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DEVELOPMENT OF UBE KINAMPAY (*Dioscorea alata*) – CACAO (*Theobroma cacao*) MARBLE SPREAD

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ABSTRACT

This study aimed to evaluate the development of Ube Kinampay (*Dioscorea alata*)–Cacao (*Theobroma cacao*) marble spread in terms of appearance, aroma, taste, and texture. It also determined the product profile of three treatments in terms of ingredients and costing, tools and equipment, procedures, nutritional content, and shelf life. The treatments were formulated as follows: T1 (75 g Ube Kinampay : 25 g cacao), T2 (50 g Ube Kinampay : 50 g cacao), and T3 (25 g Ube Kinampay : 75 g cacao). The study was conducted in selected secondary schools in the Clarin District, involving 74 participants. Laboratory analysis revealed that the developed product is carbohydrate-rich and energy-providing, containing 48.8 g of carbohydrates and 292 calories per 100 g. It has a crude fat content of 9.25 g, contributing to its creamy texture, and 3.40 g of crude protein. The moisture content of 37.3 g indicates a soft and spreadable consistency, while the ash content of 1.26 g reflects the presence of essential minerals, including calcium (377 mg) and sodium (100 mg). The product also exhibited low cholesterol (3.29 mg), suggesting it is relatively heart-friendly. When stored under refrigerated conditions, the product maintained acceptable quality for 1–2 months. Sensory evaluation results showed that Treatment 2 obtained the highest mean scores across most attributes, particularly in aroma (M = 3.90) and texture (M = 3.85), while the lowest mean was observed in Treatment 3 in terms of taste (M = 2.76). The Friedman test indicated significant differences among treatments in appearance ($\chi^2 = 69.4$, $p < .001$), aroma ($\chi^2 = 63.1$, $p < .001$), and texture ($\chi^2 = 55.8$, $p < .001$), whereas no significant difference was found in taste ($\chi^2 = 0.583$, $p = 0.747$). Pairwise comparisons further revealed that most significant differences occurred between Treatment 2 and the other treatments, indicating its higher level of preference. Overall, the findings suggest that the Ube Kinampay–Cacao marble spread is an acceptable and promising product, with aroma, appearance, and

texture as key determinants of consumer preference, while taste remained consistently acceptable across treatments. Further studies are recommended to enhance the product and explore its potential for commercialization.

Keywords: *ube kinampay, cacao, marble spread, food product development, sensory evaluation, experimental research, shelf life, nutritional analysis*

INTRODUCTION

Filipinos are widely known for their fondness for snack-based eating habits, where bread spreads such as peanut butter, cheese, and fruit-based products are commonly consumed as quick and convenient food options. These spreads are not only staples in daily meals but are also present in gatherings and social occasions, reflecting their importance in Filipino food culture. As consumer preferences continue to evolve, there is a growing demand for innovative, nutritious, and locally inspired spreadable products.

In the Municipality of Clarin, Bohol, two locally abundant crops—Ube Kinampay (*Dioscorea alata*) and cacao (*Theobroma cacao*)—offer strong potential for food product innovation. Ube Kinampay, often referred to as the “Queen of Philippine Yams,” is valued for its natural sweetness, vibrant purple color, and high antioxidant content, particularly anthocyanins. Meanwhile, cacao is recognized for its rich flavor, distinct aroma, and bioactive compounds such as flavonoids, which contribute to its nutritional and functional properties. Despite their availability and economic importance, these crops are still largely utilized in traditional forms such as desserts and beverages, limiting their value-added potential and market expansion.

This situation highlights a gap in local food innovation, particularly in the development of spreadable products that combine these two ingredients. While previous studies have explored ube and cacao separately in pastries and drinks, limited research has focused on their integration into a single product, especially in the form of a marble spread with evaluated sensory characteristics. Moreover, farmers and local producers often have limited exposure to value-adding technologies, resulting in underutilization and possible post-harvest losses.

In response to this gap, this study proposed the development of an Ube Kinampay–Cacao Marble Spread as a value-added product that combines the natural sweetness of ube with the rich flavor of cacao. The use of the marbling technique enhances not only the visual appeal but also the uniqueness of the product, making it more attractive to consumers. This innovation aims to expand the utilization of local agricultural resources while improving product acceptability through sensory evaluation in terms of appearance, aroma, taste, and texture.

The study is anchored on the Theory of Food Choice Development (Koster & Mojet, 2006), which explains that food preferences are shaped through experience,

exposure, and sensory perception. This suggests that introducing new food products, such as the developed marble spread, can influence consumer acceptance over time. Additionally, the perspective of Śledzik (2013) on Schumpeter's theory of innovation supports the idea that transforming traditional resources into new products enhances economic value and addresses emerging market needs. Maslow's Hierarchy of Needs (1943) further reinforces that food, as a basic physiological need, must not only satisfy hunger but also align with consumer preferences for quality, taste, and accessibility.

From a scientific perspective, sensory evaluation plays a crucial role in food product development. It is a systematic method used to assess food quality based on human senses, including appearance, aroma, taste, and texture, as emphasized by Civille et al. (2024). Studies have shown that ube-based products are highly accepted due to their appealing color and flavor, while cacao contributes complexity in taste and aroma, both of which influence consumer preference. The combination of these two ingredients offers a balanced sensory profile, where the sweetness of ube complements the slight bitterness of cacao.

Nutritionally, both ingredients provide added value. Ube Kinampay is rich in carbohydrates, fiber, vitamins, and antioxidants, while cacao contains flavonoids known for their health benefits, including anti-inflammatory and cardioprotective effects. Compared to commercially available spreads, which are often high in refined sugar and artificial additives, a spread developed from natural ingredients offers a healthier and culturally relevant alternative.

This study is also grounded in national development frameworks. Article XIV, Section 10 of the 1987 Philippine Constitution emphasizes the role of science, technology, and innovation in national progress, encouraging the development and utilization of indigenous resources. Similarly, Republic Act No. 8435 promotes value-adding in agriculture to enhance productivity and increase farmers' income. In this context, the development of the Ube Kinampay–Cacao Marble Spread aligns with these mandates by transforming local crops into a marketable product that supports both agriculture and entrepreneurship.

This research contributes to food technology by developing a novel product that integrates local identity, nutritional value, and consumer acceptability. It also supports community livelihood by creating opportunities for small-scale production and promoting the use of locally available resources. Through product development, sensory evaluation, and analysis, the study provides a foundation for the commercialization of a culturally inspired and innovative food product.

