Fisheries Journal, 15 (5), 2667-2680 (2025)
http://doi.org/10.29303/jp.v15i5.1851

NUTRITIONAL VALUE ANALYSIS AND CONSUMER PREFERENCES OF CATFISH AND TUNA FLOSS PRODUCTS FROM MSMES IN BANYUMAS REGENCY

Analisis Nilai Gizi dan Preferensi Konsumen Terhadap Abon Ikan Lele dan Tuna Produk UMKM di Kabupaten Banyumas

Yohanes Harvinda*, Siti Balqis Huriyah, Asro Nurhabib, Taufik Budhi Pramono, Azizah Nuraini

Faculty of Fisheries and Marine Science, Universitas Jenderal Soedirman

North Purwokerto District, Banyumas Regency, Central Java 53122

*Corresponding author: yohanes.harvinda@unsoed.ac.id

(Received September 10th 2025; Accepted October 25th 2025)

ABSTRACT

Fish floss is one of the processed fish-based products that has a longer shelf life and high nutritional value. This study aimed to analyze the nutritional composition and consumer preferences of catfish and tuna floss produced by local SMEs in Banyumas Regency. Proximate analysis showed that catfish floss contained 7.29% moisture, 2.82% ash, 27.30% protein, 16.80% fat, 33.62% fiber, and 26.79% sugar. Meanwhile, tuna floss contained 8.12% moisture, 4.86% ash, 29.66% protein, 11.32% fat, 24.71% fiber, and 28.31% sugar. Both products met most of the SNI quality standards. A hedonic test involving 60 panelists using the conjoint method revealed that price, color, aroma, and taste were the dominant attributes influencing consumer preferences. Tuna floss was superior in protein content and aroma, while catfish floss excelled in texture and fiber. These findings indicate that local fish floss products have strong potential to enhance the competitiveness of SMEs and promote higher fish consumption among the community.

Keywords: Catfish Floss, Tuna Floss, Proximate, Consumer Preference, Hedonic Test

ABSTRAK

Abon ikan merupakan salah satu produk olahan berbasis ikan yang memiliki daya simpan lebih lama serta bernilai gizi tinggi. Penelitian ini bertujuan untuk menganalisis kandungan gizi dan preferensi konsumen terhadap abon lele dan abon tuna produksi UMKM di Kabupaten Banyumas. Analisis proksimat menunjukkan bahwa abon lele memiliki kadar air 7,29%, abu 2,82%, protein 27,30%, lemak 16,80%, serat 33,62%, dan gula 26,79%. Sedangkan abon tuna memiliki kadar air 8,12%, abu 4,86%, protein 29,66%, lemak 11,32%, serat 24,71%, dan gula 28,31%. Kedua produk memenuhi sebagian besar standar mutu SNI. Uji hedonik terhadap 60 panelis dengan metode konjoin menunjukkan bahwa atribut harga, warna, aroma, dan rasa berperan dominan dalam menentukan preferensi. Abon tuna lebih unggul pada kandungan protein dan aroma, sedangkan abon lele menonjol pada tekstur dan serat. Temuan ini menegaskan bahwa produk abon ikan lokal berpotensi memperkuat daya saing UMKM serta meningkatkan konsumsi ikan di masyarakat.

Kata Kunci: Abon Lele, Abon Tuna, Proksimat, Preferensi Konsumen, Uji Hedonik

INTRODUCTION

Fish is a strategic food commodity in Indonesia, as it is rich in protein, essential amino acids, vitamins, minerals, and omega-3 fatty acids (EPA and DHA), which support cardiovascular and brain health. The government emphasizes the importance of fish consumption through national programs such as *Gemarikan* (Gerakan Memasyarakatkan Makan Ikan) to strengthen food security, improve nutrition, and reduce stunting rates. National fish consumption has shown an increasing trend from 54.56 kg per capita per year in 2020 to 58.91 kg per capita per year in 2024, nearly reaching the target of 59 kg. Despite this positive progress, consumption distribution remains uneven. The Province of Central Java, in particular, records relatively low consumption levels (approximately 36–40 kg per capita), far below the national average (KKP RI, 2024). This indicates both an opportunity and a challenge for fish-based MSMEs (Micro, Small, and Medium Enterprises) in Central Java to promote value-added products that can enhance local consumption.

Abon ikan (shredded fish floss) is a processed food product produced through a series of steps including boiling, shredding, frying, seasoning, and oil pressing, resulting in dry fish fibers with a crispy texture and savory taste (Kasmiati *et al*., 2023). Because fish is a highly perishable food commodity, processing it into *abon* serves as an effort to extend its shelf life (Rahayu & Destiana, 2022). Fish floss offers several advantages, such as a longer shelf life compared to fresh fish, relatively high protein content, and flexibility as a practical side dish or ready-to-eat food. This product is also highly preferred by consumers because it is suitable for all age groups, from children to adults.

In Banyumas Regency, several MSMEs engaged in fishery product processing produce various types of *abon*, including catfish and tuna floss, which are positioned as premium products. The main advantage of these *abon* products lies in the use of 100% pure fish meat without additional fillers (other than seasonings), providing a more authentic flavor compared to other fish floss products that typically contain additives such as ground peanuts or grated coconut.

