



**Full Length Research Article**

**COMPARATIVE STUDIES ON LIPID IN FRESHWATER AND TREATED SEWAGE WATER CULTURE  
FISH *Labeo rohita***

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**ARTICLE INFO**

**Article History:**

Received 14<sup>th</sup> May, 2013  
Received in revised form  
26<sup>th</sup> June, 2013  
Accepted 29<sup>th</sup> July, 2013  
Published online 23<sup>rd</sup> August, 2013

**Key words:**

*Labeo rohita*, Lipid,  
Muscle, Intestine and gill.

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**ABSTRACT**

Biochemical characteristics (lipid in muscle, intestine and gill) of the freshwater carp fish *Labeo rohita* were estimated. Maximum lipid content was recorded in muscle tissue of *Labeo rohita* at treated sewage fish culture pond (station – II) and minimum protein content was observed in gill tissue of *Labeo rohita* at freshwater fish culture pond (station – I). Total lipid content was studied in different days of 5, 10 and 15 days. The different tissues of muscle, intestine and gill lipid maximum was found to be sewage treated fish and compared than fresh water fish *Labeo rohita*. This study recommended that the wastewater should be treated before discharge into this culture pond.

**INTRODUCTION**

Fish has attained great nutritional significance in recent years for providing best source of protein and oil. It has been estimated that farmed *Labeo rohita* is found to be best due to its nutritional as well as commercial value as compared to that of wild fish. Fish lipid has also been assured great nutritional significance owing to their protective role against the developing cardiovascular diseases. Coronary heart diseases have been identified as one of the major source of death in Pakistan, with mortality rate increasing every year (Mahboob *et al.*, 2004). As fish is rich in providing unsaturated fatty acids, so there is no risk of cardiovascular disease and any other blockage in the vessels and also they (lipids) provide energy 9.3 Cal/g twice than that of protein (Anonymous, 1977). Fish has long been recognized as valuable resource of high quality food in human diet. Aquaculture is a low energy expenditure and protein yielding in comparison to other agriculture sectors. Since aquaculture production is affected by multiple factors, many characteristics must be measured and analyzed for production. Physical and chemical characteristic of water bodies, seed quality, stocking density, season, cultural system, feeding and harvesting patterns are important factors.

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The growth rate of aquaculture species depends on their genetic potential as well as several other factors that influence the growth of fish genetic makeup, behavior, population dynamics and endocrinology. (Sahu *et al.*, 2000). Choi and Regenstein, (2000) suggested that in addition to producing fish gelatin to meet religious needs, the commercial use of skin and bones which are normally discarded is good waste management and as well as economic benefit. Fish skin and scales that are discarded as dressing losses are an important source of protein, lipids and minerals (Iqbal, 2002). Composition of the body is a good indicator for the physiological condition of a fish but it is relatively time consuming process. Proximate body composition is the analysis of carbohydrates, proteins and moisture contents of fish. The percentage of water is good indicator of its relative contents of energy, proteins and lipids. The lower percentage of water, greater lipids, protein contents and higher energy density present in the fish (Dempson *et al.*, 2004). In recent years, the need for renewable energy generation and the need to divert biodegradable waste from landfill have pushed anaerobic digestion into the market for the treatment of biodegradable municipal waste. Out of the biodegradable fraction of municipal waste, food waste is the most challenging because of its high moisture content and readily biodegradable nature (Davidsson *et al.*, 2008; Stroot *et al.*, 2001). Although many options have been suggested for the management of foodwaste, including incineration, composting,

the use of food waste disposal units (FWDs) and anaerobic digestion has attracted more interest, particularly in policy making, due to its potential for energy generation (Banks *et al.*, 2008; Gallert *et al.*, 2003; Iacovidou *et al.*, 2012b; Zhang *et al.*, 2005, 2007b). In the present observation, the waste water was used in the fish food production.