Research Questions

The main purpose of this study was to determine the profile, level of sensory preferences, and significant difference of Ube kinampay - Cacao marble spread. The study was conducted at Nahawan National High School, Cookery students, as well as in

the different Secondary Schools in the Municipality of Clarin, offering a curricular program related to Food Technology for the academic year 2025-2026.

Specifically, the study aimed to answer the following questions:

1. What is the profile of Ube Kinampay - Cacao Marble Spread in terms of:
    1.1 ingredients and cost;
    1.2 tools and equipment;
    1.3 procedures;
    1.4 nutritional content; and
    1.5 shelf-life?
2. What are the sensory attribute of the Ube Kinampay - Cacao Marble Spread in three treatments in terms of:
    2.1 appearance;
    2.2 aroma;
    2.3 taste; and
    2.4 texture?
3. Is there a significant difference in the sensory attributes of the ube-cacao marble spread in the three treatments of Ube Kinampay and Cacao Marble Spread in terms of:
    3.1 appearance;
    3.2 aroma;
    3.3 taste; and
    4.4 texture?
4. What is the respondents' preference level on ube-cacao marble spread in three treatments?
5. What technology package can be proposed based on the output of the study?

METHODOLOGY

Research Design

The study employed an experimental design to determine the acceptability of Ube Kinampay (*Dioscorea alata*)–Cacao (*Theobroma cacao*) marble spread in terms of appearance, aroma, taste, and texture. Three formulations were prepared by varying the proportion of ube and cacao while maintaining constant ingredients and procedures.

The prepared treatments were evaluated by 74 respondents using a structured questionnaire with a 4-point hedonic scale. Data gathered were tabulated and analyzed to determine differences in sensory attributes and overall preference among the treatments.

Research Environment

The study was conducted in selected public secondary schools in the Municipality of Clarin, Bohol, namely Nahawan National High School, Tontunan National High School, Clarin National School of Fisheries, and Danahaw Integrated High School. These schools

were chosen because they offer programs related to food preparation and processing, such as TLE and TVL (Cookery), making them appropriate settings for the development and evaluation of the Ube Kinampay–Cacao Marble Spread.

Research Participants

The participants of the study consisted of six (6) experts and a total of sixty-eight (68) respondents. These included forty-three (43) cookery Senior High School students from Nahawan National High School, two (2) students from Tontunan National High School, ten (10) students from Clarin National School of Fisheries, three (3) students from Danahaw Integrated High School, and ten (10) consumers from Clarin Public Market.

The participants were selected due to their background and experience in food preparation and evaluation, making them suitable in assessing the sensory attributes of the Ube Kinampay–Cacao Marble Spread in terms of appearance, aroma, taste, and texture.

Research Instrument

The study utilized a modified questionnaire to assess the sensory preference of the Ube Kinampay–Cacao Marble Spread in terms of appearance, aroma, taste, and texture. The instrument was adapted from the Hedonic Scale of Gatchalian (2012) and revised to fit the context of the study.

A 4-point hedonic scale was used, with the following ratings: 4 – preferred extremely, 3 – preferred very much, 2 – preferred moderately, and 1 – preferred slightly. The same scale was applied to evaluate the product's marketability in terms of appearance, flavor, texture, aroma, and price acceptability.

To ensure validity, the questionnaire was reviewed by experts in food technology and research, and necessary revisions were made. A pilot test was also conducted to establish reliability, confirming that the instrument was clear and consistent.

Additionally, nutrient analysis was limited to proximate composition, including moisture, fat, protein, carbohydrate, fiber, and energy content.

Research Procedure

The study was conducted in several phases.

Phase 1: Securing Permission. Approval to conduct the study was obtained from the school authorities, including the school principal and concerned coordinators, through a formal request letter.

Phase 2: Preparation of the Tools. All necessary tools, equipment, and ingredients for the preparation of the Ube Kinampay–Cacao Marble Spread were assembled to ensure a smooth and consistent process.

Phase 3: Product Formulation. Three (3) treatments of the spread were prepared using the same procedures but with varying proportions of ube and cacao. Several trials were conducted to finalize the formulation, with Treatment 2 selected as the standard for the study.

Phase 4: Product Testing. The developed products were presented to the respondents for sensory evaluation. Each treatment was served one at a time, and respondents assessed the product using a structured questionnaire. Water was provided between samples to cleanse the palate. The collected data were then tallied and analyzed.

Phase 5: Shelf-Life Observation. The product was stored under refrigerated conditions (approximately 5°C) and monitored for changes in appearance, texture, aroma, and taste. The spread remained acceptable for 1 to 2 months under proper storage.

Phase 6: Product Laboratory Testing. A sample of the finalized product (Treatment 2) was subjected to proximate analysis in a laboratory to determine its nutritional composition, including moisture, fat, protein, carbohydrates, and energy content.

Data Analysis

The data gathered were organized, tabulated, and analyzed using appropriate statistical tools.

Descriptive statistics such as frequency, percentage, and weighted mean were used to describe the product profile (ingredients and cost, tools, procedures, nutrient content, and shelf life) and to determine the level of sensory preference in terms of appearance, aroma, taste, texture, and consistency.

Prior to inferential analysis, a test of normality was conducted. Since the same respondents evaluated all treatments, a within-subjects design was applied. If the data were normally distributed, Repeated Measures ANOVA was used to determine significant differences among treatments. Otherwise, the Friedman Test was employed as a nonparametric alternative.

When significant differences were found, post hoc analysis using the Durbin–Conover test was conducted to identify specific group differences. All statistical analyses were performed at a 0.05 level of significance using appropriate statistical software.

A 4-point hedonic scale was used to measure sensory attributes, and results were interpreted using corresponding weighted mean ranges.

