

Comparison of *Artemia urmiana nauplii* with Biomar Feed in Rearing *Rutilus frisii kutum* Larvae

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Abstract: This experiment was conducted to compare growth and survival rate of kutum (*Rutilus frisii kutum*) larvae were fed with different diets including newly hatched *Artemianauplii* (A treatment), artificial BioMar diet (B treatment) and combination of *Artemianauplii* and BioMar diet (C treatment). The experiment was conducted with three treatments and each treatment with three replications on 480 larvae with 3.5 mg weight in each replication. The experiment lasted for 4 weeks. At the end of experiment, the results showed that the larvae in C treatment obtained the highest weight and length growth in comparison with two other treatments. While the larvae were fed *Artemia nauplii* had the most survival percentage at experiment duration. This result exhibit the importance of feeding with live food in *Rutilus frisii* larvae.

Key words: *Rutilus frisii kutum* · *Artemia* · Artificial diet · Live food

INTRODUCTION

Kutum *Rutilus frisii kutum* is known as a valuable commercial species in the southern part of Caspian Sea. Considering more than 900 Km of coastline in the southern part of Caspian Sea, Kutum has a great economic importance for the Iranian fishing industry. According to FAO statistics [1], the average annual catch of kutum was about 9,600 tons in 1991-2001 in Iran. Artificial rearing of fry has been introduced as an alternative to supply kutum fry in order to restock the kutum population in the Caspian Sea.

The larval period is most important in many fish species. Success in larviculture depends on the existence of suitable diets that are easily consumed. To support good growth and health in fish larvae, diets should be used that efficiently digested and also guaranty all required nutrients for larvae [2]. The complete replacement of live feeds with artificial food in first feeding larvae has limited success [3]. An incomplete primitive larval digestive system has been considered the main cause. Manufactured feeds are usually composed of denatured insoluble proteins and carbohydrates [4]. However, during past

years, in rearing common carp (*Cyprinus carpio*) larvae with artificial diets good progress has been achieved progress [5].

In order to investigate the effects of live food and artificial diet on fish larvae, growth and survival data is useful tool [6]. Thus, the object of this study was to investigate the effects of live food and artificial dry feed and combination of these diets on growth and survival rate of kutum larvae.

MATERIALS AND METHODS

Sample Preparation: In this study, larvae were obtained from 2 captive brood stocks of kutum that migrated to Shirood River in Tonekabon city at spawning season. The eggs were obtained through a gentle pressure on the abdomen and fertilized by dry fertilization technique. After fertilization, fertilized eggs were transferred to Seth green incubators that were in the river, after 3 days fertilized eggs transferred to shahidrajaii department in 8 l incubators at Sari city for hatching. After hatching newly hatched larvae that had absorbed most part of their yolk sac, transferred to university of agriculture and natural resources of Sari city for rearing.

Larval Rearing: Nine plastic tanks (20 Liter) were used for rearing. All tanks were equipped with air pumps. Three days after hatching, larvae had a mean weight of 3.5 mg and length of 10 mm. Experiment began on the 3rd day post-hatching. Larvae distributed at a density of 40 L⁻¹ in each medium tank with 12 liter water. Aerated well water was supplied to the tanks. Water quality parameters were checked daily. Temperature was maintained at 20±1°C (measured daily; n=28) and oxygen varied between 5 and 5.5 mg/l (determined weekly in the morning). Total pH values varied from 7 to 7.5. The photoperiod for this indoor experiment was set at 12L: 12D cycle (light period from 06:00 to 18:00). Each morning before feeding, Excess feed and feces were collected by siphoning and dead larvae were removed daily and counted.

Feeds: In this study the effects of three treatments include: treatment A; newly hatched artemia, treatment B: artificial diet (BioMar), treatment C: Biomar diet in addition to newly hatched artemia. Every day certain amount of artemia cysts after weighting by digital scale, transferred to 1/5 liter bottle containing fresh water, after one hour under severe aeration, cysts were collected by 20 µ nets and transferred them into 1/5 L plastic bottle upside down in a fiberglass-tank. This bottle contained 800cc water with 32 gr/l salinity. To regulate salinity, salinity meter was used. To prevent cyst settling, aeration was done from bottom of bottle. The water temperature for hatching was 26-28°C. To provide the desired light intensity for hatching of cyst, we used photometer and light intensity was kept at 2000 lux at the tank surface. In this study, BioMar feed was used as artificial feed.

Feeding: All groups of larvae were fed ad libitum four times daily. At the end of every day growth rate was evaluated. In this study from each replications 10 larvae were choose randomly and their wet weight and total length measured carefully. Growth data were obtained by sampling 20 larvae randomly in one week intervals and in the final day, all larvae in the tank were evaluated.

