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Transforming *Dangke* into Cookies: A Sensory Evaluation of Traditional Dairy in Modern Bakery Applications

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ABSTRACT

This study investigates the transformation of *dangke*, a traditional Indonesian dairy product from Enrekang, South Sulawesi, Indonesia, into an innovative cookie formulation. Focusing on sensory characteristics and consumer acceptance, the research explores three processing methods of *dangke*: blending, grilling, and pressing. Each method was incorporated into a standardized cookie recipe and evaluated by 25 untrained panelists using a 7-point hedonic scale across four attributes: taste, flavor, color, and texture. Results indicate that cookies made with grilled and pressed *dangke* received significantly higher sensory scores than those using blended *dangke*. Grilling enhanced both savory and sweet notes, contributing to a more distinctive flavor profile, while pressing improved texture and visual appeal by reducing moisture content. In contrast, blended *dangke* resulted in lower sensory acceptance, likely due to excessive moisture affecting overall quality. These findings underscore the importance of traditional ingredient processing in product development and demonstrate the potential of *dangke* as a culturally rooted yet adaptable component for modern food innovation. The study offers valuable insights for preserving local food heritage while expanding its applications in contemporary bakery products.

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1. INTRODUCTION

Dangke is a traditional dairy-derived product that has long been an integral part of the local culinary heritage of Enrekang, South Sulawesi. *Dangke* is known for its unique, distinctive, soft, cheese-like texture and high nutritional value, especially protein and calcium (Rahman, 2014), The texture of *dangke* is generally similar to other soft cheeses, and its highest protein content has been found to be 17.94%, which is comparable to that of fresh cheese varieties (Malaka et al., 2015).

The traditional manufacturing process employs papaya latex as a coagulating agent that enables milk to curdle. The separation of the liquid-type from the curd-type *dangke* is carried out using traditional methods, by using coconut shells, which serve simultaneously as a filter and a shaping device for the *dangke*, the curds are then wrapped in banana leaves. *Dangke*'s final shape resembles tofu, which leads many people to mistakenly identify *dangke* as tofu (Fatmawaty, S. A. & Bijaksana, . A. M. A, 2024).

Dangke has good potential for further development. However, *dangke* suffers from a short shelf-life, approximately two days at ambient temperature and up to five days under refrigeration. This limited stability hampers distribution channels and diminishes its economic potential to be known (Malaka et al., 2025). In recent years, several initiatives have sought to transform *dangke* into value-added processed foods. These innovations aim not only to enhance its economic value but also to preserve local culinary heritage through product innovation (Mustamin, Jumadi, and Sumilih, 2021). One study on preservation methods, such as inoculating *Lactococcus lactis*, by applying edible films, and employing ripening techniques, has shown that *dangke*'s shelf life can be extended to over 15 days under low-temperature storage (Malaka et al., 2025).

Despite these developments, the integration of *dangke* into modern ready-to-eat food products remains limited. In fact, Successful preservation techniques that convert perishable local ingredients into longer-lasting, high-value commodities have been widely documented. For example, date fruits combined with papaya flour have been used to produce cookies that are not only economically valuable but also have a longer shelf life (Puspitarini, A. A., et al., 2019)

Cookies, in general, have a relatively long shelf life depending on the type produced. They are light in texture, dry, and dense. Standard base formulation and ingredients for making cookies include wheat flour, salt, sugar, leavening agents, eggs, and milk. Cookies are also among the product category that is highly amenable to ingredient modifications (Rachman et al., 2023). This makes cookies a viable alternative for developing *dangke*-based innovations, as they not only increase the economic and cultural value of *dangke* but also open opportunities for wider public recognition of this local product.

Research on the application of *dangke* in bakery products, particularly cookies, remains very limited. Critical knowledge gaps exist regarding thermal stability, functional interactions between *dangke* and conventional bakery ingredients to produce high-quality *dangke* cookies. Studies on the sensory characteristics of cookies made with *dangke* are also scarce, meaning the public's acceptance in terms of taste, flavor, texture, and color of *dangke*-infused cookies remains largely unknown.

