University of Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 10, Issue 2 (2021) PP 25-32

https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/UTJagr.Vo10.N2/04*

Study of the growth of common carp CYprinus carpio L. 1758 In floating cages in the Gharraf River on a local bush north of Shatrah city

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Abstract :

The current study dealt with the culture of three different densities of common carp, Cyprinus carpio.L. In floating cages in the Garraf River / north of Shatrah city, from 12/2/2020 to 7/7/2021 to obtain the best density of culture per cubic meter. To study the optimal growth, three densities (25-50-75 thickness/m3) were used: 1000 fish for the first treatment, 2000 fish for the second treatment, and 3000 fish for the third treatment, with an average weight ranging between 103 ± 2 and with two replicates for each treatment. One local diet was used for the three treatments, the first treatment recorded a survival rate of 96%, the second 93.3%, and the third 91.98%. The results of the experiment were evaluated according to the following criteria: total weight gain, daily weight gain. Feed conversion rate, feed conversion efficiency. The current study showed the superiority of fish from the first treatment with less significant density than the rest of the treatments, followed by the second treatment and outperformed the third treatment. The chemical analysis showed an increase in the protein contents of the fish body after the experiment for all the treatments in a row, and there were no significant differences for the fish components among the three treatments.

Key words: carp fish, overweight, floating cages, culture densities.

I. INTRODUCTION

Aquaculture in cages is characterized by its rapid growth, especially in the recent times during the past twenty years, and at the present time it has witnessed rapid and clear changes due to the increasing demand for marine products in all developing and developed countries (Tacon and Halwart, 2007)).Aquaculture dates back to many centuries and has been described previously in the Middle East for thousands of years, and that aquaculture is an analogue of terrestrial agriculture and its origin extends back to about 4000 years ago (Beveridge and Little, 2002). Aquaculture plays a major role today in the lives of many small communities that live near water sources and along the coast and in various places in the world. Perhaps this role will become more important in the near future due to the increased demand for high quality fish.The quantities of many natural waters have decreased. The most productive countries are Norway, Scotland and Ireland (Grottun and Beveridge, 2007). In recent years, fish farming projects in Iraq have spread widely, whether in floating cages or ponds, as a result of the decrease in the productivity of natural waters due to pollution and overfishing

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(Al-Hamiri, 2011). Breeding fish in floating cages is one of the techniques that is characterized by ease of management, high productivity in the unit area, monitoring and control of diseases, optimum use of water, non-competition of agricultural land, with low construction cost, and also reducing the loss of fish (Olubunmi, 2009). Fish in cages are the best achieved. Modern technologies during the past twenty years in the field of aquaculture (Abdul Hamid, 2009). And that raising fish in floating cages is one of the important solutions to increase fish production (Kassam, 2011)) and that one of the most important objectives of the research is to know the best density of culture (fish / m3) for common carp fish in the Gharraf River in floating cages and to study the productive characteristics and an abundant source of additional protein production animal and fish production.

II. MATERIALS AND METHODS

The study was carried out in Dhi Qar Governorate / North of Shatrah District. (6000) fish were brought from the common carp Cyprinus Carpio. L from one of the hatcheries from the city of Hilla, with weights ranging (103±2) g. They were distributed to the six experiment cages, with 3 culture densities (25-50-75 fish/m3) and two replicates for each experiment. The cage dimensions (3×3×4) which were deducted from The size of the depth as a result of the folds, as the total cage size was estimated at 20 m 2. The experiment was conducted on 12/2/2020 and continued until 7/8/2021 in Al-Gharraf River, north of Shatrah District. Fish weights (40-70 fish from each cage) were measured periodically and a manual net was used and moved outside the cages site for the purpose of measuring weights and using an electronic scale.The fish were fed on the local diet and depending on the temperature, average weight and percentage of feeding 9% of the weight of the fish at the beginning of the experiment, it was reduced after two months to 7% and then reduced with the increase in the weight of the fish until it reached 5% at the end of the experiment and the daily amount of feed was divided into one meal in At the beginning of the experiment, then into two equal meals, the first fed in the morning and the second in the afternoon, and after three months, the daily amount of feed was divided into three equal meals, the first fed in the morning, the second in the afternoon and the third in the afternoon. A local commercial diet with a protein content of 25% was used that was purchased from one of the feed factories in Dhi Qar Governorate in the form of pellets with a diameter ranging from 3 mm to 4 mm.

*Total weight gain (gm) = final weight (gm) - starting weight (gm). (Philipose, 2013)

* Daily growth rate (gm/day) = the amount of daily weight gain (gm) / the time period between the two weights in days. (Philipose, 2013)

* Feed conversion rate = Feed intake (gm) / Weight gain (gm). (Brown,1957)

*Feed conversion efficiency = (weight gain in g / weight of feed provided in g) x 100 (Utne,1978)

*Survival ratio = (total number of fish at the end of the rearing period / total number of fish at the beginning of the rearing period) x 100

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The data were statistically analyzed using the Statistical Analysis System (SAS) program.

