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Investigation Of The Proportions Of Some Chemical Components Of Fish From Al-Haffar Drainage

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Investigation of the proportions of some chemical components of fish from Al-Haffar Drainage

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ABSTRACT

This study is conducted during the period between October 2019 till July 2020 to measure the ratios of some chemical parameters in two species of fish prevalent in Al-Haffar Drainage. The concentrations of fats and proteins measured in three parts (gills, skin, and muscles) of *Tilapia Zilli* and *Liza Abu* fish. The percentages of protein in Liza Abu fish were 14.41, 24.5, 14.47%, while in Tilapia Zilli were as: 14.6, 16.74, and 11.2% for gills, skin, and muscles separately. The levels of protein in tilapia were relatively higher, and the highest levels were recorded in the skin, while in Liza Abu, The highest rate of protein is noticing in the skin and muscles, Fat percentages in Liza. A fish were 1.33, 7.01, 2.09%, while in Tilapia.z f were 2.7, 5.19, and 2.3%, in gills, skin, and muscles, the highest fat ratio is registered in the skin of both species, The lowest levels of fat in Liza. A recorded in the gills, the lowest percentage of Fat in tilapia .z was recorded in muscles.

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1. Introduction

In Iraq, there is no adequate attention to aquaculture, especially fish, as it represents an essential food resource. It is necessary to improve this sector by enhancing the quality of the feed and farms conditions, as well as the problem of inflation of population of our planet and the economic crisis afflicting the world accompanied by an increase in the demand for renewable sources of animal protein, medium cost, and high nutritional value. The number of the earth population is increased continuously and will reach 9.7 billion people in 2050 (United Nations, 2019; Hua et al., 2019). Fish are an available source rich in proteins, vitamins (A, E, D), zinc, and iron elements, Calcium and other nutrients. Not only that, Fish residues are invested in the manufacture of feed for fish and the rest of the animals (FAO, 2018; Tacon & Metain, 2018; Hicks et al., 2019; NRC, 2011). Fatty acids in fish have positive effects on human health as prevention of cardiovascular disease, improves both vision and the functions of the immune system, as well as has proven effective in reducing kidney disease, infections, and blood pressure, and contributes to reducing the level of harmful cholesterol in the blood and preventing strokes (Farooqui, 2009). Fish protein is facile to digestion due to the paucity of tissue content and the scrubby fibers that connect the muscle tissue, It contains all the amino acids that the human body needs for growth(Yousef, 2015) Despite the lack of studies concerned with measuring the chemical composition of fish, some of them have been conducted recently and included estimating the ratios of fat and protein as (Al -Hamadany, 2014; AA, 2015; Hama and Kamel, 2012; Yaqoub, 2016; Abboud, 2016; Al-Khafaji, 2006; Ganeshwade, 2016; Al-Hamdani, 2016). This study aims to measure the fat and protein ratios in Liza Abu and Tilapia Zilli fish to find out their nutritional value as they are among the prevalent species in the study area on which the population of the region depends as a source of protein and has an acceptable economic cost. Adequate studies have not been carried out on the tilapia fish, as it is a strange species in the water environment of Iraq. It was previously observed for the first time in 2007 in Al-Musayyib.

2. Methods and material

2.1: Fish sampling

Fish samples were collected after identifying the common species from Al-Haffar drainage east of the Euphrates River, the entrance to the city of Shafi'ia, in the Diwaniyah governorate, southwestern Iraq, Approximately 150-200 tilapia fish (between 9-16 cm in length and 8-45 g by weight) and 100-150 tilapia fish (ranging from 11.5-20 cm in length and 31-163 g by weight) were collected during the study period, samples placed in a heat-insulated box filled with ice to keep it from damage until reaching the laboratory to isolate the suitable pieces for study.

2-2. Preparation of Samples

A dominant fish genus was isolated, as Liza's females and Tilapia's males were predominant. Therefore, they selected for the study, and then the fish dissected using a sharp blade to set apart the organs. These organs were placed in glass Petri dishes and dried in an oven at a temperature of 100 degrees Celsius. Then the organs were ground, sifted, and kept in sterile and labeled plastic boxes until the required tests perform.

