Fisheries Journal, 14(4), 1847-1854 (2024)
http://doi.org/10.29303/jp.v14i4.1246

REVIEW ARTICLE, UTILIZATION OF FISHMEAL FOR FOOD NUTRITION IMPROVEMENT

Artikel Review, Pemanfaatan Tepung Ikan Untuk Peningkatan Gizi Pangan

Achmad Syauqibik*, Junianto

Master of Fisheries Study Program, Faculty of Fisheries and Marine Sciences, Padjadjaran University, Indonesia

Raya Bandung Sumedang KM.21 Street, Jatinangor District, West Java 45363

*Coresponding author: achmad21004@mail.unpad.ac.id

(Received October 7th 2024; Accepted October 21st 2024)

ABSTRACT

Fishmeal is a processed fish product that has the potential to improve food nutrition. This article aims to review the utilization of fishmeal in improving the nutrition of food products. The method used was a literature study and systematic review by analyzing 26 research articles published between 2014-2024 and 1 ministry report in 2020. Data were analyzed descriptively comparatively, focusing on the preparation of fishmeal, proximate composition of fishmeal, and proximate composition of food products resulting from fishmeal substitution. Results showed that the best method of making fishmeal was steaming and fat extraction, resulting in a brighter and cleaner flour. The proximate composition of fishmeal varies depending on the type of fish. Substitution of fishmeal in food products such as cookies, flakes, pizza bases, and pastries significantly increased the nutrient content, especially protein, calcium, and phosphorus, while decreasing the moisture content. Despite this, the nutritional content of these products still meets quality standards and is safe for consumption. Fishmeal is effective in increasing the nutritional value of food products, making it a promising alternative for food diversification and fortification to address malnutrition in the community.

Keywords: Fishmeal, Diversification, Proximate composition, Nutritional improvement

ABSTRAK

Tepung ikan merupakan produk olahan ikan yang berpotensi untuk meningkatkan gizi pangan. Artikel ini bertujuan untuk me-*review* pemanfaatan tepung ikan dalam peningkatan gizi produk pangan. Metode yang digunakan adalah studi literatur dan *systematic review* dengan menganalisis 26 artikel penelitian yang dipublikasikan antara 2014-2024 dan 1 laporan kementerian tahun 2020. Data dianalisis secara deskriptif komparatif, berfokus pada pembuatan tepung ikan, komposisi proksimat tepung ikan, dan komposisi proksimat produk pangan hasil substitusi tepung ikan. Hasil menunjukkan bahwa metode terbaik pembuatan tepung ikan adalah pengukusan dan ekstraksi lemak, menghasilkan tepung yang lebih cerah dan bersih. Komposisi proksimat tepung ikan bervariasi tergantung jenis ikan. Substitusi

tepung ikan pada produk pangan seperti *cookies*, *flakes*, *pizza base*, dan kue kering secara signifikan meningkatkan kandungan gizi, terutama protein, kalsium, dan fosfor, sambil menurunkan kadar air. Meskipun demikian, kandungan gizi produk-produk tersebut masih memenuhi standar mutu dan aman dikonsumsi. Tepung ikan efektif dalam meningkatkan nilai gizi produk pangan, menjadikannya alternatif yang menjanjikan untuk diversifikasi dan fortifikasi pangan guna mengatasi masalah kekurangan gizi di masyarakat.

Kata Kunci: Tepung ikan, Diversifikasi, Komposisi proksimat, Peningkatan gizi

INTRODUCTION

Fish is a commodity with high nutritional value. This is because of the macro and micronutrient content that is beneficial for humans. Protein is the most abundant component in fish which can reach 20% so that fish can be used as a potential food source of animal protein. Some of the advantages of fish are: as a source of essential nutrients, universal nature, low price, white meat, to a relatively short production process (Irham et al., 2023).

Based on the official report of the marine sector in 2020, fish consumption in Indonesia was recorded at 56.39 kg per capita, which is relatively low compared to Southeast Asian countries such as Thailand and Malaysia. Indonesia's position in the ninth place in global fish consumption indicates that there is still a lack of animal protein consumption, although it has great potential due to the geographical characteristics of the archipelago and the wealth of abundant fishery resources. The availability of fish throughout the year and maritime conditions support the development of the fisheries sector as a major national food source, which requires systematic efforts to encourage increased consumption through education, product diversification, and policies that support the accessibility and affordability of fish consumption (Ministry and Marine Affairs, 2020).

