**Int. j. adv. multidisc. res. stud.** 2026; 6(3):2039-2042

**Received:** 07-05-2026
**Accepted:** 17-06-2026

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

# Improving the Nutritional Quality of Dry Noodles by the Addition of Tilapia Fish Meat Flour

**[1] Junianto, [2] MF Ahmadi**

[1, 2] Fisheries Study Program, Faculty of Fisheries and Marine Sciences, Padjadjaran University, Indonesia

**DOI:** https://doi.org/10.62225/2583049X.2026.6.3.6527

Corresponding Author: **Junianto**

**Abstract**

Enhancing the protein content of dry noodles can be achieved by incorporating tilapia fish meat flour. One innovation in tilapia processing is converting the fish meat into flour and incorporating it into food products. Tilapia fish meat flour contains a relatively high protein content and can be utilized as a functional ingredient in food products. This study aimed to evaluate the nutritional composition of dry noodles fortified with tilapia fish meat flour. The research was conducted from February to April 2024 at the Fishery Product Processing Laboratory, Faculty of Fisheries and Marine Sciences, Padjadjaran University, and the Regional Technical Implementation Unit for Testing and Quality Application of Fishery Products (UPTD), Cirebon. The study employed an experimental method with two treatment levels of tilapia fish meat flour addition: 0% and 10%. The observed parameters included proximate analysis, namely protein content, moisture content, ash content, fat content, and carbohydrate content. The results showed that dry noodles without the addition of tilapia fish meat flour (control) contained 12.50% protein, 15.77% moisture, 1.55% ash, 0.36% fat, and 69.82% carbohydrates. Meanwhile, dry noodles with 10% addition of tilapia fish meat flour contained 17.88% protein, 12.78% moisture, 2.01% ash, 0.49% fat, and 66.84% carbohydrates. The study concludes that the addition of 10% tilapia fish meat flour increases protein, ash, and fat contents of dry noodles, while reducing moisture and carbohydrate contents.

**Keywords:** Dry Noodles, Tilapia, Tilapia Fish Meat Flour, Proximate Analysis

## 1. Introduction

Fish is a food source rich in essential nutrients, including protein, lipids, vitamins, and minerals. Fish protein content is approximately 5–15% higher than that of plant-based protein sources [1]. Tilapia protein contains all essential amino acids and is therefore considered a complete protein [2]. Protein and amino acids are key components in tissue growth in fish [3]. Common amino acids found in fish include lysine and leucine.

One innovation in tilapia processing is converting the fish meat into flour and incorporating it into food products. Fish meal is a solid product obtained by removing most of the water and part or all of the fat from whole fish or fish by-products. Fish meal has excellent nutritional quality, with highly digestible protein and a balanced essential amino acid (EAA) profile. In addition, fish meal is rich in other nutrients such as essential fatty acids, phospholipids, cholesterol, minerals, and certain vitamins [4].

Tilapia fish meat flour contains approximately 71.02 g protein per 100 g [5], whereas fresh tilapia meat contains around 16.76% protein [6]. The incorporation of fish meat flour has been applied in various food products such as *kecimpring* [7], fish flakes [8], crackers [9] and wet noodles [10]. Generally, the addition of fish meat flour aims to improve the nutritional value of food products. This fortification approach can also be applied to other products, including dry noodles.

Dry noodles are noodles that have undergone a drying process until their moisture content reaches approximately 8–10%, allowing for extended shelf life (± 3 months). The low moisture content inhibits the growth of molds and fungi. Dry noodles are widely marketed in various retail outlets, ranging from traditional markets to supermarkets, commonly in raw form packaged in plastic under brands such as Cap 89, Mimora, Dua Burung, Mi Dara, and Eko Mi.

Dry noodles are typically high in carbohydrates but relatively low in other nutritional components, particularly protein. Dry noodles contain approximately 9.34% protein, 10.8% moisture, 1.53% ash, 1.59% fat, and 79.9% carbohydrates [11]. Wet noodles, on the other hand, contain about 12.67% protein, 2.71% fat, 1.85% ash, 32.94% moisture, and 49.82% carbohydrates [12]. Meanwhile, instant noodles (e.g., Indomie) contain approximately 8% protein, 54% carbohydrates, and 14% fat. These

conditions highlight the need for food fortification programs, particularly for protein enrichment, to ensure adequate protein intake. Therefore, this study aims to determine the proximate composition of dry noodles fortified with tilapia fish meat flour.

