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TOTAL LIPID CONTENT IN INTENSTINE OF FINGERLINGS OF FRESHWATER FISH *LABEO ROHITA* FED ON FORMULATED FEED

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Abstract:

Aquaculture is the fastest growing food production sector in the world. For the expansion of aquaculture to need nutritious and low-cost fish feed because feed contributes significantly to the cost and efficiency of fish production. The quality of flesh of fish is evaluated with the biochemical composition of fish. For this in the present experiment, Nighty days experiment was conducted in glass aquaria to study lipid content in intestine of fingerlings of freshwater fish *Labeo rohita* fed on 100%,75%,50% and 25% non-conventional source of protein in formulation of fish feed i.e. .Blood of bovine animals obtained from slaughter house waste and conventional feed .i.e. .Groundnut oil cake. The fishes were fed at the rate of 2% of the body weight every day. After specific time intervals the fishes were weighed and sacrificed for intestine tissue. The tissue were quickly excised and cleaned off extraneous material, weight and used for estimation of total lipid by Floch's method. Results revealed that the total lipid was highest at 75% formulated feed followed by 25%, 50% and 100% formulated feed.

Keywords: Non-conventional resource, Formulated Feed, *Labeo Rohita*, Total lipid.

Introduction:

Fisheries have always played a very significant role in many countries and communities (Sakthivel *et al.*, 2017). Fish require a high quality and nutritionally balanced diet for adequate growth within the shortest time. Therefore, local production of fish feed using locally available ingredients at low cost is crucial to the development and sustainability of aquaculture. Affordable quality feed will make fish farming attractive to private investors and boost fish production. In the fish feed formulation protein in the feedstuffs helps to formulate proper and growth effective fish diet (Maina *et al.*, 2002). The identification and utilization of non-conventional and lesser utilized plant protein sources to replace fishmeal either partially or totally in practical diets of fish has been an area of research in aquaculture nutrition (Siddhuraju and Becker, 2003). However the increasing cost of quality fish feed required for aqua feed, due to decline in stocks

of fish from capture fishery and competition for feed in animal husbandry, therefore need of search alternative sources of animal protein for fish feed. Hence in the present study, non-conventional animal protein source as blood of bovine animal is used in feed formulation as primary ingredient along with other ingredient.

Fishes and their biochemical parameters can be considered as bio-indicators or bio-monitors of aquatic system for assessing the quality of water and also the survival and growth rates of fishes grown such environment.

Biochemical composition is of great help in evaluating not only fish nutritive value but also helps in quality assessment and optimum utilization of these natural recourses (Rodriguez-Gonzalez *et al.*, 2006; Dong-Kyu Kim *et al.*, 2012). In fish, the lipids and their constituent Fatty Acids (FA) along with their metabolic derivatives, such as the eicosanoids, play significant roles in various functions of the organism, including growth, health and reproduction (Sargent *et al.*, 2002). Dietary lipids provide energy and Essential Fatty Acids (EFA) to the fish and they also assist the absorption of fat-soluble vitamins (NRC, 1993). Lipids play important physiological roles in providing energy, essential fatty acids and fat soluble nutrients for normal growth and development of fish and human being. Hence in the present study aimed to determine effect of different combinations of formulated feed (100%, 75%, 50% and 25%) and conventional feed on activity total lipid alteration in gill and muscle of freshwater fish *Labeo rohita* which gives the understanding of utilization of nutrients in feed by fish.

Material and Method:

Formulation of feed

In the present study, for formulation of fish feed, the non-conventional animal protein source such as blood of bovine animal (80gm) was taken along with ingredients like milk powder (60 gm), corn flour (20 gm) and eggs (70 gm) were added and mixed well. Agar powder (4 gm) was added as binding agent and turmeric (0.5gm) and garlic (1 gm) were added as antibiotics. Then the mixture was boiled and cooled at room temperature. After cooling cod liver oil (3.5 ml) was added. The vitamin mixture of vitamin B complex (1gm) and vitamin E (1ml) were added in the mixture. This mixture was kept under refrigeration for 12 hrs. After 12 hrs it was squeezed over polythene sheet and then dried at room temperature for 24 hrs. The dried nodules were crushed into small pellets. The nodules were sun dried to avoid fungal infection. Finally it was weighted and stored in the bottle. Following the above procedure all the feeds were formulated in the percentage composition of 25% (blood 25%+groundnut oil cake 75%), 50% (blood 50%+ groundnut oil cake 50%),75% (blood 75% + groundnut oil cake 25%),100%

formulated (100% blood) and 100% conventional (100% groundnut oil cake) (Bhilave *et al.*, 2010).