Increasing fish consumption rates and improving nutrition in food products can be done by diversifying fish processing. The diversity of fish processing can be done by diversifying into various types of flour through various processing processes. Basically, all types of fish can be processed into fishmeal (Praptiwi & Wahida, 2021).

Flour is a semi-finished product that has a longer shelf life, an easy, practical, and more flexible distribution process in its use to be processed into various food products. This fishmeal can be applied to food products by substituting it. Food products processed and substituted with fishmeal are expected to be favored by the wider community (Aisyah et al., 2021).

There are various types of economical fish that can be processed into fishmeal, namely snakehead fish, catfish, black anchovies, catfish, tilapia, and milkfish. The flour processed by these fish can be substituted into various processed food products such as cookies, flakes, pizza bases, and pastries. It is necessary to conduct a literature study to the extent to which the fish has been processed into flour on a research scale and how the composition of the proximate from fishmeal and food products from fishmeal substitution is carried out. Therefore, this article aims to review the use of fishmeal to improve the nutrition of food products.

METHODS

The method used in this study is a systematic review conducted in August-October 2024. The research location was carried out at the Fishery Product Processing Laboratory, with the main tools used including computers, online search tools, data processing software, and printers. The research material is in the form of data sourced from 26 research report articles published in the period from 2014 to 2024 in indexed national journals and 1 ministry report published on the website of related institutions, namely in 2020.

Setiawan & Kautsar, (2018) stated that the data used in the systematic review was obtained based on the results of research related to the subject of the theme reviewed. The research is as published in the form of journals, proceedings, books, or other forms of research reports. Literature search uses the google chrome search engine with the keywords fishmeal and the use of fishmeal to improve the nutrition of food products. The discussion in this article focuses on the manufacture of fishmeal, the composition of fishmeal proximate, and the composition of proximate of food products resulting from fishmeal substitution. The data obtained were analyzed in a comparative descriptive manner. According to Adhimah et al., (2019), comparative descriptive analysis is a way of decomposing the data obtained, then comparing it with other data obtained from primary or secondary sources.

RESULT

Making Fishmeal

Fishmeal products are dry solid processed ingredients produced through the process of extracting liquids and fats from fish meat. Initially, it was only used as animal feed because of its high protein content, but the development of science encouraged its use as an alternative food for human consumption. Some of the methods of making fishmeal include boiling, steaming, and combining steaming with fat extraction, which allows the processing of fish raw materials into products with more diverse nutritional value and functionality (Fatmawati & Mardiana, 2014).

The methods used in making fishmeal are adjusted to the needs and types of fish to be made into flour. Some of the methods used in making fishmeal are presented in Table 1.

Table 1. Methods Used in Making Fishmeal

Methods	Types of Fish	References
Boiling	Snakehead fish fillet	Ganap *et al*., (2020)
	Milkfish bones	Darmawangsyah *et al*., (2016)
Steaming	Anchovies	Istifada *et al*., (2023)
	Snakehead fish meat	Nadimin *et al*., (2018)
Deproteinase and extraction	Tilapia bones	Syadeto *et al*., (2017)
Steaming and Fat Extraction	Catfish fillet	Dewi *et al*., (2023)
	Snakehead fish meat	Fatmawati & Mardiana, (2014)
	Eel meat	Wulandari *et al*., (2019)

Composition of Fish Meal Proximate

Proximate composition is a composition contained in a product. The nutritional compounds in question are water content, fat, minerals, vitamins, and carbohydrates. The content of these nutritional compounds can be measured. There have been research results that inform the composition of fishmeal proximate from various types of fish presented in the Table 2.

