Comparıson Study of Proximate Analysis of Common Carp (*Cyprinus carpio* L.) Fish Meet Reared in Earthen Ponds in Ranya (North Of Iraq)

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Abstract

The study was carried out during the five months period (May to September 2017) between the farming period and the harvesting season. The mean values of moisture ratio (75.937 % to 70.498 %) were not significantly differ (P>0.05), however fat ratio (13.36 % to 6.33 %), protein ratio (21.79 % to 10.40 %) and ash ratio (2.35 % to 1.01 %) of fish meat samples, which were taken from different fish ponds, were found significantly different (P<0.05). The panel tests that were conducted to evaluate the quality of fish's meat, showed significant differences (P<0.05) in tenderness (4.8 to 3.0 at degree scale 5) and overall acceptability (4.8 to 3.6 at degree scale 5), and no significant differences (P>0.05) in each of juiciness (4.2 to 3.4 at degree scale 5) and flavor (4.6 to 3.6 at degree scale 5).

Key Words: Common Carp, Meat Quality, Organoleptic Evaluation , Ranya and Iraq.

دراسة مقارنة للتركيب الكيمياوى للحم أسماك الكارب العادي (*Cyprinus carpio* L.) المرباة في أحواض ترابية في منطقة رانية (شمال العراق)

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الخلاصة

هدفت الدراسة الحالية تحديد المفاهيم الانتاجية لسمكة الكارب الشائع في منطقة رانية بمقارنة ستة احواض في مناطق مختلفة. اجريت الدراسة الحالية لمدة خمسة اشهر بين مايس و ايلول 2017 للمقارنة بين الحقول المختلفة وموسم الحصاد. لم تظهر إختلافات معنوية في نسبة الرطوبة (75.937% الى 70.498%) ، وكانت نسبة الدهن (13.36% الى 6.33%)، و نسبة البروتين 21.79% الى 10.40% ونسبة الرماد (2.35% الى 1.01%). أظهرت نتائج التقييم الحسي إختلافا معنويا (P<0.05) في الصلابة والتقبل العام، ولم تكن معنوية في العصيرية والنكهة.

الكلمات المفتاحية: كارب شائع، نوعية اللحم، التقييم الحسي ، رانية و العراق.

Introduction

Fishmeat is the cheapest and most easily digestible animal protein and it is obtained fromnatural sources from time immemorial for consumption. Due to overexploitation and pollution, the availability of fish in natural waters has declined considerably, forcing scientists to adopt various methods to increase its production. Fish farming in controlled or under artificial conditions has become the easier way of increasing fish production and its availability for consumption. Farmers can easily take up fish culture in village ponds, tanks or any new water body and can improve their financial position substantially. It also creates gainful employment for skilled and unskilled youths (FAO, 2015).

Freshwater aquaculture production is mainly based on the culture of short food chain fish (Carps, Tilapias) and differs basically from marine fish culture based on carnivorous fish (salmon, Japanese amberjack).Despite all the scientific studies carried out in this field, the pond as a culture environment remains a black box where fish feeds at many levels of the food web and fish species interact actively. The progresses in pond fish culture management practices have mainly been obtained by a trial and error process.

Aquaculture activity in the north region of Iraq started in 1960 with common carp on Dokan and Darbandikhan dam (MAWR, 2017). In 1999 the Food and Agriculture Organization established two projects for fish; one was in Erbil and the other in Sulaimaniya, with the development of a hatchery for the artificial reproduction of common carp (*C. carpio*), silver carp *(Hypophthalmichthysmolitrix)* and grass carp (*Ctenopharyngodonidellus*) (MPN, 2012). The capacity of each hatchery is about 20 million larvae per season, and there are two small feed-mills of a capacity of 4-5 ton per hour. The project has a number of model fish ponds for demonstration and training (MAWR, 2017). In order to analyze the water quality in carp ponds beside physical and chemical analysis of water phyto and zooplankton organisms can be used as bio-indicators (Dulic *et al*., 2006; Dulic *et al*., 2009). Using biological methods of water assessment are a very useful tool since they can reflect overall ecological quality, integrate variations in the environment and indicate biologically available nutrients which chemical analysis cannot measure .

The increase necessity on fish meat in North of Iraq's cities particularly in Sulaimaniya and Erbil Governorates due to population growth with suitable economic situation especially after 2010; also brought about excessive demand on various types of fish meats obtained from natural growing fishes in lakes. In this region, water temperature values are optimum for about 5-6 months during the year for growing of subtropical climate Cyprinids. For this reason, a rapid increasing in earthen ponds has seen. The study aimed to determine the proximate analysis of common carp (*Cyprinus carpio* L.) in Ranya Zone (Raparin Administration), with comparing ponds statics of selected six farms.

Materials and Methods

Description of studied area

Ranya (Raparin Administration): Ranya is a town located in north of Iraq, 130 km northwest of Sulaimaniya Governorate (36°15'16.26"N,44°52'59.79"E). However Raparin zone has best agriculture land and touristic places it has also many Orchard at mountain and valley, Rivers, lake, dyke, Brooks, watersheds (Khalid, 2010).