RESULTS

Growth curve of kutum larvae are presented in Fig. 1. Based on results, the mean body weight of kutum larvae under different diet treatments showed significant differences from week 1 onwards. Larvae fed mixed diet (treatment C) had significantly higher body weight than those fed artificial and live diet. By the end of the second week of experiment, there were no significant different

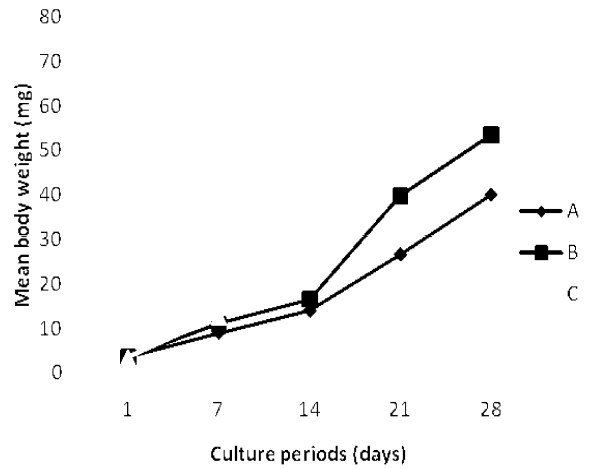


Fig. 1: Mean body weight of *Rutilus frisii kutum* under different diet treatments. A: *Artemianauplii*; B: BioMar feed; C: Mixed feed

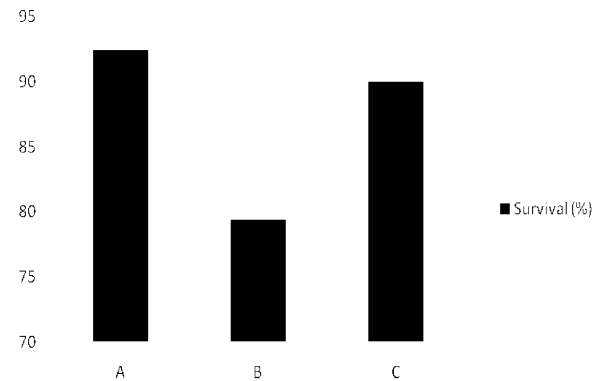


Fig. 2: Survival rate (%) of *Rutilus frisii kutum* under different diet treatments. A: *Artemianauplii*; B: Artificial feed; C: Mixed feed

between larvae fed BioMar feed and larvae fed *Artemianauplii*. From week 2 to 4, larvae fed BioMar diet had significantly higher body weight than larvae fed *Artemianauplii*.

The lowest survival rate (76.5%) was observed in larvae fed artificial dry feed. The highest survival (92.4%) was obtained in larvae fed *Artemianauplii* during the whole period of experiment, but it did not differ significantly from larvae fed mixed diet (90%).

DISCUSSION

Several studies have investigated the possibility of replacing live food with manufactured diets from the start of active feeding [7-9]. It is very hard to get effective results when first feeding larvae only fed with formulated diets [9]. In our experiment, kutum larvae were fed with

mixed diet (treatments C) obtained the highest growth rate and body wet weight than larvae were fed other diets. Research on some species for example *Cyprinus carpio*[10] showed that feeding the larvae only with dry diets or a combination of live and dry diets resulted in increased survival and growth rates when compared when live food alone. In our study, by the end of the second week of experiment, there were no significant difference between larvae fed artificial feed and larvae fed live food. From week 2 to end of experiment, larvae fed artificial diet had significantly higher body weight than larvae fed live food. Live diets usually are incomplete in some nutrients for larval development if not managed properly; this may be the reason in our experiment that larvae fed live food showed lower growth rates [9]. At the present study, larvae fed on artificial feed, showed the lowest survival compared to other treatments. The high mortality in artificial feed treatment recorded during the first week of experiment. This mortality was probably due to adaptation of larvae to artificial feed. Thus, when density of larvae in artificial feed treatment decreased, the growth of kutum larvae increased. It is well known that density is one of the important factors that affect growth rate. This may be the other reason in our experiment that larvae fed artificial feed showed higher growth rate compared with larvae fed only live food. Based on obtained results, artificial dry diets may cause faster growth but not healthy growth, where as using live food could result in higher survival rate, therefore, in aquaculture feeding larvae with live food is more favorable. However, further studies are needed to make better formulated diets for first feeding larvae of *R. frisii* and for formulating proper diets understanding of the digestion processes during *R. frisii* ontogeny is necessary.

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