Table 2. Composition of Fish Meal Proximate from Fish Types

Types of Fish	Proximate Composition				
	Moisture Content (%)	Protein Content (%)	Fat Content (%)	Ash Rate (%)	Carbohydrate Rate (%)
Cork[1]	5,68	86,13	2,31	6,29	5,27
Catfish[2]	6,79	20,39	3,36	64,23	8,35

Lemuru[3]	9,22	63,07	9,13	16,42	2,99
Tilapia[4]	7,7	58,8	5,8	3,52	
Milkfish[5]	14,31	5,68	4,1	13,55	38,15

Information:
1. Mahardika *et al*., (2017)
2. Afrinis *et al*., (2018)
3. Farida *et al*., (2024)
4. Dughita *et al*., (2021)
5. Imra *et al*., (2019)

Composition of Proximate of Food Products Substituted from Fish Meal

According to Susilawati et al., (2023) food is all components that are sourced from nature and water. The components in question are still intact or have been processed. Food is also defined as an ingredient for human consumption in the form of food and drinks. Raw materials, additives, and other materials used in the procedure of making food and beverages are also categorized as food. A food is said to be good is food that has safe properties when consumed, has good quality, has high nutrition, and is available adequately. As science develops, a food can be developed through the diversification of processed products.

Diversification of food products is defined as diversifying the types of processed products while still paying attention to quality and nutritional factors as an effort to increase product consumption, both quality and quantity, as well as increasing high selling value. One example of food product diversification is food products that are substituted for fishmeal. Research on fishmeal substitution in food products for nutritional improvement has been carried out as presented in Table 3.

Table 3. Composition of Proximate of Food Products Substituted from Fish Meal

Proximate Composition	Type of products					
	Snakehead fish cookies[1]	Catfish flakes[2]	Black anchovy pizza base[3]	Catfish cookies[4]	Tilapia cookies[5]	Milkfish pastries[6]
Moisture content (%)	2,68	2,21			1,95	3,71
Protein content (%)	14,09	13,39	17,39	9,5	17,38	
Fat content (%)	24,33	7,91	5,15			
Ash content (%)		3,23	1,73			3,9
Carbohydrate content (%)	72,62	68,11	75,73			
Calcium levels		1,9 %	239,87 mg	250,4 mg	7,5 %	1,21 %
Crude fiber content (%)		5,36				
Phosphorus content (%)					4,87	

Information:
1. Ganap *et al*., (2020)
2. Dewi *et al*., (2023)
3. Istifada *et al*., (2023)

4. Nastiti & Christyaningsih, (2019)
5. Syadeto *et al*., (2017)
6. Darmawangsyah *et al*., (2016)

DISCUSSION

Making Fishmeal

Based on Table 1 above, there are methods used to make fishmeal. According to Fatmawati & Mardiana, (2014) the method of steaming and extracting fat in making fishmeal is the best method. This is because flour made with this method looks brighter, brighter, and cleaner. The extraction carried out can reduce fats containing pigments (carotenoids) that cause brownish flour.

The steaming method in making fishmeal is proven to produce products with optimal texture quality. This process aims to lower the moisture content while maintaining the structure and density of the fish meat. The composition of the ingredients plays a crucial role in determining the characteristics of the flour, where the moisture content, fiber and fat significantly affect the final quality of the product. Excessive concentrations of fat and water can potentially cause clumping, while high levels of crude fiber can result in a less refined texture (Anggriani et al., 2019).

Based on Pomanto et al., (2016), it is stated that the smell of fishmeal tends to have a very strong fishy smell. The fishy aroma in fishmeal is caused by nitrogen components such as trimethylamine oxide (TMAO), guanidine, imidazole, and its derivatives. The way to reduce the fishy smell in fishmeal is to add strong aromatic natural ingredients such as ginger, galangal, lemongrass stalks, limes, lemons, kersen leaf extract during the manufacture of fishmeal (Anggriani et al., 2019).

The second principle in making fishmeal is to remove and reduce the water content. The production of this moisture content is carried out by drying using an oven. The amount of water that can be removed from the material is greatly influenced by the temperature and drying time. The commonly used oven drying temperature is between 40-60 oC and the drying time ranges from 8-12 hours.

The stages of making fishmeal are generally carried out as follows (Kartini & Nadimin, 2021): fresh fish is sifted and washed in running water, cut into pieces and given a squeeze of lime juice and left for 1 hour. Next, the pieces of fish are steamed for 30 minutes with steamed water given lemongrass and galangal. After that, the fish meat is separated from the skin and bones, dried in an oven at 50 °C for 10 hours. The dried fish meat is mashed with a grinder, then sifted.

Composition of Fish Meal Proximate

Based on Table 2 above, the protein content of several fish is relatively high with an average of 46.814%. According to Mikdarullah et al., (2020) protein is an essential nutrient with multiple functions in the body, acting as a source of energy, a building substance, and a regulator of metabolism. Its structure consists of amino acid polymers connected through peptide bonds, with molecules containing metallic elements such as iron and copper. The process of making fishmeal significantly affects the quality of proteins and amino acids. Excessive heating risks degrading the quality of proteins, resulting in brown discoloration and degradation of the chemical structure of proteins.

