Eco. Env. & Cons. 28 (2) : 2022; pp. (1027-1030)
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ISSN 0971–765X

DOI No.: http://doi.org/10.53550/EEC.2022.v28i02.068

The Effect of Salt Percentage Difference on the Nutritional Quality of Fermented Climbing Perch (*Anabas Testudineus* Bloch) Wadi from Central Kalimantan

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(Received 22 February, 2022; Accepted 12 April, 2022)

ABSTRACT

Wadi is a traditional fish fermentation product in semi-wet whole fish, a bit black (close to the colour of fresh fish), chewy texture with a distinctive aroma of fermented fish salty taste. Wadi is processed by dry salting in a tightly closed container with a high salt concentration (> 25%) at room temperature for 7 days to several months until the aroma of the wadi is formed. This study aims to determine the effect of giving different salt levels to the nutrition of fermented climbing perch fish wadi. The design used in this study is a qualitative descriptive method. This study showed that the higher salt content in the body of fish affects increasing levels of ash, carbohydrates and lowering the content of water, protein, and fat.

Key words : *Anabas testudineus, Central Kalimantan, Climbing Perch*

Introduction

Fermentation is a traditional fish processing method that utilizes the activity of enzymes and microorganisms. Fermented products have advantages, including high durability, distinctive taste, high nutritional value, ease to digest and functional value. According to (Desniar *et al.,* 2009), other advantages of fermented products include simple, inexpensive costs, and the fish used as the primary raw material can come from low-economic fish. Fermented products are currently being developed and produced on a larger scale. One of the fermentation products that have been developed is wadi. This wadi processing process has been known from ancestors to generation to generation to grandchildren and great-grandchildren. Besides being simple and easy to do, materials and tools for wadi processing are easy to obtain. Generally, the type of fish used in freshwater fish. The additional ingredient used in making wadi is salt as a preservative, namely organic salt taken from nature or the sea known as table salt.

Currently, making wadi in Central Kalimantan is still carried out thoroughly, and the salt is used differently so that the product's durability is different. In making wadi in this study, the fish used is climbing perch because they contain omega 3, which is beneficial for the intelligence of the fetus and child. Protein in the body helps regenerate old cells with new cells and building muscle mass. Iron helps add haemoglobin levels in red blood to bind oxygen. Phosphorus is very beneficial for bone health. This study aimed to determine the effect of different salt levels on the nutritional quality of Climbing perch fish wadi.

Materials and Method

This research includes chemical tests (protein content, fat content, moisture content, carbohydrate content, and ash content) carried out at the Center for Quality Certification of Goods in Palangka Raya City. Meanwhile, the organoleptic test will be carried out at the Fishery Product Technology Laboratory, Department of Fisheries, Faculty of Agriculture, Palangka Raya University. The method used in this research is the descriptive qualitative method. Qualitative research produces descriptive data in written or spoken words from people and observed behaviour (Bogdan and Taylor in Margono, 2007). According to Best in Sukardi (2008), descriptive research seeks to describe and interpret objects according to what they are. Research using a qualitative descriptive method means that the method is systematically carried out to contain descriptions, overviews, or illustrations.

Salting treatment I using salt as much as 5% (% b/b) of the total salt concentration in each treatment (5% salt concentration for 500 grams of fish is 25 grams), salting treatment II using salt as much as 7.5% (% b/b) of the total salt concentration in each treatment (salt concentration of 7.5% for 500 g of fish is 37.5 g). Salting treatment III using salt as much as 10% (% b/b) of the total salt concentration in each treatment (10% salt concentration for 500 g of fish is 50 g, then the fish is left for ± 24 hours in a closed container at room temperature. (28 2°C) After 24 hours, the fish is then rinsed with sterile distilled water and drained for 15 minutes. Samu comes from roasted rice until brown, then blended and sifted. Samu is smeared into fish pieces as much as 10% of the total fish weight and 10% salt. Of the total weight of the fish, then stirred evenly. After that, put the fish mixture into a container (jar) in a way that is arranged alternately between the head and tail and then closed tightly.