2-3. Lipid ratio measurement

The concentration of fats for the gills, skin, and muscles of *Tilapia Zilli* and *Liza Abu* fish was measured using the gravimetric method mentioned by (Bligh EG, 1959), As (1 g) was used from the dried organs and the fats extracted using solvents (chloroform: methanol) in specific proportions, the result expressed in mg / g, The percentage calculated by dry weight.

2-4. Protein ratio measurement

A protein concentration was measured in the gills, skin, and muscles of both types of fish by following the method mentioned by Lowry (Randall, 1951), using Follin reagent and making a standard curve using (BSA). Protein concentrations were measured based on the absorbance using UV Spectroscopy and expressed Result, mg / mL, the percentage calculated from dry weight.

2-5. Statistical analysis

Statistical analysis was attended for this study by using (One-way-ANOVA) analysis to test the significant differences in lipid and protein concentrations of Tilapia and Liza between species and organs with a probability level of $P \leq 0 > 05$.

3. Result

3-1.Lipids

The fat percentages in *Liza Abu* were 1.33, 7.01, 2.09%, and for *Tilapia*, it was 2.7, 5.19, and 2.3% in gills, skin, and muscles, severally As shown in table (1). These ratios are comparable to that mentioned in the study of (Al-Habib, 2013), where the fat ranged from (1.47 to 4.27%), As well as for (Afrah, 2008) as fat ranged from (2.6 to 3.4%) and higher than what was mentioned in (Osibona, 2009) where it did not exceed 0.96%, the fat rate ranged from (0.67 to 9.04%) as founded by (Mehmet, 2005). statistical analysis results display that there were significant differences in the concentration of fats between the seasons of the year and between the different members with a probability level of ≤0.05. It was found that the fat level was higher in tilapia fish than Liza Abu, specifically in the skin. Figure(1),(2).

Table (1): Mean values of lipids in *tilapia Zilli* and *Liza Abu* in study site *(*mean ±SD)

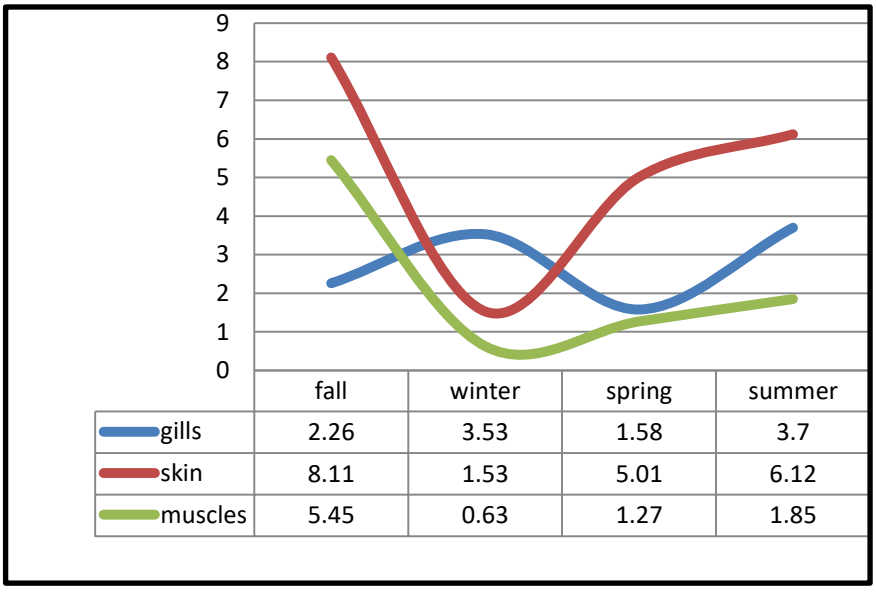
Species / Organs	*Tilapia Zilli*	*Liza Abu*
Gills	2.76%±0.88	1.33%±0.54
Skin	5.19%±2.38	7.01%±1.9
Muscles	2.31%±1.86	2.09%±0.37