III. RESULTS AND DISCUSSION

a. Total and Daily Weight Gain

The results of the statistical analysis of the study showed that there were significant differences ($p<0.05$) in the total weight gain between the various treatments. The first treatment showed a clear superiority in the total weight gain (749.85 g / thickness) over the rest of the treatments and the second treatment (644.9 g / thickness), then the third (620.1 gm/thickness). And there were significant differences ($p<0.05$) between the first treatment and the rest of the treatments (second and third) and between the second and third treatment (table 1).

Table (1) Total weight gain (gm/thickness) of common carp fish cultured with different densities in cages

The most famous experience							transaction
June	May	April	March	February	K2	K1	
A173.45	A161.00	A103.25	A112.30	A99.35	A64.00	A36.75	T1
B139.30	B146.70	A93.55	AB96.05	B77.55	B52.150	A30.60	T2
B142.00	C139.70	A103.65	B93.60	B69.80	B48.300	B23.05	T3
*	*	N. S	*	*	*	*	morale
Significant ($p\leq0.05$): N.S, Not significant*							

The results of the total weight gain were reflected on the results of the daily weight gain during the experiment period (Table 2). The results of the statistical analysis took a similar curve in the uniqueness of the fish of the first treatment, which contained the lowest culture density per cubic meter and showed significant significant differences ($p<0.05$), followed by the second treatment. that outperformed the third.

Table (2) Daily weight gain (gm/fish/day) of common carp fish cultured with different densities

The most famous experience							transaction
June	May	April	March	February	K2	K1	
A5.41	A5.02	A3.32	A3.74	A3.31	A1.99	A1.14	T1

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B4.35	B4.58	A3.01	AB3.19	B2.58	B1.62	A0.95	T2
B4.43	C4.36	A3.34	B3.11	B232	B1.50	B0.71	T3
*	*	N.S	*	*	*	*	morale
Significant (p≤0.05): N.S, Not significant*							

It was found from a review of the growth results of the common carp fish Cyprinus carpio. L cultured in floating cages and cultured with three different densities per cubic meter, where the total weight gain and the daily weight gain of fish with the lowest culture density (25 fish/m3) outperformed and gave the best growth per unit volume. Abbas et.al indicated. (2016) indicated that the best total weight gain of common carp fish cultured in floating cages was achieved in the lowest density treatments (35 fish/m3).Which was close to the density of the first treatment: 25 fish/m3 in the current study. These results agreed with the results obtained by Olmeuni et al, (2009) when Clariobranchus fish were cultured with four densities per cubic meter (20, 40, 60 and 80 fish/m3) in cages. Floating for a period of 98 days, and the results of the statistical analysis ($p<0.05$) showed that the first treatment was superior to the rest of the other treatments. The results of the total weight gain were reflected on the daily weight gain criterion for the same study and similar to the results of the current study. The results of the current study differed with the findings of Merdas and Al-Janabi (2012).) The best overall weight gain in culture density is 70 fish/m³for common carp fish cultured in floating cages, and Taher (2014) concluded that the best weight gain in culture density was 75 fish/m³, and this result did not approach the results of the current study. The lowest density, which is a density similar to the density of the culture of the current study. Abu Al-Hani (2014) indicated that the best daily growth of common carp fish cultured in floating cages is in the lowest density (35 fish/m³).

b. Food Conversion Rate and Efficiency

The feed conversion rate is expressed as the ratio between the weight of the food provided to the fish and the wet weight gain of the fish, which is a measure of the efficiency of the forage.The results of the statistical analysis of the food conversion factor characteristic Table (3) in December showed that there were no significant differences between the fish of the first treatment (6.29 g feed / g) and the second (7.54 g feed / g), and they were significantly superior to the third treatment (10.09 g feed / gm).). The results of the statistical analysis for the month of January showed the moral superiority of the fish of the first treatment (4.89 gm of feed / g) over the rest of the treatments and the absence of significant differences between the second treatment (5.73 g of feed / g) and the third treatment (5.86 g of feed / g). This superiority continued for the first treatment in the month of February to be recorded (3.07 gm feed / g), and the second and third treatment did not record any significant differences between them (3.59, 3.76 gm feed / g). It was noticed in the month of March that there were no significant differences between the fish of the three treatments and the recorded values were (4.05, 4.11, 3.93 gm feed/gm). The results of the month of April were similar to the month of May, and no significant differences were recorded between the treatments, and the values were recorded for the first treatment (3.74, 3.71, 3.03 gm of feed/gm). The month of May did not differ from the months of March and April, and no significant

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differences were recorded for the three treatments (3.09, 2.96, 3.03 gm of feed/gm). The results of the statistical analysis for the month of June showed the presence of significant differences and the superiority of the first less intensive treatment over the second and third treatment.

