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Research Article

EFFECT OF SURFACTANT ON FEEDING RATE OF FRESHWATER FISH, *LABEO ROHITA*

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ABSTRACT
Feeding rate of the fresh water fish *Labeo rohita* was studied after exposure to different concentrations of surfactant, Surf excel. Three groups were formed. Group-1 act as control group-2 and 3rd were received surfactant of different concentrations. The concentration chosen were 6.63 mg surfactant/litre water and 13.03 mg surfactant/ litre water respectively. Estimation of Feeding rate was calculated at Ist, 2nd 3rd and 4th days of the experiments. The feeding rate was reduced with increasing concentrations of surfactant in water. The study reveals that there are more physiological stresses to the fish exposed in higher concentrations of surfactant than the lower concentrations.

Keywords: *Fish, Surfactant, Feeding Rate*

INTRODUCTION
Labeo is a genus of carps in the family Cyprinidae, found in natural inhabitant of the riverine system of northern and central India.
It is commonly called rohu. The rohu is a large, silver-coloured fish of typical cyprinid shape, with a conspicuously arched head fish.
Its body is body bilaterally symmetrical, moderately elongate, dorsal profile is more arched than the ventral profile and body is with cycloid scales. It is a large omnivore fish and one of fish which is extensively used in aquaculture.
Surfactants are the most widely used groups of compounds today, with wide application in industry and household. These are unique substances that contain hydrophobic and hydrophilic moieties within their molecule and find enormous applications in biology.
Exposure to surfactant even for a relatively short period of time, can affect the fish ability to feed, flee from predators, reproduce, etc. as we know that it is one of the most common domestic wastes that commonly enter the aquatic ecosystem is detergent. In everyday life one frequently comes into contact with surfactants (surface active agents).
The metabolic rate of an organism is a useful and sensitive indication of its daily consumption of energy. Surfactant effect was performed on Indian major carp *Labeorohita* exposed to different concentrations of surfactant for different durations. Surfactants are widely used in both industrial and domestic premises as soaps and detergents to wash vehicles.
'After wash' of detergents are either drained into the aquatic environments such as ponds, lakes, rivers, streams etc. or they find their way into the aquatic environment by natural sewage.
Fish is generally considered very sensitive to all kind of environmental changes to which it is exposed as they are exclusively aquatic with external mode of fertilization. Fish is one of the most important non-target aquatic organisms affected by detergent pollution. The surfactant detergents, Linear alkylbenzene sulfonate (LAS) and Sodium dodecyl sulfates (SDS) are very toxic to bacteria, microalgae, crustaceans, echinoderms and fish (Mariani *et al.,* 2006; Asrar Sheriff *et al.,* 2012). In commercial detergent the composition of surfactant component ranges between 10% and 20%. The other components include bleach, filler, foam, stabilizer, builders, perfume, soil suspending agents, enzymes, dyes, optical brighteners and other materials designed to enhance the cleaning action of the surfactant (Swisher *et al.,* 1975; Okpokwasili and Nwabuzor, 1988).
Studies indicated that detergents have toxic effects on all types of aquatic life. There is less data available as far as the feeding rate of fish in concerned to surfactant is concerned.

Therefore, the present work was carried out to observe the effect of surfactant on the feeding rate of freshwater fish *Labeo rohita*.

MATERIALS AND METHODS

Experimental fish were obtained from a government fish seed farm, Jhajjar Haryana (India). Prior to start of experiment fishes were acclimatized under experimental conditions in laboratory for 2 weeks.

Chemical Used: Surfactant, Surf excel was used as a experimental chemical. It was weighted accurately as per requirement and dissolved in water before adding fishes in aquarium.

Experimental Design: Fishes were kept in three different groups of aquarium which were maintained at different concentration of surfactant, Surf excel. Fish, Mean Body weight (BW) 33.78 were randomly distributed at 4 fish in each group.

