SOME NUTRITIONAL AND MEAT YIELD VALUES OF SHIBOT (*Tor grypus, Heckel, 1843*) CAUGHT IN ATATÜRK DAM LAKE[1]

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ABSTRACT

In this study, some physical and chemical properties of Shibot (*Tor grypus*) were determined. Shibot lives in the Dicle (Tigris) and Fırat (Euphrates) rivers, and it is a type of fish, belonging to the *Cyprinidae* family. Its mean weight and length were found to be 2.36 kg and 77.86 cm. Although it has low carbohydrate content, it was found to be rich in fat and protein. Moisture, fat, protein, ash and pH values were found to be 71.60%, 7.07%, 19.52%, 1.10% and 6.07, respectively. Fish bodies (cleaned fish) and meat yields were also found to be 59.50% and 49.89%, respectively. As a result, it was understood that Shibot has a high potential for human nutrition.
Key words: Shibot; *Tor grypus*; Atatürk Dam Lake; Meat Yields

ATATÜRK BARAJ GÖLÜ'NDE YAKALANAN ŞABUT (*Tor grypus, Heckel*, 1843) BAZI BESİN VE ET VERİM DEĞERLERİ

ÖZET

Bu çalışmada Şabut'un bazı fiziksel ve kimyasal özellikleri belirlenmiştir. Şabut, Dicle ve Fırat nehirlerinde yaşayan, *Cyprinidae* familyasına ait bir balık türüdür. Yapılan çalışmada bu balığın ortalama ağırlıkları ve boyları 2.36 kg ve 77.86 cm olarak belirlenmiştir. Şabutun karbonhidrat içeriği düşük olmasına rağmen yağ ve protein açısından zengin olduğu görülmüştür. Örneklerin nem, yağ, protein, kül ve pH değerleri sırasıyla %71.60, %7.07, %19.52, %1.10 ve 6.07 olarak bulunmuştur. Temizleme sonrası balık eti ve et randımanları ise sırasıyla %59.50 ve %49.89 olarak tespit edilmiştir. Sonuç olarak şabutun insan beslenmesi açısından önemli bir potansiyele sahip olduğu anlaşılmıştır.
Anahtar kelimeler: Şabut; *Tor grypus*; Atatürk Baraj Gölü; Et verimi

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1. INTRODUCTION

Aqua products have an important role in human nutrition. In particular, they are important as a source of protein. Although fish meat compositions are similar to many types of animal meat compositions, their fat, some mineral, and vitamin contents are different from other animal meat. Considering the essential amino acids and fatty acids, fish is a food to be included in human nutrition. In addition, fish meat is among the easily digestible food sources since it does not contain fibers such as cellulose and hemicellulose like plants, or cartilage and nerves like other meats. Therefore, the evaluation of aquatic products is important both economically and nutritionally (Kılınççeker and Küçüköner, 2004; Olgunoglu et al., 2011; Kılınççeker, 2015; Çıkrıkçı ve ark., 2022).

Inland water area of Türkiye in terms of total size of area ranks first among European countries. However, our fishery ranks last in terms of production due to the in sufficient advancement of scientific and technological capabilities. Despite the support provided by the relevant authorities, it can be said that it is still not at the desired level (Dartay et al., 2010; Öztürk ve İbik, 2023).

Türkiye potential for inland water fish is quite rich. However, this potential can not be assessed adequately. Additionally, there is not enough research on the endemic fish species living in these waters. Shibot (*Tor grypus*) is known as an endemic species living in the Tigris and Euphrates rivers (Selki et al., 2005; Olgunoglu et al., 2011). It is an important species for the regional economy and represents a prominent group among the fish in the Atatürk Dam. (Olgunoğlu et al., 2009; Olgunoglu et al., 2011).

Its body is covered with large scales. It has two pairs of whiskers and caudal fin is deeply forked. It has a dark brown color on the back, brown sides, a dirty yellow in the abdominal region (Dal, 2006; Palalı, 2019).

