National Agricultural Technology Project

ASSESSMENT OF HARVEST AND POST HARVEST LOSSES

MARINE FISHERIES

Central Institute of Fisheries Technology
(Indian Council of Agricultural Research)
Matsyapuri P.O., Cochin-682 029.
2005

V.R. NAIR
EIS Division.

National Agricultural Technology Project

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MARINE FISHERIES

Cooperating Centre

भाकृअनुप
ICAR

Central Institute of Fisheries Technology
(Indian Council of Agricultural Research)
Matsyapuri P.O., Cochin-682 029.

Lead Centre

Indian Agricultural Statistics Research Institute
Library Avenue, Pusa, New Delhi - 110012

2005

ISBN - 81 - 901022 - 5 - 7

Published by : **Dr. K. Devadasan**
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Printers : **Niseema Printers & Publishers, Kochi - 18, Ph : 0484-2403760**

Preface

Loss of food at various stages of harvest and post harvest has been a matter of concern for developing countries like India. Fish has been gaining more and more importance in recent years in view of its high quality low cost protein. It is a known fact that wastage and loss of fish occur from production site to consumers' table due to various reasons including faulty handling, processing, transportation and storage practices. Application of quality control and food safety measures at various stages can help reduce this loss and make fish available to the population across the plains and hills of the country. A valid estimate of the types of loss and reasons thereof under Indian conditions is not available. This information is crucial in addressing the food supply and food security problems as also development of related infrastructure. Post harvest loss is an important issue in other major food items also.

It was against this background that ICAR took up a major National Project on this aspect under the leadership of Indian Agricultural Statistics Research Institute, New Delhi. The Project covered seven major commodities namely milk, meat, egg & poultry, oil seeds, wool, marine fish and inland fish. As the premier Institute working on fishing and fish processing technology, the Central Institute of Fisheries Technology, Cochin was chosen as the nodal Institute to take up the work in the field of fisheries in this Project. This Report on Harvest and Post Harvest Losses in Marine Fisheries is a very valuable document brought out by this Project based on the pilot study in Ernakulam District, the most representative geographic region for marine fisheries for the country. Loss estimates presented here are based on a sound statistical design and the same can be replicated anywhere. Similar report on the harvest and post harvest losses in Inland Fisheries is also published, based on a study conducted in Andhra Pradesh and Orissa.

Cochin
25-4-2005

Dr. K. Devadasan
Director, CIFT

Acknowledgement

The authors place on record their gratitude to the National Agricultural Technology Project (NATP) for providing necessary financial assistance for the study. The authors are also thankful to Dr. S.D. Sharma, the mission leader of the project and Director of Indian Agricultural Statistics Research Institute (IASRI), New Delhi and Dr. K. Devadasan, Director, Central Institute of Fisheries Technology (CIFT), Cochin for their encouragement and support throughout the programme.

Thanks are also due to Ms. Ruby, Shri. Ashish, Shri. Sridhar and Ms. Poonam, Senior Research Fellows at IASRI, for all the assistance rendered for the project, Officials of Directorate of Fisheries, Kerala, Cochin Port Trust for providing relevant information and M/s. Green Seas, Munambam, fishermen and other crew members of boats and crafts operating in Kerala waters for their valuable co-operation and support for collection of data.

The authors also wish to thank Shri. Ravikumar, Sr. A.O and other officials of the project section and other administrative sections of CIFT, Cochin for their administrative support.

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ASSESSMENT OF HARVEST AND POST HARVEST LOSSES

MARINE FISHERIES

NATIONAL AGRICULTURAL TECHNOLOGY PROJECT

(MISSION MODE)

2001-2004

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PROJECT PROFILE

Title of the project	**Assessment of harvest and post harvest losses**
Mode	Mission Mode
Commodity	Marine Fisheries
Location of Cooperating Centre	Central Institute of Fisheries Technology, Matsyapuri P.O, Cochin – 682 029
District selected	Ernakulam, Kerala
Duration of the study	3 years
Date of start	April 1, 2001
Date of completion	March 31, 2004
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CONTENTS

CHAPTER I

INTRODUCTION & REVIEW OF LITERATURE

1.1 Introduction

Fish is an important source of quality protein and cheaper in cost compared to other source of animal protein. About 35 percent of Indian population are fish eaters and the per capita consumption is 9.8 kg where as the recommended intake is 13 kg. In bridging the nutritional gap, reduction of harvest and post harvest losses is very crucial. Moreover, present marine resources have been stagnating and fish production through acquaculture is all the more expensive.

Among the agricultural commodities exported from India marine products rank first fetching a foreign exchange of about Rs. 6500 crores. Hence it is essential to understand and assess the quantity of fish loss during harvest and post harvest stages in the marine sector for maximum utilization of exploited fish and making it available at consumers in all parts of the country. It is in this background that a study on "Assess of harvest and post harvest losses (Marine fisheries)" was initiated undeer the leardership of Indian Agricultural Statistics Research Institute, New Delhi with the participation of Central Institute of Fisheries Technology, Cochin.

Loss occurs in marine fisheries due to discard in good condition and spoilage, making it unavailable and unacceptable for human consumption. The harvest losses occur onboard the fishing crafts mainly in the form of discard of juveniles and low value fish while post harvest losses occur due to improper handling and lack of infrastructure at different point starting from the landing center to the consumer.

1.2 Specific Objectives of the study

1. Conduct a pilot study to assess the production and post production losses of marine fisheries at different levels (Producer, market and consumer levels)
2. Quantitatively estimate the loss at different levels and reasons for loss at harvest and post harvest stages.
3. Identify causes of losses
4. Development of a suitable methodology for estimation of the losses.

1.3 Review of literature

Fish is an important source of protein and its harvest, handling, processing and

distribution provide livelihood for millions of people and at the same time contributes to valuable foreign exchange earnings to the country. It is a highly perishable food, requiring proper handling, processing and distribution, if it is to be utilized in a cost effective and efficient way. Global demand for fish is growing and reduction in post harvest losses can make a major contribution in satisfying this demand while improving quality and quantity for the consumers and increasing income for the producers

FAO (1981) and Wood (1986) have made serious attempts to develop assessment methodologies for accurate information on post harvest fish losses.

An International Development Research Centre, Canada (IDRC) sponsored study in Central Institute of Fisheries Technology, Cochin, India in 1985 was aimed at better utilisation of trawler by-catches for prevention of such fish losses.

Szabo, A.(1982.),Ames, G.R. (1990), Nyakundi, R.N. (1985) reported that post-harvest losses of fish and other kinds of aquatic food, were caused by rodents and insects. Spoilage and breakage also present a major problem to fisheries.

Poulter, R.G. *et al.* (1987) described the losses of fish that were cured by salting, drying, smoking or by a combination of these processes. Physical losses were often caused by insects, which could consume large quantities of fish flesh. The causes and extent of the different types of losses were described.

Pariser *et al.* (1987) identified the causes of post harvest losses in fish as biological and microbiological, chemical, biochemical, mechanical damage, storage, faulty transportation, refrigeration and marketing systems. They cited the minimal overall losses in developing countries as 20% of total production of non-grain surplus, perishables including fishe. They further emphasized the need for more systematic approaches to estimate the losses, aimed at reducing post harvest losses in fish and developing improved methods for handing of small pelagic fish in fresh and iced condition, drying, smoking, marketing and distribution.

Morrissery *et al.* (1988) provides an overview of post harvest losses in fisheries. The term post harvest has been defined as the period of time from when a fish is separated from its growth medium.

Clucas, I.J.; Poulter, R.G.; Caygill, J.C.(1989) found that 20% of post harvest losses of an annual fish production of about 13.5 lakh tonnes by 16 ECOWAS countries of West Africa. Similar figures were observed in the artisanal fisheries sector that contributed about 90% of the total catch.

The Meeting for the Strategy for International Fisheries Research in 1991 recommended that post harvest fish losses should be a priority issue for future research and noted that there were no tried and tested techniques by which losses could be assessed.

Shimang, G.N.(1992) reported that each year in the absence of proper handling, processing and marketing infrastructure, large quantities of fish were lost for

consumption.

Mengistu, T. (1993) suggested that the reduction of post harvest losses through improved handling and processing, transport and distribution systems in Ethiopia should be given high priority. Post harvest losses due to spoilage of fresh fish, burning during smoking, insect infestation in dried and smoked fish, breakage and rehumidification have been reported by FAO in 1992. Total losses, which were about 30% up to the 1970s, have been reduced to about 10% through extension of the use of insecticides and improved smoking ovens.

Adams, D.J. (1995) observed that with the individual fishing quota (IFQ) system, fishermen could be selective about such factors as fishing depth, bottom substrate, time of day, month or year. These factors were directly related to incidental halibut by catch mortality.

Ward, A. (1996) focused on developing methods to quantitatively assess post harvest fish losses and to understand and identify the causes in qualitative terms. The main outputs of the study were 1) manual of field based loss assessment methodology, 2) fish loss database, 3) predictive macro model and predictive cost model. The two systematic fish loss assessment methodologies developed were 1) formal recall questionnaire survey method 2) an informal method based on rapid and participatory rural appraisal. Details are also given on how informal data collection techniques can be used to generate indicative quantitative data on post harvest fish losses.

Ward *et al.* (1996) studied the fresh fish marketing between Visakhapatnam and Madras based on a survey programme conducted jointly by Central Institute of Fisheries Technology, Cochin, India and NRI, UK.

Mndeme, Y.E.S. *et al.* (1996) has reported that the availability of salted fish markets both in Kanya and foreign countries have to a great extent reduced the loss as the fish, which is not accepted by factories due to low quality and size were now salted and exported.

Hodari- Okae, M.A. et al. (1996) observed that insect infestation in shrimp resulted in considerable quantitative and qualitative loss. Improper packing, handling and stacking during transportation led to fragmentation and spoilage.

Ndem, M.A.; Akande, G.R. (1996) reported heavy post harvest losses for cured fish as a result of inappropriate processing and handling.

Eyo, A.S. (1997) estimated that 7% of fish in Kanji Lake was either discarded or value reduced due to spoilage during handling by fisher folk.

Cawthorn, R.J.; Evans, L.H.; Jones, J.B. (eds.)(2000) Estimated post-harvest losses in North America at 10-15%, representing an economic impact of US $50-75 million annually.

Ward, A.R. and Jeffries, D.J. (2000) have described three methods for investigating fish losses. The Informal Fish Loss Assessment Method (IFLAM) describes quick

way to generate qualitative and quantitative data, based on rapid and participatory rural appraisal (RRA & PRA). The Load Tracking (LT) method uses biometric sampling to measure change in fish quantity and quality losses between stages in the distribution chain. The last method, Questionnaire Loss Assessment Method (QLAM) is based on a formal questionnaire survey approach. However these methods have certain disadvantages that, the IFLAM method does not generate statistically valid data, the LT method is said to be costly and time consuming and by using the QLAM method it is not easy to quantify the loss levels.

CHAPTER II
Methodology

2.1 Introduction

The pilot study aimed at development of methodology for assessment of losses at harvest and post harvest stages in marine fisheries. The following concepts were dealt with in the study.

2.2 Concepts and definitions

1. Loss : The quantity of marine fish which is not fit for human consumption due to physical loss or spoilage or some other reason.
2. Market : Place where fish is sold
3. Wholesale market : Market where fish in different forms like fresh, iced are supplied from within and outside the district. The normal business activities in the market are auction, repackaging and redistribution.

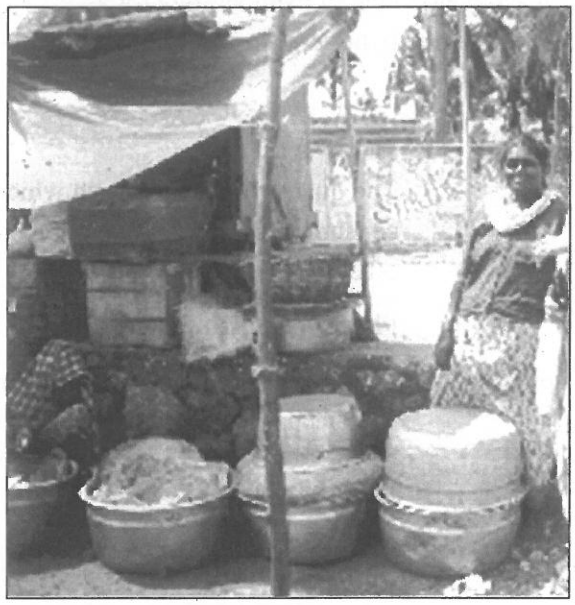
Wholesale dry fish market

4. Retail market : Common gathering place with shelter and storage facility are available and where fish from landing centre, wholesale markets and other sources assembled and redistributed to vendors and consumers.

5. Major retail market : Retail markets with number of retailers greater than or equal to 50

6. Minor retail market : Retail markets with number of retailers less than 50

7. Vendor : One who collects fish and sells it to consumers adopting various methods like door-to-door by headload bicycle, mopeds and motor bikes.



Women fish vendors

8. Roadside market : Roadside/public place where vendors gather at a specified time and sell fish. Usually the market has no storage or shelter facilities.

9. Harvest losses : Losses at the time of harvesting and onboard the fishing craft

10. Post harvest losses : Losses occur after harvesting, i.e., from the landing centre up to the consumer at different stages

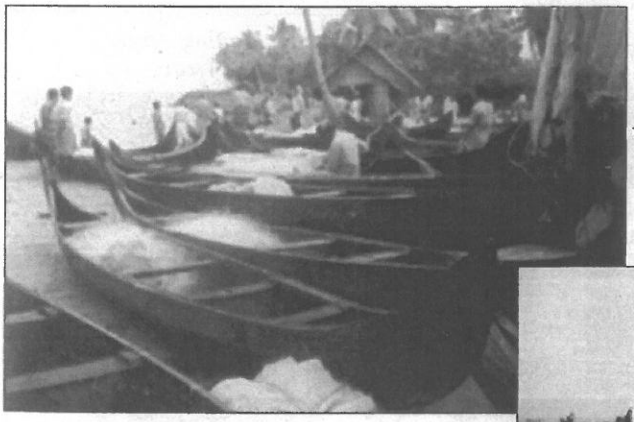
11. Spoilage : Any type of quality loss in fish

12. Mechanised crafts : Type of fishing vessel using mechanical power, fully or partially for fishing

Mechanised crafts berthed at the harbour

13. Non-mechanised crafts : Fishing carried out without the intervention of machines or motors.

14. Traditional crafts : Small size fishing crafts propelled by human power.



Traditional crafts

without motors

with outboard motors

15. Motorized crafts : Traditional fishing crafts fitted with OBM/IBM for propulsion

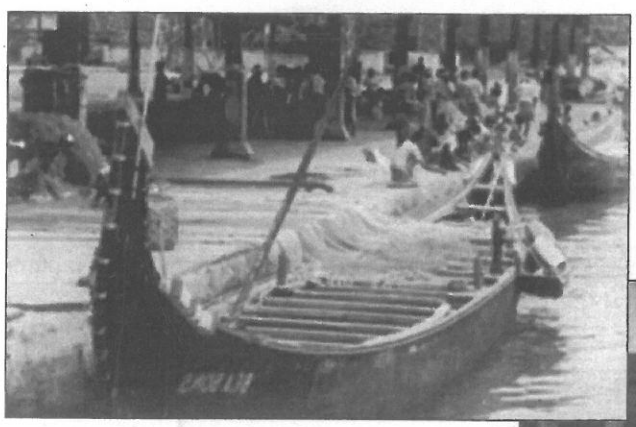
16. Landing centre : Place where landing, auction, icing, packing and transportation of fish taken place

17. Traditional landing center : Open beach where traditional crafts are landed

18. Harbour : Modern fish landing centre with sheltered, concrete/ cemented platform for berthing mechanised fishing crafts

Beach landing centre

Beach landing centre



Landing centre- harbour

19. Pre-processing center : Place where activities like peeling, beheading, cleaning etc. are carried out prior to processing into a value added products

20. Processing center : Place where fish is processed into value added products mainly for export

Fish processing in a factory

21. Monsoon : June to October during which south-west and north-east monsoon rains are available in Kerala coast.

22. Pre-monsoon : March - May; preceeding monsoon

23. Post-monsoon : November- February; following monsoon up to the beginning of summer.

24. Trawl ban : June 15 to July 31, during the period of fishing, mechanised trawlers are banned from fishing to prevent exploitation of fish in their breeding season.

25. Pre-trawl ban : December-June, period preceeding trawl ban

26. Post-trawl ban : August-November, period after the trawl ban

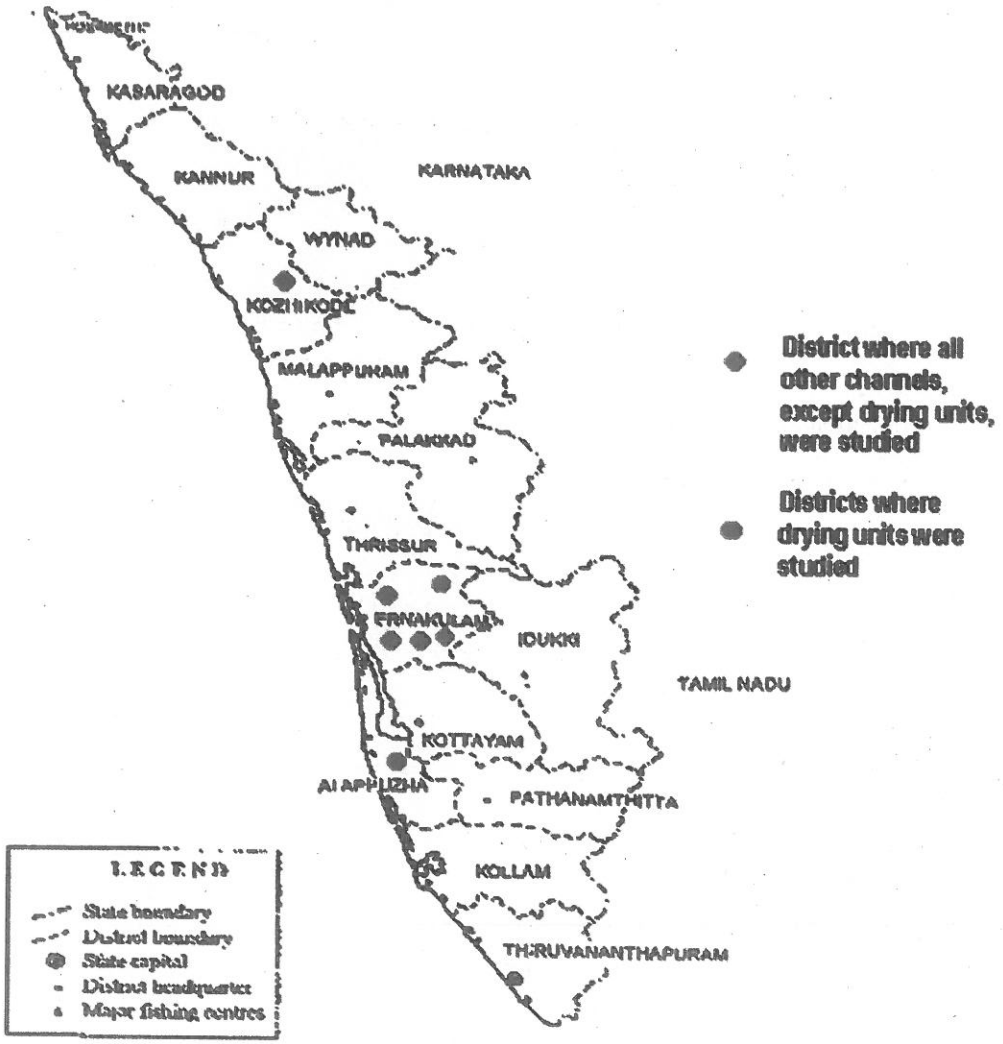
2.3 Selection of area

Ernakulam district in Kerala, being a premier centre of fishing and fish processing activities in the country, was selected for the study. The district is bound by the Arbian Sea on the West, Idukki district in the East, Kottayam and Alappuzha districts in the South and Thrissur district in the North with a land area of 2407 km^2. It has a coastline of 46 km and a coastal marine area of 218300 ha. The depth wise coastal marine water area of the district is presented in Table 1.

Table 1: Coastal marine waters of the district

Depth	Area(Ha)	Contribution of the district
Up to 20 m	61,400	13.7%
20-80 m	97,700	4%
80-200 m	59,200	5.8%

There are 197 major and minor fish markets and 68 seafood export units in the district. The total population is 28 lakhs. There are 1.36 lakh active fishermen, 63% of whom are engaged in marine fishing.



Districts where the study was undertaken. All channels, except drying, were observed for Ernakulam district. Drying units were studied in Kozhikode and Alappuzha

The contribution of marine fisheries in terms of landings is given in Table 2.

