Report

of

Working Group

on

FOOD PROCESSING INDUSTRIES

for the formulation of

NINTH FIVE YEAR PLAN

Ministry of Food Processing Industries
Government of India

CONTENTS

PREFACE

The Planning Commission constituted a Working Group on Food Processing Industries for the formulationof Ninth Five Year Plan vide Order No.VSI/27(17)/96 dated 17th January, 1996. The composition of the working group and terms of reference are given in Annexure-I.

2. The first meeting of the working group was held on 23rd February, 1996 at Panchsheel Bhavan, New Delhi. During the meeting the working group decided to constitute 9 sub-committees to look into the following specific sectors.

1. Cereal & Pulses
2. Fruits & Vegetables Products
3. Milk Products
4. Meat Products and Poultry
5. Fisheries
6. Packaging
7. Food Safety, Consumer Protection, Research & Manpower Development
8. Financing of Food Processing Industries
9. Marketing infrastructure

3. The sub-committees held a few meetings and finalised their Reports covering the growth of the sector, the progress of the schemes implemented so far, identifying the constraints in the way of faster development of the sector, projecting the growth of the sector as well as the demand and recommending the strategies to be followed for the formulation of the ninth plan.

4. The second meeting of the working group was held on 12st August, 1996 at Panchsheel Bhavan, New Delhi to consider the Reports of the sub-commitees. The reports were also circulated to the Members of the working group for their comments.

5. Based on the delibera—tions of the working group and the recommendations of the sub-committees the final report of the working group has been compiled for submission to the Planning Commission.

6. The report was prepared by Shri C.K. Basu, whose hard work and valuable contribution is acknowledged. All the Members of the working group participated in the deliberations fully and their valuable comments and suggestions greatly helped in the preparation of this report.

7. The working group sincerely hopes, that the information furnished in the report will help in developing appropriate programmes with clear objective for achieving the ultimate goal of development of food processing industries, ensuring increased income to the farmers, employment generation, export enhancement and improving the nation's economy.

INTRODUCTION

The ninth five year plan for agro food processing industries sector is to be formulated in the background of Government's thrust for processing of agricultural commodities, optimum utilisation of agricultural raw materials, value addition, better farm income, employment generation and export enhancement.

Since, agro food processing industries sector has a high employment generation with low incremental capital output ratio (0.42:1), it is considered very relevant for employment generation. Therefore, in the later part of the eighth plan period, when liberalisation of investment was emphasised in the Industrial Policy Resolution, commensurate priority was accorded to the agro food processing sector and foreign equity participation in this area was permitted. Besides, Government decided to offer various fiscal incentives for investment in a large number of food products. This, coupled with the promotional efforts by the Ministry, has sent a signal to the domestic and foreign investors that this sector is open for investment according to market requirements.

Food products are consumer products. Therefore, its growth depends on the growth of population, and consumer expenditure, which in particularis related to the per capita income in the country. When a substantial growth in the population takes place, with higher growth of GDP, the per capita income also rises.

From 841 million in the year 1991, the population of this country has increased to approximately 920 million in 1995 and it is projected that by 2001 the population will rise to 1003 million. Per Capital Income is also rising accordingly. Because of the rise in the per capita income, while the number of persons below poverty line has reduced from approx. 28% in 1991 to approx. 19% in 1995, the number of people in the middle class rose during this period from approx. 200 million to approximately 250 million. By 2001, it is projected that the below poverty line population pecentage will come down to 10%, and number of people in the middle class will rise to approx. 350 to 360 million. This expectedly will push up the demand for more processed foods, and particularly, value added food products.

The Government in the Ministry of Agriculture has taken steps to produce basic raw materials to meet the basic food requirements in the country CFTRI study indicates that food products requirements by 2001, based on the total requirement of the increased population will be of the following order:

	(Million Tons)
Cereals	[illegible]
Wheat	53
Pulses	23
Millets	21.6
Tubers	21.1
Milk	60
Fats	14
Sugar	12.7

Oilseeds	39
Vegetables	67
Fruits	39
Fish	2.62
Various Meats	2.30
Eggs (Nos.)	33 Trillion

However, these calculations are based on the minimum requirements of the population. But, with the per capita rise in income, there is likely to be substantial rise in demand and there may be a reduced percapita consumption of cereal and pulses and meat and poultry products as has been seen over the years. National Accounts Statistics indicate that since 1980 the per capita expenditure on food has reduced gradually from 53.4% in 1980-81 to 49.1% in 1993-94, and on beverages, 1.9% to 1.7%. Although, in terms of percentage of house-hold expenditure there may be a reduction, in value terms there will be a manifold increase. The increase indicates that there is a greater tendency for consumption of processed food products.

These changes, particularly in per capita income and that of growth of population, will no doubt escalate the demand for processed foods in the future. In addition, in many areas India has a low cost production base, and has the potential for export market. It is evident from the fact that the export growth of processed food products, including marine products, has risen from Rs.2823 crores in 1991-92 to Rs.10392 crores in 1995-96 approx. a fourfold rise. This trend is likely to continue during the 9th plan period. Even if the export of processed rice reduced, the export of processed meat, fruits and vegetables and other products will compensate for the loss of exports in rice. Thus, the export will also generate a tremendous demand for processed foods. The projected demand of processed food product at the terminal year of the ninth plan is stated at Annexure-II.

In the 9th plan, the resources in this sector are required to be allocated in a manner which is capable of maximising productivity and value addition in the best national interest.

In the 9th plan, as was in the case of 8th plan, the main investment into food processing sector, is envisaged to come from the private sector and cooperatives. Foreign Direct Investment(FDI) will also be a very important instrument for inducing increased capital into this sector. The public sector investments will continue only in the selected areas of processed foods and infrastructure, quality control systems, human resource development as well as in research and development. Even in the field of research and development, private sector investment will be called for. Therefore, efforts have to be made to make Policy for transfer of technology, induction of investment, improvement in quality, improved packaging and improved infrastructure required for food processing industries sector. It is envisaged that the total investment required in all the sub-sectors dealt with by this Ministry will be of the order of Rs. 28250 crores (Details are at Annexure-III). Out of this the public sector investment will be of the order of Rs. 3935, crores and Rs. 24315 crores is expected to come from private sector, including the financial institutions. With this investment, it is envisaged that the employment generation would be around for 2 million persons.

Therefore, while formulating strategies for the realisation of plan objectives, the following issues will require special attention :

1) Information and data collection which is absolutely inadequate at present;

2) Information and technology dissemination system to the intending small entrepreneurs and other;

3) Quality upgradation and quality control system.

4) Human resource development;

5) Dispersal of industries in the rural areas and creation of infrastructure in the rural areas;

6) Special incentives for the North East states, J&K, Hilly areas and backward areas including the tribal areas.

Since most food processing industries are delicensed, the entrepreneurs are free to select the locations according to their own convenience. Therefore, to disperse and induce investment in the backward regions of the country, public sector investment needs to be developed as a catalyzer. Public sector investment can also be harnessed for the purpose of creation of infrastructure and financing of innovative/unconventional areas, for the financing of which the financial institutions are not yet forthcoming.

This kind of investment is rather difficult to materialise, unless specific measures are taken as suggested by the sub-committee on financing of food processing industries. In this context of this perspective, the sub-sectoral constraints, targets and investments and strategies have been deliberated separately in subsequent chapters.

Summary of Recommendations

The working group and its various sub-committees deliberated on all these issues, and have made several recommendations which have been arranged in two sections, namely (i) those which are common to all sub-sectors/schemes and (ii) those which is specific to a particular sub-sector or activity.

The common recommendation that has emerged, holds out the indisputable need to treat food processing industries as a high priority thrust area for development, and hence proposes strong support of the Government for their growth. In order to ensure its rapid and systematic development, to meet the domestic and international demand, it calls for policy support in the following specific, complementary areas:

- promotion of large investment
- improvment of quality of the products
- development of infrastructure & marketing
- product diversification & improving demand
- development of backward linkages
- transfer of technology
- human resource development

- Export enhancement and most importantly development of database & MIS(Management Information System) for the food processing sector.

Along with the policy support for its development, action needs to be taken by the Govt. to remove the legal and administrative constraints which prohibit/retard/discourage investment or impede freedom of entrepreneurs to operate in a free market economy.

(ii) Sub-sectoral Recommendations

GRAIN PROCESSING

1. The existing plan schemes in operation under the 8th plan for Research & Development, Training Extension etc in the grain processing sector be continued and strengthened.

2. Activities for the human resource development in the grain processing sector be strengthened to make available manpower to the industry to achieve a high level of productivity and efficiently. Therefore, to improve the infrastructural facilities as well expertise, the provision may be made for financial assistance to the International School of Milling Technology at Mysore.

3. Energy audit be made compulsory for improving the efficiency of the existing units and replacing the obsolete units.

4. Rice milling, bread manufacturing activities and biscuit manufacturing are reserved for small scale sector which is causing hindrance in its growth and modernisation. Policy could be reviewed keeping in view the developments and investments required in the sector for setting up economically viable units, assure improvement of quality and encourage innovative product improvement.

5. Scheme for strengthening backward linkages for maize/coarse grain processing industry be included for implementation during the 9th plan to encourage production of value based products from these crops as also to create a demand for these crops and enable the farmer to get remunerative price for his produce.

6. To improve the efficiency of pulse milling industry in the country the 9th plan may include implementation of scheme for providing subsidy to the pulse milling industry for installation of a drier and dust control system to improve efficiency and productivity in the Centre.

7. R&D organisation should address the problem relating to environment pollution and should device products and process which are environmental friendly and non-polluting.

8. Roller Flour Milling Industry Development Fund needs to be created through taxes and duties collected by the Government on wheat and wheat based products for the modernisation of Roller Flour Milling Industry in the country. Loans/grants could be sanctioned to needy millers for the modernisation and revival of the mills.

9. The pulse milling industry may tie-up with the farmers for providing better quality high yielding pulse varieties to increase the per capital availability of pulses in the country.

10. Encouragements needs to be given for stabilisation of wheat germs which is a rich source of vitamin-E for the pharmaceutical industry. This in turn will also improve economic viability of the Mills.

11. Use of bio-degradable material be encouraged for packing food items.

12. The fortification of wheat flour be encouraged to make available essential micro-nutrients to the common man. To start with wheat flour be fortified with iron as this is considered to be very essential nutrient for children and women.

13. There are no bakery schools in this part of the world for training in bakery science and technology, except some Universities where training is imparted which are found suitable only for small bakeries. Hence provision should be made for starting of a bakery school in India to cater to the requirements of medium as well as large scale bakery industry.

14. The energy used for baking of bakery products are also very high in India as compared to other countries. Therefore, there is a need to develop energy efficient baking ovens.

15. There is about 3 to 4 % loss in bread due to staling as well as mold growth. This is because that it takes around 2 to 3 days before the bread reaches the consumer. The maximum number of days that the bread could be stored at the moment is only 3 to 4 days. Hence, there is a need to extend the shelf-life of bakery products. CFTRI could undertake the work on extending the shelf life of bread and cakes. This project could be financed by the Ministry of Food Processing Industries. The outcome of this work would help all the bakery industries in the country to reduce the losses to the extent of 3 to 4 % valued over Rs.6.0 crores per annum.

16. There is also need to develop technology for the production of specific flours required by bakery industry. This is all the more necessary, since as high as 70% of the bakery products are made in small scale sector or family scale units who have no facilities for quality control of raw materials. Therefore, supply of specific flours will help them to produce improved quality products and maintain quality of products.

HORTICULTURE BASED INDUSTRIES :

Recommendations :

(A) In order to remove the constraints and ensure the development along proper lines, the following action plan would be needed :

(i) Scrapping of Cold Storage Order is necessary.

(ii) Amendment of the Seed Policy to induct suitable strains of fruits & vegetable planting material for processing purpose.

(iii) Amendment of the Pesticides Act to ban use of BHC, DDT and to allow use of CIPC.

(iv) Amend food laws to allow irradiation.

(v) Create suitable arbitration mechanism between farmers and processors for putting the contract farming mechanism on sound footing and make it popular. If possible allow leasing of land for development of processing horticulture materials.

(vi) Improve the fund flow form financial institutions and banks. Otherwise, amend suitable the NABARD mandate to thereby create a separate financial institution for food processing industries.

(vii) Rationalise food laws to be in line with international standards keeping the domestic consumers interest and export possibilities in view.

(viii) Reduce and rationalise duties on packaging materials and machineries and remove all restrictions on the industry.

(ix) Remove restrictions on importation of ingredients, chemicals and intermediate products.

(x) Remove constraints for foreign equity investment in horticulture based industry.

(B) For inducing investments; following policy support are required :

(i) Continuance of exemption of excise duties for all fruits & vegetable products and rationalise form of duty structure for certain fruits & vegetable products which are not hither to brought under tax exemption.

(ii) States to be persuaded to reduce sales tax and other State levies on fruits & vegetable products as well as remove constraints for movement of products.

(iii) Vigorously promote domestic and foreign investment in horticulture based industries. For this purpose provide :

a) fiscal incentives by way of direct tax incentive for post-harvest infrastructure including cold chain

b) continue horticulture based industries as a thrust area for development

c) provide incentives like tax holidays to backward areas, North-Eastern States, J&K, hill States and tribal areas

d) provide plan support and catalytic investments for some innovative industries and induct States also to invest in it

e) promote investment in infrastructure development including Food Parks

f) invest in Research & Development activities, manpower development as well as creation of trading facilities for rural entrepreneurs

g) invest in infrastructure for Quality Control Labs for quality control

h) encouragement to be given for private sector investments including foreign investment in cold chain including in ports

With these investments, it is expected that additional direct employment generation will be of the order of approximately 7 lakh person during the 9th plan.

MEAT & MEAT PRODUCTS

Strategies, Recommendations and Financial Implications:

The development of Meat and Poultry Processing Industry needs to be directed towards achieving the goal of hygienic production and processing of meat and meat products, regulating the inspection systems and quality control, Technological improvement and improving transport and storage for efficient operations and availability of good quality products to the consumers domestically and for export market.

To achieve the goal of regulation of inspection system, and quality control, a coordinating agency has to be formed. The objections put forth by the Department of Animal Husbandry and Dairying to the formation of such an organisation have to be cleared and the establishment of the organisation has to be speeded up.

Most of the Municipal Bodies, Slaughter House have failed to achieve the desired result in modernising the industry; therefore, Slaughter House Corporations can be utilised to assist private sector and monitor the Government funding. These Corporations may assist private sector to set up the projects and also route the State and Central Government funds as catalytic source so that a modern and efficient industry could emerge.

Meat and meat products sector have been financed by the Ministry of Agriculture through Slaughter House Corporations (State Government Undertakings) which could not give desired results and the modernisation of slaughter house has remained a far cry. After the formation of the Ministry of Food Processing industries, a small beginning has been made to finance the joint sector projects in meat and poultry processing in addition to financial assistance to State undertakings. Whereas the State Undertakings failed again to show desired result in respect of the projects they proposed to establish directly, on the other hand the funds given to the joint sector projects have been put to use and the projects were established and most of them have started production. The industry is highly capital intensive and Govt. have to function as catalytic agent for developing the modern projects in joint sector. Therefore, Central Government funds of about 25% of the investment may be sufficient to attract investment from private sector and financial institutions (national/and international). The funds may be routed through State,Central Corporations which may also assist the industry in investing their own funds and the funds obtained from Govt. of India.

Development of marketing infrastructure of meat and poultry product have not been taken up in earlier plans in such a way that could make an impact. After establishment of the Ministry, few schemes on transport and storage were taken up but only for public sector. Since meat and poultry corporations were very weak, they have no desire nor the resources to mdernise the system and therefore, scheme did not leave much impact. But the marketing,transport and storage system have to be modernised for efficient operations. Therefore, a strong agency will have to be formed which may take up the work in association with the State Govt. agencies dealing with the agricultural marketing like marketing boards or any other State agency which is directly responsible for marketing of these products. (Since these are service facilities,a high input is required) As marketing boards and other agencies dealing with this matter may not have sufficient funds, the Govt. funding will be necessary. Similarly,establishment of quality control laboratory is also a service facility and State/Central Government Organisation who are engaged in this business also do not have funds. It is,therefore, necessary that funds should be made available by the Central Government for this purpose.

Meat and Poultry Processing, particularly pork processing in North Eastern States,tribal areas and hilly areas, require special attention as people of these regions have meat as their main diet. But the production and processing is lagging far behind. The industry is not picking up due to the non-availability of infrastructure. Big enterpreneurship in these areas may not be developed due to the prevailing conditions. But development of small scale entrepreneurship coupled with development of Cooperatives may help in developing the sector. Therefore, special arrangements like providing grant-in-aid upto 50% have to be made. Since the production of raw-material like pigs and poultry is also not upto the desired level in these areas,assistance for backward linkages alongwith the project, is required to be given.

Similarly, scheduled caste and tribes cooperative societies wanting to establish processing units may also be given financial assistance through State Government Corporations which may be at the rate of 50% of the investment.

MILK PRODUCTS

RECOMMENDED STRATEGY FOR NINTH PLAN

The focus in the successive five year plans has been on the processing of fluid milk for meeting liquid milk demand. In the 9th Plan with increased production, more milk would be available for convention into milk products, placing grater emphasis on milk product manufacture, especially value added products. The Ministry of Food Processing Industries with its mandate on milk products development would, therefore, have to play an increased role in development of dairy sub-sector.

As indicated earlier the Indian Dairy Industry has so far concentrated on the manufacture of western type milk products with little emphasis on newly emerging value added products. Similarly the organized dairy industry has not paid any attention to development of indigenous products. Besides a large domestic market, there also exists a large potential for export of these products in the International market. Thus during the 9th Plan adequate emphasis should be laid on production of newly emerging value added dairy products and up-gradation of technology for the manufacture of indigenous dairy products.

The major constraints in the development of milk products are lack of adequate technology for product development and quality control. Only limited R&D has been done on product development and technology upgradation, especially of indigenous dairy products. Whatsoever limited work has been done it is limited to laboratory scale testing. These technologies will need to be transferred to field for industrial adoption. In the 9th Plan emphasis should, therefore, be on the upgradation of these technologies, development of prototype and their transfer to operational units. Similarly R & D efforts should be made to develop suitable packaging system for milk products together with packaging material.

Quality assurance of dairy products is an area requiring upgradation in all its sphere which includes development of standard laboratory facility, testing technique and enforcement of the acceptable standards. It has now been realized that the present regulatory mechanism provided under PFA is too inadequate to meet the requirement of modern industry. The PFA standards were formulated in early 50s and there has been little development thereafter. Further under these standards no emphasis has been laid on the microbiological qualities and on the sanitary production and handling methods. The MMPO (1992) has also not created any infrastructure for carrying out inspection of the premises and evaluation of quality. They also do not have any infrastructure to regulate their standard. In the 9th Plan emphasis should be to upgrade the existing PFA standards to ensure that they provide food safety measures. In addition investment in infrastructure, especially in the establishment of cold chain needs to be supported.

In view of above an independent agency needs to be created for quality assurance. Such an agency should be acceptable to the industry on voluntary basis. The Indian Dairy Association which is as apex body of the dairy industry can fulfill these requirement, if strengthened and supported with funds. This would create confidence amongst the consumer on food safety aspect of milk products and open opportunities for international trade. This would require creation of facilities for quality testing laboratory on regional basis for the raw-material and finish products of dairy plants. There is also need for a central laboratory to act as referal point for detailed chemical and micro-biological, analysis.

The development of milk product technology in the world is very rapid. Every day new technologies are developed in different parts of the world which can be suitably adopted by Indian Dairy manufacturers. This would require a networking for technological development inflow. Such a networking should be created during the 9th Five Year Plan.

The efforts to modernise the dairy industry would call for trained manpower at various levels equipeed with latest knowledge and technique. This would need training of the existing manpower working in the dairy industry. They also would need to be given refresher training through short term training programme,

The development of milk products industry as envisaged above would require consumer awareness in terms of modern changing quality parameters and value of milk products. Indian consumer, it is realised are not fully aware of the potential hazards associated with the consumption of milk products contaminated with various undesirable additives. The consumer awareness programme needs to be taken up during the 9th Plan through mass education and use of multimedia including publication of literature.

In view of large emerging market for ice-cream, the manufacture of Ice-cream should be dereserved from small scale sector. Similarly, to promote exports of milk products, the present quantative ceiling should be removed.

FINANCING FOR F.P.I.

Creation of Specialised Development Bank for Food Processing Industries with a sufficiently large capital base subscribed by different financial institutions.

Facilitate the flow of foreign institutional credit, a window be created in NABARD for financing agro food industry. For this, NABARD may have to be strengthened.

To create or earmark funds for venture capital funds exclusively for the processed food sector in both public and private sectors.

Insuring the risk faced by the financial institutions and the commercial banks in lending to the processed food sectors.

Giving more incentive and encouragement for foreign investment and foreign equity capital in this sector, especially for projects with 50% or more Export.

Financial assistance for both private and public sector investment including cooperatives in post-harvest infrastructure and precooling facilities by both Central and State Governments.

FOOD SAFETY, CONSUMER PROTECTION, RESEARCH AND MANPOWER DEVELOPMENT

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RECOMMENDATION

The primary processing of agricultural produce at the farm level calls for raising the capabilities of personnel taking into consideration their present levels of skills and also socio-cultural background. Their training needs to be oriented to efficient application of food technologies. A number of organisations with their existing programmes of training and retraining require to be mobilised and networked into an emerging system of comprehensive training in the field of food processing including raw material handling, storage, transportation and processing them into consumer products. This system can emerge through organised networking with considerable inputs of modern science and technology. Governmental organisations, non-Governmental institutions and voluntary organisations can also be linked in the proposed network.

A National Facility for Food Safety is required to be established. It is to function in a manner that would fill a long standing void in the area of Food Safety and achieve the ultimate goal of delivering clean and safe food to people. The facility will primarily focus on surveillance and safety assessment of common food contaminants/additives in food and in biotechnology research relevant to food safety. The main areas of work would consist of:

(a) The surveillance programme will deal with aspects of monitoring the levels of additives (natural and synthetic). Pesticide residues, metals, microbial contaminants and adultrants in food. Based on the above studies, the total dietary intake of food contaminants/ additives will be computed for various population segments.

(b) The safety assessment will encompass the evaluation of safety of aforesaid toxicants and additives by employing WHO toxicology protocols.

(c) Due emphasis will be laid on developing simple kits to detect food adultrants/contaminants/additives.

(d) Attention will also be paid to spread the message of food safety by mass media, workshops and training programmes.

(e) The facility will develop a "Food Safety Data Base" for selected food contaminants.

(f) The R&D component will lay emphasis on the development of sensitive methods for the detection of pathogenic bacteria and pesticides by chemical and biological methods.

(g) Development of health,and prophylactic foods will be given priority so that the results benefit the population.

(h) Safety analysis of Biotechnology derived products such as additives, proteins and genetically engineered foods will be carried out.

(i) Emphasis will also given to molecular nutrition so as to understand the role of minor dietary constitutents such as Ca++, ZN++, Se++ in promoting health.

(j) The effect of leaching of packaging materials into food, and its interaction with food and the safety evaluation will be carried out.

(k) Development of sensitive cell lines of microbes and animal origin for detection of pesticides, metals etc. will be attempted.

(l) Development of new low toxic food colours from Natural sources and their safety evaluation will be performed.

EIGHTH PLAN PROGRAMMES

The Ministry of Food Processing Industries has been operating several developmental Plan Schemes for implementation during the Eighth Five Year Plan. The Plan outlay for these schemes during 1992-93, 1993-94, 1994-95, 1995-96 and 1996-97 have been Rs.40 Crores, Rs.47 crores, Rs.45 crores, Rs.45 crores and Rs.45 crores respectively. The Planning Commission had held a mid-term review of the Plan Schemes of this Ministry during 1994-95. Taking into consideration the points emerged at that meeting and other relevant factors some of the Plan Schemes of this Ministry have been rationalised/clubbed together and accordingly the Plan Schemes for the year 1995-96 have been drawn up and implemented. The Plan Schemes which were operated during 1995-96 are being operated during 1996-97 also.

Plan Schemes cover the following segments of the industry.

