

NUTRITIONAL CONTENTS OF CATFISH (*Pangasius sp.*) JAMBAL ROTI PRODUCTS SIDENRENG RAPPANG REGENCY, SOUTH SULAWESI

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Manuscript Received: 16 March 2024

Revision Accepted: 26 April 2024

DOI: 10.20956/jipsp.v11i1.34093

ABSTRACT

Catfish (*Pangasius sp.*) is a popular type of freshwater fish that has the potential to be cultivated in Indonesia. So far, the use of catfish, especially those from Sidenreng Lake, Sidenreng Rappang Regency, South Sulawesi, has not been optimal. Catfish is only used as a fresh commodity without processing and preservation activities. One of the well-known preserved products is *jambal roti*. *Jambal roti* is a product of salt fermentation. This research aims to analyze the nutrition contents of *jambal roti* catfish, Sidenreng Rappang Regency, South Sulawesi. The research method used was experimental with a Completely Randomized Research Design. The treatment was long fermentation (24, 36, and 48 hours) at a salt concentration of 30%. The parameters observed were water content, salt content, protein, fat, and amino acids. The research results showed that the treatment given significantly affected water content, salt content, protein, fat, and amino acids. The best treatment is a fermentation period of 36 hours.

Keywords: Catfish, Fermentation, *Jambal roti*, Nutrition, Water content

INTRODUCTION

Catfish (*Pangasius sp.*) is one of the Indonesian aquatic fish that has been successfully domesticated and cultivated semi-intensive and intensively with high stocking densities and minimal water use (Septimasy *et al.*, 2016). Currently, catfish is the most popular commodity in the European Union. Catfish are increasingly popular, considering the increasing global market demand (Suryaningrum *et al.*, 2010).

Jambal roti is a salt-fermented product that is generally made from catfish (*Arius*

thalassinus) (Rochima, 2005). *Jambal roti* production centers are Pekalongan, Cilacap, Cirebon, Pangandaran, Rembang, and along the North Coast of Java. *Jambal roti* is generally made from catfish (*Arius sp.*), and some were found to be made from catfish. The terminology of *jambal roti* emerged due to the sensory characteristics that change after frying. The frying process will change the fish's texture to crumbly like bread. The popularity of *jambal roti* is mainly characterized by its specific flavor and smell and distinctive texture, such as sand (Irianto, 2012). Amir (2015) wrote that the

characteristics of jambal roti include a fragrant aroma caused by the degradation of proteins and fats, which produce methyl ketone compounds, butylaldehyde, amino acids, and other compounds. Apart from that, the high content of amino acids and nitrogen affects the taste of *jambal roti*. Another characteristic is the soft and compact texture due to the work of proteolytic enzymes produced by microorganisms.

Several studies on the use of catfish that have been carried out include the use of catfish for making ice cream cones (Aprilliana, 2010), extruded snacks (Nurilmala *et al.*, 2014), shredded products (Jasila & Zahro, 2015), meatballs (Sinaga *et al.*, 2017), patin presto, meatballs and nuggets (Oktavianawati & Palupi, 2017), crackers (Arza & Tirtavani, 2017; Ernisti *et al.*, 2018), collagen extraction from catfish skin (Suptijah, 2018), formulation of cream preparations using collagen from catfish bones (*Pangasius* sp.) as anti-aging (Sudewi *et al.*, 2020) and collagen from catfish bones for solid bath soap (Firlianty *et al.*, 2021). Catfish production in Lake Sidenreng was found to be abundant and is still used in fresh form. There have not been any activities to preserve or process catfish found in Lake Sidenreng. This article results from research on the potential of catfish as a raw material for *jambal roti*.

MATERIAL AND METHOD

Time and Location of Research

The research was carried out from June to December 2022. Catfish samples were taken from fishermen at Sidenreng Lake, Sidenreng Rappang Regency. The manufacture of *jambal roti* catfish preserves is carried out at the Fishery Products Technology Laboratory, Faculty of Marine and Fishery Sciences, and the nutritional synthesis of *jambal roti* products is carried out at the Nutrition Laboratory, Faculty of Animal Husbandry, Hasanuddin University.

