Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.5, No.24, 2015

Use of dried Bloodworms *Chironomus riparius* to Motivate the Growth of Young Common Carp *Cyrinus carpio L.*

Muhammad Inad Ghazwan
Iraqi Natural History Museum and Research Centre

ABSTRACT

Dried imported blood worms *Chironomus reparius* was used to motivate the growth of young carp *Cyprinus carpio L.*, as fish powder was partial and total replaced by blood worms which is a component of the fodder of the common carp fish. Results have shown that blood worm partial replacement treatment surpasses the imported fish powder. Rates of growth motivation of this treatment have been higher than both the control and total replacement processes. Results have shown significant differences in the weight of the fish in the partial replacement of the fish powder by the blood worms.

Introduction:

Worms have been used as fodder for many animals, including fish, due to the high protein percent they have. In addition, breeders resort to use high-nutrition-fodder alternatives which does not compete human nutrition sources that have high reproductive results. Moreover, consume of the meet of these animals including fish, after the production period, is safe (1).

An example of these alternatives is the earth worm. It is one of the most successful nutritive alternatives when it is used as fish fodder due to its breeding ease, its quick adjust with the surrounding environment, high productivity if it has been looked after and supplied with the suitable environment. Moreover, earthworm is an important protein source for fish nutrition (2) and (3). Blood worms are regarded one of the good fish-fodder whether they are fresh or dried. Blood worms refer to ***Chironomidae*** family. ***Chironomidae*** is classified in three species: ***Baeotendipes noctifagus***, ***Benthalia dissidens***, and the more common and availability species ***Chironomus riparius*** (4). ***Chironomus riparius*** is the species used in this study. Processed and dried blood worms are easier to be digested than the other worms, such as, earthworm. They are more productive; have excellent digestive coefficient in fish (5). Their dried bodies are crispier than their frozen ones. Moreover, moveable disease factors can be avoided due to exposition to high heat during pasteurization and preparation to dryness (5). Breeding of these worms is easy one under various circumstances and conditions. It does not impose any difficulty upon any breeder seeks them as fresh or dries fodder for his fish (6). These worms can be foddered by various and many non-cost nutrition media (7) and (8).

Materials and Method:

75 common carp ***Cyrinus carpio L.*** have been used. They have been distributed randomly into three groups, 25 for each process. The first process has been of the control; the second of a partial replacement of the fish powder by dried blood worms; the third one of a total replacement of the fish powder by dried blood worms. Weight of fish used in this study ranged between 57-69 g. Three 25% protein experimental fodders have been prepared. Fish have been foddered with 0.05% of their bodies' weight during the 60 day experiment period immediately after the three weeks acclimatization period. The fish have been kept in 115 L. plastic circular basins. 10 fish out of each processing were taken for chemical analysis at the end of the experiment.

Water temperature has been measured by ordinary mercury thermometer; PH was measured by Hanna PH tool. Measures have been done each 15 days synchronically with experimented-fish weigh. Home air compressor has been used to distribute oxygen equally among the experiment three basins: control, 1st process and 2nd process.

Table no. (1) shows the materials used in the fodder of this study. Excel 2003 program has been used to express statistically the relation between weigh periods and the increase achieved in the weight of the experimented fish.

Fodder Constituents	Control Process	1st Process 'Partial Replacement'	2nd Process 'Total Replacement'
Soya beans	40.95	40.95	40.95
Imported fish powder	4.55	2.27	--
Imported dried blood worms	--	2.27	4.55
Wheat bran	36.15	36.15	36.15
Yellow corn powder	16.35	16.35	16.35
Vegetable oil	1	1	1
Table salt	0.5	0.5	0.5
Vitamin-minerals mixture	0.5	0.5	0.5

Table no. (1) Materials used in the three study fodders composition

As the components of the three fodders have been mixed well and homogeneously, each alone, they were prepared as 2 mm granules in order to suit fish mouth using home 2 mm meat grinder.