3-2. Protein

It found that the protein ratios were (14.4, 24.5, 14.47%), and (14.6, 16.7, and 11.2%) in the gills, skin, and muscles of Liza Abu, Tilapia Zilli, separately, as noted in table (2). These percentages are close to those measured in the results of (Al-Hamdani, 2014; Al-Hamdani, 2016), as it ranged from 18.4 to 20.01% for tilapia and about 19.15 in Liza Abu, as for protein percentages according to (Habib, 2008; Ibrahim, 2008; Turchini, 2009;), they ranged from 17.3 to 20.61%. As for the protein percentage, according to the results of (Sahar, 2016), it was relatively high compared to the protein ratios in the studied species, reaching 34%. According to the statistical analysis, there are significant differences in protein concentrations between gills, skin, and muscles, as well as between seasons of tilapia and Liza Abu fish, under the probability level p≤0.05). The protein level was the highest in Abu Liza fish, specifically in the skin. Figure (3),(4)

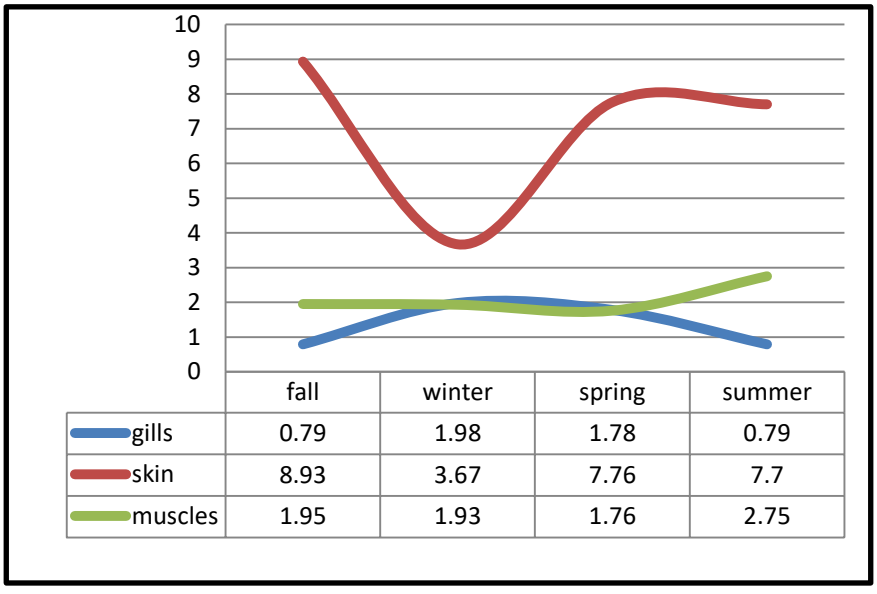
Table (2): Mean values of protein in *Tilapia Zilli* and *Liza Abu* in study site (mean ±SD)

Species / Organs	*Tilapia Zilli*	*Liza Abu*
Gills	14.65%±0.3	14.4%±4.7
Skin	16.74%±3.2	24.5%±3.2
Muscles	11.2%±2.9	14.47%±2



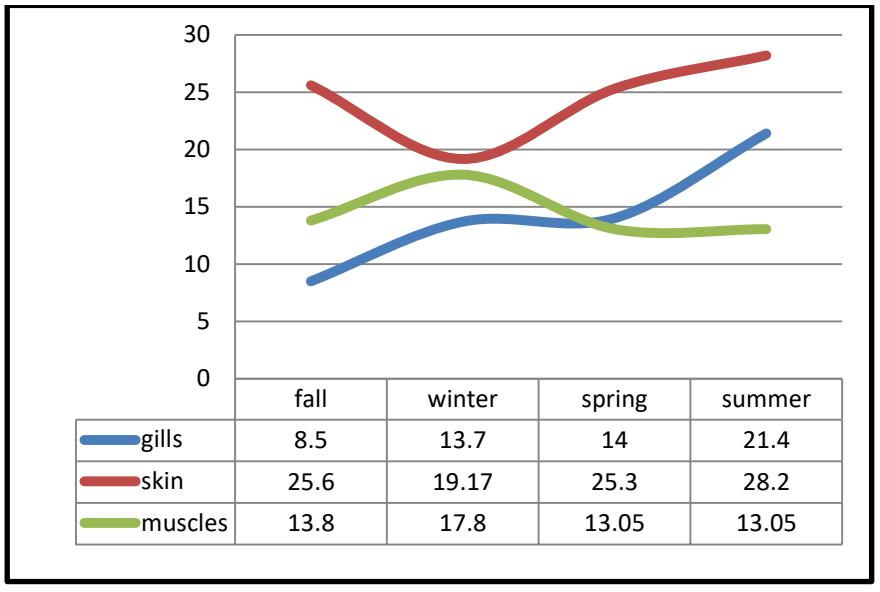
	fall	winter	spring	summer
gills	2.26	3.53	1.58	3.7
skin	8.11	1.53	5.01	6.12
muscles	5.45	0.63	1.27	1.85