Table 2: Contribution of Ernakulam district to the total marine fish production in Kerala from 1991 to 2000

Year	Landing		Contribution (%)
	State	District	
1991-92	5,34,868	83,388	15.58
1992-93	5,53,173	1,03,486	18.71
1993-94	5,59,204	1,01,592	18.17
1994-95	5,48,810	68,742	12.53
1995-96	5,32,550	92,024	17.28
1996-97	6,53,239	92,029*	14.09
1997-98	5,26,342	60,028	11.40
1998-99	5,36,762*	60,028*	11.18
1999-2000	5,75,500	53,252*	09.25

Two other districts namely Calicut (Kozhikode) and Alappuzha were selected with the specific purpose of studying the losses in drying of marine fish.

* stands for calander year instead of financial year

2.4 Description of population

The population for the study consisted of the fisheries harvest and post harvest sectors of Ernakulam district. This constituted the following stages.

1. Harvest stages.
   - i. Mechanised sector
   - ii. Motorised sector
   - iii. Traditional sector
2. Post harvest stages
   - i. Mechanised sector
   - ii. Motorised sector
   - iii. Traditional sector
3. Pre-processing
4. Processing sector
5. Drying units
6. Markets
   - i. Wholesale market
   - ii. Major retail market
   - iii. Minor retail market
   - iv. Road side market

v. Vendor

7. Consumer

i. Urban

ii. Rural

2.5 Selection of sample

The sample for the study for the selected based on the following stratified random sampling design.

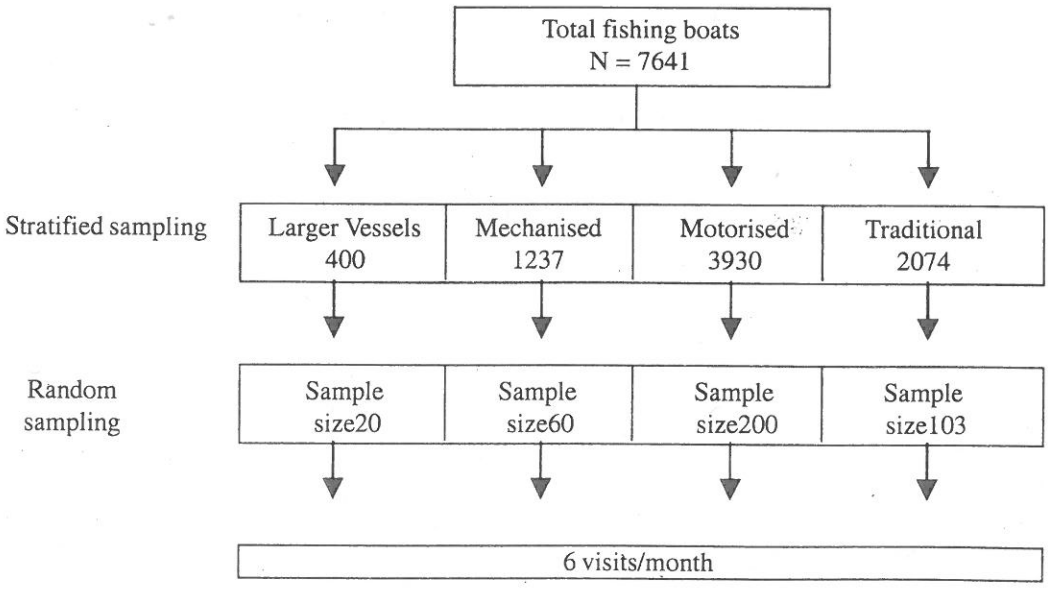
Sampling design

The sampling design adopted for estimation of harvest and post harvest losses in the marine sector was the stratified random sampling. Simple randam sampling also has been adopted appropriately wherever necessery. Sample sizes have been fixed to ensure maximum coverage of the data in view of the resources available.

Harvest level

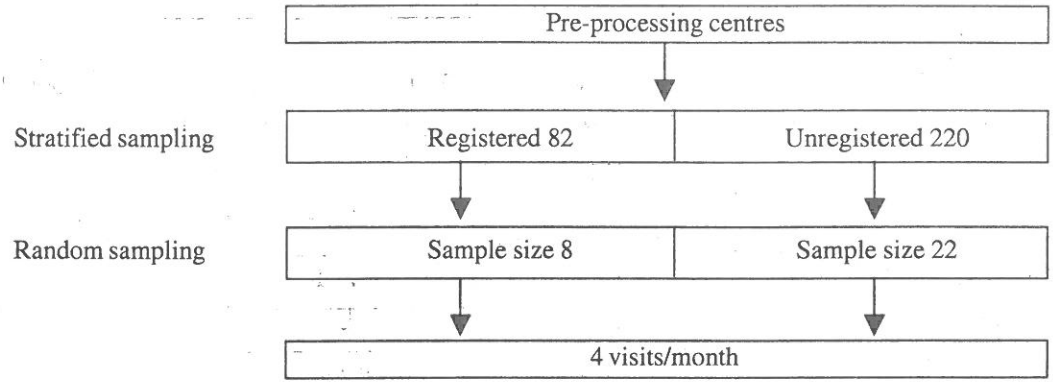
At the harvest level, a total number of 7641 fishing boats of different types are operating the marine waters of Kerala. They are of varying sizes and using different fishing methods and hence losses are also expected to be varying between them. For making the estimate, the fishing boats have been stratified in to larger vessels (mechanised), mechanised boats, motorised crafts and traditional crafts. A toal number of 400 boats come under the first stratum, 1237 boats under the second, 3930 under the third and 2074 under the forth stratum. Sample size has been fixed under each statum and selection of units were made using method of stratified random sampling. Data was collected repeatedly from these units six times in a month. The stratification and sample size are furnished as under.

Harvest level



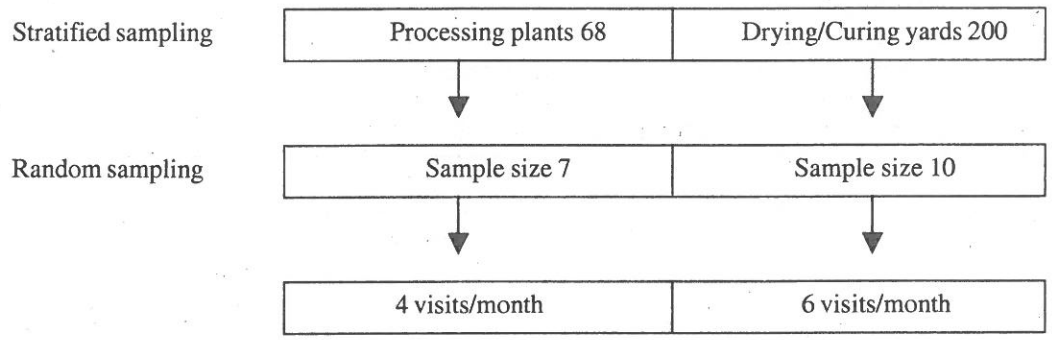
Pre-processing/processing centre

At the post harvest stage, two levels at pre-processing and processing were considered separately. Total of 302 pre processing units were stratified in to 82 registred and 220 un registred units. Sample sizes of 8 and 22 were selected randomly from registed and unregisted catagaries respectively. Also 4 visits made to the samplying units in a month. The stratification is furnished as below.



Processing plants

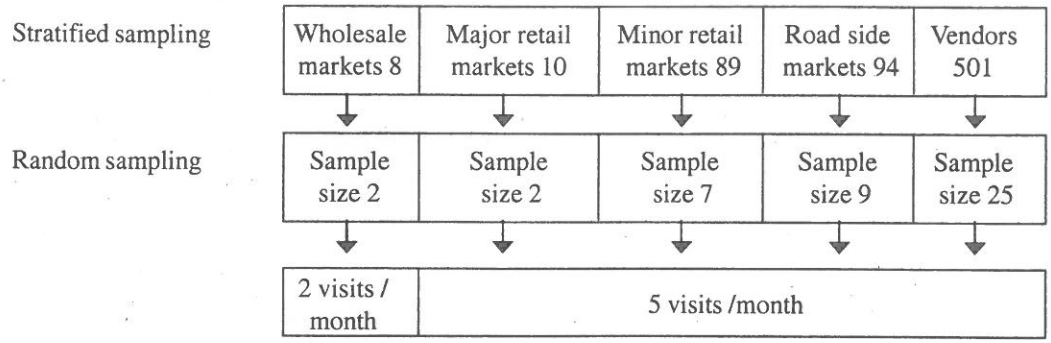
The selection of processing units was made under two catagaries of 68 processing plants and 200 dry/curing yards with sampling procedure as per the diagram furnished below.



Transportation - cum- marketing

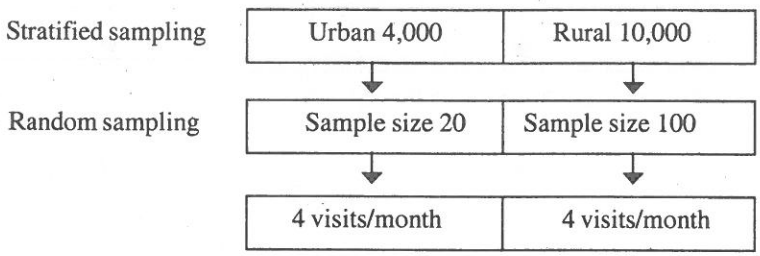
In this level we have identified the channels namely wholesale markets, major retail market and minor retail market, road side market and vendors.

In whole sale markets 2 out of 8 markets were taken as sample. 2 out of 10 units were taken as sample for major retail market. In the case of minor retail markets and road side markets respectively 7 out of 89 and 9 out of 94 markets were taken as samples. Out of 501 vendors, sample size of 25 was taken for study.



Consumer level

In this level sample size of 20 and 100 were taken for this study respectively for the population of 4000 urban and 10,000 rural population.



2.6 Tools and techniques for data collection

The methods of enquiry and physical observation were followed for data collection Information was collected on the following aspects from primary and secondary sources. The primary data included profile of the selected channels, loss details including source of commodity, major varieties, form of fish such as fresh, frozen dried or any other, quantity arrived, quantity lost and type and causes of loss for the day of observation and for the previous week. Schedules were prepared separately for all the seven stages, pretested and prepared in local language. The list of schedules is given below.

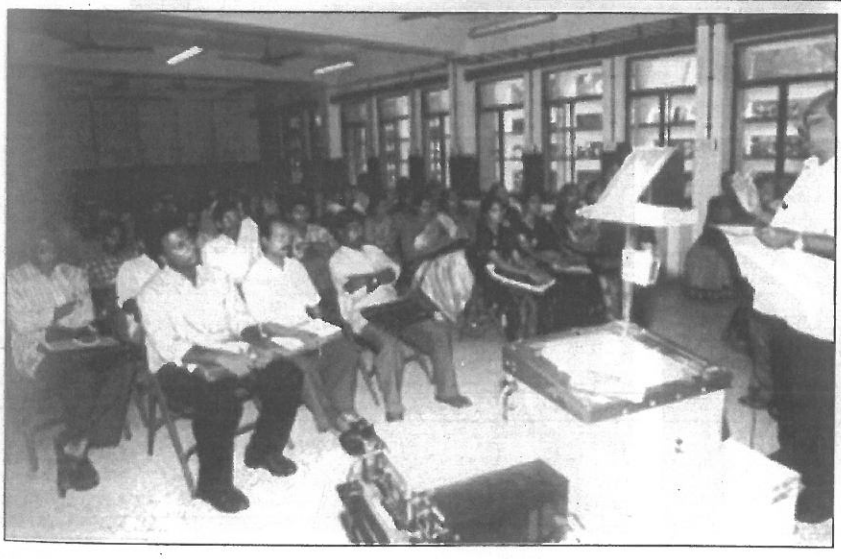
The Schedules used are as below:

1.	Schedule I	Profile of Mechanised Landing Centre
2.	Schedule IA	Loss at Mechanised sector
3.	Schedule II	Profile of Non-mechanised landing center
4.	Schedule IIA	Loss at Non-mechanised sector
5.	Schedule III	Profile of Wholesale Market
6.	Schedule IIIA	Loss at Wholesale market
7.	Schedule IV	Profile of Retail market
8.	Schedule IVA	Loss at Retail market
9.	Schedule V	Loss at Roadside market
10.	Schedule VI	Loss at Vendor level
11.	Schedule VII	Loss at Household level
12.	Schedule VIII	Profile of Pre-processing center
13.	Schedule VIIIA	Loss at Pre-processing center
14.	Schedule IX	Profile of Processing center
15.	Schedule IXA	Loss at Processing center
16.	Schedule X	Loss at small scale processors at household level
17.	Schedule XI	Profile of Drying/Curing yards
18.	Schedule XIA	Loss at Drying/ Curing yards

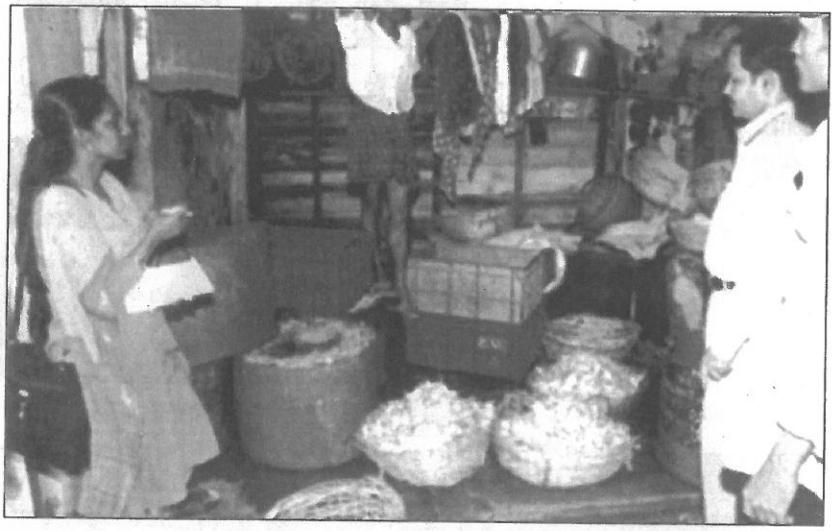
A three day training programme was conducted for the enumerators at CIFT, Cochin. The programme included lectures on the importance of the project and main objectives of the project, the method of identification of the sampling units, scheme of data collection, method of making and recording observations, collection of other relevant information, problems encountered in data collection and methods for overcoming them. This was followed by actual field training. As per the sampling scheme, time schedule for data collection was prepared for each month and work allotment was made (Work allotment schedule for June, 2002 enclosed).

Appraisal of the work done by the enumerators was carried out every month to review the progress of data collection and to suggest measures to mitigate problems faced by the enumerators during data collection. The project team regularly supervised data collection by making visits to the selected location.

Training being given to enumerators



Primary data collection by members of the project team



Sources of secondary data included Ministry of Agriculture, Govt. of India, state fisheries department, MPEDA and Port authorities

2.7 Collection of data

Primary data on fish catch and losses were collected for a period of 12 months from January - December, 2002. The data were collected through field visits with the help of 40 enumerators, specially recurited and trained for this purpose. As physical observations were to be made at each stage, the time of data collection was any times from 5 am to 7 pm depending on the time of fish landing and arrival to the markets. The quality of data was ensured by supervision and periodic inspection by the project team. The collected data was scrutinized through monthly appraisal and mid-course correction, if necessary was carried out.

Project team with the Director, CIFT and enumerators

2.8 Processing and analysis of data

The data collected were scrutinised, coded and computerised in work sheet format using MS-Excel. The data so compiled were converted in to RDBMS format using the MS-Access. The data so prepared and finalised were analysed using the software developed by the Lead Centre, Indian Agricultural Statistics Research Institute, New Delhi and the results were made available in different tabular format. The estimation of loss is based on the following methodology.

Methodology used for estimation of losses

A suitable sampling methodology was developed by the lead centre IASRI, New Delhi for assessment of harvest and post harvest losses at different channels. The details of the developed methodology are given below:

(i) Stratified Random Sampling

Let

L = Total no. of strata

N_h = Total no. of units in h^{th} stratum, h = 1, 2, … , L

$N = \sum_{h=1}^{L} N_h$ = total no. of units in the population

n_h = Sample size of h^{th} stratum

W_h = Weight of h^{th} stratum = $\frac{N_h}{N}$

y_{hi} = The quantity of fish catch/stored/available by the i^{th} unit of h^{th} stratum, i = 1,2,.., N_h

l_{hi} = The quantity of loss by the i^{th} unit of h^{th} stratum

l_{hir} = The quantity of loss by the i^{th} unit of h^{th} stratum during r^{th} round, r = 1,2, …,R_m

R_m = Total no. of rounds in m^{th} month, m= 1,2, …, M,

M = Total no. of months in a year = 12

l_{mhi} = The quantity of loss by the i^{th} unit of h^{th} stratum during m^{th} month, m = 1,2, …,M

$= \frac{D_m}{R_m} \sum_{r=1}^{R_m} l_{hir}$, D_m = Total no. of days in m^{th} month

$\hat{\bar{L}}_{mh}$ = The estimate of average loss for h^{th} stratum during m^{th} month =

Similarly,

$\hat{\bar{C}}_{mh}$ = The estimate of average fish catch/stored/available for h^{th} stratum during

m^{th} month $= \frac{1}{n_h} \sum_{i=1}^{n_h} y_{mhi}$

where $y_{mhi} = \frac{D_m}{R_m} \sum_{r=1}^{R_m} y_{hir}$

where

y_{hir} = The quantity of fish catch/stored/available by the i^{th} unit of h^{th} stratum during r^{th} round

y_{mhi} = The quantity of fish catch/stored/available by the i^{th} unit of h^{th} stratum during m^{th} month

The estimate of percentage loss during m^{th} month for the h^{th} stratum is given by

$$p_{mh} = \hat{\bar{L}}_{mh}\,\% = \frac{\hat{\bar{L}}_{mh}}{\hat{\bar{C}}_{mh}} \times 100$$

The estimate of variance of p_{mh} is given by

$$\hat{V}(p_{mh}) = \left[\frac{\hat{\bar{L}}_{mh}}{\hat{\bar{C}}_{mh}} \times 100\right]^2 \left\{\frac{\hat{V}(\hat{\bar{L}}_{mh})}{\left(\hat{\bar{L}}_{mh}\right)^2} + \frac{\hat{V}(\hat{\bar{C}}_{mh})}{\left(\hat{\bar{C}}_{mh}\right)^2}\right\}$$ ignoring the covariance term.

The estimate of variance of $\hat{\bar{L}}_{mh}$ and $\hat{\bar{C}}_{mh}$ are easily obtained as

$$V\left(\hat{\bar{X}}_{mh}\right) = \left(\frac{1}{n_h} - \frac{1}{N_h}\right) s_h^2$$

where $s_h^2 = \frac{1}{n_h - 1} \sum_{i=1}^{n_h} \left(x_{mhi} - \hat{\bar{X}}_{mh}\right)^2$ where X is the variable (loss or catch)

The standard error of p_{mh} is given by

$$S.E.(p_{mh}) = \sqrt{\hat{V}(p_{mh})}$$

The estimate of percentage loss during m^{th} month over strata is obtained as

$$p_m = \sum_{h=1}^{L} W_h p_{mh}$$

The estimate of variance of p_m is given by

$$\hat{V}(p_m) = \sum_{h=1}^{L} W_h^2 \hat{V}(p_{mh})$$

The standard error of p_m is given by

$$S.E.(p_m) = \sqrt{\hat{V}(p_m)}$$

A data analysis software consisting of three different modules based on the three methodologies developed by the lead centre; stratified random sampling is one of the modules of the software. Data analysis for all the channels was done using this module of the software. The number of strata has been taken as one since the sampling design used is simple random sampling without replacement for all the channels except pre-processing centre. Stratified random sampling has been used for pre-processing centres.

2.9 Reporting

The result obtained were summarized and presented in the Report.

CHAPTER III

RESULTS AND DISCUSSIONS

3.1 Introduction

The results of the survey pertaining to estimation of losses at different channels have been presented in this chapter. The present study was carried out in Ernakulam district of Kerala state to assess the losses at the harvest and post harvest stages in marine fisheries. The losses at harvest stage were assessed in the traditional, motorized and mechanised sectors. Besides the above three sectors, losses at post harvest level were also studied at the pre-processing, processing, markets, vendor and household levels. Losses pertaining to drying units were studied in Calicut and Alappuzha districts. Broadly, the losses have been estimated at producer, market and consumer levels.

Data analysis was carried out separately for pooled over different seasons - pre-monsoon, monsoon and post-monsoon and also for all the seasons together. The analysis was also performed with respect to the trawl ban, which is an essential aspect of the marine fisheries sector. The losses during, before and after the trawl ban have also been estimated.

3.2 Harvest losses

Harvest losses have been estimated for traditional, motorised and mechanised sector and it has been observed that harvest loss for traditional sector was 4.13%, motorized sector 3.61%, mechanized sector 14.48% and for larger vessels 21.41% with percentage standard error of 9.52, 9.98. 5.21 and 6.89 respectively. Large-scale discard of non-target low value fish and juveniles was observed during harvest in the mechanised sector.