Moreover, their growth rate is higher than many other fish. They are reliable in terms of heavy metals. Oymak et al. (2009) reported that heavy metals in muscle of *Tor grypus* from Atatürk Dam Lake were quite below the limits proposed by EU and FAO/WHO and TFC for fish.

However, when looking at the studies, it has been observed that there are not many studies that determine the important features of this fish for the food sector. In particular, studies emphasizing its nutritional content are quite limited (Oymak et al., 2009; Olgunoğlu et al., 2011).

The introduction and evaluation of shibot (*Tor grypus*) will contribute to the social and economic development of the country. The nutritional values of this fish should be determined, detailly. For this purpose, some nutritional and meat yield values of shibot were investigated in this study.

2. MATERIAL AND METHODS

After one month from the spawning period, three fish in nearly same size were caught from the Atatürk Dam Lake. Their images are presented in Figure 1. They were then transferred in refrigerated box to the food processing laboratory. They were weighed and then their skins,

heads, and internal organs were removed to obtain their bodies. Their meat was removed from bodies and bones by a thin knife and by hand. The meat was chopped and then analyzed. The study was carried out in two replications and three parallels. Means are presented with their standard deviations.

Figure 1. Shibot (*Tor grypus*) images

2.1. Determination of the body (cleaned fish) and meat yield

Body and meat yields were determined as follows:

$$\text{Body Yield (\%)} = \frac{w_1}{w_0} \text{ x } 100$$

$$\text{Meat Yield (\%)} = \frac{w_2}{w_0} \text{ x } 100$$

where w_0 is the weight of Shibot before processing, w_1 is the cleaned fish weight and w_2 is the meat weight.

2.2. Determination of the pH

Ten grams of the sample was homogenized in 100 ml of distilled water and the pH was measured using a pH meter (Orion 3-star, MA, USA) equipped with temperature probe, as outlined by Ockerman (1985).

2.3. Determination of the moisture

To determine the moisture content in fish, the sample was weighed, heated in a drying oven and weighed again to measure the loss of mass after drying. The loss of moisture was determined as % moisture (AOAC, 2000).

2.4. Determination of the fat

The fat was extracted from the sample using solvent through an extractor according to the Soxhlet method. The recovered fat was determined as % crude fat (AOAC, 2000).

2.5. Determination of the protein

Protein was determined as crude protein using the Kjeldahl method (AOAC, 2000). After the digestion of organic matter with sulfuric acid, the reaction product was made alkaline and

then the liberated ammonia was distilled and titration was performed. The nitrogen content was multiplied by the factor 6.25 to determine the crude protein content.

2.6. Determination of the ash

Ash content was determined as the sample was heated to a very high temperature, to remove all moisture and volatiles and organics. The remaining inorganics were determined as % ash (AOAC, 2000).

2.7. Determination of the carbohydrate ratio

The carbohydrate ratio was estimated by taking into account moisture, fat, protein, and ash content. The formula used for this estimation is:
Carbohydrate Ratio (%) = 100 - (Moisture (%) + Fat (%) + Protein (%) + Ash (%)).

3. RESULTS AND DISCUSSION

Nutrition and yield values of shibot (*Tor grypus*) are presented in Table 1. Mean weight and length were found to be 2364.33 g and 77.86 cm, respectively. Body (cleaned fish) and meat yields were determined to be 59.50% and 49.89%, respectively. These values were higher than the ratios determined for the inland grey mullet (*Leuciscus cephalus*) which were 52.83% and 49.71%, respectively (Yılmaz et al., 2002). In addition, a result close to the meat yield (51.42%) found in fresh carp was found by Duman and Dartay (2007). It is also similar to the meat yield values of 47.17% - 55.70% determined in trout by Çıkrıkçı et al. (2022).

