

Observations of Growth Parameters and Digestibility of Indian Snake-Headed Murrel, *Channa punctata* to Various Dietary Conditions

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Abstract: The growth and digestibility study has been performed in *Channa punctata* in four experimental conditions with pelleted diets. The formulated diets were prepared with locally available ingredients viz, rice bran, oil cake, silkworm pupae, fish meal, meat meal, blood meal etc following standard methodology. There was an increasing trend of growth parameters such as food conversion ratio and food conversion efficiency as well as digestibility in all experimental groups except those on feed pellets of blood meal as an ingredient. Findings of the present study suggest that cocoon based feed could be used for better growth and feed utilization efficiencies of snakehead *Channa punctata*.

Keywords: *Channa punctata*, Food Conversion Ratio, Food Conversion Efficiency, Digestibility

1. Introduction

Aquaculture is an expanding industry all over the world [1]. Freshwater fish especially fry or fingerling production is one of the major challenges in the field of aquaculture because they are very sensitive to water quality, feed and other environmental factors. Optimum growth of fish largely depends on feed quality, especially the ingredient of feed [2]. Artificial dry diets are the other alternative food sources for larviculture and it has been reported that some of the freshwater fish species can be exclusively reared on dry diets from the start of the exogenous feeding [3]. Supplementary feeding is one of the most important management measures which can significantly enhance the growth of cultured fish and helps in increasing the total yield. The use of cost-effective diet formulated based on nutritional requirements and other effects of the fish has been emphasized by several workers in the past who have tested the efficacy of such diets in various fish species [4]-[6]. *Channa punctata* (Bloch) is one of the highly-priced freshwater air-breathing fishes. This species is gaining prominence as a cultured freshwater fish for medicinal purposes in the Asian market. The success of rearing of a fish depends mainly on the availability of suitable diets that are readily consumed, efficiently digested and that provide the required nutrients to support higher growth and health. However, due to environmental degradation and inadequate aquaculture technology, the population of this species has declined tremendously during the last few decades in natural water and there is a need to sustain their population through aquaculture. The present investigation, therefore, is aimed to study the growth and digestibility of *Channa punctata* to various dietary conditions.

2. Materials and Methods

The experimental fish used for the study were fingerlings of *Channa punctata* procured from the local fish market. Four

isoproteinous diets A, B, C, D (TABLE-1) were used as experimental feeds and diet N served as the control group maintained with trash fish. After acclimatization fishes of the approximately same size were segregated and allocated in batches of ten fishes in five separate plastic pools: four experimental and one as a control group. The experiments were conducted in replicates.

Table 1: Ingredient Combination of Experimental and Control Diets (Attempted Protein Level 40%).

Ingredients	Diet A	Diet B	Diet C	Diet D	Diet N
RICE BRAN	6.105	9.813	15.820	7.465	
OIL CAKE	6.105	9.813	15.820	7.465	
WHEAT FLOUR	6.105	9.813	15.820	7.465	
ROASTED GRAM	6.105	9.813	15.820	7.465	
COCOON MEAL	75.580				
FISH MEAL		60.748			
BLOOD MEAL			36.720		
MEAT MEAL				70.140	
TRASH FISH					100.00*
T O T A L	100.00	100.00	100.00	100.00	100.00

A surplus amount of feed (6 to 8 percent of the body weight) was offered six days a week with pellets made for each group. The total length and body weight of all the test fishes were taken before the commencement of the experiment, once a week during the experiment and finally on termination of the experiment for 60 days on the formulated feeds. The water temperature during the study period ranged from 26°C to 29°C. The data collected were analysed and subjected to Analysis of Variance (ANOVA) to determine statistical significance among and within groups.

3. Results

The growth, nutrient utilization and digestibility of *Channa punctata* fed various experimental and control diets have been summarized in TABLE-2.

Table 2: Growth and Nutrient Utilization by Fish

DIET	Total Feed given (g)	Total Feed Left (g)	Total Dry Feed consumed (g)	Wet weight Gain (g)	Total Protein Consumption (g)	FCR	FCE (%)	Survival %	Digestibility Coefficient	DM Digestibility	PER
N	73.5	23.40	48.10	15.0	17.28	3.2	31.2	100	77.54	47.5	0.87
A	73.5	32.25	41.25	11.1	16.30	3.7	26.9	100	70.42	42.3	0.68
B	73.5	28.12	45.38	13.4	17.57	3.4	29.6	100	75.96	46.7	0.76
C	73.5	54.29	22.21	02.5	08.99	8.9	11.3	80	26.35	07.7	0.28
D	73.5	31.60	41.90	11.9	16.63	3.5	28.4	100	72.74	44.8	0.72

In fact among experimental groups, B group with Fish meal registered best growth performance in terms of weight gain, FCR (Food Conversion Ratio), FCE (Food Conversion Efficiency) and Total Protein Consumption followed by D group with a Meat meal, A Group with Cocoon meal, whereas C Group with Blood meal as an ingredient showed minimum growth performance throughout feeding trial. Analysis of Variance for the above diets indicated a significant difference ($p < 0.001$) in percent weight increment.

Highest Dry Matter Digestibility was recorded in N group (47.5 percent) maintained with trash fish followed by B group (46.7 percent) fed with Fish meal diet, D group (44.8 percent) fed with Meat meal diet, A group (42.3 percent) fed with Cocoon meal diet and minimum in C group (7.7 percent) fed with Blood meal diet. Analysis of Variance followed by Scheffe Test indicates a high significant difference for per cent Dry Matter Digestibility. The digestibility of Protein for *Channa punctata* also showed similar trends: $N=77.5 > B=75.9 > D=72.7 > A=70.4 > C=26.4$.

4. Discussion

Aquaculture is the world's fastest-growing food production sector and plays a crucial role in food and nutritional security by the farming of aquatic animals. In India, aquaculture industry transformation had occurred from highly traditional activity to well-developed technology. Several authors have studied the effects of different nutritional diets on the growth and survival of different fish species [7]-[10]. However, very little information is available on the nutritional requirements of *Channa punctata*.

In this work, best growth and digestibility were recorded in diet B (Fish meal) as an ingredient, followed by diet D (Meat meal) and diet A (Cocoon meal) may be attributed to the fact that these dietary combinations contribute the most appropriate profile of essential amino acids, as the growth of the fish is the result of intake, in a balanced proportion of the ten essential amino acids contained in the dietary protein component [11]. Results showed that feed 2 (36% protein) had significant positive effects on the feed conversation ratio (FCR) and feed efficiency and condition factor while no such differences were observed in specific growth rate (SGR) and in feed utilization efficiency variables [12].

The inhibition of growth with a blood meal diet could be the result of the deficiency of some essential amino acids. Possibilities of some complex blood proteins which is

indigestible to the fish cannot be ruled out or there may be some factors which are having inhibitory effects over the digestive enzymes. This observation corroborates earlier finding and concluded unpalatability of blood meal and its use resulted in reduced growth rates in poultry [13]-[14].

5. Conclusion

From the result obtained, it may be concluded that fish meal, meat meal and cocoon meal are well utilized by the fishes. On the contrary blood meal is unsuitable for the growth. Further, cocoon which is a waste product of the silk industry, locally available at very low costs, can be included with the advantage of substituting the costly ingredients i.e., fish meal and meat meal.

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