Mahasagar-Bulletin of the National Institute of Oceanography, **20**(2), 1987, 109-113

ADULT *ARTEMIA* AS FOOD FOR JUVENILE PRAWNS

JOSEPH P. ROYAN, SUMITRA-VIJAYARAGHAVAN AND L. KRISHNA KUMARI

National Institute of Oceanography, Dona Paula, Goa-403 004.

ABSTRACT

Feeding experiments on three commercially important shrimps *Penaeus indicus, Metapenaeus dobsoni* and *M. monoceros* were carried out using adult *Artemia* as feed. Good growth and food conversion efficiencies were recorded at 15% feeding level in all the three species. The advantages of using adult *Artemia* for cultivable species are discussed.

Key words: *Penaeus indicus, Metapenaeus dobsoni, Metapenaeus monoceros, Artemia.*

It is an accepted fact that though culture fisheries cannot replace traditional capture fisheries, it is certain that the future gap between prodouction and demand for fishery will have to be filled through aquaculture. This is in fact reflected in the world wide increase in aquaculture yield from 1 million tonnes in 1967 to about 7 million tonnes in 1983 (Thia-Eng, 1986). One of the constraints in culture fisheries is the selection of a suitable feed. Therefore, most of the studies during the past two decades have been concentrating on feeds ranging from naturally available to biochemically defined compounded ones (Kahan, 1982).

Freshly-hatched nauplii of the brine shrimp, *Artemia* are widely used as food for a variety of crustaceans in aquaculture. These are obtained either from cysts collected from natural sources or from viviparous cultures of *Artemia* produced under controlled conditions. In either case, little attention was paid to collect and use the adults as feed. The advantages of using adult *Artemia* as food source have been elucidated by Sorgeloos (1980). This communication presents the food conversion efficiency and growth in some selected species of prawns in relation to different feeding levels fed with live *Artemia* adults.

Specimens of *Penaeus indicus* (360-411 mg), *Metapenaeus dobsoni* (301-356 mg) and *M. monoceros* (235-274 mg) collected from Mandovi estuary (Goa) were used for the feeding experiments. *Artemia* nauplii hatched from cysts collected from Balamba salterns (Saurashtra coast) were

reared in 100 l fibre glass tanks containing normal seawater and fed with micronised rice bran. Adult *Artemia* were harvested daily and fed to the prawns (Biochemical composition of adult *Artemia* : protein-60.18%, ash-11.87%, lipid-16.85% and carbohydrate 11%). The prawns which were acclimatized for a week on adult *Artemia* as feed, were offered a series of five feeding levels (5, 10, 15, 20 and 25) calculated as percent of initial live weight. Experimental prawns were individually maintained in 500 ml glass jars containing millipore filtered seawater (salinity 15‰ temperature 29 ± 1°C) with continuous aeration. For each feeding level, five replicates were setup and the average values are presented in the results. Faecal matter distinguishable as strings were pipetted out every morning and their weights recorded. Feeding experiments were conducted for a period of three weeks. Gain in weight was taken as an index of growth. Hence, prawns were weighed before and after the experiments. For all weighings, Mettler AE 160 electrical balance was used.

Table I. Effects of feeding levels on live weight gain, food consumption, faecal production and assimilation in *Penaeus indicus*, *Metapenaeus dobsoni* and *Metapenaeus monoceros*.

Feeding level as % of initial live body wt/d	Initial live body wt. (mg/p)	Final live body wt. (mg/p)	(mg/p/d) Food consumed (C)	Faecal production (F)	Assimilation A=C-F
			P. indicus		
5	383.94	413.06	19.20	3.80	15.40
10	405.80	536.92	40.58	7.36	33.22
15	360.22	615.16	54.03	5.44	48.59
20	400.66	570.10	80.13	10.09	70.04
25	410.92	526.35	96.40	16.28	80.12
			M. dobsoni		
5	303.00	321.60	15.15	2.75	12.40
10	312.60	410.40	31.26	6.30	24.96
15	301.20	530.40	45.20	4.58	40.62
20	356.10	520.40	71.20	11.34	59.86
25	307.12	437.02	76.78	14.27	62.51
			M. monoceros		
5	249.00	267.73	12.45	3.16	9.29
10	274.10	356.46	27.41	5.24	22.17
15	240.30	454.00	36.05	6.31	29.74
20	235.60	430.32	47.22	9.68	37.54
25	266.48	448.59	66.32	14.85	51.47

Table I gives the details of feeding levels, initial and final live weights of prawns, food consumed, faecal production and assimilation. All the food offered were consumed by *M. dobsoni* and *M. monoceros*, while *P. indicus* had surplus food at 25% feeding level. Faecal output as percent of consumed food decreased from 5-15% feeding levels, while, at higher feeding levels, there was an increase. From Fig. 1 A it is evident that maximum growth/p/d occurred at 15% feeding level in all the species. At this level, assimilation efficiency (Fig. 1B) was also high. Assimilation efficiency ranged from 80.21 to 89.93% in *P. indicus;* 81.41 to 89.87% in *M. dobsoni* and 74.62 to 82.5% in