3.2.1 Harvest losses in traditional fisheries

For traditional sector the harvest loss was assessed at 4.13% (Table 1a). The losses were 4.18% in pre-monsoon, 4.69% in post-monsoon and 3.65% in the monsoon season (Table 1b). Losses with respect to the trawl ban seasons were 4.70% in pre-trawl ban, 3.90% during trawl ban and 3.39% after the trawl ban (Table 1c).

Table 1a: Harvest loss in traditional sector - pooled over seasons

Loss (%)	S. E.
4.13	0.39

Table 1b: Harvest losses in traditional sector - season-wise

Season	Pre-monsoon	Post-monsoon	Monsoon
Loss (%)	4.18	4.69	3.65
S. E.	0.59	0.92	0.48

Table 1c: Harvest losses in traditional sector – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	4.70	3.90	3.39
S. E.	0.68	1.04	0.31

The main reasons for losses at the harvest stage in traditional fishing were the retention of catch in the craft and gear, handling losses during unloading, use of fish as bait in hook and line fishing, attack by larger species, discard of juveniles in heavy quantities especially during pelagic trawling and spoilage due to improper icing. With reference to seasons and ban period for trawling, not much variation was observed in the loss estimates.

3.2.2 *Harvest losses in motorized sector*

The percentage of loss at harvest level for motorized sector was 3.61% (Table 2a). The seasonal losses reported were 7.83% for pre-monsoon, 2.25% for monsoon and 2.15% for post-monsoon periods(Table 2b). With reference to monsoon trawl ban, the percentage of losses were 4.79% for pre-trawl ban period, 1.41% for trawl ban period and 2.96% for post-trawl ban period (Table 2c).

Table 2a: Harvest loss in motorised sector - pooled over seasons

Loss (%)	S. E.
3.61	0.36

Table 2b: Harvest loss in motorised sector - season-wise

Season	Pre-monsoon	Post-monsoon	Monsoon
Loss (%)	7.83	2.15	2.25
S. E.	1.26	0.46	0.21

Table 2c: Harvest loss in motorised sector – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	4.79	1.41	2.96
S. E.	0.64	0.28	0.48

The motorised sector reported higher loss during pre-monsoon period that coincided with pre-trawl ban period. Heavy landings of oil sardine consisting mainly of juveniles were reported and large quantities of the species were dried for conversion into livestock feed. A major portion of this material after drying was transported out of the district to other states including Karnataka, Andhra Pradesh and Gujarat. In the motorised sector, the losses observed were due to similar causes as in the case of traditional fishing. Porpoises that damaged fishing nets were kept off bay by feeding them the fish harvested. From March to August, good catch resulted in discard of low value species. Rough seas during the monsoon season also resulted in the physical loss of the harvest due to inability to bring the catch to the shore.

The fishermen reported loss of fishing days during the period under study due to inclement weather conditions and inter-sectoral conflicts. One of the important observations made in motorized fishing was the new innovation in pelagic trawling which lead to mortality of small pelagic fish. Use of banned nets such as huge small meshed ring seine and pelagic trawl also led to loss due to catch of juveniles.

The main gear operated by the non-mechanised sector were ring seine, drift net, gill nets, cast nets etc. and the major species landed in the sector were sardine, mackerel, prawns, anchovy, trevally (*vattapara*), glassy perchlet (*nandan*), pony fish (*mullan*), pomfret, tuna etc.

3.2.3 *Harvest losses in mechanized sector (small and medium)*

Loss in Mechanized sector was estimated at 14.48% for the year under study with seasonal variations of 12.23%, 13.96% and 16.83% for pre-monsoon, monsoon and post-monsoon periods respectively (Tables 3a and 3b). With reference to monsoon trawl ban the percentage of losses were 14.26% for pre-trawl ban and 22.06% for post-trawl ban (Table 3c). Since the operation of mechanised crafts during the trawl ban period is banned, no loss was reported.

Table 3a: Harvest loss in mechanised sector - pooled over seasons

Loss (%)	S. E.
14.48	0.75

Table 3b: Harvest losses in mechanised sector - season-wise

Season	Pre-monsoon	Post-monsoon	Monsoon
Loss (%)	12.23	16.83	13.96
S. E.	0.88	1.64	1.13

Table 3c: Harvest losses in mechanised sector (small and medium) – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	14.26	0	22.06
S. E.	1.13	0	1.49

In the mechanized fisheries sector, the types of crafts operated include gill netter, gill netter-cum-hook and line, purse seiners and trawlers. Gill netters set out for fishing early in the morning and returned in the evening while trawlers set out for fishing in the afternoon and returned in the early morning. Purse seine operated only when a good catch was ensured.

3.2.4 Harvest losses in mechanized sector (large vessels)

Vessels, which also operate at deep sea, reported a loss of 21.41% for the period under study and the losses for pre-monsoon, monsoon and post-monsoon periods were 19.91%, 20.95% and 23.12% respectively (Tables 4a and 4b). Pre-trawl ban period reported a loss of 20.37% and post-trawl ban period 25.56% (Table 4c).

Table 4a: Harvest loss in mechanized sector (large vessels)-pooled over seasons

Loss (%)	S. E.
21.41	1.48

Table 4b: Harvest losses in mechanized sector (large vessels)-season-wise

Season	Pre-monsoon	Post-monsoon	Monsoon
Loss (%)	19.91	23.12	20.95
S. E.	2.01	1.61	3.07

Table 4c: Harvest losses in mechanized sector (large vessels) – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	20.37	16.26	25.56
S. E.	1.30	5.69	2.77

Multi-day fishing reported maximum loss due to capture of juveniles and their discard in the sea even before landing. A loss of about 1000 – 2000 kg due to discard of low value fish was reported during a fishing cruise of 3 – 5 days. Low market price of the varieties caught and the limitation in the fish hold capacity onboard were the main reasons for discard of such fish. Shrimp, cuttle fish and squid were the most valuable species which were brought to the land. Trawlers engaged in multi-day fishing carried with them about 15 types of nets on board for catching different species. The mesh size of cod end was less than 30 mm. Gill net boats operated for a period of 15 – 20 days continuously. These boats also used hook and line for capture of shark, ray, sail fish, tuna etc. Small fish was used as bait in the hook and line, which was also reported to be a reason for loss. It was also observed that physical damage occurred in the gill net boats due to limited storage capacity and over filling of fish holds. Major catch landed by purse seiners were mackerel, pomfret and oil sardine. During the period of study huge loss of oil sardine was reported from purse seine boats due to low price. Loss was also observed due to difficulty in removing small fish entangled in the net after emptying the catch. Loss of fishing nets in the fishing grounds was also an important reason for fish loss in the marine sector. Ghost fishing by net lost in the sea also takes place and the loss due to this cannot be statimated easily.

3.3 Post harvest losses

3.3.1 Post-harvest losses in the traditional sector

Post harvest loss in the traditional sector was 4.30% for the year with a percentage standard error of 5.73. During pre-monsoon, the percentage of loss was 4.29, during monsoon 4.53 and during post-monsoon, 4.02 (Table 5b). With regard to trawl ban the estimate of losses were 4.10% during pre-trawl ban, 3.42% during trawl ban and 5.04% during post-trawl ban period (Table 5c). The higher values of losses for pre-trawl ban and post-trawl ban can be explained by the fact that there was an increase in the total fish catch as all types of fishing crafts operated in the sea during these periods.

Table 5a: Post-harvest loss in traditional sector - pooled over seasons

Loss (%)	S. E.
4.30	0.25

Table 5b: Post-harvest losses in traditional sector - season-wise

Season	Pre-monsoon	Post-monsoon	Monsoon
Loss (%)	4.29	4.02	4.53
S. E.	0.59	0.26	0.43

Table 5c:Post-harvest losses in traditional sector – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	4.10	3.42	5.04
S. E.	0.34	0.57	0.45

Post harvest loss at traditional sector was mainly due to landing of low value fish and juveniles of oil sardine which was used for livestock feed. Major portion of these catches moved out of the district to other states including Karnataka, Andhra Pradesh and Gujarat.

3.3.2 Post-harvest losses in motorized sector

The percentage of post-harvest loss for motorized sector was 5.16 with percentage standard error of 7.09. Seasonal variations of 6.03%, 2.60% and 7.7% respectively for pre-monsoon, monsoon and post-monsoon periods were observed (Tables 6a and 6b). The percentages of loss with respect to ban on trawling were 7.33, 2.24 and 3.36 for pre-trawl ban, trawl ban and post-trawl ban period respectively (Table 6c).

Losses due to improper handling - trampling, fall from basket, and fall while separating from net

Table 6a: Post-harvest loss in motorised sector - pooled over seasons

Loss (%)	S. E.
5.16	0.37

Table 6b: Post-harvest losses in motorised sector - season-wise

Season	Pre-monsoon	Post-monsoon	Monsoon
Loss (%)	6.03	7.71	2.60
S. E.	0.57	0.86	0.43

Table 6c: Post-harvest loss in motorised sector – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss '%)	7.33	2.24	3.36
S. E.	0.60	0.30	0.60

Oil sardine being beach dried for livestock feed

Juveniles and low value fish being discarded

In the traditional sector, post harvest losses occurred mainly due to discard of juveniles in heavy quantities especially during pelagic trawling and spoilage due to improper icing. From March to August, good catch resulted in discard of low value species. Heavy landings of oil sardine were reported and large quantities of the species were dried for conversion into livestock feed. Higher losses occurred in ring seine and choodavala while unloading. The major species landed in the sector were sardine, mackerel, prawns, anchovy, Russel's scad (*vattapara*), glassy perchlet (*nandan*), pony fish (*mullan*), pomfret, tuna, ribbon fish (*thalayan*) etc.

3.3.3 *Post-harvest losses in mechanized sector (small and medium)*

Based on the data collected from small and medium sector, the post-harvest loss in the mechanised sector reported for the year under study was 0.41% with percentage standard error of 7.97. A seasonal variation of 0.69% for pre-monsoon, 0.14% for monsoon and 0.54% for post-monsoon periods was observed (Tables 7a and 7b). The losses with respect to trawl ban was 0.68% and 0.23 % respectively for pre and post-trawl ban (Table 7c).

Table 7a: Post-harvest loss in mechanised sector - pooled over seasons

Loss (%)	S. E.
0.41	0.03

Table 7b: Post-harvest loss in mechanised sector – analysis with respect to trawl ban

Season	Pre-monsoon	Post-monsoon	Monsoon
Loss (%)	0.69	0.54	0.14
S. E.	0.11	0.07	0.02

Table 7c: Post-harvest losses in mechanised sector - season-wise

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	0.68	0	0.23
S. E.	0.07	0	0.03

The major reasons for losses at the harvest level in the mechanised sector are physical damage during fishing, loss and damage of fishing nets, handling loss and throwback of low value species and juveniles, loss due to spoilage as a result of improper icing, and loss due to fish being taken away by birds etc.

3.3.4 *Post-harvest losses in mechanised sector (large vessels)*

Larger vessels, which also operated in the deep sea, reported a loss of 0.18% with percentage standard error of 22.41during the period under study. The season-wise losses reported were 0.33% for pre-monsoon, 0.12% for monsoon and 0.14% for post-monsoon periods. Loss at pre-trawl ban period was 0.22%, at trawl ban period, 0.15% and Post-trawl ban period, 0.13%. The losses with standard error are reported in Tables 8a, 8b & 8c.

Table 8a: Post-harvest loss for larger vessels - pooled over seasons

Loss (%)	S. E.
0.18	0.04

Table 8b: Post-harvest losses for larger vessels - season-wise

Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	0.33	0.12	0.14
S. E.	0.16	0.02	0.03

Table 8c: Post-harvest losses for larger vessels – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	0.22	0.15	0.13
S. E.	0.08	0.04	0.03

The reasons for losses are similar to the ones observed for the mechanised sector. Losses occurred due to lack of infrastructure facilities and poor handling of the fish being landed. The fish landed were usually of high value and has a ready market.

The major species landed were threadfin bream (*kilimeen*), lizard fish, prawns, whip tail sting ray (*thirandi*), anchovy, trevally (*vattapara*), glassy perchlet (*nandan*), crab, tongue sole (*manthal*), squid, octopus, cuttlefish, pony fish (*mullan*), pomfret, tuna, Russel's scad (*thiriyan*), spotted butter fish (*nutchara*), black king fish (*kadalvaral*), seer fish etc.

Fish unloaded at harbour- considerable loss occurs due to improper handling

3.3.5 *Pre-processing sector*

Losses in the pre-processing sector have been observed for fresh and frozen fish. The overall loss percentages were 0.26% for fresh fish and 0.14% for frozen fish with percentage standard error of 26.34 and 11.68 respectively.

3.3.5.1 Losses in pre-processing sector (fresh fish)

An overall loss of 0.26% was reported at pre-processing stage with 0.45% at pre-monsoon, 0.26% at monsoon and 0.12% at post-monsoon periods. Pre-trawl ban period reported a loss of 0.25%, trawl ban period 0.37% and post-trawl ban period 0.21%. The detailed results are given in Tables 9a, 9b & 9c.

Table 9a: Loss in pre-processing sector (fresh fish) - pooled over seasons

Loss (%)	S. E.
0.26	0.07

Table 9b: : Losses in pre-processing sector (fresh fish) - season-wise

Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	0.45	0.26	0.12
S. E.	0.22	0.07	0.08

Table 9c: : Losses in pre-processing sector (fresh fish) – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	0.25	0.37	0.21
S. E.	0.11	0.16	0.09

3.3.5.2 Losses in pre-processing sector (frozen fish)

For frozen fish, the overall loss percentage was 0.14 (Table 10a). The seasonal losses for pre-monsoon, monsoon and post-monsoon periods were 0.21%, 0.12% and 0.10% respectively (Table 10b). With respect to the trawl ban there was not much variation in the extent of losses, the percentages being 0.15, 0.15 and 0.11 before, during and after the ban period respectively (Table 10c).

Table 10a: Loss in pre-processing sector (frozen fish) - pooled over seasons

Loss (%)	S. E.
0.14	0.02

Table 10b: Losses in pre-processing sector (frozen fish) - season-wise

Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	0.21	0.12	0.10
S. E.	0.05	0.02	0.02

Table 10c: Losses in pre-processing sector (frozen fish) – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	0.15	0.15	0.11
S. E.	0.03	0.05	0.02

In the pre-processing centres, losses occurred due to faulty handling and discard of small size fish. Both fresh and iced shrimp, squid and cuttlefish were the main species processed in these centres. Loss also occurs in the shrimp meat while grading and packing. Loss of meat while washing is also observed. The pre-processing centres handled shrimp from different places outside the state and in such stock, black spot and discolouration are frequently observed, the spoilage occurring due to improper icing and exposure to ambient temperatures while transportation in flower tail prawns (*poovalan*), brown shrimp (*kazhanthan*) and deep sea prawns. In *karrikkadi* (kiddi prawn), discolouration and white patches were observed. Small size fish found in these consignments are thrown out along with the shrimp shell. This is observed in the raw material received from the non-mechanised fishing sector. Tiny deep sea lobsters that are supplied along with deep sea shrimp are also discarded. Losses occurred during unloading, re-icing, weighing and speedy and hasty operation by the workers.

3.3.6 *Processing sector*

Like in the pre-processing sector, losses in the processing sector were also studied for both fresh fish and frozen fish. Losses were very small in this sector with processing of fresh fish recording a loss of 0.15% and frozen fish 0.03%.

3.3.6.1 Losses in processing sector (fresh fish)

The processing sector recorded a loss of 0.15 % with seasonal variations of 0.31%, 0.08% and 0.10% respectively for pre-monsoon, monsoon and post-monsoon seasons (Tables 11a and 11b). With respect to ban on monsoon trawling, the loss percentages recorded were 0.22% for pre-trawl ban, 0.14% for trawl ban and 0.04% for post-trawl ban periods (Table 11c).

Table 11a: Loss in processing sector (fresh fish) - pooled over seasons

Loss (%)	S. E.
0.15	0.03

Table 11b: : Losses in processing sector (fresh fish) - season-wise

Season	Pre-monsoon	Post-monsoon	Monsoon
Loss (%)	0.31	0.10	0.08
S. E.	0.13	0.04	0.01

Table 11c: : Losses in processing sector (fresh fish) – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	0.22	0.14	0.04
S. E.	0.07	0.03	0.01

3.3.6.2 Losses in processing sector (frozen fish)

In the case of frozen fish, losses recorded were of very low order of less than 0.5%.

Table 12a: Loss in processing sector (frozen fish) - pooled over seasons

Loss (%)	S. E.
0.03	0.02

Table 12b: Losses in processing sector (frozen fish) - season-wise

Season	Pre-monsoon	Post-monsoon	Monsoon
Loss (%)	0.05	0.02	0.02
S. E.	0.05	0.02	0.02

Table 12c: Losses in processing sector (frozen fish) – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	0.04	0.02	0.02
S. E.	0.03	0.02	0.02

In the processing sector, losses occurred due to discolouration, black spot, broken tentacles and wings. During glazing also loss occurred in the meat portion. Clean shrimp meat, while moving through conveyor in the processing plants, is subjected to loss due to spillage. Damage to certain species like cuttlefish and octopus, while removing the raw material from the freezer, takes place when tentacles break. There was no significant seasonal impact on the losses in the processing sector. The sector is export oriented and the production system is tuned towards minimizing of the losses. In the export sector, rejection of consignment due to food safety problem was reported in which case the importing country rejected and destroyed the entire consignment at the receiving point. This channel was not subjected to detailed study.

3.3.7 *Losses in fish drying*

Fish drying sector reported a loss of 58.07% at Alappuzha for the period of study with seasonal losses of 38.16%, 80.86%, and 44.52% during pre-monsoon, monsoon and post-monsoon seasons respectively. With respect to trawl ban, seasonal losses of 33.65%, 61.37% and 93.05% during pre-trawl ban, trawl-ban and post trawl ban were reported. At Calicut, the loss reported was 19.36% with seasonal variations of 16.67%, 19.17% and 21.61% during pre-monsoon, monsoon and post-monsoon seasons. With respect to trawl ban, seasonal losses of 15.02%, 4.95% and 33.08% were reported during pre-trawl ban, trawl ban and post trawl ban periods. The percentage of losses for one year with seasonal variations is reported in Tables 13a, 13b & 13c and 14 a, 14b and 14c.

Table 13a: Loss in drying unit (Alappuzha) - pooled over seasons

Loss (%)	S. E.
58.07	13.32

Table 13b: Losses in drying unit (Alappuzha) - season-wise

Season	Pre-monsoon	Post-monsoon	Monsoon
Loss	38.16	44.52	80.86
S. E.	9.94	22.30	25.85

Table 13c: Losses in drying unit (Alappuzha) – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	33.65	61.37	93.05
S. E.	13.43	33.82	30.08

Table 14a: Loss in drying unit (Calicut) - pooled over seasons

Loss (%)	S. E.
19.36	21.23

Table 14b: Losses in drying unit (Calicut) - season-wise

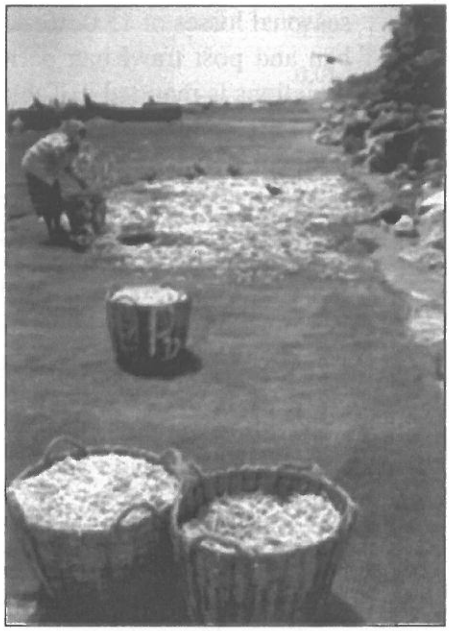
Season	Pre-monsoon	Post-monsoon	Monsoon
Loss (%)	16.67	21.61	19.17
S. E.	21.22	45.30	33.48

Table 14c: Losses in drying unit (Calicut) – analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	15.02	4.95	33.08
S. E.	22.92	17.00	52.93

Drying units were of two types, namely drying unit for human consumption and that for livestock feed. Huge quantities of oil sardine were found to be dried along the entire coast line from Chellanam in Ernakulam District to Punnapra in Alappuzha which was meant for livestock feed and extraction of fish oil during October to January. Insect infestation and attack by birds and animals also result in loss.

Losses during transportation to drying unit



Sardines being beach dried for use as feed

3.3.8 *Losses in markets*

The markets studied were wholesale markets, major and minor retail markets and roadside markets. Besides, another major marketing channel of the vendors was also studied. Details of the losses in this area are presented below.

