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The Investigation of Meat Yield of *Acanthobrama marmid* Heckel, 1843 From Karakaya Dam Lake

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Acanthobrama marmid, Karakaya Dam Lake, Meat yield

Abstract: This study was carried out to determine the meat yield of tigris bream (*Acanthobrama marmid)* caught in Karakaya dam lake. In this study, 51 *A. marmid* were used and these fishes were found to be 22.45 ± 15.02 cm in length and 145.69 ± 28.87 g in weight. Analysis of meat yield was based on the calculation of the ratio between the body weight and the weight of organs, body parts e.g. head, fins, and internal organs. In present study age composition, sexual ratio, age-length, age-weight, length- weight relationship and meat yield of *A. marmid* were determined. The weight rate of viscera, head, fins, skin, carcass of *A.marmid* according to total weight were calculated as 14.79%, 14.49% , 2.38%, 11.59% ve 57.92% respectively.

Karakaya Baraj Gölü'nde *Acanthobrama Marmid*'in Et Veriminin Araştırılması

Anahtar Kelimeler
Acanthobrama marmid, Karakaya Baraj Gölü, Et verimi

Özet: Bu çalışma Karakaya Baraj Gölü'nde yakalanan Tahta balığı (*Acanthobrama marmid)'nın* et verimliliğini belirlemek amacıyla yapılmıştır. Bu çalışmada 51 adet *A. marmid* kullanılmış olup bu balıklar ortalama 22.45 ± 15.02 cm uzunluğunda ve 145.69 ± 28.87 g ağırlığında oldukları belirlenmiştir. Et verimi analizi, vücut ağırlığı ile vücut kısımlarını oluşturan baş, yüzgeçler ve iç organların ağırlığı arasındaki oranın hesaplanmasına dayanmaktadır. Bu çalışmada *A. marmid'in* yaş kompozisyonu, cinsiyeti, yaş-boy, yaş-ağırlık, boy-ağırlık ilişkisi ve et verimi belirlenmiştir. Toplam ağırlığa göre *A.marmid*'in iç organ, baş, yüzgeç, deri, karkas ağırlık oranı sırasıyla %14.79, %14.49, %2.38, %11.59 ve %57.92 olarak hesaplanmıştır.

1. Introduction

Acantobrama marmid genus is represented by 9 species in inland waters of world and all of species live in the Middle East area. There are three species of this genus, *A. mirabilis, A. marmid* and *A. centisquama,* east of the Fırat river in the inland waters of Turkey. *A. marmid* distributes in the freshwaters of Turkey, Iran, Iraq and Syria [1].

A. marmid is typically a bentopelagic river from but it also lives in the lakes and dam lakes. Generally, species fed on zooplankton and phytoplankton and spawn at temperatures between 18-25 ^{o}C. This fish is used in human nutrition locally, but it is not an important species economically [2].

Although there are few studies on the biological properties of *Acanthobrama marmid*, there are a few studies carried out in the Fırat River System. Some biological ecological features in the Dıcle River system were investigated in a which was previously reported. Some biological characteristics of monthly evaluation of ovarium development [3, 4]. Biological characteristics of Fırat River System. Growth characteristics and changes in blood cells. Age determination with recalculation and digestive contents [5, 6, 7, 8, 9, 10, 11, 12, 13, 14]. In other studies conducted in this regard; *Leuciscus cephalus* and *Capoeta bergamae* examined the ratio of various organs to total body weight and tried to characterize the meat production [15, 16]. In a different study, it was done on the meat quality and characteristics of *Acanthobrama marmid*, which was catched from Keban Dam Lake [17].

Besides lengths determination by back calculation method of *Acanthobrama marmid* living ın Keban Dam Lake [13]. Besides, the relationship between the meat productivity of *Chondrostoma meandrense* caught in Kemer Dam Lake and various body organs was investigated. In addition, the situation of meat

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productivity was tried to be determined depending on age [18]. Karakaya Dam Lake is the third largest dam lake on the River Euphrates (in respect to the surface area of lake) right after Keban Dam Lake and Karakaya Dam Lake is situated 166 km downstream Keban Dam, in the locality near Çüngüş of Diyarbakır province. Apart from Euphrates as the main river, Sultansuyu, Tohma Brook, and other small brooks and streams join Karakaya Dam Lake [19, 20, 21].

