



## **Feeding and growth of common carp *Cyprinus carpio* fingerlings fed on three live feeds**

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### **ABSTRACT**

*The common carp Cyprinus carpio is a omnivorous fish feeding on detritus organic matter, cyclopes, rotifers, chironomus larvae etc. In the present study, live feeds such as chironomus larvae, mosquito larvae and Artemia nauplii were fed to the freshwater fish Cyprinus carpio for a period of 30 days. Compared to chironomous larvae and mosquito larvae, the use of Artemia nauplii for feeding resulted in significant improvement in the growth performance and survival of Cyprinus carpio fingerlings. It has been proven that the above said feeds have a good potential for application in the juvenile culture.*

### **INTRODUCTION**

The common carp *Cyprinus carpio* (L. 1758) is an omnivorous freshwater fish. Carp culture in India is expanding rapidly. However one of the major constraints experienced by farmers is the non- availability of suitable supplementary diets. The fish has been proved an ideal health food which is within the reach of the common man. It is the most efficient among farm animals in converting feed into nutrition (Ghafoorunnisa 2001; Vivekanandan 2001)). Adequate nutritional practices play a pivotal role in aquaculture by increasing the yield significantly to ensure quality improvement in the reproductive performances, development of immunity etc. Among nutrients, vitamins are of particular importance since dietary vitamin requirement of fish are generally higher than those of other animals (Woodward, 1994; De Silva and Anderson, 1995).

The global production of fish and shell fish from capture fisheries and aquaculture has shown a steady increase over the last few years and recorded a production level of 121

million tonnes (mmt) in 1996, with contribution of 94.6 million tonnes (mmt) and 26.4 million tonnes (mmt) from capture and aquaculture respectively (Ayyappan and Jena, 2001).

Sampath and Vivekanandan (1987) studied the effects of food items i.e. mosquito larvae, pupa, chironomous larvae and chopped pieces of fish *Lepidocephalus thermatis* on the food utilization of *Channa striatus* fry and they found highest rates of feeding, absorption, metabolism and conversion in fish fed with *Anopheles* larvae. The conversion efficiency was 38.9% in the fry fed with *Anopheles* larvae. In Hong Kong, chironomus larvae are grown in chicken manure (Shaw and Mark 1980).

## Materials and Methods:

### Collection and rearing:

The fry of *Cyprinus carpio* were collected from Fish Farmer Development Agency (FFDA), Manimuthar, Tirunelveli district, Tamil Nadu. They were carefully transported to the laboratory in the oxygenated polythene bags. The fish were acclimated to laboratory condition for more than 10 days in circular cement troughs (40 litre capacity) with de-chlorinated tap water for 2 weeks. During this period of acclimation, the fishes were fed with commonly available Carp feed (35% crude protein). Before introducing, the weight of fishes were taken using top pan balance (electric precision 0.012 accuracy). Each group of the experiment fishes were fed with one type of live feed. The duration of the feeding experiment lasted for 30 days. During the experimental period the experimental fish were fed with 5% of initial body weight once a day (9AM). The accurate feeding of any kind of fish gives less feed wastage.

After the experimental period, fish from each trough were sampled, starved for 18 hours to ensure complete evaluation of gut content and weighed separately. Then fish was sacrificed and dried at 60°C to get the dry weight of the fish. Separate gut samples were taken from each experimental set up and length of the gut was measured.

## RESULTS AND DISCUSSION

### Length and Weight Changes

*Cyprinus carpio* fed with different diets namely formulated, pelleted feed and live feeds such as chironomus larvae, mosquito larvae and *Artemia* nauplii showed distinct weight differences. An analysis of the above data revealed that highest weight gain was observed in fishes on *Artemia* nauplii fed individuals followed by chironomus and mosquito larvae. Observations with regard to length response gave better results in fishes fed with *Artemia* nauplii, followed by mosquito, chironomus and artificial pellet feed.

### Absolute Growth Rate (AGR):

*Cyprinus carpio* fed with *Artemia* nauplii exhibited the highest absolute growth rate. In mosquito larvae fed individuals, the absolute growth rate was low when compared to *Cyprinus carpio* fed on chironomus and pellet feed.

### Relative Growth Rate (RGR):

*Cyprinus carpio* fed with *Artemia* nauplii showed relative growth rate of  $43.5810 \pm 3.352$  mg/day to  $90.4378 \pm 1.792$  mg/day. Relative growth rate of fishes fed with mosquito larvae was  $40.8 \pm 3.096$  mg/day to  $83.333 \pm 0.18$  mg/day. The relative growth rate for fishes fed with chironomus larvae was from  $33.540 \pm 2.796$  mg/day to  $60.8695 \pm 0.72$  mg/day and *Cyprinus carpio* fed with pellet feed showed  $24.4398 \pm 0.0123$  mg/day to  $50.31 \pm 1.364$  mg/day.

### Specific Growth Rate (SGR) :

*Cyprinus carpio* fed with *Artemia* nauplii had the highest growth rate followed by fishes fed with chironomus larvae, mosquito larvae and control.

