

**M.S.111. SYED AHMAD ALI—Studies on the evaluation of different sources of proteins, carbohydrates and mineral requirements for juvenile penaeid prawn *Penaeus Indicus* H. Milne Edwards—1989—Dr. P. Vedavyasa Rao.**

Adequate seed and appropriate feed are the two essential requisites for the culture of prawns. Feed is an important component both in hatchery production of seed and in culturing the prawns in grow-out ponds to marketable size. For preparing balanced and low cost feeds, knowledge on the nutritional requirements of the candidate species and the evaluation of locally available raw materials are essential. In this context, the evaluation of different sources of proteins and carbohydrates and the requirement of minerals in the diet of the prawn *Penaeus indicus*, an important species for culture along the entire Indian coast, has been undertaken in the present study.

The purified proteins albumen (egg), casein, fibrin (blood) and gelatin were evaluated with the objective of finding the most suitable protein source for formulating research diets in nutritional studies. Nine natural protein sources, clam meat, fish meal, mantis shrimp (*Squilla*), prawn waste, silkworm pupa, coconut cake, gingelly cake, ground nut cake and *Spirulina* were evaluated for juvenile *P.indicus* in order to identify appropriate protein materials for formulating practical feeds. These evaluations were carried out through standard methods of nutritional biochemistry by measuring digestibility, biological value (BV), net protein utilization (NPU), protein efficiency ratio (PER) Food Conversion Ratio (FCR), and growth in statistically designed feeding experiments.

The endogenous nitrogen excretion (metabolic faecal nitrogen), determined for the first time in *P.indicus*, was found to be on an average 324 mg N per 100 gram diet. Among the purified proteins tested, fibrin and albumen had high biological value for *P.indicus* followed by casein. Gelatin was found to be a poor protein source. BV, NPU, and PER were high at low dietary protein level and showed decreasing tendency with the increase in the dietary protein level, while the digestibility of protein in the diet tended to be low at lower levels and high at higher levels of dietary protein, though the difference was not statistically significant. The requirement of protein in the diet of *P.indicus* was found to be 25% with albumen diets and 29% with casein diets at which the animals showed positive nitrogen balance. Among the natural protein sources, the animal protein materials were significantly superior to the plant proteins sources. They showed higher growth, BV, NPU and PER over plant protein sources, though their digestibility was lower than that of the plant materials. The superiority of the materials are in the order fishmeal, clam meat, prawn waste, and mantis shrimp. Silkworm pupa was found to be a poor protein source. Among the plant proteins sources, the order of superiority was *Spirulina*, ground-nut cake, coconut cake and gingelly cake. The diet having 70% animal protein source and 30% plant

protein source gave the best growth and food conversion ratio.

In the carbohydrates, three monosaccharides, glucose, fructose, galactose, two disaccharides, maltose, sucrose and two polysaccharides, glycogen, starch were evaluated through their digestibility, growth of prawns and FCR. Only maltose and starch were efficiently utilized by *P.indicus*. All the other carbohydrates tested gave poor results. However, a mixed carbohydrate having sucrose, maltose and starch in equal proportion was found to be the best source of carbohydrate in the diet of prawn. The diet with 22.5% carbohydrate produced the best performance at constant protein (34.8%), while at constant lipid (6%), the dietary carbohydrate showed protein sparing effect. The diet with 6% lipid and 33% carbohydrate gave the best performance. Cellulose was found necessary in the diet of prawn and it could be used upto 10% in the diet for the efficient utilization of the diet.

The requirement of the minerals calcium, phosphorous, copper, zinc, magnesium and manganese in the diet of *P.indicus* was determined. It was found that the prawns required 0.53% of calcium and 1.05% phosphorous in their diet. Best food conversion ratio was obtained with the diet containing 13.6 mg copper and 23.6 mg of Zinc per 100 g diet. While magnesium was not found to be required in the diet, addition of manganese to the diet depressed the growth of prawns.

Using the information obtained on the nutritional requirements of *P.indicus* and also the ingredients evaluated in the present study, a purified diet and a practical feed were formulated. Both were compared to the conventional prawn feed, clam meat, in long term feeding experiments. The purified diet resulted in high survival. The practical feed produced the highest growth and the best FCR superior to that of the conventional feed. The possibilities of using the purified diet in nutritional studies of prawns and the practical feed for the culture of penaeid prawns were discussed.