3.3.8.1 Wholesale market (fresh fish)

The loss reported for the year for fresh fish in the wholesale market was 2.17% with percentage standard error of 25.23 (Table 15a). The seasonal losses during pre-monsoon, monsoon and post-monsoon were 2.69%, 1.74% and 2.31% respectively (Table 15b). Losses at wholesale market for pre-trawl ban, trawl ban and post-trawl ban periods were 2.76%, 2.69% and 1.03% respectively (Table 15c).

15a: Loss in wholesale market (fresh fish)- pooled

Loss (%)	S. E.
2.17	0.55

15b: Losses in wholesale market (fresh fish)- season-wise

Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	2.69	1.74	2.31
S. E.	1.22	0.74	1.01

15c: Losses in wholesale market (fresh fish)- analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	2.76	2.69	1.03
S. E.	0.90	1.70	0.38

The major reasons for losses in wholesale markets are handling losses and losses due to spoilage. Improper icing and exposure to ambient temperatures were the main causes for spoilage. Handling losses are also observed during loading and unloading.

3.3.8.2 Wholesale market (dry fish)

Loss percentage of dry fish in the wholesale market was 8.28 for the year with seasonal losses of 10.37, 7.02 and 8.30 respectively for pre-monsoon, monsoon and post-monsoon periods. With reference to the ban on monsoon trawling pre-trawl ban period accounted for 9.27% loss, ban period 7.56% and post-trawl ban period 7.17%. The results with variance and standard error are presented in Tables 16a, 16b & 16c.

16a: Loss in wholesale market (dry fish)- pooled

Loss (%)	S. E.
8.28	2.86

16b: Losses in wholesale market (dry fish)- season-wise

Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	10.37	7.02	8.30
S. E.	7.15	3.78	4.74

16c: Losses in wholesale market (dry fish)- analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	9.27	7.56	7.17
S. E.	4.46	6.33	4.33

The major reasons for losses were the same as that in fresh fish market. However, spoilage of fish due to high humidity and insect infestation were also major reasons for concern in dry fish market.

3.3.8.3 Major retail market (fresh fish)

Major retail market reported loss of fresh fish as 0.16% (Table 17a). Seasonal variations reported were 0.14% for pre-monsoon, 0.14% for monsoon and 0.19% for post-monsoon periods (Table 17b). During pre-trawl ban period, a loss of 0.15%, during trawl ban period 0.14% and during post-trawl ban period 0.17% losses were reported (Table 17c).

17a: Loss in major retail market (fresh fish)- pooled

Loss (%)	S. E.
0.16	0.06

17b: Losses in major retail market (fresh fish)- season-wise

Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	0.14	0.14	0.19
S. E.	0.10	0.07	0.12

17c: Losses in major retail market (fresh fish)- analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	0.15	0.14	0.17
S. E.	0.08	0.11	0.11

3.3.8.4 Major retail market (dry fish)

A loss of 2.40% was reported during the year for dry fish in the major retail market (Table 18a). Pre-monsoon period reported a loss of 1.72%, monsoon 3.09% and post-monsoon 2.05% (Table 18b). With reference to trawl ban, the losses were 2.04% during pre-trawl ban, 6.85% during ban and 0.72% during post-trawl ban period (Table 18c).

18a: Loss in major retail market (dry fish)- pooled

Loss (%)	S. E.
2.40	1.36

18b: Losses in major retail market (dry fish)- season-wise

Season	Pre Monsoon	Monsoon	Post Monsoon
Loss (%)	1.72	3.09	2.05
S. E.	1.47	2.92	1.43

18c: Losses in major retail market (dry fish)- analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	2.04	6.85	0.72
S. E.	1.19	7.27	0.35

3.3.8.5 Minor retail market (fresh fish)

Minor retail market reported fresh fish loss of 1.89% with percentage standard error of 13.77. A seasonal variation of 2.78% during pre-monsoon, 1.77% during monsoon and 1.36% during post-monsoon was reported (Table 19a and Table 19b). The loss with reference to trawl ban was 2.11% for pre-trawl ban, 1.64% for trawl ban and 1.69% for post-trawl ban periods (Table 19c).

19a: Loss in minor retail market (fresh fish)- pooled

Loss (%)	S. E.
1.89	0.26

19b: Losses in minor retail market (fresh fish)- season-wise

Season	Pre-monsoon	Monsoon	Post-Monsoon
Loss (%)	2.78	1.77	1.36
S. E.	0.76	0.38	0.26

19c: Losses in minor retail market (fresh fish)- analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	2.11	1.64	1.69
S. E.	0.41	0.66	0.37

3.3.8.6 Minor retail market (dry fish)

Minor retail market reported a loss of 6.43% for the year while pre-monsoon, monsoon and post-monsoon losses were reported as 8.54%, 6.89% and 4.27% respectively (Tables 20a and 20b). During pre-trawl ban period, percentage losses of 5.97, during trawl ban 7.85 and during post-trawl ban 6.41 were reported (Table 20c).

20a: Loss in minor retail market (dry fish)- pooled

Loss (%)	S. E.
6.43	2.48

20b: Losses in minor retail market (dry fish)- season-wise

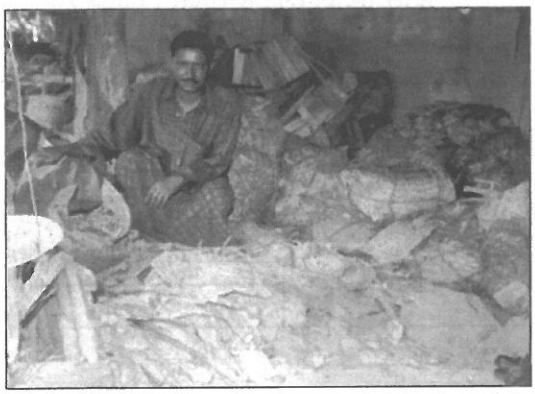
Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	8.54	6.89	4.27
S. E	6.12	4.05	2.96

20c: Losses in minor retail market (dry fish)- analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	5.97	7.85	6.41
S. E.	3.35	7.12	4.20

Physical damage due to improper handling, discard of fish due to lack of demand and low prices are the major reasons for losses at the retail level. The problems for dry fish are similar to that in other channels and are due to spoilage during periods of high humidity and infestation by spoilage organisms and insects.

Besides, in minor retail markets, there are lack of proper storage and icing facilities, which in turn lead to spoilage and discard of fish. Sometimes, fish is taken away by animals in the market area.



Sardines being dumped into a canal behind the market. Low prices and lack of demand lead to loss of this type

Loss in dry fish market. Spoilage due to high humidity and infestation by spoilage organisms and insects

3.3.8.7 Roadside market (fresh fish)

Roadside market reported a loss of 2.35% with percentage standard error of 15.63 in fresh fish. The seasonal losses were 2.70% for pre-monsoon, 3.00% for monsoon and 1.27% for post-monsoon periods. A loss of 2.00% was reported during pre-trawl ban, 2.06% during trawl ban and 3.02% for post-trawl ban periods. The results with standard error are presented in Tables 21a, 21b & 21c.

21a: Loss in roadside market (fresh fish)- pooled

Loss (%)	S. E.
2.35	0.37

21b: Losses in roadside market (fresh fish)- season-wise

Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	2.70	3.00	1.27
S. E.	1.04	0.56	0.34

21c: Losses in roadside market (fresh fish)- analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	2.00	2.06	3.02
S. E.	0.56	0.47	0.67

3.3.8.8 Roadside market (dry fish)

A percentage loss of 5.86 with percentage standard error of 28.89 was reported for dry fish in roadside market (Table 22a). The seasonal losses were 5.19 for pre-monsoon, 6.38 for monsoon and 5.73 for post-monsoon period (Table 22b). The pre-trawl ban loss was 5.28%, trawl ban loss 6.73% and post-trawl ban loss 6.30% (Table 22c).

22a: Loss in roadside market (dry fish)- pooled

Loss (%)	S. E.
5.86	1.69

22b: Losses in roadside market (dry fish)- season-wise

Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	5.19	6.38	5.73
S. E.	2.28	2.85	3.20

22c: Losses in roadside market (dry fish)- analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	5.28	6.73	6.30
S. E.	2.06	4.63	3.30

The volume of fish traded in roadside markets is rather small and as such the losses are also minimal. If fish is left unsold it is usually dried. Loss occurs in case of damaged and spoiled fish. Feeding of animals is observed in these markets also. In the roadside market, losses were observed in oil sardine due to belly bursting and physical damage.

3.3.8.9 Loss at vendor level

In door to door vending of fresh fish, a loss of 9.73% with percentage standard error of 21.76 was reported with seasonal variations of 16.85% during pre-monsoon, 6.05% during monsoon and 8.98% during post monsoon (Tables 23 a & b). The loss in pre-trawl ban period was 13.07%, during trawl ban period 5.43% and during post-trawl ban period 6.86% (Table 23 c).

23a: Loss at vendor level- pooled

Loss (%)	S. E.
9.73	2.12

23b: Losses at vendor level- season-wise

Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	16.85	6.05	8.98
S. E.	8.32	0.68	0.80

Table 23c: Losses at vendor level- analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	13.07	5.43	6.86
S. E.	4.19	1.61	0.36

Women fish vendors sorting trash fish before beginning sale

Loss at the level of vendors occurs due to discard of damaged and discoloured fish. Lack of demand for smaller varieties in some months also results in loss. The fish unsold and that which cannot be used is also thrown away.

3.3.9 Loss at household consumer level

Urban and rural households were observed to study the losses at the consumer level. Households in general are careful in the use of food items, including fish and as such losses are less, major reasons being spoilage due to lack of refrigeration facilities and feeding of pet animals. The details are presented below.

3.3.9.1 Urban household

The consumer level loss at households was 1.93% with percentage standard error of 15.58. A seasonal loss of 1.99% for pre-monsoon, 1.33% for monsoon and 2.65% for post-monsoon period was reported (Tables 24 a & b). With reference to trawl ban, the losses were 2.50%, 1.14% and 1.49% for pre-trawl ban, trawl ban and post-trawl ban respectively (Table 24c).

24a: Loss at household level (urban)- pooled

Loss (%)	S. E.
1.93	0.30

24b: Losses at household level (urban)- season-wise

Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	1.99	1.33	2.65
S. E.	0.59	0.24	0.73

24c: Losses at household level (urban)— analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	2.50	1.14	1.49
S. E.	0.55	0.30	0.33

3.3.9.2 Rural household

Consumer level loss for rural households was 4.95% with percentage standard error of 3.60. A seasonal loss of 5.23%, 4.45% and 5.37% respectively were reported for pre-monsoon, monsoon and post-monsoon seasons (Tables 25a & b). Loss reported during pre-trawl ban period was 5.32%, during trawl ban 3.34% and during post trawl ban 5.20% (Table 25c).

25a: Loss at household level (rural)- pooled

Loss (%)	S. E.
4.95	0.18

25b: Losses at household level (rural)- season-wise

Season	Pre-monsoon	Monsoon	Post-monsoon
Loss (%)	5.23	4.45	5.37
S. E.	0.37	0.26	0.33

25c: Losses at households level (rural)— analysis with respect to trawl ban

Season	Pre-trawl ban	Trawl ban	Post-trawl ban
Loss (%)	5.32	3.34	5.20
S. E.	0.28	0.49	0.23

Fish loss in urban households was higher for pre-trawl ban and post monsoon seasons, whereas, in rural households the loss was high in all the seasons ranging from 3.3 to 5.3 percentage. A household bought small quantities of less priced fish such as oil sardine, mackerel etc. up to 1 kg daily depending upon the number of family members. It is assumed that easy availability of low value fish in the coastal villages and lack of storage facility at household level led to such losses.

CHAPTER IV
SUMMARY & RECOMMENDATIONS

Summary

Losses occur in marine fisheries during different stages from harvest to the consumer level. No scientific study has so far been undertaken to assess these losses. For developing technologies for reduction of losses at various stages, it is necessary to know the extent of losses. The present study is a step in this direction and was undertaken as a mission mode NATP project after identifying the channels for the producer, market and consumer levels. A single stage stratified random sampling was adopted for collection of data on catch and loss on weekly basis. The study was undertaken in Ernakulam district and for the channels that were not available in this district, the data were collected from Calicut and Alappuzha districts. The data were analysed as per the sampling design used and briefly the results obtained are as follows:

Table : Per cent loss in different channels of marine fishery

S.No.	Sector	Loss (%)	S.E.
	PRODUCER		
	I Within craft/gear		
1	Traditional	4.13	0.39
2	Motorised	3.61	0.36
3	Mechanised	14.48	0.75
4	Larger trawlers	21.41	1.48
	II After unloading from craft/gear		
1	Traditional	4.30	0.25
2	Motorised	5.16	0.37
3	Mechanised	0.41	0.03
4	Larger vessels	0.18	0.04
	MARKET		
1	Pre-processing (fresh fish)	0.26	0.07
2	Pre-processing (frozen fish)	0.14	0.02
3	Processing (fresh)	0.15	0.03
4	Processing (frozen)	0.03	0.02
5	Wholesale market (fresh)	2.17	0.55
6	Wholesale market (dry)	8.28	2.86
7	Major retail market (fresh)	0.16	0.06
8	Major retail market (dry)	2.40	1.36
9	Minor retail market (fresh)	1.89	0.26

10	Minor retail market (dry)	6.43	2.48
11	Roadside market (fresh)	2.35	0.37
12	Roadside market (dry)	5.86	1.69
13	*Drying unit at Alappuzha	58.07	13.32
14	*Drying unit at Calicut	19.36	21.23
15	Vendors	9.73	2.12
	CONSUMER		
1	Household (Urban)	1.93	0.30
2	Household (Rural)	4.95	0.18

* Values are found varying very much between the two centres

Recommendations

In the light of the findings of the study the following recommendations are made:

- Sector specific modifications of responsible fishing methods & creation of awareness among stake holders
- Monitoring and evaluation of fishermen's own innovations in craft & gear
- Regulation of mesh size to avoid capture of juveniles & conversion into livestock feed
- Provision of infrastructural facilities to avoid discard of low value species
- Designing fuel efficient fishing vessels with increased fish hold capacity and better facility for on-board semi-processing
- Intensification of training and awareness on hygiene and sanitation in fish handling & improved handling practices at all levels
- Equipping the markets with modern facilities
- Discouraging sale of fish in open market
- Popularisation of ready-to-prepare & ready-to-cook products
- Popularisation of technologies for waste utilisation

For action on the above recommendations R&D institutions can play a role in development of technologies and implementation of training and awareness programmes. Government agencies may take up development of infrastructure, formulation of policies and implementation of regulatory measures.

REFERENCES

1. FAO (1981) Prevention of losses in cured fish. Fisheries Technical Paper No. 219, Rome: Food and Agricultural Organisation of the United Nations, FAO, 2003
2. Szabo, A.(1982). Preventing post-harvest losses of dried fish: A proposal. KIDMA No-26 pp.17-20
3. IDRC (1985) Fish Processing – India, Final report, CIFT, Cochin, India.
4. Wood, C. D. (1986) Methodology for the assessment of losses in cured fish and the evaluation of counter measures, In: Fish processing in Africa, Proceeding of the expert consultation on Fish Technology in Africa, Lusaka, Zambia, 21-25 Jan. FAO Fisheries Report 329.
5. Morrissery, M.T. (Ed.) (1988) Post harvest fishery losses, Proceedings of International workshop held at the University of Rhode Island. Kingston, Rhode Island: ICMRD.
6. Clucas, I.J.; Poulter, R.G; Caygill, J.C.(1989). Post-harvest losses of fish in West Africa. Proceedings of FAO expert consultation on fish technology in Africa fao-1989-no-400 pp273-279
7. Mengistu, T.(1993) Fish handling and processing in Ethiopia , Fisheries-Development-Planning-And-Resources-Management. Ethiopia.-Proceedings-Of-The-National-Seminar-On-Fisheries-Policy-And-Strategy.-22-25-June-1993,. FAO-Technical-Coop.-Programme,-Rome-Italy ROME-ITALY FAO 1993 pp. 111-116
8. Adams, D.J.(1995). Bycatch and the IFQ system in Alaska: A fisherman's perspective Proceedings-Of-The-Solving-Bycatch-Workshop, -September-25-27,-1995,-Seattle,-Washington. Wray,-T.-Ed. Fairbanks,-Ak-Usa Alaska-Sea-Grant-College-Program 1996 pp. 211-218
9. Hodari-Okae, M.A.; Plahar, W.A.; Annan, N.T. (1996) Post-harvest management and spoilage of tropical shrimps (Penaeus notialis). Report-and-proceedings-of-the-sixth-FAO-Expert-Consultation-on-Fish-Technology-in-Africa-Kisumu,-Kenya,-27-30-August-1996-Rapport-et-contributions-de-la-sixieme-Consultation-d'-experts-FAO-sur-la-technologie-du-poisson-en-Afrique-Kisumu,-Kenya,-27-30-aout-1996 Teutscher, -F.(ed.) 1998 no. 574, pp. 38-44
10. Mndeme, Y.E.S. (1996) Post harvest fish losses in Tanzania: A case study of Lake Victoria and Mafia Island fisheries. Report-and-proceedings-of-the-sixth-FAO-Expert-Consultation-on-Fish-Technology-in-Africa-Kisumu,-Kenya,-27-30-August-1996, Teutscher,-F.-(ed.) 1998 no. 574, pp. 254-260
11. Ndem, M.A.; Akande, G.R. (1996) Post harvest handling and marketing of smoked 'sawa' Sardinella maderensis in Lagos State, Nigeria . Report and proceedings of the sixth FAO expert consultation on fish technology - no 574
12. Ward, A.R., Papadopulos, V. Khasim, D.I., and Damle, S.P. (1996) Report on a survey of fresh fish marketing between Visakhapatnam and Madras and a workshop on rapid rural appraisal techniques, Central Institute of Fisheries Technology, Cochin, India and Natural Resources Institute, Chatham, UK.

13. Ward, A. (1996) .Quantification of post harvest fish losses. Overview document. Programme-Rep-Post-Harvest-Fish-Res-Programme London-UK Overseas-Development-Administration-ODA 1997 no. 1, 21pp

14. Ward A. R., Jeffries, T. J.(2000). A manual for assessing post harvest fisheries losses, Natural Resources Institute.

15. Ward, A.R.& D.J.Jeffries (2000). A Manuel for assessing post-harvest fisheries losses. pp. no.1- 516,20,71,87,101,10p.

ANNEXURE I: PROFILE OF TRADITIONAL FISH LANDING CENTRES

Sl No		1	2	3	4
1.	Landing Centre	Fort cochin	Puthenthode	Ambalakkadavu	Chappakadappuram
2.	Panchayat	Cochin corporation	Chellanam	Elankunnappuzha	Malippuram
3.	District	Ernakulam	Ernakulam	Ernakulam	Ernakulam
4.	State	Kerala	Kerala	Kerala	Kerala
5.	Landing area (Platform/Beach)	Beach	Beach	Platform	Beach
6.	Type of platform	Beach	Beach	Concrete	Beach
7.	Length of jetty	200 m	100m	200 m	215 m
8.	Type of shelter/shade	No shelter	No shelter	No shelter	No shelter
9.	No. of Auction platforms/area	1 no	No,Plastic sheets are used	3 Concreted platforms	No
10.	Work area for net mending/packing	5000 m^2	100m	200m	150 m
11.	Packing area.[m2]	5000m^2	No	No	No
12.	Office facility	No	No	No	No
13.	Availability of potable water	Yes	No	No	No
14.	Availability of drainage	No	No	No	No
15.	Cleaning schedule	No	No	No	No
16.	Proper facility for waste disposal.	No	No	No	No
17.	Availability of medical facility	Available in 1 km distance	Private hospital. $\frac{1}{2}$ km away	Govt.Hospital Near by	Govt.Hospital Near by
18.	Fuel pumps	Available in $\frac{1}{2}$ km distance	No	Yes	Yes
19.	Communication facility	Yes	No	Yes	Yes
20.	Number of ice plants Availability of ice	Available in $\frac{1}{2}$ km distance	Available in $\frac{1}{2}$ km distance	Available in 2 km distance	Available in 2 km distance
21.	Quantity of ice needed	50 blocks	Adequate	Adequate	Adequate
22.	Power supply	Yes	No	No	yes
23	Storage Facility	No	No	No	No

ANNEXURE I: PROFILE OF TRADITIONAL FISH LANDING CENTRES contd.

