MAKASSAR TOURISM POLYTECHNIC

Sosis Parape

Product Development of an Emulsified Skipjack Tuna Sausage with Bumbu Parape as a Marker of Makassar Gastronomic Identity

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This applied scientific paper documents the development of Sosis parape, an emulsified sausage product based on skipjack tuna (Katsuwonus pelamis) that integrates professional sausage-making technique with bumbu parape as part of South Sulawesi's gastronomic heritage.

PREFACE

This applied scientific paper, entitled *Sosis parape*: Product Development of an Emulsified Skipjack Tuna Sausage with *Bumbu parape* as a Marker of Makassar Gastronomic Identity, was prepared as an academic output of the Seafood Culinary Processing Course in the Even Semester of the 2025/2026 Academic Year, Culinary Arts Diploma Programme, Politeknik Pariwisata Makassar.

This paper documents the development of *Sosis parape*, an emulsified skipjack tuna sausage based on skipjack tuna (Katsuwonus pelamis) and *bumbu parape*. It is not presented merely as a recipe record, but as an applied culinary science document that explains how local gastronomic knowledge can be translated into a standardised, technically controlled, and professionally defensible food product. The central position of this work is that a regional flavour system can be preserved in a new product format when culinary identity and production discipline are treated with equal seriousness.

The product development process was conducted at the Practical Kitchen Laboratory of Politeknik Pariwisata Makassar. The work involved formula development, preparation of cooked *bumbu parape*, fish batter processing, casing, steaming, rapid cooling, vacuum packaging, sensory observation, and documentation. Each stage required collaboration between lecturers, laboratory instructors, and culinary students, particularly in maintaining ingredient accuracy, temperature control, batch consistency, and sensory clarity.

This paper also recognises its current methodological limitations. Laboratory analyses such as proximate composition, water activity, pH, total plate count, and validated shelf-life testing have not yet been conducted. For that reason, this document should be read as a rigorous applied culinary product development report, not as a complete food technology validation study. Further analytical testing is required before broader commercial claims or indexed journal submission can be responsibly pursued.

We hope that this work contributes to the development of seafood-based culinary products in South Sulawesi, particularly by showing how local ingredients and regional flavour systems may be developed into standardised products within culinary vocational education. More importantly, this work is intended to encourage culinary students to treat local food heritage not as a static inheritance, but as a living source of disciplined, creative, and scientifically accountable product development.

Makassar, 2026

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ABSTRACT

Sosis parape is an emulsified skipjack tuna sausage developed at the Practical Kitchen Laboratory of Politeknik Pariwisata Makassar as an applied culinary product based on *bumbu parape*. This paper documents the product development process, including formulation, sensory target design, production control, and preliminary hedonic testing. The product was formulated with skipjack tuna (*Katsuwonus pelamis*) as the main protein source, supported by cooked *bumbu parape*, tapioca starch, sago starch, egg white, iced water, neutral oil, and selected seasonings. The production process emphasised cold fish batter handling, phased chopping, casing, steaming to a minimum core temperature of 63°C, rapid cooling, and vacuum packaging. The sensory design targeted an even golden-brown colour, cooked shallot and spice aroma, firm-elastic texture, balanced savoury-sweet-acidic flavour, and moist mouthfeel. Preliminary hedonic testing involving 20 trained panellists produced an overall mean score of 4.45 on a five-point scale, with flavour receiving the highest mean score of 4.65. These findings indicate that *Sosis parape* has potential as a standardised seafood-based culinary product that translates Makassar's regional flavour system into a technically controlled sausage format. This work should be read as a rigorous applied culinary product development report; further analyses of proximate composition, water activity, pH, total plate count, and validated shelf-life are required before broader commercial claims can be made.

Keywords: *bumbu parape*; culinary glocalization; emulsified sausage; Makassar gastronomy; skipjack tuna; *Sosis parape*.

CHAPTER I
INTRODUCTION

A. Background

Sosis parape is developed as an emulsified skipjack tuna sausage that brings together professional sausage-making technique and *bumbu parape* as a regional flavour system. The product is positioned within applied culinary product development, where formulation, process control, sensory clarity, and cultural meaning must be treated as connected design elements. This position is important because a food product cannot be defended only through taste; it must also show technical logic, reproducibility, and a clear relationship with its culinary origin.

The technical basis of *Sosis parape* lies in the behaviour of fish protein within an emulsion-gel system. Fish protein can function as an emulsifier by stabilising oil and water phases through interfacial film formation around dispersed oil droplets (Lu et al., 2024). In an emulsified sausage, this mechanism is essential because the product depends on the controlled interaction of protein, water, fat, salt, starch, egg white, seasoning, and heat. For that reason, *Sosis parape* is not designed merely as minced fish mixed with seasoning; it is designed as a structured fish batter that must remain stable during chopping, casing, steaming, rapid cooling, and vacuum packaging.

Skipjack tuna (*Katsuwonus pelamis*) was selected as the main protein source because it offers both culinary and nutritional relevance. Fillet from skipjack tuna has been reported as a significant source of protein, amino acids, minerals, and vitamins (Chakraborty et al., 2017). In the context of *Sosis parape*, skipjack tuna also contributes a firm, savoury, and recognisable fish character. This character requires a seasoning system that does not erase the fish identity, but directs it into a balanced culinary profile.

Bumbu parape provides the flavour structure of the product. In this paper, *bumbu parape* is treated as a cooked spice paste built from shallots, garlic, chilli, candlenut, tamarind, palm sugar, sweet soy sauce, salt, and oil. Its function is not limited to seasoning, because the paste also contributes colour, aroma, acidity, sweetness, savouriness, and local gastronomic identity. The use of *bumbu parape* therefore transforms the product from a generic fish sausage into a fish-based culinary product with a specific regional reference.

The cultural argument of *Sosis parape* is built through translation rather than replacement. Food authenticity is not always preserved by keeping traditional forms unchanged, because authenticity can also be negotiated through ingredients, memory, quality, cultural legitimacy, and acceptance in new consumption contexts (Shahrin & Hussin, 2023). On that basis, *Sosis parape* is not intended to replace traditional parape dishes. It translates the flavour logic of parape into an emulsified sausage format that can be standardised, taught, reproduced, and evaluated within culinary vocational education.

This approach is also consistent with the idea that local food value is strengthened when product quality, cultural knowledge, and local identity are made visible to consumers. Local food experience is shaped by the relationship between cultural value, food knowledge, perceived product quality, consumption emotion, and satisfaction (Andih et al., 2025). *Sosis parape* therefore requires more than a working recipe. It requires a coherent product concept that explains why skipjack tuna, *bumbu parape*, sausage-making technique, sensory target, and packaging are organised into one product system.

The present work is framed as an applied culinary product development report. It documents the formulation, standardised recipe, process control, sensory target, and preliminary hedonic testing of *Sosis parape*. It does not claim to be a complete food technology validation study. Proximate composition, water activity, pH, total plate count, and validated shelf-life testing remain necessary before broader commercial, safety, or shelf-life claims can be responsibly made.

B. Problem Statements

1. How can fish protein emulsification principles be applied to skipjack tuna in order to produce an emulsified sausage with a firm-elastic texture, cohesive slice, and stable fish batter?
2. How can cooked *bumbu parape* be incorporated into the fish batter without disrupting the emulsion-gel structure of the product?
3. How can *Sosis parape* be designed as a standardised culinary product that retains the flavour identity of Makassar while remaining technically defensible within professional culinary practice?
4. What sensory attributes should be targeted in order to evaluate whether *Sosis parape* achieves the intended appearance, aroma, texture, flavour, and mouthfeel?

C. Objectives

1. To document the development of *Sosis parape* as an emulsified skipjack tuna sausage based on *bumbu parape*.
2. To explain how fish protein emulsification principles are applied to skipjack tuna in order to produce a firm-elastic texture, cohesive slice, and stable fish batter.
3. To describe how cooked *bumbu parape* is incorporated into the fish batter without compromising the emulsion-gel structure of the product.
4. To establish the target sensory profile of *Sosis parape* and present preliminary hedonic testing as an initial indication of product acceptance.

D. Significance of the Paper

Academically, this paper contributes to applied culinary science by documenting how a regional flavour system can be translated into a technically controlled seafood-based product. Its contribution lies not in claiming novelty in absolute terms, but in showing a defensible product development pathway for an emulsified skipjack tuna sausage based on *bumbu parape*.

Practically, this paper provides a standardised recipe, production logic, and sensory target that can be used in culinary vocational education. The document may support lecturers, laboratory instructors, and culinary students in understanding that product development requires ingredient accuracy, temperature control, batter stability, batch consistency, and clear sensory criteria.

Gastronomically, this paper positions *Sosis parape* as a product that connects skipjack tuna, *bumbu parape*, and professional sausage-making technique. Its value lies in demonstrating how local food heritage can be developed into a disciplined culinary product without detaching it from its regional flavour identity.

CHAPTER II
LITERATURE REVIEW

A. Charcuterie and Emulsified Fish Sausage

In this paper, charcuterie is positioned as a professional culinary framework for transforming animal protein into a structured, safe, reproducible, and sensorially coherent product. Professional culinary education treats standardised recipes, technical discipline, ingredient control, and quality assessment as core foundations of kitchen practice (Culinary Institute of America, 2024). Within this framework, fish-based sausage may be understood as a legitimate technical extension of charcuterie because animal protein is processed through chopping, seasoning, shaping, cooking, and quality control into a defined product form (Labensky et al., 2018).

An emulsified fish sausage should not be reduced to minced fish mixed with seasoning and filled into a casing. It is more accurately understood as an emulsion-gel system in which protein, water, fat, salt, and structural binders are organised into a stable food matrix (Lu et al., 2024). Fish protein can function as an emulsifier because it is able to position itself at the oil-water interface and form a stabilising layer around dispersed oil droplets (Lu et al., 2024). The stability of this system depends on protein type, protein concentration, ionic strength, pH, processing temperature, and mechanical treatment during production (Lu et al., 2024).

Myofibrillar protein is central to the structure of emulsified fish sausage. Myosin plays a key role in surimi gelation and processed fish products because it forms a gel network after salt extraction and controlled heating (Walayat et al., 2025). This gel network contributes to water-holding capacity, elasticity, bite, slice cohesion, and final textural stability (Walayat et al., 2025). For that reason, the success of an emulsified fish sausage depends on maintaining fish protein functionality before the cooking stage.

Binders in fish sausage should not be treated as passive fillers. Research on fish emulsion sausage made from surimi shows that protein-polysaccharide interaction affects physical properties, microstructure, oil droplet distribution, and final texture quality (Sakamut et al., 2025). This finding provides a scientific basis for using tapioca starch and sago starch as structural components in *Sosis parape*. In this formulation, starch works with fish protein and egg white to improve bite, water retention, and slice cohesion.

Temperature control is a critical point in emulsified fish sausage production. Surimi gel quality is affected by myofibrillar protein, salt concentration, water content, thermal treatment, and added ingredients within the batter system (Walayat et al., 2025). Uncontrolled temperature rise during chopping may weaken protein functionality before a stable emulsion network is formed. For this reason, chilled fish, staged addition of iced water, and cooled cooked *bumbu parape* are technical requirements rather than optional handling preferences.

Skipjack tuna (*Katsuwonus pelamis*) is a relevant main ingredient for *Sosis parape* because it provides both nutritional value and a distinctive culinary character. Studies on skipjack tuna fillet show that *Katsuwonus pelamis* is a significant source of protein, amino acids, minerals, and vitamins (Chakraborty et al., 2017). This nutritional profile supports its use as the primary protein source in an emulsified skipjack tuna sausage. Its firm, savoury, and recognisable fish character also gives the product a stronger identity than a neutral white-fish sausage.

Skipjack tuna also presents a formulation challenge. A fish with a pronounced flavour requires a seasoning system that can balance aroma, reinforce savouriness, and create a clear sensory identity. *Bumbu parape* is relevant in this context because it brings together shallots, chilli, candlenut, tamarind, palm sugar, and sweet soy sauce as a layered flavour system. In the fish batter, *bumbu parape* contributes not only flavour, but also water, oil, sugar, acid, colour, and spice particles that may affect emulsion balance. For that reason, *bumbu parape* must be cooked to a thick paste, cooled, and incorporated carefully so that its sensory contribution does not compromise the fish protein matrix.

Food safety remains a non-negotiable technical boundary in fish sausage production. Fish and seafood should be cooked to a minimum core temperature of 63°C or 145°F to meet safe consumption requirements (FoodSafety.gov, 2024). In *Sosis parape* production, steaming must therefore be verified by core temperature rather than judged by cooking time alone. Cooking time may vary according to casing diameter, product load, initial batter temperature, steamer performance, and batch density. Core temperature provides a more defensible measure of doneness because it verifies the thermal condition of the product itself.