1) Grain Processing Sector
2) Fruits & Vegetables Processing Sector
3) Meat & Poultry Processing Sector
4) Fishery Sector
5) Consumer Industries Sector
6) Secretariat Economic Services

FRUITS & VEGETABLE PROCESSING

Prior to the 8th Plan, there was no planned effort to develop this industry, although some assistance were extended in the years 89-90 & 90-91 for this sector of food processing industry. However, recognising the importance of this sector, there has been substantial policy changes in 1991 to boost/growth of this industry. While the fruits & vegetable processing sector was delicensed in 1988, fiscal incentives were provided in 1991-92 Budget, when excise duties on fruits & vegetable products were removed. Simultaneously, in various Budgets since 1991-92 the duties on capital goods for this industry have also been slashed substantially. Excise and custom duties on packaging material have also been reduced although they are still considered to be high. However, most Stage Govts. continue to impose high sales tax on the processed fruits & vegetable products. These taxes and duties deter market expansion.

During 8th Plan, Ministry operated various Plan Schemes to remove some of the constraints and encourage investments. Besides organising seminars, making available information and data, Ministry operated following Plan Schemes :

i) Scheme for assistance for the setting up of Food Processing and Training Centres in rural areas;

ii) Scheme for assistance for the creation of infrastructure facilities for fruit and vegetable processing including Mushroom processing and Hops;

iii) Scheme for assistance for the setting up/expansion/ upgradation of fruit & vegetable processing units and backward linkages between the processors and the farmers' etc.

iv) Scheme for assistance for generic advertising of processed foods and for providing marketing assistance; and

v) scheme for assistance for research and development in the fruit and vegetable processing sector.

The fund availability in the Plan schemes were totally inadequate to meet the real requirement. Therefore, during the 8th Plan, Ministry adopted a strategy mainly to :

(i) train up rural and small entrepreneurs for processing locally available fruits & vegetables in the small and cottage scale ;

(ii) make catalytic investments in the new types of fruits & vegetable processing industries to create a demonstration effect;

(iii) invest in new types of infrastructure required for fruits & vegetable processing to reduce wastage and spoilage.

(iv) assist in creation of quality control laboratories and promote generic advertising.

(v) invest in Research and Development activities which will go a long way to improve the quality; and

(vi) encourage the backward linkage of industry with the farmers.

With small catalytic investment in 5 of 6 mushroom processing units, the desired demonstration effect was created. This helped in attracting investment for setting up of some 46 mushroom processing units with foreign collaboration or otherwise having a total capacity of 1,10,000 tonnes per annum. The financial institutions also came forward to assist these types of units. Similarly, fruit processing units in Andhra Pradesh, Mizoram, Karnataka and Himachal Pradesh were assisted which helped others also to set up units in the private sector. The Ministry's assistance programme for introducing the pre-cooling system has helped in the setting up of 35 pre-cooling stations.

This has helped pre-processing and storing of grapes and other fruits for domestic market as well as for export. This has created a demonstration effect and National Horticulture Board has also agreed to assist such system. As a result, now people are coming forward to set up units. Similarly, this Ministry's assistance programme to set up ultra high humidity storage required for fruits and vegetable processing, which is different from usual potato cold storage has helped setting up of such units in the country.

Ministry also through its Generic advertising scheme gave publicity to consumption of fruit juices as a result of which domestic and foreign companies have come in to invest in production of fruit juices. These efforts and the Ministry's Plan schemes coupled with policy support have attracted investments through IEMs and foreign investments on EOUs to the extent of Rs.3500 crores.

A good deal of these units are under implementation. However, it has been noticed that in spite of the approvals and filing of IEMs, financial support from the financial institutions are not easily forthcoming because of various reasons including credit crunch. Unless some of these units are financed and are in the market, it will not be possible to attract further investments. Similarly, Ministry's efforts at attracting foreign investments have also brought in foreign equity investment in new type of products like french fries, super concentrate, spices oleoresin and fruit juices and even candid fruits & vegetables. Similarly, export oriented units for processing of gherkins with suitable backward linkages have also been established in the country.

These investment intentions and approvals have thrown up further challenge as other deficiencies in the system for faster growth have come to light. It has been noticed that our own Cold Storage order, 1984 and various Cold Storage Acts of different States do not permit easy establishment of the cold storages. Scrapping of this order is required for easy investments in the cold chain which the domestic and foreign investors are now looking into. Similarly, domestic phyto sanitary conditions for impost of certain seeds like potato seeds and inadequacy of our infrastructure for testing them is also causing delays in the introduction of processable varieties of fruits & vegetables in the country. Similarly, regulations on pesticides do not permit use of anti-sprouting agents like CIPC. While the use of CIPC is extensive in other countries which will reduce the energy consumption as potatoes are now to be stored at 12° rather than at 3-4°C. This will also help better maintenance of quality of potatoes in storage. This requires amendment.

In future, growth potential of fruits & vegetable products is immense and is likely to grow at a rate of approximately 25% per annum. Export growth which is approximately 20% per annum is also likely to register a further growth because of (i) low cost of production in the country and availability of certain fruits & vegetables during the period when these products are not available in large consuming countries in Europe, USA and Japan. It is estimated that by the end of the 9th Plan, the total demand for the fruits & vegetable products which are covered under FPO for the domestic market will increase from 1 million tonnes which is likely to be the demand by the end of the 8th Plan to approximately 2 million tonnes per annum by the end of the 9th Plan. Similarly, export will also reach a figure of approximately 0.5 million tonnes. Thus, total output needed for meeting the domestic and export demand is likely to be 2.5 million tonnes. To produce that quantity, it will be necessary to create a capacity of approximately 5 million tonnes from the existing capacity of 2 million tonnes by the end of the Plan. This capacity would be able to handle approximately 10 million tonnes of fruits & vegetables. Thus, by the end of the Plan, out of the projected production of fruits & vegetables of 154 million tonnes, in percentage terms, it will be possible to process approximately 3.5% of the total production of fruits & vegetables.

However, besides the traditional fruits & vegetable products covered by FPO, there is likely to be emergence of lightly processed fruits & vegetable products which include cleaned, cut, and packed fruits & vegetables for the domestic market or even for export.

In addition to the above, in the informal sector which are not covered under FPO, currently about 4-5 million tonnes of fruits & vegetables are processed. This is likely to rise to approximately 10 million tonnes. Thus, the total processing in the organised and informal sector by the end of the Plan will be of the order of approsimately 14-15 million tonnes which will be approximately 9-10% of the total output.

Meat & Poultry Processing

In the Meat & Poultry Processing Sector, MPPI is operating 5 Schemes.

In the Scheme for Development of Buffalo Meat Processing, we have been able to provide assistance for the setting up for such projects in the States of Punjab and Maharashtra.

Under the Scheme for Poultry and Egg Processing Project we have been able to assist in the setting up of 8 projects in the States of Andhra Pradesh, Assam, Madhya Pradesh, Mizoram, Tamilnadu, Kerala and Punjab. Similarly, sheep, goat and rabbit meat processing have also been assisted in the States of Assam, Karnataka, and Kerala.

Six Pork Processing Projects have also been assisted in the States of Uttar Pradesh, Assam, Karnataka, Mizoram and Nagaland.

Besides, assistance has also been extended for training of the workers and professionals in the Meat Processing Industry as also for establishment of deep-freezers. Since the potential for development of this industry is considered very large, it is proposed to continue these schemes during the Ninth Plan period also.

The Meat & Poultry Processing Sector has been growing steadily. However, the sector's growth is inhibited by several constraints which are enumerated elsewhere in the Report. For an integrated development, impetus from all sides will have to be provided. Apart from continuing the existing schemes, new schemes will also be required to be taken up during the Ninth Plan.

Fisheries Sector

The Ministry of implemented a number of schemes with a view to achieving an integrated development of the deep-sea fishing sector.

Under the Scheme for assistance for deep-sea fishing and processing ventures with the funds provided by MFPI, MPEDA participated in the equity of 3 companies during the Eighth Plan.

Under the Scheme for Assistance for Diversified fishing a total of 11 companies were assisted by MPEDA for motivating a total number of 21 vessels for diversification.

Under the Scheme for Cold-chain, tuna and other fish processing and Scheme for Setting up of Infrastructural Facilities for preservation and processing of fish during the Eighth Plan period a total of 37 projects were assisted by this Ministry.

Under the Scheme for Assistance for installation of communication facilities to coastal guard an amount of

Rs.255 lakhs was provided to Coast Guard during the Eighth Plan period. The targets set by the Coast Guard for acquisition and installation of equipments during the first phase has already been achieved. Under phase 2 it is proposed to acquire and install certain equipments which is under active implementation.

The objective of the Scheme for Interest subsidy was to bring down the interest burden on loans availed by entrepreneurs for acquisition of deep-sea fishing vessels. Under the Scheme a total amount of Rs.159.14 lakhs has already been disbursed as subsidy to the eligible entrepreneurs numbering six during the 8th Plan period by SCICI, Bombay.

FISHERY SURVEY OF INDIA (FSI)

Fishery Survey of India (FSI) is the Nodal Agency under the Government of India for the survey and assessment of marine fisheries resources of the Indian Exclusive Economic Zones. Besides survey FSI undertakes assessment of suitable craft and gear for deep-sea fishing, preparation of fisheries charts, training of post-institutional trainees of CIFNET and consultancy work on various aspects of deep-sea fishing.

These are being carried out through operation of 12 large survey vessels from 7 operational basis viz. Porbander, Mumbai, Madras, Marmagoa, Cochin, Vishakhapatnam and Port Blair with its Headquarters at Mumbai.

Substantial progress was made by FSI in the survey of demersal resources in the Indian EEZ and survey of deep swimming oceanic resources survey along north west coast and around Andaman & Nichobar islands. Still some of the areas and resources, particularly neritic stocks, tunas, oceanic squids, etc. are yet to be investigated in detail and the resources once surveyed and which are under different levels of exploitation are required to be resurveyed for the monitoring of the stocks on a continuous basis in the Indian EEZ. The current global approach in fisheries development is oriented to promoting optimum utilization of the available resources at sustainable level as envisaged under the UN Law of the Sea. In order to meet these challenges, apart from continuing the on going activities. The fishery survey of India proposes to take up new activities in the IX Plan.

CONSUMER INDUSTRIES

Two Public Sector Undertakings viz. Modern Food Industries (India) Limited (MFIL) and North-Eastern Regional Agricultural Marketing Corporation Limited (NERAMAC) are functioning under the administrative control of this Ministry. Budgetary Support is extended to these two Enterprises depending upon the merits of the case. In addition there are R&D Schemes on Soyabean Products, Indian Traditional Foods and one for Packaging under this Sector. Under this Scheme, assistance in the form of Grant-in-Aid is given to research institutions like Central Food Technological Research Institute (CFTRI), Mysore, Indian Institute of Packaging (IIP), Bombay etc. for development of soya-based products, new food products based on traditional foods, development of new inexpensive packaging techniques and new techniques of processing and preservation etc.

These schemes are proposed to be continued during the 9th Plan period also.

SECRETARIAT ECONOMIC SERVICES

Under the Secretariat Economic Services some of the important Plan Schemes being operated by Ministry of Food Processing Industries are as under :

Having recognised the critical role which the State Govts. have to play in the food processing sector and with a view to coordinating the activities pertaining to this sector, the State Govts. have identified nodal agencies at the State level. Financial assistance is being extended to such agencies for enabling collection of field information, preparation of data base etc. This Scheme, because of its importance, will have to be continued and substantial Central assistance may have to be provided.

Another Scheme relates to strengthening of Directorate of Fruits & Vegetable Processing for information, training, education and quality systems for development of Fruits & Vegetable Processing. As already stated, the growth of F&VP sector has been substantial. The existing structure of four regional offices and one sub office has to be strengthened for proper enforcement of Fruit Products Order and also for collection and dissemination of information regarding the performance of the industry and to render consultancy to entrepreneurs on the areas of further investment, technology, packaging etc. This Scheme also envisages to compile information on different aspects of technology, machinery, packaging etc. and disseminate the same amongst the entrepreneur, potential entrepreneurs etc. Under this scheme short films are proposed to be made for dissemination of information. 12 short films in Hindi have already been made and they are being dubbed in 10 regional languages. 23 more such films on different products are at various stages of completion. This scheme is proposed to be continued during 9th plan period also.

Participation in National/International Exhibition is necessary for familiarising the existing and prospective entrepreneurs with modern techniques of production and packaging, development of market and popularisation of products. The Ministry had been participating in such exhibitions in close association 'with APEDA, CFTRI. Defence Food Research Laboratory (DFRL) etc. Since such continued participation would be absolutely essential the scheme is proposed to be continued during the 9th Five Year Plan Period also.

In the Food Processing Sector a, major reason for underdevelopment is said to be lack of information regarding levels of current and potential production. In a number of areas realisation of the potential will require agronomic, infrastructural, technology and financial interventions. Such interventions will vary from year to year and will have to be worked out in detail. Preparation of feasibility Report is within the scope of this exercise and assessing the potential and devising method of utilising it, market research etc. both for domestic consumption and export will also have to be supported wherever necessary. Since there is no organised method of promoting data collection and studies of the nature described above, it is considered necessary to support through total or partial funding such studies undertaken by Union or State Governments or their agencies, academic bodies, recognised organisations of the industry and teams constituted of expert agencies nominated by the Government. Some such studies are also required to be commissioned by the Ministry. The scheme also envisages support for meeting the cost of seminars, symposium, workshop etc. organised by Government or academic bodies, industry association etc.

This scheme is also proposed to be continued during the Ninth Five Year Plan.

With a view to provide encouragement/recognition of outstanding achievement by units in the Food Processing Sector and for augmenting efficiency through a healthy competitive spirit, the scheme for performance awards in food processing industries was introduced in 1989-90 and is being continued. The National Productivity Council is the designated Agency for selection etc. Since the scheme is considered important enough, it is proposed to continue during the Ninth Five Year Plan also.

As a result of the various steps taken by the Government from time-to-time in the process of liberalisation food processing industries have been able to attract considerable investments. Apart from this a number of approvals have also been given by the Ministry for setting up export oriented units. In order to monitor the expenditure of implementation of these approvals, it would be necessary to set up a Cell which could take up this work.

CEREAL PROCESSING INDUSTRIES

Cereal processing industries broadly consist of the following:

1. Rice Processing Industry
2. Roller Flour Milling Industry
3. Pulse Processing Industry
4. Coarse Grain Processing Industry
5. Cereal Based Products Industry
6. Pasta Products

Different aspects relating to the current status, development, constraints, future requirements etc. in respect of each of these industries is discussed in the succeeding paragraphs.

01. Rice Processing Sector

India is the second largest producer of rice after China. It produces and consumes a little over 1/5th of the world's total rice. The past trends in rice production have been given in Annex I. Although rice is grown in almost all the States and Union Territories in India, the bulk of the production comes from about 8 States, which together account for more than 80% of the total rice output. The paddy grains obtained after harvesting and threshing are subjected to further processing before being consumed. The first stage of rice processing is hulling or shelling. However, in certain States in the South and in almost all the Eastern and North-Eastern States paddy grains are parboiled before hulling and shelling and this parboiling is done in order to gelatenise the rice karnel and enhance its storage life, as well as to reduce the percentage of brokens during milling. About 50-55% of the rice produced in the country is par-boiled. After hulling or shelling, the de-husked rice is fit for consumption as food. About 10% of the paddy is diverted for seeds and the remaining 90% is available for milling. Depending upon the technology employed, about 65-70% of the rice is recovered at this stage. Milling of paddy yields about 22% husk and 5-6% of rice bran as by-products. Most of the rice is consumed as food by home-scale processing. A small quantity of rice is converted into various other products, mainly puffed or flattened rice as well as rice flour. A very small amount is used in certain States for manufacture of alcoholic drinks. A small dent has been made in recent years for manufacture and marketing of instant mixes for traditional products like idli etc.

One of the major efforts for developing this industry relates to modernisation of rice mills in order to reduce the amount of brokens and to increase the yield of rice from paddy. In 1972, only 1% of the total paddy production in the country was processed through modern rice mills, but now approximately 65% of the total paddy production is processed in modern rice mills yielding better quality rice and by-products like bran and husk. By-products like bran can be gainfully utilised for extraction of edible oil. The number of rice mills of different types existing at present is as follows:-

S.No.	Type	Number
01.	Huller mills	91,801
02.	Sheller mills	4,538
03.	Huller-cum-sheller	8,365
04.	Modern units	34,163

The bulk of the processing industry in the country is in the private sector. There are at present about 200 rice mills machinery manufacturers in the country engaged in the manufacture of modern rice milling equipment, par boiling equipment, drying equipment and husk fired furnaces for the drying of par boiled paddy. Most of these firms are capable of instaling modern rice milling equipment on turn-key basis. The domestic industry in this respect is, by and large, capable of meeting the requirements for modernising of the rice milling industry. A few machines like water jet polishers and colour soring machines have still to be imported. A large number of processing equipment has also been covered under the standards formulated by the Bureau of Indian Standards.

Along with the modernisation of rice mills, export of rice from India in respect of both basmati and non-basmati varieties, has been showing an upward trend as detailed in Annex II.

The rice milling industry is reserved for the small scale sector and the modernisation of this industry can be given a bigger fillip by considering de-reservation of this industry, since the setting up of a modern rice mill would cost in the vicinity of Rs. 3-5 crores.

The operations of rice milling industry can be strengthened by expanding and supporting the areas of better utilisation of by-products, reduction of losses in transportation, storage and packaging and also by more efficient use of energy.

Apart from agricultural universities, there are a few institutions directly dealing with research and development as well as training and expansion in the field of cereal processing. Notable amoung these are the CFTRI, Mysore, which functions under the CSIR, and the Paddy Processing Research Centre at Thanjavur which functions under the control of the Ministry of Food Processing Industries. The industry is also governed by the Rice Milling Industries (Regulation) Act, 1958. However, there is a proposal for rescinding this Act since the industry in general is aware of the benefits of modernisation and the said Regulation seems to be no longer required.

<u>Review of the Eighth Plan:</u>

In order to facilitate the development of this industry, the Ministry implemented a number of schemes during the Eighth Plan. The schemewise details during each year of Eighth plan and the achievements thereof upto 1995-96 are given in Annex III. The final target and achievements are as follows:-

Year	Financial outlay	Amount disbursed	%age of expenditure
1992-93	Rs.365.00 lakhs	Rs.341.30 lakhs	93.50%
1993-94	Rs.340.00 lakhs	Rs.326.71 lakhs	96.09%
1994-95	Rs.370.00 lakhs	Rs.353.00 lakhs	95.40%
1995-96	Rs.370.00 lakhs	Rs.302.67 lakhs	81.80%
1996-97	Rs.330.00 lakhs		

The physical targets and achievements in this sector are as follows:-

(i) Post Harvest Technology Centre, IIT, Kharagpur:

This Centre is being fully financed by Government of India and is looking after the engineering aspects of paddy processing, covering research & development and training programmes. It was set up in 1967. It is proposed to continue this Centre during the 9th Plan. However, it is proposed to hand over the Centre to the IIT during this period and no furthehr funding would be available. With the setting up of the Food Engineering Centre at the CFIRI, it would be better to have coordinated activities undertaken under one umbrella.

(ii) Paddy processing Research Centre:

This Centre is run directly under the control of the Ministry and is functioning as a registered society. It is fully funded by the Government of India and deals with research regarding the basic aspects of paddy processing like storage, drying, par-boiling, milling and utilisation of by-products. It is proposed to continue this Centre during the 9th Plan.

(iii) Scheme for Establishment of Regional Extension Service Centres (Rice Milling):

These Centres are set up in various paddy processing States and grant-in-aid is provided for a fixed period of time for purchase of equipment and for extension work. Assistance has been provided for 13 such Centres so far. Since the efficacy of modern rice milling methods is well-established and since extension work is already being taken up by Agricultural Universities and CFTRI, it is nor proposed to continue this cheme during the Ninth Plan except for spillover component.

(iv) Research & Development and Cereal Processing Machinery Testing Centres:

Four Cereal Processing Machinery Testing Centres have been set up and assitance for R&D activities has been give to 11 institutions. It is not proposed to continue the scheme in respect of Cereal Processing Machinery Testing Centres, except for sillover component, since this work is to be taken up at the Food Engineering Centre at the CFTRI. Standards would also be laid down under the aegis of the Bureau of Indian Standards. A separate scheme would be formulated for R&D for the whole cereal processing sector and not only for rice milling sector. Only spillover component would be continued in its present form.

(v) Assistance for modernisation of Rice Milling Industry:

Under this scheme, assistance has been provided to States for modernisation of huller mills by providing partial subsidy towards the cost of modernisation. This scheme is not proposed to be continued in the Ninth Plan, since most of the States have already been provided assistance. Also, some of these States have indicated their intention to refund the amount given for this purpose for lack of interest among the beneficiaries. Others have not yet fully utilised the amounts given and are finding it difficult to do so. The total amount released for this purpose so far involves modernization of about 3500 huller mills, but the amount actually spent involves modernization of about 1500 huller mills only. Other States have not expressed an interest in obtaining assistance under this scheme. There is no spillover component.

Wheat Processing Sector

India is the 4th largest producer of wheat in the world and produces and consumes about 30% of the world production of wheat. The northern region of the country is the major wheat producing area with U.P., Punjab and Haryana together accounting for over 70% of the wheat produced. About 65 to 70% of the total wheat produced is converted into atta for household consumption. About 10% is retained as seed, about 10-11% is converted by roller flour mills into Maida and Semolina. Maida and Semolina are further used in the bakery and pasta making industries. Byproducts of wheat include starch, bran and wheatgerm.

Wheat is milled in atta chakkis in the cottage/small scale sector as well as in roller flour mills. The numer, capacity and production of roller flour mills over the years is at Annex IV. The State-wise distribution of roller flour mills is at Annex V. This industry was delicensed in 1986 and, therefore, firm data of actual capacity and production are not available. However, according to estimates, about 50% of the installed capacity is lying idle. The industry has low conversion margins, obsolete technology, resultant high pwer consumption etc. Since 1/3rd of the mills were set up by 1980, these needs to be replaced or modernised. In recent times, the atta chakkis have also been giving stiff competition to roller flour mills by marketing their atta in smaller packs to retail outlets.

The future growth of the flour milling industry would be towards modernisation of the existing facilities, diversification into speciality flours for the production of pasta production, fast food, confectionery etc. Another important aspect would be better utilization of byproducts, reduction of losses during storage and transportation, development of more modern equipments in India, skill upgradation and development of traditional technologies for value added products and for retention of nutritional value.

The Ministry had no Plan schemes for this sector during the 8th Five Year Plan.

Cereal based products

Bakery industry and pasta industry are the two major wheat based industries.

Bakery industry in India is the largest among the processed food industries and comprises of bread, biscuits, cakes, pastries, rusks, buns, rolls, etc.Bread and biscuits accounts for almost 82% of the total bakery products. Manufacture of bread, biscuits and pastries is reserved for manufacture in the small scale sector. The annual production of bakery products is estimated to be in excess of 30 lakh tonnes. However, per capita consumption of bread and biscuits is very low. This industry has an annual growth rate of about 8% and is expected to provide growing opportunities for value addition and employment. However, flour milling industry has not been able to provide specialised wheat flour with certain specific characteristics such as gluten content, water absorption capacity, etc., to this industry. Bakery equipment is available indigenuously , but there is strong need to develop the right kind of flours for this industry.

In spite of its vase potential, the manufacture of bread and biscuits in India has missed out largely on the benefits of modern technology because of the reservation policy. The reservation of these items in the small scale sector has created monopoly situation in favour of a handful of large scale industry in these sectors which were in existance before the items came under reservation. These large scale units have not upgraded their processes or products because of lack of competition. Modernisation of this industry would require large scale investments which the small scale sector would not be capable of making. Induction of this sector would automatically have a reviving effect on the flour milling industry.

Another wheat based product is known by its generic name i.e. pasta products and comprises of vermicelli, noodles macaroni and spaghatti. Pasta products have gained popularity recently as semi-processed foods which can be easily cooked and consumed either as snack food or for fast food. The present installed capacity of the pasta products in the organized sector is estimated over 34,000 tonnes per year. It is estimated that a total 178 units exist in the small sector producing pasta products and the demand for these products is likely to increase in the coming years.

This sector would require adequate number of machinery manufacturers, better packaging materials and a larger variety of specialized flours.