Material

The research materials were catfish from Lake Sidenreng and salt obtained from traditional markets in Makassar City.

Research Design

The research method used was laboratory experimental with a completely randomized design pattern of 3 long fermentation treatments (24, 36, and 48 hours) at a salt content of 30% repeated three times.

Parameters

The parameters observed are sensory (SNI 2346:2015), salt content (SNI 01-2359-1991), water content (SNI 2354.2:2015), protein (SNI 01.2354.4-2006), fat and amino acids (AOAC, 2005).

Data Analysis

Research data was processed using the SPSS 20 for Windows computer program. One-way analysis of variance was used to determine the effect of long fermentation treatment at the 95% significance value is used to determine the effect of long fermentation treatment and a further Tuckey test will be carried out to determine the differences in treatment in influencing the nutrition of Jambal roti products.

RESULTS AND DISCUSSION

Sensory

Based on an assessment using a score sheet with a value range of 1-9 of appearance, smell, taste, and texture, the sensory value of *jambal roti* for these parameters is an average of 8 which indicates that the sensory value is by SNI 8376:2017. *Jambal roti*'s sensory value based on SNI is a minimum of 7. Sensory value obtained from tests carried out by 15 trained panelists. The specifications of a complete, clean, radiant appearance according to its type and neatness, the typical smell and taste of salted fish without additional odors and tastes, and the texture of salted fish are dense, dry, and flexible. The results of Nur Hafifah's research (2023) show that the highest sensory value of the catfish *Jambal roti* product in appearance, smell, taste, and texture is 8.

Salt content

The fermentation time affects the salt content of *jambal roti* products. The longer the fermentation time, the higher the salt content absorbed. Table 1 shows the salt content of catfish *jambal roti*. It is known that the salt content of 24-hour treatment ranges from 12,300-12,403%, 36 hours between 14,497-14,576%, and 48 hours between 17,100-17,219%. Based on SNI 8376:2017, the salt content of *jambal roti* is between 15-20%.

Table 1. The salt content of Catfish *Jambal roti*

Treatment (hours)	Salt content (%)
24	1.335±0.05 ^a
36	14.524±0.04 ^b
48	17.166±0.06 ^c

Note: Different letters in the same column indicate differences ($p < 0.05$)

The results of the ANOVA test showed that the three treatments significantly affected the salt content of catfish *jambal roti*. Based on Tukey's further test results, the three treatments showed differences in the best salt content according to SNI in the long fermentation treatment of 48 hours. The results of Nur Hafifah's research (2023) show that *jambal roti* catfish has a salt content that meets and does not meet quality requirements, namely in the range of 19,44% to 24,50%. Based on SNI 8376:2017, the maximum salt content of *jambal roti* is 15-20%. Karyantina *et al.* (2018) showed

that the salt content of *jambal roti* for catfish (*Arius thalassinus*) was 18,10%.

Protein content

Protein is a food substance containing nitrogen, an essential factor for body function. A lack of protein in the body can disrupt the body's metabolic processes and can reduce the body's immunity (Bakhtra *et al.*, 2016). Table 2 shows the protein content of catfish *jambal roti*. It is known that the protein content of 24-hour treatment ranges from 30.200-30.290%, 36 hours between 41.050-41.150%, and 48 hours between 35.850-35.940%. Based on SNI 8376:2017, the protein content of *jambal roti* is not a quality requirement.

Table 2. Protein content of Catfish *Jambal roti*

Treatment (hours)	Protein content (%)
24	30,258±0,09 ^a
36	41,100±0,05 ^b
48	35,897±0,07 ^c

Note: Different letters in the same column indicate differences ($p < 0,05$)

The results of the ANOVA test showed that the three treatments significantly affected the protein content of catfish *jambal roti*. Based on the results of Tukey's further test, the three treatments showed differences. The highest protein content was in the 36-hour-long fermentation treatment. The highest protein content was in the 36-hour fermentation treatment, then decreased in the 48-hour fermentation. This is by Nooryantini *et al.* (2011),

which states that the longer the fermentation, the more the protein content decreases because when the fermentation occurs, the protein will undergo hydrolysis into its derivatives. Karyantina *et al.* (2018) showed that *jambal roti* for catfish has proteolytic activity due to the activity of indigenous bacteria in the fish's body, and affects protein levels. The protein content of *jambal roti* for catfish (*Arius thalassinus*) was 35.11%.

