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Evaluation of Different Live Foods on Growth and Survival of Seahorse Fish (*Hippocampus kuda,* Signathidae) Ponies

H.B. DHAMAGAYE[1*], N.D. CHOGALE[1], R.D. BONDRE[1], V.R. BHATKAR[1], S.T. INDULKAR[2], B.P. BHOSALE[1] and S.G. BELSARE[1]

[1]Marine Biological Research Station
Dr. B. S. Konkan Agricultural University
Ratnagiri, MS, India – 415 612

[2]College of Fisheries
Dr. B. S. Konkan Agricultural University
Ratnagiri, MS, India – 415 612

Abstract

Seahorse (*Hippocampus kuda*,Signathidae) ponies were reared for 15 days at the laboratory of Marine Biological Research Station, Ratnagiri (India) using three types of live food viz *Artemia* nauplii, rotifers (*Branchionus plicatilis*) and a combination of both. The experiment was conducted in all glass aquaria (0.30 m x 0.30 m x 0.30 m). Seahorse ponies (10 $\pm$ 0.27 mm) were stocked at 2 L^{-1} and fed with nutritional live food *ad libitum*. After 15 days of rearing, the ponies were counted and their individual lengths and weights were recorded. Significantly higher ($P< 0.05$) weight gain percentage (128.92 $\pm$ 1.27%) of seahorse ponies, length gain percentage (57.4 $\pm$ 0.82%), SGR percentage per day (5.53 $\pm$ 0.04% day^{-1}) and survival percentage (100%) of seahorse ponies were observed in the combination of *Artemia* nauplii and rotifers as food compared with *Artemia* nauplii or rotifer alone. Rotifers as live food resulted in poor growth and survival of seahorse ponies under this experimental condition.

* Corresponding Author: Tel/Fax: +91 23 5223 2995
E-mail address: narya_fish@rediffmail.com

Introduction

Seahorses are among the many genera whose life histories might render them vulnerable to over fishing or other disruption such as habitat damage, pollution etc. Due to increasing demand for seahorse in Asian traditional medicine and global aquarium trades, in conjunction with declines in some exploited Southeast Asian seahorse wild stocks, there is considerable interest in the potential for culturing seahorse (Vincent 1996; Hilomen-Garcia 1999). However, seahorses are notoriously difficult to culture and economically farm on large scale and to date, seahorse farming has proved technically challenging with few success (Vincent 1998).

One of the problems in successful seahorse rearing is poor juvenile survival that is often encountered in the first few days of rearing (Scarratt 1995; Forteath 1996). However, some researchers have been able to achieve high survival in early juvenile stages. Correa et al. (1989) obtained 97% juvenile survival in *H. erectus* during 35 days rearing period. *H. kuda* is a highly valued seahorse species available on both coasts of India. This is popular in both the traditional medicine and marine aquarium trades (Lourie et al. 1999).

The objective of the present study is to evaluate suitable live food for rearing of seahorse ponies in early stages.

Materials and Methods

Seahorse (*H. kuda*) was bred in the laboratory of Marine Biological Research Station, Ratnagiri for producing ponies. These ponies were reared for two days in the laboratory. After two days these ponies (mean length 10.0 $\pm$ 0.27 mm) were stocked in 27 l rectangular aquarium tanks (0.30 m x 0.30 m x 0.30 m). The ponies were stocked at the rate of 2 l^{-1} and reared for 15 days. These ponies were fed with *Artemia* nauplii (A), rotifer (B) or a combination of *Artemia* nauplii and rotifer (C). All the live food organism were sieved through 150 µ mesh net and washed thoroughly before feeding. To ensure that the ponies are never left totally without live food, the feeding was undertaken at *ad libitum*. The aquarium tank was siphoned twice a day at 0800 hrs and at 1600 hrs.

Water parameters such as salinity, temperature, dissolved oxygen, carbon dioxide, pH and alkalinity were determined throughout the experiment, using standard method (APHA 1998) and found within the optimum limits.

At the beginning and end of the experiment individual lengths and wet weights were measured. Length was measured as the distance from the tip of the coronet to the tip of the uncurled tail (Lourie et al. 1999). The ponies were counted to assess survival at the end of the experiment.

The experiment was conducted following randomized block design with three replicates per live feed. All data were analyzed by one-way ANOVA followed by Newman-keul's multiple range test. Differences were considered significant at $p< 0.05$ according to Zar (1974).

Results

The percentage length gain of seahorse ponies were 33.3 $\pm$ 0.67%, 20.1$\pm$ 0.49% and 57.4 $\pm$ 0.82% fed with *Artemia* nauplii, rotifers and combination of *Artemia* nauplii and rotifer respectively (Table 1). ANOVA showed significant difference ($P< 0.05$) in percentage length gain of seahorse ponies fed with different live food. Significantly higher length gain percentage (57.4 $\pm$ 0.82%) was observed in ponies fed with *Artemia* nauplii and rotifers combination feed.