Table 1. Nutritional and yield values of Shibot (*Tor grypus*)

Weight (g)	**Length (cm)**	**Body yield (%)**	**Meat yield (%)**	**pH**
2364.33±620.98	77.86±2.15	59.50±0.48	49.89±1.89	6.07±0.01
Moisture (%)	**Fat (%)**	**Protein (%)**	**Ash (%)**	**Carbohydrate (%)**
71.65±0.60	7.07±0.35	19.52±0.26	1.10±0.05	0.67±0.09

Shibot had an acidic pH, with the pH value was determined to be 6.07. It was understood that the pH value of Shibot was quite close to the 5.5-6 range stated by Gülyavuz and Ünlüsayın (1999) for fresh fish. This value is also in accordance with the range reported by Varlık et al. (1993) as 6-6.5 for fresh fish. Mean moisture content was found to be 71.65%. Moisture values were not observed to be higher than many other fish species. Generally, increasing fat levels in fish decrease moisture levels. The fat content of shibot was found to be 7.07% (Table 1). It can be said that these rates are compatible with the expressions of Gülyavuz and Ünlüsayın (1999) that the water content of fish meat is 75.8% and the fat content is 3.7%, which is emphasized that it may vary depending on the species and composition. In addition, our moisture value was lower than the humidity rates of 72.40%-76.93% emphasized in the study conducted by Olgunoğlu et al. (2011) on Shibot, while the fat rate was found to be higher than the values stated in the range of 2%-5.73%. While it was stated in the study in question that these rates may change seasonally, in our study it was understood that the moisture rate decreased due to the high fat rate in Shibot.

Furthermore, Özden (1995) indicated that the fat content of fish can range from 1% to 25%. These variations are influenced not only by the species of fish but also by seasonal conditions, nutritional characteristics within the same fish species, water salinity, and other factors (Özden, 1995; Varlık et al., 2004; Karadaş, 2024).

Fat content of shibot is high enough compared to some other fish such as trout, perch and sardines. As shown in Figure 2, shibot meat has a red color. Generally, this colorful fish meat contains higher fat than white fish meat (Gülyavuz and Ünlüsayın, 1999). Our results are consistent with these statements.

Figure 2. Image of the cleaned shibot (*Tor grypus*) body

Protein content of shibot was found to be 19.52%. This protein level makes shibot an important source of protein. Generally, fish protein levels change between 17% and 21%. Although their protein quality is similar, they contain a lower amount of connective tissue compared to other animals such as beef and poultry (Berik, 1996). The protein value of Shibot is slightly higher than the average value of 18.4% reported for fish meat by Gülyavuz and Ünlüsay (1999), revealing the nutritional importance of this fish. It was also observed that our results were consistent with the protein ratios between 17.56% and 20.38% found in the study conducted by Olgunoğlu et al. (2011) on shibot.

Also, ash content of shibot (as 1.10%) was determined to be in the range stated by Gülyavuz and Ünlüsayın as 1-2% on average in aquatic products. It is also within the range of 0.86 g/100 g -1.24 g/100 g reported for shibot fish by Olgunoglu et al. (2011).

Although fish meat is rich in protein content, it is low in terms of carbohydrate content (Varlık et al., 2004; Karadaş, 2024). The carbohydrate content of shibot is estimated to be approximately 0.67%. This ratio is similar to the values in the range of 0.13 g/100 g - 2.24 g/100 g found in the study conducted by Olgunoğlu et al. (2011) on Shibot meat. In this context, Varlık et al. (2004) also reported that fish contain negligible amounts of carbohydrates.

4. CONCLUSION

Shibot has a high potential for human nutrition. It can be said that it has a high meat yield. It has a significant amount of protein and fat content. Therefore, it is thought that it can be used as an alternative food source among inland fish. In addition, its meat can be used in different products in the food industry, making it an important source of income for those who trade in this fish. Therefore, it is a fact that more research is needed both on the necessity of supporting shibot cultivation and on its use in different food products.

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