As an innovative product, the development of fish floss—whether catfish or tuna—requires an introductory stage to the market to assess consumer acceptance before mass commercialization. The level of consumer acceptance of fish floss can be understood through consumer preferences, which reflect the tendency to choose one product over another similar product. Preferences are formed by consumer perceptions of product attributes that influence purchasing behavior in a predictable manner (Sundari & Umbara, 2019). Thus, consumer preferences for fish floss can be analyzed through intrinsic product attributes such as color, aroma, taste, texture, packaging design, labeling information, and price suitability. Product introduction results reveal consumer responses regarding the desired characteristics of fish floss and their expectations for the ideal product, which can serve as the foundation for further product development. Various methods can be used to measure preferences, one of which is the Conjoint Analysis method, which is considered effective for evaluating consumer reactions to combinations of product attributes and determining the most promising variant for further development. Additionally, these fish floss products currently lack nutritional information on their packaging, necessitating proximate and other chemical analyses.

Within this framework, this study aims to examine the nutritional content and consumer preferences for catfish and tuna floss produced by MSMEs in Banyumas Regency. Processing two fish species with distinct characteristics is expected to provide a more comprehensive understanding of sensory quality and consumer preference levels, serving as a basis for developing product improvement strategies for fish floss at the MSME level.

METHODS

Time and Place

This research was conducted in August 2025. The process of making catfish floss was carried out at one of the fishery product processing MSMEs located in Kedungbanteng District, Banyumas Regency, Central Java on August 2, 2025. Furthermore, nutritional analysis and proximate tests were conducted at the Nutrition Laboratory of the Faculty of Animal Husbandry, Jenderal Soedirman University on August 22–29, 2025.

Tool and Material

The main raw materials used in this study were fresh catfish (*Clarias* sp.) and tuna (*Thunnus* sp.), characterized by firm flesh texture, bright coloration, fresh odor, and reddish gills, in accordance with the raw material standards stated in SNI 7690-2019 concerning Fish, Crustacean, or Mollusk Floss. Additional ingredients used in the processing included lemongrass, galangal, bay leaves, shallots, garlic, coriander, granulated sugar, salt, and coconut milk. All these seasonings served to enhance flavor, reduce fishy odor, and extend the product's shelf life. The equipment used in fish floss production included a gas stove, frying pan, and steamer for boiling and steaming processes; knives and cutting boards for fish cleaning; forks, spatulas, and an oil spinner for shredding, stirring, and oil draining; as well as stainless steel basins, filter cloths, digital scales, and plastic packaging for mixing, draining, weighing, and final packaging stages.

Nutritional and proximate analyses included the determination of moisture, ash, protein, fat, crude fiber, and total sugar contents, conducted at the Nutrition Laboratory, Faculty of Animal Science, Jenderal Soedirman University (UNSOED), using methods based on AOAC (2019). The chemical reagents used in the analyses included concentrated H_2SO_4, 40% NaOH, $CuSO_4$ and K_2SO_4 catalysts, *n*-hexane solvent for fat extraction, 1.25% H_2SO_4 and 1.25% NaOH solutions for crude fiber testing, as well as 5% phenol and concentrated H_2SO_4 reagents for total sugar analysis. The instruments used comprised an analytical balance, a drying oven at 105°C for determining moisture content, a muffle furnace at 550°C for ash analysis, a Soxhlet extractor for fat extraction, Kjeldahl distillation and titration apparatus for protein determination, hot plates and electric heaters for heating processes, a desiccator, and various laboratory glassware such as Erlenmeyer flasks, burettes, pipettes, and measuring cylinders. Sugar content analysis was performed using a UV-Vis spectrophotometer to obtain more accurate results.

Making Fish Floss

The production process begins with selecting fresh fish, followed by separating the meat from the bones and head. The fish is then steamed for approximately 30 minutes using a closed steamer. Once cooked, the fish is cooled and shredded into fine fibers. The shredded meat is then sautéed with ground spices until evenly mixed. The cooking process is carried out over medium heat until the shredded meat becomes dry. Before packaging, excess oil is removed from the shredded fish using a spinner to ensure a drier and more durable product.

Nutritional and Proximate Tests

Water content

Moisture content was determined using an oven drying method based on the AOAC (2019) standard. Approximately 2 grams of shredded meat samples were weighed and then dried in an oven at 105°C until constant weight was achieved. After drying, the samples were cooled in a desiccator to prevent absorption of water vapor from the air, then reweighed. The percentage of moisture content was calculated from the difference in weight before and after drying.

Fat Content

Fat content analysis was conducted using the Soxhlet extraction method according to AOAC (2019). Approximately 2 grams of dried shredded meat samples were wrapped in filter paper and extracted using n-hexane solvent for 6 hours at the solvent's boiling point. After the extraction process was complete, the solvent was evaporated, and the remaining fat was weighed after being dried in an oven. The weighing results were expressed as a percentage of fat content to the weight of the dry sample.

Protein Content

Protein content was analyzed using the Kjeldahl method according to AOAC (2019), which includes three stages: digestion, distillation, and titration. Approximately 0.5 grams of shredded meat sample was placed in a Kjeldahl flask, and concentrated H_2SO_4 and $CuSO_4$–K_2SO_4 catalyst were added, then heated until the solution was clear. The digestion product was distilled with 40% NaOH to release ammonia, which was captured in the boric acid solution, and then titrated with standard HCl. Nitrogen content was calculated and converted to protein using a factor of 6.25.