Results and Discussion:

Component of the fodders have been analyzed (% of the dry material) as shown in table (2)

Material	Protein	Ether excerpt	Ash	Fibers	Carbohydrates
Percent	25.50	5.45	9.12	4.25	60.43

Table no. (2) Analysis of the components of the study fodders

Dried worms used in the experiment have been analyzed too (%of the dry material). Results are shown in table (3)

Material	Protein	Ether excerpt	Ash	Fibers	Carbohydrates
Percent	60.15	6.50	8	5.50	89.90

Table no. (3) Analysis of the dried blood worms

Bodies of 10 fish of each processing have been analyzed before and after the experiment (%of the dry material). Fish of each processing have been dried, crashed as powder separately analyzed as in table (4).

Components	Pre-experiment	After 1st processing 'Partial Replacement'	After 2nd processing 'Total Replacement'
Protein	16.98	20.15	18.50
Ether excerpt	8.76	7.35	7.45
Ash	1.90	0.82	1.98
Carbohydrates	0.80	0.82	0.84

Table no. (4) Analysis of the fish bodies' pre and after the experiment

Rates of water temperature and pH of each 15 day measure, i. e., four measurements as shown in table (5)

Measurements	Measurements have been done each 15 days (Rates)			
Temperature (C.)	26.7	27.4	27.6	28.2
pH	8.2	7.9	7.9	7.8

Table no. (5) Rates of water temperature and pH during the experiment

Results of the analysis of the imported fish powder have been as shown in table (6)

Material	Protein	Ether excerpt	Ash	Fibers	Carbohydrates
Percent	57.89	5.5	6.5	4.50	87.45

Table no. (6) Analysis of fish powder

Results show that the partial replacement processing of fish powder by blood worms surpasses the processing of the control and the total replacement as shown in figure (1)

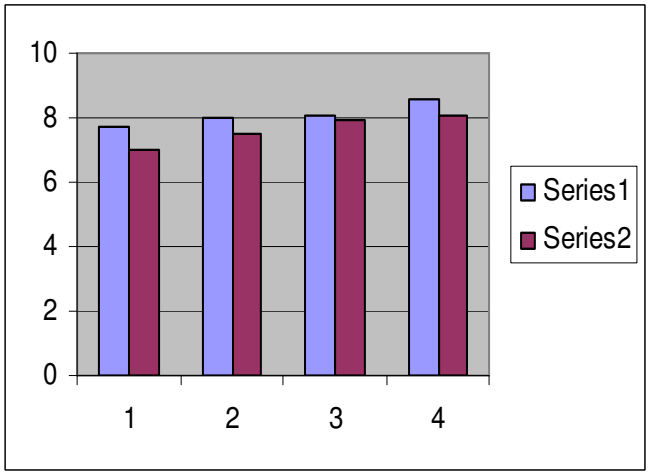

Figure (1) shows the supremacy of the 2nd processing on the 3rd one

This leads to conclude that the nutrition value of the dried worms has been higher when they partially replaced fish powder due to rarity of fibers in their bodies, the high level of amniotic acids which serves as complementary component for the fish powder content of protein and the necessary acids to build up the fish bodies (9). The lipoid acids of the bodies of the worms has an apparent effect on the rates of fish growth, especially as the lipoid percentage in the fodder of the fish has been modified by vegetable oil, so that the fodder used to feed the fish became a balanced fodder regarding the lipoid acids needed by the carp, particularly linoleum and linoleulin acids recommended by (10).as a part of the lipoid acids needed by carp fish in their fodder.

Table (4) shows protein percentage increase in the bodies of the second processing fish of the partial processing. This indicates an increase in the growth rates and protein deposit in this processing. This due to the variety of protein sources in the mixture of blood worm and fish powder which serves as complementary part for the needs of carp fish for protein (11). It has become clear that fodders of various protein animal-proteins meet the carp need more than the single animal-protein source being, for instance, only fish powder as has been the case of the first processing of the control or the third processing of the total replacement with blood worms where no significant increase in the weight of fish has been noticed on the contrary of the partial replacement processing with blood worm instead of fish powder.

These results correspond to the result attended by (12) when they used several protein sources to feed common carp. They found that using concentrated animal protein as a source leads to a higher growth increase compared to other protein sources. Table (3) indicates that raw protein percent in the bodies of blood worms is (60.15%); table (4) which shows the analysis of the second processing fish indicates that raw protein percent in their bodies is (20.15%). Worm effect on the fish growth, particularly earthworms and bloodworms as powders added to the fodders of fish increase their growth and provide them with the energy needed for their activities. A study conducted by Yaqub shows that feeding little *Heterobranchus isopterus* for 30 days with earthworms increases their growth clearly. (14) Points out that feeding little *Heterobranchus longifilis* with *hyperiodrilus euryaulos* earthworms increase the weight and growth of the little of this fish. This in turns correspond to a study conducted by (15) on little *Perionyx excavalus & Oxyeleotris marmoratus & Pangasius hypophthalmus*.