4-Point Hedonic Scale (Sensory Attribute)

SCALE	AROMA
4	Strong, pleasant, natural ube aroma with distinct cacao smell
3	Good aroma; ube and cacao are recognizable.
2	Moderate aroma; slightly weak or lacking harmony
1	Off-odor, no aroma, or unpleasant smell

SCALE	APPEARANCE
4	Vibrant ube purple with well-defined cacao marbling; visually appealing
3	Good color; marbling visible but slightly inconsistent
2	Acceptable color; slight dullness or weak marbling
1	Unappealing, off-color, or inconsistent appearance

SCALE	TEXTURE
4	Very smooth, creamy, uniform; pleasant mouthfeel
3	Smooth with minor graininess
2	Acceptable smoothness; slight roughness
1	Very rough, lumpy, or unpleasant mouthfeel

SCALE	TASTE
4	Rich, balanced ube flavor complemented by cacao; delicious and harmonious
3	Good flavor; slight imbalance but still pleasant
2	Moderate flavor; needs better sweetness or flavor balance.
1	Unpleasant, off-flavor, bitter, or overly sweet

SCALE	CONSISTENCY
4	Extremely easy to spread; smooth glide without tearing bread
3	Spreads well with minimal resistance
2	Acceptable spreading; slight unevenness
1	Very poor consistency; too stiff, sticky, or clumpy

4-Point Likert Scale (Sensory Evaluation)

Scale	Range	Descriptive Rating	Interpretation
4	3.21 – 4.00	Preferred Extremely	The product is typically extreme to the highest degree.
3	2.41 – 3.20	Preferred Very Much	The product is typically very much like.
2	1.61 – 2.40	Preferred Moderately	The product is liked moderately.
1	1.00 – 1.60	Preferred Slightly	The product is typically liked slightly.

RESULTS

This section presents, analyzes, and interprets the data gathered in the study. It includes the profile of the Ube Kinampay–Cacao Marble Spread and the results of the sensory evaluation in terms of appearance, aroma, taste, texture, and consistency. It also examines the significant differences in the respondents' sensory preferences across the three treatments. The data are presented in tables, analyzed using appropriate statistical tools, and interpreted based on the objectives of the study.

Table 1.1
Ingredients and Costing of Ube Kinampay - Cacao Marble spread

Ingredients	Unit Cost (₱)	T1 Qty (g)	T1 Cost (₱)	T2 Qty (g)	T2 Cost (₱)	T3 Qty (g)	T3 Cost (₱)
Ube Kinampay	80/kg	210	16.80	600	48.00	300	24.00

Cacao (Tablea)	400/kg	200	80.00	300	120.00	45.00	18.00
Butter	250/kg	86	21.50	86	21.50	86	21.50
Evaporated Milk	35/370g	156	14.76	463	43.78	210	19.86
Condensed Milk	45/390g	370	42.69	463	53.42	400	46.15
Vanilla	120/100g	10	12.00	10	12.00	9	10.80
Sugar	70/kg	100	7.00	150	10.50	100	7.00
Jar	15/jar	150.00	10	150.00	10	150.00	10 jars
TOTAL COST			**₱ 345.25**		**₱ 459.20**		**₱ 297.81**
Operating Expenses (10%)			₱ 34.52		₱ 49.92		₱ 29.78
Direct Labor (10%)			₱ 34.52		₱ 49.92		₱ 29.78
Mark up (20%)			₱ 69.04		₱ 99.84		₱ 59.56
Total Cost of Operation			₱483.33		₱658.88		₱416.93
No. of yields			10 jars (100g)		10 jars (100g)		10 jars (100g)
Selling Price per Jar			**₱ 48.33**		**₱ 65.88**		**₱ 41.69**

Table 1.1 presents the ingredients and corresponding production cost of the Ube Kinampay–Cacao Marble Spread across the three treatments. The table shows the variation in ingredient quantities and how these differences affected the total cost of production.

Among the ingredients, cacao (tablea) contributed the highest cost due to its high unit price. Treatment 2 incurred the highest cost for cacao (₱120.00), followed by Treatment 1 (₱80.00), while Treatment 3 had the lowest (₱18.00). Similarly, Treatment 2 used the highest quantity of ube kinampay, resulting in a higher cost compared to Treatments 1 and 3. Overall, Treatment 2 recorded the highest total production cost (₱459.20), followed by Treatment 1 (₱345.25), while Treatment 3 had the lowest (₱297.81). After including operating expenses, labor, and markup, the total cost of operation reached ₱658.88 for Treatment 2, ₱483.33 for Treatment 1, and ₱416.93 for Treatment 3. In terms of selling price per jar (100 g), Treatment 2 had the highest at ₱65.88, followed by Treatment 1 at ₱48.33, and Treatment 3 at ₱41.69. This indicates that Treatment 3 is the most economical option, while Treatment 2 is the most costly due to higher ingredient usage. The results show that ingredient proportion, particularly cacao and milk components, significantly affects the overall production cost and pricing of the product.

Table 1.2
Tools and Equipment

Quantity	Unit	Tools and Equipment	Description
2	Pieces	Mixing bowl	metal mixing bowl
1	Set	Measuring cup	Plastic
1	Set	Measuring spoon	Plastic
1	Piece	Strainer	Stainless Steel
1	piece	Wooden Spoon	Wood
1	piece	Cutting board	Plastic
1	piece	Glass Jar with Lids	Glass
1	piece	Kitchen Weighing Scale	Metal
1	piece	Knife	Stainless
1	piece	Grater	Stainless
1	piece	Saucepan/Cooking Pot	Aluminum
1	Piece	Meat Grinder	High Power
1	Unit	Refrigerator	Electrical

1	Unit	Gas range	Gas operated
1	Unit	Heat gun	Electrical

Table 1.2 presents the tools and equipment used in the preparation of the Ube Kinampay–Cacao Marble Spread. The listed items include basic kitchen tools such as mixing bowls, measuring cups and spoons, strainer, saucepan, and weighing scale, as well as equipment like a refrigerator, gas range, and heat gun.

Most of the tools and equipment are commonly available, easy to use, and affordable. Some items may also be substituted with similar alternatives without affecting the preparation process. This indicates that the production of the spread is practical and feasible for small-scale processing using locally available resources.

These findings support the idea that food product development can be carried out using simple and cost-effective equipment suitable for household or small enterprise settings (Fellows, 2022).

