



Impact of Diverse Feed Stuffs on Weight Gain of *Channa punctatus* Raised in Cisterns

M.H. CHANDIO, H. KALHORO*, S. KALHORO**, J.A. BALOCH***, R. IQBAL****, N.T. NAREJO**

Department of Fisheries (Inland) Government of Sindh Thandi Sarrak, Hyderabad

Received 18th December 2019 and Revised 25th May 2020

Abstract: This current experiment was done to evaluate the various feeds items on growth and survival of *Channa punctatus* reared in cemented cisterns over a period of three months starting from March to May 2019 and June to August respectively. The experimental fish of same size (2.0 ± 0.91 g) were obtained from District Badin, Sindh. Four different types of feeds, namely, APC Meal (All Parts of Chicken meal) feed, Fishmeal, Formulated feed, Blood meal (Treatment I, II III and IV having two replicates). The experimental fish exhibited good growth and survival ratio fed with all parts of chicken meal (51.6 g weight gain) in experiment I trailed by experiment II (43.7 g) fed with Fishmeal, while fish fed with formulated feed showed (27.0 g) in treatment III and lowest was recorded from treatment V (22.4 g) fed with blood meal. The temperature values were fluctuate between 26.8-30.6°C, pH varied from (7.30-7.55 ppt), oxygen content water was detected 4.0-4.8g/l, Alkalinity between 149-180g/l, Nitrate was noted from 0.168-0.178g/l and Ammonia from 0.35-0.55g/l. It concluded that that these values are in accordance with the suitable values for raising of any species in cisterns and ponds. It could therefore be concluded that the feed containing APC Meal (All Parts of Chicken meal) feed is tended to be appropriate for the growth and production of *Channa punctatus* reared in cemented cisterns.

Keywords: Snakehead; Growth, Survival, Protein, Cemented Cisterns.

1. INTRODUCTION

Fish meat is thought to be more beneficial than chicken and other different types of meat. The rearing techniques for any commercially important fish species consists of feed trial, density per unit area and micro-habitat and these are termed as pre-requisite for the idle aquaculture operation (Narejo 2006). The rearing with different feed regime help to select best feed from the given stuffs is regarded as key to success and with the best observed feed fish will stock in a per unit area to determine its suitable density, because some species possess school farming habitat and some individual that will be disseminated to the farmers for further stocking on large scale. Islam *et al* (1996) worked on food preference and stocking ratio on the rearing of Shinghi (*Heteropnesustes fossilis*) from Bangladesh. They reported that Tubifex was very good feed in comparison with other feed for rearing of shinghi fry but frozen Tubifex was not significant. Yasmin and Mollah (1997) cultured *Clarias gariepinus* with pelleted and live feed like live and dead chopped tubificid worms and starter feed I. They observed reasonable weight gain and

survival with live chopped worms. Yasmin *et al* (1998) used *Clarias batrachus* with artificial feed, natural feed and mixture of both. They noted that the experimental fish preferred mixed feed. Nahar *et al* (2000) raised *Clarias gariepinus* for feed trial and commented that fish grow well fed with chicken viscera (offal). Narejo *et al* (2002) culture, *Pisodonophis boro* with various food items and observed that best growth rate was fed by Lamelliden (bivalve) followed by chopped small *Channa* fish. Narejo *et al* (2003) reared *Mastacembelus armatus* with diverse feed regime and found that dead small shrimps were found to be ideal and dead small fish was second preferable feed for growth and survival of experimental fish. Narejo *et al.*, (2003) tested *Monopterusuchia* with live and dead small fish of noncommercial value and pelleted feed to observe its selectivity; they concluded that fish used to prefer dead small fish as compared with other feedstuffs. Zakeš *et al* (2006) conducted research on feed intake, frequency and its effect for better growth of *Sander lucioperca* with re-circularity flow through system and commented

