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RESEARCH ARTICLE

NUTRITIONAL VALUE OF THE ARTIFICIAL PELLETED FEED ON THE GROWTH OF THE SILUROID *HETEROPNEUSTES FOSSILIS* (BLOCH).

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ABSTRACT

Growth response and survival of catfish, *Heteropneustis fossilis,* fed artificially Compounded pelleted diet have been studied. It was observed that the fish accepts and thrives well on soft pellets, with 100% survival .The conversion factor of the feed over a 6-weeks feeding trial was found to be 1.8 corresponding to a conversion efficiency of 56%. The study suggests that cost-effective raw materials, even though without any additional supplementation with minerals and vitamins, etc., could be used for compounding nutritive feed for this species.

INTRODUCTION

Intensification of pond fish culture as well as introduction of highly industrialized fish production methods are unattainable without provision of suitable feed. Supplimentary feeding assumes greater significance under conditions of heavy stocking when supply of natural feed declines. Since feed and feeding cost no less than 40-60% of the total operating expenditure in a wide variety of aquaculture operations much emphasis is being laid upon the development of nutritionally adequate and cost-effective feed. In recent years, considerable efforts have been directed towards compounding artificial feed in accordance with the nutritional need of a number of cultivated fish species (Hilge *et al.,* 1979; Appelbaum,1980; Pillay, 1977; Brown, 1980; Hilge and Schwalb-Buchling, 1980; Kaniz and Gollmann, 1980; Lovell, 1980; Jafri *et al.,* 1981; Anderson *et al.*, 1981; and Niamat and Jafri 1982; Teshima *et al.,* 1984). Until the present work was undertaken, there was almost no experimental evidence available to show that *Heteropneustes fossilis* a common freshwater catfish, could accept and meet their need for normal growth from compounded pelleted feed. Earlier work on the food intake ,growth and conversion efficiency of this species was in relation to its ration size which consisted of oligochaetesworm and frequency of feeding (Reddy and Katre, 1979). The present study was devoted to compounding a high-protein, energy-rich pelleted feed for this siluroid using less expensive locally available raw materials. This investigation is considered important in view of rapidly developing interest in catfish culture technology in India and abroad as well.

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MATERIALS AND METHODS

Test specimens (Initial mean weight 3.03 gm and initial mean length 64 mm Obtained from local ponds at Aligarh (Lat. 27° 34′ 30″ N Long. 78° 26 E) were transferred to laboratory aquaria and acclimatized for about two weeks. Since nutritional requirements of this species have not yet been precisely worked out, the feed was formulated on the basis of some general available information on finfish nutrition.

Composition and preparation of diet

The compounded fish feed contained rice bran, yellow corn meal, wheat flour and commercial fish oil. The diet was not supplemented with vitamin, mineral or amino acid premixes. Details of the ingredients percentage of the diet have been given in Table-1. All the ingredients were weighed out as per formula and, except for wheat flour and fishoil, mixed thoroughly in a mortar. In order to obtain adequate water stability for the pellets, it was ensured that the ingredients are

finely powdered. Previously cooked wheat flour in sticky paste form and commercial fish oil were then added to the mixture. The mass was preserved in polythene bag in frozen condition for preparing fresh soft pellets. At the time of feeding, the dough was passed through a meat extruder. Extruded stands, spread on trays, were air dried at room temperature (23°-25°) and cut into pellets while still in soft form. The pellets at 10% moisture level showed adequate water stability. Diet of about 3mm pellet size were found acceptable to the fish. Control group of the fish were fed fresh minced fish meat.

Biochemical evaluation of Diet

The two diet- soft pellets and minced fish were tested for their proximate composition (Table II) using the procedure as adopted by Jafri *et al*. (1981). The energy content of the diet was assessed following the equivalent as quoted by (Pearson, 1975). This procedure gave the calorific value of 3.81 X 10^3 cal/g (15, 949 J/g) for the formulated diet and 0.99 X 10^3 cal/g (4,144 J/g) for the minced fish meal diet.

Feeding trial

Fingerlings, obtained randomly from the acclimatized group, were stocked in glass aquaria (60 x 28 x 30 cm) at a density of 30 fish / aquarium. The initial length and weight of each fish were recorded. The feeding trial was carried out for a period of six weeks and fish fed the daily rate of 5% of the total biomass at 17.00 h. Unused food, if any, was siphoned off, soacked on to a filter paper and reweighed to estimate the actual quantity of food consumed by the fish. Weekly measurements of gain in weight were taken and feeding allowances revised accordingly. The bottom of the aquarium was siphoned off every alternate day to remove faeces and the aquaria were cleaned weekly. The performance of diet was evaluated by calculating the food conversion factor, gross growth efficiency and protein efficiency ratio over the six-week feeding trial. The food conversion factor was calculated on the basis of the rate of food consumed to live weight gained by the fish. The gross growth efficiency represented the percentage of the ratio of live weight gain to food consumed, while the protein efficiency ratio was the ratio of wet weight gain to weight of protein fed. The experiment was run in triplicate. Water temperature during the period of feeding trial ranged from 22°C - 27°C.