### Weight Gain:

Weight gain was maximum in *Cyprinus carpio* fed with *Artemia* nauplii followed by individuals fed with chironomus larvae, mosquito larvae, control etc.

**Survival rate :**

The best survival of 100% was obtained in *Cyprinus carpio* fed on *Artemia* nauplii, chironomus larvae and mosquito larvae respectively.

**Feeding Frequency:**

The fish showed maximum feeding between 12.00 to 2.00pm.

**Table 1**

Type of feed	Body weight(g)		Dry weight(g)		Length(cm)	
	Initial	Final	Initial	Final	Initial	Final
Control	2.5±0.1019	3.318±0.0861	0.224±0.008	0.566±0.0463	6.16±0.2059	6.56±0.1743
	2.9±0.2280	3.838±0.0970	0.244±0.0205	0.534±0.0422	6.0±0.2607	6.56±0.1743
	2.6±0.1496	3.06±0.1743	0.266±0.0185	0.424±0.0203	5.7±0.303	6.4±0.1414
Mosquito	2.5±0.1414	3.52±0.2420	0.252±0.0248	0.792±0.0116	5.86±0.1496	6.4±0.2366
	2.1±0.2366	3.35±0.2489	0.242±0.1772	0.7375±0.6192	5.56±0.32	6.36±0.2154
	3.1±0.1414	4.06±0.3666	0.218±0.0116	0.66±0.0296	6.14±0.1019	6.44±0.1019
Chironomus larvae	2.3±0.1019	3.6±0.3203	0.29±0.0376	0.602±0.01166	6.1±0.1414	6.3±0.1414
	2.3±0.1414	3.7±0.5540	0.26±0.0357	0.684±0.0215	5.92±0.1720	6.24±0.1496
	3.2±0.1166	4.3±0.3098	0.26±0.0326	0.646±0.241	6.16±0.1019	6.38±0.078
<i>Artemia</i> nauplii	2.3±0.089	4.3±0.4111	0.234±0.0185	0.852±0.0256	6.04±0.1019	6.1833±0.0372
	3±0.1414	4.78±0.4118	0.238±0.0183	0.868±0.0116	6.22±0.1326	6.80±0.1720
	2.96±0.1743	4.854±0.4754	0.232±0.0116	0.784±0.0162	6.0±0.1414	6.86±0.1019

**Table 2**

Type of feed	Absolute Growth rate (g)	Relative Growth rate (mg /day)	Specific Growth rate (%/day)	Weight gain (%)	Survival Rate (%)	Percentage of Moisture
Control	1.278±0.005	50.31±1.364	1.358±0.016	4.26±0.003	100%	43.1792±1.267
	0.938±0.0046	24.4398±0.0123	0.9341±0.0042	3.1266±0.521		34.508±1.310
	1±0.021	37.4398±2.321	1.063±0.073	0.3333±0.211		37.39±2.732

Mosquito	1.02±0.1791	40.8±3.096	1.1450±0.039	3.4±0.22	100%	46.3700±3.176
	1.75±0.145	83.333±0.18	1.4392±0.018	4.5±0.06		25.0971±0.112
	1.29±0.013	43.5818±3.3501	1.205±0.053	4.3±0.12		27.0491±0.021
Chironomus	1.31±0.012	57.9646±1.7061	1.5240±0.039	4.26±0.003	100%	36.4406±2.310
	1.4±0.058	60.8695±0.72	1.5847±0.077	4.6667±0.004		
	1.08±0.032	33.540±2.796	0.9641±0.0442	3.6±0.533		
<i>Artemia</i> nauplii	2.08±0.033	90.4378±1.792	2.147±0.132	6.9333±0.131	100%	39.5631±0.946
	1.48±0.012	49.33±9.25	1.336±0.0044	4.933±0.230		30.324±1.247
	1.29±0.059	43.5810±3.352	1.2057±0.056	4.3±0.265		31.2056±1.407

In *Cyprinus carpio*, feed intake was three times higher in live feed than in pellet feed. Three live feeds and one pellet feed were nutritionally evaluated based on the initial and final wet/dry body weight and length growth responses of *Cyprinus carpio* for 30 days. Among the supplementation of four different live feeds, maximum growth was observed in fishes fed with *Artemia* nauplii followed by mosquito larvae and chironomus larvae. The growth responses such as absolute growth rate, specific growth rate, relative rate and weight gain were monitored in *Cyprinus carpio* fed for both live and pellet feeds for 30 days. The growth response was maximum in fishes fed on *Artemia* nauplii.

## Conclusion

The experimental results presented in this work have demonstrated that many of the live feeds used for larval production could also be applied successfully in the freshwater fish culture. The chironomus larvae, mosquito larvae and *Artemia* nauplii could be used as suitable live feeds for feeding both juvenile and adult fishes. Use of these live feeds would enable better larval culture of the freshwater fish and would lead to better growth performance and an exponential increase in the survival. Food is paramount to every organism as its growth, development and other metabolic activities depend on the energy it receives from its food.

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