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## Macronutrients analysis of triggerfish (*Abalistes stellatus*) from West Kalimantan waters

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**Abstract.** Triggerfish (*Abalistes stellatus*) is a non-commercial fish. This species is a small triggerfish genus found in West Kalimantan waters. The aim of this research was to determine the levels of macronutrient such as protein, lipid, ash and water content of the fish. The levels of macronutrients were determined using the methods recommended by Association of Official Analytical Chemists (AOAC). The fish were fairly high in macronutrient protein (19,75%) while the lipid content was 5,94%. Water and ash content were 78.87% and 1,57%, respectively. This result can be concluded that triggerfish is rich in food value, especially protein source for human dietary.

### 1. Introduction

Indonesia is an archipelago country with a total of 17,508 island and a length of coastline 99,093 km. West Kalimantan is a province of Indonesia with sea areas 3,2 million ha and length of coastline 1,398 km [1]. It has seven coastal areas, consists of Sambas, Singkawang, Bengkayang, Mempawah, Kubu Raya, Kayong Utara and Ketapang. These coastal areas have a lot of natural resources, especially in fishery field.

Marine capture fisheries production in West Kalimantan was reported at 128,207 tons in 2017 [2]. Broad range of pelagic and demersal fish, shrimp and squid existed in the area. Triggerfish (*Abalistes stellatus*) is one of demersal fish and abundant found in West Kalimantan Waters. This species is a fishery by-catch in marine capture fisheries. This species catch by local fishermen in West Kalimantan. It is uncommercial fish and consumed by local people.

Triggerfish can be an important nutrition of human diet. The nutritional of fish product depend on the levels of macronutrient such as proteins, lipids, minerals and vitamins. Fish is safer and healthier to be consumed than meat and chicken because the ratio of protein/fat is high [3]. Fish are also richest sources of polyunsaturated fatty acids, such as omega-3. This fatty acids have been shown to play vital role in human nutrition [4]. Therefore, it is important to know the levels of macronutrients from triggerfish.



## 2. Materials and Methods

### 2.1. Materials

Triggerfish was purchased fresh on the boats in TPI Sungai Kakap in September 2015. They were transporter to the laboratory in an ice box and were washed thoroughly. Then, samples were used for analysis.

### 2.2. Identification of Fish

Identification of fish were used Reef Fish Identification Tropical Pasific [5]. The characteristics of morphology of fish were observed.

### 2.3. Macronutrient analysis

The macronutrients of the fish samples were analyzed according to standard procedures of Association of Official Analytical Chemists (AOAC). Water content was determined by keeping fish samples in a oven at 100-102°C for 24 hours [6]. Ash content was determined by keeping fish samples in furnace at 500-600°C for 4 hours [6].

Proteins content was determined by destruction fish samples for an hour. The sample solutions added 10 mL natrium hydroxide and then destilated. The distillate was titrate with sulfuric acid 0,1 N [6]. Proteins content was determined by this equation:

$$\% \text{ Nitrogen total} = \frac{\text{mL } H_2SO_4 \times NH_2SO_4 \times 14,008}{g \text{ samples} \times 1000} \times 100\%$$

Lipid content were determined by soxhlet methods. Five grams of the fish samples added n-hexane solvent and then heated [6]. Lipid content was determined by this equation:

$$\% \text{ Lipid content} = \frac{g \text{ lipid}}{g \text{ samples}} \times 100\%$$

## 3. The Results and Discussions

### 3.1. Fish identification

Triggerfish also known as Etong fish in West Kalimantan. It is a triggerfish (family Balistidae) and distributed in Indian Ocean, Red Sea, Persia Bay and along the western of Pacific Ocean. Triggerfish identified as *Abalistes stellatus*. This fish widespread in the shallow waters of the tropic and subtropic zone in Indo-West Pacific. This species has important commercial value in Southeast Asia. *Abalistes stellatus* has maximum length about 60 cm with benthic animals as foods. Generally, this species inhabit in coastal areas with over muddy and sandy bottoms, also around reefs. It lives in the ocean between 20–170 m deep [7].