Proximate Analysis

The approximate composition of climbing perch was determined using standard analytical methods, including moisture, protein, ash, fat, and carbohydrate (Patricia *et al.*, 2014). Determination of moisture was done through drying 10 g of drained fish meat in an oven at 100-105 °C for 3-5 hours, thenchilled in desiccators andweighed. The materials were then dried again in the oven for 30 minutes, chilled in desiccators, and weighed. This experiment was carried out in three repetitions until the weight was constant. The calculation for moisture used this formula:

$$\text{Moisture} = \frac{\text{Begining weight} - \text{Ending weight}}{\text{Ending weight}} \times 100\ \%$$

The protein content was determined using the Kjeldahl method of nitrogen (N) analysis. The 0.5 g of the sample was weighed carefully, then added into Kjeldahl flask 100 mL. Then, an approximately 1 g mixture of selenium and 10 ml of concentrated H_2SO_4 (technical) were added. Khjedhal flask with its content was shaken until H_2SO_4 wetted all the samples. Then it was destructed in the acid cupboard until transparent. The solution was left cold, poured into volumetric flask 100 ml and rinsed by distilled water, then added distilled water until sign. An Erlenmeyer consisted of 10 ml H3BO32% + 4 drops of mixture indicator solution in Erlenmeyer 100 ml was prepared. 5 ml NaOH 30 % and 100 ml distilled water was pipetted, distilled until the container was filled about 50 ml. Then, the container and its content were titrated using HCl or H2SO40,0222 Nsolution until the solution changed into light red and did not disappear for 30 minutes. Calculating using the formula below :

$$\textit{Protein content} = \frac{(\text{V1-V2}) \times \text{N} \times 0{,}014 \times fk \times fp}{\text{W}}$$

Where:W=Sample weight; V1= HCL 0,01 N volume used forsample shaking; V2=HCL volume used forblank shaking; N=HCL normality; *f*k = Conversion factor for protein from food in general: 6.25, milk and another dairy products : 6.38, peanut butter: 5.46; *f*p=Diluting factor.

Determination of ash content by the incineration of a dried sample (5 g) in a muffle furnace (Pyrolabo, France) at 550°C for 12h until the ash turned white. Fat content was determined by hexane extraction for seven-hour in a Soxhlet apparatus. Calculating of carbohydrates value carried out using the formulas (FAO 2002):

$$\text{Ash content (\%)} = \frac{\text{B–A}}{\text{Sample weight (g)}} \times 100\ \%$$

Where: A = porcelain dish weight (g) and B = porcelain dish weight with weight (g)

Determination of fat content carried out. Provide the filter paper and cutto a length of 10 cm and a width of 8 cm, thenoven at a temperature of 105 °C

for 12 hours. Thefilter paper is weighed (a) and weighs 0.5 g of sample (b). The sample is wrapped in filterpaper and put into a soxhlet. 150 ml of etherpetroleum was put into the soxhlet flask for extraction at 40-60°C for 5-6 hours, then the sample was put in the oven at 105 °C for 12 hours and cooled in a desiccator for 30 minutes before being re-weighed (c). Fat content is calculated using the following formula:

$$\text{Fat content} = \frac{W1}{W} \times 100\ \%$$

Where: W1= sample weight (g); W= fat flask weight after extraction and W2= fat flask weight before extraction

Results and Discussion

The results of research conducted on the comparative analysis of the proximate content of fresh climbing perch fish (Anabas testudineus bloch) with wadi of climbing perch fish include proximate tests, namely (Moisture, protein, fat, ash and carbohydrates), and organoleptic tests, namely (taste, color, aroma, texture). More details can be seen in the following table.

Discussion

Proximate Analysis of Fresh Climbing perch Fish (*Anabas testudineus* Bloch)

This research conducted several chemical tests, including testing of moisture, fat content, ash content, and protein content, aiming to determine the nutritional (chemical) value in fresh climbing perch fish and climbing perch fish wadi in each treatment. Moisture has an essential role in determining the durability of food ingredients because it can affect physical properties, chemical, microbiological and enzymatic changes (Susanto, 2015). Based on the analysis results, the moisture in fresh climbing perch fish was 74.85%, while the moisture in wadi fish products ranged from 61.85% - 62.20%. The lowest moisture was obtained in treatment (C) of 61.85% with the addition of 100 g of salt, while the highest moisture was obtained in treatment (B) of 62.20% with the addition of 75 g of salt. The moisture in food determines the freshness and durability of food because high moisture makes it easy for food to be attacked by bacteria, mould, and yeast to grow, so there will be changes in foodstuffs (Winarno, 2004). This study's results were higher than (Restu, 2014) the moisture in wadi 7.45% - 19.85%. This is because the drying process uses the fermentation method using salt. The moisture from 74.85% decreased to 61.85% - 62.20% because the salt absorbs water.