The aim of the present study was to investigate meat yield of *A. marmid* in Karakaya Dam Lake, Turkey.

2. Materials and Methods

A. marmid were collected from Battalgazi region of Karakaya Dam Lake (Fig. 1). The fish were caught with pannier nets having a width of 18, 22, 32 and 36 mm. In this study was used the average length of 22.45±15.02 cm and the average weight of 145.69±28.87 g of 51 fish. *A. marmid* were transported into the laboratory prior to length and weight measurements. Fork lengths of the specimens were measured with 0.01 mm precision. Likewise total weight (TW), head weight (HW), internal organ weight (IOW), gonad weight (GW) and fin weight (FW) were measured at 0.01 g precision using a sensitive electronic scale. Age determinations were made using scales. For this purpose, a sufficient number of scales were taken from the area between the head and the dorsal fin and the scales prepared according to were examined under a microscope[22].

Dissection and weight measurements of the body parts and organs were carried out after scaling of specimens intact. Internal organs except gonads were weighed following abdominal dissection of the *A. marmid* . Dissection of heads and fins were also realized meticulously for measurements. Carcass weight was determined by weighing fish remaining after the dissection of body parts and organs, and meat yield (%) was calculated by determining the ratio of the weight of carcass to the weight of the whole fish.

Figure 1. Map of the Karakaya Dam Lake

3. Results

Table 1 shows the age composition and sex distribution of A. marmid from Karakaya Dam Lake. In the study, sex was discriminated according to age and 28 males and 23 females were examined. In all age groups, it was determined that there were 21 fish, including 8 females and 13 males, in the fish group of maximum 3 age group of *A. marmid*.

The proportion of the body parts and organs revealed that head comprised 14.36% of total weight. Internal organs, gonads and fins were 14.75%, 7.61% and 2.36% of the weight, respectively. Remaining 60.92% was the meat yield of *A. marmid* (Table 2). Additionally relationships between total fish weight and meat, head, visceral, fin, skin, gonad, carcass weights of *A. marmid* fishes (Figure 2, 3, 4, 5, 6, 7, 8, 9). Age dependent average meat yield of the individuals of *A. marmid* varied between 65.12 g for age 1, 72.77 g for age 2, 89.92 g for age 3, and 107.5 g for age 4. The proportion of the internal organs was the highest (average weight 25.85 g) at age 4 while it was the lowest (average weight 16.31 g) at age 1. The proportion of the gonads was the most fluctuating parameter. It was 6.40% of the total weight at age 1; 9.38% at age 2; 7.02 at age 3 and 7.18% at age 4. Table 3 shows the age dependent proportions in the organs of *A. marmid*. In the study conducted, it was determined that the weight ratio of all body parts of the fish increased proportionally with age.

Table 1: Age composition and sex distribution of *A. marmid*

	Male	Female	Male+Female
Ages	**N**	**N**	**N**
1	3	5	8
2	6	8	14
3	13	8	21
4	6	2	8

Table 2: Descriptive statistics of weight of *A. marmid*

Measurements Ratios	Min.	Max.	Mean±SD
Total weight (g)	70.7	207.0	145.68±28.87
Head weight (HW)	13	32	20.92±4.16
Internal organ weight (IOW)	5.14	39.5	21.49±7.13
Gonad weight (GW)	1.8	25.9	11.10±5.57
Fin weight (FW)	1.92	13	3.45±0.57
Length (cm)	18.4	25.7	22.45±1,50
Liver weight (LW)	0.5	3.56	1.8±0.59
Skin weight (SW)	11	46	17.18±5.66
Carcass weight (CW)	36	116	82.85±19.59
Bone weight	3	12	7.0±1.41
Fillet weight	33	110	75.82±19.32

4. Discussion and Conclusion

In this study, 51 *A. marmid* were used and these fishes were found to be 22.45 ± 15.02 cm in length and 145.69 ± 28.87 g in weight. The weight rate of viscera, head, fins, skin, carcass of *A.marmid* according to total weight were calculated as 21.49±7.13 g, 20.93±4.16 g, 3.08±0.57 g, 17.19±5.66 g and 82.85±19.60 g, respectively. Age dependent average meat yield of the individuals of *A. marmid* varied between 65.12g for age 1 and 72.77g for age 2, 89.92g for age 3, and 107.5g for age 4.