> *Sosis parape is therefore best understood as a synthesis between emulsified fish sausage technology and the local flavour logic of Makassar. Its technical precision lies in controlling the ratio of fish, water, fat, salt, egg white, starch, cooked bumbu parape, batter temperature, cooking, and rapid cooling. Its gastronomic value lies in the use of skipjack tuna and bumbu parape as two recognisable markers of South Sulawesi's culinary identity. This synthesis positions Sosis parape not merely as a seasoned fish sausage, but as an applied culinary product that can be standardised, reproduced, and defended within culinary vocational education.*

B. Gelation and Emulsification

1. Fish Myofibrillar Protein as a Gel-Forming Agent

An emulsified fish sausage depends on two related processes: the formation of a stable emulsion and the setting of a protein gel. In a fish batter, protein, water, fat, salt, starch, and seasoning must be dispersed evenly before cooking. Fish protein can help stabilise this system because it can adsorb at the oil-water interface and form a protective layer around dispersed fat droplets (Lu et al., 2024). This is why a good fish batter should look smooth, cohesive, and slightly glossy before it is filled into the casing.

Protein functionality must be protected during chopping and mixing. In processed fish products, emulsion stability is affected by the ability of protein to remain functional during chopping, mixing, heating, and setting (Lu et al., 2024). If the fish batter becomes too warm, is mixed unevenly, or contains poorly dispersed fat, the finished sausage may release fluid, show a coarse texture, or break when sliced. For *Sosis parape*, the batter stage is therefore a critical production point, not merely a mixing step.

The main structural protein in a fish sausage is myofibrillar protein. Myosin is especially important in surimi gelation because it forms a three-dimensional protein network after salt solubilisation and controlled heating (Walayat et al., 2025). This network gives the sausage its bite, elasticity, water-holding capacity, and slice cohesion (Walayat et al., 2025). In practical terms, *Sosis parape* must not only taste like skipjack tuna and *bumbu parape*; it must also hold its shape, cut cleanly, and remain moist after steaming.

Batter temperature is one of the most important controls in this process. Surimi gelation is affected by salt concentration, water content, heating conditions, and ingredients that interact with myofibrillar protein (Walayat et al., 2025). When the batter warms too quickly during chopping, the protein may lose part of its gel-forming and emulsifying capacity before steaming begins. Chilled fish, staged addition of iced water, and cooled cooked *bumbu parape* are therefore used to keep the batter cold and to protect the structure that will later set during cooking.

Skipjack tuna (*Katsuwonus pelamis*) provides a suitable protein base for *Sosis parape*. Studies on skipjack tuna fillet report that Katsuwonus pelamis is a significant source of protein, amino acids, minerals, and vitamins (Chakraborty et al., 2017). This protein base supports gel formation, while the natural savoury character of skipjack tuna gives the finished sausage a clear fish identity. The challenge is to build structure without making the product dry, dense, or overly firm.

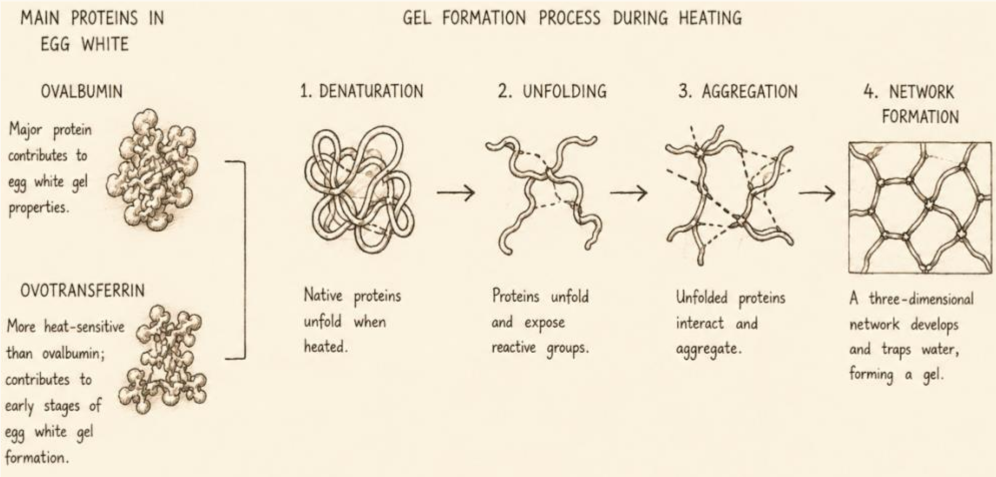
Tapioca starch and sago starch are used as structural ingredients in the fish batter. In fish emulsion sausage, polysaccharides can influence physical characteristics, microstructure, oil droplet distribution, cooking loss, and total expressible fluid (Sakamut et al., 2025). This means that starch affects how the sausage holds water, how the texture sets, and how cleanly the product slices after steaming. In *Sosis parape*, tapioca starch supports bite and moisture retention, while sago starch supports elasticity and bite structure.

The role of starch becomes more visible during heating. Comparative work on cassava, sago, and wheat flour shows that cassava-based flour and starch have gelatinisation and pasting properties relevant to heated food systems, while sago shows a higher gelatinisation temperature than several other starch samples in the study (Abduh et al., 2024). As the sausage steams, starch granules absorb water, swell, and increase viscosity in the aqueous phase. This supports the protein matrix and helps the finished sausage remain cohesive rather than loose, watery, or crumbly.

Cooking control must be based on core temperature. Fish and seafood should be cooked to a minimum core temperature of 63°C or 145°F for safe consumption (FoodSafety.gov, 2024). In *Sosis parape*, steaming time should therefore be treated as an operational guide, not as the sole proof of doneness. The casing diameter, initial batter temperature, number of sausages in the steamer, steamer load, and heat distribution can all change the actual cooking time. A verified core temperature gives a more reliable measure because it confirms the condition of the product itself.

2. Egg White, Neutral Oil, and Iced Water in a Lean Fish Batter

Egg white works as a secondary gel-forming ingredient. Its main role is to support the fish protein matrix so that the sausage sets more firmly, holds moisture, and produces a cleaner slice after steaming. Egg white proteins form gels through denaturation, unfolding, aggregation, and the formation of a three-dimensional network during heating (Li et al., 2024). As shown in Figure 1, ovalbumin and ovotransferrin contribute to this process in different ways. Ovalbumin is the major protein in egg white and contributes to the final gel properties of egg white systems (Li et al., 2024). Ovotransferrin is more heat-sensitive than ovalbumin and contributes to the early stages of egg white gel formation (Li et al., 2024). During heating, these proteins unfold, expose reactive sites, interact with one another, and form a gel network that helps trap water. In *Sosis parape*, this secondary network improves slice cohesion, supports moisture retention, and reduces the risk of a dry or crumbly mouthfeel.



Note. Schematic illustration prepared by the authors based on the role of ovalbumin and ovotransferrin in egg white gel formation during heating. The process involves protein denaturation, unfolding, aggregation, and the formation of a three-dimensional network that helps trap water and support slice cohesion in the finished sausage. Based on Li et al. (2024).

Figure 1 Egg White as a Secondary Gel-Forming Ingredient.

Neutral oil improves juiciness and mouthfeel when it is properly dispersed. Research on Alaska pollock surimi gel shows that emulsifying oil into surimi paste can improve gel properties when oil droplets are finely and stably distributed (Nguyen & Okazaki, 2024). Intensive mixing can also produce smaller oil droplets, a more stable emulsified surimi paste, and higher gel strength (Nguyen & Okazaki, 2024). In *Sosis parape*, neutral oil should be added gradually so that it disperses into the protein matrix instead of separating from the batter.

Iced water is essential for both temperature control and batter development. It helps keep the fish batter cold during chopping, which protects the functionality of myofibrillar protein before steaming. It also provides the water phase needed for salt dispersion, protein hydration, starch swelling, and gel formation. For this reason, iced water should be added in stages rather than all at once. Staged addition gives better control over batter temperature, texture, and hydration.

The final quality sausage depends on how well these ingredients work together. When the fish protein is properly extracted, the starch is hydrated, the oil is emulsified, and the batter remains cold, the sausage is more likely to have a clean cut, moist bite, firm-elastic texture, and stable mouthfeel after steaming. When one part of the system is poorly controlled, the defects are usually visible: broken batter, fluid release, coarse texture, fragile slices, greasy pockets, or a dry finish. *Sosis parape* should therefore be understood as a controlled emulsion-gel system, not as a simple mixture of fish, starch, egg white, oil, water, and *bumbu parape*.

C. The Role of Cooked *Bumbu parape* in *Sosis parape*

In *Sosis parape*, *bumbu parape* is treated as part of the formulation, not as a garnish, dipping sauce, or final coating. The paste is prepared from shallots, garlic, chilli, candlenut, tamarind, palm sugar, sweet soy sauce, salt, and oil. These ingredients are cooked until the mixture becomes thick, aromatic, and concentrated. This wording is descriptive, not a new scientific category: in the formula, cooked *bumbu parape* functions as the seasoning component that gives the fish batter its Makassar flavour reference.

The cooking stage is important because raw and cooked aromatics behave differently. Cooking changes the volatile profile of onion and shifts the aroma away from raw pungency towards a warmer cooked-onion character (Jin et al., 2024). For *Sosis parape*, the shallots and garlic in *bumbu parape* must therefore be cooked before the paste is added to the fish batter. If the paste is undercooked, the finished sausage may carry a raw onion note that competes with the skipjack tuna rather than supporting it.

The colour and cooked aroma of *bumbu parape* are also affected by browning during heating. The Maillard reaction occurs during food processing, especially heating, and contributes to changes in flavour and colour (Liu et al., 2022). In *bumbu parape*, browning is supported by palm sugar, sweet soy sauce, shallots, and sufficient cooking time. The target is a deep cooked aroma and golden-brown colour, not a scorched paste. A scorched paste would introduce bitterness and dark specks into the fish batter.

Sweet soy sauce contributes sweetness, saltiness, umami depth, viscosity, and dark colour. Research on soy sauce shows that melanoidins are generated during fermentation and Maillard-related reactions, and that these compounds contribute to soy sauce colour and antioxidant activity (Li et al., 2025). This evidence must be used carefully because sweet soy sauce in *Sosis parape* is only one ingredient in a larger formula. It supports a statement about colour and savoury-sweet depth, but it does not prove antioxidant function in the finished sausage.

Tamarind provides acidity that balances the sweet and savoury elements of *bumbu parape*. Tamarind infusion has been reported to contain citric, malic, and tartaric acids, with tartaric acid identified as the predominant organic acid under the tested infusion conditions (Uzlaşır et al., 2025). In culinary terms, this acidity helps lift the flavour of skipjack tuna and prevents the seasoning from becoming heavy. In scientific terms, the claim should remain limited to acid contribution and flavour balance unless the finished product is directly tested.

Tamarind also has ingredient-level antibacterial evidence, but this must not be transferred directly to *Sosis parape*. An in vitro study reported antibacterial activity of Tamarindus indica fruit pulp extracts against Staphylococcus aureus and Klebsiella pneumoniae (Goanar et al., 2024). This supports only a cautious ingredient-level statement. It does not prove that cooked *bumbu parape* extends the shelf-life of *Sosis parape*, and it does not replace microbiological testing of the finished sausage.

Candlenut contributes body, savouriness, and a rounded mouthfeel to cooked *bumbu parape*. Research on Aleurites moluccana seed oil identified several major fatty acid components in candlenut oil, including methyl palmitate, methyl palmitoleate, linolelaidic acid methyl ester, and methyl arachidate (de Britto Rosa et al., 2022). In the *Sosis parape* formula, this evidence supports the practical culinary role of candlenut as a lipid-rich ingredient that helps give the paste body and mouthfeel. It should not be described as the main emulsifier of the fish batter, because emulsion stability in the sausage depends primarily on fish protein, salt, water, and controlled processing.

The main production requirement is that *bumbu parape* must enter the fish batter in the correct condition. It should be cooked, thick, cooled, and evenly dispersed. A paste that is too wet may loosen the batter. A paste that is too oily may weaken fat dispersion. A paste that is too coarse may create dark spots and uneven flavour. A paste that is too hot may raise batter temperature and reduce protein functionality. For this reason, cooked *bumbu parape* is not only a flavouring ingredient; it is a formulation component that must be controlled before chopping, casing, steaming, and rapid cooling.

D. Culinary Glocalisation and Makassar Flavour Identity

Culinary glocalisation provides a useful way to understand how a product can use a widely recognised culinary technique while still carrying a local flavour identity. In this paper, the concept is applied to *Sosis parape* as a product that combines emulsified sausage technique with cooked *bumbu parape*. The point is not to make a traditional dish look modern for the sake of novelty. The point is to translate a local flavour reference into a product format that can be standardised, produced, evaluated, and taught in a culinary training environment.