This present study aims to explore the utilization of *dangke* as a primary ingredient in cookie production, focusing on optimizing its processing methods to achieve desirable quality attributes. Therefore, the research questions posed are: How can *dangke* be effectively incorporated into cookie production, and how well is *dangke*-based cookies accepted by the public? The outcomes of this study is expected to contribute meaningfully to the preservation

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and enhancement of *dangke*'s added value by expanding local food diversification and supporting the competitiveness of traditional products in contemporary markets.

2. LITERATURE REVIEW

2.1. *Dangke*

Dangke is classified as a soft cheese traditionally made by coagulating milk using papain enzyme extracted from papaya latex. The milk is processed and preserved into a product known as "*Dangke*" or "Enrekang Cheese," which is rich in nutrients, particularly protein. With its protein content exceeding 17%, *dangke* is considered a significant source of nutrition, especially in regions where access to diverse protein sources may be limited (Mukhlisah, Arief, and Taufik, 2017).

One of the distinctive characteristics of *dangke* lies in its cylindrical shape, dense and chewy texture, a pronounced milky aroma, and a savory taste, making it highly recognizable among traditional Indonesian dairy products (Fatmawaty, S. A. and Bijaksana, A. M. A., 2024). The use of coconut shell to shaped and banana leaf as wrapping materials not only serves practical purposes but also reflects the cultural heritage and ethnic identity of the Enrekang community. These traditional tools reinforce the perception of *dangke* as a culturally significant local food with unique standards of authenticity and presentation (Setiarto et al., 2025).

Figure 1. Dangke

The utilization of papaya latex as a natural coagulant imparts *dangke* with distinctive features that differentiate it from other types of soft cheeses, such as paneer or ricotta, which typically rely on acid or chemical-based curdling agents. The papain enzyme in papaya sap functions by breaking down milk proteins, thereby enabling coagulation without synthetic additives. However, the concentration of papaya latex must be carefully controlled, as excessive amounts can lead to a bitter aftertaste in the final product (Malaka et al., 2015). This highlights the importance of precise formulation and standardization in the production process to ensure product acceptability.

In response to its short shelf life, various research efforts have aimed at improving *dangke*'s storability. For instance, Malaka et al., (2024) developed an edible film made from *dangke* whey and konjac flour to extend its shelf life up to 20 days when stored at 5°C. This film successfully maintained acceptable sensory attributes such as texture and aroma, indicating its potential for application in artisanal cheese preservation. Innovations such as these not only improve the product's marketability but also align with the growing consumer demand for natural preservation methods in traditional food products (Malaka et al., 2024).

Overall, *dangke* presents a compelling case for further development as both a culturally meaningful and nutritionally valuable local dairy product. With advancements in food preservation and processing technologies, *dangke* has the potential to reach broader markets

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while retaining its traditional roots.

2.2. Application of *Dangke* in Pastry and Bakery Products

Cookies are essentially categorized as pastry and bakery-type products characterized by their crunchy texture and wide variety of shapes and flavors. Their production process typically involves mixing ingredients with distinct functional properties to create different cookie variants, depending on the type of additional components used (Rachman et al., 2023). Cookies are widely consumed and enjoyed across age groups due to their appealing taste, unique characteristics, and relatively long shelf life compared to other baked goods.

Technically, the term "cookies" refers to the baked products that have low moisture content in their final form, resulting in a crispy or crunchy texture. They also tend to contain relatively high amounts of sugar and fat, contributing to their rich flavor and extended storability (Fibri et al., 2024). These properties make cookies not only a popular snack choice but also a favorable medium for ingredient modification and innovation.

Previous studies have demonstrated that cookie formulations can be successfully diversified by incorporating local ingredients. For example, research involving the use of various root crops such as cassava, sweet potato, potato, and taro as flour substitutes in cookie recipes has shown promising results. The final products received high sensory acceptance scores, indicating the potential for further exploration of cookie-based innovations utilizing indigenous food resources (Saladino, M., J., 2023).

Despite all of this, the integration of *dangke,* the traditional fermented cheese from Enrekang into cookie formulations remains largely unexplored. However, insights from similar studies suggest that fermented cheese products can serve functional roles in baked goods. For instance, they can act as partial fat replacers or moisture binders in dough systems, thereby improving the tenderness and shelf stability of the final product (ÖZATAY and KAYA 2024).