Table 3. Age dependent proportions of body parts and organs of *A. marmid*

Ages Mean±SD	I	II	III	IV
Total weight (g)	106,91±38.97	132,64±10.87	153,51±14.80	186,03±11.73
Head weight (HW)	214,12±15.02	216,55±11.41	228,38±6.44	242,25±11.23
Internal organ weight (IOW)	16,30±5.66	21,66±6.83	22,04±4.59	25,85±10.14
Gonad weight (GW)	17,87±3.56	19,55±1.51	21,07±2.98	26,12±4.29
Fin weight (FW)	3,23±0.66	3,22±0.62	3,4±0.37	4,07±0.32
Length (cm)	7,54±4.18	12,44±5.68	10,77±4.46	13,34±7,32
Liver weight (LW)	1,40±0.62	1,77±0.66	1,86±0.31	2,08±0.76
Skin weight (SW)	15,18±2.83	15,33±3.28	17,07±3.30	20±3.02
Carcass weight (CW)	65,12±13.48	72,77±11.11	89,92±12.07	107,5±7.67

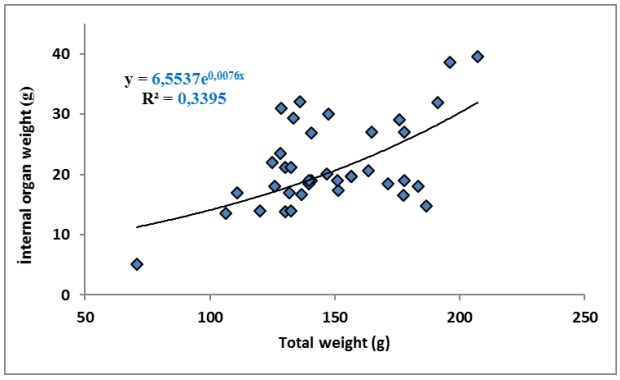

Figure 2. Relationships between fish weight and internal weights of *A. marmid* fishes.

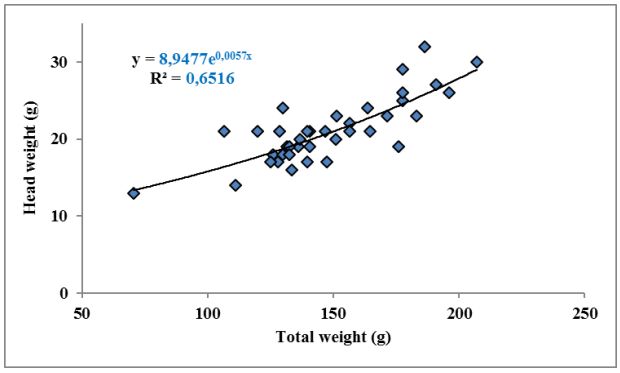

Figure 3. Relationships between fish weight and head weights of *A. marmid* fishes.

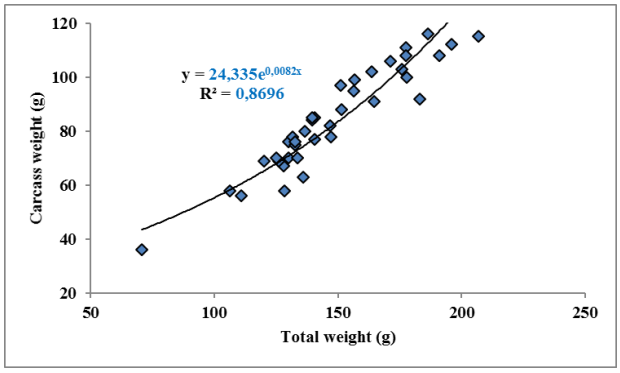

Figure 4. Relationships between fish weight and carcass weights of *A. marmid* fishes.

