

Effect of different weights of common carp on its chemical composition

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Abstract

The chemical composition of common carp depends on age, sex, type of nutrition, and the environment in which it lives. Knowing the chemical composition helps in choosing the appropriate species for the food industry and human nutrition. Also, the chemical composition has an important role in the quality of fish meat. In this research, 30 common carp fish were taken at different weights that ranged between (400-2000) g. The percentages of each of the dry matter, protein, fat, and ash were measured in special laboratories for industries. The results showed that the average moisture content was 27.80%, protein 15.52%, fat 10.48%, and ash 1.79%. The results of this research showed that there was no significant difference ($0.05 > P$) between the fish samples under study. The samples were stored by freezing at -18°C to see the effect of freezing on their chemical properties. The results were as follows: moisture were 80% ,80.17% , 80.50% , 81.50% and 82.56% for treatment T1,T2,T3,T4,T5 respectively. the protein values of all studied samples stored by freezing, as they reached 15.44, 15.0, 15.22, 14.90 and 15.33% respectively. On the other hand, the results showed that the ash percentage did not change during the freezing period. The different weights of the fish have no relationship in the content of the chemical composition of the fish meat (moisture, protein, fat, ash), and the weight of the fish does not affect the quality of the meat

Keywords: Carp fish, moisture, protein, fat, ash

Introduction

Fish is an important and valuable source of protein for humans and aquatic animals. It is the fastest-growing sector in animal food production in the world (1, 2). And that the consumption of fish comes with many benefits as an important part of the diet, and because of the presence of protein and fats, the unsaturated vitamins and minerals found in fish can play an important role in reducing malnutrition, especially in young children, pregnant women and the elderly, and that eating fish reduces heart disease And blood vessels, such as blood pressure and prevention of increased obesity, some types of cancer, Alzheimer's disease and brain damage (3,25). Due to the presence of omega-3 unsaturated fatty acids, it has a major role in human health and prevention of many diseases, including heart attack (21, 24). Fish wealth in the world and the Arab world is considered one of the important fields of economic development, because of its characteristics of continuity and renewal, and consumer demand for fish is increasing due to its high nutritional value and distinctive flavor. Iraq has a good fish wealth, so it is necessary to make the most of fish production and preserve it from wastage and loss, and thus reduce economic losses. Carp is considered one of the most important economic fish spread in inland water bodies, and it is also considered one of the main breeding fish in Iraqi fish farms (21,26). Because of the increasing demand for fish and fish products, it must be taken into account that determining the quality of fish meat is very necessary, because quality and nutritional value is the main factor for acceptance by consumers and storage of meat (6, 19). The measurement of chemical compounds (dry matter, protein, fat, and ash) in fish meat is very important to determine the nutritional value for direct consumption, storage, and marketing (8, 20). The research aims to know the effect of freezing processes on some of the basic components of moisture, protein, fat, and ash in the composition of carp fish, which is one of the desirable fish for human consumption in Iraq.

Material and methods

Preparation of raw Fish for research

This research was carried out in the fourth month of the year 2023 to determine the percentage of moisture, protein, fat, and ash of carp fish fillets cultured in cages in the Euphrates River. The fish were divided according to their weight and divided into five groups, each group of ten fish as follows:-

T1 First group of fish weighing 400 g

T2 Second group of fish weighing 800 g

T3 Third group of fish weighing 1000 g

T4 Fourth group of fish weighing 1500 g

T5 Fifth group of fish weighing 2000 g

The fish were chosen for this experiment, healthy and not infected with any disease or the presence of any abnormal symptoms. The fish were weighed with a very accurate electronic scale, and 100 grams of muscle were taken from each fish sample for examination and placed in special packages for this purpose and numbered and kept in refrigeration.

Chemical Composition Determination

Chemical tests were carried out at the rate of three replications for each fish sample. According to the method used in (27), samples of fish meat were taken by mixing fish muscles, and chemical tests were conducted on them for moisture, protein, fat, and ash.

Determination of moisture and ash.

The percentage of dry matter and ash was estimated as mentioned in (17).

Estimation of protein and fat.

Estimate the protein by multiplying the total nitrogen by the protein conversion factor (6.25). The percentage of fat was estimated after extraction by the Soxhlet method. As mentioned in (Egan, et al 1988).

statistical analysis

Statistical analysis was carried out using the statistical program SAS (2012). (29).