Furthermore, the high protein content in *dangke* presents additional potential benefits. It may contribute to the development of a more structured gluten network in the cookie dough, which is particularly important for achieving desired textural characteristics. In gluten-containing baked products, proteins from dairy sources have been shown to enhance structural integrity and overall mouthfeel, the qualities that are critical in consumer acceptance of cookies.

Given these properties, the application of *dangke* in cookies is a promising avenue for innovation in functional and culturally rooted food products. It not only opens opportunities for the valorization of local dairy resources but also supports the creation of novel baked goods with improved nutritional profiles and sensory appeal.

2.3. *Dangke* Products

Research conducted by Rafli (2024) on *Dangke Crackers* demonstrates that the development of *dangke*-based processed products is both feasible and promising. One example is the production of *dangke* chips, a crunchy snack made from dehydrated *dangke*. In this study, the initial step involved reducing the moisture content of *dangke* using a dehydrator machine, which allowed for a more efficient processing method and resulted in a final product with characteristics similar to conventional crackers or chips. Moisture reduction was a critical step in achieving the desired crispiness and extending shelf life—two essential quality parameters for snack products. This indicates that with the right technological interventions, *dangke* can be transformed into a modern, shelf-stable snack product that appeals to wider markets. (RAFLI 2024)

Another relevant study by Aulia et al. (2021) focused on *consumer attitudes toward*

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branded and unbranded dangke crackers in Cendana District, Enrekang. This research explored consumer preferences and acceptance levels toward *dangke* cracker products, both under the brand name "Melona" and those sold without branding. The study highlighted the importance of branding, packaging, and perceived product quality in influencing consumer choices. It also emphasized that product development must not only consider the physical and sensory qualities of *dangke*-based snacks but also how these products are positioned in the market (Aulia et al., 2021).

Together, these studies suggest that *dangke* holds great potential for diversification into modern snack forms. Moreover, they underscore the need for integrated approaches that combine technological optimization with consumer behavior insights in order to create viable and competitive food innovations based on local dairy heritage.

3. METHODS

This study employed a quantitative experimental method to determine public acceptance of cookies made with *dangke* (traditional Enrekang cheese).

3.1. Product Design and Formulation

Cookies come in a variety of forms depending on the type of flour, ingredients used, and preparation methods. Therefore, selecting a suitable reference formulation was essential to ensure a standardized and reproducible base that could accommodate the addition of *dangke* as a primary ingredient. This research adopted the basic sugar dough recipe from Gisslen, which consists of wheat flour, butter, eggs, powdered sugar, and vanilla extract, which are ingredients commonly used in cookie production and known to yield consistent results (Gisslen 2012).

To evaluate the effect of different *dangke* treatments, the study utilized three experimental variations (DK1, DK2, and DK3), each differing in the pre-processing treatment of *dangke* before being incorporated into the cookie dough:

Tabel 1. Treatment Table

Ingredients	Original	DK1	DK2	DK3
Butter	500 g	500 g	500 g	500 g
Powdered Sugar	250 g	250 g	250 g	250 g
Egg	95 g	95 g	95 g	95 g
Vanilla extract	8 g	8 g	8 g	8 g
Flour	750 g	750 g	750 g	750 g
Danke		150 g	150 g	150 g
Danke's Method		Blended	Blended	Blended

Source: Author, 2025

- **DK1:** *Dangke* was blended until smooth prior to mixing with other ingredients.
- **DK2:** *Dangke* was baked before incorporation into the dough, allowing partial moisture removal and flavor enhancement through Maillard reactions.
- **DK3:** *Dangke* was manually pressed to remove excess moisture before being added, with the aim of improving the final texture of the cookies.

The general cookie-making process included ingredient mixing, dough shaping (10 grams per cookie), and baking at a standardized temperature and time to ensure consistent results.

