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# Changes of Nutritional Value of Steamed Lumi-Lumi Fish (*Harpodon nehereus*) Flour

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**ABSTRACT**
Lumi-lumi fish (*Harpodon nehereus*) or known as Bombay duck is a type of commercial demersal fish in the city of Meulaboh. Aceh. This fish can live all year round. The availability of this fish is quite large but often it is not appropriately used. it is only processed traditionally. Lumi-lumi has been reported to have good nutritional content. The objective of this study was to identify the nutritional content of fish in Lumi-lumi. In this study. Lumi-lumi fish was conducted into 2 treatments: steamed fish and non-steamed fish. Identification of nutritional content was carried out on fish that had been processed into flour. In this study. the yield of Lumi-lumi fish meal in the non-steamed treatment was 10.23%. and in the steamed treatment. it was 10.57%. The nutritional value of Lumi-lumi fish meal protein which was steamed was significantly ($p<0.05$) higher than that which was not steamed. namely 13.32 ± 0.48% and 9.50 ± 0.70%. respectively. However. the fat content was lower in the steamed treatment. which was 12.56 ± 1.18%. compared to not steamed. which was 14.24 ± 0.96%. Significant moisture and ash content ($p<0.05$) were lower in the steamed treatment than in the non-steamed treatment. Meanwhile. the fiber content was significantly ($p<0.05$) higher in the steam treatment. Therefore. steamed lumi-lumi fish has a higher protein content. Fat content following SNI 01-2715-1996 fish flour quality standards.

***Keywords:*** *Lumi-lumi, Bombay duck, Harpodon nehereus, Nutritional value.*

## 1. INTRODUCTION

Lumi-lumi fish (*Harpodon nehereus*) belongs to the commercial demersal fish species in the city of Meulaboh. Coastal communities generally use Lumi-lumi simply as traditional food, such as Lomek curry and Lomek sambalado. Some others, Lumi-lumi are marketed in dry conditions and have gone through a salting process which means that optimizing the utilization of lumi fish as a processed product is still very limited. Meanwhile, Lumi-lumi fish are reported to be able to reproduce throughout the year and can live well in mud, beaches, and river estuaries [1], which means that the potential availability is quite large.

Lumi-lumi or *Harpodon nehereus* (scientific name), known as the Bombay duck name with a very wide distribution level covering the East African Sea, Malaya, Burma, India, Thailand, Java, Sumatra, Borneo, and China [2]. In addition, this fish is also one of the most popular types of fish in several countries, such as India, China, Bangladesh, and South Africa [3]. Unfortunately, research on Lumi-lumi fish is still not widely reported, especially in Indonesia, even though the level of distribution of Lumi-lumi in Indonesia is reported to be quite wide covering the waters of the Arafuru Sea, Java Sea, Sumatra, South Sulawesi, Kalimantan and the South China Sea [4].

Lumi-lumi fish is known to contain high protein. Reported protein content varies from 50.64%, 56.33% to 58.33% [5] [6] [7]. The level of diversity in protein content is strongly influenced by geographical factors [8]. Therefore, it is important to identify the content of nutritional and functional values in Lumi-lumi endemic fish in different water areas.

Research on the nutritional content of Lumi-lumi fish will help stakeholders promote the advantages of this type of fish in the future, and also encourage producers to create creative and innovative food products. The emergence of a variety of diversified food products based on the utilization of local resources will be able to boost fishermen's welfare. This is because Lumi-lumi fish that are marketed generally have a relatively low selling price, and are often not even sold in traditional markets. Thus, this research will not only support the welfare of fishermen but

also encourage innovation and creativity in superior products based on local resources, the fish meal of the endemic Lumi-lumi (*Harpodon nehereus*). In this study, Lumi-lumi fish was conducted into 2 treatments: steamed fish and non-steamed fish. Identification of nutritional content was carried out on fish that had been processed into flour whose tests included flour water content, ash content, protein, fat, and fiber. The results of this study are expected to provide optimal treatment information in producing the best nutritional content.

## 2. METHODS

Lumi-lumi fish is obtained from the main market in Meulaboh. Fish parts such as entrails, gills, and innards are removed. Then grouped into 2 treatments, namely the treatment of fish not steamed and steamed for 30 minutes. Both treatments were dried at 50 $^{o}$C for 48 h. The final result of the sample is flour which is then followed by testing the proximate nutritional value of fish, including water content, ash content, fat content, protein content, and fiber content using the SNI 01-2891-1992 [9] method. Data analysis results were processed with SPSS 22.0 (Chicago, IL, USA) using the independent sample T test analysis.