There was no Plan scheme to provide assistance to this sector in the Eighth Plan.

Pulse Processing Sector

Pulse milling industry is a major milling industry in India, next only to rice and flour milling. It has been estimated that out of the 14 million tonnes of pulses produced, 75% is processed in about 10,000 dal mills. Pulses provide about a third of the total protein intake, supplementing the deficient amino-acid and other cereal proteins. However, the production of pulses and the availability of pulses per capita has not kept pace with the requirement. Therefore, it is extremely important that the milling of pulses should have the highest possible yields.

Pulses are passed through several stages of pre-cleaning, dehusking, grading, aspirating, splitting and polishing. Pulses are processed through various methods at the homescale, cottage-scale and small scale levels. It is extremely necessary not only to increase the production of pulses but also to conserve the available supplies by proper processing techniques. For this purpose, a modern dal mill has been developed by the CFTRI. Presently the dal millers are following laborious and time consuming techniques using conventional equipment which is entirely dependent on climatic conditions. The CFTRI technology is semi-continuous in operation and substantially reduces processing time and increases the overall yield of good quality dal to 80-85%. It is also independent of climatic conditions. A few firms are already manufacturing this modern dal mill. It would be necessary to popularise such modern processing techniques. The dal mills presently operating also require the installation of dryers for drying of pulses which will greatly reduce the losses due to the vagaries of uncertain weather, since at present the drying is done through yard drying/sun drying. Another requirement would be the installation of dust control systems to improve the productivity and efficiency of the labour working in the pulse milling industry.

There was no Plan Scheme in the 8th Plan to provide assistance to this sector. However, it would be appropriate to provide assistance for this sector during the 9th

Plan towards upgradation of technology.

Maize/coarse grain processing Sector:

Maize is a versatile foodgrain which is extensively used as vegetable i.e. sweet corn/baby corn, snack i.e. popcorn/roasted corn, the coarse grain is processed for value added food products i.e. starch, glucose, dextrose, sorbitrol, edible oil, alcohol etc. These value added food products are essentially required to impart certain texture, flavours etc. to processed products, for the domestic market and for exports.

Other coarse grains like bajra, jowar, ragi, sorghum etc. from the staple food of people in particular areas, specially in dry tracts. Generally regarded as inferior grains, their consumption and processing has not received the required attention of the industry. One of the reasons is that these grains lack gluten characteristics of wheat that provide adhesiveness and elasticity to the dough for being rolled into chapatis. It is also not possible to "soft-cook" these grains. However, studies have shown that it is possible to obtain consumer acceptance of coarse grains substantially by removal of the outermost bran layer or glumes by certain milling methods. Some of these methods have been standardised. Certain varieties of ragi, bajra and jowar have been found to have a good potential in a puffed and popped form. A number of other products have also been developed in this respect by the CFTRI.

In order to promote the devlopment of this sector, and thus ensure a reasonable price to coarce grains producers who are genuinely poor dryland cultivators, it would be essential to strengthen backward linkages for grawing high quality raw material. Along with this, value added nutritional products have to be developed through R&D activities to suit consumer taste for processed food. Pilot plants have also to be set up to disseminate the production processes. Considering the high nutritional value of coarse grains, this promotional activity will go a long way in closing the nutritional gap existing in majority of the population in the country.

There was no Plan scheme in the Eighth Plan to provide assistance to this sector. It is proposed to launch a programme in the 9th Plan to develop and popularise the processes for the production of snack foods from coarse grains.

Food Engineering Centre:

During the Eighth Five Year Plan, the Ministry implemented a Plan scheme relating to the setting up of a Food Engineering Centre at the CFTRI. It was found that though the Indian Food Processing Industry is concentrated mainly in the tiny, small and medium scale sectors, the facilities and availability of R&D infrastructure relevant to the needs of such units was not adequate. The Food Engineering Centre is aimed at promoting new products and processes and to make available necessary technical services to the food processing industries sector. The proposal of the CFTRI was for Rs.490 lakhs for setting up of this Centre and the whole of this amount has been provided for in the Eighth Five Year Plan. Out of this, only an amount of Rs. 120 lakhs remains to be disbursed and a provision for the same has been made in the current year, i.e. 1996-97. The objectives of the Food Engineering Centre are as follows:-

a) Techno-economic assessment of process, product and plant designs/ profiles and their optimisation through vigorous pilot plant and other engineering studies.

b) Assistance in test-marketing of new products by serving as a production Centre during the implementation stages of the project and product modifications to suit market response.

c) Training of operators, technologiests and engineers in plant operation, maintenance and trouble shooting in process plants.

d) Development and licensing designs for new machinery and equipment with the participation of the Design Centre and proto-type fabrication shop.

e) Generation of a data base and providing information on physical, thermal, engineering and chemical properties of raw materials and ingredients.

f) Providing equipment facility for existing or new industries to help them in decision making towards selection of most suitable machinery (either new ones or replacements) for their existing process plant.

g) Serving as engineering consultants to the industry - preparation of project reports and other techno-economic reports setting up of process plants on turn key basis in collaboration with engineering firms.

The Centre will consider setting up of a pilot plant complex incorporating scale-down flows of plant and machinery for selected processes, a food engineering laboratory, a design centre for evolving new designs for plant and machinery and for providing engineering assistance to industries, a proto-type machinery fabrication shop, a process instrumentation and automation laboratory and a project engineering cell. The Centre will generate funds through joint programmes with the industry and will also perform other functions of R&D establishment.

Importance of cereals and cereal products in improving the nutritional profile of Indians:

On the basis of surveys conducted by national and international organisations in the field, it has been found that the nutritional profile of Indians is amongst the worst in the world. Under-nutrition and malnutrition are prevalent largely among the poverty affected rural population and particularly among women and children. But even in the comparatively higher income groups, nutritional levels of the population are lower than desirable levels. While the nutritional status of any section of the population would be affected by low dietary intake, other socio-economic factors have also affected nutritional aspects in the country even where dietary intakes are comparatively better. Though one of the major reasons is poverty and consequent malnutrion arising from hunger, a significant factor which cuts accross income levels is misinformation about food preparation and intake. Some of the traditional technologies for retention of nutrients in food have also become less prevalent due to urbanisation, popularity of fast food etc. It is therefore necessary to create a data base of traditional technologies which have stood the test of time and are scientifically sound. Though it would be difficult to turn the clock back from fast foods, the ill effects can be compensated for, by food-to-food fortification and fortification of raw materials like atta, maida etc. People could also be made aware of better cooking and eating habits, through publicity, in order to educate them towards improving their nutritional profile. Fortification of basic foods widely consumed by the population at risk, of Vitamin A and/or Iron deficiency is currently being done by a number of developing countries. India is currently fortifying salt with iodine. Fortification of other foods for minimising Vitamin A and/or Iron deficiency are also being considered by the Department of Women & Child Development. This will require upgradation/modification of current foodgrain milling equipment, for which some assistance could be provided. R&D could also be promoted for this purpose and the private sector can be motivated and encouraged to participate in this process.

OBJECTIVES OF THE 9TH PLAN

The main objectives of the cereal processing sector during the 9th Plan would be as follows:

1. To strengthen R&D work in the cereal processing sector towards higher yields, retention of nutritional value, fortification, better processing techniques, development of diversified products and value addition.

2. To support the use of coarse grains for production of value added products

3. To encourage the modernisation of the pulse processing industry.

4. To adapt, disseminate and popularise traditional technologies for value added products in the cereal processing sector.

5. To provide policy support for modernisation of cereal processing industries.

6. To encourage more economic use of by-products.

7. To disseminate the latest technologies for cereal processing to the industry and to promote skill upgradation.

8. To interact with the private sector for ways of fortifying cereal based foods towards minimizing micro-nutrient deficiencies.

Total Investment required in Cereal Processing Sector
during the Ninth Plan

(Rs. in Crores)

S.No.	Items	Total investment	Govt. Share	Private Share
01.	Research & Development	10.00	10.00	—
02.	Human Resource Development	10.00	10.00	—
03.	Incentives for Modernisation of Rice mills and for setting up of state-of-the-Art technology mills.	40.00	00.00	40.00
04.	Incentives for Backward linkages for Utilization of Coarse grain & Maize, Pulses and Modernisation of Pulse Mills	130.00	20.00	110.00
05.	Incentives for setting up energy saving equipments in Grain Processing Sector.	20.00	00.00	20.00
06.	Setting up of New Rice Mills, Flour Mills, Bakery Units, Pulse Mills & Maise Processing facilities	2000.00	—	2000.00
		2210.00	40.00	2170.00

PRODUCTION OF RICE

Year	Production (Million Tonnes)
1970 - 71	42.22
1975 - 76	48.74
1980 - 81	53.63
1985 - 86	63.83
1986 - 87	60.56
1987 - 88	56.86
1988 - 89	70.49
1989 - 90	73.57
1990 - 91	74.29
1991 - 92	74.68
1992 - 93	72.86
1993 - 94	80.30
1994 - 95	81.16

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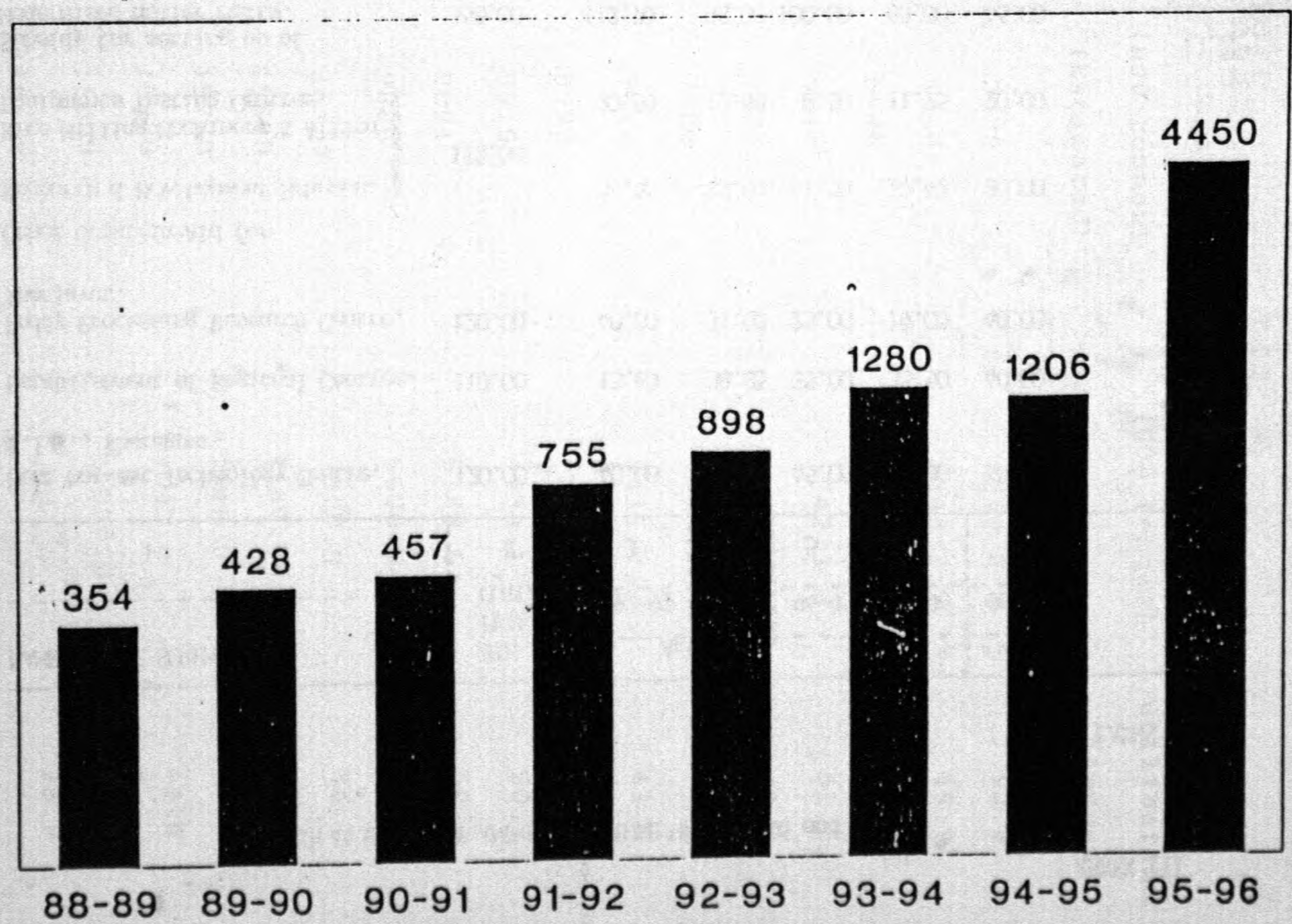
ANNEX II

EXPORT OF RICE (BASMATI AND NON-BASMATI)

Value (Rs Crore)



ANNEX III

8TH PLAN OUTLAY AND EXPENDITURE UPTO 95-96 and 96-97

(RS. IN LAKHS)

	NAME OF THE SCHEME	8TH PLAN OUTLAY	Actuals 92-93	93-94	94-95	95-96	outlay 96-97
	1	2	3	4	5	6	7
1.	Post harvest Technology Centre, I.I.T., Kharagpur.	120.00	40.00	45.00	45.00	40.00	45.00
2.	Establishment of Regional Centres.	110.00	13.60	38.85	35.00	33.50	40.00
3.	Paddy Processing Research Centre, Thanjavur.	120.00	40.00	31.00	23.00	19.00	40.00
4.	Other Grant-in-Aid for						
(a)	Research & Development Schemes.	175.00	34.50	35.96	41.50	10.42	20.00
(b)	Rice Milling Machinery & Allied Equipments Testing Centres.		20.50	12.00	8.50	11.75	20.00
5.	Subsidy for setting up of Modernised Huller Mills.	350.00	112.70	93.90	100.00	68.00	45.00
6.	Food Engineering Centre.	225.00	80.00	70.00	100.00	120.00	120.00
		1100.00	341.30	325.71	353.00	302.67	330.00

ANNEX IV

Number of mills, Capacity and Production of Roller Flour Mills as on 1st January, 1996.

Year	No. of Mills	Capacity (000 tonnes) (Estimated)	Production (000 tonnes)	% age utilisation (Annual)
1960	127	2898	1559.2	53.8
1970	206	5130	2343.2	45.7
1975	232	5946	1228.3	20.7
1980	232	5946	3042.3	51.2
1981	305	7495	3615.2	40.8
1982	310	7486	3206.1	42.8
1983	365	7848	3436.9	43.8
1984	426	8592	3417.7	39.8
1985	454	8915	4534.1	50.9
1986	464	8891	5188.6	58.3
1987*	496	9886	5600.0	56.6
1988*	557	15139	7000.0	46.0
1989	600	15500	7100.00	45.8
1992	702	15720	7546.0	48.0
1993	740	15900	7632.0	48.0
1994	750	16000	10000.0	55.0
1995*	800	18000	7000.0	38.9

Number of Roller Flour Mills in the Country as on 01.01.1995

	State	Number of Mills
01.	Uttar Pradesh	120
02.	Maharastra	61
03.	Karnataka	60
04.	Tamil Nadu	60
05.	Andhra Pradesh	58
06.	Bihar	58
07.	West Bengal	49
08.	Haryana	45
09.	Punjab	44
10.	Madhya Pradesh	41
11.	Assam	40
12.	Gujarat	34
13.	Kerala	27
14.	Jammu & Kashmir	19
15.	Orissa	19
16.	Delhi	18
17.	Himachal Pradesh	15
18.	Rajasthan	10
19.	Chandigarh	05
20.	Nagaland	04
21.	Pondichery	03
22.	Sikkim	03
23.	Goa	02
24.	Meghalaya	02
25.	Tripura	02
26.	Manipur	01
	Total:	800

HORTICULTURE BASED INDUSTRIES

Introduction

1. India's horticulture has developed to a substantial extent, particularly since 1980.

Preservation, conservation and processing of horticulture produce needs to be given key position in the agro industries development plans of our country due to the following advantages:

(i) It helps in extension of shelf life and preservation of the produce thereby reducing losses;

(ii) Improve farm income;

(iii) Helps in diversification and commercialisation of agriculture thereby stimulating larger employment in the rural areas;

(iv) Add value to the produce;

(v) Provide nutritional supplement to the diet;

(vi) Provides ingredients for the advanced food industry;

(vii) Generate employment in transportation, storage, distribution and other ancilliary activities;

(viii))Helps in foreign exchange earnings through export; and

2. In the indian context, horticulture based industries can be classified as:

i. Fruits & Vegetables processing industry including root vegetable processing;

ii. Spices, herbs and Condiment processing industries;

iii. Cashewnut and other nut processing industries; and

iv. Coconut processing industries.

3. There are other horticulture based industries such as plantation crop based industry like tea & coffee. These industries are looked after by the Ministry of Commerce.

4. Amongst the four segments of industries mentioned above, in the past there has been some attempt to develop fruits and vegetable processing industry in an organised fashion. Similarly, to some extent efforts have been made

to develop spices based industry. But, segments of coconut based industry or nut processing industry continues to remain unorganised. Cashewnut and other nuts like walnut processing industry still uses traditional technology and is skill based. While some infusion of modern technology in the area of packaging as in case of cashewnut based industry has taken place, modern technologies of sorting, grading, laser cleaning or producing value added products is still insignificant. In the case of coconut, it is either consumed in fresh form or used in confectionery industry or is mainly used as oil seed. Coconut oil processing employs a very traditional method of sun-drying the cocnut and then extracting oil by usual traditional extracting technique. Tremendous scope, however, exists for developing coconut based industry as well as nut based value added food industry.

5. Status, problems & developments in four different segments of industry are described in subsequent paras:

Fruits & Vegetable Processing Industries:

India produces approximately 106 million tons of fruits & vegetables consisting of 34 million tons of fruits excluding melons and 72 million tonnes of vegetables excluding potato & onion. In world ranking, India's position is second after China. Yet the per capita availability of fruits & vegetables is approximately 100 gms and 200 gms per day.

Processing of fruits & vegetables can be categorised into: (i) post harvest processing and treatment of fresh fruits & vegetables and (ii) processing of fruits & vegetables for production of value added products.

Post-harvest processing of fruits & vegetables:

Post-harvest treatment of fruits & vegetables like cleaning, trimming, sorting, grading, pre-cooling, coating, packing, storage at appropriate temperatures and humidity conditions, their transportation and marketing in fresh condition are covered under the post-harvest treatments. These are done basically to extend shelf-life, reduce wastages or loss of value, add value and provide the customer as fresh product as possible even in off seasons. Post-harvest processing also includes treatments like coating, irradiation, etc.

There are substantial losses and quality deterioration of fruits & vegetables in the country due to lack of proper post-harvest infrastructure for its sorting, grading, packing, storage, transportation and marketing. Although no scientific study of losses at each stage of post harvest operation upto the terminal trading point for all fruits & vegetables has been conducted, as per one estimate upto 25% to 40% of some fruits & vegetables suffer quality deterioration or loss due to inadequacy of post harvest infrastructure and processing facilities. This depends upon the pers-hability of the fruits & vegetables and the nature of treatment given. While there may not be a total loss of the fruits & vegetables, but there is no doubt about the deterioration of value of the product if proper post-harvest treatment is not provided.

In the domestic market. there are positive preferences for fresh fruits & vegetables. But inadequacy of above quoted infrastructure does not permit off season availability of fruits & vegetables. Fruits & vegetables being seasonal in nature, farmers' cannot realise better price in absence of the smooth market access caused due to inadequacy of infrastructure. This acts as a disincentive to the farmers for investing in new techniques of production and applying better inputs to achieve higher yields. Similarly, small size of holding also does not permit a farmer to make larger investments or adopt scientific management systems. In addition to the above, availability of finance and access to technologies are also major problems for the farmers to improve their yield and then store and transport the products to the terminal consuming centres.

Sorting, grading and cleaning are still manual, and therefore does not give a very uniform standard of product; system of pre-cooling was totally non-existant untill some 5 years ago. However, of late due to the efforts of this Ministry and the National Horticulture Board, these systems have just been introduced. Packing of fruits & vegetables are still very primitive although some better systems of packaging have been introduced.

As regards storage, country has a capacity of storing approximately 8 million tonnes of fruits & vegetables, 95% of which is basically meant for storing potatoes only. Total cold storages for potatoes are 2000 in number having a capacity of approximately 77 million tonnes, remaining storage capacities ate mixed storage capacities of tomatoes and some fruits & vegetables.

Even in the cold storages meant for potatoes, the storages are at a low temperature of 0 to 4°C with or without humidity control. Potatoes sprout in these types of storages on long duration storing, because of enzymatic conversion of starch into sugar due to storage at low temperature. Recommended temperature for storage is around 12°C which reduces the starch-sugar conversion. But to store at that temperature, there is a need to use some sprouting inhibitors like CIPC which is not yet permitted in the country. Storage at that temperature will reduce the energy cost and therefore there is a need for amending the rules for allowing the use of CIPC for the potatoes that are going to be used for consumption. However, potatoes that are to be used for seed purposes need to be stored at a low temperature without any sprout inhibitors.

Similarly, for a long time, use of irradiation technique was not permitted which has recently been permitted. Application of irradiation techniques will be of great help for storing potatoes, onions and some fresh fruits and vegetables without loss of quality in storage. For this purpose the laws to be amended.

Ultra high humidity storage or controlled atmosphere storage for different types of fruits are very small in number, although newer types of storage systems with high humidity, proper air circulation, etc. have been introduced and is now catching up. In the case of grapes, these are now in use in Maharashtra. But these types of storage in the other fruits & vegetable growing areas are still very small.

Cold Storage Order of 1964 as amended in 1980 sometimes acts as an obstacle for putting up cold storages. Besides there are some Cold Storage Acts in 4 States which also obstructs putting up of cold storages on the basis of requirement. Under these Acts and Orders, licenses are required for setting up and even operating of cold storages. Conditions set forth in such circumstances at times put an extra burden on an entrepreneur wishing to set up or operate such storage. There is an urgent need to review these Order and Acts and, if need be, to totally scrap these Orders/Acts.

For the preservation of the fruits & vegetables which has been pre-cooled and stored, specific types of transportation means having cool or cold chamber are required. These are highly inadequate at the present moment and need to be augmented for which necessary encouragement and support have to be provided by the government.

5.3 Processing industries for value added fruits & vegetable products :

5.3.1 Fruits & vegetable processing industries can be divided into two groups : (i) industries producing fruits & vegetable products that are covered under Fruit Products Order, 1955, and (ii) other industries producing fruits & vegetable products. Fruit Products Order, 1955 does not cover fruits & vegetable products that are fried or sun dried. Similarly those products which are not sold in a packed condition also do not come in the ambit of FPO' 1955.

5.3.2 In the fruits & vegetable processing industry that are covered under FPO a large number of the units are in the small and cottage scale employing traditional technology. However, there are some large and medium scale operation of fruits & vegetable processing. While small and cottage scale units produce traditional fruits & vegetable products like squashes, syrups, preserves, jams, jellies, pickles, ket chups, some canned products, and some dried fruits & vegetable products, larger units produce fruit based beverages, frozen fruits & vegetables, fruit juice concentrates, tomato products, some potato based products, soups, jams, jellies, marmalades, ketchups, etc. Over the last 10 years, there has been a positive movement towards the industry getting organised which will be evident from the Table-I, which will indicate the cummulative capacities in different scales of operation in last 10 years.

TABLE - I

Comparative State of Licencees as on 31st December 1984, 1990 and 1995

Category	1984 No.	I.C M.T.	1990 No.	I.C. M.T	1995 No.	I.C. M.T
Large Scale	283	2,91,200	442	7,66,370	497	16,03,790
Small Scale-B	289	51,250	331	58,500	343	60,000
Small Scale-A	198	15,800	323	25,000	371	39,200
Cottage Scale	512	11,250	768	32,600	854	34,950
Home Scale-B	1298	10,500	1303	11,530	1520	12,060
Re-labellers	426	--	679	--	783	--
Total :	3006	3,80,000	3846	8,94,000	4368	17,50,000

Note : I.C. (installed capacity) in M.T.

This Table will also clearly indicate that while there has been some growth in number and capacity of the small, cottage and home scale units, the capacity creation in the larger units have been at a much higher rate.