Ash Content

Ash content was determined using the dry ashing method based on AOAC (2019). Approximately 2 grams of dry shredded meat sample was placed in a porcelain cup of known weight, then heated in a muffle furnace at 550°C until all organic matter was completely burned and grayish ash remained. The cup was cooled in a desiccator and weighed to calculate the ash content based on the difference in weight before and after ashing.

Crude Fiber Content

Crude fiber analysis was performed using the acid-base hydrolysis method according to AOAC (2019). Approximately 2 grams of shredded meat samples were refluxed sequentially using 1.25% H_2SO_4 and 1.25% NaOH solutions, each for 30 minutes. The filtered residue was washed until neutral, then dried in an oven at 105°C, weighed, and ashed at 550°C. The difference between the weight of the dry residue and the ash was used to determine the crude fiber content.

Sugar Levels

Total sugar content was analyzed using the phenol-sulfuric acid method according to AOAC (2019). The shredded meat sample extracted with distilled water was added with a 5% phenol solution and concentrated H_2SO_4, then left to stand until a yellow-orange color formed. Color intensity was measured using a UV-Vis spectrophotometer at a wavelength of 490 nm. Total sugar concentration was calculated based on a glucose standard curve and expressed as a percentage of the sample weight.

Panelist Acceptance Test

Acceptability testing was conducted with 60 panelists selected from various segments of society. The panelists were asked to try two types of fish floss products (catfish floss and tuna floss) produced by MSMEs and then provide their assessments using a questionnaire prepared by the researchers. Santoso (2010) explains that the sample size used in conjoint research ranges from 50 to 100.

The research stages included a preliminary survey, identification of research variables, development of the questionnaire instrument, implementation of the trial, data collection, and analysis of the results. The method used was a hedonic test with a scale of 1–5: 1 = dislike very much, 2 = dislike, 3 = somewhat like, 4 = like, and 5 = like very much. Attributes assessed by the panelists included color, texture, taste, overall appearance, packaging appearance, and appropriateness of the selling price.

Data Analysis

The data obtained from the nutritional and proximate analyses, including moisture, ash, protein, fat, crude fiber, and total sugar contents, were analyzed descriptively and quantitatively. Each parameter was analyzed in three replications (triplicate) to obtain mean and standard deviation values, ensuring greater accuracy and representing the variation among samples. The mean values from each replication were used to compare the chemical characteristics of catfish floss and tuna floss against the quality standards established by the SNI.

The panelists' evaluations of the product attribute combinations were further analyzed using the Conjoint Analysis method. This analysis was employed to determine the level of consumer preference based on the satisfaction value of each attribute and their combinations. A positive satisfaction value indicated a high level of preference for a given attribute level, whereas a negative value suggested a low level of preference.

Subsequently, the total satisfaction score was calculated to identify the optimal combination of attributes according to consumer preferences. The analysis also yielded the importance level of each attribute, calculated through weighting in percentage form. The conjoint analysis was conducted using SPSS 21 for Windows software, providing information on the attributes that most significantly influenced consumer decisions in selecting fish floss products.

RESULTS

Nutritional Analysis of Catfish and Tuna Floss

The proximate analysis results show that catfish and tuna floss have different proximate and nutritional compositions (Table 1), although both meet several quality requirements for floss based on the Indonesian National Standard (SNI) for fish floss (SNI 7690-2019). These differences in composition are influenced by the characteristics of the raw fish, processing methods, and additional seasonings used.

Table 1. Nutritional content of catfish floss and tuna floss

Nutrient Composition	Floss (%)		
	Catfish Floss	Catfish Floss	SNI
Water Content	7,29	8,12	1Max 15
Ash Content	2.82	4.86	Max 9
Protein	27.30	29.66	Min 30
Fat	16.80	11.32	Max 25
Crude Fiber	3.62	2.71	Min 1
Sugar	26.79	28.31	Max 30

Note: [1]SNI Quality Requirements for Fish Floss (SNI 7690-2019), [2]SNI 01-3707-1995 (Meat Floss).

Results of Conjoint Analysis and Consumer Preferences

Table 2. Comparison of Attributes and Consumer Importance Weights for Catfish Floss and Tuna Floss

No	Product Attribute	Importance Weight (%) Catfish Floss	Importance Weight (%) Tuna Floss	Dominant Attribute	Brief Description
1	Color	14.3	16.8	Tuna Floss	The color of tuna floss was preferred due to its brighter appearance and finer fibers.
2	Aroma	14.3	13.7	Catfish Floss	Catfish floss was perceived to have a stronger savory aroma characteristic of freshwater fish.
3	Texture	14.3	15.9	Tuna Floss	Tuna floss had a softer texture and was easier to chew compared to catfish floss.
4	Taste	14.3	15.4	Tuna Floss	Panelists rated the taste of tuna floss as more balanced between sweetness and savoriness.
5	Packaging Design	14.3	13.0	Catfish Floss	The packaging design of catfish floss was considered more visually appealing and informative.
6	Price	28.6	25.2	Catfish Floss	Price was the main determining factor for consumers, particularly for the more economical catfish product

Satisfaction Value (Utility) of Catfish Floss Based on Consumer Preferences

Pearson correlation results (Figure 1) between attributes show that color and packaging design have the strongest relationship (r = 0.79), followed by texture and price (r = 0.70). This indicates a link between visual perception and economic value in shaping consumer preferences for catfish floss products.

