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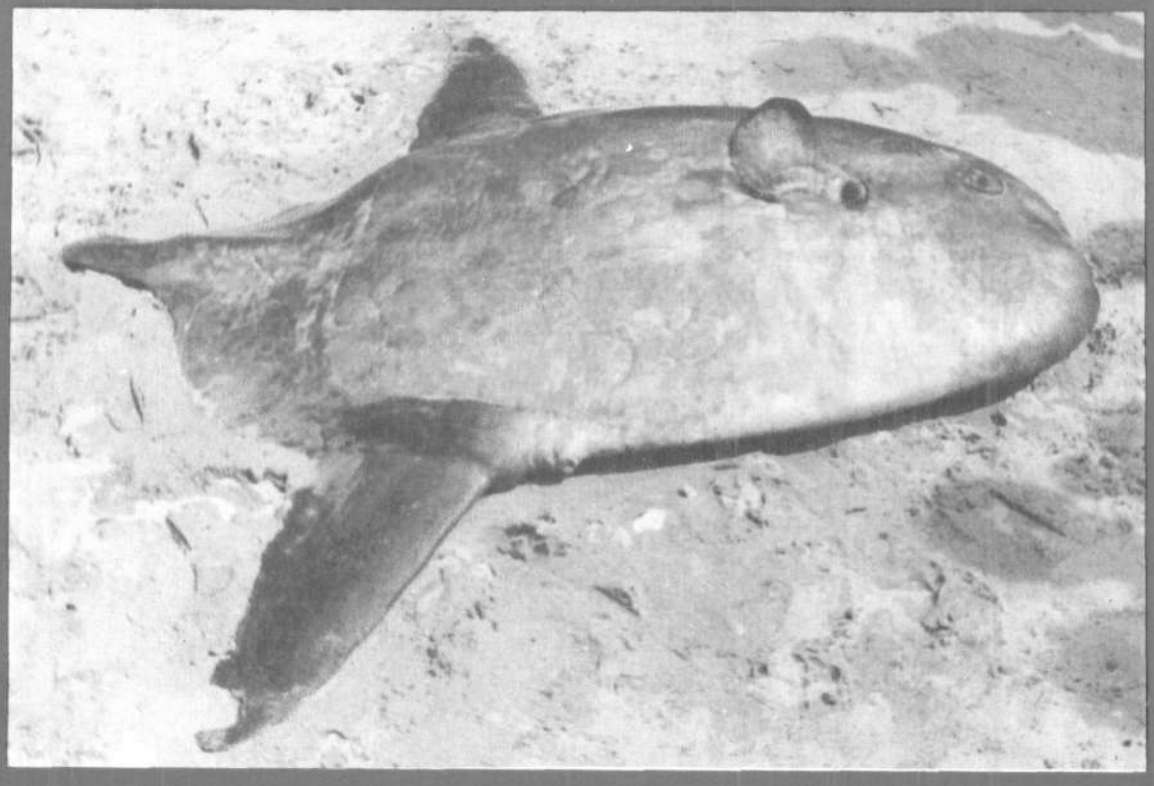

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A PROBLEM-SOLVING MODEL FOR THE PRODUCTION OF HOME-MADE PRAWN FEEDS — A CASE STUDY*

A wide gap exists between research findings and end users in the fisheries sector. The quality of a good technology is that it should be triable in field at a small scale, should earn good profit in comparison to existing practices, must be compatible with socio-cultural values and beliefs and should be simple and observable type. Extension researchers have developed different models for the linkage between research and practice. One of the best models is the problem solving model, which starts with the person who has a problem either with research or innovation. A farmer will need information to solve his problem. A part of the information will come from the experience of the farmers in a particular farming system and other part will come either from the existing research findings or from new research carried out to solve the problem. So technology should be developed keeping in view the problems, values and socio-economic levels of fishermen.

The technology related to prawn feed production is one which has to be developed based on the needs of fishermen i.e. from farm-to-lab rather than from lab-to-farm. The major problems faced by small scale prawn farmers in India is the high price of commercially available feeds and its unsuitability in local conditions. These feeds escalate the cost of production and may not always bring in desired results. Hence, researchers have to modify feed formulations based on the problem solving model for which they have to start from the farmer's field with a strong Farmer-Extension-Research linkage. The present study deals with what is happening at field level i.e. the real situation and what should be the ideal situation based on problem solving model.

In Kerala, the Tiger prawn (*Penaeus monodon*) and the white prawn (*P. indicus*) are the two species usually grown by prawn farmers. There are three culture systems, viz. (1) extensive (2) semi-intensive and (3) intensive. In extensive method, the prawns subsist mainly on the natural food available in the pond. In the semi-intensive and intensive methods, the prawns depend mainly on the supplementary feed and on frequent water exchange. Further, more fry can be stocked with supplementary feeding and aeration than with natural food alone. *P. indicus* will reach marketable size in around 3 months and *P. monodon* in 4 months when fed with supplementary and formulated diets. Thus, two or more crops of bigger and healthier prawns can be harvested in a year fetching better price.

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Traditionally, fish farmers supplement the natural food for prawns in their ponds by feeding with chicken entrails, trash fish, small shrimps, mussel meat etc. This being an unbalanced diet may not always give good yield. How a proper mixing of locally available ingredients can overcome the problem related to prawn feed, was achieved by an innovative farmer.

Home-made prawn feeds developed by an innovative farmer-- a case study

An innovative farmer Mr. Babu at Narakkal village of Ernakulam District has succeeded in producing prawn feed at his home and is happy to report an improved yield of prawns which supplementarily fed with his home-made feed. He does monitoring of the prawns every fortnight and keeps record of the growth and other parameters in a diary. Verification of his diary clearly showed the impact of the feed on the growth rate. This farmer is educated upto matriculation and is very progressive. He has undergone training in prawn culture at Krishi Vigyan Kendra of CMFRI at Narakkal. He is interested to adopt new technologies and is in touch with CMFRI and other institutions.