A glocal product must keep two things under control: technical accuracy and recognisable origin. Studies on food cultural spaces show that glocalisation involves the production and reconstruction of local food practices within changing social and cultural settings (Tan et al., 2024). For *Sosis parape*, this means that the sausage-making technique provides structure, casing, steaming, core temperature control, rapid cooling, and batch consistency. Cooked *bumbu parape* provides the recognisable Makassar reference through shallot aroma, sweet-acid balance, savoury depth, colour, and the familiar flavour direction associated with parape dishes.

This balance is important because adaptation should not erase identity. Research on Thai restaurants in Kunming shows that culinary glocalisation involves negotiation between authentic ingredients, original culinary practices, and local taste acceptance (Yin & Ardsmiti, 2024). The same principle applies to *Sosis parape*. The product does not need to be identical to a traditional *parape* dish in form. It must, however, retain the key sensory markers that allow the product to be recognised as connected to Makassar: skipjack tuna, cooked *bumbu* *parape*, savoury sweetness, mild acidity, cooked shallot aroma, and a clear regional flavour direction.

Authenticity in food should also be treated carefully. Food heritage authenticity is socially negotiated through identity, quality, legitimacy, and consumer meaning rather than fixed only by an unchanged traditional form (Shahrin & Hussin, 2023). This helps explain why *Sosis parape* should not be judged by whether it copies a traditional *parape* dish exactly. A more appropriate question is whether the product preserves the flavour logic of *parape* while applying correct emulsified sausage technique.

The development of local food into a more standardised format does not automatically remove its cultural value. Research on Riau Malay food culture shows that traditional food may enter commercial and modern settings while retaining authenticity when cultural identity, heritage value, and local meaning remain protected (Mardatillah et al., 2019). In the case of *Sosis parape*, standardisation is not used to flatten the product. It is used to make the product more consistent, teachable, and reproducible without removing the role of skipjack tuna and cooked *bumbu parape* as the main regional markers.

Local food value is also shaped by how clearly the product communicates its origin. Research on local food experience in Indonesian gastronomy shows that cultural value, knowledge appreciation, and product quality contribute to consumer understanding and satisfaction (Andih et al., 2025). For *Sosis parape*, this means that the product should not be presented only as a fish sausage with seasoning. It should be presented as an emulsified skipjack tuna sausage that uses cooked *bumbu parape* to build flavour, colour, aroma, and regional identity.

From a production perspective, culinary glocalisation must be visible in the formula and process. The global technique appears in the controlled preparation of fish batter, casing, steaming, core temperature verification, rapid cooling, and vacuum packaging. The local identity appears in the use of skipjack tuna and cooked *bumbu parape*. Both must be controlled. If the sausage technique is weak, the product may fail in texture, slice cohesion, or moisture retention. If the

Makassar flavour reference is weak, the product may become a generic fish sausage.

Sosis parape should therefore be understood as a product translation, not a replacement for traditional *parape* dishes. Its value lies in showing how a local flavour reference can be carried into a new product form without losing technical discipline or cultural readability. In this sense, culinary glocalisation is useful because it explains how *Sosis parape* can be read by chefs as a properly controlled emulsified fish sausage and by Makassar consumers as a product that still carries a familiar regional flavour identity.

CHAPTER III
PRODUCT CONCEPT AND DESIGN

A. Product Concept

Sosis parape is designed as an emulsified skipjack tuna sausage that combines fish protein processing with cooked *bumbu parape*. It is not intended to be a generic fish sausage made only for convenience. It is an applied culinary product that brings together a measured formula, controlled production, local ingredients, and a recognisable regional flavour reference. On this basis, the product must meet two requirements: it must be technically stable as an emulsified sausage, and it must remain gastronomically clear as a product based on cooked *bumbu parape*.

The technical foundation of the product is the emulsion-gel system. Fish protein can function as an emulsifier because it helps stabilise oil and water phases through structure formation at the surface of fat droplets (Lu et al., 2024). This principle is important because a fish sausage is not simply seasoned minced fish. It is a food system that depends on the balance of protein, water, fat, salt, starch, egg white, seasoning, and heat. For this reason, the product design includes cold fish batter control, staged chopping, casing, steaming, rapid cooling, and packaging as one continuous quality-control sequence.

Skipjack tuna is selected as the main ingredient because it provides both structure and a clear fish character. In the formula, skipjack tuna acts as the primary protein base and as the ingredient that gives the sausage its savoury identity. Its firm and recognisable flavour requires a seasoning component that can support the fish without masking it. Cooked *bumbu parape* is used for this purpose because it contributes cooked shallot aroma, savouriness, sweetness, mild acidity, gentle chilli warmth, and golden-brown colour.

The gastronomic concept of *Sosis parape* is built through translation, not replacement. Food authenticity does not always depend on preserving an old form without change, because authenticity may also be negotiated through ingredients, flavour memory, quality, cultural legitimacy, and acceptance in new consumption contexts (Shahrin & Hussin, 2023). On this basis, *Sosis parape* is not designed to replace traditional *parape* dishes. It translates the flavour reference of *parape* into an emulsified fish sausage that can be standardised, packed, chilled, presented, and taught within culinary vocational education.

The design position sits between professional kitchen standardisation and local culinary identity. Research on local food experience shows that cultural value, food knowledge, and perceived product quality can strengthen satisfaction with local food products (Andih et al., 2025). This is relevant because *Sosis parape* should not depend on sensory acceptance alone. The product must also be able to explain its ingredient origin, seasoning logic, production method, and cultural reason for carrying the name *Parape*. Without this explanation, it may be read only as a seasoned fish sausage.

The product concept is built on three pillars. The first pillar is technical precision: measured formula, controlled fish batter temperature, consistent product size, cooking based on core temperature, and repeatable packaging. The second pillar is seasoning integrity: cooked *bumbu parape* is prepared from fresh ingredients and cooked into a thick paste, rather than replaced by a flavour premix. The third pillar is gastronomic narrative: the product must communicate skipjack tuna, *bumbu parape*, and Makassar through a format that is controlled, portioned, and practical for service.

The product is designed in 11 cm segments to support portion consistency, cooking control, packaging, and service. A consistent size helps production control because sausages with similar dimensions are easier to assess for doneness, texture, appearance, and packaging neatness. In culinary education, this consistency is important because students must learn not only to produce good flavour, but also to reproduce the same product quality in the next batch.

Vacuum packaging is used as part of the visual and operational design of *Sosis parape*. Visually, it presents the sausage shape, product colour, and label identity. Operationally, it helps keep the product units neat during chilled holding and limited laboratory distribution. As shown in Figure 2, the vacuum-packed product allows the finished sausage form, golden-brown colour, and product identity to be read clearly. In this document, however, vacuum packaging must not be interpreted as evidence of commercial shelf-life. Shelf-life claims require direct testing of microbiological quality, water activity, pH, and storage stability. The more defensible position is that vacuum packaging is used here for product presentation, physical protection, and organised handling at the laboratory development scale.

Note. The figure shows the finished *Sosis parape* in vacuum packaging. The visual documentation highlights the sausage form, golden-brown colour, and product identity as an emulsified skipjack tuna sausage based on cooked *bumbu parape*. Source: Authors' documentation, Practical Kitchen Laboratory, Politeknik Pariwisata Makassar, 2026.

Figure 2 *Sosis parape* in Vacuum Packaging with the Parasa Sulawesi Label.

Product documentation is also needed to show the result of production as a batch, not only as a single packaged unit. Figure 3 shows several vacuum-packed *Sosis parape* units arranged in a storage tray. This visual evidence supports the discussion of product uniformity, 11 cm segment consistency, and readiness for chilled holding before service or limited distribution within the development context. The figure should be read as documentation of production appearance and unit consistency, not as evidence of food safety, shelf-life, or commercial storage stability.

Note. The figure shows several units of *Sosis parape* after vacuum packaging and placement in a storage tray. The visual documentation indicates product uniformity, 11 cm segment consistency, and readiness for chilled holding before service or limited laboratory distribution. Source: Authors' documentation, Practical Kitchen Laboratory, Politeknik Pariwisata Makassar, 2026.

Figure 3 Vacuum-Packed *Sosis parape* Units.

Through this concept, *Sosis parape* is positioned as an applied culinary product that connects technique, flavour, shape, packaging, and origin narrative. Its value does not lie only in the use of skipjack tuna or cooked *bumbu parape*. Its value lies in the way those elements are organised into a controlled production system. The success of the product design should therefore be assessed through three aspects: technical stability as an emulsified sausage, sensory acceptance as a fish-based product, and recognisable identity as a product carrying Makassar flavour identity.

B. Target Sensory Profile

The target sensory profile of *Sosis parape* is used as a product design guide before sensory evaluation is conducted. It describes the intended appearance, aroma, texture, flavour, and mouthfeel of the finished sausage. In culinary product development, this profile is important because it connects the formula with the expected eating quality. Each attribute must therefore be linked to a production control point, not only to a descriptive sensory term.

Table 1. presents the target sensory profile of *Sosis parape*. The descriptors are written as practical quality indicators that can be observed during product evaluation. The technical basis explains how the fish batter, cooked *bumbu parape*, starch, egg white, neutral oil, steaming, and cooling contribute to the final product quality.

The target colour of *Sosis parape* should be golden-brown and even. This colour should come from the cooked *bumbu parape*, not from excessive browning or scorching. A good product should show a clean surface, slight gloss, and even colour distribution. Pale areas indicate uneven paste distribution or weak colour development. Very dark specks may indicate overheated paste or coarse spice particles.

The target aroma should show cooked *bumbu parape* clearly. The product should smell of cooked shallots, warm spice, mild sweetness, and gentle acidity. A raw onion aroma indicates that the paste was not cooked sufficiently before incorporation. A burnt aroma indicates excessive cooking of the paste. A dominant fishy odour indicates that the seasoning balance, raw material handling, or cooking control needs to be reviewed.

Table 1

Target Sensory Profile of Sosis parape

Attribute	Target Sensory Descriptor	Technical Basis and Control Indicator
Colour	Even golden-brown colour, slight surface gloss, no pale patches, and no scorched dark spots.	The colour is developed from cooked *bumbu parape*, especially through palm sugar, sweet soy sauce, shallots, and controlled heating. Maillard reaction products contribute to colour and flavour development in heated foods (Liu et al., 2022). Soy sauce melanoidins contribute to dark colour formation in soy sauce systems (Li et al., 2025). The control indicators are even paste distribution, no coarse spice patches, no burnt notes, and a clean surface after steaming.
Aroma	Cooked shallot aroma, warm spice note, mild acidic freshness, and no dominant fishy odour.	The aroma is developed by cooking the shallots, garlic, chilli, candlenut, tamarind, palm sugar, and sweet soy sauce into a thick paste. Cooking changes onion volatile compounds and shifts the aroma from raw pungency towards a cooked-onion profile (Jin et al., 2024). Tamarind contributes acidic freshness through organic acids such as citric, malic, and tartaric acids (Uzlaşır et al., 2025). The control indicators are no raw onion note, no scorched paste aroma, and clear recognition of cooked *bumbu parape*.
Texture	Firm-elastic bite, cohesive slice, moderate snap, smooth internal structure, and no grainy texture.	The texture depends on the fish protein gel matrix supported by tapioca starch, sago starch, and egg white. Myosin forms a three-dimensional protein network after salt solubilisation and controlled heating, contributing to gel strength, elasticity, water-holding capacity, and slice cohesion (Walayat et al., 2025). Polysaccharides influence physical properties, microstructure, oil droplet distribution, cooking loss, and expressible fluid in fish emulsion sausage (Sakamut et al., 2025). Egg white provides secondary gel support during heating (Li et al., 2024). The control

		indicators are smooth fish batter, clean cut surface, no large internal voids, and no excessive fluid release.
Flavour	Balanced savoury-sweet-acidic flavour, clear cooked *bumbu parape* identity, recognisable skipjack tuna character, and no bitter aftertaste.	The flavour is built from skipjack tuna, cooked *bumbu parape*, salt, palm sugar, tamarind, sweet soy sauce, candlenut, and supporting seasoning. Maillard reaction products contribute to flavour complexity in heated foods (Liu et al., 2022). Tamarind supports acidic balance through its organic acid content (Uzlaşır et al., 2025). Sweet soy sauce contributes colour and savoury-sweet depth, but this should not be overstated as proof of functional antioxidant activity in the finished sausage (Li et al., 2025). The control indicators are balanced saltiness, sweetness, acidity, and savouriness, with no bitterness from overcooked paste.
Mouthfeel	Moist bite, juicy impression, clean palate, no dry finish, no oil separation, and no sticky or pasty residue.	Mouthfeel depends on the balance of skipjack tuna protein, iced water, neutral oil, starch, and egg white. Fish protein can support emulsion formation by stabilising oil and water phases in a food matrix (Lu et al., 2024). Oil emulsification in surimi paste can improve gel properties when oil droplets are finely and stably dispersed (Nguyen & Okazaki, 2024). The control indicators are moist bite, no free oil, no dry or crumbly sensation, and no excessive starchiness on the palate.