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3.2. Data Collection Technique

Primary data in this study were obtained through questionnaires distributed to panelists. To assess the level of consumer preference, a 7-point hedonic Likert scale was used, evaluating sensory attributes such as taste, aroma, color, and texture. The scale ranged from 1 “Strongly Dislike”, 2 “Dislike”, 3 “Slightly Dislike”, 4 “Neutral”, 5 “Slightly Like”, 6“Like” dan 7 “Strongly Like”. Panelists were asked to evaluate the cookies based on their sensory experience. In total, 25 untrained panelists participated in the sensory testing and performed evaluations in three separate trials to enhance data consistency and reduce bias (Agustina, R., Hartuti, and & Rubawan 2023)

Secondary data were obtained from academic journals, books, and credible online sources, including government census reports and industry publications, to support the contextual and theoretical framework of the study.

3.3. Data Analysis Method

This study employed a hedonic test, which is a part of sensory evaluation (organoleptic testing) designed to assess the degree of panelists' liking for a product. In a hedonic test, each panelist provides a rating based on their personal preference using their five senses during a product trial. Therefore, the dominant method used in hedonic testing is sensory or organoleptic evaluation.

The study involved 25 untrained panelists, each of whom evaluated the product over three separate trials to ensure data consistency and reliability. Panelists were asked to express their level of liking using a 7-point scale (Setyaningsih, Apriyantono, and Sari, 2018).

This research applied a quantitative approach, using questionnaires as the primary data collection tool. The data gathered from the panelists were analyzed by converting the hedonic scale into numerical values. The mean score was calculated using the following formula (Rahardja, Sudaryono, and Chakim, 2023):

$$\text{Average Score} = \frac{\sum \text{Panelists' Scores}}{\text{Number of Panelists}}$$

Where the summation encompassed all individual scores across panelists. The quantitative approach enabled objective comparison of sensory attributes and overall product acceptance levels.

To interpret the average scores, a criterion range was established following (Sugeng 2022), which defines rating intervals based on the scale range. The calculation of the attribute interval, or Range of Criteria (RK), was determined by:

$$RK = \frac{\text{Maximum Scale Value} - \text{Minimum Scale Value}}{\text{Number of Scale Points}} = \frac{7-1}{7} = 0.86$$

This RK value served as the basis to categorize preference scores into defined qualitative classes, as detailed in the table below:

Table 2. Interval

Interval	Qualitative Category
1,00 ≤Average <1,86	Strongly Dislike
1,87 ≤ Average <2,72	Dislike
2,73 ≤ Average <3,58	Slightly Dislike
3,59 ≤ Average <4,44	Neutral
4,45 ≤ Average <5,30	Slightly Like

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Interval	Qualitative Category
5,31 ≤ Average <6,16	Like
6,17 ≤ Average <7,00	Strongly Like

Source: (Sugeng 2022)

Finally, the compiled data were visually represented using bar charts to depict the distribution of preference scores for each attribute. Descriptive statistical summaries further elucidated the trends and highlighted any significant patterns observed in panelist responses.

4. RESULTS AND DISCUSSION

4.1 The Process of Making Cookies Using *Dangke*

All ingredients used in this study were carefully selected, verified to be food-grade, and ensured to be of high quality and safe for consumption. The *dangke* was shipped directly from Enrekang and used immediately upon arrival to preserve its freshness and maintain its original quality.

The study began with pre-treatment procedures applied to the *dangke*, each designed to modify its physical and chemical characteristics in a way that could influence the quality of the final cookie product. These treatments followed a typical experimental design methodology used in food science, focusing on ingredient manipulation.

- Treatment 1 (DK1) involved blending the *dangke* until smooth. This process was intended to homogenize its texture within the dough and facilitate the even distribution of nutrients and bioactive compounds throughout the cookie matrix (Setiarto et al., 2025).
- Treatment 2 (DK2) consisted of baking the *dangke* prior to mixing. This step aimed to trigger desirable chemical reactions such as the Maillard reaction, which enhances aroma and flavor, while simultaneously reducing the moisture content (Dong et al., 2022; Kumar et al., 2013).
- Treatment 3 (DK3) involved pressing the *dangke* using cloth to reduce its moisture and fat content, which could improve the final cookie texture by preventing sogginess (Leiva-Valenzuela et al., 2018).

The development of the cookie formulation went through five experimental trials to determine the most appropriate method and ingredient proportions for producing cookies that align with standard cookie characteristics. Throughout these trials, several challenges and failures were encountered, particularly due to the high moisture content in the *dangke*, which negatively affected dough consistency and bake quality.