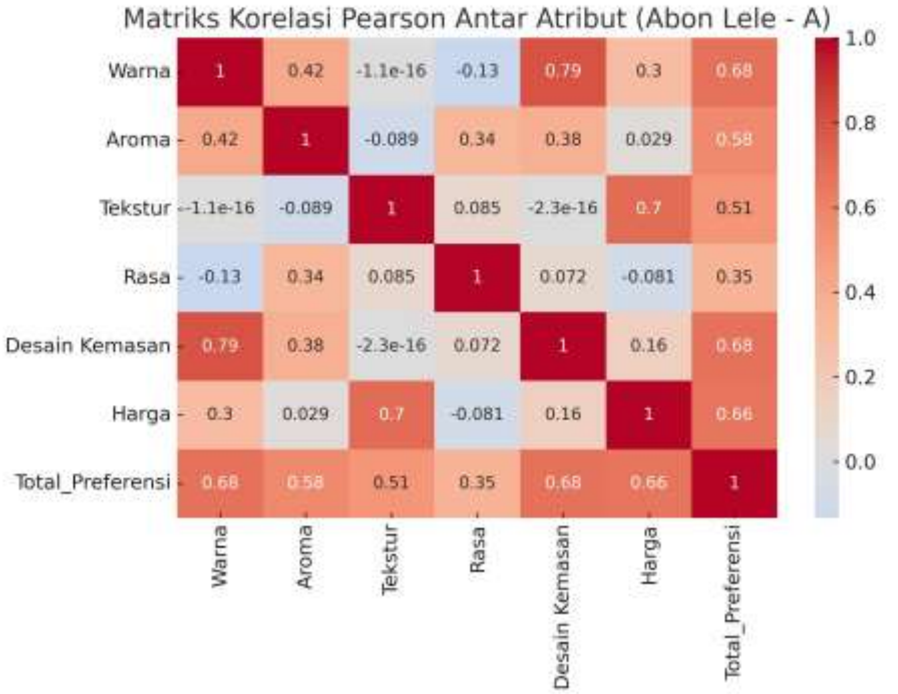

Figure 1. Pearson Correlation Matrix between attributes of Abon Lele

Satisfaction Value (Utility) for Tuna Floss at Each Level Based on Consumer Preferences

The results of the Pearson correlation test (Figure 2) showed that aroma had the strongest relationship with total preference (r = 0.67), followed by color (r = 0.62) and taste (r = 0.55). These findings indicate that sensory characteristics, particularly aroma and taste, are important factors in consumers' assessment of tuna floss.

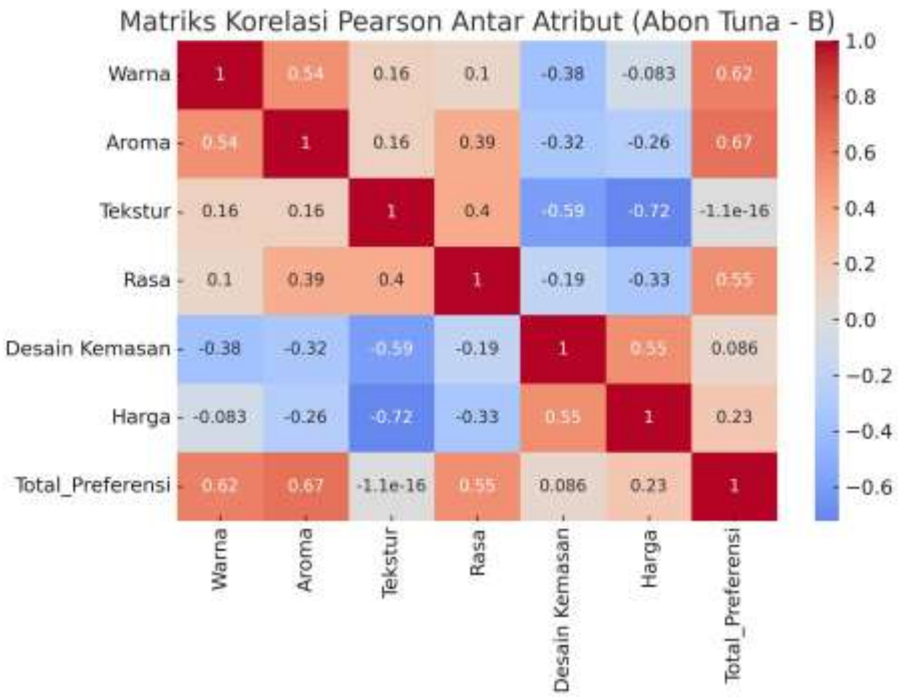

Figure 2. Pearson Correlation Matrix between Shredded Tuna attributes

DISCUSSION

Nutritional Analysis of Catfish and Tuna Floss

Water Content

The moisture content of catfish floss is 7.29%, while tuna floss contains 8.12%. Both values are far below the maximum limit set by the Indonesian National Standard (SNI) of 15%, indicating that both products are safe and stable. This difference reflects the intrinsic characteristics of the fish meat used. The flesh of catfish (*Clarias* sp.) has a softer texture and relatively higher fat content, which facilitates faster evaporation of water during the frying process. In contrast, tuna (*Thunnus* sp.) has denser muscle fibers with higher protein content, resulting in a relatively higher residual moisture content after frying. A low moisture content is essential for extending product shelf life, as water serves as the primary medium for microbial growth (Wicaksono *et al*., 2014).