Note. Developed by the authors from the *Sosis parape* formulation and supported by literature on Maillard reaction, cooked onion volatiles, soy sauce melanoidins, tamarind organic acids, fish protein emulsification, surimi gelation, polysaccharide interaction in fish emulsion sausage, egg white gel formation, and oil emulsification in surimi paste (Jin et al., 2024; Li et al., 2024; Li et al., 2025; Liu et al., 2022; Lu et al., 2024; Nguyen & Okazaki, 2024; Sakamut et al., 2025; Uzlaşır et al., 2025; Walayat et al., 2025).

The target texture is firm-elastic rather than hard. The sausage should hold its shape, cut cleanly, and remain cohesive after steaming. The internal structure should look smooth and compact without large holes, loose areas, or fluid pockets. A grainy or crumbly texture may indicate poor batter development, weak protein extraction, insufficient hydration, or unstable emulsion.

The target flavour should keep both elements visible: skipjack tuna and cooked *bumbu parape*. The product should not taste like a generic fish sausage, but it should also not taste only of spice paste. The best flavour direction is savoury, mildly sweet, lightly acidic, and clearly cooked. Bitterness, harsh chilli, excessive sweetness, or a flat fish flavour would indicate that the seasoning balance has not yet reached the intended profile.

The target mouthfeel should be moist, clean, and pleasant after chewing. *Sosis parape* should not feel dry, oily, sticky, or pasty. Moisture should be held within the sausage structure, not released as free liquid after slicing. Oil should be dispersed within the fish batter, not visible as greasy pockets. A clean mouthfeel indicates that fish protein, starch, egg white, neutral oil, iced water, and steaming have worked together as a controlled emulsion-gel system.

This target sensory profile functions as a design standard. It does not replace hedonic testing, and it should not be read as proof of consumer acceptance. Its purpose is to define what the product is trying to achieve before evaluation is conducted. In this way, the sensory assessment of *Sosis parape* can be judged against clear product intentions rather than vague impressions of whether the sausage is simply “good” or “not good”.

CHAPTER IV
STANDARDISED RECIPE AND PRODUCTION PROCESS

The formula presented in this chapter is based on the standardised recipe developed by the authors at the Practical Kitchen Laboratory of Politeknik Pariwisata Makassar. The recipe format and professional kitchen approach are technically informed by Labensky et al. (2018, p. 207).

Table 2

Standardised Recipe

Item	Description
Product name	*Sosis parape*
Product type	Emulsified skipjack tuna sausage
Main ingredient	Skipjack tuna (*Katsuwonus pelamis*)
Flavour reference	Cooked *bumbu parape*
Portion size	11 cm per segment
Product category	Frozen food product development
Technical reference	Labensky et al. (2018, p. 207)
Development site	Practical Kitchen Laboratory, Politeknik Pariwisata Makassar
Programme	Culinary Arts Diploma Programme
Institution	Politeknik Pariwisata Makassar

A. Mise en Place

Mise en place is the first control point in the production of *Sosis parape*. Before chopping begins, all ingredients must be prepared, weighed, chilled, and arranged in the correct working order. This stage is important because an emulsified skipjack tuna sausage depends on accurate measurement, cold handling, smooth workflow, and consistent timing. A well-organised mise en place reduces processing delays and helps keep the fish batter cold during production. Figure 4 shows the mise en place stage for *Sosis parape*, including weighed dry ingredients, prepared aromatics, cooked *bumbu parape*, eggs prepared for egg-white use, oil, seasoning components, and essential kitchen equipment.

Note. The figure shows the preparation stage before fish batter processing, including weighed dry ingredients, prepared aromatics, cooked *bumbu parape*, eggs prepared for egg-white use, oil, seasoning components, and kitchen equipment arranged before production. This visual documentation supports the role of mise en place as the first production-control point in *Sosis parape* processing. Source: Authors' documentation, Practical Kitchen Laboratory, Politeknik Pariwisata Makassar, 2026.

Figure 4 Mise en Place for *Sosis parape* Production.

The skipjack tuna must be kept very cold, ideally between 0°C and 4°C, until it is processed. This temperature range helps protect protein functionality and supports stable fish batter formation. Cooked *bumbu parape* must also be prepared in advance, cooked to a thick, glossy, and aromatic paste, then cooled completely before incorporation. Warm or overly wet paste can raise batter temperature, loosen the mixture, and weaken emulsion stability.

The dry ingredients must be weighed accurately and kept separate before mixing. Tapioca starch and sago starch support water retention, bite, and texture development during steaming. Salt and dry seasonings must also be measured carefully because they affect flavour balance and protein extraction. In a standardised recipe, small measurement errors can change texture, saltiness, and final mouthfeel.

Egg white, iced water, and neutral oil must be prepared according to the production sequence. Egg white supports secondary gel formation and slice cohesion. Iced water controls batter temperature and supports protein hydration. Neutral oil improves juiciness and mouthfeel when it is properly dispersed in the fish batter. The order of addition should be controlled because it affects emulsion stability and final texture.

All equipment must be clean, dry, functional, and ready for use. Essential equipment includes a food processor, stainless-steel mixing bowls, digital scale, probe thermometer, scraper, piping bag or sausage stuffer, casing, steamer, ice bath, and vacuum sealer. The probe thermometer is especially important because steaming must be verified by core temperature, not by time alone. The steamer, ice bath, and packaging area should be ready before filling begins so that the process can move efficiently from casing to steaming, rapid cooling, and packaging.

Table 3

Mise en Place Requirements for Sosis parape

Component	Preparation Requirement	Production Control Point
Skipjack tuna	Trimmed, portioned, and kept very cold at 0–4°C.	Maintains protein functionality and supports stable fish batter formation.
Cooked *bumbu parape*	Cooked to a thick, glossy paste and cooled completely before use.	Prevents excess heat and moisture from weakening the emulsion-gel structure.
Egg white	Weighed and chilled before mixing.	Supports secondary gel formation and slice cohesion.
Tapioca starch and sago starch	Weighed accurately and kept dry before use.	Supports water retention, bite, and texture development during steaming.
Neutral oil	Measured and added gradually during batter development.	Helps improve juiciness and mouthfeel when properly emulsified.
Iced water	Prepared in advance and added in stages.	Controls batter temperature and supports protein hydration.
Casing	Prepared according to product size and filling requirements.	Supports uniform shape, portion size, and cooking consistency.
Probe thermometer	Clean, functional, and ready for use.	Verifies that the sausage reaches the required core temperature during steaming.
Steamer and ice bath	Prepared before filling begins.	Ensures smooth transition from casing to steaming and rapid cooling.

A good mise en place makes production predictable. Ingredients are complete, equipment is ready, the workbench is clean, and the production team can move without delay. For *Sosis parape*, this is especially important because the product is temperature-sensitive. When mise en place is properly controlled, the team can maintain batter quality, fill the casing efficiently, steam to the required core temperature, cool rapidly, and package the product neatly.

1. *Sosis parape* Fish Batter Formula

The fish batter formula is the technical base of *Sosis parape*. It determines the structure, seasoning balance, moisture level, bite, and final mouthfeel of the finished sausage. All ingredients must be weighed accurately before processing because small changes in protein, starch, salt, water, or oil can affect emulsion stability and slice cohesion.

Table 4. presents the standardised fish batter formula for *Sosis parape*. The total batter weight is approximately 4 kg. The formula is built around chilled skipjack tuna, cooked *bumbu parape*, tapioca starch, sago starch, egg white, iced water, neutral oil, salt, and supporting seasonings. The casing requirement is 22–24 mm in diameter, with approximately 8–10 m required for this batch size.

The salt level should be checked against the seasoning intensity of the cooked *bumbu parape*. If the paste is already high in salt, the added fine salt should be adjusted carefully to prevent the finished sausage from becoming too salty. Dashi powder or fish stock powder is used as a measured umami component. This replaces the less precise "pinch" measurement in the early formula and improves consistency between batches.

The fish must be very cold before chopping, ideally between 0°C and 4°C. Cold handling protects protein functionality and helps the fish batter remain stable during processing. Figure 5 shows skipjack tuna prepared in the food chopper before batter development. At this stage, temperature control is more important than speed alone. If the fish warms too quickly, the batter may become loose, the emulsion may weaken, and the finished sausage may show fluid release or poor slice cohesion.

Table 4

Standardised Recipe

Sosis parape Fish Batter

Yield: Approximately 4 kg batter

Ingredient	Quantity (g)	Percentage of Total Batter	Technical Function
Skipjack tuna fillet, skinless, boneless, and very cold	2,220	55.4%	Main ingredient; primary protein source for gel formation.
Cooked *bumbu parape*, cooled	440	11.0%	Provides characteristic aroma, flavour, colour, and seasoning base.
Tapioca starch	300	7.5%	Supports elasticity, water binding, and bite.
Sago starch	170	4.2%	Supports elasticity and bite structure.
Chilled egg white	250	6.2%	Provides additional protein binding and supports clean slice cohesion.
Iced water	350	8.7%	Supports hydration and temperature control; added in stages.
Chilled neutral oil	160	4.0%	Improves juiciness and mouthfeel in a lean fish batter.
Fine salt	38	0.9%	Supports protein extraction, seasoning balance, and gel structure.
Paprika powder	35	0.9%	Contributes colour and warm aroma.
Onion powder	8	0.2%	Contributes dried onion aroma and savoury depth.
Ground white pepper	6	0.15%	Provides mild pepper aroma and gentle heat.
Dashi powder or fish stock powder	8	0.2%	Strengthens umami and fish-based savouriness.
Fine palm sugar or granulated sugar	20	0.5%	Balances acidity and savouriness.
Total batter	**4,005**	**100%**	**Requires 22–24 mm casing, approximately 8–10 m.**

Note. Developed by the authors from the actual *Sosis parape* product development record at the Practical Kitchen Laboratory, Politeknik Pariwisata Makassar. Percentages were calculated based on the total batter weight of 4,005 g. The recipe format and professional kitchen standardisation approach are technically informed by Labensky et al. (2018, p. 207).

Note. The figure shows skipjack tuna prepared in the food chopper before batter development. The fish should be kept very cold, ideally between 0°C and 4°C, before chopping to support protein extraction and stable fish batter formation. Source: Authors' documentation, Practical Kitchen Laboratory, Politeknik Pariwisata Makassar, 2026.

Figure 5 Preparation of Chilled Skipjack Tuna in the Food Chopper.

2. *Bumbu parape* Formula

Bumbu parape must be prepared before the fish batter is made. The paste should be thick, glossy, aromatic, and fully cooled before it is incorporated into the fish batter. This is important because warm or watery paste can raise batter temperature, loosen the mixture, and reduce emulsion stability. In *Sosis parape*, cooked *bumbu parape* is not treated as a garnish or external sauce; it is a measured formulation component that contributes aroma, colour, seasoning balance, and Makassar flavour identity.

Table 5 presents the *bumbu parape* formula. The target yield is approximately 500 g, with 438–440 g used for one 4 kg batch of *Sosis parape* fish batter. Lemongrass and kaffir lime leaves are used during cooking as aromatic components, but they are removed before the paste is added to the fish batter. This prevents coarse fibres from affecting the texture, cut surface, and mouthfeel of the finished sausage.

The paste is made by grinding the shallots, garlic, large red chilli, bird's eye chilli, toasted candlenut, and part of the neutral oil into a smooth paste. A smooth paste is important because coarse particles can create uneven colour and texture in the finished sausage. The remaining oil is used during cooking to help distribute heat and carry aroma through the paste.

The ground paste is cooked over medium heat with the bruised lemongrass and kaffir lime leaves. It should be stirred continuously until the raw aroma disappears, the colour deepens, and the oil begins to separate slightly from the paste. This stage usually takes about 15–20 minutes. Cooking changes the volatile profile of onion and shifts the aroma away from raw pungency towards a cooked-onion profile (Jin et al., 2024). The target is a cooked, aromatic paste, not a burnt paste.

Thick tamarind water is then added and cooked until the excess liquid reduces. Tamarind contributes acidity through organic acids such as citric, malic, and tartaric acids (Uzlaşır et al., 2025). In the paste, this acidity balances the sweetness of palm sugar and sweet soy sauce. It also helps lift the savoury character of skipjack tuna in the finished sausage. The claim should remain limited to flavour balance because the finished *Sosis parape* has not been tested for preservative effect or shelf-life extension.