Figure (1): Seasonal rates of lipid content of Liza Abu (%)



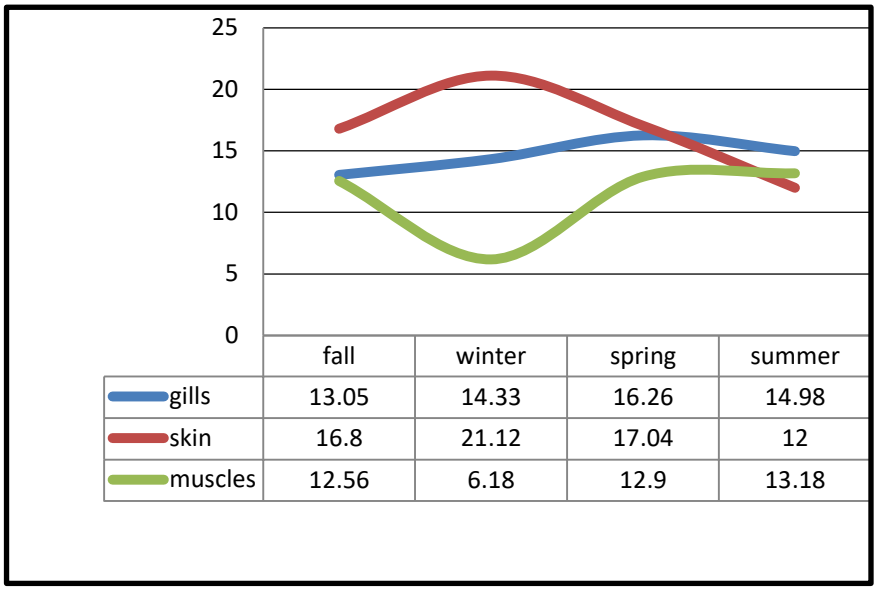
	fall	winter	spring	summer
gills	0.79	1.98	1.78	0.79
skin	8.93	3.67	7.76	7.7
muscles	1.95	1.93	1.76	2.75

Figure (2): Seasonal rates of lipid content of Tilapia Zilli(%)



	fall	winter	spring	summer
gills	8.5	13.7	14	21.4
skin	25.6	19.17	25.3	28.2
muscles	13.8	17.8	13.05	13.05

Figure (3): Seasonal rates of protein content of Liza Abu (%)



	fall	winter	spring	summer
gills	13.05	14.33	16.26	14.98
skin	16.8	21.12	17.04	12
muscles	12.56	6.18	12.9	13.18

Figure (4): Seasonal rates of protein content of Tilapia Zilli(%)