Triggerfish has a flat lateral shape, thin and elongated. The background colour is grey with smale pale spots. There are whites on the lateral side of the body extending posteriorly starting from the top of the gill opening [8]. The caudal fin is double emarginate with a lobe that grows long along with its growth. Triggerfish has enlarged scales above the pectoral fin base. This fish form a flexible tympanum behind the gill slit. Scales on the head are 27 – 32 lines. Scales of posterior body have clear keels that appear as arranged bumps extending horizontally. The dorsal fin consists of 2 fins. The first dorsal fin has 3 hard spines followed by 25–27 spines of soft rays. The anal fin consists of 24-25 spines of soft rays. The pectoral fins consists of 13–15 spines of soft rays [9]. Classification of triggerfish:

Kingdom : Animalia  
 Phylum : Chordata  
 Class : Actinoperygii  
 Ordo : Tetraodontiformes  
 Family : Balistidae  
 Genus : Abalistes  
 Species : *Abalistes stellatus*

### 3.2. Water and ash content

The macronutrients such as protein, lipid, water content and ash are given in Table 1. Water content in fish can effect the quality of food. It was determined acceptability, fresh and shelf life of product. Triggerfish has a high water content 78,87%. This value concluded that the fish easy broken or rotten. High water content caused the food more contaminants by microorganism [10]. The decay microorganism activities is low if the water content is low. Water content of the fish could be reduced by processing, such as drying, heated or preservation. This processing can extend shelf life of food. Ash content from Triggerfish is 1,57%. The chemical composition of ash depends on the source of materials.

**Table 1.** Analysis of macronutrients samples of Triggerfish

Macronutrients	Content (%)
Protein	19,75
Lipid	5,94
Water	78,87
Ash	1,57

### 3.3. Protein content

Triggerfish has 19,75% protein content. This value can fulfill the human dietary need. Human body needs 13% protein per day. Generally, fish contain a good quality of protein within the range between 18 – 20% [11]. Our body needs energy 15% each day. The source can be from protein about 90 g per day [12]. Protein in fish is an excellent source of macronutrients because of the amino acid and degree of digestibility [13]. The lack of sufficient protein is one of the most widespread nutritional deficiencies in many tropical countries.

### 3.4. Lipid content

Lipid content of triggerfish is 5,94%. Lipid contents are affected by such diverse factors as age, sex, spawning cycle and environmental conditions [14]. According to Ackman [15], generally fish can be grouped into four categories of fat content: lean fat (<2%), low fat (2-4%), medium fat (4-8%) and high fat (>8%). Triggerfish is medium fat fish.

Lipids of fish are triglyceride consists of glycerol and fatty acid. Fish contains high essential fatty acids, such as linoleic acids (omega-6) and linolenic acids (omega-3). These unsaturated fatty acids were reported prevent blockage of blood vessel (arteriosclerosis). It means that cholesterol contents of triggerfish are low and safe to consumed as protein sources.

Triggerfish included on fish with high protein and medium fat. Fish categorized into 5 groups based on protein and lipid content (Table 2). Triggerfish has a high nutrition as same as other marine fish. Therefore, triggerfish can be alternative protein source from seafood to be consumed.

**Table 2.** The fish type based on proteins and lipids content

Type	Categories	Contents	
		Proteins (%)	Lipids (%)
A	High protein, low lipid	15-20	<5
B	High protein, medium lipid	15-20	5-15
C	Low protein, high lipid	<15	>15
D	Very high protein, low lipid	>20	<5
E	Low protein, low lipid	<15	<5

Source: Stansby and Olcott [16]

#### 4. Conclusion

Triggerfish (*Abalistes stellatus*) were fairly high in macronutrient protein (19,75%) while the fat content was 5,94%. Water and ash content were 78.87% and 1,57%, respectively. This result can be concluded that triggerfish is rich in food value, especially protein source for human dietary.

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