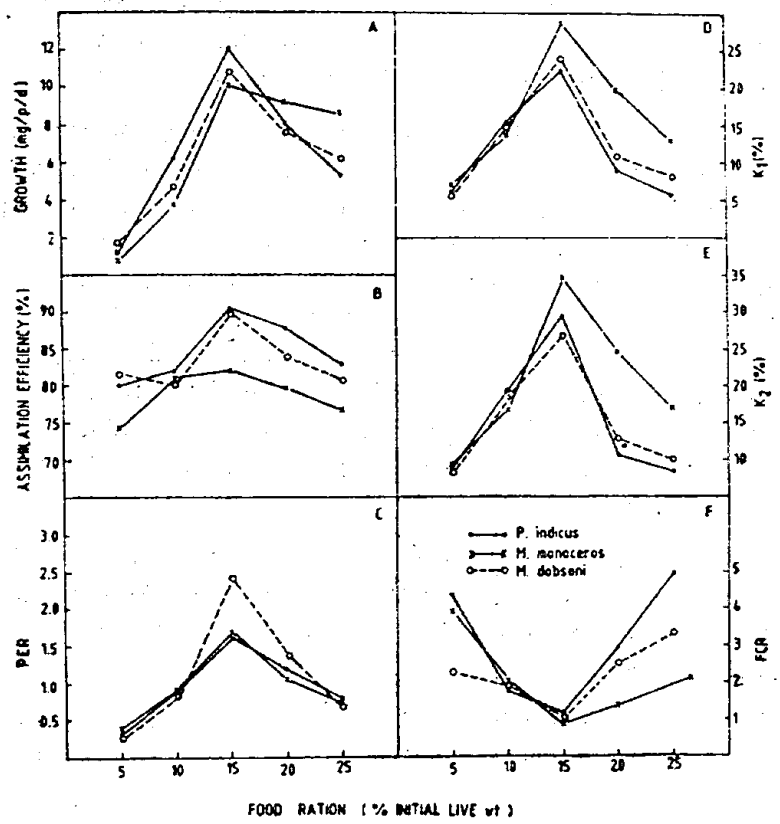

Fig. 1. Effect of different feeding levels on growth, assimilation efficiency, protein efficiency ratio, food conversion efficiencies and food conversion ratio in three species of prawns.

M. monoceros. At higher feeding levels, growth decreased and this may probably be due to high faecal production and decrease in assimilation. Of the three species, *M. monoceros* had maximum food conversion efficiencies (K_1 6.96-28.72%; K_2 9.31-34.99%). This may be due to their small size compared to other two species. Protein efficiency ratio (PER) which is wet weight gain of prawn divided by dry weight of protein intake (Fig. 1C) and food conversion efficiencies (K_1 & K_2-Fig. 1D & E) reflected the growth

pattern. Food conversion ratio (FCR), defined as the ratio of the amount of dry food consumed to the weight gain, varied from 1.24-5.0; 1.16-3.41 and 0.97-3.99 in *P. indicus, M. dobsoni* and *M. monoceros* respectively (Fig. 1F). Low FCR at 15% feeding level is reflected in high food conversion efficiencies.

Katre and Reddy (1976) recorded maximum conversion efficiency for *Palaemon lamarrei* at 10% feeding level, while it was 15 and 30% feeding levels for *Macrobrachium lanchesteri* and *Cardina weberi* respectively (Ponnuchammy, 1981). For *M. monoceros* maximum conversion efficiency has been recorded at 15% feeding level by Sumitra - Vijayaraghavan, Royan and Rao (1982). K_1 & K_2 values recorded in the present study at 15% feeding level in all the three species of prawns are close to the values reported for *M. monoceros* fed with adult *Artemia* (Royan, 1980).

Dietary protein level and its source are important for the growth of prawns. Review by New (1976) has shown that dietary protein requirements differ from species to species. Royan, Sumitra-Vijayaraghavan and Wafar (1977) have shown that for *M. monoceros* an optimal protein requirement of 60% is essential. Earlier studies on the bioenergetics of *M. monoceros* fed with a variety of feeds ranging from natural detritus to biochemically defined compounded diets have shown that adult *Artemia* as feed gives maximum growth and food conversion efficiencies (Royan, Sumitra-Vijayaraghavan and Wafar, 1977 and Sumitra-Vijayaraghavan, Wafar and Royan, 1978). The present study further confirms that the adult *Artemia* with 60% protein content is suitable for juvenile prawns.

Recent studies on *Artemia* (Sorgeloos, 1980) have shown that adult *Artemia* are better suited as feed than their nauplii and formulated diets for several reasons. Adult brine shrimps are rich in all essential amino acids (Watanabe, Arakawa, Kitajima and Fujita, 1978).

Use of live/frozen adult brine shrimp in aquaculture farms is limited in view of its high price. While production of adult brine shrimp through Air-Water-Lift raceway system is possible, it may not be cost-effective. Realistic alternative will be either pond production or exploitation from natural resources. It has been recently reported that upto as much as 1600 kg/ha of adult could be harvested from natural sources (Divanach, Kentouri and Paris, 1983). India has a long coastline with a large number of saline ponds and salterns which offer excellent scope for production of *Artemia vis-a-vis* its availability for use in aquaculture.

ACKNOWLEDGEMENTS

The authors thank the Director, National Institute of Oceanography, Goa for the facilities provided. The helpful suggestions given by Dr. Patrick Sorgeloos of Artemia Reference Centre, Belgium, Dr. A. H. Parulekar and

Dr. M. V. M. Wafar, National Institute of Oceanography are gratefully acknowledged.

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