

Role of ration size and feeding frequency in shrimp culture

Rekha J. Nair and Manpal Sridhar
 Central Marine Fisheries Research Institute
 P.B.No.1603
 Kochi - 14.

Aquaculture including shrimp culture has emerged as one of the fastest growing sectors. Alongside this growth the feed market for shrimps, fishes and other aquatic animals grew on a global scale, especially in the industrialised countries. The inability of our natural resources to meet the ever increasing demand for aqua foods has generated wide interest in shrimp culture. With shrimps contributing a lion's share to India's export earning, shrimp farming is found to be one of the most profitable enterprises of the day with a net average return of Rs.1.5 lakhs per hectare per year. Due to its capacity to earn high foreign exchange for the nation, the Ministry of Commerce, Government of India has identified shrimp farming as an "extreme focus" area and it proposes to develop it in all the coastal states on a war footing.

Different ingredients go into the establishment of successful shrimp farming, they being good quality hatchery seed, complete and well balanced feed and its proper management, water quality management and dedicated personnel.

Feed

A decisive factor in successful scientific shrimp farming and achievement of high production levels is the preparation and use of complete feeds with high protein. In aquaculture, where the cultured organism is generally stocked at high density, the amount of natural food available is not sufficient to support good growth. Hence, it is necessary to increase production of natural food by fertilization, either with chemical or organic fertilizers, supplementing with artificial feed or a combination of both. With feed constituting nearly 50% to 80% of the total variable cost of the farm, proper management of the feed is very important, not only in terms of expenditure, but also in terms of production. Excessive feed in the pond causes deterioration of pond water quality, which in turn leads to diseases of the cultivated stock while on the other hand, less quantity of feed supplied causes irregularities in growth.

As feed quality and cost are directly related, an improvement in quality inevitably leads to an increase in feed cost. Hence, development of an economically viable and biologically efficient diet for commercial species of shrimps in semi-intensive and intensive culture systems is highly warranted to obtain high growth rates and maximum production.

Feed management

Even the best shrimp feed in the World will give poor results if it is not used properly. Feed management is a critical factor in determining the profitability of a shrimp farm. Over feeding causes wastage of feed, water pollution, and in turn increasing operating costs. Underfeeding on the other hand results in less growth, cannibalism and in turn a fall in production. Shrimp being nocturnal, continuous, intermittent feeders, their feeding behaviour dictates the feed management strategy. Feed management includes two important factors - ration size and feeding frequency

Ration size

By ration size, we mean the amount of feed to be given to the animal that can be utilised for its optimal growth. Ration is considered to be the driving force and any restriction to it results in a lower metabolic rate (Brett, 1979). A precise knowledge of the relationship between food requirement and body weight for a particular species and diet would be essential to avoid both overfeeding and restricted growth through sub-maximum rations. Feeding the ration size to the individual not only helps in reducing operating cost but also helps in improving environmental hygiene. As ration size is based on the body weight of the cultured animal (continual adjustment of the ration level is necessary to compensate the changing requirements in culture system).

Feeding frequency

By the term feeding frequency we mean the number of times the animal has to be fed with its ration size in parts to obtain maximum growth and best feeding efficiency. Feeding frequency has also been shown to have substantial effect on metabolism of the cultured organism. This also depends on the feeding behaviour of the animal cultured. The feed given to the animal may be consumed at one stretch, or, it may be taken at intermittent intervals. Feeds, if they remain for a long time in water, may lose their attractability and palatability, two factors which play an important role in the consumption of the feed by the animal. Exposure of feed in water for a long time causes leaching of some of its nutritional factors, making the feed less palatable to the animal.

Feeding behaviour of shrimp differs from that of fish making some amount of water stability essential for shrimp feeds. However, 24-hour water stability is not only unnecessary if feeding frequency is higher than once per day, but it may also result in poorer palatability in dry feeds.

Generally, more frequent applications of feed will improve growth rate and feed efficiency, but the economic optimum frequency depends on other factors such as availability and cost of labour.

Feeding schedules involving both ration size and feeding frequency are being supplied by most feed manufacturers (Table.1).

Generally, recommended feeding rates range from about 20 per cent of biomass at PL 30-35 to 4 percent at 20 g and are decreased further for larger shrimp. Based on these general guidelines, ration size and feeding frequency for different stages of the Indian white shrimp *Penaeus indicus* were worked out in our laboratory. A commercial feed of international repute was used for the laboratory experiments. Of the different frequencies applied for the different stages of the shrimp viz. postlarvae, juveniles and adults, the animals were seen to appreciate and grow better under higher feeding levels of four times for postlarvae and three times for juveniles and adults respectively. Ration size was worked out and 12% was seen to be the optimum ration for postlarvae, while for juveniles and adults it was 8 per cent and 4.5 percent respectively. Best values for FCR and survival as also other growth parameters were also recorded at these ration sizes and feeding frequencies.

Recommended feeding rates must not be applied indiscriminately. Farmers must see how much of their feed is actually being consumed. Feeding should be regulated according to amount of feed being left over. Feeding quantity, water quality, and feeding activity are other important factors which contribute to shrimp production management.

Rigid feeding schedules are applicable only to intensive culture. Where the compounded feed supplements natural feed in less intensive rearing systems, visual observations are more important guides.