- Trial 1
  The first trial failed due to the addition of too little wheat flour, which made the dough overly wet after incorporating the *dangke*, making it unsuitable for shaping.
- Trial 2
  The second trial experienced a similar failure, with the dough remaining too wet, again resulting in difficulties in forming cookie shapes.
- Trial 3
  In the third trial, the baked cookies turned out overly moist, lacking the crispy texture typically expected of cookies. This indicated an imbalance between the moisture content of the *dangke* and the dry ingredients.
- Trial 4
  The fourth trial failed due to excessive egg usage, which not only added excess moisture but also introduced an unpleasant eggy aroma into the final product.

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- Trial 5
  The fifth trial resulted in baked cookies that were still wet on the inside, attributed to both the high moisture content of the *dangke* and the imprecise wheat flour measurement.

Figure 2. *Dangke* cookies (DK1, DK2 and DK3)
Source: Author, 2025

Following these initial failures, the study finalized the three treatments (DK1, DK2, and DK3) for formal testing after adjustments and improvements were made to ingredient ratios and processing techniques.

Observations of Final Products

- DK1 (Blended *Dangke*)
  Produced cookies with a slightly moist texture, which made them less crispy compared to conventional cookies. The cookies had a golden-yellow appearance, and although there was no strong dairy aroma, the taste was savory and pleasant. However, the distinctive dairy flavor of *dangke* was largely absent.
- DK2 (Baked *Dangke*)
  Resulted in cookies with a crisp texture, similar to traditional cookies. A noticeable cheesy aroma was present, thanks to the baked *dangke*. The cookies were golden in color with some browned cheese specks, and the flavor was both savory and uniquely reflective of *dangke*'s profile.
- DK3 (Pressed *Dangke*)
  Also yielded cookies with a crisp texture, though the cheesy aroma was less pronounced compared to DK2. Nonetheless, the cheese flavor was detectable, and the moisture balance was well-controlled, resulting in a pleasant texture and taste.

4.2. Hedonic Test Results

Hedonic tests were conducted in three separate trials to obtain more valid and representative results regarding consumer preferences for the cookies made with *dangke*. The following are the outcomes of the hedonic tests for each sensory attribute:

4.2.1. Taste

Taste was assessed based on the panelists' level of preference for each of the three treatments. Across all three trials, the average scores remained stable and generally fell within the "liked" category.

Table 3. Hedonic Test Results – Taste Attribute

	Taste		
	DK1	DK2	DK3
First Test	5,29	5,93	5,79

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Taste

	DK1	DK2	DK3
Second Test	5,46	6,04	5,93
Third Test	5,57	6,07	5,96
Average	5,44	6,01	5,89

Source: Author, 2025

Among the three formulations, DK2 (baked *dangke*) recorded the highest average score (6.01), followed by DK3 (pressed *dangke*) with 5.89, and DK1 (blended *dangke*) with the lowest average score of 5.44. These findings indicate that baking *dangke* before incorporating it into the cookie dough contributed positively to flavor development. This aligns with research by Sulmiyati & Said, which stated that heating local cheese can enhance umami flavor and create a distinct taste through the Maillard reaction—a chemical reaction between amino acids and reducing sugars that contributes to the complex flavors in baked goods (Sulmiyati and Said, 2019).

4.2.2. Aroma

The aroma of the cookies was evaluated across the three trials with the following results:

Table 4. Hedonic Test Results – Aroma Attribute

Aroma

	DK1	DK2	DK3
First Test	5,21	5,68	5,50
Second Test	5,46	5,64	5,68
Third Test	5,61	5,68	5,71
Average	5,43	5,67	5,63

Source: Author's Data, 2025

DK3 (pressed *dangke*) received the highest average aroma score (5.63), though DK2 (baked *dangke*) was only slightly higher at 5.67. The minimal difference suggests that both treatments were effective in reducing the strong dairy odor typically associated with traditional *dangke*. According to Malaka et al., reducing moisture content in dairy products can influence their volatile aroma profile, and minimize the strong or undesirable odors and result in a more acceptable sensory experience for consumers (Malaka, Hatta, and Baco, 2017).