Description of studied fish farms

Survey was taken 20 days completely from 26 March to 16 April- 2017 however all ponds had pathway but it was raining season, some ponds were not constructing some of them were empty, or waiting marketing shift, etc. But asking villagers took most time because they were answering carefully.

Fish sampling

The proximate analysis for fish meat were done for six pond position (S) for each pond 5 fishes were took randomly by thrown net. In order to detect the nutritional value of fish meat as chemical composition and panel evaluation were taken along with the chemical composition of the feed given to the reared fish. All fish samples were used for the chemical analysis of the muscle (Moisture %, crude protein %, ether extract % and ash %) according to (AOAC, 2000) analytical methods.

Proximate analysis of fish meat

Moisture ratio: Evaluating of Moisture content was determined by drying samples in oven at 120ºC for 24 hours to study weight (AOAC, 2000).

Fat ratio: The Soxhlet method for determining crude fat content were used, the solvent extraction step alone takes six hours (AOAC, 2000).

Protein ratio: Determination of the crude protein were conducted by Kjeldahl method (büchiautokjeldahl unit k-370) (Application Note 2006,Distillation Unit K-355) by calculating the total nitrogen content in the sample after digesting a known weight with concentrated sulfuric acid, distillation with boric acid and hydrochloric acid correction, then multiplying the nitrogen value by (6.25) (AOAC, 2000).Ash ratio: Ash was determined by combustion at 550 ± 25 ºC (AOAC, 2000).

Panel Evaluation of Fish Meat

Sensory analyses will be performed by a panel of seven experienced assessors. The fish meat fillets specimens were placed in open aluminum boxes and cooked for 15 minutes in an oven pre-heated at 180°C (Appleton and Wisconsin, 1982), (AOAC, 2000) each member of the panel filled a sensory evaluation table (Table 1).

Statistical Analysis

Analysis of variance was conducted using the general linear models (GLM) procedure of XLSTAT. Pro. 7.5 one way (ANOVA). Fisher's L.S.D test's was used to compare between means of experiment treatments.

Table (1) Panel (Sensory) Evaluation Table for Common Carp Meat Reared in Different

Treatments	Tenderness	Juiciness	Flavor	Overall acceptability
T1				
T2				
T3				
T4				
T5				
T6				
5 =extremely like; 4 = like; 3 = neither like nor dislike; 2 = dislike; 1 = extremely dislike				

Results and Discussion

Moisture: Data analysis for moisture percentage in common carp meat in studied ponds explained that the last fish pond (S_6) had highest amount of Moisture (75.937%) comparing with other ponds, maximum value for moisture was in (S_6) 75.937 % and minimum was in sixth fish pond (S_2) 70.498 % as seen in (Table 2). The percentage of water in common carp meat is (60–86 %).

Mean value with different superscripts within a column differ significantly ($P \leq 0.05$).Protein: Data analysis for protein ratio in common carp meat in studied

Table (2) Proximate Analysismoisture Ratio of Studied Common Carp Meat.

Earthen ponds	Moisture %
S_1	74.934^a ±0.038
S_2	70.498^a ±0.041
S_3	72.981^a ±0.045
S_4	71.08^a ±0.037
S_5	73.953^a ±0.054
S_6	75.937^a ±0.051

ponds explained that the pond S_3 had highest value and maximum of protein (16.8%) comparing with other ponds and minimum was in (S4) 13.2 % as shown in (Table 3)Mean value with different superscripts within a column differ significantly ($P \leq 0.05$).

Protein ratio content in common carp meat is in range from 14 to 20 % (Trbovic *et al*., 2009; Cirkovic, 2010). Although some authors state that this range is slightly higher and amounts from 13 to 25 %.

The higher Protein ratio in fish pond S3 as shown in Table (3) over other ponds refer to given fish meal for 3 months also surrounding pond by many plants and fruit trees also on pond had lights at night it was due to tract insect toward ponds and be a good source as natural food for fishes, and minimum value of protein was in fish pond S_4 13.2 % due to that pond was given poultry feed with extra oil and human food wastage.

Fat: Data analysis for fat ratio in common carp meat in studied ponds explained that the pond S1 had highest amount in comparison with other ponds, Maximum value for fat ratio was in fish pond (S_4) 13.363 % and minimum value was in (S_6) 6.335 %, while comparing the value of data analysis for fat in fishes meat in pond S4 with other ponds had significant value ($p<0.05$), as shown in (Table 4).

Table (3) Proximate Analysis of Protein Ratio of Studied Common Carp Meat.

Earthen ponds	Protein %
S_1	$13.400^{ab} \pm 0.090$
S_2	$16.200^{a} \pm 0.101$
S_3	$16.800^{a} \pm 0.185$
S_4	$13.200^{b} \pm 0.038$
S_5	$16.600^{a} \pm 0.069$
S_6	$15.400^{a} \pm 0.074$

Table (4)Proximate Analysis of Fat Ratio of Studied Common Carp Meat.