Table 5

Formula for Cooked Bumbu parape

Yield: Approximately 500 g; use 438–440 g per batch of fish batter

Ingredient	Quantity (g)	Function
Shallots, peeled	250	Main aromatic base; supports cooked-onion aroma and browning.
Garlic	40	Adds savoury depth and cooked garlic aroma.
Large red chilli	60	Contributes colour and mild chilli flavour.
Red bird's eye chilli	10	Adds gentle heat and chilli aroma.
Candlenut, toasted	35	Adds body, savouriness, and rounded mouthfeel to the paste.
Neutral oil	90	Cooking medium; helps carry fat-soluble aroma compounds.
Lemongrass, bruised	20	Aromatic component during cooking; removed before incorporation into the fish batter.
Kaffir lime leaves	4	Aromatic component during cooking; removed before incorporation into the fish batter.
Thick tamarind water	80	Provides acidity and sweet-acid balance.
Palm sugar, shaved	70	Contributes sweetness, browning, and flavour balance.
Sweet soy sauce	60	Adds savoury-sweet depth, viscosity, and dark colour.
Fine salt	10	Provides basic seasoning and flavour balance.
Ground white pepper	2	Adds mild pepper aroma and gentle heat.
Target yield	**±500**	**Use 438–440 g per batch of *Sosis parape* fish batter.**

Note. Developed by the authors from the *Sosis parape* product development record at the Practical Kitchen Laboratory, Politeknik Pariwisata Makassar. The ingredient functions are supported by literature on cooked onion volatile changes, Maillard reaction products, soy sauce melanoidins, and tamarind organic acids (Jin et al., 2024; Li et al., 2025; Liu et al., 2022; Uzlaşır et al., 2025).

Palm sugar, sweet soy sauce, fine salt, and white pepper are added after the tamarind liquid has reduced. The paste is then cooked over low to medium heat until it becomes thick, glossy, aromatic, and slightly oily. The Maillard reaction contributes to flavour and colour development in heated foods (Liu et al., 2022). Sweet soy sauce also contributes dark colour and savoury-sweet depth; studies on soy sauce show that melanoidins contribute to soy sauce colour and antioxidant activity, but this evidence should not be used as proof of antioxidant function in the finished sausage (Li et al., 2025).

Figure 6 shows cooked *bumbu parape* during the reduction stage. At this point, the paste should be stirred carefully to prevent scorching on the base of the pan. The visual target is a thick, glossy paste with a deep brown colour and no free watery liquid. If the paste is too loose, it can weaken the fish batter. If it is scorched, it can introduce bitterness and dark specks into the sausage.

Note. The figure shows *bumbu parape* during cooking and reduction, with lemongrass and kaffir lime leaves used as aromatic components before removal. The target is a thick, glossy, aromatic paste with reduced moisture and no scorched flavour. This visual documentation supports the control point for cooked *bumbu parape* before it is cooled and incorporated into the *Sosis parape* fish batter. Source: Authors' documentation, Practical Kitchen Laboratory, Politeknik Pariwisata Makassar, 2026.

Figure 6 Cooking Process of Bumbu parape.

Figure 6 shows cooked *bumbu parape* during the reduction stage. At this point, the paste should be stirred carefully to prevent scorching on the base of the pan. The visual target is a thick, glossy paste with a deep brown colour and no free watery liquid. If the paste is too loose, it can weaken the fish batter. If it is scorched, it can introduce bitterness and dark specks into the sausage.

After cooking, the lemongrass and kaffir lime leaves must be removed. The paste should then be transferred into a clean shallow container and cooled quickly over an ice bath. It should be used only when fully cooled. As a production rule, the paste temperature should not exceed 25°C when it is added to the fish batter. This limit is used to protect batter temperature and reduce the risk of destabilising the fish protein matrix.

The quality indicators for cooked *bumbu parape* are straightforward. The paste should be thick, glossy, aromatic, and concentrated. It should not smell raw, taste burnt, release excess water, or contain coarse aromatic fibres. When these indicators are met, the paste can contribute Makassar flavour identity to *Sosis parape* without weakening the emulsion-gel structure of the fish batter.

> ⚠ Critical Control: *Cooked bumbu parape must be cooled before incorporation. Paste that is still warm, especially above 25°C, may raise fish batter temperature and reduce emulsion stability. Always cool the paste in a clean container over an ice bath before use.*

B. Fish Batter Chopping Protocol

The chopping stage determines whether *Sosis parape* develops as a stable emulsified skipjack tuna sausage or as a loose fish mixture. During this stage, chilled skipjack tuna, salt, iced water, starch, egg white, neutral oil, and cooked *bumbu parape* are brought together into one fish batter. The aim is to extract functional fish protein, disperse the dry ingredients evenly, emulsify the oil, and incorporate the cooked *bumbu parape* without allowing the batter to become too warm.

This protocol uses a three-phase chopping sequence. The phases are organised by batter temperature and ingredient function. Salt and part of the iced water are used early to support myofibrillar protein extraction. Starch, dry seasonings, and egg white are added after the first protein paste has formed. Neutral oil and cooked *bumbu parape* are added later so that the fat phase and seasoning paste can be dispersed without overworking the batter.

The 12°C ceiling used in this protocol is a conservative production limit for this laboratory formula. It should not be read as a universal denaturation temperature for fish protein. Its purpose is practical: to prevent excessive heat build-up during chopping and to protect the emulsion-gel structure before steaming. If the batter reaches 12°C before the process is complete, chopping should stop and the bowl or batter should be chilled before continuing.

The batter should be checked immediately after Phase III. A properly developed fish batter should look smooth, cohesive, and slightly glossy. The colour should be evenly distributed from the cooked *bumbu parape*. There should be no visible oil separation, watery liquid, coarse spice pockets, or dry starch lumps. Figure 7 shows the *Sosis parape* fish batter after Phase III, when the cooked *bumbu parape* has been incorporated and the batter has reached the expected visual consistency.

The main risk in this stage is heat build-up. Chopping generates friction, and friction raises batter temperature. If the batter becomes too warm, the emulsion may weaken before steaming begins. The result may be fluid release, greasy pockets, coarse texture, weak slice cohesion, or a dry mouthfeel after cooking. For this reason, the production team must work with chilled ingredients, add iced water in stages, scrape the bowl as needed, and check the temperature at the end of each phase.

The second risk is incorrect ingredient order. If oil is added too early, it may not disperse properly into the protein matrix. If cooked *bumbu parape* is added while still warm, it can raise batter temperature and loosen the mixture. If dry ingredients are not dispersed evenly, the finished sausage may show grainy texture or uneven bite. The three-phase protocol is therefore designed to control sequence, temperature, and texture at the same time.

Table 6

Three-Phase Chopping Protocol for Sosis parape Fish Batter

Phase	Target Batter Temperature	Action	Technical Purpose
Phase I — Protein extraction	0–4°C	Place chilled skipjack tuna, fine salt, and one-third of the iced water into the food processor. Chop until the mixture becomes a coarse but even fish paste. Do not allow the batter to exceed 4°C at this stage.	Salt and mechanical chopping support the extraction and dispersion of myofibrillar protein. This phase prepares the protein base needed for batter binding, emulsion formation, and later gel setting.
Phase II — Batter building	4–8°C	Add another one-third of the iced water, tapioca starch, sago starch, onion powder, white pepper, dashi powder or fish stock powder, palm sugar, and paprika powder. Add chilled egg white towards the end of this phase. Chop until the batter becomes finer and more cohesive.	This phase disperses starch and dry seasonings, supports hydration, and introduces egg white as a secondary gel-forming ingredient. Starch gelatinisation occurs later during steaming; at this stage, the aim is even dispersion and hydration control.
Phase III — Emulsion and seasoning integration	8–12°C; absolute process ceiling: 12°C	Add chilled neutral oil gradually while chopping. Once the oil is dispersed, add cooled cooked *bumbu parape* and the remaining iced water. Chop briefly until the colour and texture are even. Stop immediately and measure the batter temperature.	This phase disperses the fat phase and incorporates cooked *bumbu parape* into the fish batter. The batter should appear smooth, cohesive, and slightly glossy, with no visible oil separation or coarse seasoning pockets.

Note. Developed by the authors as a production-control protocol for *Sosis parape* fish batter. The protocol is informed by principles of myofibrillar protein gel formation in muscle foods and food emulsion science (McClements, 2004; Sun & Holley, 2011), with adaptation to the *Sosis parape* formula and laboratory production conditions. The 12°C limit is used as a conservative process ceiling for batter handling, not as a universal protein denaturation threshold.

The chopping stage is complete when four conditions are met: the batter temperature remains at or below 12°C, the colour is even, the texture is smooth and cohesive, and no free oil or free liquid is visible. Once these conditions are reached, the batter should move directly to casing. It should not be left standing at room temperature because temperature rise at this point can reduce the stability that has been built during chopping.

Note. The figure shows *Sosis parape* fish batter after the final chopping phase, when chilled neutral oil, cooked *bumbu parape*, and the remaining iced water have been incorporated. The orange-brown colour indicates even distribution of cooked *bumbu parape*, while the cohesive and slightly glossy appearance indicates the intended batter consistency before casing. This visual documentation is used as a process reference only; batter stability must still be controlled through temperature monitoring, casing quality, steaming, rapid cooling, and slice evaluation. Source: Authors' documentation, Practical Kitchen Laboratory, Politeknik Pariwisata Makassar, 2026.

Figure 7 *Sosis parape* Fish Batter after Phase III Chopping

C. Filling the Casing

Casing is the stage where the finished fish batter is shaped into a uniform sausage. At this point, the batter should already be smooth, cohesive, slightly glossy, evenly coloured, and at or below the 12°C process ceiling. The aim of casing is to produce an even 11 cm segment with good shape, minimal air pockets, and enough space for expansion during steaming. Overfilling must be avoided because the casing may split when heat is applied.

Prepare 22–24 mm sausage casing before filling. Collagen casing may be used according to the manufacturer's handling instructions. Natural casing, when used, should be soaked in warm water for approximately 10 minutes, then checked to ensure that it is clean, flexible, and ready to fit onto the stuffer nozzle. The casing must slide smoothly on the nozzle so that filling can proceed without tearing or uneven pressure.

Transfer the chilled *Sosis parape* fish batter into the sausage stuffer. Fill the casing steadily and avoid trapping air inside the sausage. The filling should be firm enough to hold shape, but not so tight that the casing becomes tense. A properly filled casing should feel compact, even, and flexible. If the casing is filled too loosely, the sausage may show gaps, wrinkling, or poor shape. If it is filled too tightly, it may burst during steaming.

Form the sausage into 11 cm segments by twisting the casing at regular intervals. Each segment should be checked for uniform length and even filling. The ends may be secured with cotton string when needed. Consistent portioning is important because sausage diameter and length affect cooking time, core temperature, appearance, packaging neatness, and final yield.

Any visible air pockets should be released before cooking. Use a clean sanitised sausage pricker or fine needle to prick trapped air bubbles on the casing surface. This step helps prevent casing splitting during steaming and improves the smooth appearance of the finished sausage. Pricking should be done carefully; excessive puncturing can weaken the casing and allow moisture or fat to escape during cooking.

After filling and portioning, the sausages should move directly to steaming. They should not be held at room temperature because the batter is temperature-sensitive. If there is any delay, the filled sausages should be kept chilled while waiting for the steamer to be ready.

Table 7

Casing Control Points

Control Point	Required Condition	Production Risk if Not Controlled
Casing size	22–24 mm diameter.	Uneven cooking, irregular portion size, and inconsistent appearance.
Batter condition	Chilled, smooth, cohesive, and evenly coloured.	Weak structure, uneven filling, and poor slice cohesion.
Filling pressure	Firm but not overfilled.	Loose sausage if underfilled; splitting during steaming if overfilled.
Segment length	11 cm per segment.	Inconsistent cooking, yield variation, and uneven packaging.
Air pockets	Removed with a clean sanitised pricker or fine needle.	Casing splitting, holes, uneven surface, and internal gaps.
Holding before steaming	Filled sausages kept cold if not cooked immediately.	Batter warming, weakened emulsion, and reduced product consistency.

Note. Developed by the authors as a casing and portioning control guide for *Sosis parape* based on the standardised recipe and professional sausage production principles informed by Labensky et al. (2018, p. 207).

Note. The figure shows the casing and portioning stage of *Sosis parape* before steaming. Panel A shows the production team filling and shaping the sausage casing on a stainless-steel workbench. Panel B shows formed sausage segments after twisting and tying, with visible portion control before cooking. This visual documentation supports the control points for filling pressure, air-pocket reduction, 11 cm segment consistency, and casing readiness before steaming. Source: Authors' documentation, Practical Kitchen Laboratory, Politeknik Pariwisata Makassar, 2026.

