

Production and marketing of fish meal in India - a study

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ABSTRACT

Fish meal and fish oil are the major ingredients used for production of feed for aquaculture. A study was conducted in three coastal states of India viz., Karnataka, Kerala and Tamil Nadu in order to assess the functioning of fish meal plants, covering raw material sourcing, production process, marketing and constraints in the operation. Oilsardine is the major fish used for fish meal and fish oil production in the 35 fish meal plants operating in various coastal states of India. The installed capacity of fish meal plants varied from 20 to 350 t of raw material per day. About 65,000 t of fish meal and 34,000 t of fish oil are annually produced in the three states of Karnataka, Kerala and Tamil Nadu. Fish meal is sold at Rs. 40-50 per kg and fish oil at Rs. 50-55 per kg.

Keywords: Aquaculture, Fish meal plant, Fish oil, Low value fish, Oilsardine

Introduction

Aquaculture utilizes about 43% of global fish meal production and 85% of fish oil. Fish meal and fish oil are the major ingredients for aquafeed production. Although considerable quantity of fish meal is produced in India, no official statistics are available to indicate the quantity of fish meal and fish oil production and their usage for different industries and enterprises. There are 23 fish meal plants in Karnataka, two in Kerala, three in Gujarat, four in Maharashtra and three in Tamil Nadu.

Central Institute of Brackishwater Aquaculture (CIBA), Chennai undertook a study on fish meal plants to understand their production and marketing, as fish meal is one of the major raw material used for shrimp feed production. Availability of information about fish meal plant location, their raw material sourcing, grades of fish meal and fish oil, local and export market, the major end users and constraints in operating fish meal plants will appropriately guide the researchers, entrepreneurs, feed mill operators, planners, exporters and other concerned stakeholders for planning and implementation of many activities related to aquaculture. Total fish meal production in all the three states is approximately estimated to be 65000 t comprising 58000 t in Karnataka, 6000 t in Kerala and 1000 t in Tamil Nadu. The fish oil production is estimated to be 34000 t comprising 30500 t in Karnataka, 3000 t in Kerala and 500 t in Tamil Nadu (Personal communication from fish meal producers).

Materials and methods

The study was undertaken in Karnataka, Kerala and Tamil Nadu. In order to have representative sampling, approximately 30% of existing fish meal plants in the three states under study were covered. Thus a total of 10 plants were sampled comprising 8 in Karnataka and one each in Kerala and Tamil Nadu. A semi-structured interview schedule was used for data collection. The trend of oilsardine landings for the years from 1994 to 2008 were sourced from the annual reports of Central Marine Fisheries Research Institute, (CMFRI), Kochi for the period from 1994-1995 to 2008-2009. Likert score method (Likert Rensis, 1932) was used to prepare the survey instruments related to constraints, with three point continuum viz., 3 for severe constraints, 2 for medium constraints and 1 for less constraints. The frequency analysis was carried out to ascertain the severity of the problems encountered by fish meal operators. SAS software was used for analysis.

Results and discussion

The oilsardine *Sardinella longiceps* constitutes the most important pelagic resources sustaining the marine fishery on the west coast of India and the trend in its landings is presented in Fig.1. The analysis of time series data for 80 years from 1926 to 2005 indicated that spawning and recruitment period of oilsardine is overlapping with major upwelling season of June to September along the Malabar coast (Krishnakumar *et al.*, 2008). A decline in oilsardine fishery was recorded only in early 1940s and in

1994. The continued availability of oilsardine in adequate quantity motivated the entrepreneurs to establish fish meal plants, by considering the locational advantages and raw material availability and price, which tended to be below Rs. 8 per kg.

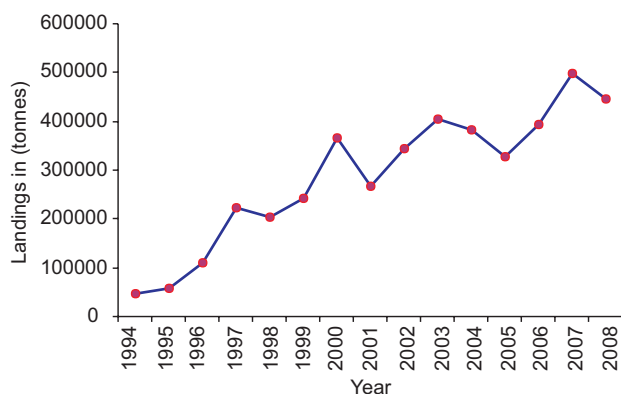


Fig. 1. Estimated landings of oilsardine in India (1994-2008)

The data collected from 10 fish meal plants in three states of Karnataka, Kerala and Tamil Nadu are presented below to reflect (i) production (Table 1) and (ii) marketing (Table 2) aspects of fish meal production and sales. Most of the fish meal plants are located in Mangalore and Karwar regions in Karnataka, Thrissur and Malappuram in Kerala and Radhapuram and Myladuthurai in Tamil Nadu. Majority of the fish meal plants operate for about 6 to 10 months in a year, depending upon the availability of raw material in the locality. Skilled and unskilled workers are working in the ratio of 1:4 in most of the plants. Approximately 8 skilled and 25 unskilled workers are working to produce 100 t of fish meal in a shift of 8 h per day. The wages paid @ Rs. 6000 / month for semi-skilled and Rs. 4000 / month for unskilled labourers.