Fish meat generally contains a high proportion of water, ranging from 66–84% (Muchtadi *et al*., 2007). Through frying and the use of a spinner, moisture can be significantly reduced, producing a dry product such as floss. Another factor contributing to the reduction of water content is the use of sugar and salt in the seasoning, both of which act as humectants capable of binding water and lowering the water activity of the product (Soerarti *et al*., 2004). The lower moisture content of catfish floss implies a slightly longer shelf life compared to tuna floss, although the difference is not substantial.

Ash Content

The ash content, which represents the mineral composition, was recorded at 2.82% for catfish floss and 4.86% for tuna floss. Both values remain below the maximum limit of 9% as specified by the Indonesian National Standard (SNI). The higher ash content in tuna floss can be attributed to the characteristics of marine fish, which are inherently richer in essential minerals such as sodium, calcium, magnesium, and phosphorus compared to freshwater fish (Andhikawati *et al*., 2021). In addition, the use of supplementary seasonings such as salt, lemongrass, and bay leaves also contributes to variations in ash content. These results indicate that tuna floss may serve as a richer source of minerals than catfish floss, while still remaining within the safe limits for consumption.

Protein Content

Tuna floss has a higher protein content, which is 29.66%, compared to catfish floss with 27.30%. Both values are slightly below the minimum protein standard for fish floss according to the Indonesian National Standard (SNI), which is 30%. The high protein content in tuna corresponds to the characteristics of large pelagic marine fish, which are known to be rich in high-quality protein, containing about 20–25% protein in their fresh form (Nurilmala *et al.*, 2006).

Cooking treatments, particularly steaming and frying, cause protein denaturation, which enhances the digestibility of the product (Zainuri *et al.*, 2022). For consumers, this is important because denatured proteins are more easily broken down by digestive enzymes. This also contributes to the added value of fish floss as a high-protein animal-based food product that is practical and suitable for consumption by various consumer groups, including children and the elderly.

Fat Content

The fat content of catfish floss is 16.80%, which is higher than that of tuna floss at 11.32%. Both values remain well below the SNI maximum limit (30%). The higher fat content in catfish corresponds to the characteristics of catfish meat, which generally possesses greater fat reserves compared to tuna. Catfish meat contains between 4%–7% fat (Asriani *et al.*, 2019), while tuna meat ranges from 0.7%–2.7% (Amahorseja & Noya, 2019).

Omega-3 fatty acids, which are beneficial for human health, are predominantly found in marine fish rather than freshwater species. Marine fish such as tuna generally contain higher levels of omega-3 because their diet consists of marine organisms rich in these fatty acids. Conversely, freshwater fish such as catfish tend to have lower omega-3 levels due to differing and less abundant food sources. Marine waters harbor a diverse range of organisms, including plankton, algae, and mollusks, which serve as natural sources of omega-3. Omega-3 fatty acids themselves cannot be synthesized naturally by fish but are obtained from their dietary intake (Sukarsa, 2004). However, a high-fat content can also present a disadvantage, as it may accelerate rancidity due to lipid oxidation, thereby shortening the shelf life (Kasmiati *et al.*, 2023). The frying process also influences the fat content of the product, as evaporated water is replaced by cooking oil absorbed into the fish tissue cavities.

Fiber Content

The fiber content of catfish floss reaches 3.62%, which is significantly higher than that of tuna floss at 2.71%. This difference may be attributed to variations in the structural composition of fish muscle fibers and the processing methods employed. Catfish meat, characterized by finer and softer muscle fibers, tends to produce floss with more fragmented strands. Panelists generally perceived the texture of catfish floss as softer, although in terms of attribute importance, texture is not always the primary factor compared to taste or aroma. In general, fish floss products possess relatively low fiber content; therefore, incorporating plant-based ingredients such as jackfruit fibers, which are rich in dietary fiber, is considered an innovative approach for the development of floss products (Azis *et al.*, 2024).

Sugar Levels

The sugar content of tuna floss is higher (28.31%) compared to catfish floss (26.79%), although both remain below the maximum limit of 30%. The characteristic brown to reddish coloration of floss is produced through non-enzymatic browning via the Maillard reaction and sugar caramelization (Figure 3). The caramelization reaction plays an essential role in the formation of brown pigments, which subsequently enhance the reddish hue of food products, including floss. Moreover, sugar contributes to the distinctive sweet–savory flavor of fish floss while also functioning as a humectant that binds water, thereby reducing water activity and aiding in product preservation (Ketaren, 1986).

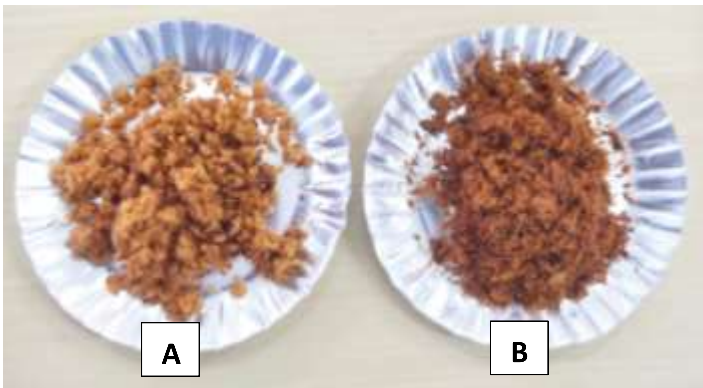

Figure 3. Appearance of catfish floss (A) and tuna floss (B)

