleptic properties, Yogurt*

INTRODUCTION

Food security and national economic stability are strategically supported by the growth of the livestock industry in Indonesia, particularly the beef and dairy cattle subsectors, which play a crucial role in meeting domestic meat and milk needs. Over the past decade, population growth and increased cattle productivity have become strategic issues, along with the increasing need for animal protein due to population growth and increasing social welfare (Lubis *et al.*, 2025). Dairy farming has good prospects in terms of economy and job creation as public awareness of consuming milk and its processed products increases. However, the current production capacity of dairy farmers is still unable to meet domestic market demand. Indonesian people's current animal protein consumption is still 4.19 g/capita/day, lower than the FAO adequacy standard of 6 g/capita/day, thus indicating a gap in fulfilling animal protein needs (Muhammad Amrizal Bai, 2023).

Dairy farming has good economic prospects and plays a role in providing employment as public awareness of the consumption of milk and dairy products increases. However, domestic milk production is insufficient to meet domestic market demand, so Indonesia remains dependent on imports of milk and dairy products (Priyono *et al.*, 2023). Yogurt, as a fermented milk product, has advantages over fresh milk, including a longer shelf life, a more widely accepted taste, and functional benefits for digestive health through its lactic acid bacteria content. Therefore, yogurt has significant potential to be developed as a value-added product to support dairy-based food diversification.

Yogurt is widely consumed by the public due to its high nutritional value derived from the activity of microorganisms and its varied textures and flavors. Microorganisms produce metabolites such as protein, minerals (phosphorus and calcium), and vitamins, which are naturally present in milk. Generally, yogurt made from fresh cow's milk contains only a small amount of ascorbic acid, folic acid, iron, and other functional components.

Therefore, it can be modified with various other ingredients to improve its functional and sensory properties (Arya Dwiki Ramadhan *et al.*, 2024). Additives added to yogurt can be either natural or modified. Various natural additives are added to yogurt formulations to improve the physicochemical, textural, and sensory properties of yogurt. Studies have shown that these additives affect the nutritional properties of yogurt when added. Therefore, yogurt enriched with functional additives, especially natural additives, is reported to have better nutritional quality and provide several health benefits to consumers (Ushidee-Radzi *et al.*, 2025). *Pandanus amaryllifolius* leaves have long been used as a natural additive in food products due to their distinctive aroma and increased consumer acceptance. Furthermore, pandan leaves contain bioactive compounds, such as flavonoids and phenolics, which have potential antioxidant activity. The use of pandan leaves as a food additive has been widely applied to improve the sensory characteristics of various food and beverage products. Yogurt made from cow's milk generally has a sour taste and a specific aroma that is not always preferred by all consumers. The addition of pandan leaves is known to reduce the fishy odor in goat's milk, so a similar application to cow's milk in the yogurt-making process is thought to influence and improve the aroma of the resulting yogurt (Globenewswire, 2024).

LITERATURE REVIEW

Dairy Farming

Dairy farming plays a crucial role in supporting national food security and economic stability by providing milk as a source of animal protein. As the population and prosperity increase, the demand for milk continues to rise. However, domestic milk production capacity is still insufficient to meet domestic market demand, leaving Indonesia dependent on imports of milk and its derivatives (Lubis *et al.*, 2025; Priyono *et al.*, 2023).

Yogurt as a Fermented Milk Product

Yogurt is a fermented milk product that has a longer shelf life than fresh milk and contains lactic acid bacteria, which are beneficial for digestive health. In addition to its diverse textures and flavors, yogurt contains protein, minerals, and vitamins produced by the activity of microorganisms. However, yogurt made from fresh cow's milk still has a relatively low content of certain functional components, so it can be modified by adding various ingredients to enhance its functional and sensory properties (Arya Dwiki Ramadhan *et al.*, 2024).

Adding Natural Additives to Yogurt

The addition of natural additives to yogurt formulations aims to improve physicochemical properties, texture, sensory characteristics, and nutritional quality. The use of natural additives has been reported to increase the nutritional value of yogurt and provide better health benefits for consumers compared to the use of synthetic additives (Ushidee-Radzi *et al.*, 2025).

Pandanus amaryllifolius (Fragrant Pandan Leaves)

Pandanus amaryllifolius leaves have long been used as a natural additive in food products due to their distinctive aroma, which consumers appreciate. Furthermore, pandan leaves contain bioactive compounds such as flavonoids and phenolic compounds, which have potential antioxidant activity. The use of pandan leaves as a food additive has been widely applied to improve the sensory characteristics of various food and beverage products. In cow's milk-based yogurt, the addition of pandan leaves is thought to improve the yogurt's aroma and increase consumer acceptance by reducing the characteristic milky aroma, as has been applied to other dairy products (Globenewswire, 2024).