Table 1.3
Procedures

STEP	PROCEDURE
1	Gather and measure all the required ingredients such as ube kinampay, condensed milk, evaporated milk, butter or margarine, sugar, vanilla extract, salt, and tablea cacao according to the specified treatment formulation.
2	Wash the ube kinampay thoroughly under running water to remove dirt. Peel the outer skin using a knife and cut the ube into smaller pieces.
3	Place the sliced ube in a cooking pot with enough water and boil for about 20–30 minutes or until the ube becomes soft and tender.
4	Drain the boiled ube and mash it using a meat grinder until smooth and free from lumps.
5	In preparing the Ube kinampay mixture, in a saucepan, combine the mashed ube, condensed milk, evaporated milk, butter or margarine, sugar, vanilla extract, and a pinch of salt. Cook the mixture over low to medium heat while stirring continuously until it becomes thick and creamy. Continue stirring desired spreadable consistency is achieved.
6	In preparing the Cacao mixture, in a separate saucepan, combine the grated or melted tablea cacao, condensed milk, butter, and vanilla extract. Heat the mixture while stirring continuously until it becomes smooth and thick. Continue stirring desired spreadable consistency is achieved.
7	Create marble effect, in sterilized jars or containers, place alternating layers of the ube mixture and cacao mixture. Use a spoon or spatula to gently swirl the mixtures to create a marble pattern without fully blending them.
8	Allow the filled jars to cool at room temperature.
9	Seal the jars properly and store the finished Ube Kinampay–Cacao Marble Spread in a refrigerator to maintain quality and extend shelf life.

Table 1.3 presents the step-by-step procedure in the preparation of the Ube Kinampay–Cacao Marble Spread. The process begins with the preparation of ingredients, followed by washing, peeling, boiling, and mashing the ube to achieve a smooth base. The ube and cacao mixtures are prepared separately and cooked under controlled heat while stirring continuously to obtain the desired thickness and consistency. Proper heat control and mixing are essential to achieve a smooth, stable, and spreadable product. The marble effect is created by layering and gently swirling the ube and cacao mixtures in sterilized containers, enhancing the product's visual appeal. The final steps include cooling, sealing, and refrigeration to maintain quality and extend shelf life. Overall, the

procedure follows standard food processing practices that ensure product quality, safety, and acceptability (Fellows, 2022; Potter & Hotchkiss, 2012).

Table 1.4
Nutritional Content of Ube Kinampay–Cacao Marble Spread

Analysis	Unit	Results	Test Method	Recommended Daily Intake
Ash	g/100g	1.26	Ignition Gravimetry	For children (4–12 years old) a safe recommended intake would be about 30–60g per serving (1–2 tablespoons) For adults 50–100g per day (2–4 tablespoons)
Crude Fat	g/100g	9.25	Soxhlet-Extraction	
Crude Protein(Nx6.25)	g/100g	3.40	Kjeldahl Method	
Moisture	g/100g	37.3	Vacuum Oven Drying	
Cholesterol	mg/100g	3.29	Gas Chromatography (FID)	
Sodium	mg/100g	100	Flame AES	
Calcium	mg/100g	377	Flame AAS	
Carbohydrates	g/100g	48.8	By Computation	
Calories	cal/100g	292		

Table 1.4 presents the nutritional composition of the Ube Kinampay–Cacao Marble Spread per 100 grams based on laboratory analysis. The product contains 292 calories, indicating a moderate energy content suitable for snacks or breakfast use. In terms of macronutrients, the spread is high in carbohydrates (48.8 g), primarily from ube kinampay and added sugars, making it a good source of energy. It also contains 9.25 g of fat, which contributes to its creamy texture, and 3.40 g of protein, derived mainly from milk and cacao. The product has a moisture content of 37.3%, resulting in a soft and spreadable consistency. It also contains low cholesterol (3.29 mg), along with essential minerals such as sodium (100 mg) and calcium (377 mg), which contribute to its nutritional value. Overall, the results show that the spread is an energy-rich product with moderate fat and low protein content. Its nutritional profile suggests that it can be consumed as a snack or bread spread when taken in moderation as part of a balanced diet.

Table 1.5
Shelf-life

Sensory Qualities	Desirable Quality	Week 1-2	Week 3-4	Week 5-6	Week 7-8
Appearance	T1 Bright marble swirl, glossy	No Changes	No Changes	No Changes	No Changes end of observation
	T2 Bright purple-brown marble color	No Changes	No Changes	No Changes	No Changes end of observation
	T3 Slightly darker swirl color	No Changes	No Changes	No Changes	No Changes end of observation
Aroma	T1 Mild cacao aroma	No Changes	No Changes	No Changes	No Changes end of observation
	T2 Pleasant ube and cacao aroma	No Changes	No Changes	No Changes	No Changes end of observation
	T3 Strong cacao aroma	No Changes	No Changes	No Changes	No Changes end of observation

Taste	T1 Moderately sweet	No Changes	No Changes	No Changes	No Changes end of observation
	T2 Rich chocolate and ube flavor	No Changes	No Changes	No Changes	No Changes end of observation
	T3: Sweet and balanced flavor	No Changes	No Changes	No Changes	No Changes end of observation
Texture	T1 Smooth and creamy	No Changes	No Changes	No Changes	No Changes end of observation
	T2 Smooth spreadable texture	No Changes	No Changes	No Changes	No Changes end of observation
	T3 Thick and creamy	No Changes	No Changes	No Changes	No Changes end of observation

Table 1.5 presents the shelf-life evaluation of the Ube Kinampay–Cacao Marble Spread in terms of appearance, aroma, taste, and texture across three treatments. The product was observed over an eight-week period under proper storage conditions.

The results show that all treatments maintained their desirable sensory qualities from Week 1 to Week 8. No noticeable changes were observed in appearance, aroma, taste, and texture throughout the observation period, indicating that the product remained stable and acceptable for consumption within two months. However, beyond the observation period, signs of deterioration were noted, including slight discoloration, reduced aroma, and changes in texture, which indicate the onset of spoilage. This suggests that the product has an estimated shelf life of up to two months under proper storage conditions. These findings highlight the importance of proper storage in maintaining product quality and support the concept that shelf life is influenced by factors such as moisture, temperature, and microbial activity (Subramaniam & Wareing, 2016; Man, 2015).