Satisfaction Value (Utility) for Catfish Floss at Each Level Based on Consumer Preferences

The conjoint analysis of catfish floss products produced by MSMEs revealed that the price attribute occupied the dominant position, with an importance level of 28.6%, nearly twice that of other attributes, which averaged around 14.3%. This indicates that the panelists, representing diverse societal backgrounds, were more sensitive to price factors than to sensory attributes. This finding aligns with the study by Huriyati (2005), which explained that in the context of food-based MSMEs, price serves as the primary indicator in purchasing decisions, particularly among middle-class consumers in Indonesia. Price plays a crucial role for enterprises in facing market competition. This situation triggers price competition among various snack products, leading price-sensitive consumers to switch to more affordable brands. In the decision-making process, price functions as an allocation tool that helps consumers determine how to obtain maximum utility according to their purchasing power.

Nevertheless, organoleptic attributes such as color, aroma, texture, and taste still make significant contributions, even though their weights are relatively balanced. This can be understood considering the characteristics of catfish meat as the main raw material. Catfish (*Clarias sp.*) has pale white flesh with a fine texture and relatively high protein content (approximately 17–19%) (Apriyani, 2019). These characteristics make catfish a promising raw material for producing floss with a dry yet tender texture, which tends to be preferred by consumers. Panelists in this study assessed that any increase in sensory quality positively affected preference levels, as indicated by uniformly positive utility values (+0.167).

Further Pearson correlation analysis revealed patterns of relationships among attributes. The strongest correlation was found between color and packaging design (r = 0.79), indicating that panelists who rated the product's color as more appealing also tended to give positive evaluations of its packaging. This reinforces the findings of Sosianika *et al.*(2021) and Hiariey and Karuwal (2023), which stated that consumers' visual perception of processed food products is often influenced by the synergy between the color of the floss and its packaging design. Thus, maintaining the consistency of a golden-brown floss color paired with modern packaging becomes an important factor in perceived quality.

Another strong correlation was observed between texture and price (r = 0.70). Panelists who rated the texture of the floss as better tended to perceive the price of IDR 35,000 per 80 grams as more appropriate. This relationship indicates that consumers tend to evaluate price based on sensory experience rather than solely on nominal value. This finding is consistent with Sundari and Umbara (2019), who emphasized that the perceived suitability of food product prices is often linked to sensory satisfaction, especially for animal-protein-based products.

Meanwhile, aroma showed moderate correlations with color (r = 0.42) and taste (r = 0.34). This suggests that although aroma plays a role, its contribution is not as strong as other attributes. This may be related to the characteristic earthy odor of catfish, which, despite being reduced through processing and the addition of spices, remains detectable to some consumers. Panelists in the organoleptic test tended to prefer catfish floss due to its stronger umami flavor, possibly influenced by its higher fat content.

In terms of total preference, the most consistently influential attributes were color (r = 0.68), packaging design (r = 0.68), and price (r = 0.66). In other words, panelists tended to evaluate catfish floss comprehensively based on a combination of visual, packaging, and economic factors. This aligns with the study by Sundari and Umbara (2019), which found that consumer preference for fish-based products is strongly influenced by visual perception and product value in addition to sensory aspects.

The panelists' demographic diversity—covering various ages, genders, and occupations—provided a representative picture of public acceptance. The majority of panelists were within the productive age group (15–40 years), a segment that is generally active on social media and possesses moderate purchasing power. Therefore, marketing strategies for catfish floss can be directed toward strengthening visual branding and offering competitive pricing, accompanied by consumer education on the nutritional value of fish-based products.

Overall, the analysis shows that catfish floss has strong market potential for consumer acceptance. Optimization of visual attributes (color and packaging) and price adjustment are key factors. On the other hand, addressing the distinct aroma of catfish remains a challenge to further enhance consumer preference.

Utility Values of Tuna Floss at Each Level Based on Consumer Preference

The conjoint analysis of tuna floss produced by MSMEs indicated that consumer preferences across product attributes were relatively balanced. The importance levels for each attribute—color, aroma, taste, packaging design, and price—were around 18.2%, while texture accounted for only 9.1%. This finding demonstrates that consumers did not differentiate strongly among individual attributes but tended to evaluate the product comprehensively. Consumers considered the overall combination of organoleptic quality and packaging value rather than focusing on a single aspect (Herdhiansyah *et al.*, 2024).

The positive utility values for each attribute (+0.167) indicate that improvements in any attribute correspond directly with increased consumer satisfaction. In other words, the sensory quality and visual presentation of tuna floss strongly determine its market acceptance.

Pearson correlation analysis supported these results. Aroma had the strongest correlation with total preference (r = 0.67), followed by color (r = 0.62) and taste (r = 0.55). This is reasonable since tuna (*Thunnus sp.*) is known for its distinctive marine aroma, moderate fat content, and characteristic umami flavor (Herdhiansyah *et al.*, 2024). If processing is suboptimal, the fishy odor may dominate, affecting consumer liking. Therefore, the MSMEs' ability to reduce this odor through optimized cooking, seasoning, and drying techniques becomes crucial.