The difference in the value of nutritional content in each type of fishmeal can be caused by changes in nutrition, especially protein after boiling/steaming 0-30 minutes. This can cause a decrease in protein levels because some of the protein can dissolve directly into the boiling water and the protein itself will be degraded at high temperatures. The carbohydrate content in fishmeal, especially milkfish, is relatively high compared to other

fishmeal, but much lower than the carbohydrate content in cornmeal, which is 79.51%. This is because fishmeal does not contain as much starch as corn flour (Imra et al., 2019).

Composition of Proximate of Food Products Substituted from Fish Meal

Based on Table 3, cookies products made with the addition of snakehead fish meal for their nutritional content meet the requirements issued by the Ministry of Health of the Republic of Indonesia in accordance with PMK No. 51 of 2016. Meanwhile, the making of cookies with the addition of catfish meal also meets the 2013 Nutritional Adequacy Figure. This is because in 100 grams of cookies made can meet 19% of protein adequacy and 24.8% of calcium adequacy of children aged 4-6 years. Food processing based on local food ingredients such as catfish can increase the use value of the ingredients used and the nutritional value of food products made. According to Syadeto et al., (2017) making cookies with the addition of tilapia bone meal will increase the levels of calcium, phosphorus, protein, and reduce the moisture content of cookies. The calcium and phosphorus content in fish bones is due to the presence of inorganic matrix in the bones consisting of calcium crystals between collagen fibers in the form of calcium phosphate. The increase in protein in cookies is due to the imperfect deproteinization process when making tilapia bone meal. The moisture content of cookies decreases due to the addition of Ca++ particles that will later bind to OH-. However, the nutritional content is still in accordance with SNI cookies.

Based on table 3, the moisture content of catfish meat meal substitute flakes products is relatively low, but it is still in accordance with SNI 01-4270-1996, which is below 3%. The lower the moisture content, the crisper the flakes produced (Febrianty et al., 2015). In addition to water content, other nutritional content is also still in accordance with SNI flakes. The average protein and calcium content was 13.39% and 1.9% higher respectively than flakes products without substitution. The use of catfish meat meal as a substitute can increase the protein and calcium of the product.

The addition of anchovy flour to pizza base products can have the effect of increasing the content of protein, fat, ash, and calcium. Anchovies contain high protein so the addition of anchovy flour can increase the protein of the product. The high fat in the product is due to the process of making anchovy meal that can remove all or part of the oil contained in the body of the fish (Fanny et al., 2019). The high minerals in the product are due to the anchovy flour processing process which uses all parts of the fish including the head. This makes the ash content in the product high because of the organic mineral content in it which can reach 6.87% (Nugraha, 2016). Meanwhile, making pastries with the addition of milkfish bone flour provides an increase in ash and calcium levels. However, the nutritional content in it still meets the quality standards of pastries.

CONCLUSION

Fishmeal is one of the dry solid products of fish that can be used to be substituted into food products. The principle of making fishmeal is to remove liquid, part, or all of the fat in the meat and bones of fish. There is a significant increase in nutrition for food products that are substituted with fishmeal. The addition of fishmeal increases the nutritional content of food such as protein, fat, ash, carbohydrates, calcium, crude fiber, and phosphorus and tends to reduce water content.

ACKNOWLEDGEMENT

On this occasion, the author would like to thank all parties who have helped in the creation of this article.

REFERENCES

Adhimah, N., Ruswaji., & Pudiastiono. (2019). Analisis Komparatif Pendapatan Antara Usaha Becak Kayuh dan Becak Motor di Sekitar Plaza Lamongan. *Jurnal Penelitian Ilmu Manajemen*, *4*(1), 832–840. https://doi.org/10.30736/jpim.v4i1.225

Afrinis, N., Besti, V., & Anggraini, H. D. (2018). Formulasi dan Karakteristik Bihun Tinggi Protein dan Kalsium dengan Penambahan Tepung Tulang Ikan Patin (*Pangasius Hypopthalmus*) untuk Balita Stunting. *Jurnal Media Kesehatan Masyarakat Indonesia*, *14*(2), 157–164. https://doi.org/10.30597/mkmi.v14i2.3984