Sl No		1	2	3	4
24.	No. of boats landed /day and type of nets used	350 (Choodavala, Tangu vala Neetuvala, Ring seine)	26	40 (Neetuvala, Ring scine)	45
	Murivallam	25(Fibre)	22	30	22
	Traditional	200	4	10	
	Inboard				23
	Hook and line				
	Others specify	125			
25.	No. of active fishermen	600	100	160	120
26.	Working time	5 am to 7 pm	7am-9.30 am	7 am-9.30 am	4 am-7 am
27.	Weekly holiday	Sunday	Sunday	No	Sunday
28.	No. of boat owners.		26	30	25
29.	No of agents	6	1	3	4
30.	No. of helpers	90	Nil	3	10
31.	No of vendors [head load/small cycle vendors	150+50	15	45	16
32.	Transport facility				
	a) No. of trucks operating/ day	1 (lorry)			
	b) No. of mini vans/day	10			4
	c). No. of two wheelers/day	200	4	5	12
	d) No. of autorikshas	25		3	5
	e) Cycles	25	8	8	10
	f) Head loaders	10	3	6	10-15
33.	Availability of pucca road	Yes	Yes	Yes	No

ANNEXURE II: PROFILE OF FISHING HARBOURS- LANDING CENTRES FOR MECHANISED CRAFT

Sl No		1	2
1.	Landing Centre	Munambam fishing Harbour	Cochin Fisheries Harbour
2.	Panchayat	Pallippuram	Cochin Corporation
3.	District	Ernakulam	Ernakulam
4.	State	Kerala	Kerala
5.	Landing area Platform/Beach	Platform	Platform
6.	Type of platform	Concreted	Concreted
7.	Length of jetty	440m	330m
8.	Type of shelter/shade	Asbestos roof with bird proof	Asbestos roof
9.	No. of Auction platforms/area	2595m^2	2 platforms, 5027 sq.m
10.	Work area for net mending/packing	No special area, free part auction platform itself is used for net mending	1 asbatose roffed shed with a lawn area of 3046 sq. m including north platform
11.	Packing area.[m^2]	No special area, free part auction platform itself is used for packing	Both platforms are being used .
12.	Office facility.	Yes	Yes
13.	Availability of potable water	Yes	Yes
14.	Availability of drainage	Yes	Yes
15.	Cleaning schedule.	Twice daily (After each landing)	One time during 10 am to 12 pm
16.	Proper facility for waste disposal.	Yes	Yes
17.	Availability of medical facility.	No attached medical facility, available in 2km distance	No attached medical facility, available.
18.	Fuel pumps.	No attached fuel pump, available in ½ km distance	Two fuel pump, available in Cochin fishries harbour
19.	Communication facility.	Available in ½ km distance	Available .
20.	Number of ice plants	10 in 1km distance	7 plants are available in the nearby area.
21.	Availability of ice.	Yes	Yes
22.	Quantity of ice needed		
23.	Power supply.	Yes	Yes
	Storage Facility	No storage facility	No storage facility
24.	No. of boats landed /day and type of nets used		2147 (Total No.of boats operating from the harbour)
25.	PN	3	40

ANNEXURE II: PROFILE OF FISHING HARBOURS- LANDING CENTRES FOR MECHANISED CRAFT contd.

Sl No		1	2
26.	GN	42	250
27.	Small TN	41	
28.	Large TN		1045
29.	Hook and line		300
30.	Others specify	10	512
31.	No. of active fishermen		
32.	Working time	24hrs	24hrs
33.	Weekly holiday	Sunday	Sunday
34.	No. of boat owners.		50
35.	No of agents	40	102
36.	No. of helpers		2000
37.	No of vendors [head load/small cycle vendors		60
38.	Transport facility	yes	yes
	a) No. of trucks operating/ day	7	50
	b) No. of mini vans/day	150	200
	c). No. of two wheelers/day	125	150
	d). Availability of pucca road	Yes	Yes

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS

S. no		1	2	3	4	5	6
1	Name of Pre-processing Centre	N. K.. Raju	C. K. Sadanandan	Grace Marine foods	P. O. Devassy	Bell sea foods	National sea foods
2	Location	Malippuram	Njarakkal	Njarakkal	Elamkunnappuzha	Thoppumpady	Karuvelippady,
3	District	Ernakulam	Ernakulam	Ernakulam	Ernakulam	Ernakulam	Ernakulam
4	State	Kerala	Kerala	Kerala	Kerala	Kerala	Kerala
5	Registration No.	Unreg	Unreg	Unreg	Unreg	Regd	Regd. 586
6	Ownership Pattern (Shared/Full Ownership)	Fully	Fully	Fully	Fully	Fully	Fully
7	Roof (cemented, Concreted, thatched)	Concreted	Asbestos	Concreted	Concreted & tiled	Concreted	Concreted
8	Floor -(cemented, Concreted, thatched)	Cemented	Cemented	Cemented	Cemented	Marble	Marbles
9	No. of workers	40 f+ 5 m	10 f + 1 m	38 f + 6 m	15 f + 2 m	12 f + 19 m	140 f + 10 m
10	No. of working tables	2	1	4			
11	Availability of utensils	Yes, plastic trays &boxes	Yes, plastic trays & boxes	Yes plastic trays & boxes	Yes, plastic trays & boxes	Yes, plastic trays & boxes	Yes, plastic trays & boxes
12	Availability of moving space	Yes, 650 sq feet	Yes, 600 sq feet	Yes, 100 sq feet	Yes, 600 sq feet	Yes	Yes, 5000 sq feet
13	Infrastructure						
	i. Availability of potable water	Yes, tanker lorry	Yes, tanker lorry	Yes, tanker lorry	Yes, tanker lorry	Yes, water supply	Yes, water supply
	ii. Source of water	Bore well	Bore well	Bore well	Bore well	water supply	water supply
	iii. Availability of ice	Yes	Yes	Yes	Yes	Yes	yes
	iv. Source of ice	3 km	1 km	2 km	1 km	own flake ice plant	own ice flake machine
	v. Supply system	Yes	Yes	Yes	Yes	Yes	Yes
	vi. Communication	Yes	Yes	Yes	Yes	Yes	Yes
	vii. Approach road	Yes, monsoon season is difficult		Yes	Yes	Yes	Yes
	viii. Availability of Medical Aid	Yes, 2km	Yes, 2 km	Yes, 2 km	Yes, 2 km	Yes	Yes, 1km
14	Storage Facilities						
15	Type of storage						

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS Contd.

S. no		1	2	3	4	5	6
	i) Public storage (Cold)						
	(ii) Private storage(Cold)					Own cold storage	Own cold storage, freezer & chill room
	(iii) Storage sheds (Modern)						
	(iv) Storage sheds (Traditional)	Own tank with ice	Own tank with ice	Own tank with ice	Own tank with ice		
16	Capacity	1500 kg	400 kg	4000 kg	1500 kg	10000 kg	18000 kg
17	Duration of storage	2 days	1 days	1 week	1 week	3 weeks	1 week
18	Sanitation facility						
	i. Cleaning schedule	Daily after each shift	Daily after each shift	Daily after each shift	Daily after each shift	Daily twice or after each shift	Daily after each shift
	ii. Availability of potable water	Yes	Yes	Yes	Yes	Yes	Yes
	iii. Availability of proper drainage	Yes	Yes	Yes	Yes	Yes	Yes
	iv. Proper facility for waste disposal	Yes	Yes	Yes	Yes	Yes, contract cleaning for by-product manufacturing	Yes, contract cleaning for by-product manufacturing
	v. Proper sanitation	Yes	Yes	Yes	Yes	Yes	Yes
19	Operation Details						
	i. No of workers	43	11	44	18	31	150
	Male	3	1	6	3	19	10
	Female	40	10	38	15	12	140
	ii. Skilled workers						
	iii. Trained workers						

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS Contd.

S. no		1	2	3	4	5	6
20	Source of supply						
	Source of commodity (Centre) & Season	Munambam, Kalamukku, Cochin harbours	Munambam, Kalamukku, Cochin harbours	Munambam, Kalamukku, Cochin harbours	Munambam, Kalamukku, Cochin harbours	Cochin, Kanyakumari, Tamil Nadu, Andhra Pradesh, Kollam, Munambam, Nagapatnam	Cochin, Kollam, Munambam, Neendakara, Andhra Pradesh, Madras, Mangalapuram, Nagapatnam
	Fresh	Prawns	Prawns	Prawns, Squid, Cuttle fish	Prawns	Shrimp, Squid, Scampi, Cuttle Fish, Rohu, Ribbon fish, Octopus	Prawns, Cuttle fish
	Frozen						Squid, Octopus, Cuttle Fish, Scampi
	Dried						
	Any other						
	Main destination	Abad caps, Fort cochin					Own Processing centre
21	Mode of transport						
	i. Lorries/ container/truck					Container	Container/truck
	ii. Mini vans	Yes	Yes	Yes		insulated mini van	Yes
	iii. Two wheelers						
	Iv Vendors/Head loaders						
	v. Auto Rickshaws		Yes	Yes	Yes		
22	Packaging						
	i. Bulk with ice	Yes	Yes	Yes	Yes		Yes
	ii. Baskets without insulation						
	iii. Basket with insulation					Yes	Yes
	iv. Insulation materials						
23	Any other relevant details						

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		7	8	9	10	11	12	13
1	Name of Pre-processing Centre	Geo Sea Foods	Ameena enterprises	Star fish exports	N. R. H.	Integrated Rubian	Bhatson Aquatic Products	O. P. Ali
2	Location	Thoppumpady	Chandiroor	Edacochin	Chandiroor	Aroor	Aroor	Chandiroor
3	District	Ernakulam	Alappuzha	Ernakulam	Alappuzha	Alappuzha	Ernakulam	Ernakulam
4	State	Kerala	Kerala	Kerala	Kerala	Kerala	Kerala	Kerala
5	Registration No.	Regd, 536	Regd, 680	Unreg	Unreg	Regd., 616	Regd, 701	Regd.
6	Ownership Pattern (Shared/Full Ownership)	Fully	Fully	Fully	fully, rented	Fully	Fully	Fully
7	Roof (cemented, Concreted, thatched)	Concreted	Concreted	Concreted	Asbestos	Concreted	Concreted	Asbestos
8	Floor -(cemented, Concreted, thatched)	marbles	Concreted	Concreted	Cemented	tiled	tiled	Cemented
9	No. of workers	320 f + 30 m	30 f + 10 m	60 f + 8 m	65 f + 7 m	45 f + 15 m	68 f + 8 m	60 f + 8 m
10	No. of working tables		6	15	3	20	36	2
11	Availability of utensils	Yes, plastic trays & boxes	Yes	Yes, plastic trays &boxes	Yes, plastic trays &boxes, steel basins	Yes, plastic trays &boxes	Yes, plastic trays &boxes	Yes, plastic trays &boxes
12	Availability of moving space	Yes	Yes	Yes	Yes, 2000 sq. feet	Yes, 2000 sq. feet	Yes, 3000 sq. feet	Yes
13	Infrastructure							
	i. Availability of potable water	water supply	Borewell	Bore well	Bore well	Bore well	Bore well	Bore well
	ii. Source of water	Bore well	Borewell	Bore well	Bore well	Bore well	Bore well	Bore well

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		7	8	9	10	11	12	13
	iii. Availability of ice	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	iv. Source of ice	Own ice flake machine	Own ice plant	1 km	1 km	Own ice plant	Own ice plant	.5 km
	v. Supply system	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	vi. Communication	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	vii. Approach road	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	viii. Availability of medical aid	Yes 1 km	Yes	Yes, 2km	Yes, 1 km	Yes, 1 km	Yes, 1 km	Yes
14	Storage Facilities							
15	Type of storage							
	i) Public storage (Cold)							
	(ii) Private storage (Cold)	Own cold storage	Own cold storage	Own cold storage	Own storage, ice & store	Own cold storage & chill room	Own cold storage & chill room	
	(iii) Storage sheds (Modern)							
	(iv) Storage sheds (Traditional)		Yes					Yes
16	Capacity	20000 kg	14000 kg	4000 kg	3000 kg	10000 kg	225000 kg	3000 kg
17	Duration of storage	3 weeks	2 months	2 weeks	2 days	1 month	1 month	2 days
18	Sanitation facility							
	i. Cleaning schedule	Daily after each shift, whenever necessary	Daily after each shift, whenever necessary	Daily after each shift	Daily after each shift	daily on each shift	daily on each shift	daily on each shift

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		7	8	9	10	11	12	13
	ii. Availability of potable water	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	iii. Availability of proper drainage	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	iv. Proper facility for waste disposal	Yes, contract cleaning for by-product manufacturing	Yes, contract cleaning for by-product manufacturing	Yes	Yes, contract cleaning	Yes, contract cleaning for by-product manufacturing	Yes, contract cleaning for by-product manufacturing	Yes, contract cleaning for by-product manufacturing
	v. Proper sanitation	Yes	Yes	Yes	Yes	Yes	Yes	Yes
19	Operation Details							
	i. No of workers	350	40	68	72	60	76	68
	Male	30	10	8	7	15	8	8
	Female	320	30	60	65	45	68	60
	ii. Skilled workers							61
	iii. Trained workers							7
20	Source of supply Source of commodity (Centre)& Season	Cochin, Kollam, Tamil Nadu, Andhra Pradesh	Kollam, Ambalappuzha, Cochin, Chennai, Calicut, Malappauram	Mallipatnam, Andhra Pradesh, Chennai	Cochin, Munambam, Kollam, Mangalapuram, Chennai	Kalamukku, Munambam, Kollam, Mangalaporam, Andhra Pradesh, Neendakara, Mandapam, Quilandy, Tamil Nadu	Kollam, Quilandy, Mangalapuram, Andhra Pradesh, Munambam, Kanyakumari	Mangalapuram, Andhra pradesh
	Fresh				Prawns			Prawns
	Frozen	Prawns, Squid, Cuttle fish,	Prawns	Prawns, Cuttle fish,	Prawns	Scampi, Prawns, Octopus,	Octopus, Squid, Cuttle fish, Scampi, Prawns	

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		7	8	9	10	11	12	13
		Octopus, Reef code, Ribbon fish		Crab, Squid, Octopus		Crab, Squid, Cuttle fish		
	Dried							
	Any other							
	Main destination					own processing centre		
21	Mode of transport							
	i. Lorries/ container/truck	Container	Container			Container	Container	Truck
	ii. Mini vans	Insulated mini van	Yes	Insulated mini van	Insulated mini van	Insulated mini van	Insulated mini van	Yes
	iii. Two wheelers							
	iv Vendors/Head loaders							
	v. Auto Rickshaws							yes
22	Packaging							
	i. Bulk with ice							
	ii. Baskets without insulation			Yes	Yes	Yes	Yes	Yes
	iii.Basket with insulation	Yes	yes	yes		yes	yes	
	Iv Insulation materials							
23	Any other relevant details							

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		14	15	16	17	18	19	20	21
1	Name of Pre-processing Centre	Sabna sea foods	Mukundan	Josy panakkal	Camio sea foods	M.S. Enterprises	N.M.S	Maria Enterprises	R.L.E
2	Location	Edacochin	Edacochin	Pallippuram	Munambam	Aroor	Ezhupunna	Edacochin	Chandiroor
3	District	Ernakulam	Ernakulam	Ernakulam	Ernakulam	Alappuzha	Ernakulam	Ernakulam	Alappuzha
4	State	Kerala	Kerala	Kerala	Kerala	Kerala	Kerala	Kerala	Kerala
5	Registration No.	Unreg	Unreg	Unreg	Unreg	Regd	Regd, 445	Unreg	Regd.
6	Ownership Pattern (Shared/ Full Ownership)	Fully	Fully	Share	Fully	Fully	Fully	Fully	Fully
7	Roof (cemented, Concreted, thatched)	Concreted	Concreted	Tiled	Aluminium sheet	Concreted	Tiled	Asbestos	Asbestos
8	Floor -(Cemented, Concreted, Thatched)	Cemented	Cemented	Cemented	Cemented	Cemented	Cemented	Cemented	Cemented
9	No. of workers	30 f+ 5 m	25 f + 1 m	30 f + 3 m	45 f + 5 m	51 f+ 2 m	77f + 4 m	30 f + 4 m	114 f + 6 m
10	No. of working tables	10	3	1	1	4	2	4	3
11	Availability of utensils	Yes, Plastic trays &boxes	Yes, Plastic trays &boxes	Yes, Plastic trays &boxes	Yes, Plastic trays &boxes	Yes, Plastic trays &boxes, steel basins	Yes, Plastic trays &boxes, steel basins	Yes, Plastic trays & boxes	Yes, Plastic trays & boxes
12	Availability of moving space	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13	Infrastructure								
	i. Availability of potable water	Bore well	Bore well	Yes, tap water	Yes, tap water	Yes, tap water stored in can	Yes, well	Water supply	Municipal water supply
	ii. Source of water	Bore well	Bore well	Yes, bore well	Yes, bore well	Bore well	Well	Bore well	Bore well
	iii. Availability of ice	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		14	15	16	17	18	19	20	21
	iv. Source of ice	.5 km	.5 km	1 km	1 km	2 km	3 km	1 km	1 km
	v. Supply system	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	vi. Communication	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	vii. Approach road	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	viii. Availability of Medical Aid	Yes, 1km	Yes , 1 km	Yes	Yes, 1 km	Yes 1 km	Yes, 2 km	Yes	Yes 1 km
14	Storage Facilities								
15	Type of storage		No storage facility					No storage facility	No storage facility
	i) Public storage (Cold)								
	(ii) Private storage (Cold)						stored in square with ice		
	(iii) Storage sheds (Modern)					stored in square with ice			
	(iv) Storage sheds (Traditional)	stored with ice in square		Yes	Yes	Yes	Yes	Yes	Yes
16	Capacity	4000 kg		5000 kg	5000 kg		6000 kg		
17	Duration of storage	2 days		1 day	1 day	1 day	2 days		
18	Sanitation facility								
	i. Cleaning schedule	daily on each shift	daily on each shift	daily on each shift	daily on each shift	daily on each shift	daily on each shift	Twice daily	daily on each shift
	ii. Availability of potable water	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	iii. Availability of proper drainage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	iv. Proper facility for waste disposal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	v. Proper sanitation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		14	15	16	17	18	19	20	21
19	Operation Details								
	i. No of workers	35	26	33	50	86	84	34	120
	Male	5	1	3	5	21	4	4	6
	Female	30	25	30	45	65	80	30	114
	ii. Skilled workers								
	iii. Trained workers								
20	Source of supply								
	Source of commodity (Centre) & Season	Munambam, Mangalapuram	Nearest processing centre, Opasana	Munambam	Munambam	Mallipattanam, Kottapatanam, Nagapattanam, Mangalapuram, Cochin	Nagapatnam	Mangalapuram, Kollam	Madras, Kollam, Cherthala
	Fresh			Prawns & fishes				Cuttle fish, Squid	
	Frozen	Squid, Octopus	Squid		Prawns, Cuttle fish	Prawns	Prawns		Prawns
	Dried								
	Any other								
	Main destination			Karnataka	Abad caps, Malipuram	Export units in Cochin	Processing centres , Ezhupunna, Aroor	Precessing centres, Aroor	Processing centres in Alappuzha and Cochin
21	Mode of transport								
	i. Lorries/ container/truck	Lorry						Lorry	Lorry
	ii. Mini vans		Yes	Insulated mini van	Yes	Yes	Insulated mini van	Yes	Yes
	iii. Two wheelers								

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		14	15	16	17	18	19	20	21
	iv Vendors/Head loaders								
	v. Auto Rickshaws						Yes		Yes
22	Packaging								
	i. Bulk with ice	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ii. Baskets without insulation								
	iii.Basket with insulation					Yes			
	iv. Insulation materials								
23	Any other relevant details								

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		22	23	24	25	26
1	Name of Pre-processing Centre	Suttu marine	Sapna marine	Kunjumoideen shed	A.J.N	Mampilly (C.M.Kunjappan)
2	Location	Chandiroor	Edacochin	Eramalloor	Eramalloor	Njarakkal
3	District	Alappuzha	Ernakulam	Alappuzha	Alappuzha	Ernakulam
4	State	Kerala	Kerala	Kerala	Kerala	Kerala
5	Registration No.	Regd	Unreg	Regd.	Regd	Unreg
6	Ownership Pattern (Shared/Full Ownership)	Fully	Fully	Fully	Shared	Fully
7	Roof (Cemented, Concreted, Thatched)	Asbestos	Tiled	Asbestos	Asbestos	Asbestose
8	Floor (Cemented, Concreted, Thatched)	Cemented & portion concreted	Cemented	Cemented	Cemented	Cemented
9	No. of workers	187 f + 8 m	45 f+ 6 m	55 f + 5 m	50 f + 6 m	60 f + 8 m
10	No. of working tables	2		4	1	2
11	Availability of utensils	Yes, plastic trays &boxes	Yes, plastic trays &boxes	Yes, plastic trays &boxes	Yes, plastic trays &boxes	Yes, plastic trays &boxes
12	Availability of moving space	Yes	Yes	Yes	Yes	Yes
13	Infrastructure		Yes			
	i. Availability of potable water	Municipal water supply & well	Corporation water supply	Municipal water supply	Bore well	Tanker lorry
	ii. Source of water	Bore well	Bore well	Bore well	Bore well	Bore well
	iii. Availability of ice	Yes	Yes	Yes	Yes	Yes
	iv. Source of ice	1 km	1 km	1 km	.5 km	1 km
	v. Supply system	Yes	Yes	Yes	Yes	Yes
	vi. Communication	Yes	Yes	Yes	Yes	Yes
	vii. Approach road	Yes	Yes	Yes	Yes	Yes
	viii. Availability of Medical Aid	Yes 1 km	Yes	Yes 1 km	Yes 1 km	Yes 2 km