Experimental protocol

The fingerlings of freshwater fish *Labeo rohita* measuring about 4 to 5 cm in length were obtained from the Fish Seed Rearing Centre, Rankala, Dist. Kolhapur, unit of Department of Fisheries, Government of Maharashtra. After obtaining them, they were brought to the laboratory and acclimatized in rectangular glass aquaria of 36x12” with 60 liters capacity containing aerated water for seven days. During acclimatization adequate aeration was maintained and temperature was maintained from 28°C to 30°C. The fishes which survived during acclimatization were distributed randomly into five aquaria (10 in each) and labeled as per the feed combination. They were fed at the rate of 2% of total body weight. The feeding was done once in a day. The body weights and lengths were recorded at each time interval i.e. 30, 45, 60, 75 and 90 days throughout the experimental period respectively.

Estimation total lipid by Barnes and Black Stock (1973)

The method is based on the ability of unsaturated lipid metabolism to produce by reaction with vanillin reagent. A colour compound whose intensity of coloration is proportionate to the total lipid concentration in the sample and it is measured at 540 nm.

Protocol

For lipid estimation homogenates of selected tissue (Intestine, gill and muscle) were prepared in Folch's mixture with mortar and pestle (Folch's *et al* 1957). The Folch's mixture was prepared by taking chloroform and methanol in 2:1 ratio. For standard graph known concentration of cholesterol were used for calculation. The blank and unknown tubes contained 1 ml of distilled water and homogenate from respective organ of fish fed on formulated feed. The homogenate was evaporated at 40°C in water bath and then added 1ml of concentrated sulphuric acid. The tubes heated in boiling water bath for 10 minutes. After cooling 2 ml of vanillin reagent were added in each tube. The pink colour developed was measured at 540 nm on spectrophotometer. The standard graph was plotted against unknown sample and calculates the actual amount of lipid in all tissues.

Result and Discussion:

Islam and Tanaka (2004) reported that, protein is one of the most important dietary nutrients in feed and which considerably affects by growth, survival and yield or production of fish. They are providing essential and non-essential amino acids to synthesize body protein and

energy for maintenance. According Robinson and Lii (1998) and Mohanta (2013), the feed stuffs of animal origin are considered the better alternative protein sources of the fish meal in formulating fish feed because of their higher protein content and superior indispensable amino acids than that of plant origin. Thus, in the present investigation, the non conventional animal protein source such as blood of bovine animal is used in feed formulation as primary ingredient along with other ingredients which was observed enhance the growth and disease resistance in fishes.

Table 1: Total lipid content from intestine of freshwater fish *Labeo rohita* fed on conventional and formulated feed

Sr. No	Days	Conventional feed	Formulated feed			
			100%	75%	50%	25%
1	30 days	2.88±0.080	3.46±0.31 ^{ns}	3.96±0.17**	3.35±0.38 ^{ns}	3.78±0.25*
2	45 days	4.40±0.39	4.24±0.35 ^{ns}	6.15 ± 0.43**	3.78±0.30 ^{ns}	4.29±0.69 ^{ns}
3	60 days	5±0.05	6.16±0.43 ^{ns}	6.35±0.43 ^{ns}	4.66±0.25 ^{ns}	4.22±0.35*
4	75 days	6.34±0.075	7.46±0.20 ^{ns}	6.59±0.92 ^{ns}	7.5±0.095 ^{ns}	5.11 ±0.58 ^{ns}
5	90 days	5.71 ±1.32	6.92 ±0.60 ^{ns}	7.51±0.095 ^{ns}	7.50±0.095 ^{ns}	7.49± 0.096*

Value expressed is mean of n (n=5) ± SD, * P< 0.05, **P<0.01, ***P<0.001, NS = Non significant