Figure 8 Casing and Portioning of Sosis parape before Steaming.

⚠ Critical Control: *Do not overfill the casing. Sosis parape fish batter expands and sets during steaming. A casing that is too tight may split, while a casing with trapped air may form weak points. The target is a compact, even, flexible sausage segment that can withstand steaming and still produce a clean slice after cooling.*

D. Cooking, Rapid Cooling, and Storage

Cooking is the stage where filled *Sosis parape* sets into its final sausage structure. During steaming, fish protein forms the main gel network, egg white supports secondary gel formation, starch contributes to bite and moisture retention, and the casing maintains the product shape. The main cooking target is not time alone, but core temperature. Fish and seafood should reach a minimum internal temperature of 63°C or 145°F (FoodSafety.gov, 2024; USDA FSIS, 2024). For that reason, *Sosis parape* must be checked with a clean probe thermometer. Cooking time is an operational guide; core temperature is the verification point.

The primary cooking method is steaming at 90°C. Place the filled sausages on trays in a steamer that has reached the target temperature. Steam for approximately 10 minutes, or until the centre of the sausage reaches at least 63°C. The probe thermometer should be inserted into the thickest part of the sausage without tearing the casing excessively. If the required core temperature has not been reached, continue steaming and check again.

A combination oven may also be used when steam control and multi-tray production are required. Set the oven to 85°C with steam and cook for approximately 15–20 minutes, or until the sausage reaches a minimum core temperature of 63°C. A short dry-heat step at 160°C for 3–5 minutes may be used only when a slightly drier surface or improved surface colour is desired. This dry-heat step is optional and must not replace core temperature verification.

Rapid cooling is required immediately after cooking. Transfer the sausages into an ice bath for approximately 5–10 minutes after the required core temperature has been reached. This step helps stop residual cooking, stabilise the gel structure, and reduce the time the product spends in the temperature danger zone. The temperature danger zone is commonly defined as 40–140°F, or approximately 4–60°C, where bacterial growth can increase rapidly if food is held too long (USDA FSIS, 2020). Figure 9 shows the cooking and rapid cooling

sequence used in *Sosis parape* production.

Note. The figure shows two sequential control stages in *Sosis parape* production. Panel A shows filled sausages arranged on trays in a combination oven during steam cooking. Panel B shows cooked sausages placed in an ice bath immediately after cooking for rapid cooling. This visual documentation supports the process sequence from cooking to rapid cooling, but it does not validate final doneness, cooling rate, shelf-life, or storage stability. Core temperature must still be verified with a clean probe thermometer, and cooling control must be managed through time, temperature, and proper cold storage practice. Source: Authors' documentation, Practical Kitchen Laboratory, Politeknik Pariwisata Makassar, 2026.

After rapid cooling, the sausages should be drained and dried before packaging. Excess surface moisture can reduce packaging neatness and affect the appearance of the vacuum-packed product. Once dry, the sausages may be vacuum packed for organised chilled holding or frozen storage within the laboratory development context. In this document, vacuum packaging and cold storage are not used as proof of commercial shelf-life. Validated shelf-life requires direct testing of microbiological quality, pH, water activity, storage temperature, packaging integrity, and sensory change over time.

Chilled holding should be maintained at 0–4°C. Frozen storage, when used for product development purposes, should be maintained

Figure 9 Cooking and Rapid Cooling of Sosis parape

at -18°C or below. These temperatures support controlled handling, but they do not establish a validated shelf-life for *Sosis parape*. The product should be labelled with production date, batch code, storage condition, and intended use. Any storage duration applied in laboratory practice must be treated as an internal control decision until validated shelf-life data are available.

Table 8

Cooking, Rapid Cooling, and Storage Control Points for Sosis parape

Stage	Required Condition	Production Control Point
Steaming method	Steam at 90°C for approximately 10 minutes, or until the product reaches the required core temperature.	Time is a guide; core temperature is the verification point.
Combination oven method	85°C with steam for approximately 15–20 minutes, or until core temperature is reached.	Suitable for controlled multi-tray cooking when steam distribution is stable.
Optional dry-heat finish	160°C dry heat for 3–5 minutes, only when surface colour or surface drying is required.	Must not replace core temperature verification.
Core temperature	Minimum 63°C / 145°F at the centre of the sausage.	Verifies safe cooking for fish and seafood products.
Probe thermometer	Clean, functional, and inserted into the thickest part of the sausage.	Prevents reliance on time alone and improves cooking verification.
Rapid cooling	Ice bath for approximately 5–10 minutes immediately after cooking.	Stops residual cooking, supports gel stabilisation, and reduces time in the temperature danger zone.
Draining and drying	Surface moisture removed before vacuum packaging.	Improves packaging neatness and product appearance.
Vacuum packaging	Applied after cooling and drying.	Supports organised handling and physical protection at laboratory scale.
Chilled holding	0–4°C.	Maintains cold storage conditions; does not validate shelf-life by itself.
Frozen storage	-18°C or below when frozen storage is used.	Supports frozen holding for development purposes; shelf-life still requires validation.
Labelling	Production date, batch code, storage condition, and intended use recorded.	Supports traceability and batch control.

Note. Developed by the authors as a cooking, rapid cooling, and storage control guide for *Sosis parape* based on the standardised recipe, professional kitchen practice, and food safety guidance for fish and seafood core temperature and temperature danger zone control (FoodSafety.gov, 2024; Labensky et al., 2018; USDA FSIS, 2020, 2024).

CHAPTER V
PRODUCT ANALYSIS AND DISCUSSION

A. Product Analysis

1. Oragnoleptic Evaluation

Organoleptic evaluation was conducted to assess whether *Sosis parape* achieved the intended sensory direction established in the target sensory profile. The evaluation focused on five attributes: colour, aroma, texture, flavour, and overall impression. These attributes were selected because they represent the main quality indicators of an emulsified skipjack tuna sausage: visual appearance, cooked *bumbu parape* aroma, gel-based texture, flavour balance, and total eating response.

The evaluation was conducted on 23 July 2026 at 09.00 in the lobby area of the Practical Kitchen Laboratory, Politeknik Pariwisata Makassar. The test was scheduled in the morning interval after breakfast and before lunch to reduce the likelihood that panellists were either fully satiated after a meal or excessively hungry before lunch. Sensory testing guidance advises that evaluations should not be conducted directly after meals, while panellists should also not be hungry during testing; for that reason, the middle part of the morning or afternoon is considered suitable for sensory work (Deutsche Landwirtschafts-Gesellschaft, 2012). Choi (2013) also notes that midmorning or midafternoon sessions are commonly preferred because panellists are usually not overly hungry or full, and that panellists should avoid eating for at least one hour before testing.

The product sample was prepared from the standardised formula described in Chapter IV. The core production process followed the established procedure of fish batter preparation, casing, steaming, rapid cooling, and controlled handling. For the organoleptic session, the sausages were then grilled before evaluation to simulate a common serving condition for sausage products. This distinction is important: grilling was used as the serving simulation for sensory evaluation, not as a replacement for the cooking and rapid cooling controls described in Chapter IV.

Each panellist received three *Sosis parape* samples on a serving plate. The samples were presented in hot, warm, and cold serving conditions to observe product readability across common service temperatures. The available data, however, were recorded as aggregate hedonic scores by sensory attribute, not as separate statistical comparisons among hot, warm, and cold samples. Therefore, the results in this section are discussed as overall organoleptic response to the served product, not as a comparative serving-temperature study.

The panel consisted of 20 trained panellists from the Culinary Arts Diploma Programme, Politeknik Pariwisata Makassar. The number of panellists was selected for preliminary product development evaluation, not for broad consumer market representation. ISO 8586:2023 specifies criteria and procedures for the selection and training of trained sensory assessors, while ISO 11136:2014 describes approaches for measuring the degree to which products are liked or relatively liked in a controlled area (International Organization for Standardization, 2023; International Organization for Standardization, 2014). A review of trained sensory panels in food science reported that many trained panels used 8–12 panellists, while other panels used more than 12 and up to 32 panellists (Djekic et al., 2021). On this basis, 20 trained panellists is defensible for internal product development screening because it falls within the practical range used for trained-panel work, but it should not be interpreted as sufficient for market-wide consumer acceptance.

The test location was arranged as a controlled evaluation area within the lobby of the Practical Kitchen Laboratory. Although the session was not conducted in individual sensory booths, the location was used in a controlled manner to maintain consistency in sample serving, panellist instruction, scoring format, and response collection. ISO 8589:2007 provides general guidance for the design of sensory test rooms, including the need to consider testing area and preparation area requirements in sensory analysis (International Organization for Standardization, 2007). In this study, the lobby setting was therefore treated as a controlled educational testing area, not as a full ISO sensory laboratory.

Each panellist evaluated the product using a five-point hedonic scale. The scale was interpreted as follows: 1 = strongly disliked, 2 = disliked, 3 = neutral, 4 = liked, and 5 = strongly liked. Panellists scored each sensory attribute and provided short comments where relevant. The comments were used to support interpretation of the numerical data, not to replace the score results.

Data analysis was descriptive. The score for each attribute was totalled across the 20 panellists, divided by the number of panellists, and reported as the mean score. Each mean score was also converted into a percentage of the maximum possible score to make the result easier to read. No inferential statistical test was applied because the evaluation was designed as a preliminary product development assessment, not as a hypothesis-testing study. The absence of standard deviation, variance, and inferential statistics is recognised as a methodological limitation.

Table 9 presents the hedonic evaluation results for *Sosis parape*. The data show that all sensory attributes received favourable mean scores. Flavour obtained the highest mean score, while texture received the lowest mean score among the evaluated attributes, although it remained within the liked category.

The highest score was recorded for flavour, with a mean score of 4.65 and a score achievement of 93%. This result indicates that the integration of cooked *bumbu parape* into the skipjack tuna fish batter was well received by the trained panellists. The flavour was perceived as distinctive because the product retained the savoury character of skipjack tuna while presenting the sweet, acidic, and cooked-aromatic direction associated with *bumbu parape*. This supports the product concept, but it should not be overstated as proof of commercial success.

Aroma received a mean score of 4.55, equal to 91% of the maximum score. This suggests that cooked *bumbu parape* contributed a clear aromatic identity to the sausage. In production terms, this result supports the decision to cook the paste before incorporation. A properly cooked paste reduces raw onion notes and gives the product a warmer, deeper aroma. The result also supports the need to control paste cooking carefully, because undercooked paste may taste raw, while overcooked paste may introduce bitterness.

Table 9

Hedonic Evaluation Results of Sosis parape

n = 20 trained panellists

Sensory Attribute	Total Score	Mean Score	Score Achievement	Category	Dominant Panellist Comment
Colour	87/100	4.35	87%	Strongly liked	Even golden-brown colour, authentic appearance, and appetising visual impression.
Aroma	91/100	4.55	91%	Strongly liked	Cooked *bumbu parape* aroma was immediately recognisable, especially by local panellists.
Texture	84/100	4.20	84%	Liked	Firm and cohesive; several panellists expected a more pronounced snap.
Flavour	93/100	4.65	93%	Strongly liked	Makassar flavour direction was perceived as distinctive in a fish sausage format.
Overall impression	90/100	4.50	90%	Strongly liked	Most panellists perceived the product as different from ordinary commercial fish sausage.
Total mean	**445/500**	**4.45**	**89%**	**Strongly liked**	**Overall response indicates strong preliminary sensory acceptance within the trained panel group.**

Note. Developed by the authors from the *Sosis parape* organoleptic evaluation conducted on 23 July 2026 at 09.00 in the lobby area of the Practical Kitchen Laboratory, Politeknik Pariwisata Makassar. The evaluation involved 20 trained panellists from the Culinary Arts Diploma Programme. Each panellist received three grilled *Sosis parape* samples presented in hot, warm, and cold serving conditions. The five-point hedonic scale was interpreted as follows: 1 = strongly disliked, 2 = disliked, 3 = neutral, 4 = liked, and 5 = strongly liked. Total score was calculated from 20 panellists, with 100 as the maximum score for each attribute and 500 as the maximum total score across five attributes. The results represent preliminary product development data and should not be generalised as consumer market acceptance or as a statistical comparison among serving temperatures.

The highest score was recorded for flavour, with a mean score of 4.65 and a score achievement of 93%. This result indicates that the integration of cooked *bumbu parape* into the skipjack tuna fish batter was well received by the trained panellists. The flavour was perceived as distinctive because the product retained the savoury character of skipjack tuna while presenting the sweet, acidic, and cooked-aromatic direction associated with *bumbu parape*. This supports the product concept, but it should not be overstated as proof of commercial success.

