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Profile of Fatty Acid and Polycyclic Aromatic Hydrocarbons Smoked Pokea Clam (*Batissa violacea celebensis* Martens 1897) Produced in North Konawe District, South East Sulawesi

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ABSTRACT
Pokea clam (Batissa violacea celebensis Martens 1897) is one of the endemic species in Southeast Sulawesi, which is much fave by local people as one of the daily favorite food menus, and one form of processing is by smoking. However, research on the profile of fatty acids and PAH compounds in smoked pokea clam has not been conducted, so information about these parameters is not yet available. The method used in this research is descriptive, where samples of smoked pokea clam produced from North Konawe District, were analyzed in terms of fatty acid profiles and PAH compounds, with sampling 3 times for 3 consecutive days. The results of the analysis of fatty acids obtained as many as 36 types of fatty acids, with a relative percent range of 0.001 to 98.539. While 5 types of PAH were detected, namely Naphtalene 0.10 ppm; Acenaphthene 0.05 ppm; Phenentrene 0.03 ppm; Fluorantene 0.08 ppm and Pyrene 11.98 ppm.
***Keywords**: Batissa, smoking, fatty acid, PAHs*

1. INTRODUCTION

Several types of mollusks are potential fisheries commodities to be developed and are very promising as candidates for sources of new bioactive compounds for various biotechnological applications. Bivalvia and gastropods are a type of mollusk that are abundant in tropical waters and are a good source of animal protein at relatively low prices. Bioactive compounds found in mollusks are identified as essential peptides, depsipeptides, sesquiterpenes, squalene, terpenes, polypropionates, nitrogen compounds, macrolides, prostaglandins and fatty acid derivatives, other compounds and alkaloids; all have certain types of activities [1]; [2]. Pokea clam (Batissa violacea celebensis Marten 1897) are a bivalvia of the Corbiculidae Family found in the Pohara River Konawe District, Sulawesi. In their habitat, Pokea clam inhabit the bottom of the waters with sandy substrate texture. These clam also like waters with strong currents and live in groups as a form of adaptation [3].

Smoking of foodstuffs, especially fish and other fishery products (one of which is a clam), is one of the many traditional processing technologies carried out for years traditionally. Smoking can be defined as the process of penetration of volatile compounds in products produced from the burning of wood or similar materials, which are noted to produce products with specific taste and aroma, long shelf life due to anti-bacterial activity, inhibiting enzymatic activity in the product so that it can affect the quality of smoked products [10].

Several studies have been carried out to observe the smoking process of the quality of fish or smoked shellfish in different types of fish and shellfish [4-10]. However, information about bioactive compounds as well as toxic compounds of PAHa smoke shellfish produced in North Konawe Regency, Southeast Sulawesi is not yet available, so this research is expected to provide new information about smoked pokea clam.

2. METHODS

Time and place

The research was carried out in June 2019, with the location of sampling is in Pu'uwanggudu Village, Asera District, Konawe Utara Regency. Analysis of fatty acid profiles and PAHs was carried out at the Integrated Research and Testing Laboratory (LPPT) of Gadjah Mada University Yogyakarta.

Material Used

The materials used include, for example, concentrated HCl (Sigma-Aldrich, 37%); diethyl ether (Sigma-Aldrich, ≥ 99%); petroleum ether (Sigma-Aldrich, 75%); N2 gas sodium metalonic solution (Sigma-Aldrich); Boron trifluoride metanoate (Aldrich 13-15% BF3); heptane (Sigma-Aldrich, 99%); NaCl (Sigma-Aldrich, 99.5%).

Research methods

The research method used is descriptive method, which is testing the fatty acid profile using the Gas chromatography method with a flame ionization detector (FID) following the method [11] and PAH using the Gas chromatography (Agilent Technologies 6890 N) method with a flame ionization detector (FID) following the method [12] on smoked poke shells smoked using cabinet smoking, with sampling three times. While the data were analyzed using Microsoft Excel.

III. RESULTS AND DISCUSSION

The results of the analysis of the fatty acid profiles are shown in Table 1 below,

The large number of undetectable PAHs can be caused by habitat from unpolluted fish [13] as well as smoke composition, type of wood / fuel used [14]. Variations in the level of contamination in fish can be influenced by several factors, namely fish species / species, eating habits, bioavailability of chemicals in food and water, as well as the physicochemical parameters of the aquatic environment [15]; [16]. The high fat content in fish also facilitates the increase of PAHs adsorption into fish / shellfish meat [9]. Research conducted [17] reported that the PAHs content was very diverse in various types of fish smoked using sawdust, firewood, charcoal and drying ovens.