It could be concluded out of this that the nutrition value of bloodworms is neither less than that of earthworms in feeding fish nor than the nutrition value of fish powder which is used as protein concentrates to feed this fish when they are used as mixtures with these concentrators or with the animal-origin protein powder (16).

References

1. Al-Janabi, Mohammed Inad Ghazwan (**2005**), *Study of the Effect of the Local Enhancer (Propaiotic Iraq) on the Growth of Cyprinus carpio L.*, M. Sc. thesis, College of Agriculture, University of Baghdad.
2. Dynes, R. A. (**2003**): Earthworms: *Technology Information to Enable the Development of Earthworm Production*, RIRDC publication, no. 03/ 085, 23, pp. 1-3.
3. William, T., Mason Jr. Roger W., Rottman, J. and Dequine, F. (**2006**), *Culture of Earthworms for Bait or Fish Food*, http;//edis.ifas.ufl.edu. University of Florida.
4. Mojdeh, S. F., Frank P., Connie A. (**2014**), *Chironomidae Bloodworms Larvae as Aquatic Amphibian Food*, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium, Zoo Biology 9999, 1-7.
5. De La Noue J. Choubert G. (**1985**), *Apparent Digestibility of Invertebrate Biomass by Rainbow Trout*. Aquaculture 50: 103-112.
6. Galtsoff PS., Welch PL., Lutz FE. (**1937**) *Culture Methods for Invertebrate Animals*, Dover Publication Inc. ISBN 13:9780486605265.
7. Habashi MM., (**2005**), *Culture of Larvae (Insects- Diptera Chrionomidae) under Different Feeding Systems*, Egypt J Aquat Res 31: 403- 418.
8. Habib MAB, Yusoff FM., Phang SM., Ang. KJ., Mohammed S., (**1997**), *Nutritional Value of Chrionomidae Larvae Grown in Palm Oil Mill Effluent and Algal Culture*, Aquaculture 158: 95- 105.
9. Jauncey, K. (**1982**) *Carp Cyprinus carpi L.*, A Review in: Recent Advances in Aquaculture, Muir, J. F. and Roberts, Jr. (eds), London, 215- 63.
10. Hapher, B. (**1988**), *Nutrition of Pond Fish*, London, Cambridge University Press, 237.
11. Atack, T. H., Jauncey, K. and Matty, A. J. (**1979**), *The Utilization of Some Single-cell Protein by Fingerling Mirror Carp*, Aquaculture, 18: 337- 48.
12. Yaqub, H. B. (**1997**), *Earthworm and Maggot Meals as Proteintial Fish Meal Replacement*, http://www.oceandoc.
    5.org/bitstream/1834/1268/1/paper feed. Pdf.

13. Sogbesan, O. A. and Madu, C. T. (**2008**), *Evaluation of Earthworm* (*hyperiodrilus euryaulos*, 1914, *Oligocheata: Eudrilidae) Meal as Protien Feedstuff in Diets for Heterobranchus longifilis Valenciennes 1840 (Teleostei: Clariidae) Fingerlings Under Laboratory Conditions,* Research Journal of Environmental Sciences, 2 (1): 23- 31.
14. Yen Nhi, N. H. (**2010**), *Utilization of Earthworms (Perionyx excavatus) as a Protien Source for Growing bFingerling Marble Goby (Oxyeleotris Marmuratus) and Tra Catfish (Pangasius Hypothalmus)*, www.mekarn.org/msc2008- 10/ theses/Nhi%20lit.htm.
15. Mackey AP. (**1977**) *Quantitative Studies on the Chrionomidae (Diptera) of the River Thames and Kennet*. 111. The Nuphar Zone. Arch Hydrobiology 62- 102.
16. Maier KJ, Kosalwat P., Knight AW. (**1990**) *Culture of Chrionomidae Decorus (Diptera: Chrionomidae*) *and the Effect of Tempreture on Its Life History*, Environ Entomol 19: 1681- 1688.