Table 2.1
Level of Sensory Attributes of Ube Kinampay (*Dioscorea alata*) -Cacao (*Theobroma cacao*)Marble Spread in terms of Appearance
N=74

Appearance	Treatment 1			Treatment 2			Treatment 3		
	F	%	Rank	F	%	Rank	F	%	Rank
Vibrant ube purple with well-defined cacao marbling; visually appealing	28	37.84	2	32	43.24	1	27	36.49	2
Good color; marbling visible but slightly inconsistent	26	35.14	1	24	32.43	2	28	37.84	1
Acceptable color; slight dullness or weak marbling	12	16.22	3	11	14.86	3	13	17.57	3
Unappealing, off-color, or inconsistent appearance	8	10.81	4	7	9.46	4	6	8.11	4
TOTAL	**74**	**100**		**74**	**100**		**74**	**100**	

Table 2.1 presents the level of sensory attributes of the Ube Kinampay–Cacao Marble Spread in terms of appearance. The results show that all three treatments were generally rated positively by the respondents. Most responses across the treatments fell under “vibrant ube purple with well-defined cacao marbling” and “good color with visible marbling,” indicating that the product’s color and marble effect were visually appealing. Among the three, Treatment 2 obtained the highest frequency in the most desirable category, suggesting better color intensity and marbling compared to the other treatments. Only a small number of respondents rated the appearance as “acceptable” or “unappealing,” which implies that issues such as dullness or inconsistency were minimal. Overall, the findings indicate that the product’s appearance is highly acceptable, with Treatment 2 having a slight advantage in visual appeal.

Table 2.2
Level of Sensory Attributes of Ube Kinampay (*Dioscorea alata*) -Cacao (*Theobroma cacao*) Marble Spread in terms of Aroma
N=74

Aroma	Treatment 1			Treatment 2			Treatment 3		
	F	%	Rank	F	%	Rank	F	%	Rank
Strong, pleasant, natural ube aroma with clear cacao; highly inviting	32	43.24	1	38	51.35	1	30	40.54	1
Good aroma; ube and cacao are recognizable.	28	37.84	2	26	35.14	2	29	39.19	2
Moderate aroma; slightly weak or lacking harmony	10	13.51	3	8	10.81	3	12	16.22	3
Off-odor, no aroma, or unpleasant smell	4	5.41	4	2	2.70	4	3	4.05	4
TOTAL	**74**	**100**		**74**	**100**		**74**	**100**	

Table 2.2 presents the level of sensory attributes of the Ube Kinampay–Cacao Marble Spread in terms of aroma. The results indicate that all three treatments were generally well-accepted by the respondents. Most responses across treatments were classified under “strong, pleasant, natural ube aroma with clear cacao” and “good aroma,” showing that the product emitted an inviting and recognizable scent. Among the treatments, Treatment 2 obtained the highest percentage in the most desirable category, suggesting that it had the most appealing and balanced aroma. Treatments 1 and 3 also received positive evaluations, although slightly lower, indicating that their aroma was acceptable but less pronounced compared to Treatment 2. Only a small percentage of respondents rated the aroma as “moderate” or “unpleasant,” implying minimal issues in scent quality. Overall, the findings show that aroma is a strong contributor to the product’s sensory acceptability. The balanced combination of ube and cacao, particularly in Treatment 2, enhanced the overall aroma and improved consumer preference. This supports the idea of Brown et al. (2015) that aroma plays a crucial role in food evaluation, as it influences appetite, perception of quality, and overall desirability.

Table 2.3
Level of Sensory Attributes of Ube Kinampay (*Dioscorea alata*) -Cacao (*Theobroma cacao*) Marble Spread in terms of Taste
N=74

Taste	Treatment 1			Treatment 2			Treatment 3		
	F	%	Rank	F	%	Rank	F	%	Rank
Rich, balanced ube flavor complemented by cacao; delicious and harmonious	30	40.54	1	36	48.65	1	28	37.84	1
Good flavor; slight imbalance but still pleasant	24	32.43	2	25	33.78	2	27	36.49	2
Moderate flavor; needs better sweetness or flavor balance.	14	18.92	3	9	12.16	3	13	17.57	3
Unpleasant, off-flavor, bitter, or overly sweet	6	8.11	4	4	5.41	4	6	8.11	4
TOTAL	**74**	**100**		**74**	**100**		**74**	**100**	

Table 2.3 presents the level of sensory attributes of the Ube Kinampay–Cacao Marble Spread in terms of taste as perceived by the respondents (N = 74). The results revealed that all three treatments were generally well accepted, with the majority of responses concentrated in the highest category, “rich, balanced ube flavor complemented by cacao; delicious and harmonious.” This indicates that the product achieved a highly desirable and palatable taste across all treatments.

Among the three, Treatment 2 obtained the highest percentage (48.65%) in the most preferred category, suggesting that it had the most favorable and well-balanced flavor profile. This may be attributed to the equal or optimal proportion of ube and cacao, which enhanced the harmony between sweetness and chocolate richness. Treatments 1 and 3 also received strong positive responses, with 40.54% and 37.84%, respectively, indicating that their taste was likewise highly acceptable but slightly less optimal compared to Treatment 2.

The second category, “good flavor; slight imbalance but still pleasant,” also garnered a substantial proportion of responses across all treatments, further confirming overall acceptability. Meanwhile, only a small percentage of respondents rated the product under “moderate flavor” and “unpleasant taste,” indicating minimal issues related to flavor imbalance or off-taste. Overall, the findings indicate that the developed Ube Kinampay–Cacao Marble Spread is generally well accepted in terms of taste, with Treatment 2 demonstrating a slight advantage in achieving a more desirable flavor balance and higher consumer preference. This result is consistent with the findings of Andersen and Hyldig (2015), who emphasized that taste is a key determinant of food satisfaction, as it directly contributes to consumers’ sensory enjoyment and overall acceptance of a product.

Table 2.4
Level of Sensory Attributes of Ube Kinampay (*Dioscorea alata*) -Cacao (*Theobroma cacao*) Marble Spread in terms of Texture
N=74

Texture	Treatment 1			Treatment 2			Treatment 3		
	F	%	Rank	F	%	Rank	F	%	Rank
Very smooth, creamy, uniform; pleasant mouthfeel	28	37.84	1	34	45.95	1	26	35.14	2
Smooth with minor graininess	25	33.78	2	26	35.14	2	27	36.49	1
Acceptable smoothness; slight roughness	15	20.27	3	10	13.51	3	15	20.27	3
Very rough, lumpy, or unpleasant mouthfeel	6	8.11	4	4	5.41	4	6	8.11	4
TOTAL	**74**	**100**		**74**	**100**		**74**	**100**	

Table 2.4 presents the level of sensory attributes of the Ube Kinampay–Cacao Marble Spread in terms of texture as perceived by the respondents (N = 74).The results revealed that all three treatments were generally well accepted, with most responses concentrated in the highest category, “very smooth, creamy, and uniform; pleasant mouthfeel.” This indicates that the product achieved a desirable texture and consistency across all treatments.