Reported that the compound content of Acenaphthene, Phenentrene, Anthracene, and Fluorantene was higher in all samples studied, namely smoked tuna filet, smoked swordfish and smoked salmon [26]. According to [27], Acenaphthene, Phenentrene, Anthracene, and Fluorantene compounds are PAHs compounds that have two, three or four aromatic rings, with low molecular weight and do not include carcinogenic compounds, which compounds are more representative of their presence only in marine ecosystems. Whereas [28] states that PAHs containing four joined rings, for example benzo (a) anthracene and chrysene, are weak carcinogenic. While five or six combined polycyclic hydrocarbon rings, some of which are carcinogenic potential, such as benzo (b) fluoranthene, benzo (a) pyrene, and indeno (1,2,3-cd) pyrene.

The composition of fish oil fatty acids is very dependent on fish eating habits [18], fish species and their growth conditions [19]. In addition, differences in food processing methods (especially fish) can affect the quality of fatty acids in the product, as well as changes in fatty acid content between fresh fish and processed fish. Processing that is commonly done on fish is by cooking, smoked, canned, baked, baked and fried.

The results of this study did not identify any content of EPA and DHA. This can be caused by heat treatment in the fogging process. According to [24], unsaturated fatty acids are less resistant to heat, with instability that increases with saturation. Combined with oxygen, PUFA degradation occurs more rapidly and PUFA experiences a noticeable oxidative effect. Several other studies also reported similar results, including [4] who reported that the DHA content fell sharply by 86.46% or 104.79 mg / 100g during the fumigation process in milkfish. [21] also observed a decrease in EPA and DHA content in smoked sardines. While [25] determine the decrease in the content of EPA and DHA in smoke shells.

Table 1. The fatty acid profiles

Fatty Acid	Relative Percentage (%)±SD
Caproic acid	0.009±0.006
Lauric acid	0.005±0.003
Tridecanoic acid	0.027±0.041
Miristic acid	0.006±0.007
Pentadecanoic acid	0.077±0.097
Myristoleic acid	0.587±0.794
Palmitic acid	0.577±0.544
Heptadecanoic acid	0.026±0.038
Palmitoleic acid	8.134±8.914
Oleic acid	2.372±2.930
Stearic acid	0.082±0.114
Linoleic acid	0.066±0.077
Linolenic acid	0.001±0.001
Euric acid	0.603±0.836
Eicosatrinoic acid	0.054±0.001
Arachidonic acid	0.053±0.090
Lignoceric acid	0.002±0.001
Docosadinoic acid	0.028±0.001
Aracidic acid	0.131±0.097
Eicosenoic Acid	0.019±0.001
Eicopentanoic acid	0.001±0.001
Nervonic acid	0.006±0.005
cis-5,8,11,14,17 Eicopentanoic	0.010±0.001
Butiric ME	84.887±15.906
Undecanoid	0.002±0.001
cis-10 Pentadecanoid	0.830±1.396
Elaidic	0.031±0.037
Linolelaidic	0.017±0.025
Gama Linolenic	0.977±1.354
Behenic	0.008±0.009
cis-11, 14 Eicosadieoic	0.062±0.086
Tricosanoic	0.008±0.006
cis-10 Heptadecanoid	0.034±0.044
cis-8, 11, 14 Eicosatrionic	0.242±0.210
cis-11, 14, 17 Eicosatrionic	0.081±0.006
cis-13, 16 Docosadionic	0.234±0.001

While the results of the analysis of the PAH compound profiles are presented in Table 2 below,

Table 2. The PAH compound profiles

PAHs	Concentration (ppm)±SD
Naphtalene	0.097±0.006
Acenaphthene	0.050±0.001
Phenentrene	0.033±0.001
Fluorantene	0.077±0.006
Pyrene	11.978±2.026

Palmitic acid (C16: 0) and stearic acid (C18: 0) were found to be very excessive in content in different types of fresh fish or shellfish, and would increase in content after smoking, as reported [20], that increased palmitic acid content (C16: 0) and stearic acid (C18: 0) fresh sturgeon fish from 17.70% to 27.52%, and from 7.49% to 13.63% after smoking. [21] also reported an increase in the percentage of C16: 0 fatty acids in smoked sardine fish fillets. On the contrary, [22] and [23], which reported that there was no significant effect (P> 0.05) of the fumigation process on these fatty acid changes.

IV. CONCLUSION

The results of the research have shown that the amino acid profile of smoked pokea clam shells is quite diverse, and the profile of PAH compounds can be categorized as weak group PAHs.

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