**MATERIALS AND METHODS**

Freshwater fish *Labeo rohita* were collected from culture pond and treated waste water ponds in Thanjavur area and experiment was conducted in the laboratory at Department of Zoology, Annamalai University, Chidambaram, Tamil Nadu India. The fishes were sacrificed and tissues such as muscles, intestine and gill were dissected and removed. The tissues (10 mg) were homogenized in 80% methanol, centrifuged at 3500 rpm for 15 min. and the clear supernatant was used for the analysis of total Lipids. Total lipid in the tissue was estimated by the method Folch, (1957).

**RESULTS**

In the present study, the total lipid content were analyzed from freshwater carp *Labeo rohita* are present in Table 1. Total lipid values were noted in 5, 10 and 15 days.

Total lipid content was measured from different tissues (muscle, intestine and gills) of carp *Labeo rohita*. Maximum amount of lipid (0.70 mg/g) was recorded in muscle tissue for a period of 15 days and minimum lipid content (0.04 mg/g) was recorded in gill tissue of *Labeo rohita* for a period of 7 days.

**Station – I (Freshwater culture fish *Labeo rohita*)**

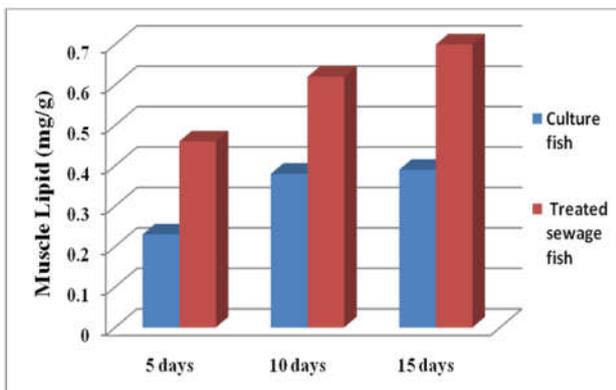
Lipid values were measured from freshwater carp fish *Labeo rohita* in different tissues (muscle, intestine and gills), during the period of 5, 10 and 15 days. These results are present in Table 1. In the present study the lipid level 0.23, 0.38 and 0.39 mg/g were recorded in muscle tissues (Fig. 1), the intestinal lipid values 0.15, 0.24 and 0.25 mg/g were recorded in carp *Labeo rohita* (Fig. 2) and the gill lipid level 0.04, 0.09 0.06 were recorded in *Labeo rohita* during the period of 5, 10 and 15 days (Fig. 3). The maximum value of lipid (0.38 mg/g) was recorded in muscle tissue, during the period of 10 days and the minimum lipid value (0.04) was recorded in gill tissue of carp *Labeo rohita* during the period from 7 days.

**Station – II (Treated sewage water fish *Labeo rohita*)**

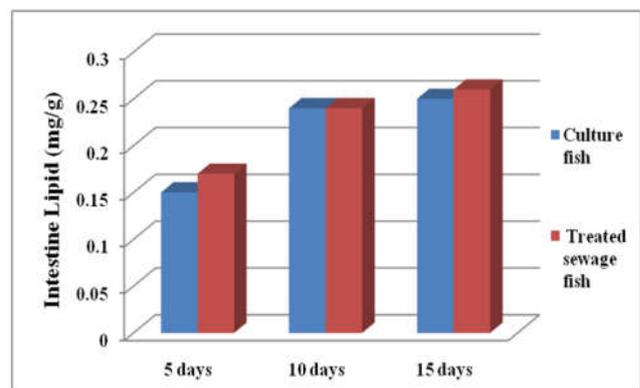
The total lipid content was analyzed from treated sewage water carp *Labeo rohita* in muscle, intestine and gill tissues during the period of 5, 10 and 15 days (Table 1).