Unlike catfish floss, the price attribute in tuna floss showed only a weak correlation with total preference (r = 0.23). Consumers appeared to prioritize sensory quality over price, possibly because tuna is perceived as a higher-value raw material. Tawar (2022) supports this, noting that premium marine-based products continue to attract middle- to upper-class consumers despite higher prices, as long as their organoleptic quality is maintained.

Visual factors also played an important role, with color showing a fairly strong correlation with total preference (r = 0.62). Dark brown tuna floss was considered appealing and indicative of proper processing, even though its color was darker than that of catfish floss (Figure 3). The correlation between packaging design and price (r = 0.55) suggests that panelists tended to accept the stated price when the packaging was perceived as high-quality. This aligns with the findings of Israr and Kamariah (2023), who noted that perceived value in processed fish products is strongly influenced by modern, informative packaging design.

In terms of panelist characteristics, most belonged to the productive age group (15–40 years) with diverse occupational backgrounds. This group tends to have rational preferences and to consider the functional aspects of products, including nutritional value. Tuna is known to be rich in protein (20–25%), low in saturated fat, and high in omega-3 fatty acids, docosahexaenoic acid (DHA), and eicosapentaenoic acid (EPA), which are beneficial for heart and brain health (Hu *et al.*, 2022). Consumer awareness of these health benefits may explain why price was not a dominant factor, as they placed greater emphasis on sensory quality and nutritional value.

In summary, the analysis demonstrates that tuna floss is perceived by consumers as a product that must excel in aroma, color, and taste. Price has relatively little influence on purchasing decisions, unlike in catfish floss. Therefore, product development strategies for tuna floss should focus on maintaining sensory quality—particularly reducing fishy odor, stabilizing color, and ensuring flavor consistency. Meanwhile, attractive packaging can enhance perceived value, allowing higher prices to remain acceptable to consumers.

CONCLUSION

This study successfully assessed the nutritional content and consumer preferences for catfish and tuna floss produced by MSMEs in Banyumas Regency. Proximate analysis showed that both products met most Indonesian National Standard (SNI) standards, although their protein content was still slightly below the minimum standard. In terms of consumer preference, price was the dominant factor for catfish floss, while sensory qualities such as aroma and taste were more important for tuna floss. In general, catfish floss was superior in terms of texture and fiber content, while tuna floss had a higher protein content and a more distinctive aroma. These results indicate that both types of floss have significant potential for development, with a differentiation strategy based on the strengths of each product.

ACKNOWLEDGMENTS

Thanks are extended to the Banyumas Regency Planning, Research, and Development Agency (Bappedalitbang) for collaborating with the Faculty of Fisheries and Marine Sciences, Jenderal Soedirman University (FPIK UNSOED) through the Fish Planning and Processing Study Program in Banyumas Regency. The support from these institutions has made a significant contribution to the implementation of research activities, from the planning stage to data collection in the field. Thanks are also extended to the partner MSMEs and the Nutrition Laboratory of the Faculty of Animal Husbandry, UNSOED, for their assistance, facilities, and good cooperation during the analysis and testing process.

REFERENCES

Amahorseja, A. L., & Noya, E. D. (2019). Profil Asam Lemak dan Asam Amino Ikan Tuna (*Thunnus* sp.) Asap dari Beberapa Jenis Asap Cair. *Jurnal Hibualamo: Seri Ilmu-ilmu Alam dan Kesehatan, 3*(2), 1–11.

Andhikawati, A., Junianto, J., Permana, R., & Oktavia, Y. (2021). Review: Komposisi Gizi Ikan terhadap Kesehatan Tubuh Manusia. *Marinade, 4*(2), 76–84. https://doi.org/10.31629/marinade.v4i02.3871

AOAC [Association of Official Analytical Chemists]. (2019). *Official Methods of Analyses of AOAC International.* Rockville, Maryland: AOAC International.

Apriyani, I. (2017). *Budidaya Ikan Lele Sistem Bioflok: Teknik Pembesaran Ikan Lele Sistem Bioflokkelola Mina Pembudidaya.* Yogyakarta: Deepublish.

Asriani, A., Santoso, J., & Listyarini, S. (2019). Nilai Gizi Konsentrat Protein Ikan Lele Dumbo (*Clarias gariepenus*) Ukuran Jumbo. *Jurnal Kelautan dan Perikanan Terapan (JKPT), 1*(2), 77–86. https://doi.org/10.15578/jkpt.v1i2.7257

Azis, R. F., Jumiyati, J., & Yulianti, R. (2024). Differences in Organoleptic Quality and Nutritional Value Profile of Tuna Fish Floss with Addition of Jackfruit Dami as an Alternative Source of Protein and Fiber: Perbedaan Mutu Organoleptik dan Profil Nilai Gizi pada Abon Ikan Tuna dengan Penambahan Dami Nangka sebagai Alternatif Sumber Protein dan Serat. *JITIPARI (Jurnal Ilmiah Teknologi dan Industri Pangan UNISRI), 9*(2), 205–213. https://doi.org/10.33061/jitipari.v9i2.10763

Badan Standardisasi Nasional. (1995). *SNI 01-3707-1995: Abon.* Jakarta: Badan Standardisasi Nasional.

Badan Standardisasi Nasional. (2019). *SNI 7690:2019 Abon Ikan, Krustasea atau Moluska.* Jakarta: Badan Standardisasi Nasional.

Herdhiansyah, D., Lesmana, S. A. D., & Sadimantara, M. S. (2024). *Inovasi Abon Ikan Tuna: Integrasi Metode Kano dan QFD untuk Pengembangan Produk.* Pekalongan: Penerbit NEM.