The regional distribution and growth of these units have been growing which is evident from the Table below:

TABLE-II

Region-wise distribution of FPO licencees in India under the six categories, during 1984, 1990 and 1995:

1. Northern Region

	1984	1990	1995
Large Scale	74	100	103
Small Scale - B	89	79	95
Small Scale - A	66	118	151
Cottage Scale	189	259	339
Home Scale	318	465	631
Relabeller	101	134	253
Total	837	1155	1572

2. Eastern Region

	1984	1990	1995
Large Scale	30	47	48
Small Scale - B	32	35	36
Small Scale - A	27	31	28
Cottage Scale	44	64	70
Home Scale	95	133	134
Relabeller	43	52	68
Total	271	362	384

3. Western Region

	1984	1990	1995
Large Scale	99	138	169
Small Scale - B	80	107	90
Small Scale - A	39	85	99
Cottage Scale	154	223	222
Home Scale	641	359	456
Relabeller	209	321	312
Total	1222	1233	1348

4. Southern Region

	1984	1990	1995
Large Scale	80	157	177
Small Scale - B	88	110	122
Small Scale - A	66	89	93
Cottage Scale	125	222	273
Home Scale	244	346	299
Relabeller	73	172	150
Total	676	1096	1064

The growth of the units in different areas have generally been influenced by the factors like (i) market; (ii) raw-material availability; and (iii) promotional efforts by the States and Centre.

The output of various fruits & vegetable processing industry covered under FPO for the last 10 years is given in Table-III. This will indicate that there has been substantial growth in output and better capacity utilisation after the Government introduced the liberalised policy, provided incentives, when larger scale units came in with the better technologies and launched strong marketing efforts.

Fruits & vegetable products that are not covered under FPO consists of (i) fried and sun-dried products and those types of products which are produced by the informal sector. Amongst the fried products, most popular products are potato chips, banana chips and now recently introduced fruit chips. Potato chips industry which was quite insignificant in early 80's producing approximately 3,000 to 4,000 tonnes is now producing approximately 20,000 tonnes and is utilising approximately 1.2 - 1.4 lakh tonnes of potatoes. Of the 20,000 output only approximately 3,500 tonnes are produced in organised large scale units who have a total capacity of approximately 15,000 tonnes. Rest are produced in small scale sector and informal sector. The high-powered advertising and marketing expansion being done by the organised units has helped creation of demand for these products, advantage of these have been taken by the small scale and informal units. A recent study of the Tate Economic Consultancy Services (TECS), indicates the present production of potato chips in the informal sector (those who have not registered anywhere - SSI or KVIC or under Factories' Act). is approximately 9000 tonnes, which was only approximately 3,800 in 1980. The annual growth rate of this product in the informal sector is estimated to be 10% and is expected to grow by approximately 12% per annum in the informal sector. Similarly, 7500 tonnes of these product is made in the small scale units selling locally branded products or un-branded products.

6.2.6 The other fried products are banana chips which is generally produced in a very small scale and informal sector units that are mainly concentrated in the southern part of India particularly in Kerala. Some fried products manufacturing units in the organised sector are in the process of being established in Eastern part of India. The informal sector of industry produces a variety of fruits & vegetable products. These are :

i) sun-dried products like dried potato chips, banana chips, tapioca chips, peas, raisins

ii) preserved and candied products like murabas, pethas, tooti-fruity, etc.;

iii) pickles & chutneys;

iv) preserved bamboo shoots, cabbages and similar vegetables in acetic or lactic acid;

v) freshly produced juices like sugarcane juice, fruits & vegetable juice, etc.;

vi) sauces like tomato sauce, chilli sauce or similar sauces; and

vii) Aam pappad and similar products.

Since these informal sector units are widely distributed , precise production data of these are not available. However, it is estimated that the total output of the informal and unorganised sector is approximately 1.2 to 1.5 million tonnes utilising approximately 3.5 to 5 million tonnes of fruits & vegetables.

TABLE - III

PRODUCT GROUP-WISE PRODUCTION OF FRUIT PRODUCTS

SNO	PRODUCT GROUP	YLY. PRDN./%	1986	1987	1988	1989	1990	1991*	1992*	1993*	1994*	1995*
1	R T S BEVERAGES	P	24.5	59.4	91.3	105.0	126.4	131.9	136.0	152.1	182.52	220.70
		C	37.64	142.45	53.70	15.01	20.38	4.35	3.11	11.84	20.00	25.30
2	CANNED AND BOTTLED FRUIT AND VEGETABLES	P	12.6	11.7	9.0	8.7	8.5	14.0	19.0	22.8	24.93	30.10
		C	-3.82	-7.14	-23.08	-3.33	-2.30	64.71	35.71	20.00	9.34	20.74
3	FRUIT JUICE	P	19.4	10.6	9.5	1.0	7.5	11.0	16.0	19.1	22.10	26.30
		C	-3.48	-45.36	-10.38	-89.47	650.00	46.67	45.45	19.38	15.71	19.00
4	FRUIT PULPS	P	21.7	41.9	34.0	36.0	52.0	74.0	103.0	121.7	152.10	190.50
		C	-50.23	93.09	-18.85	5.88	44.44	42.31	39.19	18.16	24.98	25.25
5	JAMS/SQUASHES/SYRUPS	P	34.9	24.8	31.1	26.5	26.0	28.2	42.6	45.8	50.30	65.20
		C	-8.16	-28.94	25.40	-14.79	-1.89	8.46	51.06	7.51	9.83	29.62
6	FRUIT JUICE CONC.	P	4.1	5.0	4.9	5.4	3.7	4.5	5.5	5.7	6.45	7.20
		C	36.67	21.95	-2.00	10.20	-31.48	21.62	22.22	3.64	13.16	11.62
7	PICKLES, PRESERVES & CHAINIES	P	22.1	22.2	23.9	22.3	20.9	39.2	52.4	64.6	74.70	96.50
		C	-3.49	0.45	7.66	-6.69	-6.28	87.56	33.67	23.28	15.63	29.18
8	DEHYDRATED FRUITS & VEGETABLES	P	2.1	1.5	1.5	1.8	2.6	5.4	8.5	17.2	15.00	18.20
		C	5.00	-28.57	0.00	20.00	44.44	107.69	57.41	43.53	22.95	21.33
9	FROZEN FRUITS AND VEGETABLES	P	0.9	1.7	1.3	2.7	4.0	9.0	31.3	46.0	63.25	79.50
		C	-62.50	88.89	-23.53	107.69	48.15	125.00	247.78	46.96	37.50	25.69
10	TOMATO PRODUCTS INCL. TOMATO KETCHUP & SAUCE	P	9.5	8.5	11.5	15.6	17.1	29.2	35.4	43.2	54.43	68.50
		C	7.95	-10.53	35.29	35.65	9.62	70.76	21.23	22.03	26.00	25.85
11	CANDIED/CRYSTALISED FRUITS	P	3.8	5.0	5.2	5.2	4.3	6.5	11.0	16.8	20.23	24.30
		C	8.57	31.58	4.00	0.00	-17.31	51.16	69.23	52.73	20.42	20.12
12	VENEGAR, OTHER SAUCES & MISC. PRODUCTS	P	5.9	5.5	8.1	7.2	7.0	7.1	8.3	9.0	10.12	15.20
		C	47.50	-6.78	47.27	-11.11	2.78	1.43	16.90	8.43	12.44	50.19
	TOTAL		161.5	197.8	231.3	237.4	280.0	360.0	469.0	559.0	676.13	850.20
			-9.88	22.48	16.94	2.64	17.94	28.57	30.28	19.19	20.95	25.75

P - Prodn. in Thousand Tonnes
C - % change w.r.t Previous Year
* - Estimated

constraints

However, considering the total volume of fruits & vegetables processed by the units covered under FPO, the percentage of fruits and vegetables processed is still approximately 1.6% of the total production. Although there has been a quantum jump from 0.5% processing in 1990-91 to 1.6% in 1995, this is still very insignificant if we compare with other countries. Such a low processing activity/high losses is mainly due to following factors:

i) inadequate policy support in the past;

ii) non-availability of processable varieties of raw-materials over a longer period of time at reasonable prices to the industry;

iii) inadequacy in post-harvest processing infrastructure;

iv) inadequate linkage between the farmer and the processor;

v) high incidences of taxes and duties particularly State's levies, duties on packaging materials etc.;

vi) inadequacy of marketing efforts and market expansion;

vii) shortage of finance from financial institutions;

viii) complexity of food laws.

SPICES, HERBS & CONDIMENTS PROCESSING

. India produces a variety of spices and is amongst the leaders in some spices, particularly for Black Pepper and cardamom. Besides, India also produces a very large quantity of chillies, ginger and a variety of spices. These spices are generally traded as such, although approxmately 2/3 of the spices are sold domestically in the processed and grounded form. These spices which are sold in the grind form are Turmeric, Cumin, Cumin seeds, corriander and red pepper. Other spices like aneseeds, ginger and pepper, cardamom and cinnamon are sold in whole form. With the growth of food processing industry in India and demand for greater convenience, spice powders and spice mixtures are also finding market within the country and also abroad. Some mixtures of spices like Curry Powder, Sambher Powder, Meat Masalas are also now in the shelf.

In the domestic market the sale of spices oleoresins is still not very well developed except for some of the oleoresins like clove oil, Cinnamon oil, usually used in fruit drinks etc. Spices oleoresins of all varieties are extremely important for export market. Similarly in the future also this will find a tremendous place in the domestic food industry and for the consumers.

Although spices Board is charged with the responsibility of export of spices and therefore to some extent has done some research and development activities and extension work, for the domestic requirement or for the development of spice processing industry, no planned effort has been made so far. While the Agriculture Ministry has a scheme for enhanced growing of spices, however, value added spice products in a systematic way will go a long way in improving the use of spices and also for export. the Planning Commission has advised this Ministry to take up spice processing. This will not only help value addition to spice processing but will also help some backward regions like North Eastern region where spices are grown, but value addition does not take place there. This makes evacuation of spices from remote areas costly because of cost of transportation.

However, if there is value addition in North Eastern Region itself or in the inaccessible region in the country, spice farmers will get better return.

Spices processing, particularly spices grinding and spices oils being reserved for small scale sector, no large investments are made for these types of products so far. The production of spices oleoresins needs to be encouraged because it gives value addition to the produce. Similarly, if spices processing is done on a larger scale a larger volume of spices will be produced by large companies which may be of great convenience to the consumer. However, currently it has been seen that some sub-contracting in the form of giving spices grinding activity to the small scale industries and then packaging and selling in their own brand name is done. But, being in the small scale sector with a lower investment limits in the plant and machinery it does not allow the introduction of better techniques like crave grinding to induce high value spices products.

To begin with it is necessary to encourage production of spices oleoresins, cryo ground spices for the export markets and at the same time it will be necessary to encourage setting up of processing units. The projected export of spices in the 9th Five Year Plan period is at Table-1.

Table 1

EXPORT OF SPICES FROM INDIA - PROJECTIONS FOR IXth PLAN

(QUANTITY IN MT., VALUE IN RS.LAKHS)

SPICE	1997-98 QTY	1997-98 VALUE	1998-99 QTY	1998-99 VALUE	1999 2000 QTY	1999 2000 VALUE	2000-2001 QTY	2000-2001 VALUE	2001-2002 QTY	2001-2002 VALUE
PEPPER	36750	24990.00	39000	26520.00	41300	28084.00	44000	29920.00	47000	31960.00
CARDAMOM(SMALL)	680	1360.00	720	1440.00	760	1520.00	800	1600.00	850	1700.00
CARDAMOM(LARGE)	1790	1253.00	1900	1330.00	2000	1400.00	2100	1470.00	2200	1540.00
CHILLIES	42000	16800.00	44300	17720.00	47000	18800.00	50000	20000.00	53500	21400.00
GINGER	16800	3360.00	18000	3600.00	19000	3800.00	20000	4000.00	21400	4280.00
TURMERIC	27300	5460.00	28800	5760.00	30000	6000.00	32000	6400.00	34200	6840.00
CORIANDER	10500	2100.00	11000	2200.00	11700	2340.00	12500	2500.00	13400	2680.00
CUMIN	4200	1890.00	4430	1993.50	4700	2115.00	5000	2250.00	5350	2407.50
CELERY	3150	945.00	3320	996.00	3500	1050.00	3700	1110.00	3600	1080.00
FENNEL	2100	630.00	2200	660.00	2300	690.00	2500	750.00	2700	810.00
FENUGREEK	16800	1680.00	17700	1770.00	18700	1870.00	20000	2000.00	21400	2140.00
OTHER SEEDS	3150	630.00	3300	660.00	3500	700.00	3700	740.00	4000	800.00
GARLIC	7350	1102.50	7750	1162.50	8200	1230.00	8700	1305.00	9300	1395.00
OTHER SPICES	23100	4158.00	24400	4392.00	25800	4644.00	27500	4950.00	29500	5310.00
CURRY POWDER	4200	1680.00	4400	1760.00	4600	1840.00	4900	1960.00	5200	2080.00
MINT OIL	1260	4410.00	1300	4550.00	1400	4900.00	1500	5250.00	1600	5600.00
SPICE OLEORESINS & OTHER OILS	1730	12058.10	1825	12721.30	1950	13591.50	2100	14637.00	2250	15682.50
GRAND TOTAL	202860	84506.60	214345	89235.30	226410	94574.50	241000	100842.00	257450	107705.00
VALUE IN MILLION US $		248.55		262.46		278.16		296.59		316.78

However, in the domestic market, demand for various types of spices and spice oleoresins are also growing because of the growth of value added processed food industry, hospitality industry, and fast food industry in future. Therefore, there is need to encourage the processing facilities for the spices products, particularly the blended spices. Research and Development activities in the spices processing for use of Indian spices in a value added stable blends form needs to be encouraged. Similarly, technologies which help processing of spices in the North Eastern Regions for higher value addition with a low capital investment needs to be developed and encouraged.

It is estimated that during the 9th Plan, investment for export oriented products will be approximately Rs.600 crores, some of which needs to be shared in the following manner.

Table - 2

SUMMARY OF EXPENDITURE OF MAJOR HEADS

(Rs. in lakhs)

		1997-98	1998-99	1999-2000	2000-01	2001-02	Total
1	2	3	4	5	6	7	8
I)	Export Oriented Production ...	1308.58	1308.77	1310.20	1315.63	1315.07	6558.25
II)	Export Oriented Research ...	270.00	300.00	320.00	330.00	330.00	1550.00
III)	Quality Improvement ...	498.00	587.00	728.00	879.00	1015.00	3707.00
IV)	Export Development ...	1125.00	1305.00	1480.00	1495.00	1495.00	6900.00
V)	HRD & Works ...	125.00	125.00	105.00	95.00	95.00	555.00
	TOTAL	3326.50	3625.77	3943.20	4114.63	4250.07	19270.25

or Say Rs.200 crores.

The proposed expenditure will be shared as under :-

Central Government Investment	Rs. 30.00 crores
State Governments Share of Investment	Rs. 30.00 crores
Private investments envisaged	Rs.540.00 crores
Total	Rs.600.00 crores

Investment during 9th Plan from 1997-98 to 2001-02.

The Central Government's investment will be more in the case of quality improvement, catalystic investment, R&D and promotion of export development (which will be taken care of by the Ministry of Commerce).

CASHEWNUT & OTHER NUT PROCESSING

Cashewnut is an important agricultural crop of India. There are excellent prospects of exports of this item which at present is exported to 60 countries worldwide with a foreign exchange earnings of Rs.1240 crores (approximately). Processing of cashewnuts in the country is done manually mostly in unorganised sector although some units are operating in the organised sector.

In the case of cashewnuts processing, there are approximately 616 units in the organised sector and 265 units in unorganised sector. Most of these units employ manual labour and use old technology for extracting kernels from the cashewnuts. These units are mainly spread in the States of Kerala, Tamil Nadu, Goa, Andhra Pradesh and Karnataka.

The land ceiling laws of cashew growing States in India prevent cashew farming in large areas on plantation/economic scale and though certain States like Maharashtra, Tamil Nadu and Karnataka are providing some exemption from these laws for cashew cultivation. It is a serious problem affecting the natural development of cashew production in the country. State Governments may utilise even wastelands with minimum rainfall conditions under cashew cultivation.

The cashew processing units process apprximately 3.71 lakhs M.T. of cashewnuts drawn from the indigenous sources and another approximately 2.31 lakh M.T. from imported raw cashewnuts making total of approximately 6 lakh M.T. of cahsewnuts. The recovery from the cashewnuts is approximately 25% of the kernels equivalent of the total output of approximately 1.50 lakh M.T.

The imported raw cashewnuts are processed only in organised sector and unorganised sector uses the indigenous cashewnuts. Of the total production of 1.5 lakh M.T., approximately, 75000 M.T. are exported and the remaining 75000 M.T. are used for the domesic consumption.

During the processing of cashewnuts, shell oils are also recovered, particularly in the organised sector, cashew fruit is thrown away. Export is mainly in the form of cashewnuts and no value aded products are exported or sold even in the domestic market. Based on the past performance for 5 years and the projections of the domestic production of the raw cashewnuts, import of raw cashewnuts and export of kernels are given below:

Year	Domestic Production of Raw Cashewnuts (Lakh MT)	Import of Raw Cashewnuts		Export of Cashew Kernels	
		Quantity (Lakh MT)	Value (Rs.Crores)	Quantity (Lakh MT)	Value (Rs.Crores)
1990-91	2.94	0.82	134.00	0.49	442.24
1991-92	3.05	1.06	266.68	0.47	669.09
1992-93	3.49	1.34	376.33	0.53	745.49
1993-94	3.48	1.91	482.70	0.69	1046.02
1994-95	3.71	2.31	684.84	0.76	1241.97

It is estimated that by the end of 9th Plan (i.e. 1997-2002) the total domestic production of cashewnuts will reach the level of more than 8 lakh M.T. In addition to the existing State growing cashewnuts, steps have been taken to grow cashewnuts in the States of Andhra Pradesh, West Bengal and Orissa etc. These new areas needed to be encouraged for increasing the production of cashewnuts to meet the growing demand of this product.

At the same time, the demand of cashewnuts in the domestic and export market may probably reach the level of 10-12 lakh M.T. Thus there is a need for increasing the processing capacity by about 4-5 lakh M.T.

Besides, there is a need for producing value added products such as salted/roasted cahsewnuts and sell it in the unit consumer packs. Value added products from the broken cashewnuts and split cashewnuts must be undertaken for increasing the export earnings as well as better price realisation. Unfortunately, there has been no planned effort to develop this industry in the past to get higher price realisation.

In addition, there is a need to promote processing facilities of the cashew apples which could be utilized for the purpose of making alcoholic beverages and non-alcoholic beverages like food cocktails. Besides, proper sorting and grading facilities using laser techniques must be adopted to increase the value of cashewnuts exported.

It is expected that the consumption of cashewnuts will increase in the domestic market once per capita income of the people in India is increased.

Because of the health advantage of cashew there is excellent scope for increasing consumption of cashew worldwide. Promotional efforts need to be undertaken to place Indian cashewnuts as prodigenous product in world market.

Even though India continues to be the world leader in the production, processing and export of cashew kernels, constituting about over 60% of the world supply, price of cashew kernels were more or less stagnant for the last two decades. U.S.A. being the largest buyer of cashew kernels in the world dictate the price of cashew in the world market. It is high time that we diversify our markets and create a stronger demand in other countries. At present we are exporting to more than 60 countries of the world. To strengthen these markets for cashew, aggressive promotional measures are called for.

Cashew has the greatest potential than any other cash crop in India for development of production, processing and export, employment generation, especially among the rural women.

The benefits that could accrue from cashew cultivation are:-

* Development of wastelands.
* Employment generation in farms and factories.
* Generation of employment among women, especially among socially and economically backward communities in rural areas.
* Prevention of migration of the rural poor to cities.
* Development of industries with minimum consumption of electric power.
* Additional foreign exchange earnings.

WALNUT PROCESSING

Walnut production in India is mainly confined to States of Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh. Annual production in Jammu & Kashmir is estimated to be of the order of 11,000 - 12,000 tonnes representing about 80% of India's production. In Uttar Pradesh, walnuts are grown in mountaineous districts and the hilly parts of Nainital and Dehradun. Other major areas for walnut production are in Himachal Pradesh with Marab, and Kulu areas producing tinned walnut varieties, while Mahasu, Mandi, Chamba, Sirmur and Kinnaur areas produce most hard nuts.

It will be of interest to note that the World Bank is continuing a programme in India for improving a post harvest technology and handling of walnuts. This programme includes construction of drying and dehulling centres. Further a processing and export facility is being established in Jammu & Kashmir. The significant feature of Indian export is the growing share of shelled walnut export which constitutes of about 90%.

India currently produces approximately 25,000 MTs of walnuts in Jammu & Kashmir and another 6-7 thousand MTs in Himachal Pradesh and Uttar Pradesh. Walnuts is mainly grown in the hilly regions. These walnuts are then further processed by hand. It is a labour intensive activity and employs a very substantial people during its duration i.e., from November to March. These processed walnuts are sold domestically and are also exported. Indian walnuts are qualitatively very superior, but does not fetch much value in the international market because of inadequate sorting, grading or cleaning. Besides, walnuts are generally sold as such and no value adition for the walnuts is done at present. The export of walnuts is approximately 6,000 MTs per annum which brings in foreign exchange of approximately Rs.8 crores. If proper laser cleaning systems are utilised it is possible to export approximately 8,000 MTs of walnuts. Thus bringing in an additional revenue of approximaely Rs.14 crores. Similarly, some value added products like salted, roasted and chocolate coated walnuts are also bringing in much higher value in the domestic and international market. Therefore, there is need for promoting such industries in the country. Unfortunately there has not been any attempt to develop this industry in the past. But during the Ninth Plan, Central Govt. should encourage setting up of laser cleaning facility in J&K/Himachal Pradesh and also encourage setting of value added products.

COCONUT PROCESSING INDUSTRY

The coconut production which was approximately 5807 million nuts in 83-84 has increased to 12,359 million nuts by the year 93-94 and it is expected that by the end of the 8th Plan, coconut production will reach 15,000 million nuts per year. Major coconut producing States are Kerala, Tamil Nadu, Andhra Pradesh and Karnataka. Similarly, lot of efforts are being made to popularise coconut growing in Orissa, Pondicherry and West Bengal.

With the efforts that are being made by the Ministry of Agriculture, by the end of the 9th Plan, anticipated production of coconut will be 24,000 million nuts with increased productivity.

Presently, coconut is processed mainly as copra and then into eidble oils. Some coconut is of course consumed as raw coconut and some for religious rituals. With the increased coconut availability, there has been no serious attempt to develop coconut-based food industry in the past although coir based industry to some extent has development in the country. With limited demand for coconut oil or copra, it is necessary to diversify the use of cocnut for edible purposes by using various types of other techniques. During the 8th Plan, sporadic action was initiated to assist some companies to introduce the technology for developing coconut-based industries like coconut cream, coconut water, descicated coconut and coconut milk based drinks. With the increased availability of coconut, it will be necessary to promote these types of industry in future.

Besides, simpler technologies for use of coconut into different food products as is done in Phillipines also needs to be promoted. This is needed for encouraging larger investment in integrated system of coconut processing.

Quality evaluation and upgradation of coconut based food products has assumed greater significance in the view of the fact the production diversification and food sector necessitates intensive quality control. Quality testing laboratories need to be established on a regional basis and introduction of modern copra dryers need to be introduced.

Even in copra processing, assistance needs to be extended to cooperative and private sector for copra processing, crushing, packing and marketing oil by adopting improved technologies that are available in the country. Similarly, even greater use of coconut oil as edible oil in the country will help easing the problems of edible oil in the country, technologies need to be developed to remove the odour of cocnut oil to make it more acceptable in the Northern regions of the country. For the processing industry, it will therefore be necessary to have catalytic investment for integrated coconut processing systems and technology transfer for decentralised coconut processing and copra processing in the country, besides R&D efforts.

It is expected that during the 9th Plan in the various programmes including Research & Development, some 250 crores are likely to be invested and the Central Government support in this regard will be of the order of approximately 25 crores.

To achieve all these during the 9th Plan, it is proposed to adopt the following strategies :-

(1) To remove the constraints for development;

(2) Facilitate/induce investments in agro-food industries and inrfrastructure through

a) Policy support.

b) Catalytic investments.