Aisyah, S., Puspitasari, F., Purnomo, & Suhanda, J. (2021). Diversifikasi Pengolahan Ikan Sepat Rawa (*Trichogester trichopterus* Pall) sebagai Substitusi Kue Kering di Desa Sungai Batang, Kecamatan Martapura Barat, Kabupaten Banjar. *Aquana: Jurnal Pengabdian Kepada Masyarakat*, *2*(1), 82–87. http://aquana.ulm.ac.id

Anggriani, A. N., Pujaningsih, R. I., & Sumarsih, S. (2019). Pengaruh Perbedaan Metode Pengolahan dan Level Pemberian Ekstrak Daun Kersen (*Muntingia calabura* L.) terhadap Kualitas Organoleptik Tepung Ikan Rucah. *Jurnal Sain Peternakan Indonesia*, *14*(3), 282–291. https://doi.org/10.31186/jspi.id.14.3.282-291

Darmawangsyah., Jamaluddin., & Kardiman. (2016). Fortifkasi Tepung Tulang Ikan Bandeng (*Chanos chanos*) dalam Pembuatan Kue Kering. *Jurnal Pendidikan Teknologi Pertanian*, *2*, 149–156. https://doi.org/10.26858/jptp.v2i2.5170

Dewi, T. A., Tjahjaningsih, W., Pujiastuti, D. Y., Subekti, S., Nirmala, D., & Saputra, E. (2023). Karakteristik Kimia dan Organoleptik Flakes dengan Substitusi Tepung Daging Ikan Patin (*Pangasius* sp.). *Jurnal Teknologi Pangan*, *17*(2), 84–97.

Dughita, P. A., Respati, A. N., Kusuma, A. H. A., & Hakim, A. (2021). Pengaruh Beda Metode Pemasakan dalam Pembuatan Tepung Limbah Ikan Nila Merah terhadap Kandungan Nutrien. *Bulletin of Applied Animal Research*, *3*(1), 7–10. https://doi.org/10.36423/baar.v3i1.676

Fanny, L., Rahayu, C., & Pakhri, A. (2019). Daya Terima dan Kandungan Zat Gizi Mikro Serabi yang Diperkaya Tepung Tempe dan Tepung Ikan Teri (*Stolephorus* sp). *Media Gizi Pangan*, *26*(2), 190–200.

Farida, I., Samanta, P. N., & Maulana, H. (2024). Evaluasi Mutu Nutrisi dan Organoleptik Tepung Ikan yang Berasal dari Bagian Tubuh dan Kepala Ikan Lemuru. *Jurnal Peternakan*, *21*(1), 38–47. https://doi.org/10.24014/jupet.v21i1.22683

Fatmawati., & Mardiana. (2014). Analisa Tepung Ikan Gabus sebagai Sumber Protein. *Octopus: Jurnal Ilmu Perikanan*, *3*(1), 235–243.

Febrianty, K., Widyaningsih, T. D., Wijayanti, S. D., Nugrahini, N. I. P., & Maligan, J. M. (2015). Pengaruh Proporsi Tepung (Ubi Jalar Terfermentasi : Kecambah Kacang Tunggak) dan Lama Perkecambahan terhadap Kualitas Fisik dan Kimia Flake. *Jurnal Pangan dan Agroindustri*, *3*(3), 824–834.

Ganap, E. P., Sugmana, P. A., Amalia, R. R., & Hidayati, L. I. (2020). Nilai Gizi dan Daya Terima Cookies Ikan Gabus sebagai Makanan Tambahan untuk Ibu Hamil di Kabupaten Sleman, DIY. *Jurnal Kesehatan Reproduksi*, *7*(3), 133–140. https://doi.org/10.22146/jkr.61004

Imra., Akhmadi, M. F., Abdiani, I. M., & Irawati, H. (2019). Karakteristik Tepung Tulang Ikan Bandeng (*Chanos chanos*) dari Limbah Industri Baduri Kota Tarakan. *Jurnal Techno-Fish*, *3*(2), 60–69. https://doi.org/10.25139/tf.v3i2.2122

Irham., Norau, S., Iksan, K. H., & Umasangaji, N. (2023). Tingkat Konsumsi Ikan dan Faktor-Faktor yang Mempengaruhi pada Masyarakat Kecamatan Sanana, Kabupaten Kepulauan Sula. *Jurnal Ilmiah Agribisnis dan Perikanan (Agrikan Ummu-Ternate)*, *16*(1), 294–300.