## 2. Materials and Methods

### 2.1 Location of the Study, Equipment and Materials

This study was conducted at the Fishery Product Processing Laboratory, Padjadjaran University, for the production of tilapia fish meat flour and dry noodles, and at the Regional Technical Implementation Unit (UPTD) for Testing and Quality Application of Fishery Products, Jalan Sutawinangun No. 2, Cirebon, for proximate analysis.

The equipment used for producing tilapia fish meat flour and dry noodles included knives, basins, a blender, a 100-mesh sieve, a digital scale, a steamer, trays, filter cloth, a noodle maker, an oven, a cutting board, spoons, and forks. The materials used consisted of tilapia fish meat, tilapia fish meat flour, high-protein wheat flour, tapioca flour, mineral water, salt, and chicken eggs.

### 2.2 Experimental Design

This study employed an experimental method with two treatments. The treatments involved the addition of tilapia fish meat flour to dry noodle formulations based on the percentage of wheat flour used. The treatments were as follows:

- **Treatment A**: 0% tilapia fish meat flour addition (control)
- **Treatment B**: 10% tilapia fish meat flour addition

The research procedure consisted of producing tilapia fish meat flour, formulating dry noodles (as shown in Table 1), and conducting proximate analysis.

### 2.3 Preparation of Tilapia Fish Meat Flour

The preparation of tilapia fish meat flour followed the method of Syauqibik *et al* [13] with modifications. Fresh tilapia were first cleaned by removing scales, viscera, and gills, then washed thoroughly with clean water and drained. The cleaned fish were steamed at 100°C for 10 minutes after the water reached boiling point. The cooked fish meat was separated using a spoon and fork, then dried in an oven at 45°C for 4 hours. The dried fish meat was ground using a powder grinder until fine and homogeneous, and then sieved using a 100-mesh sieve to obtain uniform flour.

### 2.4 Preparation of Dry Noodles

The preparation of dry noodles followed the method of Canti *et al* [14] with modifications. All ingredients were mixed evenly according to the predetermined formulation (Table 1). The dough was shaped into small balls and rolled into sheets using a noodle maker until a smooth surface was obtained. The dough sheets were rested for 15 minutes to optimize gelatinization. After resting, the dough was re-rolled to a thickness of 4 mm and shaped into noodles. The noodle strands were rested for 30 minutes, then steamed at 100°C for 15 minutes. Drying was carried out in an oven at 60°C for 3 hours. The dried noodles were then cooled at room temperature for 15 minutes.

**Table 1:** Formulation of Dry Noodles with the Addition of Tilapia Fish Meat Flour

| Ingredients | Treatment A (0%) | Treatment B (10%) |
|---|---|---|
| Fish meat flour (g) | 0 | 10 |
| Wheat flour (g) | 100 | 100 |
| Egg (g) | 10 | 10 |
| Salt (g) | 2 | 2 |
| Water (mL) | 35 | 35 |

### 2.5 Observed Parameters and Data Analysis

The parameters observed were proximate composition, including protein content, moisture content, ash content, fat content, and carbohydrate content of the dry noodles. Data obtained from chemical analysis, including moisture, ash, protein, fat, and carbohydrate contents, were analyzed descriptively [15], by explaining causal relationships through comparison between the two treatments.

### 2.6 Results and Discussion

The results of the proximate analysis of dry noodles supplemented with tilapia fish meat flour are presented in Table 2.

**Table 2:** Proximate Analysis Results

| Parameters | Treatment A (0%) | Treatment B (10%) |
|---|---|---|
| Protein Content (%) | 12.50 | 17.88 |
| Moisture Content (%) | 15.77 | 12.78 |
| Ash Content (%) | 1.55 | 2.01 |
| Fat Content (%) | 0.36 | 0.49 |
| Carbohydrate Content (%) | 69.82 | 66.84 |

#### 2.6.1 Protein Content Analysis

Protein content analysis was conducted using the total nitrogen method in accordance with Indonesian National Standard [16] for determining protein content in fishery products. The results showed that the protein content of dry noodles in the control treatment was 12.50%, while the 10% treatment reached 17.88%.

