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PROTEIN EFFICIENCY RATIO (PER) AND GROSS FOOD CONVERSION EFFICIENCY (GFCE) OF FRESHWATER FISH *LABEO ROHITA* FED ON FORMULATED FEED

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ABSTRACT

In the present study, experiment was conducted to evaluate Protein Efficiency Ratio and Gross Food Conversion Ratio of freshwater fish *Labeo rohita* fed on 100%, 75%,50% 25a% non conventional formulated feed *i.e.* blood of bovine animals obtained from slaughter house and 100% conventional feed i.e. Groundnut oil Cake. The fishes were fed at the rate of 5% of the total body weight per day. The fish shows high body weight at 100% formulated feed as compared to 100% conventional feed. And fishes were having high Protein Efficiency Ratio and Gross Food Conversion Efficiency value as compared to conventional feed.

INTRODUCTION

The essential nutrient requirements of fish are proteins, lipids, carbohydrates, vitamins and minerals. It should be noted that knowledge of the protein requirement of fish is essential for the formulation of a well-balanced artificial diet for economical fish feeding (Lovell, 1989; De Silva, 2001; Omoniyi and Fagade, 2003). Protein requirement is linked with the general energy requirement of the fish and the ability of the fish to gain weight at its inherent capacity (Eyo, 2003). According to Falaye (1992), the nutrient requirements of fish depend on the age, species, production function and environmental condition. In fish feed formulation protein and energy requirements of the species under culture practices is predominantly considered above all other nutrients (Otubusin, 1987).

The protein component in aquaculture diet is the single most expensive portion and important dietary nutrient. Fish meal remains the major dietary protein source, comprising about 20 to 60% of fish feed (Watanabe, 2002). The determination of less expensive sources of protein that provide satisfactory growth is advantageous for diet manufacturers and aquaculture producers (Coyle *et al.,* 2004). Protein Efficiency Ratio (PER) is a measurement of how the protein sources in a diet could provide the essential amino acids requirement of the fish feed (DeSilva and Anderson, 1995) and Gross Feed Conversion Efficiency (GFCE), which is a basis for assessing feed utilization *i.e.* the conversion of feed into body tissues.

Hence the present study is aimed to determining the PER and GFCE of *Labeo rohita* fed on non conventional formulated feed and conventional feed.

MATERIALS AND METHODS

Experimental set up

After acclimatization, 25 fingerlings of experimental fish were randomly stocked in each aquarium. The average initial weight of fingerlings was noted. All physico chemical parameters were maintained within normal range during experiment (Table 1). The fishes were fed at 5% of total body weight once a day. The body weights of fishes were also recorded at selected time intervals (Table 2). The PER and GFCE values were obtained by taking into account the weights of fishes and by applying the related formula.

Statistical analysis

For this, growth was expressed as weight gain (%), Protein Efficiency Ratio (Zeitoun *et al.,* 1976), Gross Food Conversion Efficiency (Stickeney and Hardy, 1989).

Protein Efficiency Ratio (PER)

This was calculated by using the relationship between the increase in the body weight of fish (*i.e.* the weight gain of fish) and protein consumed according to the methods of Zeitoun *et al.* (1976).

PER = Weight gain of fish / crude protein in diet

Gross Food Conversion Efficiency (GFCE): This was calculated as the reciprocal of the FCR expressed as a percentage (Stickeney and Hardy, 1989).

RESULTS AND DISCUSSION

Ability of an organism to convert nutrient especially protein

Table 1: **Proximate analysis of conventional and formulated feed**

S.No	Parameter	100%Conventional feed	Formulated feed			
			100%	75%	50%	25%
1	Moisture (%)	6.16	5.6289	8.011	6.784	6.789
2	Ash (%)	4.73	6.120	3.64	3.69	4.39
3	Protein (%)	33.94	31.84	43.27	29.89	30.29
4	Fat (%)	7.72	4.01	7.46	6,52	5.4
5	Fiber (%)	2.28	6.05	8.8	6.2	2.4
6	Carbohydrate	44.64	52.34	18,8	52.18	51.478
7	Energy kcal/100g	372.82	315.42	315.42	386.80	375.51

Table 2: Weight gain (g) of *Labeo rohita* fed on conventional and formulated feed

S.No	Duration in days	100%Conventional feed	Formulated feed			
			100%	75%	50%	25%
1	30	1.33	1.98	0.88	1.72	1.27
2	45	1.49	2.47	1.22	1.90	1.98
3	60	1.42	2.36	1.12	2.12	1.87
4	75	1.41	2.93	1.40	2.02	2.53
5	90	1.85	3.3	1.95	2.92	2.47

Table 3: The PER of *Labeo rohita* fed on conventional and formulated feed

S.No	Duration in days	100%Conventional feed	Formulated feed			
			100%	75%	50%	25%
1	30	0.0568	0.0628	0.0203	0.0575	0.0429
2	45	0.0497	0.0776	0.0281	0.0635	0.0653
3	60	0.0416	0.0741	0.0258	0.0709	0.0617
4	75	0.0415	0.0920	0.0324	0.0846	0.0666
5	90	0.0547	0.104	0.450	0.0976	0.0815

Table 4: The GFCE of *Labeo rohita* fed on conventional and formulated feed

S. No	Duration in days	100%Conventional feed	Formulated feed			
			100%	75%	50%	25%
1	30	56.82	99	44.05	86.20	63.69
2	45	84.74	125	99	95.23	59.17
3	60	70.92	119	84.74	106.38	94.33
4	75	70.92	147	70.42	126.58	101.01
5	90	92.59	166	98.04	147.05	125

positively influence its growth performance. This is justified by the PER in 100% formulated feed than in the conventional feed and also GFCE shows highest value in 100% formulated feed *i*.e. 166% as compared to conventional feed 92.59%(Table 4). Similar results were reported on *Heterobranchus longifilis* (Sonbesan and Ugwumba, 2008) and in catfish *Clarias batrachus* (Otubusin *et al.,* 2009). The feed containing 10% blood meal (31.34% protein) gave the best performance in the culture of tilapia (*Oreochromis niloticus)* in floating bamboo net cages (Otubusin, 1987). In present study, the feed containing 100% blood meal shows good performance and exhibit significant results of PER and GFCE (Table 3 and 4).

Blood meal is rich in lysine having twice the content in white fish meal and almost three times the levels in dehulled soyabean meal (Crawshaw, 1994). Allan (1998) reported that blood meal in feeds was well utilized by Barramundi and Atlantic salmon which were adapted to carnivorous diets. Blood meal is also rich source of leucine and valine (NRC, 1993), high in histidine and phenylalanine (Hertrampf and Piedad - Pascual, 2000). In 1980s, less than 10% animal fish feed production was used in aqua feeds and. Tacon (1990) reported that perpotion has increased over 46%. This study has shown that Blood meal can serve as an equally efficient and cost effective inclusion for fish feed.

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