***Figure (5); Liza Abu* in study site**

***Figure (6); Tilapia Zilli* in study site**

4. Discussion

Many factors lead to changes in the rates of biochemical contents (protein, lipid) in fish, including the nature of the food present in the surrounding waters, the stage of sexual maturity, as well as the fishing season and environmental factors, the most important of which is the temperature (Ali., Et al, 2001; Javaid) ., et al, 1992; Craig., et al, 1989; Shearer, 1994), that the decrease or increase in the percentages of biochemical contents during the study period was attributed to the nutritional status, i.e. quantity and quality of food, salinity, hunting season, age, temperature and It vary with different species or individuals within the same species according to age, gender and surrounding environment conditions (Hammoudi, 1989; Huss, 1995; Enderson, 1984) The period of reproduction in fish and the process of egg formation and growth is associated with the consumption of large amounts of energy, which leads to a decrease in the content of Fat and protein in other organs, especially muscles (Al-Tamimi, 2004; Htun-Han, 1978), high energy reserve represented by protein and fats in any season of the year is a result of obtaining an adequate amount of food and the absence of depletion of energy; To use it as a source of energy during The period of maturity of the ovaries (Afrah, 2007) The winter season usually witnesses a scarcity of food sources and a decrease in temperature, which is reflected in the content of fat and protein in the tissues (Al-Khafaji, 1988; Ahmed, 1992; Hindi, 1996; Hantoush, 1998)as mentioned by (Al-Mousawi, 1990; Al-Muzaffar, 1999; Hammoudi, 1989), that the winter season witnesses a decline in that stock due to the construction and development of germs, and the performance of various vital activities also leads to the depletion of energy (Ali., Et al, 2004; Koehn, 2004). during the summer, the rate of accumulation of biochemical components increases significantly due to the high level of nutritional activity and metabolism, as well as the lack of the need to use energy stores in the sexual maturity process (Al-Aqabi, 1997; Yesser, 1988; Htun-Han Al-Khafaji, 1978, 1988; Al-Mousawi, 1990).

Both (Al-Khafaji, 1999; Al-Muzaffar, 1999) stated that the percentage of females in the studied fish is higher than that of males for several reasons, including the arrival of males to the stage of sexual maturity before the females. Activity and energy and consequently their exposure to disease or death increases (Burbid, 1969), or it may be due to genetic reasons that lead to the production of eggs that hatch more females than males (Siddiqui, 1977), (Özcan, 2016) stated in his study that the proportion of females was Prevalent (1: 1.29), according to the study of (Chelemal., et al, 2009; Özcan 2016) that Liza Abu females are predominant over males due to the high growth rate compared to males, and females were more mature by 8.73 compared to males 2.66 and bighead. As stated in the study (Al-Shamaa, 2009), that any difference in fish sizes is due to many factors, including changes that occur before and during periods of sexual maturity, nutrition, disease status, and age (Yilidrim, 2001).

Liza Abu fish is of great economic importance, as it is available and low in price compared to other types of fish, as it of nutritional benefits (Shamaa ., et al 2009) and the individuals of this species live in fresh and saltwater in (rivers, lakes, estuaries, ponds, marshes). The shallow and deepest point in the seas, its original home in Asia, specifically Iraq, Syria, Iran, and Turkey, as well as spread in different regions of Africa, Europe, and Australia (Koutrakis, 2011; Al-Daham, 1984; Talwar, 1991; Nasir, 1988; Kaya, 2016). It can withstand temperatures up to 39 and salinity of 10-30 parts per thousand. As for the pH, the lowest value it can bear is 4 (Talfan, 1983). (Naama, 1982) stated that liza is one of the carnivores since its diet is rich in protein and fats. It feeds on phytoplankton and zooplankton, insects, algae, and organic crumbs, and its diet varies according to the season (Al-Shamaa and his group, 2012).

Tilapia can resist in the harshest environments such as saltwater, hot springs, acid, and alkaline lakes, and they can adapt to these environments (Yusef, 2016). They are native to Africa, then transported to aquatic bodies around the world. , And the pH is between 6.5-9, and the optimum temperature for their reproduction is 30 ° C (Body, 1979; Balarin & Haller, 1982; Panfil., ***et al***, 2004), they can withstand dissolved oxygen up to 0.7 mg/liter, they thrive at DO 3 mg / L (Piper., ***et***

al, 1992). Tilapia fish depend on phytoplankton, invertebrates, animal, and plant dead remains for their food. Tilapia is good food that is widespread in warm and tropical regions and is considered to be a fast-breeder and is characterized by easy hatching (Lucy, 2005)

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