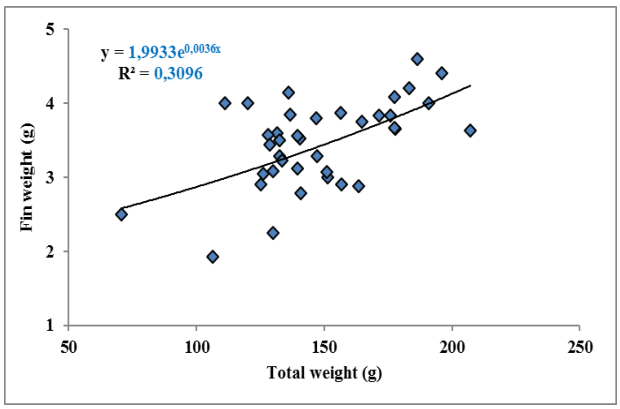

Figure 5. Relationships between fish weight and fin weights of *A. marmid* fishes.

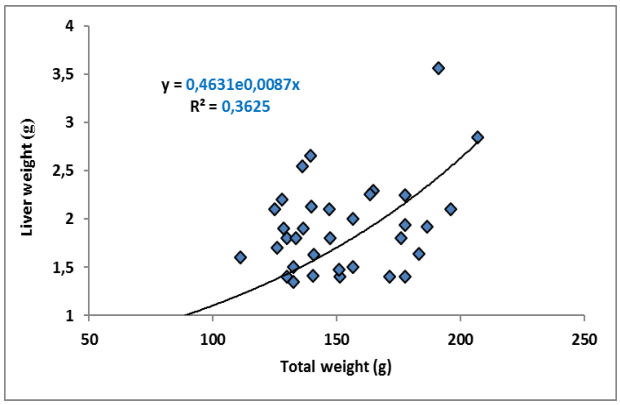

Figure 6. Relationships between fish weight and liver weights of *A. marmid* fishes.

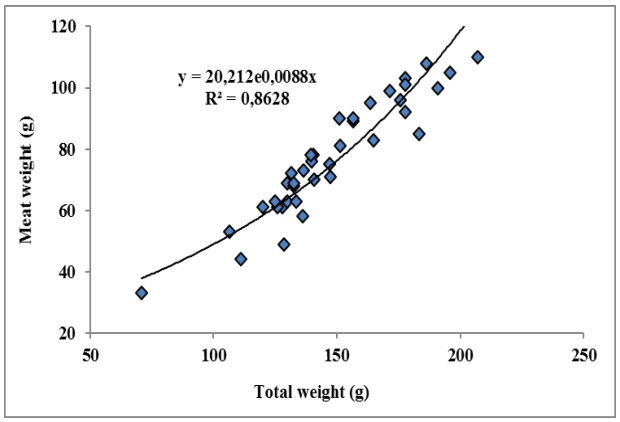

Figure 7. Relationships between fish weight and meat weights of *A. marmid* fishes.

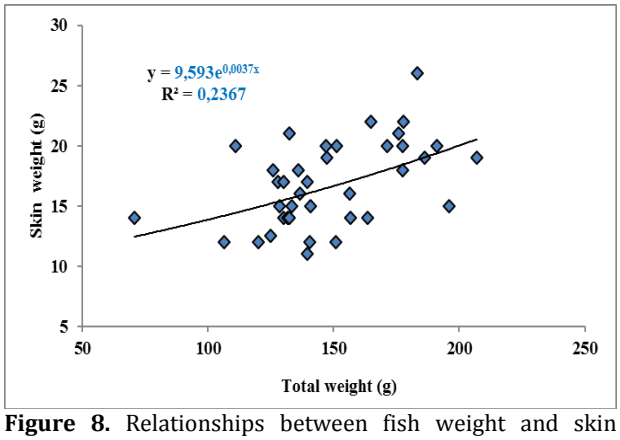

Figure 8. Relationships between fish weight and skin weights of *A. marmid* fishes.

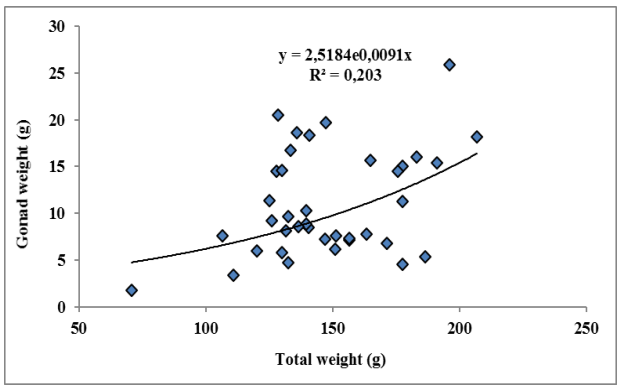

Figure 9. Relationships between fish weight and gonad weights of *A. marmid* fishes.