(3) Invest and encourage investments in infrastructure for :

a) Post-harvest processing.

b) Storage and transportation.

c) Quality control.

d) Development of food parks.

(4) Invest and promote investments in research & development activities and technology transfer.

(5) Encourage backward linkages through contract farming.

(6) Develop entrepreneurship for setting up of small food processing units in rural areas.

Removal of constraints :

The development of food industry is restricted because of various statutory and administrative regulations which need be removed. The actions need to be taken therefore, are :-

(a) Review the Cold Storage Order and Cold Storage Acts of the States and if need be totally scrap them with a view to remove the bureaucratic intervention in the investment in cold storage activities and their operations.

(b) REview and amend the Seed Policy suitably to simplify Phyto-sanitary inspection system so that suitable planting materials for processable varieties of fruits and vegetables could be imported and introduced easily in the country.

(c) Suitably amend the Pesticides Act/Order. Ban the use of BHC and DDT with a view to improve the quality of the processable produce and simultaneously, allow the use of CIPC which is an anti-sprouting agent and internationally acceptable pesticide for potatoes.

(d) Create simple arbitration mechanism for resolving disputes between the farmers and processors to promote contract farming. If possible allow leasing of land for development of processable horticulture materials.

(e) Improve funds flow from the financial institutions into the horticulture based industries. For this purpose, if required amend suitably the NABARD's mandate, or create separate financila institution for food processing industries.

(f) Rationalise food laws in line with the international standards keeping in view the domestic consumer interest and export possibilities.

(g) Reduce and rationalise duties on packaging materials.

(h) Permit entry of large units in the field of packging by removing restrictions.

(i) Remove restrictions on importation of specified ingredients, chemicals and intermediate products required for the horticulture processing industries.

(j) Removal of restrictions for foreign equity investments in horticulture based industries like pickles, spices oil etc.

Measures to induce investments in this sector:

The policy support needed to be given for increasing the rate of investment in the horticulture based industries are:

(i) Continuing the exemptions of excise duties for all fruits and vegetable products. Simultaneously, rationising the duties for all fruits and vegetable products;

(ii) These tax exemptions should continue for atleast during the 9th Plan period by which time it is expected that the processed horticulture products would increase in volume and market expansion will take place;

(iii) discuss and impress upon the States to reduce/rationalise sales tax on fruits & vegetable products, octroi, mandi tax and remove constraints on the movement of the products;

(iv) Vigourously promote domestic and foreign investment in the horticulture based industries for which all restrictions may be removed.

(v) Provide fiscal incentives by way of depreciation benefits or direct tax incentives for establishing post-harvest infrastructures like, precooling, sorting, grading stations, cold storage and specialised transportation of horticulture based industries;

(vi) Continue the horticulture based industries as thrust area;

(vii) Provide special incentives like tax-holidays in the backward areas, North-East States, J&K, hilly States and tribal areas.

<u>Catalytic investment for horticulture based industries:</u>

Inspite of abundence of horticulture produce in some of the States, due to lack of infrastructure and some other deficiencies the investments are not taking place in all parts of the country. Besides, the financial institutions and other investors are reluctant to promote certain industries which are new. Therefore, in order to encourage the investments in these areas, the basic principle of catalytic investments adopted during the 8th plan should continue. While the private sector will play a major role during the 9th plan period the Government investment and assistance should be focused towards encouraging investments in the areas (i) which have a high export potential (ii) areas which are hitherto under-developed like North-eastern States, J&K, backward, hilly and tribal areas, (iii) for new and innovative products, and (iv) small scale units being set up in rural areas.

For this purpose, State Agro Industries Corporations and similar promotional bodies could be utilised to channelise the assistance which could be in the form of loan to these channalising agencies. These channalising agencies then take equity in the food processing units and for the small units this could be given as seed capital assistance through grant-in-aid and the channalising agencies in such cases could even be the financial institutions themselves.

Investment in the Infrastructure :

Investment in the infrastructure will be of paramount importance during the 9th plan. Therefore, for encouraging investments, besides the catalytic investments for post-harvest processing, storage and transportation and assistance for setting up of quality control labs, Government may consider providing incentives to private investors by way of direct tax reliefs for such post-harvest infrastructure. So far as the quality control labs is concerned, these could be set up as a private organisation or by an organised society or industry associations and once they are set up the recognition of such laboratories could be done by a Central Body. Infact such laboratories should be self-sufficient to provide services to the industry itself. The chain of network of such laboratories would help in developing new technologies and products for the industry and improve the quality of the horticulture based products. Simultaneously the industries should be encouraged to setup theirown laboratories and assistance may be provided to those who obtain ISO 9000 certification or similar international certifications. During the 9th Plan period catalytic investment in the infrastructure as is done during the 8th Plan should continue for development of cold chain like ultra high humidity storage, cold/cool chain, cold trasnportation etc.

However, during this Plan period Food Parks need to be developed. These food parks can be either under the public sector or in the private sector or even in the joint sector. The assistance from the Minsitry should be only for the purpose of specialised facilities in such food parks such as specialised water treatment plant, cold storage, waste disposal, centralised utilities like steam generating, packing houses and quality control labs. These food parks need not necessarily be exclusively for horticulture products only but could be set up for other products also. Such centres should be set up in the areas where fruits and vegetables are available in plenty. Out of 33 such centres identified in the country, during the 9th plan food parks should be set up atleast in the 10 centres. In the event of the State Governments contributing substantially for setting up of such centres, more food parks should be set up in the rural areas.

In the areas of Research & Development further work for identifying developing and standardising the traditional fruits and vegetable products will be done in a scientific system to have a larger R&D activity. Besides basic research for food safety which have been taken up during the 8th plan should be continued. The engineering solutions for treating the Indian fruits and vegetable products should also be found through the R&D activities. Thus, to the industry, a full package from basic research upto the engineering solutions should be provided. In all such R&D activities excepting the basic research, involvement of industry in the R&D activities should be attempted. Such R&D activities could be undertaken in the nationally recognised laboratories in association with the industries.

In addition to the above, during the 9th plan a detailed study of actual post-harvest wastage of fruits and vegetables at different stages need to be done because so far no scientific study in this regard has been made. In the absence of such detailed study it is difficult to take focussed remedial action to reduce the post-harvest losses.

This study coupled with the R&D activities would find out appropriate solution for reducing the post-harvest losses and would go a long way in conserving the horticulture produce. There are a large number of processed technologies which has already been developed and which, if adopted for conserving the raw materials will help upgradation of quality and preserving of fruits and vegetables even in a decentralised manner. The dissemination of this information through various media, literature and through Food Processing & Training Centres and District Industries Centres would help general upgradation of the quality of the processed horticulture based products in the country that are being made in the informal sector.

Development of backward linkages through contract farming is very important for ultimate quality of the products. This system not only help the industry to get processable raw materials at reasonable prices, but also help the farmers in increasing their yield and an increase in the return on their investment. The industry has to help the farmers in transfer of technology for preparation of appropriate raw material and also, if necessary supply the infrastructure for production of suitable raw materials. This concept has been generated during the 8th plan and is accepted in a larger manner. It should be continued further till such date this system becomes a norm. While a system for arbitration of disputes under this contract farming between the farmers and the processors need to be developed, it is necessary to encourage the industry to adopt the system of contract farming by way of providing some incentives as has been done in the 8th plan. This scheme must continue during the 9th plan. Catalytic investment in this regard is also equipped with the investment for production and preservation of fruits and vegetables.

With a view to create manpower for fruit & vegetable processing (as well other food processing) and entrepreneurship in the rural areas, the scheme for setting up of Food Processing & Training Centres needs to be continued but confined to un represented the districts in the country. During the 8th plan, in every State, one or two FPTCs which have been set up and have started functioning successfully, need to be identified and upgraded, which can then act as an information dissemination point for other FPTCs in the States and coordinate their training activities. Similarly, during the 8th Plan some FPTCs needs to be set up in the Polytechnics, selected ITIs as well as in selected schools at the Plus-2 stage, curriculum for such employment oriented activity should be made. In addition, besides CFTRI, some more engineering institutions, atleast one in each region should be identified and strengthened to teach food processing technologies for development of entrepreneurship in this sector.

Keeping all these in view, the investment required during the 9th plan for horticulture based industries including the coconut, cashewnut, wallnut and spices based industry will be as under. This estimation has been made in a very conservative manner keeping the likely availability of funds.

(Rs. in crores)

	Public		Private	Total
	Central	State		
(A) Processing of fruits & vegetables.				
1) Capacity creation	310	185	5490	5985
2) Backward linkages	20	-	-	20
B) Infrastructure :				
1) Post-harvest infrastructure	500	500	2000	3000
2) Food Parks	200	300	700	1200
3) Quality Control Labs.	20	10	20	50
C) Manpower Development :				
1) FPTCs including upgradation of selected existing FPTCs	30	5	15	50
2) Food Technology and Engineering Study Centres.	10	-	-	10
D) R&D and Studies				
1) Research project	20	-	10	30
2) Extension & Promotion	15	-	5	20
3) Studies	5	-	-	5
Total :	1130	1000	8240	10370

DAIRY INDUSTRY

The Indian Dairy Industry has achieved substantial growth during the 8th Five Year Plan. India is now the second largest milk producing country in the world. Milk Production which was almost stagnant between 1947 and 1970 with an annual growth rate of merely 1% has since then registered a growth rate of 4.5% during the 8th Five Year Plan. Milk Production target of 70 million tonnes at the end of 8th Plan (1996-97) is likely to be achieved with per capita availability of milk at 204 gm/day against the recommended nutritional requirement of 220 gm/day.

Similarly, there has been increase in production of milk powder including baby food, malted food products, condensed milk and their estimated annual productions during 1995 was 2,00,000 tonnes, 48,000 tonnes and 9,100 tonnes respectively. There are over 150 milk processing plants in public, private and co-operative sector. As a result of liberalised industry policy announced by the Government of India during the year 1991, import of technology and machinery has become easier. This has resulted in the industry taking up manufacture of new products like edible casein, pharmaceutical grade lactose and whey protein concentrate and other high value products, which are export oriented and import substitute items. Some projects with foreign collaboration and by back arrangements have also been set up. The Ministry of Food Processing Industries has received a number of proposals for joint venture and foreign investment in milk products sector.

The Indian Dairy Industry has an installed processing capacity of 20 million litres per day with an estimated investment of Rs.1000 crore. About 60% of the installed processing capacity is in co-operative sector, but with the liberalisation of the Indian economy, more processing plants are coming up in private sector. The Industry has a turnover of 50,000 crore which is estimated to go upto 60,000 crore by the end of 8th Plan.

A small quantity of dairy products are also exported. The main items of export are SMP and Ghee. Recently export of edible casein has started and the export of lactose, whey protein and cheese is on the anvil.

The role of Ministry of Food Processing Industries has been that of a catalyst. There was no centrally plan-scheme to provide assistance to the industry. The Ministry however played an important role through its intervention in the Government of India's policy for milk products. It has also provided token assistance to two units for undertaking production of value added products.

CONSTRAINTS TO DEVELOPMENT

The diary industry in India, has traditionally been subjected to licensing and restrictions. The Government policy in this regard has been to give preference to establishment of milk processing plants selling liquid milk. This policy was guided by an overall shortage of milk and national milk production falling short of nutritional requirement. Consequently processing plants manufacturing products received lower priority. With the liberlization of Indian economy, although licensing has been done away with. Dairy plants processing more than 10,000 litres of milk per day and those manufacturing milk products have to obtain registration under Milk and Milk Product Order (MMPO) 1992.

Quality Constraints

The large demand for milk and milk products has placed pressure on the industry resulting in compromise with respect to quality. While the cooperative sector have set up a net work for collection of milk, the proportion of milk handled by privately owned firms is largely purchased through net work of local buyers, contractors and brokers. In order to meet increasing demand, many of these intermediaries resort to methods of extending supplies of real milk, often compromising its quality. This creates serious threats to the health of consumers and jeopardise exports.

The PFA standards for quality of milk and milk products were formulated in early 50' and have become out dated. They are also not in conformity with the international standards. In addition, the method of enforcement of these standards are neither transparent nor affective. There are very few testing laboratories. Similarly testing kits for rapid quality testing at grass root level are not available. Unsanitary local condition, unhygenic containers, sub-standard processing equipment, poor handling methods, brakes in the cold chain etc. etc. contribute to poor qaualit y.

Poor Data Base

The data base for the dairy industry is inadequate and not reliable. A modern competitive dairy industry must have access to reliable, upto dat data, accompanied by trade analyses, projection and early warnings. The data must include statistics on production, off take, use of milk, product manufacture, capacity utilisation etc.

Inadequate R&D and Product Development.

Dairy processing plants have been concentrating on manufacturing of westernised products like some milk powders, baby food, butter, cheese etc. The Organised sector has paid little attention to the manufacture of traditional Indian milk products. Even in the case of westernised products, little attention has also been paid to the production of value added products from

Lactose, whey, formanted dairy products and other milk products enriched with additives.

NDRI Karnal has developed a number of innovative technologies for the manufacture of indigenous dairy products on commercial scale.Some of these products are Khoya making machines,sweets like burfi and gulab jamun and rasgulla mix power, kulfi mix power, mechanised rasgulla making etc. These technologies have unfortunately not been transferred to the field and manufacture of Indian dairy products remains in the hands of conventional sector which uses out dated technology and equipments for their manufacture.

Packaging of milk products plays a very important role in deciding the shelf life of the product. Dairy products are not included in the mandate of Indian Institute of Packaging and therefore only limited work could be done in development of packaging at NDRI, Karnal. Very little information is available on packaging of indigenous dairy products and no worthwhile technology of packaging of these products on commercial scale is available. Most of the packaging for indigenous products is done manually and a continues packaging line has not been developed.

At present there is inadequate facility of cold storage for dairy products in major consumption centre. There is also atsence of cold chain. These pose serious constraints to the maintenance of quality marketing of dairy products.

Fiscal and Policy Issues

At present sale tax is levied on dairy products at multi points. Thus when a product is transferred from a District Milk producers Union to the State Federation, sales tax is levied. Then when it gets transferred to major markets for sale to the consumer, sales tax is again charged. The levy of multi point tax adds to the cost of the product. Similarly in many States, mandi tax is charged on milk, without milk actually entering the Mandi for sale since the milk is collected from Co-operative Societies and brought to the processing plant directly.

Ice cream manufacturing is reserved for small scale sector industry. The ice-cream making in modern days requires the latest state of the art technology, advance engineering and sanitation practices, requiring large scale investment. No where in the world ice cream is not bracketed out as a reserved item as is the case in India. This particularly, seems contradictory in the face of liberalisation. Such a protectionist measure militates against technology upgradation.

The export of milk products, at present is subjected to quantitative ceilings. This prevents the exporters from developing export market and to plan production on long term basis. These restrictions need to be removed.

DEMAND AND PRODUCTION TARGETS

It has been indicated in the preceding chapter that milk production at the end of 8th Plan is expected to increase 70 million tons. At present only some 12.5 percent of total production gets processed by the organised sector. In the 9th Plan, greater emphasis is likely to be placed on increasing milk production and the production is projected to grow to a level of some 90 million tonnes. Further the proportion of milk handled by the organised sector would also improve. This would require creation of an additional processing capacity to handle 10 to 12 million litres per day. Most of the additional capacity would be in private sector and utilised for product manufacture. The demand of milk products would increase as a result of increase in population and increase in national GDP. In order to meet the demand during 9th Five Year Plan, following production targets are estimated:

S.No.	Products	Unit	Targets for the year	
			1997-98	2001-2002
1.	Milk Powder (including Baby Food)	000MT	210	300
2.	Butter	000MT	80	120
3.	Ghee	000MT	115	200
4.	Cheese	000MT	5	20
5.	Malted Food Products	000MT	50	100
6.	Casein	000MT	2	8
7.	Lactose	000MT	1	10

The indigenous milk products are mostly manufactured in small scale unorganised sector. At present about 800 tonnes of Khoyas and Sweets and about 200 tonnes of Paneer is manufactured. It is estimated that by the Year 2001-2002, their production would go up to 15000 tonnes and 300 tonnes respectively.

Investment Required

As indicated above it is estimated that during 9th Plan an additional processing capacity of 10 million would be created for product manufacture. This would require an investment of Rs.2000 crore in the plant. In addition an investment of Rs.500 to 1000 crore would be required in building infrastructure for marketing of products including creation of a cold chain to maintain quality of the products.

Employment Generation

The milk processing plants are capital intensive. In dairy units, bulk of employment is created in the rural areas in milk production, collection and transportation of milk. However, the additional processing capacity created during the 9th Plan is estimated to generate employment for 15,000 to 20,000 persons. In addition some 30,000 to 40,000 jobs would be created in the marketing of the products.

PROPOSALS FOR 9th PLAN

In order to support development of milk products following schemes are suggested to be financed by MFPI as centrally sponsored schemes:

1. R&D for product development
2. R&D for milk products packaging development
3. Support for quality assurance
4. Support for establishment of information networking
5. Support for establishment of cold chain
6. Market development support for milk products.

The details of these schemes is given in following paragraphs. Implementation of these schemes would require an outlay of Rs.200 crore.

Meat and Meat Products

SUMMARY

The contribution of livestock is about 8% of the Gross Domestic Products. The meat and meat products accounts 22% of the output of livestock. Despite the continued increase in supply, per capita consumption of livestock products in India is considerably low. The population of livestock is 444 million. Buffalo, cattle, sheep & goat, pigs and poultry are the main animals for production of meat. The meat production is steadily increasing. The total production is 3.74 million tonnes. The supply of high value added products is over 50,000 tonnes. The projected output of 9th five year plan would be around 5.02 million tonnes and value-added products is about 0.15 MT per year. The output of egg products which is not very significant would be about 2,40,000 tonnes per year during the plan period. The strategy of development of meat and meat products industry involves establishmentn modern meat processing projects including pork and poultry projects, modernisation development of existing abattoirs. During the 9th five year plan, the development and modernisation of marketing systems, quality control and training and National Meat Inspection System with the agency National Meat and Poultry Development Council has also been proposed. The development will be through the establishment of joint sector, cooperative sector assisted sector associations and private entrepreneurs sector. Special emphasis would be given for the establishment of modern integrated pork and poultry processing plants in North Eastern States. Special emphasis will also be given for the development of Integrated Pork and Poultry Units in Special Scheduled Castes Plans and Special Scheduled Tribes Planswill be formulated. Pilot projects particularly in pork & poultry processing will be established in some areas including North Eastern and largely tribal and Scheduled Castes populated areas in consultation with the Central Food Technology Reseach Institute. A large part of the funding will be generated from private sector. However, where private entrepreneurship is not coming forward to establish/modernise the projects the Central Government will initiate and establish projects. The total funding including private would be Rs.4000 crores for this sector during the plan period, out of which Rs.3200 crores will be from private sector and Rs.750 crores from public sector. The public sector funding will be distributed in the ratio of 3:2. between Centre and State.

MEAT & MEAT PRODUCTS

. **Status of the Industry:**

The contribution of livestock sector was about 6% of the gross domestic products in 1949-50 which has increased to 6% in recent years. In relation to agriculture, the contribution of livestock sector to the total contribution on agricultural sector has increased from 16% in the 50s to over 26% in recent years. The total value of output from livestock excluding work output was Rs.436 billion in 1991 at current prices. The value of output grew three folds between 1951-1991 and the rate of the total output value of the entire agriculture sector during the decade 1980-90. The value of output from livestock sector and the share of meat and meat products could be seen in Table-I of the Annexure. The meat group which includes beef, mutton, goat meat, pork, poultry, poultry meat and other meat products and biproducts contributed 17260 crores in 1995 and share 22% of the total value of the output from livestock. In comparison to all livestock, poultry has made excellent progress. The value of eggs produced in the country in 1990-91 was as high as Rs 13.43 billion, which is about 42% of the total value of the output at current prices. The percentage contribution of egg products was 1.6% in 1950-51 has increased to 4.2% in 1990-91. The contribution of poultry meat has also increased from 3.6% in 1950-51 to 5.3% in 1990-91. It has been further noted that meat output has a total increase at an average annual rate of about 5%, during the period 1988-92 largely due to the sharp increase in poultry meat output (14%), Goat m meat output(5%) and other meat output (3 to 4%). It is very difficult to assess the employment opportunities in meat and poultry sector separately as this is a part and parcel of the livestock production system as a whole.

Livestock sector as a whole has considerable impact on rural employment. About 75% of the rural house-holds own livestock. National Commission on Agriculture (1976) projected 42.5 million man-year as employment potential by the turn of the Centuary. A nation-wide NCAER survey indicated that average income from livestock is 22.5% of total rural house-hold incomes. Livestock in the Indian context is a major instrument of improving rural employment particularly self employmment. Rural employment in livestock grew at 4.1% per annum during 1972-82 and was much higher than in agriculture (1.15%). Since the organisation of livestock production has largely remained unchanged, the employment growth is on account of increased output, agricultural marketisation, increased activity related to intermediate processing and value addition. In fact the traditional house-hold production system which used to be virtually self containing depending on getting free residues and at family level are increasingly getting integrated into input as well as output markets. Therefore, the developmment of trade, marketing and processing of livestock and livestock products in India needs to be viewed as a process linked with livelihood of rural house-holds which depend on livestock farming for supplementary incomes.

Despite the continued increase in supply, per capita consumption of livestock products in India is still considerably lower than other developed and developing countries. For example, per capita poultry meat consumption is only about 12% of per capita poultry meat consumption in China. Annual per capita consumption of eggs is 29 and poultry meat is 0.58 kg. India is still significantly lower than the other countries. It is far below the recommendations of the National Institute of Nutrition i.e., 180 eggs and 9 kgms. of all meats. Moreover, the bulk of the consumption of eggs and poultry meat (75 to 80%) is taking place in urban areas and semi-urban areas. The per capita availability of eggs in rural areas is estimated to be as low as 13 eggs. The per capita consumption of livestock products in India and selected countries is given in Table-II

Although the consumption of meat and meat products in India is still quite low by the world standards, they nevertheless account for a significant proportion of house-holds products. It is estimated that the demand of consumption of livestock products will increase in future. The basic trends noted in this connection are as follows:-

a) Increase in non-vegetarianism - primarily for poultry, mutton and goat meat.

b) The high income and price elasticities of demand for meat and meat products.

Experience of other countries shows that the consumption of livestock products increases sharply after per capita GDP crosses US $ 1000 level. Lowering the product prices due to increased productivity and improved market efficiency can also have the same effect. Based on the 1992 supply and demand levels, the production of meat and meat products and demand and supply situation in the year 2000 as estimated by World Bank is given in TableIII.

Meat industry in India is bi-products and is a sub system to a system in which animals are mainly reared for draught, milk and fibre, except pigs and poultry. The extraction rate of animal from its production is therefore, very low. It is estimated that about 60 million sheep and goats, 22.3 million bovines (cattle and buffaloes) and 10 million pigs are slaughtered every year leading to an extraction rate of about 30% for sheep and goat, 10% for bovines and 99% for the pigs. These slaughter rates are quite low as compared to other countries particularly keeping in view the availability of large number of animals in India. Poor carcass yield is another major cause for low production of meat and meat products. Cattle, buffaloes, goat, sheep, pigs and poultry are the major meat animals in the country. Yak is also slaughtered for meat in some North Eastern States. In recent years, rabbit is also being reared for meat purposes in some places like Kerala and Nagaland. However, its contribution to the total production of meat is insignificant.