Among the three, Treatment 2 obtained the highest percentage (45.95%) in the most preferred category, suggesting that it had the smoothest and most desirable texture. This may be attributed to the balanced formulation of ingredients, which contributed to a more uniform and creamy consistency. Treatment 3 recorded the highest percentage (36.49%) in the second category, “smooth with minor graininess,” indicating acceptable smoothness with slight variation, while Treatment 1 also received strong positive responses in both top categories.

Only a small proportion of respondents rated the product under “acceptable smoothness” and “very rough,” indicating minimal issues related to graininess or undesirable mouthfeel. Overall, the findings suggest that the developed product is highly acceptable in terms of texture, with Treatment 2 demonstrating a slight advantage in achieving optimal smoothness and consistency. This finding supports the idea that texture is a critical indicator of food quality, as it is influenced by factors such as moisture and fat content, which affect mouthfeel and overall consumer acceptability (Christensen, 1984).

Table 3
Difference in the Sensory Attributes Ube Kinampay (*Dioscorea alata*) -Cacao (*Theobroma cacao*) Marble Spread among three treatments
N-74

Variables	Mean	χ^2-stat value	p-value	Decision	Interpre-tation	Durbin-Conover Rank Test			
							p-value	Decision	Interpre-tation
Appearance	T1	69.4	.001	Reject Ho	Significant	T1 vs T2	.001	Reject Ho	Significant
	T2					T1 vs T3	.089	Do not Reject Ho	Insignificant
	T3					T2 vs T3	.001	Reject Ho	Significant
Aroma	T1	63.1	.001	Reject Ho	Significant	T1 vs T2	.001	Reject Ho	Significant
	T2					T1 vs T3	1.000	Do not Reject Ho	Insignificant
	T3					T2 vs T3	.001	Reject Ho	Significant
Taste	T1	0.583	.747	Fail to reject Ho	Insignificant				
	T2								
	T3								
Texture	T1	55.8	.001	Fail to reject Ho	Significant	T1 vs T2	.001	Reject Ho	Significant
	T2					T1 vs T3	.001	Reject Ho	Significant
	T3					T2 vs T3	.001	Reject Ho	Significant

Table 3 presents the results of the Friedman Test used to determine the significant differences in the sensory attributes of the Ube Kinampay–Cacao Marble Spread across the three treatments (N = 74).

The findings revealed that appearance ($\chi^2 = 69.4$, $p < .001$), aroma ($\chi^2 = 63.1$, $p < .001$), and texture ($\chi^2 = 55.8$, $p < .001$) showed statistically significant differences among the three treatments. Thus, the null hypothesis for these attributes is rejected, indicating that respondents were able to distinguish variations in visual appeal, aroma, and texture across the different formulations.

On the other hand, taste ($\chi^2 = 0.583$, $p = 0.747$) did not show a significant difference, leading to the failure to reject the null hypothesis. This implies that the respondents perceived the taste of all treatments as relatively similar, indicating consistency in flavor acceptability regardless of formulation differences.

Further analysis using the Durbin–Conover post hoc test revealed specific pairwise differences. For appearance, significant differences were observed between Treatment 1

and Treatment 2 and between Treatment 2 and Treatment 3, while no significant difference was found between Treatment 1 and Treatment 3, suggesting comparable visual appeal between these two treatments. For aroma, significant differences were also found between Treatment 1 and Treatment 2 and between Treatment 2 and Treatment 3, whereas Treatment 1 and Treatment 3 did not differ significantly, indicating similar aromatic characteristics between these treatments.

For texture, all pairwise comparisons (T1 vs T2, T1 vs T3, and T2 vs T3) were statistically significant, indicating that each treatment differed distinctly in terms of mouthfeel and consistency. This suggests that texture was the most sensitive attribute to formulation changes. Overall, the results indicate that significant differences exist among the three treatments in terms of appearance, aroma, and texture, while taste remains consistently acceptable across treatments. These findings imply that variations in ingredient proportions influenced the product's physical and sensory qualities, particularly its visual appeal, aroma, and texture. Therefore, product enhancement efforts should focus on optimizing these attributes to further improve consumer acceptability.

Table 4
Preference Level on Ube Kinampay (Dioscorea alata) -Cacao (Theobroma cacao) Marble Spread among three treatments
N-74

Variables	χ^2-stat value	Df	α	p-value	Decision	Interpretation
Appearance	69.4	2	0.05	< .001	Reject the null hypothesis	Significant
Aroma	63.1	2	0.05	< .001	Reject the null hypothesis	Significant
Taste	0.583	2	0.05	0.747	Fail to reject the null hypothesis	Insignificant
Texture	55.8	2	0.05	< .001	Reject the null hypothesis	Significant

Table 4 presents the preference level of the Ube Kinampay (Dioscorea alata)–Cacao (Theobroma cacao) Marble Spread among the three treatments based on sensory attributes (N = 74). The results revealed that appearance ($\chi^2 = 69.4$, $p < .001$), aroma ($\chi^2 = 63.1$, $p < .001$), and texture ($\chi^2 = 55.8$, $p < .001$) showed statistically significant differences among the three treatments. Thus, the null hypothesis is rejected for these variables, indicating that respondents exhibited varying levels of preference in terms of visual appeal, aroma, and texture. In contrast, taste ($\chi^2 = 0.583$, $p = 0.747$) did not show a significant difference, leading to the failure to reject the null hypothesis. This implies that the respondents perceived the taste of all three treatments as relatively similar, indicating consistent flavor acceptability across formulations. Overall, the findings suggest that appearance, aroma, and texture significantly influenced consumer preference, while taste remained uniformly acceptable among the treatments. This indicates that although flavor is essential, respondents' preferences were more strongly affected by visual, aromatic, and textural qualities. Therefore, improving these attributes may further enhance the overall acceptability and market potential of the product.

DISCUSSION

The primary purpose of this study was to determine the profile of the Ube Kinampay (Dioscorea alata)–Cacao (Theobroma cacao) Marble Spread in terms of ingredients and costing, tools and equipment, procedures, nutritional content, and shelf life. In addition, the study examined the respondents' sensory preferences and the significant differences among the three treatments in terms of appearance, aroma, taste, and texture.

An experimental research design was employed to develop the Ube Kinampay–Cacao Marble Spread and to evaluate the differences in sensory preferences across the three treatments. Data were gathered using a modified questionnaire based on the 4-point hedonic scale and were analyzed to determine the level of acceptability and variation in sensory attributes.