METHOD

1. Time and Place

Study This implemented in the District Bontomarannu Regency Gowa. Time implementation ongoing on month April - May 2026.

2. Tools and Materials

The tools used in this research include pans, stoves, thermometers, spoons, scales, measuring cups, electronic pH meters (Ionix), aw meters (Novasina MS 1 Set-AW), viscometers (VT-04F), Erlenmeyer flasks, test tubes, incubators, autoclaves, plastic containers, Scott bottles, spoons, stationery, and questionnaires. The materials used in this research consist of yogurt smoothies, pandan leaf extract, cow's milk, pH 4 and pH 7 buffer solutions, *Buffered Peptone Water* (BPW), *De Man Rogosa and Sharpe Agar* (MRSA), distilled water, aluminum foil, cotton, and *High Density Polyethylene* (HDPE) plastic.

3. Implementation of the Study

3.1 Study Implementation Method

This study was conducted using a Completely Randomized Design (CRD) method consisting of four treatments in the form of different proportions of dairy cow's milk and fragrant pandan leaf extract, with four replications for each treatment, to determine the process variation and its effect on yogurt characteristics. Four liters of cow's milk were given the following treatments:

P0 = 1 Liter of cow's milk yogurt without the addition of pandan leaf extract

P1 = 1 Liter of cow's milk yogurt with the addition of 10% pandan leaf extract

P2 = 1 Liter of cow's milk yogurt with the addition of 13% pandan leaf extract

P3 = 1 Liter of cow's milk yogurt with the addition of 16% pandan leaf extract

The parameters observed during the implementation of the study, namely organoleptic test analysis, include:

Table 1. Organoleptic Test Scoring

Score	Flavor	Color	Aroma	Texture
1.	Not very sour	Dark green	Weak yogurt aroma	Very runny
2.	A bit sour	Light green	The aroma of yogurt is a bit weak	Thin
3.	Sour	Greenish white	Strong yogurt aroma	Thick
4.	Very sour	White	The aroma of yogurt is very strong	Very Thick

Previously washed fragrant pandan leaves, then fragrant pandan leaves are put in a blender to be smoothed without adding water, after smooth fragrant pandan leaves are put into a clean container. Making Yogurt A total of 4 liters of fragrant pandan leaf extract is added as much as P1 = 10%, P2 = 13%, P3 = 16%, 20% milk and 5% sugar into a blender at low speed for 5 minutes, after mixing everything the mixture is put into a glass jar and then pasteurized at a temperature of 80 ° C for 5 minutes, then cooled to a temperature of 40 ° C, after the biokul yogurt culture is entered as much as 10% then mixed with a spatula until the mixture is homogeneous, then the mixture is tightly closed and incubated at a temperature of 37 ° C for 15 hours after which the Yogurt is obtained and then analyzed.

4. Data Analysis

The data analysis in this study was arranged based on a Completely Randomized Design (CRD). The data obtained were analyzed statistically using variance (F test) at a 5% significance level with the Microsoft Excel application and Statistical Product and Service Solution (SPSS) version 20 for Windows 7. The parameters studied were viscosity and sensory tests.

RESULTS AND DISCUSSION

1. RESULTS

Research results regarding the physical characteristics of yogurt with the addition of pandan leaf extract conducted through organoleptic tests covering parameters of color, taste, texture, taste, and aroma . The average values of the observation results can be seen in Table 2 below.

Table 1 Results of Organoleptic Test of Physical Characteristics of Yogurt with the Addition of Pandan Wangi Leaf Extract

Parameter	Treatment			
	P0	P1	P2	P3
Color	4.00 ± 0.00 ^d	2.80 ± 0.00 ^b	2.87 ± 0.00 ^c	1.53 ± 0.00 ^a
Favorites	2.67 ± 0.00 ^d	1.80 ± 0.00 ^b	2.13 ± 0.00 ^c	1.73 ± 0.00 ^a
Texture	3.33 ± 0.00 ^c	2.27 ± 0.00 ^b	3.53 ± 0.00 ^d	1.47 ± 0.00 ^a
Flavor	3.07 ± 0.00 ^d	2.67 ± 0.00 ^c	2.13 ± 0.00 ^b	1.67 ± 0.00 ^a
Aroma	2.93 ± 0.00 ^d	2.67 ± 0.00 ^c	2.27 ± 0.00 ^b	1.67 ± 0.00 ^a