## 3. RESULT AND DISCUSSION

The yield of Lumi-lumi fish meal in the non-steamed treatment was 10.23%, and in the non-steamed treatment was 10.57%. It means that the treatment process does not affect the results of the yield range. The results of the nutritional content of Lumi-lumi fish meal are presented in Table 1 below.

The results of the analysis of moisture content and ash content in Table 1 show that Lumi-lumi fish meal still meets the requirements for fish meal in SNI 01-2715-1996, namely not exceeding an ash content of 20-30%, and a moisture content of 12%. Moisture content not exceeding 12% indicates that Lumi-lumi fish meal is safe to store in the long term. The moisture content in the sample needs to be analyzed because the moisture content can affect damage during storage, such as mold that easily grows at a fairly high moisture content [10]. In the Lumi-lumi treatment which went through the processing process, namely steaming, it showed a significantly lower ($p<0.05$) moisture content, namely 4.37 ± 0.41% compared to that which was not steamed, 12.87 ± 2.84%. This is because during the heating process the fish releases a certain amount of water followed by a decrease in water content. This is following the statement of Sipayung [11] that during the cooking process the water content will decrease if the hot steam flowing to the surface of the material will cause water vapor pressure to occur, resulting in diffusion from the inside of the material to the surface. The pressure will decrease if the moisture content decreases until it reaches equilibrium with the surrounding air.

**Table 1.** Nutritional value of Lumi-lumi fish (*Harpodon nehereus*) flour

| Nutritional Value | Steamed | Non-steamed |
|---|---|---|
| Moisture content (%) | 4.37 ± 0.41 $^{a}$ | 12.87 ± 2.84 $^{b}$ |
| Ash content (%) | 9.17 ± 0.19 $^{a}$ | 12.13 ± 0.23 $^{b}$ |
| Fat content (%) | 12.56 ± 1.18 $^{a}$ | 14.24 ± 0.96 $^{a}$ |
| Protein content (%) | 13.32 ± 0.48 $^{b}$ | 9.50 ± 0.70 $^{a}$ |
| Fiber content (%) | 0.24 ± 0.04 $^{b}$ | 0.12 ± 0.05 $^{a}$ |

Data presented were mean ± standard deviation. n = 3 (triplo). Numbers with different letter in the same column and row showed significant differences at the 5% test level.

The results of the fat content in Table 1 show that the fat content of Lumi-lumi fish meal that is not steamed exceeds the requirements for fishmeal quality standard SNI 01-2715-1996, which is a maximum of 12%. Differences in fat yield due to processing because during the steaming process or tissue fluid is lost, and heating will accelerate the movement of fat molecules which causes the distance between fat molecules to become large and facilitates the process of removing fat from the material [11].

Furthermore, the crude protein content presented in Table 1 shows that Lumi-lumi fish meal which was steamed was significantly ($p<0.05$) higher, namely 13.32 ± 0.48%, compared to not steamed, which was 9.50 ± 0.70%. The high value of crude protein content in steamed fish is thought to be due to the tighter and more compact structure of the meat in fish compared to non-steamed fish meat so that during the heating process the protein content increases [12]. This is following the statement of Puwastien [13] that the protein content in fresh fish can change proportionally from 18.1% to 22.9% after cooking. In addition, the increase in protein content in steamed Lumi-

lumi fish meals can be due to the decrease in water content during steaming. This is following the literature of Devi and Sarojnalini [14], which states that protein changes are associated with reduced moisture content during cooking. The greater the shrinkage of the moisture content after cooking, the higher the change in protein content in the fish.

In the analysis results, the crude fiber content of Lumi-lumi fish meal which was steamed was significantly ($p<0.05$) higher than that which was not steamed, namely $0.24 \pm 0.04\%$ and $0.12 \pm 0.05$ %, respectively. The high crude fiber content in Lumi-lumi fish meal which is steamed is because during the steaming process the walls of the cells in the fish break down so that the measured crude fiber is slightly higher. The crude fiber content of Lumi-lumi fish meal in both treatments complied with the fish meal quality standard requirements of SNI 01-2715-1996, namely 1.5-3% maximum.

## 4. CONCLUSION

Steamed lumi-lumi fish has a higher protein content. Fat content following SNI 01-2715-1996 fish flour quality standards. The moisture content in the steaming treatment was significantly lower than without steaming which indicated that the shelf life of fish flour treated by steaming could be more durable.

## AUTHORS' CONTRIBUTIONS

**Safrida :** Conceptualization, Methodology, Writing – original draft. **Cukri Rahma :** Software, Writing – review & editing. **Maiza Duana :** Writing – review & editing.

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