The population of livestock and poultry as counted in 1987 is given in Table No.IV of the Annexure. From the table, it is evident that population of all the animals except sheep have increased in 1987. Both cattle and buffalo provided meat as an adjunct to the milk system. Mainly surplus males and unproductive buffaloes form the meat animals. Similarly, in case of cattle, unproductive cattles are slaughtered for meat but female cattles i.e., cows are banned for slaughter in most of the States. Northern and western states of the country impose total ban on slaughter of cattle while eastern and southern states are more liberal and permits slaughter of cattle but have restricted it to unproductive cattle. However, cattle and buffaloes are not slaughtered in their prime life. Buffalo is a major source of meat for export. Sheep and goat forms the prime group for meat products for domestic consumption. Goats are held in small numbers throughout the country particularly by the poor section of the rural population. In Gujarat, Rajasthan and Himachal Pradesh, these animals are locked in larger numbers by the nomadic breeders. Sheep on the other hand are invariably in flocks of a few dozen to several hundreds. The distribution of sheep and goats in the country, agro climatic regionwise shows a preponderance of goats in the lower gangetic plain, middle gangetic plains, eastern, central and western and southern plateau and hilly regions. Sheep in India are traditionally reared for meat and wool while goat for meat purposes. Pigs are distributed throughout the country. The pig husbandry is mostly in the hands of socially backward sections of the society. Pig production is very popular in northeastern region and is a fairly efficient operation there, though still a backyard system. In rest of India, pig production operates at a very low level of efficiency, almost as scavangers for recycling human waste with hardly any input going into the system. But species have excellent attributes like high proliferacy, high foecundity, short generation interval, high growth rate, high feeding conversion efficiency and produces proteins of high biological value. So far big production could not attain desired attention in the plan development programme. But Swine Husbandry has enormous potential for providing economic opportunities all over the country and may follow the foot step of the poultry industry. Swine husbandry is particularly important for North Eastern States and other tribal areas. Third and fourth plan launched a more structural programme for development of pig husbandry. Unfortunately, all implemented by Government Departments. These include regional pig breeding forms, becon factories, pig breeding units and piggery development blocks. All of them failed to drag Swing Husbandry into the main stream. Becon factory could not function well because their supply position was weak whereas piggery development contributed nothing.

Poultry in India forms from fowls, ducks and other domesticated birds. Under the five year plans, State infrastructure development supported this industry to grow. In 1959, the scope of the scheme was enhanced and several poultry breeding forms were set up. This was followed with intensive poultry development blocks in all states and Union territories. FAO has also helped in developing poultry programmes. Regional poultry breeding firms were also set up in 70s. With these efforts intensive poultry production was taken up in the private sector. Backyard poultry is mostly for human consumption of poultry meat and eggs. Though the backvard poultry is not large income earner, but contributed subsequently to domestic foods and nutrition. The well developed state in pig production are Punjab and Tamil Nadu. Southern States accounts for 45% of the egg production and 38% of the broiler production.

Rabbit farming is comparatively new in India. Rabbit are good meat producers and the meat is comparable to chicken broiler meat. They are prolific and produce 5 to 6 litters a year with a litter size of over 7 to 8 on an average. The slaughter age is about 8 to 10 weeks. The feeding habits of rabbit are also favourable as they can also the consume roughage in their diet. With a view to develop rabbit meat processing, Government of India have included rabbit meat processing as one of the item in the 8th five year plan and a pilot project with a small cost of Rs.25 lakhs was launched in Kerala. Inspite of the good quality of meat, rabbit production is still very insignificant.

High Value Added Processed Meat:

The production of high value added processed meat proucts is limited. However, there is a steady increase in the production of processed meat products mainly due to the pressure of high income groups in urban areas. In 1984, the production of such products was to the tune of 18,000 MT whereas it increased to 30,000 MT in 1990. Though the authenticated figures are not available, but according to an estimate, the production of processed meat at present is over 50,000 MT. Small quantities of value added processed meat is exported mainly to the middle east and Malaysia in the form of meat preparations, meat extracts and meat juice.

Slaughter House and Meat Processing Plants:

There are about 3600 Slaughter Houses in the country. These Slaughter Houses are managed by Municipal Corporations or other local bodies. There are 121 small meat processing units manufacturing high value added products like ham, becon, sausages, kababs etc. Most of these units are in private sector but 7 becon factories established in 4th five year plan are functioning in public sector. In last few years, integrated meat processing plants mainly for buffalo meat have been established. These plants were set up with the purpose of export of meat. The number of such plants is 7 at present. These plants are exporting buffalo and sheep and goat meat. The utilisation of bi-products in such plants is also optimum. In recent years a phenomenon have also been observed that the meat importing country would like to buy meat only from those companies who are maintaining a modern Slaughter House. The value addition of buffalo meat have also increased on account of the requirement of importing countries. There are about 21 deboning and freezing unit of meat engaged in the export of sheep, goat and buffalo meat. Most of these units are situated in and around Delhi and Bombay. Most of the municipality owned Slaughter Houses lack modern facilities of production and processing of meat. However, the deboning units, integrated meat processing plants and small meat products processing units are functioning on modern lines and are processing and producing hygienic meat and meat products.

Project Output:

The present production of meat is estimated at about 3.7 million tonnes. The production of high value added processed meat products is estimated at about 50,000 tonnes only. The exports of buffalo meat is to the tune of about 700 crores in a quantity of 13149 tonnes of mutton and 115550 tonnes of buffalo meat. The quantity of export of processed meat is about 1450 tonnes which mainly include pork products. The export of poultry meat and table eggs is insignificant at present. However, the export jof egg products in the form of powder and frozen products have started and few consignments have been exported to Europe and Japan. The production of different types of meat may be seen in the Annexure at Gable No.V and exports at Table No.VI. The meat production is steadily increasing. The production of processed meat is also increasing whereas the export jof meat and meat products is more or less constant quantity-wise but value-wise the export of meat and meat products is continuously rising. The increased production of meat is mainly due to the increase in demand because of the change of habits and increase in per capita income. Similarly, the increase in production of high value added processed meat products is due to the increase in incomes and urbanisation of the population.

The output of eggs per year is about 28,000 million eggs per year. The output of broiler is about 356 million per year. The projected output of the industry for 2001 is as follows:-

Beef	-	1.20 million tonnes
Buffalo meat	-	1.80 million tonnes
Sheep meat	-	0.17 million tonnes
Goat meat	-	0.75 million tonnes
Pig meat	-	0.30 million tonnes
Poultry meat	-	0.80 million tonnes

The output of high value added processed meat products is about 50,000 tonnes which by the end of 2001 is projected at 1,50,000 The output of egg powder at present is not very significant but at the end of 2001 it is projected to be 2,40,000 tonnes on the basis of liquid products which may include about 1,20,000 tonnes liquid products and about 40,000 tonnes dried egg products in the form of powder.

The value of exports of meat and meat products is Rs.631.50 crores. The quantity-wise export of buffalo meat is more orr less constant during the lasst two years whereas sheep and goat meat have shown some increase. The export mof high value added meat products is fluctuating and no inference can be drawn from the past exports.

However, with conserted efforts, high value added processed meat products may be projected to about 5,000 tonnes by 2001. The projected exports of the meat and meat products may be as follows:-

Type of Meat	Quantity (Tonnes)	Value (Rs. in crores)
Sheep & Goat Meat	15,000	200
Buffalo meat	1,50,000	1000
Processed Meat	5000	30
Poultry Products including poultry meat	5000	25
egg products	2,40,000	1000
	4,15,000	2255

Constraints:

The buffalo and sheep and goat meat industry has a divergent status. On one side, an organised and efficient exporting industry has emerged but on the other side which is also feeding to the export industry, an unorganised outdated, inefficient domestic industry exists. In recent years, it is noted that the export industry has developed on modern lines. Though it is connected with domestic industry which is still primitive in technique and hygiene, but because of the international pressure to maintain public hygiene which could comply the export requirement, most of the meat jprocessing units and Slaughter Houses catering to the need of exports have been modernised. Though there is not much resentment against slaughter of animals for domestic use but at the same time, the slaughtering of animals for export invites resentment and public agitations. The quality of meat produced from the slaughter houses catering to the need of domestic market is very poor. Such Slaughter Houses do not maintain any hygiene where slaughtering is done on the floor. The poor transport system of meat also contributes to the deterioration in quality. Though many export houses are buying meat from such Slaughter houses, but they have their own arrangements of colection of carcass from such slaughter houses and bring to their modern processing units where the carcass is chilled, deboned, packed and frozen. The export is usually done in retail packs or in bulk quantities. Large quanitities of the meat exported is now being taken from the animals slaughtered in modern export Slaughter Houses. Such meat certain is better in quality and is fetching good price in international market. The practice of buying meat from unhygienic Slaughter Houses though fast decreasing but still prevalent and is a big constraint for exports as well.

Pork is very popular meat in North Eastern States and tribal areas but this is not well connected with backward linkages. Often there is shortage of raw-material i.e., pigs in these states. It is because of the lack of infrastructure like availability of feed, breeding farms of pigs etc. In other states pig husbandry is still in a very poor state and is still considered as a scavanging operation. As the demand of pork in these areas is limited to the consumption by certain communities, the pig husbandry could not develop well. However, pig is a prolific animal, having a high convergent ratio, and can be a good source of income provided proper production and marketing practices are adopted. In recent years, it is seen that the export of pork and pork products is rising. In 1995-96, the pork and pork products to the tune of 1431 tonnes have been exported. In earlier years, the export of pork and pork products was very small. This export has taken place without any efforts from the Government side. Therefore, the pork production and processing have to be developed with proper backward linkages. There is a need to provide funding from public sector to develop this industry, as this is in the hands of the poor and lower strata of the society. Slaughtering of pigs is still unregulated and modern processing plants are only a few.

Poultry and Egg production is a well developed industry in the country. However, processing of poultry is still to be developed. There is hardly any efforts made in this direction before 8th five year plan. Indian egg is small size eggs and cannot fetch export market. However, the production of eggs is quite good in the country. In Southern India, egg producers usually do not get good price because of low consumptin. Therefore, the alternative is to process eggs into egg products for export. The concept has been recently transformed into an industry. However, the egg processing industry is yet to take a shape to start a full fledged marketing to European countries, Japan and some other countries.

Meat is still being considered a dirty industry. Therefore, finding a location for the industry is an uphill task. However, the modern meat industry projects are just like any other plant which can be maintained in very good hygienic conditions and pollution free environment. But the Indian minds are to be properly educated regarding this. Hardly there is any site marked in the Master plan of cities for this industry.

A large quantity of Slaughter House bi-products are wasted. This is not only an economic loss which not only affect the viability of the industry but it creates unhygienic conditions. The modern Slaughter Houses are utilising bi-products for economic gain but the number of such Slaughter Houses is very small and therefore, there is need to instal bi-products utilisation plants in big Slaughter Houses where sufficient quantity of bi-products is generated.

The Inspection and Quality Control System of meat and meat products is not adequate. Though there are strict bye laws for inspecting animals before slaughtering and carcass after slaughter, but these inspections are seldom carried out in practice. There is no public awareness also to enforce the inspection system. Moreover, there are no facilities in most of the Slaughter Houses maintained by Municipal authorities carrying out these inspections. Therefore, the end quality of meat products cannot be maintained properly.

The transportation of meat is being carried out in tongas, lorries, rickshaws which not only lower down the keepig quality of meat but is also public nuisance. The system has to be revamped with the provision of insulated and refrigerated vans. Exporters are using insulated and refrigerated vans to transport their products from the site of the factory to the places of shipment. This system has to be extended for domestic market also.

The marketing of meat is unorganised. There are no proper channels for frozen meat. The upkeep of meat shops is in a very poor state. Most of the meat shop do not have cold storage facilities. The marketing systems, shortage and retail outlets have to be modernised.

The industry is gaining importance at the Central level because of the availability of good export market for Indian meat, hence a Coordinating body for production, processing, marketing etc. is required. This is all the more necessary as the municipal authorities have failed to develop this industry into a well organised industry.

Strategy during Ninth Plan:

The strategy of development of meat industry in earlier five year plan was based on the modernisation and development through meat/slaughter house/livestock/municipal corporations. In VIII five year plan the strategy has been slightly curved and joint sector projects where corporations/state undertakings assisting the projects of private sector externally have been encouraged by the Ministry on priority basis. This approach has been successful and this strategy should continue to assist private sector projects. Modern meat processing projects including buffalo meat projects for export, sheep and goat meat project for export and domestic market, pork and poultry processing project for export and domestic market egg processing projects for export may continue to be assisted financially and technically through meat/ Slaughter House/Livestock Corporations/financial institutions.

In some states, Cooperative sector has been developed with the assistance of the State Governments. State level cooperative federations have also been formed and are assisting the farmers and landless labourers for poultry and pig rearing. But these cooperatives do not have sufficient financial back up, therefore, full fledged integrated project cannot be established. Such cooperatives and federations may be assisted to establish pork and poultry project.

Poultry and pork processing require full attention of th Government. This is important for marketing of poultry and pigs fo remunerative prices to the farmers and hygienic meat products to consum But such facilities are not available in many states particularly i North Eastern States. The crux of the problem is that there is no aware-ness also in the public for such facilities. Hence pilot plants i

/consultation with

such states may be constructed in /Central Food Technological Researc Institute, Mysore with the financial assistance of the Govt. of India. One or two pilot plants may be located in North Eastern States. Some pilot plants may be established in other states having large populatio of Scheduled Caste and Scheduled Tribes. These plants may be used fo providing training in processing of pork and poultry products. North Eastern states and Sikkim are large pork and poultry meat eating states. But the pork/poultry production and processing have not been developed. to the desired level. Private entrepreneurship is also lacking there. Therefore, integrated projects through cooperative/corporations/state government/cooperative federations may have to be developed. The cooperative societies/federations composed of majority members from Scheduled Caste/Scheduled Tribes, may be provided financial assistance for setting up of integrated pork and poultry production and processing under Scheduled Caste Plan and Scheduled Tribes Plan.

Financial Strategy:

The financial requirement for development of production and processing of hygienic meat and meat products and poultry products will be very high, if the sector is to provide good quality meat and meat products to the entire meat and poultry consuming population of the country. To develop this sector, finances have to be provided for infrastructure development like the development of cold storages, market-ing system and cold chains (cold/refrigerated transport). The quality control and inspection system of meat and meat jproducts is lagging far behind and has to be revamped for which the necessity of a strong agency has been felt. Efforts have been made in the 8th five year plan to form the Meat and Poultry Products Development Council (Livestock Products Development Council). However, due to certain constraints the agency could not be formed. But the agency is not only required for coordination of the development activities of the meat industry but also for taking up of National Meat Inspection System for domestic export market. Public financing is also required for testing meat and meat products and poultry products for export purposes. Public financing is further required for improvement and regularisation and market systems of meat. The Government funding is also necessary for training activities for the meat operators. The meat, poultry and egg processing activities will be financed largely through private funding with the catalytic investment from Government.

The scheme on modernisation of Muncipal Slaughter Houses was taken up by the Department of Animal Husbandry & Dairying in earlier five year plans. A few Slaughter Houses have been modernised and some are undermodernisation by the Municipal Corporations under the grant-in-aid programme of the Deptt. of Animal Husbandry and Dairying. Modernisation of Slaughter Houses cannot be treated a separateentity and it is a part and parcel of the domestic and export meat industry. For this purpose, huge funding is necessary. Usually, local bodies do not have funds. State Government is also reluctant to provide funds for this purpose. Therefore, the slaughter houses which has got strategic importance for the purpose of domestic as well as export market should be modernised with Central Government funding. A 100% grant in case where local bodies and the State Govt. are not in a position to provide funds, can be given to the Corporations to establish Slaughter Houses. In other cases where local bodies/State can provide part of funds, 50% to 75% grants may be provided.

In this way, the total funding in 9th five year plan would be around Rs.4000 crores for this sector, out of which Rs. 3250 crores will be from private sector and Rs. 750 crores from public sector. The public sector funding may be distributed in the ratio of 3:2 between the Centre and State.

Allocations of the Ministry of Food Processing Industries for the scheme proposed for the 9th five year plan may be as follows:-

S.No.	Name of the Scheme	Allocation proposed
1.	Development/Improvement of Marketing of Meat Systems.	Rs.50.00 crores

2.	Development of Meat & Poultry Processing	Rs.150.00 crores
3.	National Meat and Poultry Products Development Council and Development of National Meat Inspection System, Quality Control and Training of operators and setting of quality control laboratories.	Rs.100.00 crores
4.	Modernisation of Municipal Slaughter Houses.	Rs.150.00 crores
	TOTAL:	Rs.450.00 crore

TABLE-I

VALUE OF OUTPUT FROM LIVESTOCK (AT 80-81 PRICES)

(Rs. Crores)

Sl. No.	Items	1950-51	1960-61	1970-71	1980-81	1990-91
1.0	Milk	3437	3867	4445	6804	11711
2.0	Meat group	1118	1308	1264	1570	2638
2.1	Meat	832	989	943	1227	2252
2.1.1	Beef	66	74	83	178	259
2.1.2	Mutton	509	565	563	537	920
2.1.3	Pork	44	38	54	68	155
2.1.4	Poultry meat	213	312	243	444	918
2.2	Meat products	71	79	61	93	117
2.3	By products	215	240	260	250	269
2.3.1	Hides	93	104	108	125	104
2.3.2	Skin	82	94	93	85	122
2.3.3	Other by products	40	42	59	40	43
3.0	Eggs	94	138	190	351	715
4.0	Wool & Hair	72	77	81	49	66
4.1	Wool	32	35	39	39	54
4.2	Hair & bristles	40	42	42	10	12
5.0	Dung	1088	1209	1173	1352	1523
5.1	Dung fuel	575	642	592	673	802
5.2	Dung manure	513	567	581	679	721
6.0	Silk Worm, Coocoons & honey.	27	44	83	136	271
7.0	Increment in stock	55	214	151	335	269
	Total Value of Output	5895	6857	7387	10597	17193

Source:
National Accounts Statistics (1992 and 93) CSO, Dept.of Statistics Ministry of Planning and Programme Implementation, GOI.

TABLE-II

PER CAPITA CONSUMPTION OF LIVESTOCK PRODUCTS IN INDIA AND SELECTED COUNTRIES

Product	India per capita Consumption kg./year	Comparative levels in other countries (kg./year)
Milk (Fluid)	65	China -3; Australia -104; US -104
Eggs (pieces)	29	China- 170; Japan - 217; Australia - 170; U.S.-170
Beaf and Veal	1.1	China- 2 ; Australia-36, US -43; France-29
Buffalo meat	1.4	
Lamb and mutton and goat meat	0.7	New Zealand-20; Greece-1.4; Saudi Arabia-6
Poultry meat	0.5	Hong Kong-47; China-4; US-40.

TABLE-III

PER CAPITA SUPPLY AND DEMAND

Item	Poultry & Meat	Mutton,Goat Meat
Consumption in 1992	0.442	0.619
Increase due to increased population	0.052	0.073
Increase due to increased income	0.130	0.190
Estimated demand in 2000	0.624	0.884
Supply in 1992	0.382	0.623
Supply in 2000	1.090	0.820
Surplus (deficit)	0.466	0.064

TABLE-IV

NUMBER OF LIVESTOCK AND POULTRY IN 1982 AND 1987

(In million)

Species	1982	1987
Cattle	192	200
Buffaloes	70	77
Sheep	48	46
Goats	95	110
Pigs	10.1	10.6
Poultry	207	275

TABLE-V

MEAT PRODUCTION

(Million Tons)

Species	1979-81	1991	1992	1993	1994
Cattle	0.80	1.18	1.21	1.27	1.29
Buffaloes	0.82	1.17	1.18	1.18	1.20
Sheep	0.15	0.17	0.17	0.17	0.17
Goats	0.30	0.45	0.46	0.47	0.47
Pigs	0.15	0.15	0.16	0.15	0.17
Total:	2.22	3.48	3.56	3.14	3.74

TABLE-VI

Meat & Meat Products Exports

Year	Quantity in Tons			Total Value
	Mutton	Frozen Buffalo Meat	Processed	(Rs. in crores)
1991-92	9767	85300	-	183.00
1992-93	11022	101666	-	342.00
1993-94	12810	112000	19	345.00
1994-95	10800	116100	14	391.80
1995-96	13149	115550	-	613.41

FISHERIES

Current Status

Fish production in the country has increased from 7.5 lakh tonnes in 1950-51 to 47.89 lakh tonnes during 1994-95. The average annual growth rate in fish production during the period 1984-85 to 1994-95 is 5.6 per cent. The growth rate in the marine and inland fisheries have been 5 per cent and 6.7 per cent per annum respectively during the period. The export of marine products has recorded a significant increase and, for the first time, crossed US$ one billion during 1994-95. The trend of fish production and export are listed in Table 1. The target for fish production in 1995-96 was 49.50 lakh tonnes comprising 28.25 lakh tonnes from marine sources and 21.25 lakh tonnes from inland waters. As against this, the estimated total production is 49.47 lakh tonnes, of which 27.02 lakh tonnes is from marine sources and 22.45 lakh tonnes from inland sources. According to a quick estimate of the Central Statistical Organization, the contribution of fisheries sector to the net domestic product has increased from Rs.1478 crore in 1984-85 to Rs.6753 crores in 1993-94 at current prices.The Fish Production is estimated to be 63.67 lakh tonnes (Table No.II) by the turn of the century. Out of this, it is estimated that 33.12 lakh tonnes will be contributed by Marine Sector and 30.55 lakh tonnes will be from Inland Sector. At this projected level of production, the per capita availability of fish will be 11 Kg per annum as against the per capita availability of fish of 9 Kg per annum. The National Fisheries Policy also envisages that availability of 11 Kg of fish per person will be enough to meet the nutritional requirement of essential protein.

Fishing potential and Fishing vessels

India has had no traditional entrepreneurship in the deep sea fishery sector which is highly capital intensive and risk prone. In order to promote investment in this sector for greater exploitation of marine fishery resources towards availability of fish for export earnings and for employment generation, the Government provided certain policy supports for the development of this industry. Hitherto, the Government policies have been focussed on encouraging the rational exploitation of various types of fish resources and therefore, accordingly acquisition of deep sea fishing vessels capable of exploiting these resources had been encouraged. The Shipping Development Fund Committee was entrusted with the task of extending soft loans to the deep sea fishing sector. Loans were provided to the extent of 95% of the cost of the vessel and the debt equity ratio was 6:1. A number of Indian companies acquired deep sea fishing vessels but almost all of these were shrimp trawlers and operated on the East Coast in a limited area from Vishakhapatnam. The fleet strength of these shrimp trawlers continued to rise and their operations were economically viable till a point was reached when the gold rush tendency invited more players in the field than were sustainable on the basis of available resources. The average catch per trawler reached an all time high of 35 tonnes per annum when the total number of vessels operating was 68 in 1984. As the number of shrimp trawlers continued to increase and reached 180 in

1991, the average catch per trawler hovered between 2.6 tonnes and 10.5 tonnes between 1987 and 1991. The companies started defaulting on loan repayments and as of today they owe a combined debt of 131 crore rupees to the Government. Rehabilitation measures have failed in the past and another proposal is under consideration in the Finance Ministry. Taking the above aspeçts into consideration, the Government had been emphasizing the introduction of only resource specific vessels such as tuna long liners, pole and line vessels for tuna fishing, tuna purse seiners and squid jiggers etc.

Along with the soft loans provided for acquisition of vessels, the Government also operated schemes for chartering of vessels and the operation of these vessels was governed by the MZI Act. These vessels fly the foreign flag of the country of origin. The Government has decided to phase out this scheme and as against 75 vessels in 1990, only 4 vessels are operating under charter now. No new permits are being given and only the offers made earlier are being implemented/extended as per the provisions of this scheme.

In order to diversify the deep sea fishing effort towards non-shrimp resources, the Government formulated the New Deep Sea Fishing Policy in 1991 to encourage joint ventures, leasing and test fishing for technology transfer, since other nations had the requisite technology and the appropriate vessels for this purpose. Vessels under joint venture are owned by the Indian joint venture company and fly the Indian flag. Twenty four vessels are operating under the new deep sea fishing policy as of now. Vessels operating under charter, leasing and test fishing which fly the foreign flag, can operate only beyond 24 nautical miles on the West Coast because of the wider continental shelf, so that greater oceanic area is available for coastal fishing. On the East Coast, however, all deep sea fishing vessels whether flying the foreign or Indian flag, operate beyond 12 nautical miles. In 1995, however, the Government of India has declared a three-miles corridor after 12 nautical miles in North West coast and deep sea fishing vessels are required to operate only beyond this.

The current average annual marine fish production is around 2.692 MT against a potential of 3.9 MT. The exploitation of resources in the coastal zone (i.e. upto a depth of 50 Mtrs.) has been rather heavy whereas the resources beyond 50 Mtr. depth are still underexploited. The contribution of the deep sea fishing to the total marine production has been less than 2%. This needs to be enhanced by exploiting fin & shell fish resource, tuna & tuna like resources etc. which are underexploited. The thrust of deep sea fishing sector has to be on less conventional non-shrimp resources, i.e. Tuna, cepholopods, mollusc, clams, etc.