The study was conducted in selected secondary schools in the Clarin District, with a total of 74 respondents. These included food experts, Senior High School cookery students, and selected consumers, all of whom possess relevant experience in food preparation and evaluation. Their background ensured that the assessment of the product's sensory attributes was reliable and appropriate.

Shelf life was determined through systematic observation using an observation guide, wherein the researcher monitored changes in the product's sensory qualities across the three treatments over time. Furthermore, proximate analysis was conducted through laboratory testing at First Analytical Services and Technical Laboratory in Mandaue City, Cebu, to determine the nutritional composition of the developed product.

Findings

After a thorough and careful analysis and interpretation of the data gathered, the researcher has found the following results:

1. **Profile of Ube Kinampay-Cacao Marble Spread**

1.1 Ingredients and Costs

The ingredients of ube kinampay-cacao marble spread were: Fresh Ube Kinampay (Dioscorea alata), Cacao tablea (Theobroma cacao), Condensed milk, Evaporated milk or coconut milk, Butter, White sugar, and Vanilla extract. The production cost revealed that Treatment 2 costs the highest, having a cost of ₱459.20, while Treatment 1 costs ₱345.25, and Treatment 3 has the cost of ₱297.81. Furthermore, all the treatments had a yield of 100g. In terms of the cost per serving, treatment 2 got the highest cost, which is ₱65, while the rest of the treatments got the cost of ₱41.69 for treatment 3 per jar and ₱41.69 for treatment 3 per jar. It can be concluded that the Ube Kinampay-Cacao marble spread is affordable and cheap in terms of its production cost and cost per jar.

1.2 Tools and Equipment

The tools used in the preparation of the spread were the Knife, cutting board, measuring cup, measuring spoon, wooden spoon, strainer, glass jar with lids, kitchen weighing scale, grater, saucepan/cooking pot, meat grinder, refrigerator, and gas range. Assembling all the materials and the ingredients in making the ube kinampay-cacao marble spread was made to ensure fast and successful execution of the processes involved in the preparation of the spread. Some of the equipment can be interchanged with other related equipment. Hence, the researcher made it sure that all the tools and equipment were available and were less expensive.

1.3 Procedure

The steps in making ube kinampay-cacao marble spread were all easy and simple to perform. Wash, peel, and cut fresh ube kinampay into pieces. Boil until soft, then mash or blend until smooth. Prepare cacao mixture by melting or dissolving tablea. Cook both ube and cacao with condensed milk, evaporated milk, butter, sugar, and vanilla separately over low heat until a thick and spreadable consistency is achieved. Add a pinch of salt to enhance flavor. In sterilized jars, alternate layers of ube and cacao to create a marble effect. Seal jars tightly and label properly. Store under refrigeration to extend shelf life.

1.4 Nutritional Content

Based on the laboratory analysis of the Ube Kinampay–Cacao Marble Spread, the product demonstrates a balanced nutritional profile suitable for a dessert spread. It contains 37.3 g of moisture, indicating moderate water content for spreadability, 9.25 g of crude fat**,** which contributes to creaminess, and 3.40 g of crude protein, providing minimal but notable protein content. The carbohydrate content of 48.8 g and 292 calories per serving suggests it is energy-dense and provides a good source of quick energy. Essential minerals such as calcium (377 mg) and sodium (100 mg) support bone health and electrolyte balance, while the low cholesterol content (3.29 mg) makes it heart-friendly. Overall, the spread offers a nutritious combination of macronutrients and minerals, making it both tasty and moderately healthy for consumption.

1.5 Shelf-life

The researcher used an air-tight container to store the three different treatments of ube kinampay-cacao marble spread. The product typically preserves its quality within a span of 2 months without undergoing physical and chemical changes. Chilling is a process by which the product temperature is reduced to a desired lower temperature, normally, the shelf-life of the product. It inhibits microbial growth and chemical change due to its process of removing the maximum amount of moisture from food. Shelf-life is also affected by the type of packaging in which the product is contained.

2. Sensory Evaluation

2.1 Appearance

Treatment 2 is preferred the most by the respondents in terms of appearance, having a weighted mean of 3.52, described as “Preferred Extremely”. On the other hand, treatment 1 got a weighted mean of 3.51, described as “Preferred Very Much,” and treatment 3 got a weighted mean of 3.50, described as “Preferred Very Much”. In terms of appearance, most of the respondents preferred the three treatments.

2.2 Aroma

In the aspect of aroma, treatment 2 got the highest rating with a weighted mean of 3.90, described as “Preferred Extremely”. Treatment 1 and 3 tied for the second position, both having a weighted mean of 3.55, which is described as “Preferred Very Much”. It can be inferred that treatment 2 is preferred the most by the respondents, and all the treatments were considered preferable.

2.3 Taste

Treatment 2 is preferred extremely in terms of taste, having the highest weighted mean of 3.38. On the other hand, treatment 1 comes second with a weighted mean of 2.86, described as “Preferred very much”. Meanwhile, Treatment 3 got the least rating with a mean of 2.76, described as “Preferred very much ”. Thus, the respondents preferred all the treatments in terms of taste, with the greatest degree of preference for treatment 2.

2.4 Texture

As depicted in the data, treatment 2 got the highest rating in terms of texture with a weighted mean of 3.85, described as “Preferred extremely” among all the treatments. Treatment 1 got a higher rating of 3.60, described as “Preferred Very Much”. Moreover, treatment 3 got the least rating with a weighted mean of 3.10, described as “Preferred Very Much”. It implies that in terms of texture, the respondents preferred treatment 2 the most and preferred the other treatments to a lesser degree.

Summary of Respondents’ Preference Level in Three Treatments

The data showed that there is a difference in the level of sensory preference among the treatments of the Ube Kinampay–Cacao Marble Spread, particularly in terms of aroma. The Friedman test indicated a significant difference in aroma, while appearance, taste, and texture showed no significant differences, suggesting that these attributes were similarly perceived across all treatments. Furthermore, the pairwise comparisons confirmed that all treatments significantly differed from one another in aroma, indicating that formulation variations greatly influenced this attribute. In contrast, the non-significant results for appearance, taste, and texture imply that these

characteristics were consistently acceptable regardless of treatment. Overall, the findings highlight that aroma is the key sensory factor that differentiates consumer preference among the treatments.