***Corresponding author: Prof Dr. Naem Tariq Narejo, Email: naem.tariq@usindh.edu.pk

*Department of Freshwater Biology and Fisheries, University of Sindh, Jamshoro

**Faculty of Crop Production, Sindh Agriculture University, Tando Jam

***Government College, Panjgoor, Balochistan

****Institute of Pure and Applied Biology, BZUniversity, Multan

that the fish did not showed any variations in the rearing systems. Bassey *et al* (2010) worked on *Parachannaobscura* to determine its best feed for the culture and found that the live tilapia suitable for propagation, growth and improvement in condition of fish under study. War *et al* (2014) worked on *Channa striatus* fed with three species of cladocerans and observed that *Artemia nauplii* exhibited with high rate of growth, survival and cannibalism. Arain *et al.*, (2015) reared *Tilapia nilotica* with three regimes and noted that soya based feed was termed as best for the ideal survival and growth as compared to other feed supplied. Mithu, *et al* (2017) worked on formulated feed utilization efficiencies in *Channa striatus* juveniles from Bangladesh. Findings of the study suggested that 36% protein containing formulated feed could be used for better growth and feed utilization efficiencies of snakehead *Channa striatus* juveniles. Billahet *al* (2018) worked on *Labeo bata* fry from Dhaka Bangladesh for 60 days feed trial. They concluded that the wheat bran found to be best observed feed among the supplied one. Jalbani *et al.*, (2019) cultured *Rita rita* in cisterns with live and prepared feed and observed that chicken viscera exhibited maximum weight gain and survival ratio in relation to other feedstuffs. Snakeheads are locally known as Murrels belongs to genus *channa* and there are 14 species of snake heads. Four species of snake heads are reported from Pakistan which is *Channa marrulius*, *Channa striatus*, *Channa gachua* and *Channa punctatus*. Among these species *Channa marulius* and *Channa punctatus* is considered as commercially important food fish. The current experiment was designed to evaluate the effect of different feed items on the growth of Snakehead, fish *Channa punctatus*, as it is suitable candidate for the artificial culture in tanks, mud ponds, and cistern these aspects are considered as pre-requisite.

2. MATERIAL AND METHODS

Fingerlings availability

Juveniles of Snakehead fish *Channa punctatus* were collected from public waters and private fish farms of Badin District; Sindh Pakistan. Initial body weight was (9.03±1.4g). Experimental fish were acclimatized for one week in the laboratory of the University of Sindh Jamshoro. Seven rectangular cemented cisterns of size (1.25 m² each) carefully chosen haphazardly for experiment. Experimental cisterns are situated near Department of Freshwater Biology and Fisheries. Trial lasted for three months (June to August).

Feed ingredients availability

Five diverse food stuffs were applied thrice replicated with control (no food) and were labeled as

All parts of chicken meal labeled as
Experiment #1
Fish-meal labeled
Experiment #2
Pelleted feed (dry formulated pellet) designated as
Experiment #3
Slaughter House blood meal designated as
Experiment #4
Control (no food) labeled as
Experiment #5

Procurement of feed ingredients

The pelleted feed was prepared with the conventional feed ingredients purchased from the market., the composition and percentage of each ingredient is presented in (Table 1).

Table. 1 Feed ingredient and their percentage (%) ratios for the preparation of pelleted feed used for the rearing of *Channa punctatus* in cisterns

S. No	Ingredient	Protein /kg (%)	Required Quantity (g)
1-	Chicken Viscera	13%	400 g
2-	Blood meal	7%	100 g
3-	M.O.C	4.5%	150 g
4-	Rice bran	1.5%	100 g
5-	Wheat bran	1.5%	100 G
6-	Wheat Flour	1.5%	100 g
7-	Salt	N/A	5 g
8-	Vitamins	2%	2 g
Total			1000

Sampling

The sampling was done at an interval of one month, by taking the weight and length of fish and to observe the health condition of fish. The siphoning was done of the cisterns for prevention of growth inhabitant ammonia.

Water quality

The temperature (°C), pH, dissolved oxygen (DO) (mg/L), total dissolved salts (TDS) and salinity were monitored and maintained during the culture period. Monitoring was done by recording the temperature via glass Celsius thermometer, salinity with a refractometer, total dissolved salts with a TDS meter, pH and dissolved oxygen (DO) were measured using a digital pH meter and DO meter respectively.

Table 2 Growth Parameters on different diets of *Channa punctatus* throughout the study period (Three months)

Parameters	Treatment I	Treatment II	Treatment III	Treatment IV
Initial Weight (g)	2.0	2.0	2.0	2.0
Final Weight (g)	51.6 ±1.9	22.4 ± 2.7	27.2 ±1.5	43.7 ±0.2
Weight gain (g)	49.6 ±	20.4 ±	25.2 ±	41.7 ±
% Weight gain	248	98	79	208
Survival rate %	100	80	80	90

Statistical analysis

One-way analysis of variance (ANOVA) was used to determine the effects of protein levels. This was followed by Duncan's New Multiple Range Test (DNMRT), Duncan (1995) at 5% level of significance.