Istifada, D. S., Swastawati, F., & Wijayanti, I. (2023). Pengaruh Penambahan Tepung Ikan

Teri Hitam (*Stolephorus insularis*) terhadap Karakteristik Kimia dan Tekstur Pizza Base. *Jurnal Pengolahan Hasil Perikanan Indonesia*, *26*(2), 229–240. https://doi.org/10.17844/jphpi.v26i2.44748

Kartini, T. D., & Nadimin. (2021). Mutu Gizi Aneka Kudapan Cokibus. *Jurnal Kesehatan Manarang*, *7*(2), 125–130. https://doi.org/10.33490/jkm.v7i2.496

Kementerian Kelautan dan Perikanan. (2020). *Kelautan dan Perikanan Dalam Angka DJPRL Tahun 2021* (Vol. 1, Issue March).

Mahardika, N., Karnila, R., & Edison. (2017). Analisis Komposisi Kimia Daging dan Tepung Ikan Gabus (*Channa striata*). *Jom Unri*, 1–8.

Mikdarullah., Nugraha, A., & Khazaidan. (2020). Analisis Proksimat Tepung Ikan dari Beberapa Lokasi yang Berbeda. *Buletin Teknik Litkayasa Akuakultur*, *18*(2), 133–138. https://doi.org/10.15578/blta.18.2.2020.133-138

Nadimin., Nurjaya., & Lestari, R. S. (2018). Daya Terima terhadap Jajanan Lokal Sulawesi Selatan Subtitusi Tepung Ikan Gabus (*Channa striata*). *Jurnal AcTion: Aceh Nutrition Journal*, *3*(2), 141–148. https://doi.org/10.30867/action.v3i2.115

Nastiti, A. N., & Christyaningsih, J. (2019). Pengaruh Substitusi Tepung Ikan Lele terhadap Pembuatan Cookies Bebas Gluten dan Kasein sebagai Alternatif Jajanan Anak Autism Spectrum Disorder. *Media Gizi Indonesia*, *14*(1), 35–43. https://doi.org/10.20473/mgi.v14i1.35-43

Nugraha, Y. A. (2016). Kualitas Non Flaky Crackers dengan Substitusi Tepung Sukun dan Tepung Ikan Teri Nasi (*Stolephorus* sp.). *Skripsi*.

Pomanto, R. M., Dali, F. A., & Mile, L. (2016). Uji Organoleptik Tepung Ikan Manggabai (*Glossogobius giuris*) yang Direndam dengan Larutan Asam Alami. *JIAT: Jurnal Ilmiah Agrosains Tropis*, *9*(3), 195–199.

Praptiwi, I. I., & Wahida. (2021). Kualitas Tepung Ikan di Pesisir Pantai Kabupaten Merauke sebagai Bahan Pakan. *Jurnal Ilmu Peternakan Dan Veteriner Tropis*, *11*(2), 156–164. https://doi.org/10.46549/jipvet.v11i2.146

Setiawan, Y. A., & Kautsar, A. P. (2018). Review Artikel: Peningkatan Mutu Pelayanan Kesehatan terhadap Kepuasan Pasien Menggunakan Metode PDCA. *Farmaka*, *16*(3), 244–253.

Susilawati, S., Arza, S., Ega, E., Novita, N., Fiona, F., Darmawan, B., & Hikmal, H. (2023). Analisis Legalitas Produk Pangan di Kabupaten Sambas. *Journal of Food Security and Agroindustry*, *1*(3), 105–110. https://doi.org/10.58184/jfsa.v1i3.137

Syadeto, H. S., Sumardianto, & Purnamayanti, L. (2017). Fortifikasi Tepung Tulang Ikan Nila (Oreachromis niloticus) sebagai Sumber Kalsium dan Fosfor Serta Mutu Cookies. *Jurnal Ilmiah Teknosains*, *3*(1), 17–21.

Wulandari., Herpandi., Lestari, S. D., & Putri, R. M. (2019). Karakteristik Fisiko-Kimia Biskuit dengan Fortifikasi Tepung Belut. *Jurnal Pengolahan Hasil Perikanan Indonesia*, *22*(2), 246–254.