Group 1. Act as control
Group 2. 6.63 mg/lit surfactant
Group 3. 13.03 mg/ lit surfactant

All the fishes were fed with formulated diet with feeding rate 5% BWd Food was given to fishes at 9:00am & uneaten food was collected at 4:00pm. Each group of fish were exposed to their respective diet for four hours thereafter, the uneaten feed was siphoned out.

Feeding Rate: Feeding rate was studied by calculating the food eaten by fishes in different groups.

RESULTS AND DISCUSSION

The result shows the 100% survival was recorded in groups received 0, 6.67 and 13.3 mg/l surfactant concentrations. But as far as feeding rate was concerned it was certainly affected by the presence of surfactant in the fish accordingly. The results of present study indicated that maximum food was consumed by control group fishes. As 1.677g food was given daily to the fishes and they consumed figure 3; 0.587g (Table 1), 0.707g (Table 2), 0.907g (Table 3) & 0.48g (Table 4) food in 1st, 2nd, 3rd& 4th day respectively.

In second group fishes 1.705g food was given figure 1 & it was recorded that they consumed figure 3; 0.415g (Table 1), 0.415g (Table 2), 0.39g (Table 3) & 0.35g (Table 4) food during 1st ,2nd ,3rd & 4th day.

In case of last group that is group 3rd, 1.68g food was given figure 1 & it was recorded that they consumed 0.36g (Table 1), 0.40g (Table 2), 0.31g (Table 3) & 0.30g (Table 4) food during 1st, 2nd, 3rd & 4th day respectively. These findings indicates that more food was collected from the bottom of aquarium in groups 2nd& 3rd i.e. remaining food figure 2, approximately 1.29g (Table 1), 1.29g (Table 2), 1.315g (Table 3) & 1.355g (Table 4) in 2nd group, 1.32g (Table 1), 1.28g (Table 2), 1.37g (Table 3) & 1.38g (Table 4) in 3rd group.

Table 1: Effect of Surfactant on Feeding Rate of Fish *Labeo rohita* on 1st Day

Parameters (in gm)	Group 1st Control	Group 2nd 6.67mg/l Surfactant	Group 3rd 13.3mg/l Surfactant
Food Given	1.677	1.705	1.68
Food Remaining	1.09	1.29	1.32
Food Consumed	0.587	0.415	0.36

Table 2: Effect of Surfactant on Feeding Rate of Fish *Labeo rohita* on 2nd Day

Parameters (in gm)	Group 1st Control	Group 2nd 6.67mg/l	Group 3rd 13.3mg/l
Food Given	1.677	1.705	1.68
Food Remaining	0.97	1.29	1.28
Food Consumed	0.707	0.415	0.40

Table 3: Effect of Surfactant on Feeding Rate of Fish *Labeo rohita* on 3rd Day

Parameters (in gm)	Group 1st Control	Group 2nd 6.67mg/l	Group 3rd 13.3mg/l
Food Given	1.677	1.705	1.68
Food Remaining	0.77	1.315	1.37
Food Consumed	0.907	0.39	0.31

Table 4: Effect of Surfactant on Feeding Rate of Fish *Labeo rohita* on 4th Day

Parameters (in gm)	Group 1st Control	Group 2nd (6.677mg/l)	Group 3rd (13.3mg/l)
Food Given	1.677	1.705	1.68
Food Remaining	1.97	1.355	1.38
Food Consumed	0.48	0.35	0.30