Results and discussion

chemical composition of carp

From the results in Table 1, it was noted that there was a slight change in the chemical composition of each of the moisture, protein, fat, and ash with an increase in weight for the carp fish under study. The lowest moisture content of the samples was reached in samples of 400 gm, which was 77.85%, and the highest moisture content was reached in samples of large weights, which ranged between 1600-2000 gm were 81.00- 82.12%. Studying the physical composition of fish to understand the nutritional characteristics and changes in the quality of fish is very important, and based on the quality of fish meat, the sensory characteristics, chemical composition, and physical properties of it are determined, and the characteristics of the quality of fish meat in terms of its consumption by the consumer, and meat recipes are considered a good indicator of its fitness for food, and these characteristics It is easy to measure (4,9). The researchers explained that the quality of different types of fish is determined by knowing their chemical characteristics such as moisture, protein, fat, and ash (15, 18). In other studies, changes have been shown in the chemical properties of carp fish meat when commercial probiotics are added to the fish diet, where protein levels range from 47-48%, fat 22-32%, and ash 2-5% (11). Studies indicate that an increase in the amount of crude protein and fat in fish leads to good growth (12,13). (1) indicated that the nutritional value of fish used as a food source depends on its chemical composition. (7) reported that the chemical composition information is used to find the optimal conditions for processing and storing fish and also works to know how fresh it is. The protein percentages in the different samples ranged between 15.50% for fish weighing 400 gm and 15.67% for fish weighing 2000 gm. The average protein for all samples was 15.02%. The amount of protein in healthy fish is the most important composition in fish, and the protein in fish is ideal for essential amino acids, as well as an important source of vitamins A, B, and D (14,16). These percentages of protein in all samples are considered normal percentages, but they are considered low when compared with the protein content of river fish, which usually has of protein content is to 12-18%, and marine fish, which ranges between 9-22% (8, 10). There is no significant difference in the fat content for all samples and different weights of fish, as the fat content in fish weighing 400 gm reached 10.60% and in fish with large weight 10.50%. There is also no significant difference in the ash content of all samples, as it reached 1.90% in small fish and 1.71% in large fish, and the average ash content of all samples reached 1.79%. From these results, we notice the change in the percentage of fat, ash, and moisture with increasing weight, but slightly. The researchers found that the quality of fish meat in different species and one species depends on environmental conditions, season, nutrition, sex, size, and age (5, 6). At the expense of the amount of water in the muscles of fish (22, 23). In Iraq, the consumer tends to consume fish of medium to large size, and there is another consideration that marine fish is considered better than freshwater fish or fish farmed in rivers.

Table 1. Average chemical composition of different weights of common carp

Chemical Composition%	400 gm	800 gm	1200 gm	1600 gm	2000 gm	average
Moisture content	77.85	80.07	80.0	81.00	82.12	27.80
Protein content	15.50	.1505	.1540	.1500	.1567	.1502

Fat content	10.60	.1065	10.71	.1050	.1006	.1050
Ash content	.190	2.00	1.81	.182	.171	1.79

These results represent the average of two replicates

Effect of frozen fish storage on its chemical properties

Table 2. shows the results of the chemical properties of fish samples under study after storing them by freezing at -18 C ° for four weeks. It appears that When compared to the results of Table No. 1. showed an increase in the humidity at very low rates after 4 weeks of storage from freezing was 80% For samples weighing 400 g, 80.17% for samples weighing 800g, 80.50% for samples weighing 1200g, 81.50% for samples weighing 1600g and 82.56% for samples weighing 2000g but it remains within acceptable limits. On the other hand, the results showed that the ash percentage did not change during the freezing period in the samples of the fish species under study at -18C° freezing degrees compared to the fresh samples in Table 1. The results of the study showed a slight decrease in the protein values of all studied samples stored by freezing, as they reached 15.44, 15.0, 15.22, 14.90, and 15.33% respectively. Fat content for all treatments were 10.52, 10.45, 10.64, 10.40, and 10.0% for T1, T2, T3, T4, and T5respectivel. These results indicate that these properties were not affected by freezing storage at -18 degrees for four weeks. These results agreed with what the researcher reached when storing samples of imported fish meat by freezing for different storage periods (28).

Table 2. Effect of frozen fish storage on its chemical properties

Chemical Composition%	Storage period / 4 week				
	Type of sample				
	400g	800g	1200g	1600g	2000g
Moisture	80.0	80.17	80.5	81.50	82.56
Protein	15.44	.1500	.1522	14.90	.1533
Fat	10.52	.1045	.1064	.1040	.1000
Ash	1.91	2.00	1.85	.188	.174

These results represent the average of two replicates

Conclusion

We conclude from this study that the results of some chemical and qualitative tests for samples of some types of local frozen fish from Iraq have proven the validity of the studied species for human consumption after comparing them with the values of the Iraqi and international standard specifications approved globally, it is average and very suitable, but in terms of nutrition of carp fish at different weights, it has no significant effect on its chemical composition.

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