Aroma received a mean score of 4.55, equal to 91% of the maximum score. This suggests that cooked *bumbu parape* contributed a clear aromatic identity to the sausage. In production terms, this result supports the decision to cook the paste before incorporation. A properly cooked paste reduces raw onion notes and gives the product a warmer, deeper aroma. The result also supports the need to control paste cooking carefully, because undercooked paste may taste raw, while overcooked paste may introduce bitterness.

Colour received a mean score of 4.35, equal to 87% of the maximum score. The golden-brown appearance was consistent with the intended visual profile. This colour comes from cooked *bumbu parape*, sweet soy sauce, palm sugar, and controlled heating of the paste. The colour result is important because appearance is the first sensory cue received by the panellist. A fish sausage with uneven colour, pale patches, or dark scorched spots would weaken the product's visual identity.

Texture received the lowest mean score among the five attributes, with a mean score of 4.20 and a score achievement of 84%. This result does not indicate product failure because the score still falls within the liked category. Instead, it identifies a specific refinement point. The panellist comments suggest that the sausage was firm and cohesive, but the snap could be made more pronounced. Future trials may explore adjustment of tapioca starch and sago starch balance, casing tension, chopping endpoint, or controlled use of texture-supporting hydrocolloids. Any hydrocolloid addition, including carrageenan, should be tested in small formulation trials before being adopted into the standardised recipe.

The overall impression score was 4.50, equal to 90% of the maximum score. This score reflects the combined effect of colour, aroma, texture, flavour, and product identity. The result suggests that *Sosis parape* was not perceived merely as a standard fish sausage with added seasoning. It was read as a product with a clear Makassar flavour direction, supported by a controlled sausage format.

The total mean score of 4.45, equivalent to 89% of the maximum possible score, places *Sosis parape* in the strongly liked category within this preliminary evaluation. This result supports continuation of product development, particularly in refining texture and confirming consistency across repeated batches. However, the interpretation must remain within the limits of the method. The panel size was limited, the panellists came from a culinary education environment, and the test was not designed as a large consumer acceptance study. Further evaluation with a broader consumer panel would be required before drawing stronger conclusions about market acceptance.

From a validity perspective, this evaluation has several strengths. The product was prepared from a standardised formula, the test was conducted at a defined date, time, and location, the same sensory attributes were used for all panellists, the scoring scale was consistent, and the panel consisted of trained culinary assessors. These conditions improve internal consistency for a product development evaluation. The main limitation is external validity. The results show how the product was received by a trained culinary panel in a controlled educational setting, but they do not yet show how the wider consumer market would respond.

From a product development perspective, the organoleptic results are useful because they show both product strength and direction for improvement. The main strength lies in flavour, aroma, and overall identity. The main refinement area lies in texture, particularly snap and bite. This means that the next development stage should focus on improving textural precision while maintaining the recognised character of skipjack tuna and cooked *bumbu parape*.

2. Comparison with Comparable Fish Sausage Categories

The comparison in this section is used to clarify the product position of *Sosis parape*. It is not intended to make unsupported claims about specific commercial brands. Commercial fish sausages vary widely in raw material, seasoning system, additive use, texture, price point, and labelling practice. For that reason, the comparison is presented at category level: *Sosis parape*, a high-quality commercial fish sausage category, and a generic fish sausage category.

This distinction is important for scientific accuracy. Without direct label review, laboratory analysis, or supplier specification, it would not be defensible to state that a particular commercial sausage uses a specific preservative, fish material, or flavouring system. The table therefore compares observable and documentable product design features, while placing commercial products within cautious category descriptions.

The comparison shows that the strongest differentiating feature of *Sosis parape* is not only its use of skipjack tuna, but the way the product combines a documented fish batter formula with cooked *bumbu parape*. A commercial fish sausage may be technically consistent and convenient, but *Sosis parape* has a more explicit regional flavour reference. Its identity is built through the use of skipjack tuna, cooked *bumbu parape*, golden-brown colour, savoury-sweet-acidic flavour balance, and a product name that is directly connected to Makassar culinary memory.

The comparison also shows that *Sosis parape* should not be positioned through unsupported claims of being “healthier,” “more natural,” or “free from preservatives” unless those claims are supported by laboratory data and full ingredient verification. In this document, the safer position is that *Sosis parape* uses a transparent formulation and does not make a validated commercial shelf-life claim. Its safety and quality control depend on standardised production, minimum core temperature, rapid cooling, vacuum packaging, cold storage, and traceability.

Table 10

Comparative Matrix of Sosis parape and Comparable Fish Sausage Categories

Parameter	*Sosis parape*	High-Quality Commercial Fish Sausage Category	Generic Fish Sausage Category	Interpretive Boundary
Fish raw material	Documented skipjack tuna fillet, skinless and boneless, used as the main protein base.	May use identifiable fish fillet, fish mince, surimi, or selected fish material depending on brand formulation and label.	May use fish mince, surimi, or mechanically separated fish material depending on formulation, label, and production specification.	Commercial composition must be verified from product label, ingredient declaration, or supplier specification.
Main product identity	Emulsified skipjack tuna sausage based on cooked *bumbu parape*.	Usually positioned through brand quality, seafood content, convenience, or texture consistency.	Usually positioned through affordability, convenience, and broad consumer familiarity.	This is a positioning comparison, not a market survey.
Seasoning approach	Cooked *bumbu parape* prepared from shallots, garlic, chilli, candlenut, tamarind, palm sugar, sweet soy sauce, salt, and oil.	Commonly uses standard seasoning blends or commercial flavour systems for batch consistency.	Commonly relies on simplified seasoning systems, flavour enhancers, or premix-based flavour profiles.	Specific seasoning systems must be verified from label or manufacturer data.
Cultural identity	Strong Makassar flavour reference through skipjack tuna and cooked *bumbu parape*.	Generally limited unless the product is explicitly designed around a	Generally limited or absent unless stated on the label or	Cultural identity is assessed from product concept, formulation,

		regional culinary identity.	product concept.	naming, and sensory readability.
Colour and appearance	Golden-brown colour from cooked *bumbu parape*, sweet soy sauce, palm sugar, and controlled heating.	Usually designed for uniform and commercially acceptable colour.	Usually designed for consistent appearance and mass-market familiarity.	Colour comparison requires direct visual or instrumental evaluation for stronger claims.
Flavour profile	Savoury, mildly sweet, lightly acidic, cooked-aromatic, and recognisable as skipjack tuna with *bumbu parape*.	Often designed to be neutral, broadly acceptable, and familiar to a wide consumer base.	Often designed to be simple, mild, and standardised for broad acceptance.	Flavour comparison should be confirmed through side-by-side sensory testing.
Texture target	Firm-elastic bite, cohesive slice, moist mouthfeel, and clean cut after steaming and cooling.	Typically targets consistent bite, shape, and reheating stability.	Typically targets acceptable texture, affordability, and processing efficiency.	Texture comparison requires instrumental texture analysis or controlled sensory comparison.
Additives and preservation control	No commercial shelf-life claim is made. Product control depends on cooking to core temperature, rapid cooling, vacuum packaging, chilled or frozen holding, and traceability.	May use permitted food additives, stabilisers, or preservatives depending on formulation and applicable regulation.	May use permitted food additives, stabilisers, flavourings, or preservatives depending on formulation and applicable regulation.	Additive use must be read from label and regulation; it should not be assumed without evidence.
Sensory evidence in this paper	Preliminary hedonic evaluation with 20 trained panellists	Not evaluated in this study.	Not evaluated in this study.	The present study does not compare *Sosis parape* directly with

	produced a total mean score of 4.45, categorised as strongly liked.			commercial samples.
Documentation strength	Standardised formula, production process, process control points, visual documentation, and preliminary sensory data are documented.	Requires product label, manufacturer information, and independent testing for direct comparison.	Requires product label, manufacturer information, and independent testing for direct comparison.	Direct superiority claims are not made without comparative testing.

Note. Developed by the authors from the *Sosis parape* organoleptic evaluation conducted on 23 July 2026 at 09.00
Note. Developed by the authors as a category-level product positioning matrix. The *Sosis parape* column is based on the standardised formulation, production process, and preliminary organoleptic data presented in this paper. The commercial-category columns are cautious comparative categories and should not be read as claims about specific brands. Fish raw material categories are framed with reference to recognised fish-processing forms such as fillet and minced fish flesh, while additive-related statements are limited to the principle that food additives are regulated and require authorised use, technological justification, and appropriate labelling (Codex Alimentarius Commission, 1989/1995; European Commission, n.d.; European Food Safety Authority, 2025).

The main advantage of *Sosis parape* is its clarity of formulation and culinary identity. The product is not presented as a generic fish sausage with a local name attached to it. The formula, process, and sensory profile are designed so that cooked *bumbu parape* becomes part of the fish batter system and not merely a surface flavour. This gives the product a stronger gastronomic identity than a sausage that depends only on a standard seafood flavour base.

At the same time, the comparison must be interpreted within the limits of the available data. This study did not conduct a direct side-by-side sensory test against named commercial fish sausage products. It also did not perform proximate analysis, instrumental texture analysis, microbiological testing, water activity testing, or validated shelf-life evaluation. Therefore, the present section should be read as product positioning and formulation-based comparison, not as proof of market superiority.

For the next stage of development, a stronger comparative study should include selected commercial fish sausage samples, ingredient-label documentation, blind sensory testing, instrumental texture analysis, and basic laboratory testing. That design would allow *Sosis* *parape* to be compared not only by concept, but also by measurable quality indicators. Until such data are available, the most defensible conclusion is that *Sosis parape* shows a clear product identity, strong preliminary sensory acceptance, and a documented production system that distinguishes it from generic fish sausage formats.

B. Discussion

The development of *Sosis parape* shows that a regional flavour reference can be translated into an emulsified sausage format when formulation, process control, and sensory intention are treated as one connected system. The product should not be judged by whether it reproduces a traditional parape dish exactly. The more relevant question is whether it can carry the flavour logic of cooked *bumbu parape* while meeting the technical requirements of an emulsified skipjack tuna sausage.

The technical foundation of the product lies in fish batter stability. Fish protein can support emulsion formation by stabilising oil and water phases within a food matrix (Lu et al., 2024). Myofibrillar protein, especially myosin, contributes to gel formation after salt solubilisation and controlled heating (Sun & Holley, 2011; Walayat et al., 2025). This explains why the production controls in Chapter IV are not merely procedural details. Cold handling, ingredient sequence, chopping endpoint, casing control, core temperature verification, and rapid cooling are the main conditions that allow the product to hold its shape, retain moisture, and cut cleanly after cooking.

The three-phase chopping protocol is especially important because it controls the order in which structure, moisture, fat, and flavour are built into the fish batter. Food emulsion stability depends on dispersion, interfacial stabilisation, droplet size, ingredient interaction, and processing conditions (McClements, 2004). In *Sosis parape*, the early phase supports protein extraction, the middle phase builds the batter with starch, seasoning, and egg white, and the final phase incorporates neutral oil and cooked *bumbu parape*. The 12°C ceiling should therefore be understood as a conservative laboratory control point for batter handling, not as a universal denaturation threshold.

Cooked *bumbu parape* is the strongest identity marker of the product, but it is also a technical variable. It contributes aroma, colour, sweetness, acidity, savouriness, oil, moisture, and spice particles. For that reason, the paste must be thick, glossy, cooled, and evenly dispersed before casing. If the paste is hot, watery, scorched, or coarse, it may weaken the fish batter or create sensory defects. This shows that local flavour identity in *Sosis parape* is not achieved only by adding a regional seasoning. It is achieved by controlling how that seasoning behaves inside the emulsion-gel system.

The sensory results support this product logic. The total mean score of 4.45 indicates strong preliminary acceptance within the trained panel group, while the highest score for flavour suggests that cooked *bumbu parape* was recognised and accepted in the sausage format. These findings support the gastronomic direction of the product. However, the results should not be overstated as proof of broad consumer acceptance because the evaluation used 20 trained panellists in a culinary education setting. Reviews of trained sensory panels show that trained-panel work commonly uses relatively small assessor groups, including panels of 8–12 and larger trained panels up to 32 assessors (Djekic et al., 2021). In this study, n = 20 is therefore defensible for preliminary internal product development screening, not for market-wide preference claims.

Texture remains the main refinement area. Although texture was still within the liked category, it received the lowest score among the evaluated attributes. This means the product does not require a complete reformulation, but it does require targeted refinement in snap, bite, and slice structure. The next trials should focus on controlled adjustments to tapioca–sago balance, casing tension, chopping endpoint, oil dispersion, and cooling consistency. Research on fish emulsion sausage shows that protein-polysaccharide interaction can affect microstructure, oil droplet distribution, cooking loss, and expressible fluid (Sakamut et al., 2025). Egg white also supports gel formation through denaturation, unfolding, aggregation, and network formation during heating (Li et al., 2024). These references support the direction of refinement, but direct testing on *Sosis parape* is still required.

