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EFFECT OF USING CORN RESIDUES AS A SUBSTITUTES IN THE CAGE DIET OF COMMON CARP ON EUPHRATES RIVER

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Abstract

This experiment was conducted on common cage carp fishes bred in Euphrates River from 1st June to late October 2017. Corn residues were used to replace barley as diet for being cheaper provender. Fish average weight was 140 $\pm$ 17.8g and fed with various provender types with variant corn percentages The fishes sample were divided, which were 1000, into four diet treatments with two replications for each. The first treatment was the control which contains 15% barley without corn residue, the second treatment was given a mix of 10% barley and 5% corn, the third treatments was given a mix of 5% barley and 10% corn residue, and the fourth one was given diet with 15% corn without barley. Fish weights and weight wired monthly measured by taking 260 randomly sample of fish gain as 20% of the sample was weighed randomly. Results showed that fish, which were fed with variant corn redid diet, gained significant weight ($P \leq 0.05$) and that the fourth treatment with 15% corn residue diet gained higher weight than the other treatments, which was achieved by two cost diet.

Key words : Fish, corn, residue, ration, cages, weight.

Introduction

Fish cages flourished rapidly in terms of productivity from 18.06 million tons in 2006 to 20.01 million tons in 2009 (FAO,2006), due to the population growth and health awareness, which increases demand on fish meat for high quality protein (Abimorad, E.G, 2007). Therefore, floating fish cages technique was adopted for its economics, facility of breeding control, feeding, health, marketing and management. The technique facilitates using natural nutrition and human supervision. The cages provide high fish density in the square meter (Kadhim 2013), (Jawdhari, 2018). Fish diet consists of several nutritional components that satisfy the needs of the fish to the basic elements (Delahiguera, M, 1988), considering the economics being the most important issues facing fisheries owners, which increase the project costs (Jackson1982). Hence, many researchers paid attention to find diet alternatives for the traditional ones like soybean shells or other protein sources (Anderew, 2002), (Jobling, 1996), (Hamed, 2011) like the use of Sesbania plant as a substitute for soybean to decrease the cost of the unit production of white meat due to the use of cheap diets that are locally available. The use of the various types' agricultural by-products can reduce diet cost up to 20-40% as partial or total alternatives to traditional diets (Mokhtar, 1974). Thus, such alternatives represent an important economic value for being the main diet source as they can be given to fish directly or with minor improvements. The potential of introducing agricultural by products into animal diets requires identifying their physical, chemical characteristics and planning of the proper introduction as a diet (Martin, 2008) and (Losa, 2001).

Corn is one of the well-known grain products of food and industry in many countries in the world as it occupies the third place internationally following wheat and rice in terms of the farmed areas, production and use in energy sector. Corn starch content is 65% in addition to very low percentage of fiber (0.1-2%). Protein content in corn varies from 8% to 13% Protein in corn comes in two types: zein protein, like that in abundance of endosperm, which lacks the basic amino acids and fat protein, which varies from 3% to 6% (Capote, 2013). Corn is usually crushed before it is added to animal diets and its residues

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and bran are used in manufacturing livestock and bird diets. Corn by-products include everything resulted from pealing and sorting process, leaves, and manufacturing residues. Such residues are used to make products as animal diets, hence they are called co-products, not industrial by-products, for their nutritional value. Corn residue from corn wet manufacturing is used after extracting most of the starch, core and external shell, which is rich in protein and has high nutritious value as well as its use as a source for carbohydrates and proteins in livestock and poultry fodder(Hornshaw,1983). Fodder is one of the most important issues facing progress in fisheries due to the high protein requirement in the diet (A. Khoshnaw, 2009). This can limit the increase of fisheries industry. So, science turned to the use of alternatives to provide balanced and cheap diet.

In this experiment, corn fodder has been used after separating the seeds in silos in corn marketing season. This material is cheap, however, animals cannot eat it alone because of its bad taste and difficulty of offering due to its light weight that makes it fly in the air. This material is characterized by its rood nutritious value and resemblance to protein content of barley according to its chemical analysis as it contains 11.4% protein (Jamil, 2015). Therefore, the use of this material would provide high and cheap protein content as well as the use of corn residue for being cheap to make quality nutritious diet after getting it mixed with the basic diet elements. Additionally, resemblance was noticed in the amount of the consumed experimental diet in the four treatments, which indicates resemblance in acceptance and tastiness of the this diet by the fish.