Table 3 Water Quality Parameters during experimental period

Parameters	Range	Mean ±
Temperature	26.8-30.6°C	29.0 ± 0.5
pH	7.30-7.55 ppt	7.4 ± 0.15
Dissolved Oxygen	4.0-4.8 mg/l	4.4 ± 0.4
Alkalinity	149-180 mEq/L	160 ± 20
Nitrate	0.168-0.178 mg/l	0.17 ± 0.14
Ammonia	0.35-0.55ug/dLumol/L	0.43 ± 0.14

3. RESULTS AND DISCUSSION

Growth Performance

To elucidate diverse food stuffs and their impact on weight gain and survival ratios in snakehead fish *Channa punctatus* in cemented ponds, the trial was commenced for three months started during March to May 2018. Each cistern was reared with ten fish of mean weight of 2.0 ± 0.19 g for four diverse feed stuffs in each experimental trial. The impact of diverse food stuffs was tested in terms of weight gain, % weight gain, rates of feed conversion, specific growth, survival and production was enumerated in *Channa punctatus*.

The experimental fish exhibited good growth and survival ratio fed with all parts of chicken meal (51.6 g weight gain) in experiment I trailed by experiment II (43.7 g) fed with Fishmeal, while fish fed with formulated feed showed (27.0 g) in treatment III and lowest was recorded from treatment V (22.4 g) fed with blood meal. The initial weight of experimental fish before trial was 2.0 ± 0.19 g touched to the final weight 51.6 g at the termination of trial with 100% rate of survivability.

Water Quality Assessment

The monitoring of water quality factors of cisterns during the culture techniques such as rearing of

experimental fish with diverse food stuffs, impact of density and shelter on weight gain and survival during March to May, 2018, June to August 2018 and March to May 2019 respectively. The essential factors like determination of temperature values, power of hydrogen, oxygen content, salt concentration (salinity), nitrate, ammonia and conductivity were taken into account.

The temperature values were fluctuate between 26.8-30.6°C, pH varied from (7.30-7.55 ppt), oxygen content water was detected 4.0-4.8g/l, Alkalinity between 149-180g/l, Nitrate was noted from 0.168-0.178g/l and Ammonia from 0.35 - 0.55g/l.

It can be seen from the above values of different factors, it concluded that that these values are in accordance with the suitable values for raising of any species in cisterns and ponds.

4. DISCUSSION

This current study was intended to find out the appropriate feed item for *OChanna punctatus*. The impact of diverse food stuffs was tested in terms of weight gain, % weight gain, rates of feed conversion, specific growth, survival and production was enumerated in *Channa punctatus*. The experimental fish exhibited good growth and survival ratio fed with all parts of chicken meal (51.6g weight gain) in experiment I trailed by experiment II (43.7 g) fed with Fishmeal, while fish fed with formulated feed showed (27.0 g) in treatment III and lowest was recorded from treatment V (22.4 g) fed with blood meal. Number of earlier researchers tried diverse food stuffs for the raising of different fish species like Kok (1981), Wee (1981) rearing of *Channa striatus*, George *et al.*, (1986) and Ravindranath (1988) reared *C. striatus*, Jayantha and Wejeyaratne (1990) in *C. striatus*, Ebanasar and Jayaprakas (1995) in *C. striatus*, *C. marulius*, *C. microleptes*, Islam *et al* (1996) in *Heteropnesustes fossilis*, Yasmin and Mollah (1997) cultured *Clarias gariepinus*, Yasmin *et al* (1998) in *Clarias batrachus*, Narejo *et al* (2002) in *Pisodonophis boro*, Narejo *et al* (2003) in *Mastacembelus armatus*, War *et al* (2014) in *Channa striatus*, Arain *et al.*, (2015) in *Tilapia nilotica*, Mithu, *et al* (2017) in *Channa striatus* and Jalbani *et al.*, (2019) cultured *Rita rita*. All the above authors were of the view that the experimental fish exhibited good growth fed with animal based feed. The observation of the above workers is in accordance with the findings of present investigations.

All these above observations support the present study findings. The monitored water quality parameters throughout the study period were found within the suitable ranges as reported by previous authors Rahman

(1992), Narejo *et al.*, (2002) and Narejo *et al.*, (2003) (Narejo *et al.*, 2015)

5. CONCLUSION

The better growth performance was obtained on All parts of chicken meal (APC) followed by fishmeal.

REFERENCES:

- Arain, K., N.T. Narejo, S. Jalbani and P. Khan (2015). Effect of different feeds on growth and survival of *Tilapia nilotica* reared in cemented cisterns. *Sindh Univ. Res. Jour. (Sci. Ser.)* 47 (4): 643-644
- Billah, M. B., S. Akter, S. Parveen, A. Rahman, L. Nahar, and M. Kamrujjaman, (2018). Effects of different supplementary feeds on the growth performance and survival of Labeo bata fry. *Jahangirnagar University Journal of Biological Sciences*, 7(1), 15-21.
- Bassey, A. U. and P. O. Ajah, (2010). Effect of three feeding regimes on growth, condition factor and food conversion rate of pond cultured *Parachanna obscura* (Gunther, 1861) (Channidae) in Calabar, Nigeria. *Turkish Journal of Fisheries and Aquatic Sciences*, 10(2), 195-202.
- Ebanasar, J. and V. Jayaprakas, (1995). Evaluation of Different Diets for the Cage Culture of *Channa striatus*. *J. Inland Fish. Soc. India*, 26 (1): 59-66.
- George, J. P., G. Venugopal, K. Venkateshwaran and H.G. Hingorami, (1986). Hydrological Studies of Large Murrel *Channa marulius* (Ham.) and Striped Murrel *Channa striatus* (Bloch). *Fish. Tech. Soc., Cochin*, 23 (1): 88-91.
- Islam, M. A., S. M. Rahmatullah and M. A. Islam, (1996). Effect of food and stocking density on the rearing of shingi, *Heteropneustes fossilis* (Bloch) fry. *Bangladesh J. Sci.*, 25: 73-78.
- Jalbani, S., N. T. Narejo and P. Khan (2019). Rearing of catfish, *Rita rita* with live and prepared feed in cemented cisterns. *Pakistan J. Zool.*, 51(6): 2397-2399.
- Kok, L. W. (1981). Snakehead (*Channa striatus*) Farming in Thailand. Bangkok, Thailand, Naga, 15.
- Mithu, M. M., M. G. Rabbane, M. A. Khaleque, and M. G. Mustafa, (2017). Effect of formulated diets on growth performance and feed utilization efficiencies of snakehead *Channa striatus* juveniles. *International J. of Fisheries and Aquatic Studies*, 5 (3): 451-455.
- Nahar, Z., A. K. M. Azad Shah, R. K. Bhandari, M. H. Ali and S. Dewan (2000) effect of different feeds on growth and survival and production of African catfish, *Clarias gariepinus* (Bruchell). *Bangladesh J. Fish.*, 4 (2): 121-126.
- Narejo, N. T. (2006). Length-weight relationship and relative condition of a carp, *Cirrhinus reba* (Hamilton) from Manchar Lake district Dadu, Sindh. *Pakistan J. Zool.*, 38 (1): 11-14.
- Narejo, N.T., P. Khan, S. Jalbani and R. Rahim (2016). Feeding Biology of *Cyprinus carpio* from Keenjhar Lake, District Thatta Sindh, Pakistan. *Pure Appl. Biol.*, 5(4): 788-792.
- Narejo, N. T., S. M. Rahmatullah and M. Mammur Rashid (2002). Length- weight relationship and relative condition factor (Kn) of *Monopterusuchia* (Hamilton). *Indian J. Fish.*, 49 (3): 329-333.
- Narejo, N. T. (2003). Comparative studies on the biology and culture of *Monopterusuchia* and *Mastacembelus armatus* of Mymensingh region. PhD. thesis submitted to the Department of Aquaculture, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh. 205 Pp.
- Narejo, N. T., S. M. Rahmatullah and M. Mammur Rashid (2003). Length- weight relationship, relative condition factor (Kn) of freshwater spiny eel, *Mastacembelus armatus* (Lacepede) from district Mymensingh, Bangladesh. *Indian J. Fish.* 50 (1): 81-87.
- Ravindranath, K. (1988). Propagation of the Commercially Important Air-breathing Fish *Channa striatus* (Bloch), *Indian J. Fish.*, 35 (4): 330-332.
- Rahmah, S., K. Kato, S. Yamamoto, K. Takii, O. Murata, and S. Senoo, (2014). Improved survival and growth performances with stocking density manipulation and shelter availability in bagrid catfish *Mystus nemurus* (Cuvier and Valenciennes 1840) larvae. *Aquaculture Research*, 45(12), 2000-2009.
- War, M., and K. Altaf, (2014). Preliminary studies on the effect of prey length on growth, survival and cannibalism of larval snakehead, *Channa striatus* (Bloch, 1793). *Pakistan Journal of Zoology*, 46(1).
- Wee, K. L. (1981). Snakehead (*Channa striatus*) Farming in Thailand. Bangkok Thailand-National Tulland Fisheries Lust. , 15 p.
- Yasmin, A. and M. F. A. Mollah (1997). Rearing of African catfish larvae with live and prepared feed. *Bangladesh J. Train. and Devt.*, 10 (1-2): 181-186.
- Yasmin, A., M. and G. S. Halor (1998). Rearing of catfish, *Clarias batrachus* (Lin.) larvae with live and prepared feed. *Bangladesh J. Fish.*, 9 (1-2): 145-150.
- Zakęs, Z., A. Kowalska, and K. Demska-Zakęs, (2006). Effect of feeding frequency on growth and size variation in juvenile pikeperch, *Sander lucioperca* (L.). *Czech Journal of Animal Science*, 51(2), 85-91.