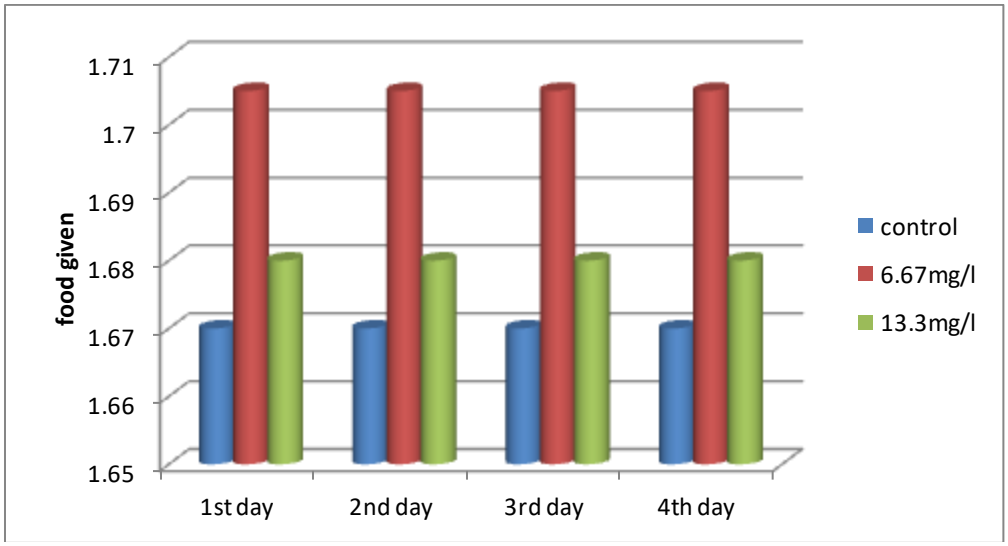

Figure 1: Conc. of Given Food under Different Surfactant Conc.

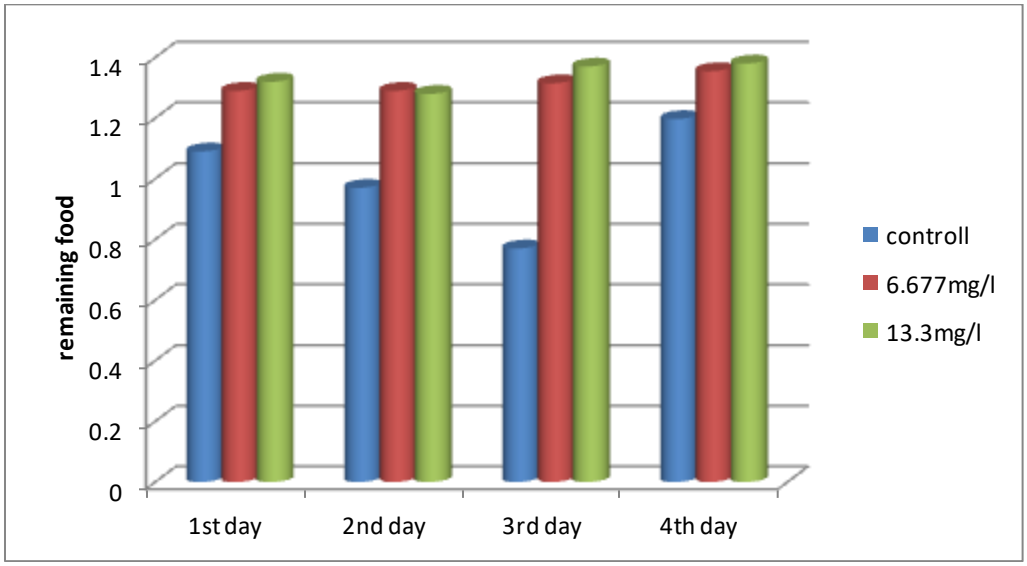

Figure 2: Conc. of Remaining Food under Different Surfactant Conc.