The percentage weight gain of seahorse ponies were 101.11 $\pm$ 1.81%, 75.32 $\pm$ 1.53% and 128.92 $\pm$ 1.27% when fed on *Artemia* nauplii, rotifers and *Artemia* nauplii plus rotifers respectively (Table 1). ANOVA showed significant difference ($P< 0.05$) in percentage weight gain of seahorse ponies fed on three different live foods for 15 days. Significantly higher weight gain percentage (128.92 $\pm$ 1.27%) was recorded in combination of *Artemia* nauplii and rotifers as food as compared with *Artemia* nauplii and rotifers, significantly less (75.32 ± 1.53) weight gain was observed in rotifer as live feed.

The specific growth rate (% day $^{-}$1) of seahorse ponies were 4.65 $\pm$ 0.61, 3.74 $\pm$ 0.64 and 5.53 $\pm$ 0.04 when fed on *Artemia* nauplii, rotifers and combination of both respectively (Table 1). ANOVA showed significant difference ($P< 0.05$) in specific growth rate of seahorse ponies fed on three different live foods for 15 days. Significantly higher (5.53 $\pm$ 0.04) specific growth rate was observed in combination of *Artemia* and rotifers as food as

compared with *Artemia* nauplii and rotifers, significantly less (3.74 ± 0.64) specific growth rate was observed in rotifer as live feed.

During 15 days of rearing period 100 % survival of seahorse ponies was observed when fed on combination of live food.

During 15 days of rearing experiment, temperature varied in the range of 27.0 to 31.0^{0}C, dissolved oxygen in the range of 4.8 to 5.6 ppm and pH in the range of 7 to 8 and salinity in the range of 30 to 32 ppt (Table 2). All the parameters were found to be within the tolerance range of seahorse ponies.

Table 1. Growth and survival of ponies of *H. kuda* reared by feeding different live feeds

Parameters	Diets		
	Freshly hatched *Artemia* nauplii	Rotifer (< 150 μ)	Freshly hatched *Artemia* nauplii + Rotifer
Initial average length (mm)	10 ± 0.27	10 ± 0.27	10 ± 0.27
Initial average weight (g)	2.08 ± 0.01	2.08 ± 0.01	2.08 ± 0.01
Final length gain (mm)	13.33 ± 0.07	12.01 ± 0.05	15.74 ± 0.08
Final weight gain (mg)	4.18 ± 0.04	3.64 ± 0.03	4.77 ± 0.03
Length gain (%)	33.3 ± 0.67^a	20.1 ± 0.49^b	57.4 ± 0.82^c
Weight gain (%)	101.11 ± 1.81^a	75.32 ± 1.53^b	128.92 ± 1.27^c
Specific growth rate (% day)	4.65 ± 0.61^a	3.74 ± 0.64^b	5.53 ± 0.038^c
Survival (%)	80	40	100

Note: a, b, c, d, e Values in rows sharing similar letters do not differ (P<0.05); ±: Standard error

Table 2. Water parameters during the 15 days of rearing experiments

Parameters	Minimum	Maximum
Temperature	27.0°C	31.0°C
Dissolved oxygen	4.8 ppm	56 ppm
pH	7.0	8.0
Salinity	30 ppt	32 ppt

Discussion

One of the major problems encountered in the culture of seahorse is the requirement of live food (Bellomy 1969; Scarratt 1995; Garrick-Maidment 1997). Consequently, relatively a large amount of food must be ingested (Garrick-Maidment 1997; Giwojna and Giwojna 1999), but in

small, frequent feeding rather than in a single large feeding. The optimal nutritional profile for seahorse is hitherto unknown, although a variety of prey items appears beneficial. For example, *H. kuda* adults fed with a combination of HUFA-enriched *Artemia*, mysids and tilapia fry bred more often and had bigger brood sizes than those fed with a single diet of the aforementioned prey only (Hilomen-Garcia 1999). Likewise, better growth and survival rate of *H. kuda* fed with the diet combination of *Artemia* and rotifer was observed than those fed a single diet of *Artemia* nauplii or rotifer only.

Cheap, alternative live foods to *Artemia*, which can be cultured on a large scale as the main dietary component for seahorse culture need to be investigated. *Artemia* possess nutritional inadequacies in relation to the dietary requirements of the animal they are being fed (Watanabe et al. 1978; Barclay and Zeller 1996; Furuita et al. 1999). In this investigation, a combination of *Artemia* and rotifer showed better growth and survival rate but alternate artificial food need to be investigated.

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