Earthen ponds	Fat %
S_1	9.890^{b} ±0.313
S_2	10.189^{b} ±0.252
S_3	7.652^{bc} ±0.183
S_4	13.363^{a} ±0.097
S_5	7.622^{bc} ±0.352
S_6	6.335^{c} ±0.292

Mean Value with Different Superscripts within a Column Differ Significantly (P≤0.05).

Different age, breeding systems and food are caused wide ranges of fat content in carp from 2.3 to 16.8 % (Miroslav,*et al*., 2011; Ljubojevic *et al*., 2012). Expect farmers were used the same feed(poultry feed grad 2)contain higher ratio of fat (5-7 %)comparing to fish feed (1-1.5 %), the distinction fat ratio in fish pond S4 as shown in (Table 4) over other ponds refer to the farmer was fish monger it due to decreasing stocking density/m^3 and decreasing competition on natural foods, it caused to fast growing of fishes, also that farm didn't infected by diseases the ponds (S_1,S_2,S_3 and S_5) had rather close value of fat ratio the environment and fish stocking density are same, the fishes in pond S_6 had lowest fat ratio due to causes mentioned before as observed in (Table 4).

Ash: Data analysis for Ash ratio or percentage ratio in common carp meat in studied ponds explained that the fishes in pond S3 had highest amount and maximum value of Ash contain (2.355 %) comparing with other ponds and minimum value was in (S_5) 1.018% as showing in (Table 5), while comparing value of fat in fish meat in S_3 with S_1, S_2, S_5 have significant value ($p<0.05$), expect that there are no significant value in comparison among other ponds fish in Ash contain in carp meat ($p>0.05$).

Table (5) Proximate Analysis for Ash of Studied Common Carp Meat.

Earthen ponds	Ash %
S_1	1.068^{b} ±0.118
S_2	1.074^{b} ±0.097
S_3	2.335^{a} ±0.545
S_4	1.599^{ab} ±0.407
S_5	1.018^{b} ±0.093
S_6	1.561^{ab} ±0.359

Mean Value with Different Superscripts with in a Column Differ Significantly (P≤0.05).

Panel Evaluation of Fish Meat

Tenderness: Data analyses of tenderness evaluations for common carp meat, (S_5) got 4.800 score as highest and maximum value and (S_4) as lowest value 3.00 as shown in (Table 6), the data analysis explained that comparing difference of fish meat in pond S5 with ponds S_1, S_3, S_4, S_6, had significant differences ($p<0.05$), but the comparisons among other fish ponds had no significant differences ($p>0.05$) as shown in (Table 6).

Juiciness: Data analyses for juiciness evaluations for common carp meat showd that pond (S_5) got 4.200 as highest value and pond (S_1) as lowest mean with minimum value 3.400 as shown in (Table 6).in data analysis explained comparison among all ponds for juiciness there were not significant value among them ($p>0.05$) as observed in (Table 6).

Flavors: Data analyses for flavors evaluations for common carp meat evaluation showd that pond (S_5) got 4.600 as highest value and pond (S_4) as lowest value 3.600 as shown in (Table 6), the data analysis also explained the comparisons between fish ponds meat for flavor evaluations they were had no significant differences among them ($p>0.05$) as shown in (Table6).

Overall acceptability: Data analyses for Overall acceptability evaluations for common carp meat showd that pond (S_5) got 4.800 as a maximum value and pond (S_4) as lowest score 3.600 as shown in (Table 6), the data analysis explained the comparison among fishes meat S_5 with S_1, S_3, S_4 had significant values ($p<0.05$) instead of these comparisons among other fishes meat had no significant values ($p> 0.05$) as shown in (Table 6).

Table (6) Panel (Sensory) Evaluation for Common Carp Meat.

Treatments	Tenderness	Juiciness	Flavor	Overall Acceptability
S_1	3.600^{b} ±0.152	3.400^{a} ±0.263	4.000^{a} ±0.177	3.800^{a} ±0.220
S_2	4.000^{ab} ±0.177	4.000^{a} ±0.250	4.000^{a} ±0.177	4.400^{ab} ±0.124
S_3	3.800^{b} ±0.220	3.800^{a} ±0.220	3.800^{a} ±0.220	3.800^{b} ±0.118
S_4	3.000^{b} ±0.236	3.600^{a} ±0.248	3.600^{a} ±0.317	3.600^{b} ±0.152
S_5	4.800^{a} ±0.093	4.200^{a} ±0.106	4.600^{a} ±0.119	4.800^{a} ±0.093
S_6	3.600^{b} ±0.248	3.600^{a} ±0.152	4.000^{a} ±0.177	4.200^{ab} ±0.199
5 =extremely like; 4 = like; 3 = neither like nor dislike; 2 = dislike; 1 = extremely dislike				

Mean Value with Different Superscripts within a Column Differ Significantly (P≤0.05).

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