Protein is the most crucial food substance for the body because protein functions as fuel in the body, besides protein also functions as a regulatory and building substance (Winarno, 1997). The presence of protein plays an essential role in determining the quality of the fish wadi produced because protein has essential functions in the body, including the dismantling of protein molecules to obtain energy or compound elements such as nitrogen or sulfur in the body's metabolism.

Based on the analysis results, the protein content in fresh climbing perch fish was 20.15%, while the protein content in fish wadi products ranged from

Table 1. Proximate Analysis Test Result for Climbing perch Fish (*Anabas testudineus* bloch)

Repetition	1	2	3	Average	STD
Moisture (%)	74.77	74.85	73.65	74.42	0.67
Protein (%)	20.51	20.12	19.82	20.15	0.34
Fat (%)	2.43	2.7	2.28	2.47	0.21
Ash (%)	1.87	1.8	1.78	1.82	0.047
Carbohydrate (%)	0	0	0	0	0

Table 2. Proximate Analysis Test Result for Climbing perch Fish (*Anabas testudineus* bloch) Wadi

Treatment	Water	Protein	Fat	Ash	Carbohydrate
A	62.1	14.95	2.1	3.16	16.42
B	62.2	15	2.15	3.2	16.7
C	61.85	15.9	2	3.12	19.38

14.95% - 15.90%. The lowest protein content was obtained in treatment (A) of 14.95% with 50 g salt, while the highest protein content was obtained in treatment (C) of 15.90% with the addition of 100 gr salt. The value of the protein content test in this study was lower than the climbing perch fish wadi research value of 23.41% (Petrus, 2012). The average yield of catfish wadi protein content was 27.18% - 30.56%. The protein content in climbing perch fish decreases after the fermentation of wadi because the protein dissolves with water absorbed by the salt.

Fats and oils are food substances that are important for maintaining the health of the human body. Besides, oils and fats are a more effective energy source than carbohydrates and protein (Winarno, 1997). However, fat in food also needs attention because fat oxidation can produce rancidity that affects consumer acceptance (Winarno, 1997).

Based on the analysis results, the fat content in fresh climbing perch fish was 2.45%, while the fat content in the fish wadi products ranged from 2.00% - 2.15%. The lowest fat content was obtained in treatment (C) of 2.00% with 100 g of salt, while the highest fat content was obtained in treatment (B) of 2.15% with the addition of 75 g of salt. The fat content in climbing perch fish decreases after the wadi fermentation occurs because the moisture decreases so that the fat also decreases due to a reduction in moisture.

Ash content analysis aims to determine the mineral content of a food ingredient. The ash content in food shows the amount of inorganic material remaining after the organic matter is digested. If the ash content is high, the mineral content is also high.

Based on the analysis results, the ash content in fresh climbing perch fish was 1.80%, while the ash content in the wadi fish products ranged from 3.12% - 3.20%. The lowest ash content was obtained in treatment (C) of 3.12% with 100 g of salt, while the highest ash content was obtained in treatment (B) of 3.20% with 75 g of salt.

Carbohydrates are present in plant and animal tissues and in various forms of microorganisms. The main sugars are glucose and glucose stored carbohydrates, while in milk, the dominant primary sugar is lactose disaccharides (Kusuma, 2010) (Rusmalina, 2019).

Based on the analysis results, the carbohydrate content in fresh climbing perch fish was 0%, while the carbohydrate content in fish wadi products ranged from 16.42% - 19.38%. The lowest carbohydrate content was obtained in treatment (A) of 16.42% with 50 g salt, while the highest carbohydrate content was obtained in treatment (C) of 19.38% with the addition of 100 g salt. The carbohydrate content in climbing perch fish higher after the fermentation of climbing perch fish wadi is because carbohydrates are obtained by adding samu (roasted rice) during the wadi processing process.

Conclusion

Comparison of the proximate content of fresh climbing perch fish with wadi of climbing perch fish, it can be concluded that the higher the salt content in the fish has the effect of increasing the ash, carbohydrate content and reducing the water, protein, and fat content. The average level of preference for the panellists based on the Organoleptic Test carried out, and the highest average value is in taste with a value of 6.8 with a specification of like, appearance/colour with a value of 6.8 with specifications of like, smell/aroma with a value of 6,7 with specifications of like, and textures with a value of 6.9 with specifications of like.

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