On a visit to his farm he told that his feed was in good demand in the locality but he was not in a position to produce the feed in large quantity to meet the demand due to lack of facilities. The ingredients used by him were noted down including the proportion and proximate composition was calculated. On consultation with a nutrition expert the values were found satisfactory. Method of production, calculated proximate composition of the mix and cost of the feed at local market rate are given in Table 1.

These local ingredients appear to be quite good as prawn feed and they are easily available. It satisfied the nutritional requirements of animal protein, vegetable protein, carbohydrates, fats and chitin. These ingredients also contain enough quantity of fibre.

Grinding and drying

All ingredients are ground at home and then steamed in a pressure cooker. After steaming the product is made in the form of spaghetti or noodle like product, into a range of pellet lengths, using a kitchen extruder. It is then sundried and kept in air-tight containers.

Major advantage of home-made feed is that one can utilize the feed ingredients available in own locality, thereby exploiting local resources in a desirable way. A few points have to be kept in mind while prawn feeds are prepared at home.

1. Advice of a nutritionist or some one who has already prepared the feed should be sought to make sure that while locally available ingredients are incorporated the nutritional composition of the feed is not affected.

2. It has to be ascertained that the feed contains about 35-45% protein from animal and vegetable sources, 10% fats and 25% carbohydrates. Fibre content should not exceed 6%. Inclusion of chitin, mussel meat or squid/cuttle fish waste in minor quantities augments the feed attractability.

TABLE 1.

Ingredients	Quantity mixed kg	*Cost in Rs. per kg	Total cost	Proximate composition** (% dry matter)						Calculated proximate composition of the mix.				
				DM	CP	EE	CF	NFE	Ash	CP	EE	CF	NEF	Ash
1. Wheat powder	2.50	6.50	16.25	67.6	13.9	1.7	3.1	79.4	1.9	3.48	0.43	0.78	19.85	0.48
2. Groundnut oil cake	2.00	5.00	10.00	94.0	40.1	12.2	14.0	25.9	7.8	8.02	2.44	2.80	5.18	1.56
3. Prawn head waste°	1.75	-	-	-	30.6	9.7	0.3	2.5	57.0	5.36	1.70	0.05	0.44	1.00
4. Fish meal	1.75	20.00	35.00	86.0	55.6	12.0	2.9	8.2	21.3	9.73	2.10	0.51	1.44	3.73
5. Rice bran	1.50	2.50	3.75	91.3	13.7	5.4	20.0	48.8	18.1	2.06	0.81	3.00	7.32	2.72
6. Dried tapioca leaves @°	0.50	-	-	27.3	8.8	0.9	9.8	6.2	1.7	0.44	0.05	0.49	0.31	0.09
		Total	65.00							29.09	7.53	7.63	34.54	9.58

* As reported by the farmer.
** From *FAO/UNDP Report* by M.B. NEW (1987). Feed and feeding of fish and shrimp, *ADCP/REP/87/26*, 275 pp.
@ From T.V.R. Pillay (1990). Principles and Practices in Aquaculture. Fishing News Books
° Cost could not be estimated

DM Dry matter
CP Crude proteins
EE Ether extract or crude protein
CF Crude fibre
NFE Nitrogen free extract or Soluble carbohydrates.

3. Do not use moist or rancid ingredients, especially rice bran, cod liver oil and flour. Moulds easily develop on moist ingredients and produce toxic substance which can be harmful not only to prawns but for human beings also.

4. In extensive and semi-intensive methods of prawn culture where the ponds are fairly productive in terms of nutrients, addition of vitamin and mineral premixes in food is not generally recommended. On the other hand if included it will increase the feed cost.

5. Prawn farmers can organise together, and grinding of ingredients can be done jointly with the local feed miller.

6. It is better to produce not less than 10 kilograms of feed at one time to save time and effort in preparation.

7. Store extra ingredients in a cool, clean and dry place after proper sealing and labelling.

8. Right amount of feed for prawns at right time is very important. The use of feeding trays is better because the prawns learn when and where to get their food and the farmers will be able to know whether the feed given is sufficient or excess. Accordingly the amount of feed can be adjusted to accomplish need-based feeding.

Economics of feed production

The economic viability of making compounded feeds at the farm as opposed to purchasing them from a feed mill or from market, being place and time specific, needs local study. It is therefore impossible to generalise on the economics of 'home-made' feed production. (Michael B. New, Feed and feeding of fish and shrimp, *FAO/UNDP Report, ADCP/REP/87/26*, 100 pp). However, the cost of 1 kg of feed produced by the farmer when worked out amounted to be Rs. 6.50 calculated as per the local market rate.

In the context of this case study the preparation of prawn feeds at households appears to be a relevant and appropriate alternative to overcome the constraints of high cost and unsuitability feed to local systems. A recent study carried out by the author on entrepreneurial behaviour of prawn farmers showed that the prawn farmers use bait fish, clams and chicken entrails mainly as feed having single ingredient. This can be a very inefficient use of feed because a single ingredient is most unlikely to supply all the nutrients required by the animal in the proportion in which it needs them. A single feed ingredient may for example, be too high in indigestable fibre which may be largely wasted, or in carbohydrate of limited digestability. Commercially, the ingredient may be too high in expensive protein which may be consumed to satisfy the energy requirement of the animal rather than for growth. Hence, further dissemination of low-cost home made feed technology by creating more awareness and persuation of farmers to adopt this practice is needed.

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