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		22	23	24	25	26
14	Storage Facilities					
15	Type of storage	No storage facility	No storage facility	No storage facility		
	i) Public storage (Cold)					
	(ii) Private storage(Cold)					
	(iii) Storage sheds (Modern)					
	(iv) Storage sheds (Traditional)				Yes	Own tank with ice
16	Capacity				3000 kg	4000 kg
17	Duration of storage				2 days	2 days
18	Sanitation facility					
	i. Cleaning schedule	Daily on each shift	Daily on each shift	Daily on each shift		Daily on each shift
	ii. Availability of potable water	Yes	Yes	Yes	Yes	Yes
	iii. Availability of proper drainage	Yes	Yes	Yes	Yes	Yes
	iv. Proper facility for waste disposal	Yes	Yes	Yes	Yes, contract cleaning	Yes
	v. Proper sanitation	Yes	Yes	Yes	Yes	Yes
19	Operation Details					
	i. No of workers	195	51	60	56	68
	Male	8	6	5	6	8
	Female	187	45	55	50	60
	ii. Skilled workers				50	
	iii. Trained workers				6	
20	Source of supply					
	Source of commodity (Centre) & Season	Mangalapuram, Madras, Ernakulam, Kollam	Cochin, Mangalapuram	Kollam, Madras, Alappuzha, Cherthala	Nagapatnam	Kalamukku. Munambam, Cochin
	Fresh			Prawns		
	Frozen	Prawns, Cuttle fish	Prawns		Prawns	Prawns

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		22	23	24	25	26
	Dried					
	Any other					
	Main destination	Processing centres in Alappuzha and Cochin	Processing centres in Alappuzha and Cochin	Processing centres in Alappuzha and cochin	Choice group of exporting	
21	Mode of transport					
	i. Lorries/ container/truck		Container	Lorry	Lorry	
	ii. Mini vans	Insulated mini van	Yes	Yes	Yes	Yes
	iii. Two wheelers					
	Iv Vendors/Head loaders					
	v. Auto Rickshaws				Yes	Yes
22	Packaging					
	i. Bulk with ice	Yes	Yes	Yes	Yes	Yes
	ii. Baskets without insulation					
	iii.Basket with insulation					
	Iv Insulation materials					
23	Any other relevant details					

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		27	28	29	30
1	Name of Pre-processing Centre	Dalvin (Haridas)	PAL (Cochin frozen foods)	SKF (ideal marine)	Fatima (Shahida) marine
2	Location	Elamkunnappuzha	Edacochin	Chandiroor	Edacochin
3	District	Ernakulam	Ernakulam	Alappuzha	Ernakulam
4	State	Kerala	Kerala	Kerala	Kerala
5	Registration No.	Unreg	Regd	Unreg	Regd
6	Ownership Pattern (Shared/Full Ownership)	Fully	Fully	Fully	Fully
7	Roof (Cemented, Concreted, Thatched)	Asbestose	Concreted	Concreted	Asbestose
8	Floor (Cemented, Concreted, Thatched)	Cemented	Marble	Cemented	Cemented
9	No. of workers	10 f + 1 m	68 f + 14 m	50 f + 4 m	45 f + 3 m
10	No. of working tables	1			2
11	Availability of utensils	Yes, plastic trays & boxes	Yes, plastic trays & boxes	Yes, plastic trays & boxes	Yes, plastic trays &boxes & steel basins
12	Availability of moving space	Yes	Yes 1800 sq. feet	Yes	Yes
13	Infrastructure				
	i. Availability of potable water	Tanker lorry	Corporation water supply	Private agency supply	Well
	ii. Source of water	Bore well	Bore well	Bore well	Well
	iii. Availability of ice	Yes	Yes	Yes	Yes
	iv. Source of ice	1 km	1 km	1 km	3.5 km
	v. Supply system	Yes	Yes	Yes	Yes
	vi. Communication	Yes	Yes	Yes	Yes
	vii. Approach road	Yes	Yes	Yes	Yes
	viii. Availability of Medical Aid	Yes	Yes	Yes	Yes, 3.5 km
14	Storage Facilities				
15	Type of storage				

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		27	28	29	30
	i) Public storage (Cold)				
	(ii) Private storage(Cold)		Yes		
	(iii) Storage sheds (Modern)				
	(iv) Storage sheds (Traditional)	Own tank with ice		Own tank with ice	Own tank with ice
16	Capacity	500 kg	6000 kg	2000kg	3000 kg
17	Duration of storage	1 day	1 week	1 week	2 days
18	Sanitation facility				
	i. Cleaning schedule	Daily on each shift	Daily on each shift	Daily on each shift	Daily on each shift
	ii. Availability of potable water	Yes	Yes	Yes	Yes
	iii. Availability of proper drainage	Yes	Yes	Yes	Yes
	iv. Proper facility for waste disposal	Yes	Contract cleaning	Yes	Yes
	v. Proper sanitation	Yes	Yes	Yes	Yes
19	Operation Details				
	i. No of workers	11	82	54	74
	Male	1	14	4	4
	Female	10	68	50	70
	ii. Skilled workers				
	iii. Trained workers				
20	Source of supply				
	Source of commodity (Centre) & Season	Kalamukku, Munanbam, Cochin	Munambam, Cochin, Kollam, Calicut, Kannur, Alappuzha	Nagapatnam, Mallipatnam, Madras, Andhra Pradesh, Cochin, Munambam	Nagapattnam
	Fresh				
	Frozen	Prawns	Prawns	Prawns	Prawns
	Dried				

ANNEXURE III: PROFILE OF PRE-PROCESSING UNITS contd.

Sl No.		27	28	29	30
	Any other				
	Main destination		Processing centres in Alappuzha and Cochin		
21	Mode of transport				
	i. Lorry/ Container/Truck		Truck	Truck	
	ii. Mini vans	Yes	Yes	insulated mini van	insulated mini van
	iii. Two wheelers				
	Iv Vendors/Head loaders				
	v. Auto Rickshaws	Yes			yes
22	Packaging				
	i. Bulk with ice	Yes	Yes	Yes	Yes
	ii. Baskets without insulation				
	iii.Basket with insulation			Yes	
	Iv Insulation materials				
23	Any other relevant details				

ANNEXURE IV: PROFILE OF PROCESSING UNITS

Sl No.		1	2	3	4
1.	Name of Processing Centre	Integrated Rubian	Bhatson Aquatic	Abad Caps, Azheekkal	R. FD, Exports
2.	Location	Aroor	Aroor	Vyppin	Chandiroor
3.	District	Alappuzha	Alappuzha	Ernakulam	Alappuzha
4.	State	Kerala	Kerala	Kerala	Keralam
5.	Registration No.	616	701	Regd.	696
6.	Ownership Pattern (Shared/Full Ownership)	Pvt. Ltd. (fully)	Pvt. Ltd. (fully)	Pvt. Ltd. (fully)	Pvt. Ltd. (fully)
7.	E U approved or not	Yes	Yes	Yes	Yes
8.	Attached pre-processing centre	Yes	Yes	Yes	Yes
9.	Roof (Cemented, Concreted, Thatched)	Concrete	Concrete	Concrete + Asbestos	Concrete
10.	Floor (Cemented, Concreted, Thatched)	Concrete+Tiles+Marbles	Concrete+Tiles+Marbles	Concrete+Tiles+Marbles	Cemented
11.	No. of workers	13 f p+45 f pp+7m p + 15 m pp	15 fp + 9f m+68 fpp+ 8mpp(92f+6m)	60f+30m	50f+25m
12.	No. of working tables	4	4	12	10
13.	Availability of utensils	Yes	Yes	Yes	Yes
14.	Availability of moving space	Yes	Yes, 3000 sq. feet	Yes	Yes
15.	Infrastructure				
	Availability of potable water	Borewell	Borewell	Borewell	Tanker lorry supply
	Source of water	Borewell	Borewell	Borewell	Borewell
	Availability of ice	Yes	Yes	Yes	Yes
	Source of ice	Own ice plant	Own ice plant	Own ice plant & ice flake machine	Own ice plant
	Supply system	Yes	Yes	Yes	Yes
	Communication	Yes	Yes	Yes	Yes
	Approach road	Yes	Yes	Yes	Yes
	Availability of Medical Aid	Yes, 1 km	Yes, 1 km	Yes	Yes
16.	Storage Facilities				

ANNEXURE IV: PROFILE OF PROCESSING UNITS contd.

Sl No.		1	2	3	4
17.	Type of storage				
	i) Public storage (Cold)	Own cold storage & chill room	Own cold storage & chill room	Own cold storage & chill room	Own cold storage & chill room
	(ii) Private storage(Cold)				
	(iii) Storage sheds (Modern)				
	(iv) Storage sheds (Traditional)				
18.	Capacity	10000kg	22500 kg	10000 kg	300000 kg(300 ton)
19.	Duration of storage	1 month	1 month	1 month	6 month
20.	Sanitation facility				
	Cleaning schedule	Daily on each shift or whenever necessary	Daily on each shift or whenever necessary	Daily on each shift or whenever necessary	Daily on each shift or whenever necessary
	Availability of proper drainage	Yes	Yes	Yes	Yes
	Proper facility for waste disposal	Yes, contract cleaning for by product manufacturing	Yes, contract cleaning for by product manufacturing	Yes	Yes, land filling
	Proper sanitation	Yes	Yes	Yes	Yes
21.	Operation Details				
	No of workers				
	Male	7	9	30	25
	Female	13	15	60	50
	Skilled workers				
	Trained workers				
22.	Source of supply				
	Source of commodity (Centre) & Season	Kalamukku, Munambam, Mangalapuram, Kollam, Quilandy, Andhra pradesh, Mandapam	Kollam, Quilandy, Mangalapuram, Andhra Pradesh, Munambam, Kanyakumari	Cochin, Munambam, Alappuzha, Kollam, Mangalapuram	Kollam, Ambalappuzha, Cochin, Munambam
	Fresh	Scampi, Prawns, Octopus, Crab, Squid, Cuttle fish	Octopus, Squid, Cuttle fish, Scampi, Prawns	Prawns, Cuttle fish, Squid	Prawns, Cuttle Fish

ANNEXURE IV: PROFILE OF PROCESSING UNITS

Sl No.		1	2	3	4
	Frozen				
	Dried				
	Any other				
	Main destination				
23.	Mode of transport				
	i. Container/Truck	Yes	Yes	Yes	Yes
	ii. Lorries				Yes
	iii. Mini vans	Insulated mini van	Insulated mini van	Insulated mini vans	Yes
	iv. Two wheelers				
	v Vendors/Head loaders				
	vi. Auto Rickshaws				
24.	Packaging				
	i. Bulk with ice	Yes	Yes	Yes	Yes
	ii. Baskets without insulation				
	iii.Basket with insulation	Yes	Yes	Yes	Yes
	iv Insulation materials				
25.	Processing details				
	Processing stage	Freezing	Freezing	Peeling, blanching, Freezing	Freezing
	Material handled	Squid, Cuttle fish, Prawns	Prawns, Cuttle fish, Squid, Octopus	Prawns, Cuttle fish, Squid	Prawns
	Final product	IQF, Block freezed	IQF, Block freezing	IQF, Block freezing	Block
26.	Details of export				
	Product	IQF, Block freezed	IQF, Block freezed	IQF, Block freezed	Block
	Exported to		Europe, China, Korea	Europe, American counties, Arab countries	China
27.	Any other information				

ANNEXURE IV: PROFILE OF PROCESSING UNITS contd.

Sl No.		5	6	7
1.	Name of Processing Centre	Sea pearl Enterprises Pvt. Ltd.	Ameena enterprises, Pvt. Ltd	Torry Harris
2.	Location	Chandiroor	Chandiroor	Ezhupunna
3.	District	Alappuzha	Alappuzha	Alappuzha
4.	State	Kerala	Kerala	Kerala
5.	Registration No.	676	680	683
6.	Ownership Pattern (Shared/Full Ownership)	Pvt. Ltd. (fully)	Pvt. Ltd. (fully)	Pvt. Ltd. (fully)
7.	E.U approved or not	Yes	Yes	Yes
8.	Attached pre-processing centre	Yes	Yes	Yes
9.	Roof (Cemented, Concreted, Thatched)	Concrete	Concrete	Concrete
10.	Floor -(Cemented, Concreted, Thatched)	Concrete	Concrete	Marble (kadappa)
11.	No. of workers	35 f+ 15 m	30 f + 10 m	45 f + 50 m
12.	No. of working tables	10	6	14
13.	Availability of utensils	Yes	Yes	Yes
14.	Availability of moving space	Yes	Yes	Yes, 5000 sq. feet
15.	Infrastructure			
	i. Availability of potable water	Borewell	Nearby well	Borewell
	ii. Source of water	Well	Well	Borewell
	iii. Availability of ice	Yes	Yes	Yes
	iv. Source of ice	Own ice plant	Own ice plant	Own ice plant
	v. Supply system	Yes	Yes	Yes
	vi. Communication	Yes	Yes	Yes
	vii. Approach road	Yes	Yes	Yes
	viii. Availability of Medical Aid	Yes	Yes	Yes
16.	Storage Facilities			
17.	Type of storage			
	i) Public/ private storage (Cold)	Own cold storage &	Own cold storage &	Own cold storage &

ANNEXURE IV: PROFILE OF PROCESSING UNITS contd.

Sl No.		5	6	7
		Chill room	Chill room	Chill room
18.	Capacity	15000 kg	14000kg	20000 kg
19.	Duration of storage	2 month	2 month	1 month
20.	Sanitation facility			
	i. Cleaning schedule	Daily on each shift or whenever necessary	Daily on each shift or whenever necessary	Daily on each shift or whenever necessary
	ii. Availability of proper drainage	Yes	Yes	Yes
	iii. Proper facility for waste disposal	Yes	Yes	Yes, contract cleaning for by product manufacturing
	iv. Proper sanitation	Yes	Yes	Yes
21.	Operation Details			
	No of workers			
	Male	15	10	50
	Female	35	30	45
	Skilled workers			
	Trained workers			
22.	Source of supply			
	Source of commodity (Centre) & Season	Local Pre-processing centres, Kollam, Cochin, Alappuzha, etc.	Ambalappuzha	Kollam, Munambam, Pazhayar, Cochin, Beypur
	Fresh	Prawns	Prawns	Squid, Cuttle fish, Octopus
	Frozen			
	Dried			
	Any other			
	Main destination			
23.	Mode of transport			
	i. Container/Truck	Yes	Yes	Yes
	ii. Lorries	Yes	Yes	

ANNEXURE IV: PROFILE OF PROCESSING UNITS contd.

Sl No.		5	6	7
	iii. Mini vans	Yes	Yes	Insulated mini van
	iv. Two wheelers			
	v. Vendors/Head loaders			
	vi. Auto Rickshaws	Yes	Yes	
24.	Packaging			
	i. Bulk with ice			Yes
	ii. Baskets without insulation			
	iii.Basket with insulation	Yes	Yes	Yes
	iv Insulation materials			
25.	Processing details			
	Processing stage	Freezing	Freezing	Freezing
	Material handled	Prawns	Prawns	Cuttle fish, Squid, Octopus
	Final product	Block	Bock, IQF	IQF, block
26.		Details of export		
	Product	Block	Block	IQF, Block
	Exported to	Europe	Europe	USA, Japan, Spain, Italy
27.	Any other information			

ANNEXURE V: PROFILE OF WHOLESALE MARKETS

S.No		1	2
1.	Name of market	Eranakulam fish market	Champakkara fish market
2.	District	Ernakulam	Ernakulam
3.	Ownership Pattern (Shared/Fully owned	Fully owned by Corporation of Cochin	Fully owned by Corporation of Cochin
4.	Working time		
	FN	7.00-1.00	5.30am-7.00am, 11am-1pm
	AN	4.00-8.00	
5.	Weekly holidays	No Holiday	No Holiday
6.	Infrastructure		
	(i) No. of shops/ area(m2)	150, 10 m2	7, 100 sq. feet
	(ii) Available area in (m^2)	2000 m2	500 x 150 sq feet
	(iii) Type of shelter	Asbestos	3 Tiled, 3 Concreted
	(iv) Washing facility for vehicles	No	No
	(v) Communication	Yes	Yes
	(vi) Approach road	Yes	Yes
	(vii) Availability of medical aid	Yes	Yes (in 1 km distance)
7.	Detailed information on market		
8.	Area in (Sq. m)	2000 (m^2)	500 x 150 sq. feet
9.	No of Vendors	25	25
10.	No of Wholesale agents	10	7
11.	No of Retailers	100	15
12.	No of Auction agents	3	7
13.	Storage		
	Type, Capacity, Duration of storage		
	I) Public storage (cold) II) Private storage (cold) III) Storage sheds (Modern) IV) Storage sheds (traditional) V) Any other	Storage sheds (traditional) 200kg 2days	Private storage (cold) 1500 kg 2 days

ANNEXURE V: PROFILE OF WHOLESALE MARKETS contd.

S.No		1	2
14.	Sanitation facility		
	(a) Availability of proper drainage	Yes	Yes
	(b) Cleaning schedule	Once daily	Twice daily
	(c) Proper facility for waste disposal	Yes	No (limited facility)
	(d) Proper drainage	Yes	Yes
	(e).Proper sanitation	Yes	Yes
	(f). Availability of ice	Adequate	Adequate
	(g). Raised platform	Yes	Yes
15.	Source of supply		
	Source centre	Andhra Pradesh, Hyderabad, Kanyakumari, Parappanangadi, Kozhikode	Munambam, Thoppumpady, kozhikode, Alappuzha, Kollam, Tamil Nadu
	Major verities Fresh	Red Snapper (Chempalli), Pearl spot (Karimeen), Sea bream (Eri), Catla, Milk fish (Poomeen)	
	Frozen	King fish (Moda), Sea bream (Pulli eri), Bridled emperor - bream (Velameen)	
	Dry	Perchelet (Nandan), Anchovy (Kozhuva), Dhoma (Kuttan), Anchovy (Natholi)	
	Salted	Shark, Pony fish (Mullan), Tongue sole (Mantal), White fish (Parava)	
	Destination	Ernakulam, Kaloor, Thevara, Champakkara	Ernakulam, Thevara, Thrippunithura, Perumbavoor, Piravom
16.	Mode of transport		
	I) Containers	1	1
	II) Lorries/ Mini vans	5	15
	IV) Two wheelers	15	60
	V) Vendors/Head loaders	50	100
	VI) Auto rickshaws	20	20
17.	Packaging		
	A) Bulk with ice.	Yes	Yes
	B)Baskets without insulation.	Bamboo baskets	Plastic
	C) Baskets with insulation	Plastic boxes	boxes
	Insulation material	Plastic sheets , one type of big leaf	
18.	Any other relevant details		

ANNEXURE VI: PROFILE OF RETAIL MARKETS contd.

S.No.		1	2	3	4	5
1.	Name of market	Parvoor Angadi	Aluva	Perumbavoor	Piravom	Kaloor
2.	District	Ernakulam	Ernakulam	Ernakulam	Ernakulam	Ernakulam
3.	Ownership Pattern (Shared/Fully owned	Contract	Municipality	Shared	Contract	Corporation of Cochin
4.	Working time					
5.	FN	7.30- 9.30	6.00 –11.00	6.00-7.00	6.00-7.00	7.00-12.00
6.	AN					5-8
7.	Weekly holidays	No holiday	Sunday	No holiday	Sunday	No holiday
8.	Infrastructure					
	(i) No. of shops	No separate shops	10	4+16	15	20
	(ii) Available area in (m^2)	25 x 13 sq feet	100 sq. ft.	200 sq.ft.	1.5 x 2 sq m	200 sq feet
	(iii) Type of shelter	Asbestos	Tiles, concreted & asbestos	Concreted	Asbestos	Asbestos
	(iv) Washing facility for vehicles	Limited	Yes	No	No	No
	(v) Communication	Yes, in ½ km	Yes	Yes	No	Yes, in ½ km
	(vi) Approach road	Yes	Yes	Yes	Yes	Yes
	(vii) Availability of medical aid	Yes, in ½ km	Yes	Yes	Yes, in 2km distance	Yes, in ½ km
9.	Area in (Sq.m)	25x13 sq. m	1 acre	1.25 acre	52 x 8 sq. m	0.25 acre
10.	No of Vendors	55	10	12	18	33
11.	No of Wholesale agents	3	3	1	5	3
12.	No of Retailers	18	100	3	13+20	30
13.	No of Auction agents	0	3	7	0	0
14.	Storage					
	Type I) Public storage (cold)	Private ordinary storage and	In the platform in plastic boxes	Private ordinary storage, in plastic	Private ordinary storage and	Private ordinary storage and traditional storage sheds

ANNEXURE VI: PROFILE OF RETAIL MARKETS contd.