**Table 1. The total lipid content (mg/g) in tissues of fresh water culture pond fish and treated sewage water culture fish *Labeo rohita* (Means ± SD)**

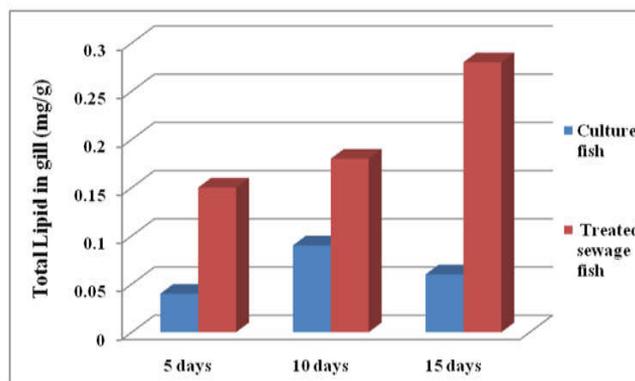
Days	Station -I Freshwater culture fish			Station -II Sewage water fish		
	Muscles	Intestine	Gill	Muscles	Intestine	Gill
5 days	0.23 ± 0.07	0.15 ± 0.04	0.04 ± 0.02	0.46 ± 0.06	0.17 ± 0.04	0.15 ± 0.03
10 days	0.38 ± 0.13	0.24 ± 0.06	0.09 ± 0.03	0.62 ± 0.08	0.24 ± 0.03	0.18 ± 0.06
15 days	0.39 ± 0.03	0.25 ± 0.03	0.06 ± 0.02	0.70 ± 0.04	0.26 ± 0.05	0.28 ± 0.04



**Fig. 1. Total lipid content of muscles (mg/g) in tissues of freshwater and treated sewage water fish *Labeo rohita*.**



**Fig. 2. Total lipid content of intestine (mg/g) in tissues of freshwater and treated sewage water fish *Labeo rohita*.**



**Fig. 3. Total lipid content of gill (mg/g) in tissues of freshwater and treated sewage water fish *Labeo rohita***

In the present study, total lipid values 0.46, 0.62 and 0.70 mg/g were observed from muscle tissues (Fig. 1), the total intestinal lipid values were recorded 0.17, 0.24 and 0.26 mg/g in carp *Labeo rohita* (Fig. 2). The total lipid values were observed in the gill tissues of 0.15, 0.18 and 0.28 mg/g in treated sewage water carp fish *Labeo rohita* during the period of 5, 10 and 15 days (Table 1 and Fig. 3). The maximum level of lipid content (0.70 mg/g) was recorded in muscle tissue of carp *Labeo rohita* during the period of 15 days and the minimum level of lipid content (0.15 mg/g) was recorded in gill tissue of *Labeo rohita* for a period of 5 days (Fig. 3).

## DISCUSSION

Biochemical responses can be affected by environmental factors, such as physico-chemical profiles of aquatic medium, seasons, fish nutrition status, age and health (Lohner *et al.*, 2001). Higher feed intake refers to disturbance in metabolism. Variations in the energy reserves (lipids) are indicative of long term exposure of toxicant stressor (Mayer *et al.*, 1992). In the present study, Lipid content maximum was recorded in muscle tissue of *Labeo rohita* (treated sewage water fish) and minimum level of lipid content was recorded in the gill tissue of *Labeo rohita* (Freshwater culture fish). Lipid content was recorded in different tissues such as muscle, gill and intestine of *Labeo rohita*. All the tissues, maximum level of lipids were observed in sewage treated water fish when compared that the freshwater culture fish during the study period. Similarly it was reported by (Stickney and Hardy, 1989). Lipids are also the storage form of energy's like glycogen. The lipid levels also decreased in the tissues of intestine and gills of fish when compared to the muscle tissue of fish (Peyami *et al.*, 2006). The results of the present study showed that when the fishes were exposed to freshwater culture carp fish and treated sewage water carp fish *Labeo rohita*. The total lipid content were found to be increased in the treated sewage water pond in different tissues such as muscles, intestine and gills of carp *Labeo rohita*.

## Conclusion

Thus, the present baseline information of the biochemical composition of carp *Labeo rohita* would form a useful tool for further ecological assessment and monitoring of these freshwater and sewage treated water in Thanjavur district. So the poor water quality conditions in potential problem of fish culture ponds, moreover regular fish health monitoring may also be practiced. Accordingly, it is recommended that the wastewater should be treated before discharge into this culture pond.

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