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Effect of vermicompost-bred earthworms on fish growth

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ABSTRACT

Organic waste recycling is an efficient and environmentally friendly technology to convert wastes into value added products. Vermicomposting uses earthworms to turn organic wastes into very quality compost. Major nutrient status of vermicompost of agro waste processed by species of earthworm namely, Eudriluseugeniae. There is very little information on the use of earthworm meal in poultry diets. Care must be taken when growing earthworms for use in animal feeds. Heavy metals and other pollutants are taken up by the worms and can be passed on to the birds consuming the earthworms ([1]). In the present investigation, live earthworms bred from vermicompost were used as feed. Carbohydrate, protein was increased in earthworm fed fish when compared to fish with control diet. The lipid content was lower in in earthworm fed fish as compared to fish with control diet. The study concludes that earthworm fed fish has good nutritional impact as compared to fish with control diet. This study suggested that earthworm superior feed for fish than artificial or control feed.

Keywords: Eudriluseugeniae, Catlacatla, Control diet

INTRODUCTION

India is the third largest producer of fish in the world next only to China and Peru and it ranks second in the production of Inland fishes. Fish production has increased from 0.75 million tons in 1950to 6.90 million tons in 2006-2007, registering a compound growth rate of 4.53% per annum which has been the fastest growing one in respect of any item in the food sector. The fisheries sector contributes Rs. 19,555 cores to national income which is 1.4% of the GDP and 4.7% of the agricultural GDP. Out of total Indian exports, the share of export is 3.32%. The distribution, however, is that it is the 3rd largest contributor to the net foreign exchange earned by the country. This sector accounts for13.95% of total exports of the Indian economy. Fishery sector, besides contributing towards nutritional security component of the food basket of India, is recognized for providing livelihood and employment to millions of people.

Due to an ever rising population of India, there is an increased interest in the development of aquaculture production for food security and for larger economic benefits. Furthermore the intake of fish in our country population diet is relatively less compared to international average consumption. Fish is very nutritive diet for the human beings. Nutrient content varies with fish species and depending on the supplementation of the fish. Earlier works use earthworm as fish feed **([2], [3]).**Previous works used earthworms as pellet form mixed with other food supplements such as wheat flour, egg shell dust, dried earthworm dust, plant rhizome, waste of soybeans, chicken gut and rice bran flour as binder etc.. In the present investigation, live earthworms bred from vermicompost were used as feed. The present author bred the earthworms *Eudriluseugeniae* from vermicompost consisting of agro waste ([4]). The present work was undertaken to evaluate and compare biochemical parameters in fish, Catlacatla, fed with live earthworm, Eudrillus Eugenia, and control diet.

MATERIALS AND METHODS

Collection and acclimation of experimental fish:
Fingerlings of *C.catla* (average weight 4.85 ± 1.12 g) was procured from Fish farm, Thittai, Thanjavur District, Tamil Nadu, India, using cast net and maintained in the laboratory in a glass aquarium tank and acclimatized in aerated tap water with continuous aeration for two weeks prior to experimentation.

CATLA CATLA
Taxonomy position:

Kingdom	:	Animalia
Phylum	:	Chordata
Class	:	Actinopterygii
Order	:	Cypriniformes
Family	:	Cyprinidae
Genus	:	***Catla***
Species	:	***catla***
Binomial Name	:	***Catlacatla***

Then the mature earth worms *Eudriluseugeniea* were collected from Earthworm form, Periyar Maniyammai University, Thanjavur, Tamilnadu, India.

Eudriluseugeniae
Scientific classification

Kingdom	:	Animalia
Phylum	:	Annelida
Class	:	Clitellata
Subclass	:	Oligochaeta
Order	:	Haplotaxida
Family	:	Eudrilidae
Genus	:	**Eudrilus**
Species	:	***eugeniae***
Binomial name	:	***Eudriluseugeniae***

EXPERIMENTAL SECTION

Two glass aquariums tanks (50 L) were used in this trial. Each tank was provided with a proper continuous aeration. Each aquarium was stocked with fifteen fish. The numbers of treatments in the trial were two with three replicates for each. The aquaria (replicates) were randomly allocated to minimize differences among treatments. The continuous water flow discharged non-consumed feed and feces particles from the aquaria. In addition, a daily cleaning by siphon method was applied to remove remaining particles from the system.

The *Catlacatla* was used in this study and animals were grouped in the following

The experiments were conducted for 40 days.

Group 1 - Fresh water fish fed with Control diet
Group 2 - Fresh water fish fed with live earthworm *Eudriluseugeniea*.
The length (mm), breadth (mm) and weight (gm) of individual fish were recorded separately on treatment wise with the help of measuring scale and portable sensitive balance.