4.2.3. Color

The appearance or color of the cookies was another important sensory criterion evaluated by panelists:

Table 5. Hedonic Test Results – Color Attribute

Color

	DK1	DK2	DK3
First Test	5,18	5,21	5,46
Second Test	5,25	5,39	5,64
Third Test	5,32	5,57	5,79
Average	5,25	5,39	5,63

Source: Author, 2025

DK3 scored the highest in terms of color (5.63), which panelists described as more visually appealing. The moisture reduction through pressing allowed for a more even

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browning during baking, resulting in cookies with a uniform golden surface. This supports findings by Imani et al., who demonstrated that moisture content significantly affects surface color development in baked products, particularly during the Maillard reaction and caramelization phases (Imani, Hutami, and Pertiwi, 2022).

4.2.4. Texture

The texture of the cookies was rated during all three testing sessions, producing the following results:

Table 5. Hedonic Test Results – Texture Attribute

	Texture		
	DK1	DK2	DK3
First Test	5,00	5,11	5,46
Second Test	5,07	5,18	5,64
Third Test	5,18	5,32	5,71
Average	5,08	5,20	5,61

In the texture category, DK3 again achieved the highest score, with an average of 5.61, followed by DK2 at 5.20 and DK1 at 5.08. Overall, panelists rated DK3 as the crispest and least soggy, which is a desired characteristic for cookies. These results suggest that removing excess moisture from the *dangke* significantly improves cookie texture. This finding is consistent with research by Rieuwpassa, which emphasized the correlation between moisture levels and crispness in cookie products—drier dough typically leads to better structural integrity and crunchiness after baking (Rieuwpassa, Silaban, and Kelanohon, 2023).

4.2.5. Overall Average and Interpretation

Based on the results across the four sensory attributes (taste, aroma, color, and texture), the treatments DK2 (baked *dangke*) and DK3 (pressed *dangke*) demonstrated the most favorable organoleptic characteristics among the three variations tested. DK2 excelled in taste and aroma, as the baking process initiated Maillard reactions, which are known to enrich the flavor and aroma of food through complex chemical changes between amino acids and reducing sugars.

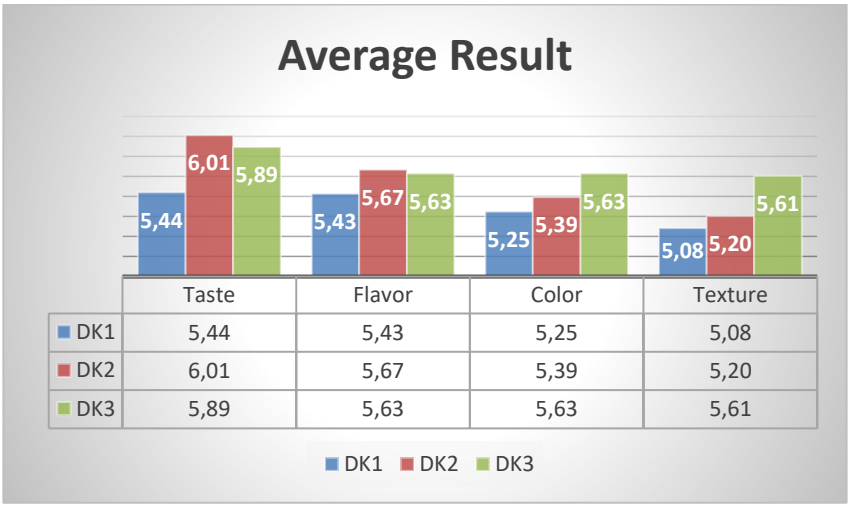

Figure 4. Average Result of *Dangke* cookies (DK1, DK2 and DK3)
Source: Author, 2025

On the other hand, DK3 outperformed the other treatments in color and texture,

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attributed to the lower moisture content resulting from the pressing treatment. This led to cookies with a more uniform golden appearance and a crispier texture, aligning closely with the ideal characteristics of dry cookies in general.

The findings from this study suggest that *dangke*, a traditional dairy product from Enrekang holds significant potential as a functional ingredient in modern bakery products, particularly in cookies. The incorporation of *dangke*, especially through baking or pressing treatments, not only promotes the integration of local ingredients into contemporary food products but also contributes to the diversification of Indonesia's traditional food heritage. As noted by Setiarto et al., the development of *dangke*-based innovations can expand market opportunities and increase the economic value of traditional foods such as Enrekang's *dangke* (Setiarto et al., 2025).