The quality check on the raw material is carried out based on the size (normally 28 counts and below for one kg), freshness (within 4 h), proper icing and transportation in insulated vehicle. Although many plants possessed their own analytical labs, they outsourced sample analysis from private laboratories. The operators are switching over from flame drying to steam drying and also from self fabricated machinery to imported machinery, due to ease of operations, operational efficiency and compact appearance. All the fish meal plants have storage facilities for both fish meal (100 to 1000 t) and fish oil (100 to 5000 t). Fish meal specifications as produced by fish meal plants are : 10 % moisture (max.), 60% protein (min.), 2% silica (max.), and 3% salt (max.) and fish oil specifications are: 5% free fatty acid, 2% moisture and impurities with an iodine value of 140. These specifications are in cocurrence with the earlier reported values for sardine oil (Ambasankar and Balakrishnan, 2006).

Fish meal and fish oil are the main products in all the fish meal plants studied. Analysis of marketing channel of these products reveals that fish meal and fish oil are directly purchased by consumers. The main channel of marketing is from fish meal plant to aquafeed companies, poultry feed manufacturers, fish meal direct importers, whereas fish oil is marketed to aquafeed companies and fish oil direct importers. Fish meal produced are exported mainly to Australia, China, Egypt, Japan, middle east countries, South Korea, Saudi Arabia, Pakistan, Spain, South Africa, Thailand, Vietnam and New Zealand. The other marketing parameters related to fish meal plants in three states of Karnataka, Kerala and Tamil Nadu are given in Table 2.

Reduction in profit margins is due to lorry halting charges near the shrimp feed production factories. Profit cutting is also due to stiff competition. Sometimes, feed companies cite the presence of mould in the fish meal and

Table 1. Comparative analysis of production parameters of fish meal plants in three states

Particulars	Karnataka	Kerala	Tamil Nadu
Year of establishment	1968, 1991, 2001 to 2007	2006	2003 to 2008
Installed production capacity	20 to 350 t of raw material per day.	80 to 160 t per day	60 t per day
(i) Raw material	Oilsardine constitute 95-97 % followed by threadfin breams, carangids, flatfish, lesser sardine, silverbellies.	Oilsardine is the predominant fish	Oilsardine is the only species
(ii) Sources of availability	From Kochi to Mangalore-Malpe coast, Goa and upto Ratnagiri in Maharashtra from boat owners and commission agents	From entire Kerala coast	70% from Tamil Nadu and 30% from Kerala
(iii) Period of availability	Maximum availability of oilsardine is during September to January and lesser availability during February to May	September to December	October to February
(iv) Procurement rate	Rs. 600 to 850 / t	Rs. 650 to 700 / t	Rs. 530 to 650 / t

Table 2. Comparative analysis of marketing parameters of fish meal plants in three states

Particulars	Karnataka	Kerala	Tamil Nadu
Fish meal grades	Fish meal is produced in two grades. Grade A is produced with more than 58% protein and priced at Rs. 30 to 38 / kg (depending upon the % of protein specified) which goes to aquafeed industry and also exported. Grade B is produced with 50 to 55% protein priced at Rs. 22 to 28 / kg and generally to poultry industry and also exported.	Fish meal is marketed with only one grade, being sold @ Rs. 32.50 / kg for aquafeed companies and poultry feed manufacturers and also exported	Three grades with 45% protein, 60% protein and 60-63% protein are made and sold @ Rs. 15, Rs. 30 and Rs. 35 / kg.
Fish oil grades	Fish oil is produced in three grades. Grade A is called refined oil with less than 1% FFA and priced at Rs.85 / kg, Grade B is centrifuged oil with less than 3% FFA and priced at Rs. 52 / kg and Grade C is non-centrifuged oil with less than 4% FFA and priced at Rs. 45 / kg.	The fish oil is marketed in two grades as (i) centrifuged oil @ Rs. 40000 / t and (ii) crude oil @ Rs. 35000 / t.	Two grades as (i) centrifuged oil @ Rs. 40000 / t and (ii) crude oil @ Rs. 35000 / t.
Profit margins	Companies reported that they sell the products with a net margin of 5 to 10%.	The profit margin is said to be 10 to 20% of the total turn over.	About 10% of the total turn over

reject the lot, leading to heavy loss. The problems of sourcing the raw material include limited availability, delayed information about truck arrival or catch, fish spoilage, poor road facilities, *etc.* Capacity utilization of plants will be limited if the raw material availability is less. Lack of government patronage and assistance may be due to insufficiency in the number of operators in this sector. The ban on export of edible oils has also taken fish oil industry under its umbrella, thus putting this sector at disadvantage in respect of exports. Fish meal producers also incur invisible costs which add to the overhead costs. Additional overheads, like purchase and installation of a scrubber (Rs. 5 to 6 lakhs) to minimise undesirable odour from fish meal plants, may escalate production costs. Alternatively, the entrepreneurs are willing to invest in activities like donation to educational institutions and giving monetary support for local religious events. The constraints expressed by the fish meal operators were prioritised and presented in the Table 3.

is required to convert fish oil into edible oil, which can be sold at Rs. 60 / kg. Fish meal and fish oil contains PUFAs which are highly prone for oxidation and hence research efforts are needed to improve the quality of these products. More efforts are required towards popularisation of quality fish meal and oil produced by Indian fish meal plants. Provision of export subsidy and abolishment of Central Sales Tax (CST) will be helpful to enhance the profit margins.

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Table 3 Prioritisation of constraints faced by fish meal operators

Constraints	Severity of the constraints		
	Severe constraints	Medium constraints	Less constraints
Losses associated with transportation	16.67	50.00	33.33
Problems in sourcing of raw materials		33.33	66.67
Lack of awareness on quality production	33.33	50.00	16.67
Poor government patronage	41.67	58.33	
Difficulties in export of fish oil	8.33	75.00	16.67
Invisible or overhead costs		50.00	50.0
Social costs	16.67	75.00	8.33

The sustainability of the feed industry rests on the development of fish meal plants and hence research effort

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