2. DISCUSSION

2.1 Color

The analysis results showed that the addition of pandan leaf extract to yogurt had a very significant effect ($P < 0.01$) on color parameters. The highest average value was obtained in treatment P0 at 4.00 ± 0.00 , while the lowest value was obtained in treatment P3 at 1.53 ± 0.00 . This indicates that the higher the level of addition of pandan leaf extract, the more changes in yogurt color occur, which causes a decrease in the level of panelist acceptance.

This color change occurs because pandan leaves contain the natural pigment chlorophyll, which gives food products their green color. The higher the concentration of pandan extract added, the more the yogurt's base color, typically yellowish-white, turns greenish. According to Suryani et al. (2022), the chlorophyll content in natural ingredients can affect the color of processed food products, causing changes in their visual characteristics. Research by Pratama et al. (2023) also states that the addition of herbal plant extracts can increase the intensity of the natural color in fermented milk products.

2.2 Favorites

The analysis results showed that the addition of pandan leaf extract had a **very significant effect ($P < 0.01$)** on the panelists' preference level. The highest value was obtained in treatment **P0 at 2.67 ± 0.00** , while the lowest value was found in treatment **P3 at 1.73 ± 0.00** .

The decrease in panelists' preference is thought to be due to the increased concentration of pandan extract, which changes the yogurt's overall characteristics, including color, flavor, and aroma. The higher the pandan extract added, the lower the panelists' acceptance rate.

According to Rahman et al. (2021), panelists' acceptance of food products is influenced by the combination of color, aroma, taste, and texture produced by natural additives. Research by Wibowo et al. (2024) suggests that increasing the use of herbal ingredients in fermented food products can influence consumer preferences.

2.3. Texture r

The results showed that the addition of pandan leaf extract had a **very significant effect ($P < 0.01$)** on yogurt texture. The highest value was obtained in treatment **P2 at 3.53 ± 0.00** , while the lowest value was found in treatment **P3 at 1.47 ± 0.00** .

Changes in yogurt texture are influenced by the water content and bioactive components of pandan extract, which interact during the fermentation process. At certain concentrations, the yogurt texture improves due to the balance between water content and protein gel formation. However, at too high a concentration, the texture becomes less stable.

According to Putri et al. (2022), yogurt texture is influenced by the composition of additional ingredients, which can affect the formation of protein structures during fermentation. Research by Santoso et al. (2023) explains that plant extracts can affect the viscosity of fermented milk products.

2.4. Flavor

The analysis results showed that the addition of pandan leaf extract had a **very significant effect ($P < 0.01$)** on the taste of yogurt. The highest value was obtained in treatment **P0 at 3.07 ± 0.00** , while the lowest value was found in treatment **P3 at 1.67 ± 0.00** .

The higher the concentration of pandan leaf extract, the more the original, sour taste of yogurt will blend with the distinctive pandan flavor. This changes the flavor balance, resulting in a decrease in panelist acceptance. According to Nugroho et al. (2021), yogurt flavor is influenced by the formation of lactic acid during fermentation and the additional ingredients used in the product formulation. Research by Andini et al. (2024) suggests that adding large amounts of herbal extracts can alter the product's flavor.

2.5 Aroma

The results showed that the addition of pandan leaf extract had a **very significant effect ($P < 0.01$)** on the aroma of yogurt. The highest value was obtained in treatment **P0 at 2.93 ± 0.00** , while the lowest value was obtained in treatment **P3 at 1.67 ± 0.00** .

Aroma changes occur because fragrant pandan leaves contain volatile compounds in the form of **2-acetyl-1-pyrroline** which produces a distinctive pandan aroma. The higher the addition of pandan extract, the more dominant the distinctive aroma becomes, thus influencing the panelists' assessment. According to Wijaya et al. (2022), fragrant pandan leaves contain aromatic compounds that can provide a distinctive aroma to food products. Research by

Kusuma et al. (2025) explains that too strong an aroma intensity in fermented products can reduce the level of panelists' sensory acceptance.

CONCLUSION

According to the analysis of color, aroma, taste, and texture, the more Pandang Wangi leaves added, the more the resulting light green color, a slightly weaker yogurt aroma, a slightly sour taste, and a runny texture. Many panelists were attracted to the P2 treatment.

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