The increase in tilapia fish meat flour addition was directly proportional to the protein content of the dry noodles. According to Ramlah *et al* [6], tilapia contains 16.76% protein, and when processed into flour, the protein content increases to 71.02% [5]. This indicates that the addition of tilapia fish meat flour significantly enhances the protein content of dry noodles, as tilapia serves as a primary protein source. Wood [17] stated that protein content generally increases with fortification ($p < 0.05$).

The protein content obtained in this study is higher than that reported by Zuhri *et al*. [11] for 10% catfish flour addition (15.28%), but lower than that of Andira *et al* [18] using 10% mackerel flour (20.22%), and comparable to Canti *et al* [14], who reported 17.93% with 10% skipjack tuna flour. According to the Indonesian National Standard [16] for dry noodles, the minimum protein content is 10%. The results of this study meet the required standard.

#### 2.6.2 Moisture Content Analysis

Moisture content was determined using the gravimetric method with a vacuum oven [16]. The results showed that the moisture content of the control treatment was 15.77%, while the 10% treatment was 12.78%.

The addition of tilapia fish meat flour reduced the moisture content of dry noodles. This is likely due to the high protein content of fish flour, as protein molecules can bind water through their amino acid side chains. Materials with higher protein content tend to retain water more strongly and release less moisture under the same heating conditions [19].

Compared to previous studies, the moisture content in this study is higher than Zuhri *et al* [11] (10.58%), and Amalia *et al* [20] (6.31%). According to SNI 8217-2015, the maximum moisture content for dry noodles is 13%. The control treatment did not meet this standard, while the 10% treatment complied with it.

**2.6.3 Ash Content Analysis**

Ash content was determined using the gravimetric method [16]. The ash content of the control treatment was 1.55%, while the 10% treatment reached 2.01%. The ash content increased with higher concentrations of tilapia fish meat flour, indicating an increase in mineral content. Compared to previous studies, this result is higher than Zuhri *et al* [11] (1.85%) and Amalia *et al* [20] (1.35%), but comparable to Litaay *et al* [21] (1.97%) and Canti *et al* [14] (2.13%). There are no specific requirements for ash content in dry noodles according to SNI 8217-2015.

**2.6.4 Fat Content Analysis**

Fat content analysis showed that increasing the concentration of tilapia fish meat flour led to an increase in fat content. This is consistent with Zuhri *et al* [11], who reported that fat content increases due to the lipid content in fish. The fat content was analyzed based on SNI 2354-3:2017. The control treatment had a fat content of 0.36%, while the 10% treatment had 0.49%. Wheat flour contains relatively low fat (2.29%), while tilapia fish meat flour contains about 4.46% fat [5]. The results of this study are lower than those reported by Irsalina *et al*. (2016) (0.94%) but higher than those reported by Litaay *et al* [21] (0.17%). There are no specific SNI requirements for fat content in dry noodles.

**Carbohydrate Content Analysis**

Carbohydrate content was determined using the by-difference method, calculated as: Carbohydrate (%) = 100% − (protein + fat + fiber + ash). The carbohydrate content of the control treatment was 69.82%, while the 10% treatment was 66.84%. The results indicate that increasing the concentration of tilapia fish meat flour reduces carbohydrate content. This decrease is due to the lower carbohydrate content of tilapia fish meat flour (5.05%) compared to wheat flour (85.20%) [5]. Wheat flour is the primary source of carbohydrates in noodle production. Compared to previous studies, the carbohydrate content in this study is lower than Zuhri *et al* [11] (73.19%) and Amalia *et al* [20] (78.42%), but higher than Yulianti [22] (33.05%). There are no specific SNI requirements for carbohydrate content in dry noodles.

## 3. Conclusion

Based on the results of this study, it can be concluded that the addition of 10% tilapia fish meat flour to dry noodles improves their nutritional quality. The resulting composition includes 17.88% protein, 12.78% moisture, 2.01% ash, 0.49% fat, and 66.84% carbohydrates.

