Plant Archives Vol. 21, Supplement 1, 2021 pp. 59-62 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
doi link : https://doi.org/10.51470/PLANTARCHIVES.2021.v21.S1.012

EFFECTS OF DRIED RAW FISH OFFAL MEALS AND COOKED AS ANIMAL PROTEIN IN DIETS OF COMMON CARP (*CYPRINUS CARPIO* L.) ON GROWTH CRITERIA

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ABSTRACT

The study was conducted for the period 25/8/2019 and for 25/11/2019 in fish laboratory / College of Agricultural Engineering Sciences / University of Baghdad to definition effect of using cooked fish offal meals and heat and solar dried intent on diets of common carp fish. 126 fingerlings with an average initial weight of 24.5 ± 0.5 g / biomass were randomly distributed to nine feeding treatments by two replicates per treatment and by seven fingerlings per replicate. Equal Nine protein and energy feeds were formulation approximately with different proportions of addition of fish offal meals (%10, %24). Respectively for all treatments except the control treatment that was free of addition and included T2, T3: thermally dried cooked offal meal and T4, T5: sun-dried, cooked offal meal and T6, T7: thermally dried un cooked offal meal and T8, T9: sun dried un cooked offal meal. The results indicated that the T4 treatment was the best laboratory treatment, and there were significant differences (P <0.01) were recorded with the control treatment T1 and the rest of the other treatments in the growth and diet criteria, We conclude from the present study to the possibility of using Fish offal meal cooked and sun-dried at a rate of %10 as a source of animal protein in diets of common carp fish without negative effects on the efficiency of nutrition, growth and at the lowest nutritional costs.

Keywords **:** Growth, common carp, fish offal meal, Diets.

Introduction

Fish has been economically important in all countries of the world since ancient times, as the importance of fish in some countries is such that it constitutes a high proportion of daily human food (Fawole *et al*., 2007). The global demand for aquatic food is on the rise, and this is not only due to population growth, but because fish is considered a good healthy food through its contribution and providing high quality protein (Abimorad *et al*., 2007). The fish farming sector is the fastest growing in production and maintaining global food security for more than two decades due to its rapid development, so intensive fish farming systems are seen as the main food source rather than commercial fisheries (FAO, 2018). Fish farming has become of great importance in providing fish, especially in countries that have fresh water, such as Iraq. It is also seen that a future outlook can be optimistic for the purpose of maintaining a good and appropriate consumption rate for the Iraqi individual. Increasing the production of intensive farming systems must be supported and consistent with Increased production of processed feed in fish feeding (Rahman *et al*., 2013). Nutrition is one of the most important ingredients of fish farming success and is important to most workers in this field and that industrial nutrition is required and essential in high-density culture systems to increase the production rate of farmed fish as the availability of sufficient quantities of good quality of food leads to faster growth of fish (Muzinic *et al*., 2006). The cost of feed represents the highest percentage of the operating costs of fish farming, and protein sources are the main contributor to the cost of fish feed. Fish meal is the preferred food protein source for many types of farmed fish due to the balance of amino acids, vitamins and mineral salts and it palatability, especially since fish are animals of high protein requirement compared to poultry and ruminants, the protein requirement in the diet varies according to type and different growth stages, ranging from 25 to 60% (Sogbesan and Aladetohun, 2013). The research aims to study the possibility of utilizing discarded Offals in the fish selling markets (internal organs) as a source of animal protein and use it as meals in the rations of fingerlings of common carp fish (*Cyprinus carpio*) and in the proportions that give the best growth rates and provide the fish feed industry with a less expensive ingredient food component than traditional fish meal. On the other hand, this will also contribute to protecting the environment through the use of organic fish offal that can pollute the environment and find a way to get rid of them, because the fish offals is perishable because it contains easily digestible protein and microbial organisms linked to the digestion process, which is one of the main causes of spoilage.