Hiariey, S., & Karuwal, J. (2023). Pengaruh Jenis Ikan terhadap Penerimaan Organoleptik Abon Ikan. *Jurnal Perikanan Unram, 13*(3), 674–681. https://doi.org/10.29303/jp.v13i3.600

Hu, L., Zhang, H., Hu, Z., Chin, Y., Zhang, X., Chen, J., & Hu, Y. (2022). Comparative Proteomics Analysis of Three Commercial Tuna Species through SWATH-MS Based Mass Spectrometry and Chemometrics. *Food Control, 141*(4), 109162. https://doi.org/10.1016/j.foodcont.2022.109162

Hurriyati, R. (2005). *Bauran Pemasaran dan Loyalitas Konsumen.* Bandung: Alfabeta.

Israr, A. A., & Kamariah, N. (2023). Strategi Pengembangan Produk melalui Perancangan Desain Kemasan Baru pada UMKM Warcok. *ADMIT: Jurnal Administrasi Terapan, 1*(2), 204–222. https://doi.org/0.33509/admit.v1i2.2357

Kasmiati, K., Putri, A. A., Sumule, O., Latuconsina, N., Khasanah, R., Khotimah, H., Nurfaidah, L. S., Handarini, K., Rahmatang, & Metusalach, M. (2023). Karakteristik Mutu Abon Ikan Sapu-Sapu (*Pterygoplichthys pardalis*) dari Perairan Danau Tempe, Sulawesi Selatan. *Jurnal Pengolahan Hasil Perikanan Indonesia, 26*(2), 291–302. https://doi.org/10.17844/jphpi.v26i2.43873

Ketaren, S. (1986). *Minyak dan Lemak Pangan.* Jakarta: Universitas Indonesia.

KKP RI [Kementerian Kelautan dan Perikanan RI]. (2024). *Konsumsi Ikan Masyarakat.* 1 September 2025. https://portaldata.kkp.go.id/portals/data-statistik/konsumsi-ikan-rt/summary

Miratis, S. T., Sulistiyati, T. D., & Suprayitno, H. E. (2013). Pengaruh Suhu Pengukusan terhadap Kandungan Gizi dan Organoleptik Abon Ikan Gabus (*Ophiocephalus striatus*) (Doctoral dissertation). University of Brawijaya.

Muchtadi, D., Astawan, M., & Palupi, N. S. (2007). *Pengetahuan Bahan Pangan Hewani.* Jakarta: Universitas Terbuka.

Nurilmala, M., Wahyuni, M., & Wiratmaja, H. (2006). Perbaikan Nilai Tambah Limbah Tulang Ikan Tuna (*Thunnus* sp) Menjadi Gelatin serta Analisis Fisika-Kimia. *Jurnal Pengolahan Hasil Perikanan Indonesia, 9*(2). https://doi.org/10.17844/jphpi.v9i2.980

Rahayu, W. E., & Destiana, I. D. (2022). Perbandingan Hasil Sensori dan Kandungan Gizi Abon Ikan Tenggiri (*Scomberomorus commerson*) dengan Abon Ikan Selar Kuning (*Selaroides leptolepis*). *EDUFORTECH, 7*(2), 132–137. https://doi.org/10.17509/edufortech.v7i2.50965

Santoso, S. (2010). *Statistik Multivariat.* Jakarta: PT. Elek Media Komputindo.

Soerarti, W., Rasita, N., & Himawati, E. R. (2004). Pengaruh Jenis Humektan terhadap Pelepasan Asam Sitrat dari Basis Gel secara in vitro. *Media Majalah Farmasi Airlangga, 4*(2), 73-75.

Sosianika, A., Gunawan, A. I., Najib, M. F., Amalia, F. A., Senalasari, W., & Kania, R. (2022). Peran Penting Kemasan dalam Meningkatkan Persepsi Kualitas Produk Makanan. *Bhakti Persada Jurnal Aplikasi IPTEKS, 8*(2), 85–92.

Sukarsa, D. R. (2004). Studi Aktivitas Asam Lemak Omega-3 Ikan Laut pada Mencit sebagai Model Hewan Percobaan. *Buletin Teknologi Hasil Perikanan, 7*(1), 68–79.

Sundari, R. S., & Umbara, D. S. (2019). Preferensi Konsumen terhadap Produk Agroindustri Abon Ikan. *Jurnal Mebis, 4*(1), 36–43. https://doi.org/10.33005/mebis.v4i1.51

Tawar, I. A. (2022). Minat Konsumen Milenial terhadap Konsumsi Ikan Air Laut dan. *Jurnal FishtecH, 11*(1), 30–38.

Wicaksono, A. T. S., Swastawati, F., & Anggo, A. D. (2014). Kualitas Ikan Pari (*Dasyatis* sp) Asap yang Diolah dengan Ketinggian Tungku dan Suhu yang Berbeda. *Jurnal Pengolahan dan Bioteknologi Hasil Perikanan, 3*(1), 147–156.
Zainuri, A. M., Patma, T. S., & Suharto, N. (2022). Analisis Perpindahan Massa dan Uji Organolektik Pembuatan Nugget Ikan Laut Menggunakan Deep Fat Frying. *Jurnal Teknik Ilmu dan Aplikasi, 3*(2), 105–111.