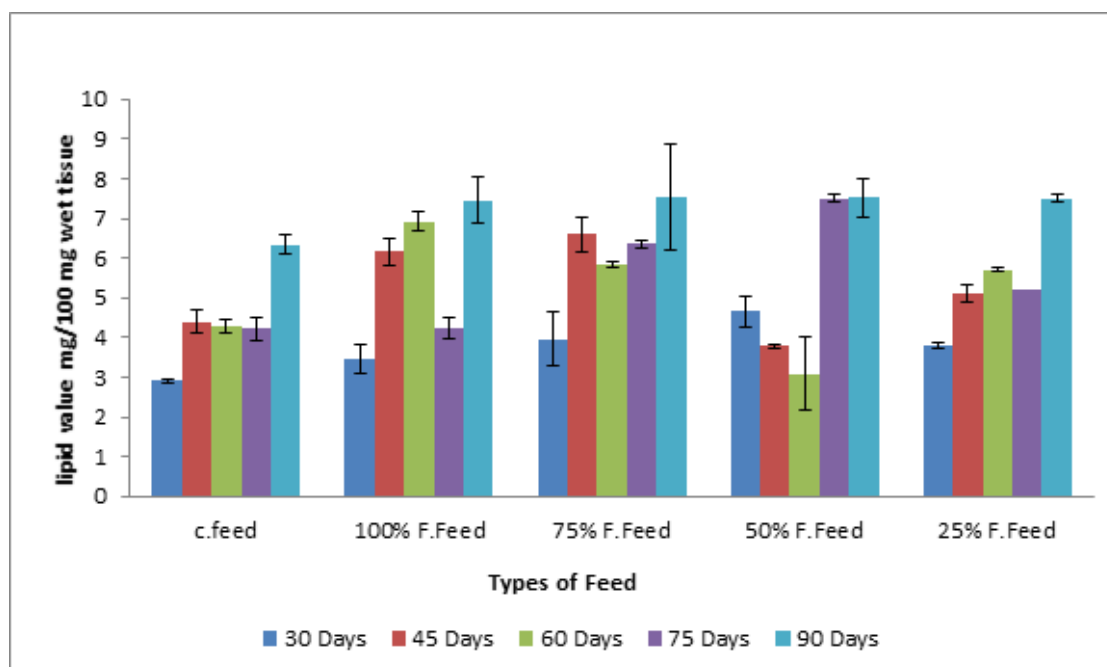


Figure 1: Total lipid content from intestine of *Labeo rohita* fed on conventional and formulated feed

According Bhilave *et al.* (2011) to least cost formulation to include non-conventional animal protein source such as blood of bovine animal of with different percentage with groundnut oil cake (100%, 25%, 50%, and 75%) and this formulated feed was well accepted and utilized by fingerlings of *Labeo rohita*. Kaushik and Oilva –Teles (1985) and Medal *et al.* (1991) reported that the total lipid contents of fish are with gradual increase in the weight and length of the fish and also due to seasonal changes as well as the availability of nutrient in varied habitats.

In the present research work, the lipid content in intestine was oscillated from specific time interval such as 30,45,60,75 and 90 days. The highest lipid content was found at 75% formulated feed 7.51 ± 0.095 mg/100mg wet tissue followed by 50% formulated feed was 7.50 ± 0.095 mg/100mg wet tissue, at 25% formulated feed 7.49 ± 0.096 mg/100mg wet tissue and 100% formulated feed was 6.92 ± 0.60 mg/100mg wet tissue as compared to conventional feed 5.71 ± 1.32 mg/100mg wet tissue. Comparatively, the formulated feeds was observed non-significantly ($P > 0.005$) lipid content compared with conventional feed. The lipid content at 75% formulated feed was significantly ($P < 0.01$) varied between 30 and 45 days with conventional feed. At 25 % formulated feed fed groups was found less significant ($P < 0.01$) difference in lipid content at 30, 60 and 90 days. Hence, above result stated that, the highest lipid content in intestine tissue of fingerlings of *L. rohita* was observed at 75% formulated feed followed by 50% formulated feed, 25 % formulated feed and 100% formulated feed when compared to conventional feed of 90 day experiment.

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