Fat content

Fat is a part of fish content that has less value than protein. However, fat is a supporting factor in producing the taste and aroma of smoked fish (Swastawati *et al.*, 2013). Table 3 shows the fat content of catfish *jambal roti*. It is known that the fat content of 24-hour treatment ranges from 0,500-0,539%, 36 hours between 1,000-1,020%, and 48 hours between 4,100-4,148%. Based on SNI 8376:2017, the fat content of ready-made *jambal roti* is not a quality requirement.

Table 3. The fat content of Catfish *Jambal roti*

Treatment (hours)	Fat content (%)
24	0,520±0,02 ^a
36	1,010±0,01 ^b
48	4,123±0,03 ^c

Note: Different letters in the same column indicate differences ($p < 0,05$)

The results of the ANOVA test showed that the three treatments significantly affected the fat content of catfish *jambal roti*. Based on

the results of Tukey's further test, the three treatments showed differences. The highest fat content was in the 48-hour-long fermentation treatment.

The increase in fat content is possible due to activity during the fermentation process. Proteolytic lactic acid bacteria may be able to hydrolyze protein-lipid complexes so that the amount of free lipids increases. The fat content of *jambal roti* for catfish (*Arius thalassinus*) was 1,74%. (Karyantina, *et al.*, 2021).

Water content

Water content in food ingredients shows the total amount of water contained in the ingredients, whether in the form of free water, water dispersed on the surface of macromolecules, or water that is physically and chemically bound (Sudarmadji *et al.*, 1997 in Saputra *et al.*, 2014). Water is an essential component of food because water can affect the appearance and texture of food. Water content is one of the factors causing food spoilage because water is a supporting medium for the activity of spoilage microbes (Majid *et al.*, 2014).

Table 4 shows the water content of catfish *jambal roti*. It is known that the 24-hour treatment water content ranges from 37,500-37,520%, 36 hours between 36,300-36,390%, and 48 hours between 37,800-37,860%. Based on SNI 8376:2017, the maximum water content for *jambal roti* is 50%.

Table 4. The water content of Catfish *Jambal roti*

Treatment (hours)	Water content (%)
24	37.510±0,01 ^a
36	36.347±0,02 ^b
48	37.837±0,03 ^c

Note: Different letters in the same column indicate differences (p < 0,05)

The results of the ANOVA test showed that the three treatments significantly affected the water content of catfish *jambal roti*. Based on the results of Tukey's further test, the three treatments showed differences. The best water content was in the long fermentation treatment of 36 hours. Low water content can increase product shelf life. The results of Nur Hafifah's research (2023) show that *jambal roti* catfish have a water content of 28.40%.

Amino acid

The amino acid analysis results showed that nine types of essential amino acids were found in *jambal roti* products for all treatments. These essential amino acids are Phenylalanine, Isoleucine, Valine, Lysine, Leucine, Threonine, Histidine, Tryptophan, and Methionine. At 24 hours of treatment, the highest essential amino acid was Leucine ±30626.32 mg/kg; at 36 hours, Lysine ±29487.93 mg/kg; and at 48 hours, Leucine ±32896.16 mg/kg. The results of Alhadi's research (2022) show that the total amino acids *jambal roti* from catfish by 23.327 ± 0.057% without heating, 25.780 ± 0.041% after

heating steam, and $26.146 \pm 0.015\%$ after heating steam with the addition of spices.

CONCLUSION

Based on the nutritional parameters observed, the best treatment for fermentation time at a salt concentration of 30% for the Catfish *Jambal roti* product was a fermentation time of 36 hours. The nutritional content of salt, protein, fat, and air meets quality requirements based on SNI 8376:2017 and contains essential amino acids.

ACKNOWLEDGEMENT

We sincerely thank the Hasanuddin University Research and Community Service Institute for their generous funding enabling this research endeavor. Additionally, we would like to thank the Sidenreng Rappang Regency Government for their invaluable support and collaboration throughout the project. Their contributions have been instrumental in the successful completion of this study.

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