STUDY OF DIETARY GARLIC INDUCED EFFECTS ON GROWTH PERFORMANCE AND FEED UTILIZATION IN *Clarias Batrachus* (LINNAEUS, 1758)

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Abstract

The aim of this study was to assess the effect of garlic (*Allium sativum*) on growth performance and feed utilization in *Clarias batrachus* for period of 30 days. The frequency of feeding, aggression was observed to increase in experimental group when compared with control. The results showed significant increase in Total Weight gain, Total Length gain, Body Weight Index, Specific Growth Rate, Relative Growth Rate, Average Health Condition, Average Feed Intake, Feed Efficiency Ratio and Average Survival Rate than control fishes. The performance of fish was increase with increase in duration. The obtained results cleared that garlic (*Allium sativum*) is a growth promoter that enhance the growth, increase feed utilization and supports the survival of *Clarias batrachus* so it should be added to the diets of fish.

Keywords: *Behaviour, Clarias batrachus, feed utilization, garlic, growth factors.*

Introduction

Feed and feeding are among the most important factors influencing growth, feed utilization and tissue composition of the fish in intensive culture (Okumus and Mazlum, 2002). Garlic is an important vegetable extensively cultivated in many countries. It is used as food for humans as well as some animals and as remedy for several diseases, as reported in folk medicine (Shalaby *et al.*, 2006). It is probably one of the earliest known medicinal plants. In recent years, the concern about bacterial resistance to antibiotics in livestock industry has led to legislation minimizing the use of such compounds. Garlic contains sulfur containing compounds. Alliin is converted to the antimicrobial active allicin, when the bulb is cut or bruised. The fresh bulb contains Alliin, Allicin and volatile oils. Allicin gives garlic its characteristic pungent smell. Also, it contains vitamins and minerals and trace elements like selenium and germanium (Skidmore-Roth, 2003). Allicin is the most abundant compound representing about 70% of all thiosulfinates present or formed in crushed garlic (Block, 1992; Han *et al.*, 1995). Using of garlic in fish farming has become popular for as a growth promoter (Diab *et al.*, 2002; Metwally, 2009) also it increased body gain, feed intake and feed efficiency ratio (Abd-El Allatif and Ebraheem, 1996; Metwally, 2009).

The present work was carried out to study the effect of dietary garlic on behaviour responses, growth performance and feed utilization in *Clarias batrachus.*

Material and methods

The present study is the evaluation of behavior responses, growth performance and feed utilization of *Clarias batrachus* fed on garlic-based diet. For the presented experiment, the following protocol suggested by Joshi (2017) was adopted.

Experimental fish: The fishes measuring about 20±0.5 cm length and weighing ranges from 50±05g in weight were selected for the experimental study. Fishes were transferred to the place of experiment and acclimated for a week. During the acclimation, fish were fed the experimental diet to satiation twice a day at 09:00 and 15:00 hours. After acclimation, fish were fasted for one day; batch weighted and randomly distributed among density of 10 fish per tank. During experiment, the water quality, aeration and light: dark cycle of 12:12 h was maintained (Joshi *et al.*, 2015).

Experimental diet and feeding regime: The basal experimental diets were formulated with the commonly available ingredients. The formula and analyzed proximate composition of the basal diet are shown in Table 1. The ingredients were dried, grinded, milled, weighed, mixed and pelleted. After pelleting, the feeds were air dried and put in an air-tight container. During the experiment, fish were fed the experimental diet to satiation third a day at 08:00, 12:00 and 16:00 hours.

Table 1: Formulation of experimental fish diets with different concentration of garlic powder and oil (g/100g diet).