## 4. References


1. Andhikawati A, Junianto, Permana R, Oktavia Y, Y. Review: Nutritional composition of fish and its effects on human health. Marinade. 2021; 4:76-84.
2. Sanchez FH, Morales MEA. Nutritional richness and importance of tilapia consumption in the Papaloapan region. Revista Electronica de Veterinaria. 2012; 13:1-12.
3. Li X, Zheng S, Wu G. Nutrition and functions of amino acids in fish. In G. Wu (Ed.), Amino Acids in Nutrition and Health 1285(2021). Springer.
4. Tacon AGJ, Metian M, Hasan MR. Feed ingredients and fertilizers for farmed aquatic animals: Sources and composition. FAO Fisheries and Aquaculture Technical Paper. FAO, Rome. 2009; 540.
5. Limbe SS, Mile L, Yusuf N. Hedonic quality analysis of flour-based longgi brownies cake substituted with tilapia. Scientific Journal of Fisheries and Marine Science. 2019; 7:82-87.
6. Ramlah E, Soekendarsi Z, Hasyim, Hasan MS. Comparison of nutritional content of tilapia (*Oreochromis niloticus*) from lake mawang (Gowa Regency) and hasanuddin university lake (Makassar). Makassar Biology Journal. 2016; 1:39-46.
7. Fauzi IM, Junianto, Nia K. Fortification of tilapia fish meat on organoleptic characteristics and nutritional content of *kecimpring*. Journal of Fisheries and Marine Sciences. 2017; 8:161-167.
8. Muda MM, Wahyu M, Wirawan W. Production of fish flakes from a combination of mocaf flour, soybean flour, and tapioca with catfish flour fortification. Scientific Publication of Faculty of Agriculture Students. 2016; 4:1-8.
9. Putri AY, Sumarto, Suparmi. Fortification of tilapia (*Oreochromis niloticus*) flour on cracker characteristics. Student Online Journal (JOM). 2020; 7:1-15.
10. Safitri Z, Sumartini RGS, Ruth Zuhernani, Putri WR. Fortification of pangasius (*Pangasionodon hypophthalmus*) on the physical and nutritional characteristics of wet noodles. National Seminar on Technology, Science, and Humanities. 2022; 1:41-50.
11. Zuhri NM, Fronthea S, Ima W. Enrichment of dry noodle quality with the addition of African catfish (*Clarias gariepinus*) meat flour as a protein source. Journal of Fishery Product Processing and Biotechnology. 2014; 3:119-126.
12. Rohmalina D, Nunung CD. Acceptability and nutritional content of wet noodles based on chicken liver flour and Bogor taro flour. Muhammadiyah Journal of Nutrient and Food Science. 2022; 4:1-13.
13. Syauqibik A, Junianto, Fitrianto N, Rostini I. Variation in the addition of snakehead fish (*Channa striata*) meat flour on the acceptability and nutritional profile of koro benguk tempeh. Fisheries Journal. 2025; 15:1135-1146.
14. Canti M, Ivana F, Diana L. Characteristics of dry noodles substituted with wheat flour, pumpkin flour, and tuna fish flour. Journal of Food Technology Applications. 2020; 9:181-187.
15. Sugiyono. Quantitative, Qualitative, and R&D Research Methods. Bandung, Alfabeta, 2017.

16. Indonesian National Standard (SNI) 2354.2:2015. Determination of Moisture Content in Fishery Products. National Standardization Agency of Indonesia (BSN), Jakarta.
17. Wood JA. Texture, processing, and organoleptic properties of chickpea-fortified spaghetti with insights into the underlying mechanisms of traditional durum pasta quality. Journal of Cereal Science. 2009; 49:128-133.
18. Andira A, Sumartini, Julius H, Septiani PS, Ayu RA. Fortification of mackerel fish meat on the Characteristics and Nutritional Content of Wet Noodles. SemanTech, 2022, 94-103.
19. Mulyana, Wahono HS, Indria P. Effect of proportion (over-fermented tempeh flour: Tapioca flour) and water addition on the characteristics of tempeh crackers. Journal of Food and Agroindustry. 2014; 2:113-120.
20. Amalia NR, Naiu AS, Yusuf N. Effect of flying fish flour (*decapterus sp*) substitution on dry noodle formulation. Multidisciplinary Scientific Journal. 2023; 2:232-241.
21. Litaay TAM, Ashri I, Laela N, Nurhaidar R. Fortification of anchovy (*Stolephorus* sp.) flour on the physical characteristics and microstructure of sago-based noodles. JPHPI. 2023; 26:127-138.
22. Yulianti. Effect of skipjack tuna flour addition on dry noodles substituted with sweet potato flour. Gorontalo Agriculture Technology Journal. 2018; 1:8-15.