The comparison with comparable fish sausage categories should also be read carefully. *Sosis parape* should not be positioned through unsupported claims of being healthier, safer, more natural, preservative-free, or superior to commercial products. Its defensible strength is different: it has a transparent formula, documented process control, Makassar flavour identity, visual documentation, and preliminary trained-panel acceptance. Direct superiority claims would require side-by-side testing with selected commercial products, ingredient-label documentation, instrumental texture analysis, proximate analysis, pH, water activity, microbiological testing, and validated shelf-life evaluation.

Food safety interpretation must remain equally controlled. *Sosis parape* uses core temperature verification, rapid cooling, vacuum packaging, chilled holding, and frozen storage as handling controls. Fish and seafood should reach a minimum internal temperature of 63°C or 145°F, and food should be handled to minimise time in the temperature danger zone (FoodSafety.gov, 2024; USDA FSIS, 2020, 2024). These controls support safe handling practice, but they do not validate commercial shelf-life. Shelf-life claims require direct evidence from microbiological quality, pH, water activity, packaging integrity, storage temperature, and sensory stability over time.

From a culinary glocalisation perspective, *Sosis parape* is best understood as product translation. The emulsified sausage technique provides structure, casing, cooking control, rapid cooling, and standardisation. Cooked *bumbu parape* provides flavour identity, aroma, colour, and cultural readability. Food heritage authenticity can be negotiated through ingredients, memory, quality, cultural legitimacy, and consumer meaning rather than fixed only by unchanged traditional form (Shahrin & Hussin, 2023). This supports the position that *Sosis parape* does not replace traditional parape dishes. It carries selected flavour markers into a new format that can be taught, reproduced, and evaluated in culinary vocational education.

The product also shows how local food identity can be made visible through design. Local food experience is shaped by cultural value, food knowledge, perceived product quality, and satisfaction (Andih et al., 2025). In *Sosis parape*, the name, ingredient choice, cooked *bumbu parape*, golden-brown colour, sausage form, packaging, and serving condition must work together so that the product remains readable as Makassar-inspired. Without that clarity, the product would risk becoming only another flavoured fish sausage.

The methodological strength of this work lies in its traceability. The paper records product concept, formula, mise en place, chopping protocol, cooked *bumbu parape* preparation, casing, cooking, rapid cooling, packaging, visual documentation, sensory profile, organoleptic evaluation, and product positioning. This makes *Sosis parape* more defensible than a recipe-only report. Its limitation is that the product has not yet been validated through proximate analysis, instrumental texture testing, pH, water activity, total plate count, and validated shelf-life testing. The sensory evaluation was also conducted with trained panellists from a culinary education environment, not with a broad consumer population.

Overall, the evidence supports *Sosis parape* as a promising applied culinary product rather than a fully validated commercial food product. Its strongest contribution is the disciplined translation of skipjack tuna and cooked Makassar *bumbu parape* into a standardised emulsified sausage format. Its current strength lies in flavour identity, aroma, overall acceptance, and process documentation. Its next development priority is texture refinement, repeated-batch consistency, and laboratory validation.

The findings have direct implications for formula refinement, production control, culinary education, and future validation. These implications are not separate from the discussion; they translate the findings into actions required for the next development stage.

First, the Makassar flavour identity should be protected. Since flavour was the strongest sensory attribute, cooked *bumbu parape* should remain the core flavour reference. The practical action is to standardise paste ratio, cooking time, final consistency, cooling temperature, and dosage in the fish batter. This protects flavour consistency across batches without making the product neutral or generic.

Second, texture should become the main refinement target. The product was accepted, but the snap and bite need more precision. The next trials should test small adjustments in tapioca–sago ratio, casing tension, chopping endpoint, oil dispersion, and cooling consistency. Any addition of texture-supporting hydrocolloids should be tested in small batches before being adopted into the standardised recipe. The target is a cleaner snap and firmer bite without making the sausage rubbery, dry, or overly processed.

Third, batter temperature monitoring should be strengthened. The three-phase chopping protocol should be retained, but temperature should be recorded at the end of each phase. This makes the process more traceable and allows the production team to correct temperature rise before the batter becomes unstable.

Fourth, cooking and cooling records should be formalised. Each batch should record cooking method, cooking time, measured core temperature, cooling method, cooling duration, storage condition, and batch code. These records are necessary before *Sosis parape* can move from laboratory prototype to repeated production.

Fifth, *Sosis parape* can be used as a teaching model in culinary vocational education. The product requires students to connect recipe accuracy, cold handling, protein functionality, casing pressure, core temperature, rapid cooling, sensory evaluation, and process documentation. This makes it suitable for teaching standardised seafood product development in a professional kitchen setting.

Sixth, laboratory validation must be completed before broader claims are made. The next stage should include proximate composition, pH, water activity, total plate count, instrumental texture analysis, repeated-batch sensory evaluation, and validated shelf-life testing. Without these data, claims about nutrition, shelf-life, microbiological safety, and commercial storage stability should not be made.

Table 11

Implementation Implications for Further Development of Sosis parape

Area	Finding from This Study	Implementation Action	Evidence Required in the Next Stage
Flavour identity	Flavour was the strongest sensory attribute.	Retain cooked *bumbu parape* as the main flavour reference; standardise paste consistency, cooling, and dosage.	Repeated-batch sensory consistency and trained-panel confirmation.
Texture	Texture was accepted but scored lowest among the attributes.	Refine tapioca–sago balance, casing tension, chopping endpoint, oil dispersion, and cooling consistency.	Instrumental texture analysis and repeated sensory evaluation.
Batter stability	Stable fish batter depends on cold handling and ingredient sequence.	Retain the three-phase chopping protocol and monitor temperature at each phase.	Batter temperature record and visual batter quality checklist.
Cooking control	Doneness must be verified by core temperature, not time alone.	Use probe thermometer verification for a minimum core temperature of 63°C.	Core temperature log for each batch.
Rapid cooling	Cooling supports texture stabilisation and reduces time in the danger zone.	Continue ice-bath rapid cooling and record cooling practice.	Cooling time and temperature record.
Packaging	Vacuum packaging supports neat handling but does not prove shelf-life.	Use vacuum packaging for presentation and organised chilled holding only.	Packaging integrity check and validated shelf-life study.
Culinary education	Product requires integration of recipe, technique, control, and sensory judgement.	Use *Sosis parape* as a teaching model for standardised seafood product development.	Student production record, reflective evaluation, and product assessment rubric.
Commercial readiness	Product has promising preliminary acceptance but incomplete validation.	Conduct laboratory testing and broader consumer testing before commercial claims.	Proximate analysis, pH, water activity, total plate count, shelf-life data, texture analysis, and consumer acceptance study.

These implications show that *Sosis parape* is ready for controlled refinement, not for unsupported commercial claims. The immediate priority is to protect Makassar flavour identity while improving textural precision. The next priority is to strengthen evidence through repeated production, laboratory testing, and broader sensory evaluation. In this way, *Sosis parape* can move from a successful applied culinary prototype towards a more validated seafood-based product without losing its regional flavour identity.

CHAPTER VI
CONCLUSION AND RECOMMENDATIONS

A. Conclusion

This applied culinary product development paper has documented the development of *Sosis parape* as an emulsified skipjack tuna sausage based on cooked *bumbu parape*. The product was designed to combine the technical discipline of emulsified sausage production with a clear Makassar flavour identity. Its formulation, process sequence, sensory target, visual documentation, product positioning, and preliminary organoleptic evaluation show that *Sosis parape* can be developed as a standardised seafood-based culinary product within a vocational culinary education context.

The technical foundation of *Sosis parape* lies in the controlled formation of a fish batter and an emulsion-gel structure. Skipjack tuna provides the main protein base, while salt, iced water, tapioca starch, sago starch, egg white, neutral oil, and controlled heating support texture, moisture retention, slice cohesion, and mouthfeel. The three-phase chopping protocol, batter temperature control, casing procedure, core temperature verification, rapid cooling, and vacuum packaging demonstrate that the product requires disciplined process control rather than simple mixing and cooking.

Cooked *bumbu parape* functions as the main flavour reference of the product. Its role is not limited to taste; it also contributes cooked shallot aroma, golden-brown colour, sweetness, mild acidity, savouriness, and cultural readability. However, its use must be controlled. The paste must be thick, glossy, cooled, and evenly incorporated into the fish batter so that it supports the product without weakening the emulsion-gel structure.

The organoleptic evaluation showed strong preliminary acceptance by 20 trained panellists. The total mean score was 4.45, placing the product in the strongly liked category within the trained panel group. Flavour received the highest score, indicating that cooked *bumbu parape* was recognised and accepted in the sausage format.

Texture received the lowest score, although it remained in the liked category, indicating that the product is acceptable but still requires refinement in snap, bite, and slice structure.

The comparison with comparable fish sausage categories shows that the main strength of *Sosis parape* lies in its transparent formulation, documented process control, regional flavour identity, and preliminary trained-panel acceptance. The product should not be positioned through unsupported claims of being healthier, safer, more natural, preservative-free, or superior to commercial fish sausages. Direct superiority claims would require controlled comparison with selected commercial products, ingredient-label documentation, instrumental texture analysis, laboratory testing, and broader sensory evaluation.

Sosis parape should therefore be understood as a promising applied culinary prototype, not as a fully validated commercial food product. The present work provides a strong foundation in product concept, formula, process control, sensory profile, category positioning, and preliminary trained-panel evaluation. However, claims related to commercial shelf-life, microbiological safety, nutritional value, market acceptance, or superiority over commercial fish sausages require further laboratory and consumer testing.

Overall, *Sosis parape* demonstrates that skipjack tuna and cooked *bumbu parape* can be organised into a standardised emulsified sausage format without losing their regional culinary readability. The product's main contribution lies in translating a Makassar flavour identity into a controlled seafood-based product that can be taught, reproduced, evaluated, and further developed within culinary vocational education.

B. Recommendations

The first recommendation is to refine the texture of *Sosis parape* without changing its core flavour identity. Texture received the lowest score among the evaluated attributes, although it remained in the liked category. Future trials should therefore focus on improving snap, bite, and slice structure through small adjustments in the tapioca–sago ratio, egg white level, casing tension, chopping endpoint, oil dispersion, and cooling consistency. The purpose is not to reformulate the product entirely, but to strengthen the bite while preserving the recognised character of cooked *bumbu parape*.

The second recommendation is to repeat the production process across several batches to confirm consistency. Each batch should use the same standardised formula, the same three-phase chopping protocol, and the same cooking and cooling controls. The production record should include ingredient weight, batter temperature at each chopping phase, cooked *bumbu parape* condition, casing length, measured core temperature, cooling practice, packaging condition, storage condition, and batch code. This step is necessary before the product can be considered stable as a repeatable culinary product.

The third recommendation is to conduct basic laboratory validation. Further testing should include proximate composition, pH, water activity, total plate count, instrumental texture analysis, and shelf-life evaluation. These tests are necessary because the present study provides formulation, process documentation, visual evidence, and preliminary organoleptic data, but it does not yet validate nutritional value, microbiological quality, storage stability, or commercial shelf-life.

The fourth recommendation is to continue sensory evaluation with a broader panel. The present organoleptic test with 20 trained panellists is sufficient for preliminary product development screening, but it is not enough to represent wider consumer acceptance. A future evaluation should involve more diverse respondents and may include blind comparison with selected commercial fish sausage products. This would allow *Sosis parape* to be assessed not only as a promising prototype, but also as a product with measurable sensory position among comparable fish sausage categories.

Based on these recommendations, the nearest development priority is clear: improve texture, confirm repeated-batch consistency, complete basic laboratory validation, and expand sensory testing. These steps are realistic, directly connected to the findings, and necessary before *Sosis parape* is positioned beyond the applied culinary product development stage.

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Sosis Parape

Synopsis

This applied scientific paper documents the development of Sosis parape, an emulsified skipjack tuna sausage based on bumbu parape as a marker of Makassar gastronomic identity. Developed at the Practical Kitchen Laboratory of Politeknik Pariwisata Makassar, the work integrates formulation design, sensory targets, production control, and preliminary hedonic evaluation.

The product combines skipjack tuna, cooked bumbu parape, starches, egg white, iced water, neutral oil, and selected seasonings. The process emphasizes cold batter handling, phased chopping, casing, steaming, rapid cooling, and vacuum packaging. Preliminary testing with 20 trained panellists produced an overall mean score of 4.45/5, indicating promising potential as a standardized seafood-based culinary product. Further proximate, microbiological, and shelf-life analyses remain necessary before broader commercial claims can be made.

Keywords: *bumbu parape; culinary glocalization; emulsified sausage; Makassar gastronomy; skipjack tuna; Sosis parape.*

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