BIOCHEMICAL ESTIMATIONS
Estimation of total protein:
Protein was estimated by the method of**([5]).**

Estimation of total Lipids:
Total lipids in tissues were estimated by the method of**([6]).**

Estimation of total Carbohydrate
Carbohydrate was estimated by the method of **([7])**.

RESULTS

The present study was carried out to analyze the various biochemical parameters in fish fed with control and live earthworms. The observations made on different groups of fishes were compared as follows:

Table II - shows the levels of Carbohydrate in control diet fish and earthworm fed fish. Carbohydrate was increased in earthworm fed fish when compared to fish with control diet.

Table III - shows the levels of Protein in fish with control diet and earthworm fed fish. Protein was increased in earthworm fed fish when compared to fish with control diet.

Table IV - shows the levels of Lipids in fish with control diet and earthworm fed fish. Lipids were non significantly increased in earthworm fed fish when compared to fish with control diet.

Table I : Morphometric analysis of fish during culture period

Week	Weight (gm)		Length (cm)		Breadth (cm)	
	Control	Treated	Control	Treated	Control	Treated
1	6.110	6.380	7.970	8.500	1.820	2.010
2	7.170	7.780	8.250	8.760	2.020	2.340
3	8.210	8.590	8.520	9.340	2.250	2.540
4	9.260	9.680	9.110	9.460	2.470	2.660
5	9.980	10.150	9.000	9.500	2.670	2.830
Mean	8.146	8.516	8.570	9.112	2.246	2.476
STD	1.393	1.352	0.434	0.405	0.304	0.282

Table II: Carbohydrate levels in fish with control diet and earthworm fed fish

Fish	Carbohydrate (mg/gm)
Group I	3.63 ± 0.16
Group II	3.93±0.15*

Values were expressed as mean ±SD.
** Significantly different from fish with control diet (P< 0.05)*

Table III: Estimation of Protein in fish with control diet and earthworm fed fish

Fish	Protein (mg/gm)
Group I	6.4±0.15
Group II	9.25 ± 1.16

Values were expressed as mean ±SD.
**significantly different from fish with control diet (P< 0.05)*

Table IV: Estimation of Lipids in fish with control diet and earthworm fed fish

Fish	Lipids (mg/gm)
Group I	0.300 ± 0.19
Group II	0.170±0.10*

Values were expressed as mean ±SD.
** Significantly different from fresh water fish (P< 0.05)*

DISCUSSION

Biochemical studies are very important from the nutritional point of view. Protein is essential for the sustenance of life and accordingly exists in the largest quantity of all nutrients as a component of the human body ([8]) In various fish species, proteins are important as structural compounds, biocatalysts and hormones for control of growth and differentiations ([9])). Protein in fish is a main component constituent of tissue and organs. They are precursors of other nitrogen compounds (enzymes, hormones, slurry, neurotransmitters, cofactors, etc..) and constitute an important energy source. The effect of dietary lipid levels on fish growth performance varies considerably within species, size, age, diet and composition, range of lipids level tested and rearing conditions ([10]). Inadequate protein levels in the diets result in a reduction of growth and loss of weight. However, when an excess of protein is supplied in the diet, only part of it is used for protein synthesis (growth) and the remaining is transformed into energy ([10]).

Each body cell is composed mainly of protein. Protein makes up the membrane surrounding the cell and also occurs within the cell. During growth period, adolescence and pregnancy, the number of cell increases and more protein is required for cell growth. In all stages of life tissue protein is constantly being broken down and must be replaced by dietary protein. Protein plays a vital role in the formation of enzymes, antibodies and hormones and other substances that regulate the body process.

CONCLUSION

Fish is mostly consumed for its delicacy with little knowledge of its nutritional wealth. Nutrition is core pillar of human development. High prevalence of low birth weight, high morbidity and mortality in children and poor maternal nutrition of the mother continue to be major nutritional concerns in India. Clearly, this situation emphasizes the need for examining several issues of nutritional significance. One among the issues is the dearth of information about the nutritional benefits of our food.

The current examination on the nutritional profile of fresh water and earth worm fish, bringing to our attention the richness of healthy nutrients present in the eatable portion such as muscle. The protein content was higher in earthworm fed fish as compared to fish with control diet.

- The carbohydrate content was higher in earthworm fed fish as compared to fish with control diet.
- The lipid content was lower in in earthworm fed fish as compared to fish with control diet.

The study concludes that earthworm fed fish has good nutritional impact as compared to fish with control diet. This study suggested that earthworm feed is superior feed for fish instead of artificial feed.

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