S.No.		1	2	3	4	5
	II) Private storage (cold) III) Storage sheds (Modern) IV) Storage sheds (traditional) V) Any other	traditional storage sheds	with ice	boxes with ice,	traditional storage sheds	
15.	Capacity	500 kg			200 kg	100 kg
16.	Duration of storage	I day	4-8 hours	1 day	1 day	2 days
17.	Sanitation facility					
	(a) Availability of proper drainage	No	Yes, limited	Yes	No	Yes, limited
	(b) Cleaning schedule	Once daily	Daily	Stalls daily, common market area once in a month	Weekly once	Yes, not satisfactory
	(c) Proper facility for waste disposal	No	Yes, limited	Yes	No	No
	(e).Proper sanitation	No	Yes, limited	Yes	No	No
	(f). Availability of ice	No	Yes	Yes	No	Yes
	(g). Raised platform	No	Yes	Yes	No	Yes
18.	Source of supply					
	i. Source centre	Chamapakkara, Orissa, Andhra Pradesh, Cochin	Maharashtra, Tamil nadu, Karnataka, Goa, Andhra Pradesh	Munambam, Champakkara, Kollam, Aluva, Cochin, Vyppin	Champakkara, Vaikom	Ernakulam, Cochin, Champakkara, Thevara, Aroor
19.	Major varieties					
	Fresh	All varieties	Seabream (Eri), Square tail mullet (Kanambu), Caranx (Vatta), Red Snapper (Chempalli), Shark	Mackerel, sardine, Nemipterous (Kilimeen), Milk fish (Poomeen), Catla, Rohu, Sea bream (Eri), Red snapper Chempalli	Brackish water fish	Pearl spot (Karimeen), Catfish (koori), Red snapper (Chempalli), Sea bream (Eri), Catla, Milk fish (Poomeen)
	Frozen		Thirandi (Rays)		All varieties	Mackeral, Sardine, Kolan,

ANNEXURE VI: PROFILE OF RETAIL MARKETS contd.

S.No.		1	2	3	4	5
	Dry		Rays (Thirandi), Malabar reef code (Kalava), Pony fish (Mullan), Shark,Tongue sole (Nanku)	Pony fish (Mullan), Croaker (Pallikora), Black king fish (Kal Varal), Shark, Prawns, Perchlet (Nandan), Anchovy (Kozhuva), Dhoma (Kuttan)	Pony fish (Mullan),	Prawns, Anchovy (Kozhuva) Dhoma (Kuttan)
	Salted	White fish Parava, Mackerel, Pony fish (Mullan)	Sardine, White fish (Parava),Tongue Sole (Nanku), Shark, Rays (Thirandi)	Rays (Thirandi), Shark	Shark, Pony fish (Mullan), glassy Perchlet (Nandan), Anchovy (Manangu), Mackerel, White fish (Parava), Thriad-fin-bream (Kilimeen)	Tongue Sole (Manthal)
20.	Destination	Vaikom, Udayamperoor, Murinjapuzha	Retailers around Aluva	Perumbavoor	Piravom, Koothattukulam, Moovattupuzha, Kothamangalam	Kaloor
21.	Mode of transport					
	I) Trucks				3	
	II) Lorries		7	7		
	III) Mini vans					
	IV) Two wheelers	2		20		2
	V) Vendors/ Head loaders	55		50	20	8
	VI) Auto rickshaws	4		2		4
22.	Packaging					
	A) Bulk with ice. B) Baskets with out insulation. C) Baskets with insulation.	Aluminium vessels and plastic boxes with ice	Boxed ice packing	Plastic boxes with ice	Aluminium vessels with ice	Plastic boxes and bamboo baskets with ice covered with plastic sheet
23.	Insulation material					
24.	Any other relevant details					

ANNEXURE VI: PROFILE OF RETAIL MARKETS contd.

S.NO		6	7	8	9
1.	Name of market	Nayarambalam	Kuzhuppilly	Valappu	Thevara
2.	District	Ernakulam	Ernakulam	Ernakulam	Ernakulam
3.	Ownership Pattern (Shared/Fully owned)	Contract	Shared	Panchayath property	Corporation of cochin
4.	Working time				
5.	FN	6.00 –12.00	7.00 – 11.30	7.00 – 1.00	6.00 – 11.00
6.	AN	3.00 – 7.00	4.30 – 7.00	4.00 – 9.00	4.00 – 8.00
7.	Weekly holidays	No holiday	No holiday	Sunday (forenoon)	Sunday (forenoon)
8.	Infrastructure				
	(i) No. of shops	10	14	7	5
	(ii) Available area in (m^2)	20 cent	17.21 sq. m	100 sq. m	300 sq. m
	(iii) Type of shelter		Tiled	No shelter	Concreted
	(iv) Washing facility for vehicles	Yes	Yes	No	Yes
	(v) Communication	Yes, in ½ km	Yes, in ½ km	Yes	Yes
	(vi) Approach road	Yes	Yes	Yes	Yes
	(vii) Availability of medical aid	Yes, in 1 km	Yes, in 1 km	Yes, in 1 km	Yes, in ½ km
9.	Area in (Sq.m)	20 cent	104 sq. m	100 sq. m	230 sq. m
10.	No of Vendors	15	35	23	15
11.	No of Wholesale agents	3			2
12.	No of Retailers	12		23	3
13.	No of Auction agents	5 * contracto	1	1	2
14.	Storage				
	Type I) Public storage (cold) II) Private storage (cold) III) Storage sheds (Modern) IV) Storage sheds (traditional) V) Any other	Public storage ordinary, provided by Matsyafed	Iced and stored in plastic boxes in the platform	No storage facility, and balance stored by the vendors at their own houses	Private ordinary storage and traditional storage sheds

ANNEXURE VI: PROFILE OF RETAIL MARKETS contd.

S.NO		6	7	8	9
15.	Capacity	200 kg		50 kg	300 kg fresh + 100 kg dry
16.	Duration of storage	1 day		1 day	3 day for fresh fish 1 week for dry fish
17.	Sanitation facility				
	(a) Availability of proper drainage	Yes , damaged	Yes	No	Yes
	(b) Cleaning schedule	Once daily	Daily twice	By vendors	Yes daily
	(c) Proper facility for waste disposal	No	Yes	No	Yes
	(e).Proper sanitation	No	Yes	Yes	Yes
	(f). Availability of ice	Yes, in 3 km distance	Yes	Yes, in 1 km distance	Yes
	(g). Raised platform	Yes	Yes, limited	Yes	No
18.	Source of supply				
	Source centre	Munambam, Murikkumpadam, Nayarambalam,	Nayarambalam, Munambam,	Munambam, Valappu, Kalamukku, Njarakkal, Nayarambalam	Cochin fishing harbour, Ernakulam, Aluva, kaloor markets
19.	Major varieties Fresh	Mackerel, Sardine, Lizard fish (Pallimeen), White fish (Parava), Rays (Thirandi), Shark,crab, small fishes	All species including Brackish water fish	All varieties	Sardine, Prawns, Square tail mullet (Kanambu), Mackerel, Pony fish (mullan), Pearl Spot (Karimeen)
	Frozen	Seer fish (Arakka), Tuna (Kera), Tongue Sole (Nanku), Squid, Brackish water fishes			
	Dry	Tongue sole (Nanku), Anchovy (kozhuva), Lizard fish (pallimeen), Crockers (kora), shark		Prawns, Shark, Sole (Nanku), Croakers (Kora)	Prawns, Anchovy (Kozhuva)
	Salted				
20.	Destination	Njarakkal, Nayarambalam	Kuzhuppilly, Chathangad, Edavanakad, Pazhangad	Vyppin islands	Thevara and Cochin corporation area

ANNEXURE VI: PROFILE OF RETAIL MARKETS contd.

S.NO		6	7	8	9
21.	Mode of transport				
	I) Trucks				
	II) Lorries				
	III) Mini vans				
	IV) Two wheelers	3	3	4	25
	V) Vendors/Head loaders	15	11+14	10+5	40
	VI) Auto rickshaws	3-5	1	10	5
22.	Packaging				
	A) Bulk with ice. B) Baskets without insulation. C) Baskets with insulation.	Plastic boxes, Alumium vessel, S	Aluminium vessels with ice and covered with plastic sheet	Aluminium vessels and plastic boxes with ice	Bulk with ice in plastic boxes
23.	Insulation material				
24.	Any other relevant details				

ANNEXURE VIIA: PROFILE OF DRYING UNIT, ALAPPUZHA

SL No		1	2	3	4	5
1.	Name of Drying/Curing yard	Devadas	Ramachandran	Satheesan	Rajumon	Sudakaran
2.	Location	Alappuzha	Alappuzha	Alappuzha	Alappuzha	Alappuzha
3.	Ownership Pattern (Shared/Full Ownership)	Fully	Fully	Shared	Shared	Shared
4.	Detailed information of Drying/Curing yard					
5.	Type of working units	Thatched	Thatched	Thatched	Concreted	Thatched
	Number of working units	3	5	3	2	3
6.	Availability of moving space	Enough	Enough	Enough	Enough	Enough
7.	Infrastructure					
	Roof (Cemented, Concreted, Thatched)	Thatched	Thatched	Thatched	Concreted	Thatched
	Floor (Cemented, Concreted, Thatched)	Thatched	Thatched	Cemented	Cemented	cemented
	i. Availability of potable water	Yes	Yes	Yes	Yes	Yes
	ii. Source of water	Well	Bore Well & Municipal water	Well and Bore well	Bore Well & Municipal water	Well & Municipal water
	iii. Availability of salt	Enough	Enough	Enough	Enough	Enough
	iv. Source of salt	Agency Purchased and gave on demand.	Nearby markets	Nearby markets	Nearby markets	Nearby shops
	v. Supply system	No	yes	No	Yes	yes
	vi. Communication	Yes	Yes	Yes	Yes	No
	vii. Approach road	Yes	Yes	Yes	Yes	Yes
	viii. Availability of Medical Aid	Yes	Yes	Yes	No	Yes
8.	Storage Facilities	Yes	Yes	Yes	Yes	Yes
9.	Type of storage (i) Storage sheds (Modern) (ii) Storage sheds (Traditional)	Storage sheds-Traditional	Storage sheds-Traditional	Traditional	Storage sheds-Attached to house	Traditional Storage sheds- - Attached to house

ANNEXURE VIIA: PROFILE OF DRYING UNIT, ALAPPUZHA contd.

SL No		1	2	3	4	5
	Capacity	3000 kg	1500 kg	5000 kg	150 kg	2000 kg
	Duration of storage	One week	3 months	Three weeks	3-4 weeks	3 months
10.	Sanitation facility					
	i. Cleaning schedule	Weekly	Daily	Weekly	Daily	Daily
	ii. Availability of proper drainage	No	No	No	No	No
	iii. Proper facility for waste disposal	Throw back to sea	Throw back to sea	Throw back to sea	No	Throw back to sea
	iv. Proper sanitation	No	Yes	No	Yes	Yes
11.	Operational Details					
	i. No of workers	6	5	5	6	7
	ii. Skilled workers					
	iii. Trained workers					
12.	Education level of workers					
	Below SSLC	6	5	4	6	7
	SSLC & above			1		
	Graduation & Diploma					
	PG & Professional					
13.	Age details of workers	35-50	25-60	25-50	25-50	25-60
	Below 25			1		
	25-35		2	3	3	2
	35-50	6	2	1	3	4
	50 and above		1			1
14.	Average No. of dependent family members	30	18	25	15	35
15.	Source of supply	Sea	Sea	Sea	Market	Sea
16.	Source of commodity (Centre) & Season	Purakkad	Purakkad	Pallana	Valanjavazhy	Punnapra

ANNEXURE VIIA: PROFILE OF DRYING UNIT, ALAPPUZHA contd.

SL No		1	2	3	4	5
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh
	Dried					
	Any other					
	Main destination	Tamil nadu , Gujarat and other North Eastern Hill Regions (NEH)	Nearby markets, Chavakkad, Thrissur & North Indian states	Local markets and nearby districts	Local markets in Alappuzha and Kottayam	Local markets in Alappuzha, Thoothukudy, Mangalapuram and Tamilnadu
17.	Mode of transport	By road	By road	By road	By road	By road
	i. Lorries	1	3			1
	ii. Mini vans	2	2	2		2
	iii. Two wheelers	3	1	4		2
	ivVendors/Headloaders	1			1	1
	v. Bicycle	2	4	2	4	3
	vi. Auto Rickshaws	2	2	1	2	1
18.	Packaging					
	Raw material &qty (kg)	Fresh fish 40kg/basket	Fresh fish 25-40kg/basket	Fresh fish 15-30 kg/basket	Fresh fish 40kg/basket	Fresh fish
	i. Bulk with ice					
	ii. Baskets without insulation					
	iii. Basket with insulation	Basket with insulation	Baskets with insulation	Basket with insulation	Basket with insulation	Basket with insulation
	iv Insulation materials	Bamboo	Bamboo	Bamboo & Aluminium	Bamboo	Bamboo
19.	Drying/curing details					
	Curing stage	Fresh fish	Fresh fish Salted fish put in Tanks	Fresh fish	Fresh fish	
	Material / Variety Handled	Glassy Perchlet (Nandan), Anchovy (Kozhuva),	Glassy Perchlet (Nandan), Anchovy (Kozhuva)	Mackerel Glassy Perchlet (Nandan)	Pony fish (Mullan), Lizard fish (Pallimeen),	Perchlet (Nandan), Sardine and

ANNEXURE VIIA: PROFILE OF DRYING UNIT, ALAPPUZHA contd.

SL No		1	2	3	4	5
		Ribbon Fish and Mackerel	Sardine and White Sardine (Veloori)	Sardine	Perchlet (Nandan), Anchovy (Kozhuva), Ribbon Fish and Mackerel	White Sardine (Veloori)
	Final product	Dry fish	Dry fish	Dry fish	Dry fish	Dry fish
20.	Destination details					
	Product	Dry fish	Dry fish	Dry fish	Dry fish	Dry fish
	Destination	North Indian states	North Indian states & local markets	Andra Pradesh, Orissa and local markets	Local markets in Alappuzha and Kottayam	Thoothukudy, Mangalapuram &Tamilnadu
	Mode of transport	By road	By road	By road	By road	By road
	Packaging	Sacks	Sacks	Sacks	Bamboo baskets, Palm leaf baskets and Paper cover	Sacks
21.	Any other relevant details	Major quantity is used as poultry feed and for household use they separately dry the fish themselves.	Around 50 % of the dried variety are used for cattle feed	For household use they dry the fish themselves.	All quantity dried is utilised in the local markets for human consumption.	90 % dried quantity is used as poultry feed

ANNEXURE VIIB: PROFILE OF DRYING UNITS, CALICUT contd.

SL No		1	2	3	4	5
1.	Name of Drying/curing yard	Seamum	Rasak	M.K.S	Hamsa (Katta)	N.P.Ali
2.	Location	Puthiyappa	Puthiyappa	Puthiyappa	Vellayil	Vellayil
3.	Ownership Pattern (Shared/ Full Ownership)	Fully	Fully	Shared	Shared	Fully
4.	Detailed information of Drying/ curing yard					
5.	Type of working units	Cemented	Cemented	Cemented	Cemented	Cemented
	Number of working units	1	1	1	25	1
6.	Availability of moving space	Beach	Beach	Beach	Beach	Beach
7.	Infrastructure					
	Roof (Cemented, Concreted, Thatched)	Tiled	Thached	Tiled	Tiled	Tiled
	Floor (Cemented, Concreted, Thatched)	Cemented	Cemented	Cemented	Cemented	Cemented
	i. Availability of potable water	No	No	No	Yes	No
	ii. Source of water	Well and Hand pipe	Hand pipe	Well	Well	Well and Hand pipe
	iii. Availability of salt	Enough	Enough	Enough	Enough	Enough
	iv. Source of salt	Thoothukudy	Thoothukudy	Thoothukudy	Thoothukudy	Thoothukudy
	v. Supply system	Yes	No	Yes	Yes	Yes
	vi. Communication	Yes	No	Yes	Mobile phone	Yes
	vii. Approach road	No	No	No	No	Yes
	viii. Availability of Medical Aid	No	No	No	No	Yes
8.	Storage Facilities	Yes	Yes	Yes	Yes	Yes
9.	Type of storage (i) Storage sheds (Modern) (ii) Storage sheds (Traditional)	Storage sheds-Traditional	Storage sheds-Traditional	Storage sheds-Traditional	Store in tanks with salt	Store in tanks
	Capacity	6000 kg	2000 kg	5000 kg	5000 kg	3000 kg
	Duration of storage	10-15 Days	10-15 Days	30-40 Days	1 month	10-20 Days

ANNEXURE VIIB: PROFILE OF DRYING UNITS, CALICUT contd.

SL No		1	2	3	4	5
10.	Sanitation facility					
	i. Cleaning schedule	Daily	Daily	Daily	Daily	Daily
	ii. Availability of proper drainage	No	No	Yes	Yes	No
	iii. Proper facility for waste disposal	No	No	No	No	No
	iv. Proper sanitation	No	No	Yes	Yes	No
11.	Operational Details					
	i. No of workers	6	8	9	15	14
	ii. Skilled workers	4	4	4	10	10
	iii. Trained workers	2	2	5	5	4
12.	Education level of workers					
	Below SSLC	2	6	9	5	14
	SSLC & above	2	2		10	
	Graduation & Diploma	2				
	PG & Professional					
13.	Age details of workers	25-50	35-50	25-50	35-50	35-50
	Below 25					
	25-35	4	4	3	5	10
	35-50	2	4	6	10	4
	50 and above					
14.	Average No. of dependent family members	24	36	49	40	64
15.	Source of supply	Puthiyappa beach	Puthiyappa beach	Puthiyappa beach	Calicut central market	Calicut central market

ANNEXURE VIIB: PROFILE OF DRYING UNITS, CALICUT contd.

SL No		1	2	3	4	5
16.	Source of commodity (Centre) & Season	Puthiyappa	Puthiyappa	Puthiyappa	Market	Market
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh
	Dried					
	Any other					
	Main destination	Calicut dry fish market	Calicut dry fish market	Tamilnadu	Idukky and Kottayam Districts	Waynadu and Calicut markets
17.	Mode of transport	Auto rickshaws	Auto rickshaws	Lorry	Auto rickshaws	Auto rickshaws
	i. Lorries			Yes		
	ii. Mini vans					
	iii. Two wheelers					
	ivVendors/Headloaders					
	v. Bicycle					
	vi. Auto Rickshaws	Yes	Yes		Yes	Yes
18.	Packaging					
	Raw material & Qty (kg)	Coconut leaf	Coconut leaf		Dried Coconut leaf	Coconut leaf
	i. Bulk with ice					
	ii. Baskets without insulation					
	iii. Basket with insulation	Baskets with insulation	Baskets with insulation	Baskets with insulation	Baskets with insulation	Baskets with insulation
	iv Insulation materials	Coconut leaf	Coconut leaf			
19.	Drying/curing details					
	Curing stage					
	Material / Variety Handled	Anchovy	Anchovy	Small sardine	Pony fish	Sardine
	Final product	Dried	Dried	Dried	Dried	Dried

ANNEXURE VIIB: PROFILE OF DRYING UNITS, CALICUT contd.

SL No		1	2	3	4	5
20.	Destination details	Eastern region	Eastern region	Tamilnadu (Pollachi)	Kottayam and Idukki	Wayanadu and Calicut markets
	Product	Dried Anchovy	Dried Anchovy	Dried Sardine used as poultry feed	Dried Ponyfish	Dried Sardine
	Destination	Eastern region	Calicut dry fish market	Tamilnadu	Kottayam and Idukki	Waynadu and Calicut markets
	Mode of transport	Goods auto	Goods auto	Lorry	Goods auto	Goods auto
	Packaging	Small plastic covers (100gm, 200gm)	Sacks (40 kg)	Sacks (50 kg)	Baskets (40 kg)	Baskets
21.	Any other relevant details	No potable water available in the beach, Fish dried in racks.		No sanitation facility available in the beach,They spread some chemicals in the beach to avoid insect infestation in fish while drying	No potable water and No proper drainage facility available in the beach.	No potable water and No proper drainage facility available in the beach. They are having their own dry fish stalls in the central market.

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule I: Profile of fish landing center at Mechanised Sector – Ernakulam District

I. Identification particulars

1.Landing Centre	
2. Stratum No.	
3. State	
4. District	
5. Panchayat	
6. Fishing village	
7. Date of visit	

II Profile of the landing center

1. Landing area (m^2)(Platform/Beach)	
2. Type of platform	
3. Infrastructure	
(i) Length of jetty (ii) Type of shelter/shade (iii) No. of Auction platforms/area (iv) Work area for net mending/packing (v) Packing area.[m^2] (vi) Office facility. (vii) Availability of potable water (viii) Availability of drainage (ix) Cleaning (x) schedule. (xi) Proper facility for waste disposal. (xii) Availability of medical facility. (xiii) Fuel pumps. (xiv) Communication facility. (xv) Number of ice plants. (xvi) Availability of ice. (xvii) Quantity of ice needed (xviii) Power supply.	