Sr. No.	Ingredients (g dry wt.)	Control	Garlic Powder		Garlic Oil	
		G1	G2	G3	G4	G5
1.	Wheat flour	45	42.5	40	43.75	42.5
2.	Soybean flour	25	25	25	25	25
3.	Corn flour	10	10	10	10	10
4.	Meat powder	15	15	15	15	15
5.	Soybean oil	05	05	05	05	05
6.	Garlic Powder	-	2.5	5	1.25	2.5

Growth Performance and Feed Utilization: The evaluation of growth performances of control and experimental fishes was carried out after 30 days. Records were analyzed by using the formulae suggested by Altorre-Jacome *et al.,* (2012) with some modification.

a) Total Weight Increase (TWI) = Wt – W0

b) Total Length Increase (TLI) = Lt – L0

c) Specific growth rate (SGR) = $\frac{\ln Wt - \ln W0}{T} \times 100$

d) Relative Growth Rate (RGR)= $\frac{\text{Weight gain (g)}}{\text{Time (Days)}}$

e) Body Weight Index (BWI)= $\frac{\text{Weight (g)}}{\text{Length (cm)}}$

f) Average Health Condition (AHC)= BWI ×100

g) Feed Intake (FI)=$\frac{\text{Total feed intake per fish (g)}}{\text{Number of days}}$

h) Feed Conversion Ratio (FCR)=$\frac{\text{Total dry feed consumed (g)}}{\text{total weight gained (g)}}$

i) Feed Efficiency Ratio (FER)= $\frac{\text{Live weight gained(g)}}{\text{Dry feed given (g)}} \times 100$

j) Average Survival Rate (ASR)= $\frac{\text{No.of experimental fish survive at end}}{\text{No.of experimental fish at the start}} \times 100$

Table 2: The effects of dietary garlic on growth performance of fresh water fish *Clarias batrachus* after 30 days

S.N.	Parameter	Control		Garlic Powder				Garlic Oil			
		G0		G1 (2.5 %)		G2 (5%)		G3 (1.25 %)		G4 (2.5 %)	
		Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD
1	Total Weight Increase	20.11	1.218	22.80	0.218	33.67	1.242	27.24	1.406	39.27	1.119
2	Total Length Increase	7.957	0.226	11.560	0.254	12.749	0.112	13.071	0.175	12.527	0.032
3	Body Weight Index	0.515	0.030	0.793	0.008	0.716	0.014	0.663	0.020	0.666	0.003
4	Specific Growth Rate	1.068	0.006	1.275	0.023	1.848	0.021	1.648	0.027	2.220	0.014
5	Relative Growth Rate	1.319	0.018	1.642	0.016	2.131	0.008	1.556	0.003	1.760	0.015
6	Average Health Condition	51.460	3.040	79.330	0.820	71.580	1.440	66.290	1.970	66.550	1.250
7	Average Feed Intake	4.033	0.062	4.179	0.106	5.342	0.056	4.571	0.064	5.850	0.015
8	Feed Conversion Ratio	10.76	0.540	09.83	0.846	7.48	0.392	8.67	0.603	7.83	0.267
9	Feed Efficiency Ratio	2.873	0.014	3.587	0.012	4.376	0.005	3.293	0.003	4.917	0.015
10	Average Survival Rate	75.00		87.50		100.0		90.00		100.0	

Statistical analysis: Data were collected, organized and analyzed by using Microsoft Excel program. Results were recorded as mean ± standard deviation (SD) of survived individuals.

Results and Discussion

It is cleared that garlic is one of the main vegetable that extensively cultivated in many countries. It is used as food for humans as well as some animals and as remedy for several diseases, as reported in folk medicine. The effect of dietary garlic on growth performance and feed utilization of freshwater fish *Clarias batrachus* after 30 days of feeding were studied.

The results related to the effects of dietary garlic on growth performance of *Clarias batrachus* was observed in this experiment are summarized below (Table 2). In the present study, the experimental fish group had highest total weight increase, total length increase, body weight index, specific growth rate, relative growth rate, average health condition, average feed intake, feed efficiency ratio and average survival rate than control fishes. The performance of fish was increase with increase in duration. The feed conversion ratio showed the contradictory pattern. The present observation supports the recent finding of Joshi *et al.,* (2015); Joshi and Gulhane (2015); Ajiboye *et al.,* (2016); Labrador *et al.* (2016); Khalil *et al* (2016); Hassan and Soltan (2016); Bhalerao (2017)Joshi (2017); Joshi and Gulhane (2017); Adineh, *et al.* (2020); Akter and Hossain (2021); Edeh *et al.* (2022) and name a few.

Conclusion

The obtained results cleared that garlic (*Allium sativum*) is a growth promoter that enhance the growth, increase feed utilization and supports the survival of *Clarias batrachus* so garlic should be added to the diets of fish.

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