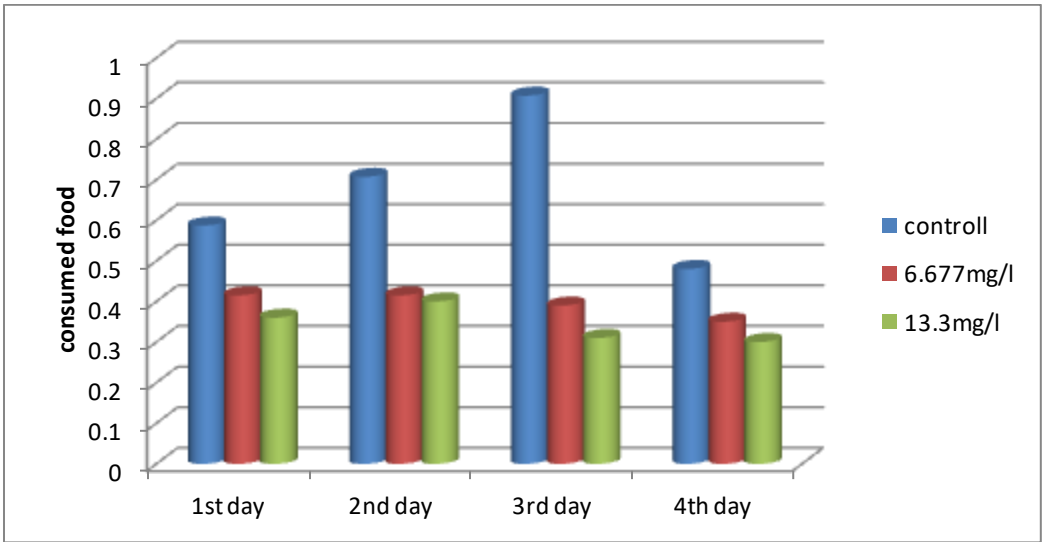

Figure 3: Conc. of Consumed Food under Different Surfactant Conc.

Food consumption decreases with an increase in concentration and time of exposure and may be due to the penetration of the pollutants at subcellular level. In our study food consumption was decreased with increased concentrations (one third) of detergent in *Labeo rohita*. Whereas with two third sublethal concentration of detergents significant decrease in food consumption with an increase in time was noticed, in the later exposure periods. Many of the reports available are related to the effects of surfactants during exposure period of 15 min to 30 days. Feeding was largely affected in the presence of surfactants.

Reduction in food intake in *Mystus vittatus* reared in the chemical factory effluent leads to reduced growth (Palanichamy *et al.,* 1989). Sakthivel *et al.,* (1991) have studied the effect of textiles dye stuff effluent on food utilization of the fish *Cyprinu scarpio*. Sheela *et al.,* (1992) have studied the rate of feeding, absorption, growth, metabolism and conversion efficiency of the fish *Channa striatus* exposed to fenvalerate and phosphamidon. Nagarajan and Ramesh (2001) have studied the growth rate, feeding rate, conversion rate and conversion efficiency of the fish *Catlacatla* introduced in control and sublethal concentrations of sago effluent. Aguigwo (2002) has reported the specific growth rate and food conversion efficiency in the sublethal concentration of cymbush pesticide. Nagarajan and Shasikumar (2002) have investigated the growth rate, conversion rate and conversion efficiency of the fresh water fish *Labeo rohita* subjected to control and different concentrations of sago industry effluent. Similar observations were made in *Catlacatla* exposed to sublethal concentrations of dyeing effluent (Nagarajan & Boopathyraja, 2004). The fish *Clarias batrachus* has great economic value and also it is an important food item hence, an attempt is made to study the growth with respect to the effect of sago effluent. Sheela *et al.,* (1992) have observed the decreased rates of feeding, absorption, growth, metabolism and conversion efficiency of the fish *Channa striatus* exposed to fenvalerate and phosphamidon with increasing concentrations. Similar sequence of events has been reported in the fresh water fish *Rasboradaniconius* exposed to different HCH sub lethal concentrations. Sakthivel *et al.,* (1991) have reported that the dye stuff effluent sub-lethal concentrations reduced the food intake and caused a significant reduction in growth rate. Decrease in food consumption, growth and conversion efficiency was observed in the fish *Barbus stigma* reared in the industrial effluent (Haniffa & Sundaravadanam, 1983).

Conclusion and Recommendations

From this investigation, it is clearly evidenced that the higher concentrations of surfactant have more toxic factor to the fishes than the lower concentrations. All the above findings were in conformity with the present investigation where the high concentration of surfactant obstructs the food intake and growth. The present study further recommended that if possible surfactants should not be introduced in to water and if

it can't be avoid surfactant should be diluted as the lower concentrations of surfactants are not much harmful for aquaculture.

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