Materials and Methods

This experiment took place in the floating fish cages in Euphrates river (Al-Mussaib district) Corn residues from Al-Iskandariyah silo were used as alternative to barley in common carp *Cyprinus carpio* diet bred in those cages from 1st June to late October 2017. Fish fishes were brought from Babylon city with average weight of 140 $\pm$ 17.8g and they were moved by tank vehicle to the experiment site. Fishes were dealt with by submerging in 7.6g of Potassium permanganate that is dissolved in 500 liters of water to neutralize potential parasite infections during transportation. Then the fishes were transporting to 8 flouting cages (dimensions : 3m × 6m × 2m) with 1000 fish for each cage.each cage contains three feeders were fed with various portions of diet of corn residues (Table 1). The experiment contained four treatments of fish Fishes as follows: the first treatment was the control and given 10% barley diet without corn residue, the second treatment was given diet of 10% barley and 5% corn residue, the third treatment was given diet with 5% barley and 10% corn residue, and the fourth treatment was given diet 15% corn residue and the entire replacement of barley.

Diet components were gathered after adding corn residue and then mixed well, crushed, pressed and dried to make belt-shape diet in a private factory for fodder production. The fish were fed with this diet along the study period by dividing the diet evenly among the specimen treatments with giving two meals. Each cage contains three feed, each was 30kg. feeders were filled with diet and there was a spring connecting the feeder to water inside the cage. When the fish move the spring, the diet falls in the cage so the fish can feed. the monthly weight and weight gain of the fish was measured by weighing 20% of the fish randomly in the cage with a sensitive scale.

Table 1: Composition of the experimental fish diet.

Items	T_1	T_2	T_3	T_4
Wheat bran	23	23	23	23
Rice bran	24	24	24	24
Barley	15	10	5	0
Wheat flour	18	18	18	18
Protein	3	3	3	3
Soybean	15	15	15	15
Corn residue	0	5	10	15
Salt	1	1	1	1
Feeding additives	1	1	1	1
Total	100	100	100	100
CP%	19.57	19.68	19.79	19.90
Metabolizable energy%	2966	2949	2933	2916

Statistical Analysis

SAS (Statistical Analysis System) software (Douglas,1990) was used to analyze the research data for the variant effects of the treatments in the studied parameters with complete random design (CRD). Significant differences were compared among the means with multiple-boundary (SAS., 2012)and (Duncan 1955).

Results and Discussion

Results showed table 2 Body weight was significantly high in the fourth treatment during June (264.0 $\pm$ 11.63) and July (415.0 $\pm$ 22.52), and for the third (645.0 $\pm$ 18.93, 793.0 $\pm$ 19.31, 1475.0 $\pm$ 36.58) and fourth (786.0 $\pm$ 25.25, 990.0 $\pm$ 33.72, 1796.0 $\pm$ 43.61) treatments during August, September and October respectively. This was due to that the content of corn residue in the diet gives noticeable weight especially fish that weigh 1000-1600g as they have high efficiency in metabolism (Nkosi, B. D., Meeke, 2010) due to the big volume of fish and the increase in

Table 2: Monthly averages fish weight ± standard error.

Fish weight Ration	June	July	August	September	October
T_1 control	193.0±8.43b	357.0±15.02b	579.0±16.17c	691.0±14.29c	985.0±26.47c
T_2	194.0±9.04b	365.0±11.64b	595.0±18.35bc	710.0±26.15c	1094.0±32.09c
T_3	205.0±9.46b	388.0±19.04ab	645.0±18.93b	793.0±19.31b	1475.0±36.58b
T_4	264.0±11.63a	415.0±22.52a	786.0±25.25a	990.0±33.72a	1796.0±43.61a
Significance	*	*	*	*	*

Table 3: Monthly weight gains rate by relation (average standard error).

Fish weight Ration	June	July	August	September	October	Total weight
T_1 control	57+2.14b	164+7.23a	222+9.47c	112+5.60b	294+8.91d	849+18.54c
T_2	54+1.83b	171+2.69b	230+13.46B	115+5.82b	384+15.39c	954+23.48c
T_3	55+2.05b	238+6.52c	555+11.30a	148+7.41ab	682+24.09b	1325+41.02b
T_4	90+4.27a	151+7.03a	371+15.34b	204+9.50a	806+28.66a	1649+47.94A
Significance	*	*	*	*	*	*

diet consumption in this age.

There is significant increase ($P \leq 0.05$) in weight gain in the fish whose diet was replaced by corn residue along the whole study period (Table 3). Fish in the second, third and fourth treatments table 3 showed significant monthly weight gain compared to the control. Weight gain in the fourth treatment was 90±4.27g in June. In July, weight gain in the second and third treatments was 171±2.69 and 238±6.52. In August, all treatments had been a significant weight gain compared to control, the best of which was the third treatment. Also, the fourth treatment showed increasing weigh gain up to 204±9.50 compared to other treatments. In September, all treatments showed significant weigh increase, the highest of which was the fourth treatment.

It is clear in this study that corn residue, which is a co-product of corn factories, can be used as an alternative diet in fisheries as they are cheap and abundantly available from corn factories and silos especially in corn harvest season, because this diet contain high percentage of protein (11%) and give quality results when used as barley substitute. In addition, such corn residue diets are of high nutritious value and cost-effective.

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