Materials and Methods

Fish offal meals

Samples of discarded parts of fish (internal viscera) weighing 20 kg were collected from the fish market in the Dora region for two days to formulation and prepare them as a product and source of animal protein to be added to the rest of the diets. Parts of discarded fish consist of internal viscera, which includes: the digestive tract, liver, pancreas, spleen, gonads and air sac that are not sold because they are not suitable for human consumption. The samples collected were washed with clean water to get rid of impurities, dust, and unwanted suspended matter and cook half of the amount on a quiet heat at a temperature 50 °C. With the process of extracting and emptying the fish oil, the process continued until the oil did not appear, and the product was divided into two halves, and one was dried in the sun and the other thermally in the oven at 50 ºC produced supplements were placed in plastic bags and stored in the refrigerator until the diets were formulation, while the second part was divided into two halves and one of them was dried Without solar cooking and left in the shade for a week with good coverage and the other is dried heat in the oven at a temperature of 50 °C on intermittent intervals so that the fish oil is collected after that the forms are packed in plastic bags in the form of meals and stored in the freezer at -18 ° C until the manufacture of experimental diets.

Formulation of experimental Diets

The process of preparing feeds included buying feed materials from the local market and grinding materials that need grinding such as soybean meal, sorghum, barley and wheat bran by a Chinese-origin laboratory mill in a fish laboratory. Table (1) After calculating the proportions of feed ingredients included in the feed components, mix the feed materials with Some of them were homogeneous, made nine experimental diets, close to protein content, and the heat and sun-dried cooked and raw fish offal meals were added to eight diets, %10 for T2, T4, T6, T8 treatments, and %24 for T3, T5, T7, T9 treatments, while the T1 control treatment Add fish offal meals table (2). Mix by hand until the mixture is homogeneous for each diet separately and add 400 ml water per kilogram of the mixture of the feed components and then placed in a Chinese meat mincing machine with 4.5 mm holes to form coherent feed strands by re-choping twice and then spread the fingers of the blackberry into vessels and exposed to the air to dry At room temperature for 48 hours, cut the fingers of the bush after drying completely into small pieces that fit the size of the mouth of the experiment fish. Then they were kept in bags and the diets were stored in the freezer at a temperature of -18 °C until the experiment was started.

Statistical Analysis

The obtained data were subjected to statistical analysis including analysis of variance (one way ANOVA) and significance of differences between means was tested according to Duncan (1995), using SAS Program.

Results and Discussion

Table (3) shows the criteria for the growth of common carp fish in the current study, in which the initial weight of all treatments was uniform at a rate of (24.5 ± 0.5) g. The current study showed, after performing the statistical analysis, that there were significant differences (P <0.01) between the control treatment T1 and the rest of the factors The other trial was (T2, T3, T4, T5, T6, T7, T8, T9) as T2 (T3, T4, T5, T6, and T8) coefficients outperformed the control treatment T1 in the final weight rate, weight increase rate, specific growth rate, and relative growth rate as the fourth treatment showed (T4) was highly significant and the best in the mentioned criteria were the highest values recorded: 75.74 g, 51.24 g, 2.01% and 209.16%, respectively, followed by the fifth treatment (T5) 72.07 g, 47.57 g, 1.92 194.18%, respectively, followed by the treatment Second (T2) 69.40 g, 44.90 g, 1.86% and 183.27%, respectively, followed by the third treatment 67.82 (T3) gm, 43.32 g, 1.83% 176.81 respectively, followed by the sixth treatment (T6) 65.59 g, 41.09 g,% 1.76 and 167.73%, respectively, followed by the eighth treatment 63.53 (T8) g, 39.03 g, 1.70% and 159%, respectively. While statistical analysis showed that the control treatment T1, which recorded the values 61.70 g, 37.20 g, 1.65% and 151.83%, respectively, outperformed the coefficients (T7) and (T9) that did not differ significantly between them and recorded the lowest values in the growth criteria The same 58.47 g, 33.97 g, 1.55% and 138.67%, 59.29 g, 37.79 g, 1.57% and 142.00%, respectively. The reason may be due to the nutritional efficiency of T4, and its palatability by experimental fish, or because sun-dried fish offal meals is a good source of protein, as it contains protein-analyzing enzymes in diets to facilitate digestion and absorption in the intestine, and this has been reflected increased growth rates or may be due to its content The high and balanced quantity and quality of the essential amino acids necessary for growth, especially lysine, methionine and tryptophan, which are among the needs of fish and it is necessary to contain protein in fish diets on essential amino acids to be an integrated protein (Tegena *et al*. 2018) as well as its high content of necessary mineral elements which are important It is vital in the performance of the body and plays. an important role in the representation of proteins, fats, carbohydrates, vitamins, bone building and tissues such as calcium, phosphorus, magnesium, potassium, iodine and iron (Mondal *et al*., 2008). These results were agreed with Iriobe *et al*. (2018). as they demonstrated that the use of fish offal meals and sun-dried in Running (*Clarias gariepinus*), 11.14% in The diet, which is close to the 10% rate used in the current study, showed significant superiority P <0.05 in the weight gain rate, the specific growth rate and the relative growth rate. The results of the current study were in agreement with the results of the study conducted by Mondal and others (2011) in his study on the use of fish offal meals by 10% in the Indian Minor Carp diet (Labeo bata), which showed significant superiority at the level of (P<0.05) in the rate of weight gain which It did not differ significantly with the control treatment.