The proportion of the internal organs was the highest (average weight 25.85g) at age 4 while it was the lowest (average weight 16.31g) at age 1. Although there have been many studies on the characteristics of populations and growth of *A. marmid*, there have been few studies on meat consumption. In another study on this fish, have identified some biological properties of *Acanthobrama marmid* in the Dicle River such as growth and growth rates in terms of sex, weight and weight. I-V is composed of 454 samples, 33.26% male, 61.01% female and 5,73% juvenile individuals distributed among the age groups. Height and weight between male and female III and IV. Age groups were also found statistically significant [6]. Another study carried out in order to determine the meat production and chemical composition of the fish (*Gadus merlangus euxinus*) caught in the Middle Black Sea. Net meat rates of female and male fish were found as 51,25 ± 0,775 and 55,66 ± 0,455. The percentages of the head, gonad, liver and other internal organ weights of the female subjects according to body weight were 27,48%, 7,07%, 4,30% and 9,67%, respectively. These rates were calculated as 29,52%, 3,21%, 2,59% and 8,91% for male subjects, respectively [7]. In another study, meat productivity of 100 catfish (*Capoeta trutta*) and 100 fish (*Capoeta umbla*) caught at Uzunçayır Dam Lake were investigated and relations between various body organs were investigated. As a result of the review, the highest consumable meat rate in *C.trutta* was found in XI. (60,08%) age group and the lowest meat rate is VI. In the age group (55.23%), the highest meat rate in *C. umbla* was found in II. The lowest meat rate in the age group (63,40%) was found in the first age group (54,65%). The proportions of head, internal organs, skin, spine, fins and consumable parts in the total samples according to species are as follows; 10.65%; 17,22%; 7.75%; 3.73%; 2.78%; 55,57%, while these values were found to be 12,40% in disqualified fish; 11.51%; 8.25%; 3.67%; 2.25%; 61,92% were found [8]. The study conducted by different researchers aimed to reveal the carcass, head and other body proportions and meat yield of the Black Sea trout (*Salmo trutta labrax*) of the ages of II-V depending on age and sex. As a result of this study, mean fin of 4,3 ± 0,49%, head of 12,2 ± 2,86%, carcass of 69,5 ± 2,37, bone of 2,4 ± 0,2, internal organs of 14% 0 ± 5,36, 60,4 ± 1,52% of the liver, 1,3 ± 0,88% of the liver, 6,7 ± 1,78% of the skin and 4,7 ± 4,24 of the gonad. Differences in head, carcass, meat yield, fins, skin and liver ratios were found to be important in gender-related assessments. It was observed that the age of fishes III and IV was lower than that of fishes II and V. [9]. In a different study, meat productivity of 170 (*Tinca tinca*) catched from Seyhan Dam Lake and relations between various body organs were examined. As a result of the review, the average head / body weight ratio was 11.15%; weight of internal organs / body weight 8.93%; fin weight / body weight of 2.77% and meat productivity of 77.07% In a different study carried out, the relationship between the meat productivity of 159 (*Chondrostoma regium*) and the various body organs in the Seyhan Dam Lake was investigated. As a result of the review, the average head / body weight ratio was 12.76%; weight of internal organs / body weight 5.08%; fin weight / body weight of 2.08% and meat efficiency of 79.40% [10]. Examined the meat yield and biochemical composition of the silvery poolfish caught in Çıldır Lake. In the study, 51 (*Carassius gibelio*) with an average length of 20.83 ± 0.03 cm and an average weight of 149.52 ± 0.89 g were obtained from Çıldır Lake. Percentage of fish weight, internal organ weight, fin weight, skin weight, carcass weight and meat weight per body weight were 24.79 ± 0.04%, respectively; 14.24%, ± 0.59; 11:55 ± 0.24%; 10:34 ± 0.35%; 12.14 ± 0.24 and 23.87 ± 0.39, respectively [11].

In conclusion, the present study shows that there is certain variation in meat yield of *A. marmid* from Karakaya Dam Lake. Further studies should be carried out in order to obtain information such as meat yield and reproduction cycle of the fish in another region of Karakaya Dam Lake.

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