RESULTS AND DISCUSSION

The results of six- weeks feeding trial using locally formulated diet presented in Table III. The results indicate that *H.fossilis* can ingest artificial diet in soft pelleted form, presenting no apparent palatability problem, and the diets appears to be assimilative. The fish were active throughout the experiment and showed 100% survival. The mean individual weight of the fish fed the compounded diet increased from 3.03 g to 6.55 g registering an increase of 116% for the experimental period. It is apparent from the data that growth of the fish was slower during the first week of feeding being 57 mg^{-} day /individual in the fish group fed formulated feed and 4 mg^{-}day/ individual in the control group fed minced fish meat, the increment corresponding to average daily food intake of 113 mg/ individual and 153 mg / individual respectively.

Table I. **Composition of the diet**.

Ingradients	gm/100 g dry weight
Fish Meal	60.00
Soyabean Meal	8.00
Rice Bran	14.00
Wheat Flour	5.00
Fish Oil	3.00
Yellow Corn Meal	10.00

Table II. Proximal Chemical Composition and Energy Value of Test Dietsg/100g Dry Weight.

Contents	Minced Fish	Soft Pellets
Moisture	78.00±0.12	10.5±0.12
Ash	1.0±0.0	12.5±0.60
Protein	15.0±0.	38.56±0.03
Fat	3.0±0.12	14.5±0.22
Carbohydrates	3.0±0.13	23.94±0.20
Energy Content (10 cal/g)	0.99±0.09	3.81±0.08

Table III. Results of Feeding Soft Pelleted (Experimental) and Minced Fish (Control) to H.fossilis during 6 weeks growth trial.

Contents	**Control**	**Experimental**
Initial No. of Indivisuals % survival	30	30
Percentage Survival	100%	100%
Initial Mean Length (mm)	63.0±1.22	63.0±0.09
Initial Mean Wet Weight g/individual	30.6±0.66	30.3±0.58
Final Mean Length (mm)	83.0±3.01	104.0±2.91
Final Mean Wet Weight after 6 weeks/ individual	8.5±0.76	6.55±1.41
Percentage increase in Weight(g)	24.0±2.41	116.0±4.74
Food Conversion Ratio	9.0±0.52	1.8±0.04
Gross Growth Efficiency	11.0±0.58	56.0±1.24
Protein Efficiency Ratio	0.73±0.01	1.46±0.003

In the last week of feeding, the average growth of the fish became 83 mg^{-}day /individual, respectively. The rate in daily feed intake of the two groups also enhanced considerably in the last week of feeding, becoming 195 mg/ individual. The food conversion ratio and gross growth efficiency percent with the formulated feed were of 1.8: 1 and 56%, respectively, whereas with the minced fish or control diet a poor food conversion ratio (9:1) and gross growth efficiency (10 %) were recorded. The protein efficiency ratio of the compounded feed was also higher (Table III). The food conversion value indicates that relatively more food has been converted into flesh. The poor conversion value in fish fed minced fish meat diet could be attributed to the low protein and energy content of this diet. *H.fossilis*, by virtue of being a carnivore, would obviously require a high protein and energy rich food for optimum growth and these requirements seem fulfilled with the formulated diet containing 38.5% protein and 3.81 X 10^3 cal/ g energy.

Stickney and Lovell (1977) have reported that channel catfish fingerlings shows optimal protein conversion when fed on containing 30% protein, although total production was greater at high (36%) protein levels. Reddy and Katre (1979) have observed 23.28% conversion efficiency in *H.fossilis* fed with oligochaete worm, *Tubifex tubifex*, at 3% ration level. This value declined to 9,86% at 20% feeding level. It has recently been reported by Dehadrai and Thakur (1980) that *H.fossilis* can readily accept and grow on supplementary feed mixture consisting of low grade trash fish and rice bran (1:1) and fish offal, slaughter house waste or dried silk worm pupae mixed

with rice bran and oilcake (1:1:1). These authors have pointed out that a mixture of oilcake, rice bran add biogas slurry (1:1:1) could also serve as successful low-cost feed for raising this catfish. According to the above workers, in semi-intensive polyculture of *H.fossilis* and *Clarias batrachu*s on the above diets, food conversion of 1:5:1 can be effectively achieved. However, results obtained in the present experiment using compounded fee, stress the need for intensified studies in the direction. Further modification of percentage composition of the various components of nutrition on the dietary level as well as, field trials of the compounded diet are essential.

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