Table 1 : Rates Recommended by Shrimp feed manufacturers and others

Company	Species	a) Daily Ration as % of Biomass per dry					
		b) Feeding Frequency (per day)					
		c) Animal Size					
Gold Coin Singapore Pvt. Ltd	<i>P.monodon</i>	a) 40-20	20-10	10-6	6-4	4-25	
		b) 5	5-4	4-3	4-3	4-3	
PT Malabar Feed, Indonesia	<i>P.monodon</i>	a) 25-15	15-10	10-7	7-4	4-3	
		c) 0.01-0.5g	0.53.5g	3.5-10.5g	10.5-19.5g	19.5+	
(Levell 1989)	Not specified	a) 30-20	20-8	8-6	6-4	4-3	
		b) 6	4-3	3	3-2	3-2	
		c) PL 15-30	PL 30-5g	5-10g	10-20g	20g +	
Chiu, 1988	<i>P.monodon</i>	a) NS	12-4	4-3	4-3	4-2	
		b) NS	5	5	5	5	
		c) NS	0.5-7g	7-14g	14-22g	22g +	
The Hanaqua Group	<i>P.monodon</i>	a) 25-20	20-8	8-6	6-4	5-3	
		c) upto PL 30	PL 30-5g	5-10g	10-25g	25g +	
CP Group	<i>P.monodon</i>	a) 40-20	15-7	7-6	6-4	4-2	frequency at
		b) 3	3-4	3-4	3-4	3-4(4-5)	20 g + depends
		c) 0.02-0.2g	0.2-5 g	5-12 g	12-20 g	20 g +	on pellet size
Nicoline Hermanos SA	Not specified	a) N.S	25-6	6-35	3.5-2	1.8	
		c) N.S	1-6 g	6-10 g	10-22 g	22 g+	
Aquastar	<i>P.monodon</i>	a 0.5-1 kg/ha	0.15-0.8kg / 10,000	1.2-2.3 kg / 10,000	2.8-6.5 kg / 10,000	6.5-9 kg/10,000	
		b) PL 15-30	0.5-3 g	4-8g	8-20 g	20 g +	

Source - Technical and economic aspects of shrimp farming - Michael B. New, Henride Saram and Tarlochan Singh (Editors)

Extensive shrimp Mortality in Vakapadu Area Near Visakhapatnam

According to a report, a large number of shrimp farms in Vakapadu area, close to Visakhapatnam have been ravaged by a bacterial disease leading to heavy mortality. This unexpected development has been studied by Dr. D.E.Babu Reader in the Department of Zoology, Andhra University. The mortality has been attributed to poor management and ineffective application of technology.

According to Dr. Babu, farmers did not have the needed insight into the management of shrimp farms.

The main reasons for the mortality were stated to be fall in salinity and deficiency in water quality, he says. These factors led to the upsurge in bacterial multiplication and the bacterial disease spread over the entire zone. While virus was responsible for the death of shrimps in areas of South Andhra Pradesh, in the present area the cause for the disease was bacterial infection, according to his study.

Dr. Babu feels that the farmers would require considerable guidance in shrimp culture. Between crops, pond bottoms would have to be totally dried before using them for the next crop, starting with chlorination/Liming.

Blue Star Fisheries, Panvel.

M/s. Blue star fisheries, Panvel, Raigad district Maharashtra is setting up a brackishwater fish farm adjacent to National Highway 4-B, at a distance of about 50 km. from Bombay. It is stated that this is the first brackishwater shrimp farm set up in proximity to Bombay. The location and other aspects of the farm are stated to have been approved by the MPEDA and the Maharashtra Fisheries Department.

The farm has an extent of 7 ha located in the limits of village Pagote, Tal-Uran. This village is also very close to J.N.Port Trust. The work on four ponds is nearing completion and the management hopes to start these ponds in Dec 1994. The entire farm is expected to be ready by the end of Feb.95. The office of the company is located at 4-Sneha Sadan, Gadkari Path, Panvel-410 206.

New Model Oxygen Analyser

An analyser that measures 0-100 per cent atmospheric oxygen as well as 0-20 ppm dissolved oxygen is stated to have been introduced by Engineered System & Designs, 119-A, Sandy Drive New York, DE 19713, U.S.A (FAX 302 45 60441).

It is sold in Kit form. Named Model 600, it is stated that it is designed for the non-technical user. It is maintenance-free. The galvanised sensor requires no membrane. It

does not also need filling solution replacements. Each Meter includes a five foot sensor, instructions, 9-volt battery and a carrying case. The meter is guaranteed for two years and the electrode for two years.

NCW for Ban on TN Shrimp Farming

The legal bench at the National Commission for Women's (NCW) Public Hearing on the condition of women working in the unorganised sector, has ruled in favour of immediate ban on shrimp farming in the state, it is reported.

Handing down a couple of independent quasi-judicial rulings after the Public Enquiry in the City on 13 Dec, Justice V.R.Krishna Iyer and Justice Krishnaswami Reddiar separately observed that the deleterious impact of this activity, as reported by the agricultural workers and fisher-women from the coastal districts of the State, was grave enough to warrant such a ban.

Commending the state government's pilot scheme to provide one van to every fisherwomen's association, Justice Reddiar said it was needed to give these women access to market through alternatives to the public transport system. The problem of pollution of the seas by industrial wastes needed to be tackled on a war footing, he said.