Fish Processing

The tropical climate of the country offers advantage as well as disadvantages, specially in a sector like fisheries. Being tropical, the sea offers a variety of commercially valuable fish species. At the same time, it also results in higher wastage, in the absence of proper processing facilities. Non-availability of storage and preservation/processing facilities coupled with lack of insulated/refrigerated transportation facilities is the main stumbling block in the development of sea food processing sector in this country. There has been significant improvement in the processing sector in terms of creation of capacity. The number of processing units have increased from 246 in 1991 to 367 in 1996 with a corresponding increase in capacity from 2503.30 tonnes per day to 6496 tonnes per day. The region-wise details are given below:-

Region	1996 No.of units	1996 Capacity tonnes/day	1991 No.of units	1991 Capacity tons/day
Kerala	121	1584.07	86	650.25
Karnataka	14	186.40	9	80.5

Tamil Nadu	45	489.00	26	244.55
Vizag	50	703.20	26	212.40
Maharashtra) and Gujarat)	77	2916.12	52	1136.60
Calcutta	34	311.50	31	75.50
Bhubaneshwar	19	202.00	13	75.50
Goa	7	104.00	3	28.00
Total	367	6496.00	246	2503.30

(Source : MPEDA)

About 45% of these are modern units. However, most of the units are not working to their full capacity for various reasons. Therefore, the focus during the 9th Plan has to be on improving the existing capacity utilization. Table III gives overview of infrastructure for the seafood processing industry. At present, hardly 20% of the total fish production is being processed (Table IV). Freezing is the most popular technology adopted in the country for export. Most of the units use blast freeze, plate freeze or block freeze methods for freezing. Some plants have more modern technologies like individual quick freezing techniques. Apart from freezing and canning, conventional methods of processing of fish such as drying and smoking also exist in the country for catering to the needs of the local market. A major portion of our export is in the form of institution packs, rather than consumer pack which results in a much lesser value realisation per unit. Recently, the European Union and other countries have formulated stringent standards for hygiene and quality control and unless the existing plants in the country modernise and upgrade their facilities, their products will not be competitive in the international markets and the niche created by the export of the Indian marine products in the world markets will be lost. There is also need to strengthen the traditional technologies for better remunerative prices to traditional fisher-folk. The smoked and dried fish which has a good market, is being processed without any emphasis on hygienic requirements. Revival of these two sub-sectors on more hygienic and modern lines would not only increase the acceptability of the product but would also result in employment generation and in turn additional income to the rural fisher-folk in the coastal areas of the country. In the fish processing sector, therefore, increased attention will have to be given for upgradation of technology and modernisation of the processing facilities, setting up of cold storages, improving the packaging facilities and technologies and revising and strengthening traditional fish processing technologies.

Research and Development

Research and technology development in fish processing has so far been mainly for enhancing exports by evolving better methods of processing and improving the quality of the products. Efforts are on to boost export of fish and fish products by developing technology for the production of value-added products as IQF shrimp, ready-to-cook or dry, battered and breaded frozen products packed in attractive consumer packs and heat processed products packed in retortable pouches. However, more emphasis needs to be laid on upgrading the handling, transportation, distribution, processing and packing of fish for the domestic market. The Industry is generally reluctant to introduce modernisation and technology upgradation for reasons such as huge investment cost. To overcome these difficulties, the following steps are recommended:

- Financial support to take up new technologies or innovations in existing technologies

- Proper linkages between the R&D organizations and the fish processing industry

Sponsoring of research projects particularly by the industry to facilitate immediate exploitation of the results

Efforts for extension of research findings to the industry

Provision of fresh water, ice and hygienic environment at the fisheries harbours, fish markets and other fish handling centres for efficient handling of fish from the point of landing till it reaches the consumer or processing factories. There is scope for improving the methods of handling, packing, preservation and transportation.

It is important to develop containers to protect the frozen fish against thawing. Refrigerated trucks are generally used for this purpose. Since the cost of these trucks is prohibitive, use of insulated trucks and coolants like dry ice and liquid nitrogen sprays may be explored.

Modern production technologies will have to be adopted for diversification of fishery products for both internal consumption and exports. These machines are required for the processing of IQF shrimp and lobster, frozen head-on shrimp and lobster, surimi-(picked meat of fish/shell fish free from bones, washed and mildly salted) and allied products, breaded fish or ready to fry battered and breaded fish/shell fish products and good fish meal which have export potential. Efforts are also to be made for exploring the unutilised species like jelly fish and for processing high sea,deep sea fishes such as oceanic squid, deep sea lobster, deep sea prawns, lantern fish and tunas. Many of the machineries and equipment required for these activities are not presently available in India and therefore these are to be imported on a selective basis to suit the requirements of the country.

- Most of the machineries imported at present are of high capacity. Taking into consideration the quantum of raw material available during various months, at various centres, composition of catch etc., low capacity processing machineries are to be developed. For this, suitable R&D work has to be undertaken.

- A recent trend in many of the developed countries is to prefer natural additives in food products. R&D work for identification and development of suitable natural colouring matters, anti-oxidants etc. suitable for fish and fisheries needs to be initiated.

- Development of the domestic market and infrastructure for marine fish needs to be taken up by the government and the industry. While export markets should continue to be developed, the value-addition in this sector does not really accrue to the primary producers and is mainly available to processors and it is only with the development of the domestic market and infrastructure that the primary producers; specially traditional fishermen, will be able to obtain the benefits of greater value addition.

- The various organisations engaged in R&D work in fisheries sector are :- CMFRI, Cochin, FSI, Mumbai IFP Cochin, CIFNET Cochin, CIFT, Cochin and CIFE Mumbai.

EXPORTS

The sea food exports crossed 1 bilion US dollar mark during 1994-95 when 307300 MTs of marine products were exported, valued at Rs.3375.27 crores compared to 243960 MTs valued at Rs.2503 crores in 1993-94. Exports of marine products has been on the increase and contributing significantly to the foreign exchange earnings. (Table-V). Japan continued to be our major market followed by USA. However, the European community as a whole is the second largest market for Indian sea food. The conventional marine catch forms the bulk of our exports. The major items of our exports are frozen shrimp, frozen fish and frozen squid, frozen cuttle fish etc. India has been exporting these products in bulk packs in block frozen form, for reprocessing into value added products in the importing countries. In order to maintain the upward trends of export, it is necessary that there ~~is more~~ emphasis on export of value added products and also diversification of the products. Based on the studies conducted, MPEDA has identified certain items of value added marine products which can be processed and packed by Indian exporters. These items include shrimp (whole/headless), accelerated freeze dried shrimp, cuttle fish fillets, cuttle fish tantacles, cuttle fish rings, squid tubes, stuffed squids, fish fillets, fish cutlets, burgers dehyderated clam meat, Surimi, Snail meat etc. The export projections may kindly be seen at Table IV.

Manpower Requirement and Training

The need to provide the required training to the people engagaed in fishing, fish handling and fish processing is very important for the healthy development of the fishery industry in the country. In deep sea fishing activities, the need is for training the personnel who are engaged on-board the fishing vessels. Adequate exposure should be given to the personnel for handling the fishing gear and equipments, particularly in resource specific vessels such as tuna long liners, squid jiggers etc. Presently, the following institutions are imparting the requisite training in fishing, fish processing and related fields:- 1) Central Institute of Fisheries Technology, Cochin. 2) Central Institute of Fisheries Education, Mumbai. 3) Fisheries College, Mangalore. 4) Department of Industrial Fisheries University of Science and Technology, Cochin. 5) Integrated Fisheries Project, Cochin, 6) CIFNET, Cochin. The need for training the rural fisherfolk in handling of fish and fish products is also necessary for developing the domestic market. Since the level of literacy is low, suitable extension programmes could be considered. This may involve (1) training and equipping personnel for processing of fish and fishery products (2) training in hygienic handling and processing at the primary production centres, (3) imparting audio-visual education on modernisation of handling and processing of fish (4) establishing demonstration units for practical training in the modernisation of traditional fish curing/drying industry etc. These Organisations would be requested to evolve suitable short term training programmes covering the above-mentioned aspects.

Quality Assurance

Fish is a perishable item. In a tropical country like India, quality control/quality assurance is an area which needs to be strengthened. The facilities available at present are hardly adequate to meet the requirements during peak seasons. Presently, whatever attention is being given in this area is limited to the product meant for export only. This aspect is almost non existent as far as the domestic market is concerned. Therefore, in order to ensure the development of the domestic market for marine products, adequate measures will have to be taken to ensure quality. Creation of adequate infrastructural facilities like cold chains, insulated refrigerated vehicles for transport of fish and fishery products etc are needed at all important fishing harbours and landing centres. A network of sea-route transfer of catch is also required to be developed for rural landing centres all along the Coast which are not connected by road. Most of the importing countries have now set up very stringent quality control regulations, based on HACCP (Hazard Analysis Critical Control Point). EU countries have recently issued directives pertaining to sanitary conditions of producing and marketing fishery products. It is high time that the sea food processing sector takes up effective measures to meet the international quality standards of the importing countries. Recently US Food & Drug Administration issued a notification to the effect that all imports of shrimps should be banned unless it is certified that trawlers used in harvesting the shrimp have used the Turtle Excluder Device (TED), to protect the turtles. These developments in the international markets will have a direct bearing on our exports and the industry should gear itself to meet these challenges.

Review of Eighth Plan

With a view to achieving an integrated development of the deep sea fishing setor, the Ministry implemented a number of schemes. The allocation to the deep sea fishing and fish processing sectors of the Ministry of Food Processing Industries had been about Rs.700.00 lakhs in each year of the 8th Plan for developmental schemes.

Financial targets and achievements

The scheme-wise outlays during each year of the 8th Plan and the achievements thereof upto 1995-96 are given in Table VII. The final targets and achievements are as under:-

Year	Targets	Achievement	% Achievement
	(Rs. in lakhs)		
1992-93	700	672.73	96.14
1993-94	700	375.96	53.42%
1994-95	700	151.00	23.00%
1995-96	700	493.55	70.57%
1996-97	690		

Physical targets and achievements (upto 31.3.1996)

The physical targets and achievements in the deep sea fishing and fish processing sectors are as under:-

(1) Assistance for deep sea fishing and processing ventures

With the funds provided by MFPI, MPEDA participated in the equity of 3 companies (M/s Sudesh Sea Foods, Tirumala Fiji Tech Acqua Farms Ltd. and Indo Aquatics Ltd.) during Eighth Plan.

(2) Diversified fishing

A total of 11 companies were assisted by MPEDA for modifying a total number of 21 vessels for diversification.

(3) Scheme for cold chain, tuna and other fish processing and scheme for setting up of infrastructural facilities for preservation and processing of fish

During the 8th Plan period, a total of 32 units were assisted by this Ministry for setting up of infrastructural facilities for preservation and processing of fish. This included 21 units in the private sector and 10 under State/UT/their Corporations/Federations.

(4) Assistance for Installations of communications facilities to Coast Guard

Under this scheme a total amount of Rs.255 lakh was provided to Coast Guard during the 8th Plan period. Apart from this, an amount of Rs.90 lakhs was also provided to Coast Guard before the commencement of the 8th Five Year Plan.

As per the targets set, the Coast Guard was to acquire and install 12 sets each of Transmitter MHS 124 and Receiver MWR 5200 during the Phase I. The targets set have already been achieved.

Under Phase II the proposal is to acquire and install 14 sets each of Inmarsat Terminals 'C' and 'M' and 18 sets of Transreceiver RT 2047. Phase II is under active implementation.

(5) Scheme for Interest Subsidy

The objective of the scheme was to bring down the interest burden on loans availed by entrepreneurs for acquisition of deep sea fishing vessels. Under this scheme, a total amount of Rs.159.14 lakh has already been disbursed as subsidy to the eligible entrepreneurs (numbering 6) during the 8th Plan period by SCICI Ltd., Bombay, out of a total amount of Rs.175.83, lakh provided to SCICI by this Ministry.

Objectives of the 9th Plan

The average annual growth rate in fish production during the last decade has been around 5.6%. The growth in marine fisheries production over the recent years has been rather slow as compared to inland fisheries. During the year 1992-93 to 1995-96, marine fisheries registered a growth of 3.66% as compared to inland fisheries which registered a growth of 5.64% during the corresponding period(Table VIII). The potential of marine fishery resources has been estimated to be 3.9 million MTs, out of which around 2.7 million MTs is exploited at present. Out of 3.9 million MTs, 2.28 million MTs are available within the 50 Mtrs. depth range, 1.367 million MTs are estimated to be present between depths of 50 to 200 Mtrs. and a very small amount i.e. 0.028 million MTs is available in the depth range of 200-500 Mtrs.(Table-IX). The resources within the coastal zone have been exploited to the optimum level in most coastal areas or over-exploited in some areas (for example shrimp resources). There is, therefore, no further scope for increasing production from most coastal areas. Introduction of more mechanised vessels in this area will lead to unhealthy competition between mechanised and non-mechanised sector. Any increase in the production of marine fish resources would have to come from the deep sea fishing sector i.e. within the depth range of 50 to 200 Mtrs. Inputs to increase the production from deep sea sector would be necessary through the introduction of additional resource specific vessels and diversification of the existing shrimp trawlers. Deep sea fishing has not grown at a rate commensurate with the potential for exploitation of the available resources. There is need therefore, to encourage diversification of the existing fishing fleet from shrimp resources to non-shrimp resources and to upgrade the mechanised fishing vessels so as to exploit deep sea fishing resources. The survey and monitoring of deep sea resources is also to be strengthened to provide authentic data of available resources in the deep sea. The fisheries sector witnessed an unprecedented agitation during the 8th Plan period in which the traditional fishermen protested against the Government's policy on inducting deep sea fishing vessels through joint venture, leasing etc. Though the points raised by the traditional fishermen were not supported by scientific evidence, apprehensions have been expressed that expansion of deep sea fishing sector would not be in the interest of the traditional fishermen. In view of the recommendations of the Murari Committee, Government has decided to rescind the New Deep Sea Fishing Policy. 1991

An amended deep sea fishing policy would have to be formulated, keeping in view the imperative need to nurture and strengthen the deep sea fishing industry in India, which has been going through a serious slump in the past years. It is also extremely important to exploit the fishery resources in the Exclusive Economic Zone, specially in the deep sea areas. We would also need to prevent the clandestine & ecologically unsustainable exploitation of resources in our EEZ by foreign countries when we try and limit lawful operation through joint ventures and other programmes in these areas. The amended policy would also have to balance our economic and nutritional interests on the one hand and sustainability of resources on the other.

Processing of fish, irrespective of the source, will lead to greater value addition and in turn better return to the fisher-folk. This industry has undergone considerable change during the past 10 years. The number of processing units has increased from 261 to 367 during the Eighth Plan period. However, most of these units are not working to their full capacity and the average capacity utilization is around 27%. Fish production is also not growing in proportion to the demand and this calls for optimum utilization of the available capacity for production of value added products fetching higher unit value. The installed capacity in this sector was greatly under utilized because of inadequate backward and forward linkages. Presently only a very small fraction of the total catch is being processed and this too only for the export market. Processed fish is almost non-existent in the domestic market. There is therefore vast scope for promoting processed fish products in the domestic market. In view of the fact that sufficient installed capacity is lying unutilized, steps should be taken to improve the existing capacity utilization through development of processed fish products for the domestic market.

It is however felt that policy and financial support to the fish processing sector should take into account the special interests of small, medium and large scale sectors of this industry. For this purpose, fish processing sector should be developed with initiatives and support meant separately for the small scale, medium scale, and large scale sector.

Small scale sector

Fish processing sector in the small scale is characterised by traditional technologies which have not been strengthened with measures for promoting better quality, hygiene etc., and this sector employs a large number of fisherfolk, mainly fisherwomen. In some cases, traditional fishermen did not get appropriate returns on their catch because the arrangements for transporting the same were hampered due to lack of roads joining the villages to other consuming sectors. In other cases, there was no domestic demand their catch. A coordinated approach therefore would have to be developed so that marine fish landings are transported to consuming centres/processing units and on the other hand, the domestic market is developed to create a demand for species/products for which no demand or low demand exists at present. In areas where fishing villages are not connected by road, fish catch may be transported by the sea route to some neighbouring areas which are connected by road and this transportation cost may be worked into the scheme for creation of infrastructure.

Small scale sector should be developed by strengthening traditional technologies and marketing closer to the production centres. The small units which are generally located in rural areas should be assisted by giving financial assistance as grant in aid and also by taking up research & development projects, keeping in view the specific constraints of this sector. The highest rate of subsidy should apply to units in this category since this would ensure maximum returns to the maximum number of people, specially in rural areas. Also, the value addition would bring benefits directly to the primary producer.

Medium scale sector

The medium sector is characterised by intermediate technology and limited access to export markets. These units could, in some cases, act as forward linkages for the small scale sector and also have the potential to upgrade the facilities with the latest technology. This would require strengthening of available technology, development of infrastructure like cold chains, ice plants, insulated transportation vehicles etc. The units in this sector would also require some financial support for this purpose. This assistance could be in the form of grant in aid or soft term loan.

Large scale sector

The large scale sector for establishment of processing facilities, including cold chains, would require induction of latest technology, development of export markets, IQF equipment, development of airports and ports etc. for handling of an extremely perishable commodity like fish. The initial investment in such units is is very high and the returns are slow because of a variety of factors, including seasonality of production. The units in this sector would therefore need some financial support. It is therefore proposed that this sector may be promoted by giving soft term loans in order to reduce the initial burden of resource mobilization. These units will also be encouraged to take up R&D work related to this sector, part of which may be funded by the Central Government.

The main objectives of the fisheries sector during the 9th Plan will be:-

1. To improve the fish production from deep sea fishing by consolidating the operations of deep sea fishing vessels and also support surveillance of the EEZ.

(2) To create infrastructure for storage and transportation of fish in order to reduce wastage.

(3) To further strengthen the fish processing sector for greater value addition by adopting improved hygienic standards, better quality control measures, product diversification, induction of modern technology, strengthening of traditional technologies, improving of packaging standards and skill upgradation of the

people engaged in fishing/processing.

(4) To aim at ensuring remunerative prices to the fisher-folk and better wages for the labour engaged in this sector.

(5) To assist fisheries cooperatives in fish processing and marketing sectors.

(6) To develop the domestic and export markets for fish and fisheries products.

To achieve these objectives, the following areas relating to infrastructure, processing, R&D, skill upgradation, traditional technologies and surveillence & monitoring would require focus during the Ninth Plan.

Deep Sea Fishing Sector

The deep sea fishing sector is capital intensive and involves a measure of uncertainity and risk. The Government of India realised that without a certain amount of active support in form of policy initiatives and incentives, it would be unrealistic to expect speedy development in the initial phases. The Government of India provided following policy framework in order to promote a structured development of deep sea fishing sector.

- Soft loan for acquisition of deep sea fishing vessels.

- Financial assistance to the deep sea fishing sector.

- Charter Policies of 1981, 1986 and 1989.

- New Deep Sea Fishing Policy for promotion of joint ventures and leasing projects.

A number of entrepreneurs availed of the assistance provided by the Government, but, unfortunately over a period of time the companies engaged in deep sea fishing were reduced to a single species industry and this species was over-exploited as fishing effort was increased in disregard to the sustainability of shrimp resources. Consequently, the companies started defaulting on repayment of loans and problems reached serious proportion. The schemes included in the 8th Five Year Plan for diversification of these vessels had also not found many takers. Another scheme for interest subsidy also remained largely unimplemented because the defaulting companies could not avail of this scheme. The third scheme for equity participation in deep sea fishing ventures could also not take of because this sector did not attract many new entrants. There has been general slump in this sector because of the large number of shrimp vessels introduced in the last 80's. It was also found that the new deep sea fishing policy is also being re-examined and has been on hold for more than a year. However, the fact remains that resources in the depth range of 50-200 Mtrs. are under-exploited and, therefore, the industry must take some concrete and definite steps to diversify the existing fleet to exploit non-conventional resources like tuna, cuttle fish, squids, etc. Together with this, there is also need to train Indian crew in the latest deep sea fishing technologies so that the operating cost of operating the latest fishing vessels are reduced and employment opportunities in this sector are increased. Efforts should also be made to encourage the traditional fishermen to take up deep sea fishing and suitable incentives should be given to them for this purpose.

It is estimated that a sum of Rs.40 crore would be required for diversification/upgradation of the existing 75 Indian vessels.

DEVELOPMENT OF INFRASTRUCTURE

Presently fish is consumed mostly in fresh form in India. Lack of adequate storage, preservation and transporation facilities results in :-

(a) Low return to the fisher folk
(b) Wastage
(c) Price fluctuation in the market
(d) Non-availability of the raw material during lean period for the processsing units.

Increased fish production can be utilized effectively only when there is a proper preservation and distribution system. The existing facilities are highly inadequate. Development of infrastructure facilities like raw material handling centres, cold storages, ice plants chilling rooms, insulated/transport etc. need to be accorded priority during the 9th Plan.

(i) Raw material handling centres

The quality of the finished products is greatly influenced by the handling of the product at the initial stages. Proper handling of the raw material after harvest leads to quality products which retain their texture, colour and freshness. It would be desirable to establish integrated raw material handling centres at landing centres. Creation of proper handling facilities would lead to better hygiene standards of the product. The raw material handling centres will consist of cold storage, auction facilities, ice plants etc. This would greatly reduce any possible damage to the quality of the raw material.

(ii) Setting up of Ice-Plants and cold storages/cold chain and transportation facilities

Fish deteriorates fast in quality particularly in the tropical conditions. So, all stages of its handling and processing require specific attention towards keeping the temperature low. Icing is the predominant method adopted for short-term preservation of fish. Starting from landing of fish on-board the fishing vessel, ice plays an important role in the preservation of fish. Its application at the landing centres prior to transportation for marketing/processing, is also equally important to ensure quality of the product. Hence availability of ice at landing/consuming centres in adequate quantity at reasonable cost is a pre-requisite for effective handling and preservation of the catch. Further distribution of well preserved fish from landing sites to other areas will require an effective system of cold chains/storages linked through refrigerated/insulated vehicles, insulated containers boxes as well as development of proper marketing facilities by way of setting up of modern vending retail outlets or setting up of KIOSKS.

PROCESSING FACILITIES

There are at present 871 peeling sheds and 367 units engaged in processing (freezing) of sea food in the country. Out of these, about 50% are using conventional technology for processing, which results in low value addition. With a view to increasing the value addition and thereby earning more foreign exchange, it would be desirable to encourage these units to modernise/upgrade their processing facilities. Immediate attention is needed on this front as most of the developed countries like USA, EU countries, Japan etc. which are the major sea food buyers from India are insisting on hygienic and high quality standards for the products. If the processing facilities are not upgraded, it is likely that the Indian Seafoods

Processors/Exporters may lose the export markets which they have established. This will not only result in a reduced foreign exchange inflow, but also lead to widespread unemployment.

(i) Pre-processing facilities

The quantity of end products is greatly influenced by the processing of the product at the initial stages. Proper handling ensures that the product retains good texture, shape, size and colour after processing. The catch should be treated in a hygienic and scientific manner immediately after the harvesting till it reaches the consumers or the processing units. Most of the processing plants procure their raw material from the pre-processing units situated near landing centres. These units don't have access to facilities like ice, potable water, clean tables, containers, fly proof mesh etc. These units, which are the first link in the chain of processing, need to be modernised so as to ensure quality processed products. The available facilities are highly inadequate and not as per the international standards. There is need to assist these units towards adoption of better hygienic standards and also better working conditions for the workers engaged in these units.

ii) Processing facilities

The export projections for frozen proucts by the end of year 2002, is around 5.6 lakh tonnes. Presently only 2.6 lakh tonnes of the total fish production is being processed and exported. The bulk of the items are processsed and exported in frozen form. From the above facts, it is clear that export target of 5.6 lakh tonnes of processed products can be easily achieved through the existing capacity. Moreover, most of the plants use block freezers, plate freezers etc. for processing, and the processed products are exported in bulk form and reprocessed in the country of import. This results in a low value realisation to the processors. Such units needs to be assisted to adopt modern technologies of processing in order to export in consumer packs, for better value realisation. The setting up of new units should also be encouraged if they aim at value addition through product diversification. In view of the stringent quality control standards being imposed by most of the importing countries, it is necessary that quality assurance is granted increased focus. This would mean that existing units may have to undertake other modifications like foot bath at entrances, foot operated watertaps, easily washable flours & walls, stainless steel tables, inhouse water treatment, devices for keeping away insects & rodents etc.