Table (3) Feed conversion rate of common carp fish cultured with different densities in cages

The most famous experience							transaction
June	May	April	March	February	K2	K1	
B3.76	A3.09	A3.74	A4.05	B3.07	B4.89	B6.29	T1
A4.19	A2.96	A3.71	A4.11	AB3.59	A5.73	B7.54	T2
AB3.93	A3.03	A3.03	A3.93	A3.76	A5.86	A10.09	T3
*	N. S	N. S	N. S	*	*	*	morale
Significant (p≤0.05): N.S, Not significant*							

The results of the feed conversion efficiency showed similarity with the results of the feed conversion rate, and the first less intense treatment outperformed the second and third treatments. Table (4) shows that there were no significant differences in the month of December between the fish of the first treatment (15.89%) and the fish of the second treatment (13.28%), and they were significantly superior to the fish of the third treatment (9.97%). In January, the fish of the first treatment outperformed (20.40%).) on the fish of the second and third treatment, which did not show significant differences between them, and the values were recorded (17.44, 17.04%) and the results of February confirmed the superiority of the fish of the first treatment (32.48%) over the fish of the second treatment (27.84%) and the fish of the third treatment (26.65%), which were not recorded No moral differences between themIn the months of March, April and May, the results of the feed conversion rate were identical, and there were no significant differences between the fish of the three treatments. The values were recorded as follows: March (24.68, 24.84, 25.50%), April (26.71, 27.38, 32.96%), and May (32.32, 33.70, 32.94%). To return the superiority to the fish of the first treatment in the month of June, and significant differences appeared between them and the second and third treatment, which was shown through the statistical analysis

Table (4) Feed conversion efficiency of common carp fish cultured with different densities in cages over a period of

The most famous experience							transaction
June	May	April	March	February	K2	K1	
A26.57	A32.32	A26.71	A24.68	A32.48	A20.40	A15.89	T1
B23.84	A33.70	A27.38	A24.84	B27.84	B17.44	A13.28	T2
AB25.43	A32.94	A32.96	A25.50	B26.65	B17.04	B9.97	T3
*	N. S	N. S	N. S	*	*	*	morale

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Significant (p≤0.05): N.S, Not significant*

Ahmed et al. (2002) The best feed conversion rate obtained for common carp fish cultured in floating cages in Kaptai Lake in Bangladesh was 3.55 when fed on submersible feed which is close to that obtained in the first treatment fish. Al-Bahadli (2011) mentioned that the feed conversion rate of common carp fish cultured in floating cages using submerged feed was 3.7, which is similar to the feed conversion rate of fish fed on submerged broth for the current study.Taher et al. (2018) that the food conversion rate of common carp fish cultured in the semi-closed system when using submersible feeds was 1.74. The feed conversion rate for the current study when using the submersible feed is higher than that. The reason is due to the loss of the submersible diet in natural waters through floating cages and in the semi-closed system Relationships are controlled within the system, so loss is less or completely absent. These results are in agreement with the findings of Narejo et.al. (2010), which found that feed conversion rate and feed conversion density of Labeorohita fish in cages are more effective at lower stocking densities.

c. retention rate

The high survival rate is one of the most basic and economically effective factors in the fish farming system Kam et al. (2003) Table (5) shows the survival rates of the different treatments, as the first treatment recorded the highest survival rate than the rest of the treatments, which amounted to 96%, followed by the second treatment with a survival rate of 93.3%, and the third treatment 91.98%. The results of the statistical analysis showed that the first treatment was significant ($p<0.05$). On the second and third. Survival rates show that high densities have higher mortality and consequently the survival rate decreases. The reason is due to overcrowding per unit area and also competition for food and consequently the occurrence of fatalities. Stckney (2000), Nurun Nabi. (1997) recorded a survival rate of 99.5% higher than the current study of fish Common carp cultured at 500 fish/m3 in a cubic meter cage in Meghan-Gomti River in Bangladesh for 100 days,The present results are in agreement with the results of (Al-Bahadli, 2011) a survival rate was recorded in the less dense treatments with a survival rate of 100% in the first and second treatments with densities of 20-40 fish/m3. The results of Gomes et al. (2006) in line with the results of the current research, which concluded that the highest survival rate was 99.7% in the density of culture 20 fish / m3 and the survival rate was 98.7% at the density of culture 30 fish / m3, while the survival rate decreased in densities of 40-50 fish / m3 to 97.6 - 97%, respectively, of tambaqui fish in cages.

Table (5) Survival rates for the three treatments

survival rate %	The number of deaths	Number of fish in cages	culture density (thickness/m3)	experimental transactions
96 a	40	500	25	T1
93.3 b	134	1000	50	T2

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91.98 c	239	1500	75	T3

IV. CONCLUSION

The use of floating cages for fish farming in the Al-Gharraf River, north of Shatrah, Dhi Qar Governorate, due to its environmental factors suitable to meet the needs of fish for the purpose of cage farming. Breeding fish twice a year by cultivating them in cages in the southern regions. Fish farming projects in floating cages are economically feasible, and it is possible to recover the capital and reap profits through one farming season.

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