Conversely, DK1 (blended *dangke*) consistently received the lowest scores across all sensory attributes. This outcome indicates that adding *dangke* without reducing its moisture content by doing the blended method is not recommended, as it compromises the final quality of the cookies, particularly in terms of texture and appearance.

The findings further emphasize that pre-treatment of *dangke* is essential to optimize the quality of the final cookie product. Whether through baking or pressing, reducing particle size and moisture content leads to significant improvements in texture, appearance, and overall consumer acceptance of the cookies.

In general, the cookies that most closely aligned with standard dry cookie characteristics, as described in previous studies, were those from the baked *dangke* treatment (DK2). According to Rieuwpassa, the desired flavor profile of cookies should be savory or sweet, which aligns with the outcomes observed in DK2 (Rieuwpassa et al., 2023). In terms of aroma, DK3 and DK2 closely resembled the desired sensory profile, producing a distinct but not overpowering dairy aroma, consistent with findings by Imani et al., who emphasized the importance of a balanced dairy scent in baked products (Imani et al., 2022).

From a color perspective, DK3 produced cookies with the most visually appealing appearance, also supported by Imani et al., (2022), who noted that a vibrant, uniform golden color is ideal in cookie products. For texture, DK3 was also the most preferred, offering a crisp and dense mouthfeel, consistent with Rieuwpassa's assertion that crispiness is a key textural benchmark in high-quality cookies (Rieuwpassa et al., 2023).

4.3. Limitations of the Study

Despite the promising results, this study is not without limitations. First, the sample size of untrained panelists was relatively small, limiting the generalizability of the findings. A larger and more demographically diverse panel would be needed to obtain broader insights into consumer preferences. Second, the study used only one basic cookie formulation (sugar dough), leaving the potential for exploration of other types of cookie recipes untapped.

Moreover, this study did not conduct compositional analysis related to shelf life, nutritional profile, or microbial safety, which are critical for product development on a commercial scale. Future studies should incorporate scientific evaluations of storage stability, nutrient retention, and food safety parameters to ensure that the product is suitable for wider consumption.

Lastly, the *dangke* used in this research was produced using traditional methods without standardized quality control, which may introduce variability between batches. This

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inconsistency could impact the reproducibility and consistency of the final cookie product. Future research should consider standardized or industrially processed *dangke* to achieve more consistent results.

These limitations should serve as a basis for further research and development, enabling the potential commercialization of *dangke*-based cookies and expanding their accessibility to a wider consumer base, both locally and internationally.

5. CONCLUSION

The process of making cookies using *dangke* as a primary ingredient begins with weighing all materials, followed by creaming butter and powdered sugar. Next, eggs and vanilla extract are added. *Dangke* is then incorporated into the dough after undergoing three different pre-treatments: blended (DK1), baked (DK2), and pressed (DK3). Finally, flour is added and mixed until a uniform dough is formed. The dough is then shaped into oval pieces, each weighing approximately 10 grams, and baked at 140°C for 30 minutes until fully cooked.

The results of the hedonic test across four sensory attributes—taste, aroma, color, and texture—indicate that the baked *dangke* (DK2) variant was the most preferred in terms of taste (average score: 6.01) and aroma (average score: 5.67). Meanwhile, the pressed *dangke* (DK3) variant was favored for its color (average score: 5.63) and texture (average score: 5.61). The blended *dangke* (DK1) variant consistently received the lowest scores across all attributes.

These findings suggest that the utilization of *dangke* in cookie production holds significant potential, provided the dairy ingredient undergoes appropriate pre-processing. The application of heat or moisture reduction treatments to *dangke* contributes positively to the final product's sensory characteristics, resulting in cookies that are crispy, flavorful, and well-accepted by consumers.

This innovation highlights the opportunity to integrate local traditional ingredients like *dangke* into modern pastry products through relatively simple techniques. The study contributes meaningfully to the field of local food diversification and paves the way for scaling up *dangke*-based product innovations to a commercial level, offering both economic and cultural value

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