4. Storage Facility

(a) Type of storage

Type	Capacity/Area	Duration of storage

(b) Fish

Type of fish	Type of storage	Capacity/Quantity	Duration of storage
Fresh Dry Salted			

5. No. of boats landed /day and type of nets used

Type of net	PN	GN	Small TN	Large TN	Hook and line	Others specify
No. of boats						

6. No. of active fishermen	
7. Working time	
8. Weekly holiday	
9. No. of boat owners	
10. No of agents	
11. No. of helpers	
12. No of vendors [head load/small cycle vendors	

13. Transport facility

a) No. of trucks operating/ day	
b) No. of mini vans/day	
c). No. of two wheelers/day	
d). Availability of pucca road	

Investigator Code/Name

Date

Signature

Supervisor Code/Name

Date

Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule IA: Loss at the landing center - Mechanised sector, Ernakulam District

I. Identification particulars

1. Name of Craft		11. Duration of fishing days	
2. Observation No.		12. Size of crew	
3. Stratum No.		13. Length of boat	
4. District		14. Width of boat	
5. Date of visit		15. Area of operation	
6. Landing Centre		16. Depth of operation	
7. Craft used		17. Fishing time	
8. Type of craft (Mech/ Motorised/Non.motorised)		18. Quantity of ice used	
9. Type of gear (PN/TN/GN/ H&L/ Others)		19. On Board Fish storage capacity	
10. Ownership pattern (Shared/ Fully owned)			

II. Loss at harvest level

Catch on current day		Quantity of loss on		Type of loss	Causes
Species	Qty (kg)	Current day (kg)	Previous week (kg)		

Causes of loss

1) Uneconomical species
2) Too small to be processed
3) Physical damage
4) Inadequate storage facilities (on board)
5) Any other (specify)

III. Losses at post harvest level

a) Losses at landing centre

Sl. No.	Species	Quantity Landed (kg)	Loss (kg)		Type of loss	Causes
			Current day	Previous week		

Causes of loss

1) Improper handling
2) Improper icing
3) Lack of transport
4) Lack of demand
5) Others (Specify)

Investigator Code/Name

Date

Signature

Supervisor Code/Name

Date

Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule II: Profile of fish landing center at Non-Mechanised Sector – Ernakulam District

I. Identification particulars

1.Landing Centre	
2. Stratum No.	
3. State	
4. District	
5. Panchayat	
6. Fishing village	
7. Date of visit	

II Profile of the landing centre

1. Landing area (m^2) (Platform/Beach)	
2. Type of platform	
3. Infrastructure	
a. Length of jetty b. Type of shelter/shade c. No. of Auction platforms/area d. Work area for net mending/packing e. Packing area.[m^2] f. Office facility. g. Availability of potable water h. Availability of drainage i. Cleaning schedule. j. Proper facility for waste disposal. k. Availability of medical facility. l. Fuel pumps. m. Communication facility. n. Number of ice plants. o. Availability of ice. p. Quantity of ice needed q. Power supply.	

4. Storage Facility

(b) Type of storage

Type	Type of storage	Capacity/Quantity	Duration of storage

(b) Fish

Type of fish	Capacity/Area	Duration of storage
Fresh		
Dry		
Salted		

5. No. of boats landed /day and type of nets used

Type of net	GN	Small TN	Large TN	Hook and line	Others specify
No. of boats					
6. No. of active fishermen					
7. Working time					
8. Weekly holiday					
9. No. of boat owners.					
10. No. of agents					
11. No. of helpers					
12. No. of vendors [head load/small cycle vendors					

13.Transport facility

a) No. of trucks operating/ day	
b) No. of mini vans/day	
c). No. of two wheelers/day	
d). Availability of pucca road	

Investigator Code/Name

Date

Signature

Supervisor Code/Name

Date

Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule IVA: Loss at Retail Market - Ernakulam District

I. Identification particulars

1. Name of market		5. Observation No.	
2. Date of visit		6. Market days	
3. Stratum No.		7. Time	
4. District			

I. Loss particulars

a) Fresh fish

Arrival From	Destination	Species	Mode of transport	Packing pattern	Quantity (kg)		Loss (kg)	Mode of utilization of unsold	Causes	Loss during previous week (kg) & causes
					Arrived	Sold				

b) Cured/Dry fish

Arrival From	Destination	Species	Mode of transport	Packing pattern	Quantity (kg)	Loss (kg)	Type of loss	Causes	Loss during previous week (kg) & Causes

Causes of loss	Mode of transport
1)Physical loss	7) Lorries
2)Insect infestation	8) Trucks
3)Rodent	9) Mini Vans
4) High Moisture content	10) Two Wheelers
5) Others (Specify)	11) Head load
	12) Others (specify)

3) Availability of storage facility

a) Type b) Capacity

4) Container Type

a) Plastic b) bamboo c) Any other (specify)

Investigator Code/Name

Date

Signature

Supervisor Code/Name

Date

Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule V: Loss at Roadside Market - Ernakulam District

1. Details of fish market

I. Identification particulars

1. Name of market		6. No. of customers / day	
2. Stratum No.		7. Working time	
3. District		8. Market days	
4. Date of visit		9. Observation No.	
5. Ownership Pattern (Shared/Fully owned)			

2. Loss details

a) Fresh fish

Arrival From	Destination	Species	Mode of transport	Packing pattern	Quantity (kg)			Mode of utilization of unsold	Causes	Loss during previous week (kg) & causes
					Arrived	Sold	Loss			

b) Cured/Dry fish

Arrival From	Destination	Species	Mode of transport	Packing pattern	Quantity (kg)		Type of Loss	Causes of loss	Loss during previous week (kg) & causes
					Arrived	Loss			

Causes of loss	Mode of transport
1)Physical loss	13) Lorries
2)Insect infestation	14) Trucks
3)Rodendnt	15) Mini Vans
4) High Moisture content	16) Two Wheelers
5) Others (Specify)	17) Head load
	18) Others (specify)

3) Availability of storage facility

a) Type b) Capacity

4) Container Type

a) Plastic b) bamboo c) Any other (specify)

Investigator Code/Name

Date

Signature

Supervisor Code/Name

Date

Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule VI: Loss at Vendor level - Ernakulam District

I. Identification Particulars

1. Name of vendor	
2. Address	
3. Stratum No.	
4. Location	
5. Date of visit	
6. Availability of ice	
7. Source of ice	

8. Storage Facilities

1. Type of storage
   - (i) Public storage (Cold)
   - (ii) Private storage(Cold)
   - (iii) Storage sheds (Modern)
   - (iv) Storage sheds (Traditional)
   - (v) Household
2. Capacity
3. Duration of storage

9. Source of supply

Source of commodity (Centre)	Major Varieties				Main destination	No. of houses covered/day
	Fresh	Frozen	Dried	Any other		

10. Mode of Sale

i. Auto Rickshaws	
ii. Two wheelers	
iii Bicycle	
iv. Head loading	

11.Packaging

i. Bulk with ice	
ii. Baskets without insulation	
iii.Basket with insulation	
Iv Insulation materials	

12. Sale details

Quantity Purchased (kg)	Sold (kg)	Loss (kg)	Utilisation of unsold	Type of loss	Causes of loss	Loss during previous week(kg) & Causes

Causes of loss

1. Discolouration
2. Spoilage due to Improper icing
3. Spoilage due to improper handling
4. Long time transport
5. No Storage facility

Investigator Code/Name

Date

Signature

Supervisor Code/Name

Date

Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule VII: Loss at House hold level - Ernakulam District

I. Identification Particulars

1. Stratum No.			
2. State			
3. District			
4. House No.			
5. Name of Head of the family			
6. Address			
7. Date of visit			
8. No. of family Members		Male	Female
	i.Adults		
	ii. Children		
9. No. of Vegetarians			
10. No. of Non-Vegetarians			
11. Consumption Pattern (Daily/Weekly/Occasionally)			

12. Consumption Details

No. of fish consuming days/ week	Preferred Variety	Source/ Purchased from	Quantity consumed (kg)		Loss (kg)		Type of loss	Causes
			That day	Previous week	On the day	Previous week		

13. Socio-economic details

i. Type of house
   a) Concreted (Ordinary)
   b) Modern
   c) Tiled roof
   d) Thatched
   e) Kacha
ii. Average monthly income
iii. No. of earning members
iv. Education level of family members

	Below SSLC	SSLC & above	Graduation & Diploma	PG & Professional
No of members				

v. Assets

a) Land

b) House

c) Agricultural area

d) Any other (specify)

vi. Home appliances

a) Television

b) Refrigerator

c) Telephone

d) Washing Machine

e) Mixie

f) Two Wheeler

g) Four wheeler

Investigator Code/Name

Date

Signature

Supervisor Code/Name

Date

Signature

Schedule VIII: Profile of Pre-processing Centres - Ernakulam District

I. Identification Particulars

1. Name of Pre-processing Centre	
2. Stratum No.	
3. State	
4. District	
5. Registration No.	
6. Location	
7. Ownership Pattern (Shared/Full Ownership)	
8. Date of visit	

II. Detailed information on Preprocessing Centre

i. Roof (Cemented, Concreted, Thatched)	
ii. Floor (Cemented, Concreted, Thatched)	
iii No. of workers	
iv No. of working tables	
v. Availability of utensils	
vi.Availability of moving space	

III. Infrastructure

ix. Availability of potable water	
x. Source of water	
xi. Availability of ice	
xii. Source of ice	
xiii. Supply system	
xiv. Communication	
xv. Approach road	
xvi. Availability of Medical Aid	

IV. Storage Facilities

1. Type of storage
   - (i) Public storage (Cold)
   - (ii) Private storage(Cold)
   - (iii) Storage sheds (Modern)
   - (iv) Storage sheds (Traditional)
2. Capacity
3. Duration of storage

V. Sanitation facility

i. Cleaning schedule	
ii. Availability of potable water	
iii. Availability of proper drainage	
iv. Proper facility for waste disposal	
v. Proper sanitation	

VI. Operation Details

	Male	Female
i. No. of workers		
ii. Skilled workers		
iii. Trained workers		

VII Source of supply

Source of commodity (Centre) & Season	Major Varieties								Main destination
	Fresh		Frozen		Dried		Any other		
	Variety	Qty	Variety	Qty	Variety	Qty	Variety	Qty	

VIII. Mode of transport

i. Lorries	
ii. Mini vans	
iii. Two wheelers	
iv Vendors/Head loaders	
v. Auto Rickshaws	

IX. Packaging

i. Bulk with ice	
ii. Baskets without insulation	
iii. Basket with insulation	
Iv Insulation materials	

X. Any other relevant details

Investigator Code/Name

Date

Signature

Supervisor Code/Name

Date

Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule VIIIA: Loss at Pre-processing Centres - Ernakulam District

I. Identification particulars.

1. Name of Pre-processing Centre	
2. Stratum No.	
3. Registration No.	
4. Location	
5. Ownership Pattern (Shared/Full Ownership)	
6. Capacity	
7. Date of visit	

II. Loss details - same day

Source of commodity (Centre)	Major Varieties								Type of loss	Causes
	Fresh		Frozen		Dried		Any other			
	Arrived	loss	Arrived	loss	Arrived	loss	Arrived	loss		

III. Loss details - Previous week

Source of commodity (Centre)	Major Varieties								Type of loss	Causes
	Fresh		Frozen		Dried		Any other			
	Arrived	loss	Arrived	loss	Arrived	loss	Arrived	loss		

IV. Pre-processing details

Pre-processing stage	Variety	Material Handled	Quantity arrived on that day (kg)	Loss on that day (kg)	Type of loss	Causes	Quantity - previous week (kg)	Loss-Previous week	Type of loss and causes

Investigator Code/Name
Date
Signature

Supervisor Code/Name
Date
Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule IX: Profile of Processing Centres - Ernakulam District

I. Identification Particulars

1. Name of Processing Centre	
2. Stratum No.	
3. State	
4. District	
5. Registration No.	
6. Location	
7. Ownership Pattern (Shared/Full Ownership)	
8. Date of visit	
9. EU Approved or not	
10. Attached preprocessing centre	

II. Detailed information on Preprocessing Centre

i. Roof (Cemented, Concreted, Thatched)	
ii. Floor (Cemented, Concreted, Thatched)	
iii No. of workers	
iv No. of working tables	
v. Availability of utensils	
vi.Availability of moving space	

III.Infrastructure

i. Availability of potable water	
ii. Source of water	
iii. Availability of ice	
iv. Source of ice	
v. Supply system	
vi. Communication	
vii. Approach road	
viii. Availability of Medical Aid	

IV.Storage Facilities

1. Type of storage
   (i) Public storage (Cold)
   (ii) Private storage(Cold)
   (iii) Storage sheds (Modern)
   (iv) Storage sheds (Traditional)
2. Capacity
3. Duration of storage

V. Sanitation facility

i. Cleaning schedule	
ii. Availability of potable water	
iii. Availability of proper drainage	
iv. Proper facility for waste disposal	
v. Proper sanitation	

VI. Operation Details

	Male	Female
i. No. of workers		
ii. Skilled workers		
iii. Trained workers		

iv. Education level of workers

	Below SSLC	SSLC & above	Graduation & Diploma	PG & Professional
No. of workers				

v. Age details of workers

	Below 25	25-35	35-50	50 and above
No. of workers				

vi. Average No. of dependent family members

VII. Source of supply

Source of commodity (Centre) & Season	Major Varieties (kg)								Main destination
	Fresh		Frozen		Dried		Any other		
	Variety	Qty	Variety	Qty	Variety	Qty	Variety	Qty	

VIII. Mode of transport

i. Lorries	
ii. Mini vans	
iii. Two wheelers	
iv. Vendors/Head loaders	
v. Auto Rickshaws	

IX. Packaging

i. Bulk with ice	
ii. Baskets without insulation	
iii.Basket with insulation	
Iv Insulation materials	

X. Processing details

Processing stage	Material / Variety Handled	Final product

XI. Export details

Product	Country of exported

XII Any other information

Investigator Code/Name
Date
Signature

Supervisor Code/Name
Date
Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule IXA: Loss at Processing Centres - Ernakulam District

I. Identification particulars.

1. Name of Processing Centre	
2. Registration No.	
3. Stratum No.	
4. Location	
5. Ownership Pattern (Shared/Full Ownership)	
6. Date of visit	

II. Loss details- on the day

Source of commodity (Centre)	Major Varieties (kg)								Type of loss	Causes
	Fresh		Frozen		Dried		Any other			
	Arrived	loss	Arrived	loss	Arrived	loss	Arrived	loss		

III. Loss details - on previous week

Source of commodity (Centre)	Major Varieties (kg)								Type of loss	Causes
	Fresh		Frozen		Dried		Any other			
	Arrived	loss	Arrived	loss	Arrived	loss	Arrived	loss		

IV. Processing details

Processing stage	Material / Variety Handled	Final product	Final product (kg)	Loss(kg)	Reason

V. Export details

Product	Exported to	Quantity(kg)	Loss (kg)	Type of loss	Causes

Investigator Code/Name
Date
Signature

Supervisor Code/Name
Date
Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule X: Loss at Small Scale Processors at House hold- Drying/Curing

I. Identification particulars

1. House No.		
2. Address/ Name of unit		
3. Stratum No.		
4. State		
5. District		
6. Date of visit		
7. No. of Members	Male	Female
Adults		
Children		

II. Loss details-drying/curing

Source/ Purchased from	Variety	Quantity arrived on the day (kg)	Loss - on the day (kg)	Type of loss	Causes	Quatity- on previous week(kg)	Loss(kg) & Causes- Previous week

III. Storage facility

	Capacity	Duration
Separate shed (Modern)		
Separate shed (Traditional)		
Along with House		
Rented service		

IV. Smoking

a) No. of Chimney

b) Availability of fuel

Type	Quantity	Cost/kg

c) Duration of smoking

V. Loss details -smoking

Material handled	Variety	Quantity arrived on the day (kg)	Loss - on the day (kg)	Type of loss	Causes	Quatity- on previous week(kg)	Loss(kg) & Causes- Previous week

VI. Mode of transport

i. Lorries	
ii. Mini vans	
iii. Two wheelers	
iv Vendors/Head loaders	
v. Bicycle	
vi. Auto Rickshaws	

VII. Socio-economic details

i. Type of house
   a) Concreted (Ordinary)
   b) Modern
   c) Tiled roof
   d) Thatched
   e) Kacha

ii. Average monthly income

iii. No. of earning members

iv. Education level of members

	Below SSLC	SSLC & above	Graduation & Diploma	PG & Professional
No of members				

vii. Assets
   a) Land
   b) House
   c) Agricultural area
   d) Any other (specify)

Investigator Code/Name
Date
Signaturea

Supervisor Code/Name
Date
Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule XI: Profile of Drying/ Curing yards

I. Identification Particulars

1.	Name of Drying/Curing yard	
2.	Location	
3.	Stratum No.	
4.	Ownership Pattern (Shared/Full Ownership)	
5.	Date of visit	

II. Detailed information on Drying/curing yard

i. Roof (Cemented, Concreted, Thatched)			
ii. Floor (Cemented, Concreted, Thatched)			
iv Type of working units	1)	2)	3)
Number			
vi .Availability of moving space			

III. Infrastructure

i.	Availability of potable water	
ii.	Source of water	
iii.	Availability of salt	
iv.	Source of salt	
v.	Supply system	
vi.	Communication	
vii.	Approach road	
viii.	Availability of Medical Aid	

IV. Storage Facilities

1. Type of storage
   - (i) Storage sheds (Modern)
   - (ii) Storage sheds (Traditional)
2. Capacity
3. Duration of storage

V. Sanitation facility

i. Cleaning schedule	
ii. Availability of proper drainage	
iii. Proper facility for waste disposal	
iv. Proper sanitation	

VI.Operation Details

	Male	Female
i. No. of workers		
ii. Skilled workers		
iii. Trained workers		

iv. Education level of workers

	Below SSLC	SSLC & above	Graduation & Diploma	PG & Professional
No. of workers				

v. Age details of workers

	Below 25	25-35	35-50	50 and above
No. of workers				

vi. Average No. of dependent family members

VII Source of supply

Source of commodity (Centre) & Season	Major varieties(kg)						Main destination
	Fresh		Dried		Any other		
	Variety	Qty	Variety	Qty	Variety	Qty	

VIII .Mode of transport

i. Lorries	
ii. Mini vans	
iii. Two wheelers	
iv Vendors/Head loaders	
v. Bicycle	
vi. Auto Rickshaws	

IX. Packaging

	Raw material & Qty (kg)	Cured/Dried variety& Qty (kg)
i. Bulk with ice		
ii. Baskets without insulation		
iii. Basket with insulation		
iv Insulation materials		

X. Drying/Curing details

Curing stage	Material / Variety Handled	Final product

XI. Destination details

Product	Destination	Mode of transport	Packaging

X. Any other relevant details

Investigator Code/Name
Date
Signature

Supervisor Code/Name
Date
Signature

Central Institute of Fisheries Technology, Cochin-29
NATP Mission Mode Project on
Assessment of Harvest and Post Harvest Losses (Marine Fisheries)

Schedule XIA: Loss at Drying /Curing yards

I. Identification particulars.

1. Name of Drying/Curing yard	
2. Location	
3. Stratum No.	
4. Ownership Pattern (Shared/Full Ownership)	
5. Date of visit	

II. Loss details- on the day

Source of commodity (Centre)	Major Varieties (kg)						Type of loss	Causes
	Fresh		Dried		Any other			
	Arrived	loss	Arrived	loss	Arrived	loss		

III. Loss details- Previous week

Source of commodity (Centre)	Major Varieties (kg)						Type of loss	Causes
	Fresh		Dried		Any other			
	Arrived	loss	Arrived	loss	Arrived	loss		

Causes of loss: 1) Discolouration 2) Spoilage due to improper icing 3) Spoilage due to improper handling 4) Long time transport

IV. Drying/Curing details- on the day

Drying/curing stage	Material / Variety Handled	Product	Quantity (kg)	Loss(kg)	Type of loss	Causes

V. Drying/Curing details- Previous week

Drying/Curing stage	Material / Variety Handled	Product	Quantity (kg)	Loss(kg)	Type of loss	Causes

Reason: 1) Discolouration 2) Spoilage due to improper icing 3) Spoilage due to improper handling 4) Spoilage due to improper drying/curing in the previous stage 5) Long time transport

VI. Smoking

a) No. of Chimney

b) Availability of fuel

Type	Quantity (kg)	Cost/kg

c) Duration of smoking

VII. Loss details - smoking - on the day

Material handled	Variety	Quantity (kg)	Loss(kg)	Type of loss	Causes

VII. Loss details - smoking - Previous week

Material handled	Variety	Quantity (kg)	Loss(kg)	Type of loss	Causes

Investigator Code/Name

Date

Signature

Supervisor Code/Name

Date

Signature