Conclusions

The study showed the possibility of using sun-dried fish offal meals as feedstuff in diets of common

carp fish by up to 10% as a source of animal protein, as it showed better results in growth standards and a reduction in high costs per feed compared to the control diet and the possibility of producing a local protein center from fish offal Neglected and thus encourage the use of locally available feed instead of traditional imported feed, which contributes to reducing import values for the country and encouraging small business owners to contribute to the animal feed industry in general and fish in particular.

Table 1 : The chemical composition of the primary materials involved in the formation of diets of experimental common carp fish

Feed article	CP Protein %	Fat %	Ash %	Fiber %	Carbohydrate%
fish meal *	62	14	9	1.20	13.80
Soya meal **	45	6.44	7.21	6.90	35.81
Maize **	9	4.87	2.61	2.25	80.15
Wheat flour **	12.8	1.79	2.14	2.48	79.56
Barley **	12	3.00	13.80	9.40	63.00
Wheat bran **	15.72	12.50	3.21	4.11	62.99

* The card installed by the manufacturer on the product ** As stated in N.R.C (2011).

Table 2 : Ingredients and proximate composition of experimental diets (on %dry matter basis)

Ingredients	T1	T2	T3	T4	T5	T6	T7	T8	T9
fish meal	17	10	—	10	—	10	—	10	—
fish offal meal	—	10	24	10	24	10	24	10	24
Soya meal	43	43	45	43	44	43	45	43	42
Maize	6	7	8	5	3	7	7	7	5
Barley	8	7	6	8	4	8	5	8	5
Wheat bran	12	12	8	12	16	14	10	4	14
Wheat flour	12	10	7	10	7	6	7	6	8
Fish oil	0.5	—	—	—	—	—	—	—	—
V/M Premix	1	1	1	1	1	1	1	1	1
Salt	0.5	1	1	1	1	1	1	1	1

Table 3 : Feeding and growth performance of common carp fed on diets containing fish offal meals (mean ± standard error)

TRT	Initial Weight	Final Weight	Weight Gain	S G R	R G R
T1	24.50 ± 3.5 a	61.70 ± 0.20 g	37.20 ± 0.20 g	g 1.65 ± 0.010	g 151.83 ± 0.81
T2	24.50 ± 3.5 a	69.40 ± 0.12 c	44.90 ± 0.12 c	c 1.86 ± 0.000	c 183.27 ± 0.49
T3	24.50 ± 3.5 a	67.82 ± 0.52 d	43..32 ± 0.52 d	d 1.83 ± 0.015	d 176.81 ± 2.12
T4	24.50 ± 3.5 a	75.74 ± 0.46 a	51.24± 0.46 a	a 2.01 ± 0.015	a 209.16 ± 1.89
T5	24.50 ± 3.5 a	72.07 ± 0.16 b	47.57 ± 0.16 b	b 1.92 ± 0.005	b 194.18 ± 0.67
T6	24.50 ± 3.5 a	e 65.59 ± 0.39	e 41.09 ± 0.39	e 1.76 ± 0.10	e 167.73 ± 0.61
T7	24.50 ± 3.5 a	h 58.47 ± 0.19	h 33.97 ± 0.19	h 1.55 ± 0.005	h 138.67 ± 0.79
T8	24.50 ± 3.5 a	f 63.53 ± 0.11	f 39.03 ± 0.11	f 1.70 ± 0.00	f 159.33 ± 0.47
T9	24.50 ± 3.5 a	h 59.29 ± 0.47	h 34.79 ± 0.47	h 1.57 ± 0.015	h 142.00 ± 1.92

Note: a, b, c, d, e, f, h significance at ($P < 0.01$)

Acknowledgement

This research was partially supported by Directorate of Animal Resource who provided insight and expertise that greatly assisted the research.

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