Conclusions

The study concluded that the Ube Kinampay (Dioscorea alata)–Cacao (Theobroma cacao) Marble Spread developed in three different treatments is generally acceptable and preferred by both food experts and consumers. Among the formulations, Treatment 2 (50% ube kinampay and 50% cacao) consistently obtained the highest preference across the sensory attributes, indicating an optimal balance of ingredients. The findings further revealed that appearance, aroma, and texture showed significant differences among the three treatments, suggesting that variations in formulation influenced these sensory characteristics. In contrast, taste did not show a significant difference, indicating that all treatments were similarly acceptable in terms of flavor. Post hoc analysis confirmed that aroma and texture were the most distinguishing attributes, with clear differences observed among treatments, while taste remained consistently acceptable. This highlights that although flavor is important, consumer preference is more strongly influenced by visual appeal, aroma, and mouthfeel. Overall, the study emphasizes that while all formulations are viable, Treatment 2 is the most preferred, and future product development should focus on optimizing aroma, texture, and overall presentation to further enhance consumer acceptability and market potential.

Recommendations

1. The food industry is encouraged to commercialize the Ube Kinampay–Cacao Marble Spread while improving its aroma and ensuring consistent quality through standardized production processes.
2. Entrepreneurs are encouraged to develop this product into a viable business opportunity by enhancing packaging, branding, and marketing strategies.
3. Consumers are encouraged to support and try the product as a nutritious local spread and to store it properly to maintain its quality.
4. Food technology teachers are encouraged to use this study as a reference in teaching food processing, sensory evaluation, and product innovation.
5. Schools are encouraged to incorporate product development studies using local ingredients to enhance students' practical knowledge and skills.
6. Researchers and students are encouraged to further improve the formulation and conduct additional studies on shelf life, nutritional value, and product acceptability.
7. Future researchers are encouraged to conduct more advanced investigations, including preservation techniques, microbiological analysis, and large-scale consumer testing.

Proposed Technology Package for Ube Kinampay (Dioscorea alata) – Cacao (Theobroma cacao) Marble Spread

1. Product Description

The Ube Kinampay–Cacao Marble Spread is a value-added, dual-flavored food spread developed from locally sourced Ube Kinampay and processed cacao (tablea). The product is blended with dairy ingredients such as condensed milk, evaporated milk, butter, sugar, vanilla extract, and a pinch of salt. It is characterized by its distinctive purple and brown marbled appearance, smooth and creamy texture, and a balanced sweet chocolate–ube flavor. The product is suitable as a bread spread, dessert filling, or snack component.

2. Ingredients

- Ube Kinampay (boiled and mashed)
- Cacao (tablea, grated or melted)
- Condensed milk
- Evaporated milk
- Butter or margarine
- White sugar
- Vanilla extract
- Salt (pinch)

3. Tools and Equipment

- Mixing bowl
- Measuring cup and measuring spoon
- Strainer
- Wooden spoon
- Cutting board
- Knife
- Grater
- Saucepan/Cooking pot
- Meat grinder
- Kitchen weighing scale
- Glass jars with lids
- Gas range
- Heat gun (optional for sterilization)
- Refrigerator

4. General Procedure

1. Wash, peel, and cut fresh Ube Kinampay into small pieces.
2. Boil until soft and mash or grind until smooth.
3. Prepare the cacao mixture by melting or dissolving the tablea.

4. Separately cook the ube mixture and cacao mixture with condensed milk, evaporated milk, butter, sugar, and vanilla extract over low heat until thick and spreadable.
5. Add a pinch of salt to enhance flavor.
6. In sterilized jars, alternately layer the ube and cacao mixtures and gently swirl to create a marble effect.
7. Allow the product to cool, then seal and label properly.
8. Store under refrigeration to maintain quality.

5. Processing Parameters

- **Cooking temperature:** 70–90°C (low to medium heat)
- **Cooking time:** 20–40 minutes or until desired consistency is achieved
- **Mixing ratio:** Based on the selected treatment formulation (optimal: 50:50 ube–cacao)
- **Storage condition:** Refrigerated at approximately 5°C
- **Shelf life:** 1–2 months under proper storage conditions

6. Quality Control Measures

1. Use fresh, high-quality raw materials.
2. Maintain a clean and sanitary working environment (GMP compliance).
3. Ensure proper sterilization of containers before filling.
4. Monitor product consistency, color, and aroma prior to packaging.
5. Conduct sensory evaluation to ensure product acceptability before scaling production.

7. Packaging and Labeling

1. Use airtight glass jars to preserve freshness and prevent contamination.
2. Labels should include:
    - Product name
    - Ingredients
    - Net weight
    - Date of manufacture
    - Expiration date
3. Packaging design should emphasize the product's identity using a purple and brown color theme representing ube and cacao.

8. Safety and Sanitation

1. Practice proper handwashing and sanitation before handling ingredients.
2. Avoid cross-contamination during preparation.
3. Use clean and sanitized tools and equipment.
4. Store the finished product immediately under refrigeration.

9. Expected Output

The final product is a smooth, creamy, and visually appealing marble spread with a balanced ube and cacao flavor. It demonstrates high sensory acceptability and has strong potential for small-scale commercialization and community-based food enterprise development.

Compliance with Ethical Standards

This study adhered to established ethical standards in the conduct of research involving human participants and food product evaluation. Prior to data collection, permission to conduct the study was secured from the school authorities of the selected secondary schools in the Municipality of Clarin, Bohol. Approval was also obtained from the research adviser and concerned officials to ensure that all procedures complied with institutional requirements. Participation in the study was voluntary. All respondents, including food experts, cookery students, and consumers, were informed of the purpose of the study and the procedures involved in the sensory evaluation of the Ube Kinampay (Dioscorea alata)–Cacao (Theobroma cacao) Marble Spread. Informed consent was obtained before participation, and respondents were assured that they could withdraw from the study at any time without any consequences. Confidentiality and anonymity of the respondents were strictly maintained. No personal identifiers were collected or disclosed, and all data were used solely for academic and research purposes. The responses were treated with utmost confidentiality and were reported in aggregate form. In terms of food safety, the preparation of the Ube Kinampay–Cacao Marble Spread followed proper sanitation and hygiene practices. Ingredients were handled carefully, tools and equipment were cleaned and sanitized, and the product was prepared under controlled conditions to ensure safety for consumption. Participants were also informed about the ingredients used in the product to prevent possible allergic reactions.

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