Thus the processing units will require assistance for technology upgradation as well as quality assurance.

Strengthening of traditional fish processing technologies/ marketing in rural areas

The most preferred method of fish processing and preservation is icing and freezing. However, a small percentage of the harvested fish is preserved & processed by way of drying, in the rural coastal areas. Fisher-folk usually adopt various methods like smoking, curing, salting and sun drying. The drying of fish in most coastal areas, is undertaken by women under extremely unhygienic conditions. It was found that this sector should be supported by the Govt. by popularising cheap indigenous technologies for drying of fish. This will result in value addition to the women engaged in this sector and also provide hygienically dried fish for domestic market as well as for exports. It is estimated that 2.29 lakh MTs of dried fish is produced in the country, a small portion of which is exported. During the year 1994-95,3000 tons of dried fish amounting to Rs.5.9 crore was exported. Presently dried products are being produced by using traditional technologies with no consideration for hygienic standards and quality control. The products are dried simply on sand or on leaves. This not only leads to a low quality product but the returns are also low. Therefore, there is an urgent need to strengthen this sector. The people engaged in this profession should be encouraged to adopt hygienic ways for processing by using the traditional technologies. They can be given training in this regard. There is also need to assist them by setting up of cold storage facilities to store the fish in good condition when the landings are good and it is difficult to handle the bulk quantity over a short period of time. Efficient and more scientific methods of drying, for example, raised beds for drying, electric drying machine etc. need, to be introduced.

Utilization of low value fish to make value addded products

India is the seventh largest fish producing country in the world, unlike the fishery of cold and temperate waters where the catch comprises only of a limited species of fish. Indian fishery is a multispecies one, comprising of a large number of species of fish of highly varying sizes. The catch consists of some very small sized fishes which often cannot be put to any economic use. Such fish by-catch is discarded overboard or at landing centres. The low value fishes constitute on an average 30-40% of the country's total marine catches. Discard of these fishes, which are rich in protein, is therefore, a loss to the nation where such cheap protein-rich food is needed. The producers and processors reject these fishes only because they don't have commercial value. In the recent past, considerable R&D work has been done by the instutes under ICAR and College of Fisheries, Mangalore. The processed products of these fishes were prepared on an experimental basis and were found to be acceptable to the consumer. However, in the absence of any organised schemes, these products could not become popular. There is need to encourage setting up of 'Pilot Projects' which would take up commercial production of value added products like protein concentrate, fish wafers, fish sausage, fish soup, fish cutlets, fish balls etc, using low value fish.

Research & Development

The importance of R&D in the development of any sector requires no emphasis. Development of deep sea fishing sector requires optimum utilization of the resources and proper post harvest technologies to use the harvest effectively. The R&D work should be taken up in consultation with user industry. Some of the areas which need attention are:-

(a) The marine landings in India are dominated by pelagic fishes like mackeral etc. Not much attention has been given so far for processing of low value fish which constitute around 30 to 40% of the catch. This catch is generally discarded as it does not have much commercial value. Therefore, further research in this areas needs to be carried out for development of value added products by using low value fish.

(b) Product development for such variety of fishes which are available in the plenty but have no market at present, for example, thread fin breams, bull eye, lizard fish etc.

(c) Standardization of processing technologies for non conventional marine animals like snails, clams, mussels, oysters.

(d) Development of low cost packaging technologies so as to increase the shelf life of processed fish products.

(e) Development of suitable fishing gears and other accesories for exploitation of non shrimp resources.

Skill upgradation of the people engaged in fishing and processing

Modern fishing is a highly skilled operation. India has had no traditional entrepreneurship in this field. Development of this sector would also require availability of trained manpower in the area. Presently majority of the crew employed on board are not skilled. Training facilities need to be strengthened and provision made for training of Indian fishing crew by deputing overseas and/or by inviting foreign trainers/experts to the country. The training institutions need to be strengthened for this purpose.

Any attempt to strengthen the processing sector has to emphasise production of quality products under hygienic conditions. The people engaged in handling at landing sites/processing units need to be trained. The activities suggested for this are:-

(a) To train and equip personnel for processing of products.

(b) To impart training in hygienic handling and processing a primary production centres.

(c) To establish demonstration units for practical training i traditional technologies on scientific lines.

(d) To impart training for processing non-conventional fis like Mussels, Clams, Oysters etc.

8. Quality assurance

Quality control is dependent on two factors, namely availability of facilities for producing quality products an enforcement of various control measures to ensure that procduc is as per specifications. The present facilities available t monitor quality are inadequate and not upto the mark. There i need to set up quality control labs equipped with the lates technologies.

9. Monitoring & Surveillance of EEZ

India with a vast coastline of 7500 KMs. ha abudance of natural resources in the EEZ. Monitoring an surveillance of EEZ is very essential to ensure continuous an uninterrupted supply of biological resources without causing an damage to the ecology. Constant monitoring and detaile information about the living resources available are important tools in determining the biological regime, which in turn will determine the availability of resources in future. Coast Guard has been helping the deep sea fishing industry by apprehending poachers or vessels fishing in restricted/non permitted areas. FSI is the premier organization engaged in the survey of living resources in the EEZ. However, the present facilities for surveillance need to be strengthened. Recent development in the field of communication using satellites offer a more efficient monitoring and data collection system. It is proposed that we should adopt satellite monitoring system in a phased manner for monitoring the EEZ. The information so collected can be used for better exploitation and utilization of resources.

FISHERY SURVEY OF INDIA:

Substantial progress was made by FSI in the survey of demersal resources in the Indian EEZ and survey of deep swimming oceanic resources survey along north west coast and around Andaman & Nicobar Islands. Still some of the areas and resources, particularly neritic stocks, tunas, oceanic squids, etc. are yet to be investigated in detail and the resources once surveyed and which are under different levels of exploitation are required to be resurveyed for monitoring of the stocks on a continutous basis in the Indian EEZ. The current global approach in fisheries development is oriented towards promoting optimum utilization of the available resources at

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sustainable level as envisaged under the UN Law of the Sea. In order to meet these challenges, apart from continuing the on-going activities, the Fishery Survey of India proposes to take up new activities in the IX Plan

1. RESOURCES SURVEY/MONITORING

(i) CONTINUATION OF ON-GOING PROJECTS

The main charter of work of Fishery Survey of India is the survey of the fishery resources, charting of fishing grounds and dissemination of this resource information to the industry. Since fish is a living resource, its bahaviour is incluenced by changes in the ecology and other oceanographic parameters. It is, therefore, important that the survey resources/areas be also continuously monitored, simultaneously noting the changes in the ecology and other sea truth data. In the context of International Convention on Straddling Fish Stocks and Responsible Fishing, it becomes essential to survey not only within the Exclusive Economic Zone but also beyond.

It is, therefore, necessary for the Fishery Survey of India to continue the critical on-going activities of survey of maritime fishery resources in the EEZ and beyond by deploying the 12 survey vessels of Fishery Survey of India during the IXth Plan period as an on-going activity of the VIIIth Plan.

ii) NEW SURVEY ACTIVITIES

The new survey activities to be taken up during the IXth Plan include survey of coastal pelagic resources by mid-water trawling by acquiring new vessels; industrial resources survey for surface swimming oceanic tunas by chartering an oceanic purse-seiner; resource specific surveys; joint surveys in foreign countries on specific requests and investigation of krill and other fishery resources in the Southern Ocean.

INFRASTRUCTURE FACILITIES

i) ACQUISITION OF VESSELS

The Fishery Survey of India is presently having 12 survey vessels of 31.5-42.5m OAL, out of which 6 vessels will be phased out during the IXth Plan Period. Simultaneously, it is proposed to acquire 6 new survey vessels, (3 imported and three indigenuous) maintaining the fleet strength at 12 vessels. The existing vessels will be modernised by providing state-of-the-art equipments for data collection.

ii) CONSTRUCTION OF BUILDINGS AT HEADQUARTERS AND BASES

The infrastructure build-up envisaged during the VIth Plan (which saw the creation of zonal bases) and, which continued during the VIIth and VIIIth Plan did not materialise in full due to financial constraints and other reasons like formalities of obtaining environmental clearances etc. While the construction of the office-cum-workshop buildings at Madras, Vishakhapatnam and Cochin and the residential building at Port Blair were completed between 1989-1990, the construction of other buildings could be initiated only during the VIIIth Plan Period. As this infrastructure build-up is at various stages, it would be necessary to complete the same during the IXth Plan period as a critical on-going/spillover activity of the VIIIth Plan. It is proposed to complete the constructions at Headquarters Mumbai, Marmugao, Cochin, Port Blair and Porbandar.

3. FUNCTIONAL REORGANISATION OF FSI

FSI has been recognized by the Department of Ocean Development as one of the National marine data centre. In order to carry out its activities effectively functional reorganisation of FSI will be required which will include establishment of deep sea fishery data centre, strengthening of the base workshops, establishment of Consultancy Cell, establishment of an extension division and strengthening of the engineering set up of the FSI.

4. FINANCIAL OUTLAY

Details of the Financial Outlay under Capital and revenue expenditure for different on-going and new schemes to be taken up during IXth Plan are given below:-

FINANCIAL OUTLAY

		IXth Plan (1997-2002)		
No.	Scheme	Revenue	Capital	Total
1.	Ongoing Activities	5415.00	1300.00	6715.00
2.	New Activities	2470.00	6804.00	9274.40
TOTAL		7885.00	8104.00	15989.40

4.1 FOREIGN EXCHANGE

The outlay includes foreign exchange component of Rs.52 crores under capital required for acquisition of three foreign vessels (Rs.42 crores) and imported components for three indigenous vessels (Rs.10 crores).

5. STRENGTHENING OF FSI WITH NECESSARY MAN POWER TO TAKE UP THE ON-GOING/NEW ACTIVITIES.

It is proposed to strengthen the Fishery Survey of India with appropriate scientific engineering and administrative staff for undertaking the on-going and new activities. The requirement of additional manpower will be based on the norm fixed by the Government.

Total investment required in deep sea fishing sector during the 9th Plan

(Rs. in crores)

Sub Sector	Total invest-ment	Govt. share Central	State	Private sector
1. Diversification and upgradation of existing shrimp trawlers	40	-	-	40
2. Surveillance & monitoring of EEZ	5	4	-	1
3. Infrastructure Development	3000	150	150	2700
4. Strengthening of traditional technologies	20	6	6	8
6. Low value fish utilization	100	5	5	90
7. Research & Development	5	5	-	-
8. Skill upgradations	5	5	-	-
9. Quality assurance	10	5	-	5
10. Fishery Survey of India	160	160	-	-
	3345	340	161	2844

Table 1

Marine and Inland Fish Production and

Export of Marine Products

Year	Fish Production			Export of Marine Products	
	Marine	Inland	Total	Quantity	Value
	(In lakh tonnes)			(lakh tonnes)	(Rs.crore)
1989-90	22.75	14.02	36.77	1.11	634.99
1990-91	23.00	15.36	38.36	1.39	893.37
1991-92	24.47	17.10	41.56	1.72	1375.89
1992-93	25.76	17.89	43.65	2.09	1767.43
1993-94	26.49	19.95	46.44	2.44	2503.62
1994-95 (Prov.)	26.92	20.97	47.89	3.07	3575.27
1995-96 (Target)	28.25	21.25	49.50		

Source: Economic Survey 1995-96, GOI.

Table II

Fish Production Projections

Year	Fish Production * Marine (in lakh tonnes)	** Inland	# Total	Projected Total Population (in '000)	Fish Eating Population (56% of Total)	Per Capita Availability (in KG)
1996-97	28.57	22.83	51.40	931.976	521.907	9.85
1997-98	29.43	24.20	53.63	947.895	530.821	10.10
1998-99	30.31	25.65	55.96	963.786	539.720	10.37
1999-2000	31.22	27.19	58.41	979.654	548.606	10.65
2000-01	32.16	28.82	60.98	995.500	557.480	10.94
2001-02	33.12	30.55	63.67	1011.243	566.296	11.24

* at 3% growth rate
** at 6% growth rate
# at 4.38% growth rate

Source: Ministry of Agriculture.

Table III

Infrastructure for the Seafood Processing Industry

Category	As on 31.03.1990 Registered (Nos.)	As on 31.03.1990 Capacity (Tonnes/day)	As on 31.05.1995 Registered (Nos.)	As on 31.05.1995 Capacity (Tonnes/day)
Exporters	864	-	1105	-
Freezing Plants	231	2295.88	344	-
Canning Plants	24	83.50	22	71.10
Ice Plants	132	1854.00	137	1978.00
Fish Meal Plants	26	463.00	18	333.50
Peeling Sheds	924	-	871	2393.95
Coveyance	481	-	501	-
Cold Storages	304	42458.00	418	70219.00
Agar Agar Plants	-	-	4	-
Isinglass	-	-	1	-

Source: (Ministry of Agriculture)

Table IV

Disposition of Fish Catch

('000 MT)

Year	Marketing (fresh)	Frozen	Cured	Canned	Reduced	Mis. Purposes	Offal Reduction	Total
1977	1517.6	159.6	497.0	4.9	91.6	31.5	9.7	2311.9
	(65.64)	(6.9)	(21.50)	(0.21)	(3.96)	(1.36)	(0.42)	(100)
1978	1504.8	146.7	497.4	4.5	100.7	32.2	19.8	2306.1
	(65.25)	(6.3)	(21.57)	(0.2)	(4.37)	(1.40)	(0.86)	(100)
1979	1510.6	151.6	512.7	4.3	120.0	33.3	7.1	2339.6
	(64.57)	(6.48)	(21.91)	(0.18)	(5.13)	(1.42)	(0.30)	(100)
1980	1591.6	144.6	512.9	5.2	125.5	48.4	14.0	2442.2
	(65.17)	(5.92)	(21)	(0.21)	(5.14)	(1.98)	(0.57)	(100)
1981	1668.0	118.1	441.7	5.5	162.00	27.2	21.4	2443.9
	(68.25)	(4.83)	(18.07)	(0.23)	(6.63)	(1.11)	(0.88)	(100)
1982	1701.2	130.2	358.0	5.7	126.1	27.6	18.3	2367.1
	(71.87)	(5.50)	(15.12)	(0.24)	(5.33)	(1.17)	(0.77)	(100)
1983	1784.6	145.0	423.9	7.3	110.6	22.4	12.9	2506.7
	(71.19)	(5.70)	(16.91)	(0.29)	(4.41)	(0.89)	(0.51)	(100)
1984	1978.9	207.0	424.1	13.6	194.8	34.3	9.4	2862.1
	(69.14)	(7.23)	(14.82)	(0.48)	(6.81)	(1.20)	(0.33)	(100)
1985	1843.3	196.4	562.1	9.8	170.0	28.6	14.0	2824.3
	(65.27)	(6.95)	(19.91)	(0.35)	(6.02)	(1.01)	(0.50)	(100)
1986	1964.0	209.7	460.9	12.1	158.3	105.8	11.5	2921.8
	(67.22)	(6.16)	(18.11)	(0.17)	(6.56)	(0.65)	(0.63)	(100)
1987	1968.3	179.0	526.4	4.9	190.6	19.0	18.4	2906.6
	(67.72)	(6.16)	(18.11)	(0.17)	(6.56)	(0.65)	(0.63)	(100)
1988	2075.1	233.7	529.1	20.6	174.6	25.2	24.2	3082.4
	(67.32)	(7.58)	(17.16)	(0.67)	(5.66)	0.82)	(0.79)	(100)
1989	2301.4	261.2	590.9	28.7	315.2	62.0	25.1	3584.5
	(64.20)	(7.29))	(16.48)	(0.80)	(8.79)	(1.73)	(0.70)	(100)
1990	2497.2	285. 7	598.8	29.3	322.3	63.4	34.8	3831.5
	(65.18)	(7.46)	(15.63)	(0.76)	(8.41)	(1.65)	(0.91)	(100)
1991	2706.0	265.9	613.8	30.1	333.4	47.1	47.7	4044.0
	(66.91)	(6.58)	(15.18)	(0.74)	(8.24)	(1.16)	(1.18)	(100)
1992	2798.4	284.8	590.2	25.9	355.8	47.4	70.6	4173.1
	(67.06)	(6.82)	(14.14)	(0.62)	(8.53)	(1.14)	(1.69)	(100))

Source: Handbook on Fishery Statistics, Ministry of Agriculture
(Figures in brackets indicate %).

Table V

Export of Marine Products

Year	Quantity tonnes	Value (Rs.crore)	Average Unit Value (Rs.per Kg)	Growth rate Quantity %	Growth rate Value % (Tonnes)
1961-62	15732	3.92	2.49	-21.30	-15.52
1970-71	35883	35.07	9.77	+13.21	+4.83
1980-81	75591	234.84	31.07	-12.51	-5.62
1990-91	139419	893.37	64.08	+25.78	+40.69
1991-92	171820	1375.89	80.08	+23.24	+54.01
1992-93	209025	1768.55	84.61	+21.65	+28.54
1993-94	243960	2503.62	102.62	+16.71	+41.56
1994-95	307300	3575.27	116.34	+25.96	+42.80

Source : MPEDA, Cochin

Table -VI

EXPORT PROJECTIONS FOR THE 9TH FIVE YEAR PLAN
(1995-96 TO 2001-2002)

Q - in tonnes
V - in Million US $
UV - in US $

		95-96	96-97	97-98	98-99	99-2000	2000-2001	2001-2002
Frozen Shrimp	Q:	90000.00	103750.00	119375.00	137500.00	158750.00	182500.00	210000.00
	V:	720.00	830.00	955.00	1100.00	1270.00	1460.00	1680.00
Fr.Squid	Q:	35000.00	40000.00	41200.00	42143.00	41212.00	41053.00	41190.00
	V:	77.00	90.00	103.00	118.00	136.00	156.00	180.00
Fr.C.Fish	Q:	24920.00	28571.00	31988.00	31892.00	32000.00	32500.00	32143.00
	V:	78.00	90.00	103.00	118.00	136.00	156.00	180.00
Fr.Fish	Q:	119469.00	137168.00	157522.00	181416.00	208850.00	240708.00	276991.00
	V:	135.00	155.00	178.00	205.00	236.00	272.00	313.00
Dried Fish	Q:	5973.00	7080.00	8142.00	9381.00	10796.00	12389.00	14159.00
	V:	6.75	8.00	9.20	10.60	12.20	14.00	16.00
Live Items	Q:	1230.00	1408.00	1600.00	18.40	2120.00	2440.00	2800.00
	V:	3.00	3.45	4.00	4.60	5.30	6.10	7.00
Others	Q:	11842.00	13684.00	15789.00	18158.00	21053.00	24211.00	27895.00
	V:	45.00	52.00	60.00	69.00	80.00	92.00	106.00
Total	Q:	288434.00	331662.00	375616.00	422329.00	474781.00	535801.00	605178.00
	V:	1065.00	1228.00	1412.00	1625.00	1876.00	2156.00	2482.00
	UV :	3.69	3.70	3.76	3.85	3.95	4.02	4.10

(FISHERIES)

Plan outlays and expenditure during Four years of 8th Five Year Plan (from 1992-93 to 95-96) MFPI

(Rs. in lakhs)

S.No.	Scheme	1992-93 Out-lay	1992-93 Actual	1993-94 Out-lay	1993-94 Actual	1994-95 Out-lay	1994-95 Actual	1995-96 Out-lay	1995-96 Actual
1.	Scheme for assistance for deep sea fishing and processing vaentures	100	100	75	28	100	-	100	-
2.	Scheme for interest subsidy loan for acquisition of deep sea vessels	150	103.54	100	22.83	50	50	50	-
3.	Scheme for Diversified Fishing	50	35	100	-	100	-	50	-
4.	Scheme for Implementation of MZI Act - Communication facilities to Coast Guard	100	100	75	75	40	40	40	40
5.	Scheme for Cold Chain facilities	100	135.50	175	182.63	-	-	-	-
6.	National Marine Fisheries Development Board	100	-	50	-	50	-	50	-
7.	Scheme for tuna & other fish processing	100	198.70	125	67.50	-	-	-	-
8.	Scheme for R&D in fish processing	-	-	-	-	-	-	50	750
9.	Scheme for setting up of infrastructural facilities for preservation & processing of fish	-	-	-	-	360	61	360	446

Table VIII

Fish Production and Annual Growth Rate (%)

During the Period 1950-51 to 1995-96

Fish Production(Lakh Tonnes)				Percentage Annual Growth rate		
Year	Marine	Inalnd	Total	Marine	Inland	Total
1950-51	5.34	2.18	7.52	-	-	-
1960-61	8.80	2.80	11.60	6.48	2.84	5.43
1970-71	10.86	6.70	17.56	2.34	13.93	5.14
1973-74	12.10	7.48	19.58	-	-	-
1980-81	15.55	8.87	24.42	4.32	3.24	3.91
1981-82	14.45	9.99	24.44	-7.07	12.63	0.08
1982-83	14.27	9.40	23.67	-1.25	-5.91	-3.15
1983-84	15.19	9.87	25.06	6.45	5.00	5.87
1984-85	16.98	11.03	28.01	11.78	11.75	11.77
1985-86	17.16	11.60	28.76	1.06	5.17	2.68
1986-87	17.13	12.29	29.42	-0.17	5.95	2.29
1987-88	16.58	13.01	29.59	-3.21	5.86	0.58
1988-89	18.17	13.35	31.52	9.59	2.61	6.52
1989-90	22.75	14.02	36.77	25.21	5.02	16.66
1990-91	23.00	15.36	38.36	1.10	9.56	4.32
1991-92	24.47	17.10	41.57	6.39	11.33	8.37
1992-93	25.76	17.89	43.65	5.27	4.62	5.00
1993-94	26.49	19.95	46.44	2.83	11.51	6.39
1994-95(P)	26.92	20.96	47.88	1.62	5.06	3.10
1995-96(T)	28.25	21.25	49.50	4.94	1.38	3.38
1996-97(T)	28.57	22.83	51.40	-	-	-

(P) Provisional
(T) Target

Source (i) CMFRI Upto 1970-71
(ii) State Govts.UTs.

Table IX

Potential Resources Available, level of Exp[loitation and the Potential Available for Exploitation, Depth-wise, within the Indian EEZ

(in million tonnes)

Depth Range (m)	0-50	50-200	200-500	Oceanic	Total
Demersal	1.28	0.625	0.028	-	1.933
Neretic Pelagic	1.00	0.742	-	-	1.742
Oceanic Pelagic	-	-	-	0.246	0.246
Total (%)	2.28 (58)	1.367 (35)	0.028 (0.7)	0.246 (6.3)	3.921
Present Level of Exploitation	2.15	0.54	Negligible	-	2.69*
Available for exploitation	0.13	0.827	0.028	0.246	1.23

Source: Ministry of Agriculture, Government of India *1994-95

FINANCING OF FOOD PROCESSING INDUSTRIES
STATUS OF THE FOOD PROCESSING SECTOR.

There has been a spectacular increase in food production in India in the recent times. The country has emerged as the second largest producer of rice, vegetables and milk, the largest producer of fruits, spices, groundnut and rapeseeds; the fourth largest producer of wheat and the seventh Targest producer of fish. However, the post harvest management of agricultural commodities in India has not kept pace with the production. Processing is an important aspect of the post harvest management of many agricultural produce.

Food processing industry has an important place in the Indian economy. The share of the food processing industry in total industry increased from 14% in 1980-81 to 15% in 90-91 and at present would be about 19%. This sector also employs 16.7% of the country's labour force. However, it accounts for only 5.2% of the total investment. At present, only 1.6% of fruits and vegetables are processed in the country. Compared with the other countries the position is far from satisfactory. For example, Brazil, Phillipines, Thailand and Malaysia process 70%, 78%, 30% and 83% respectively of their total horticultural produce. At the same time, the utilisation of the installed capacity of food processing industries in India especially in the case of fruits and vegetables is very low, only 35%. The low capacity utilisation is generally traced to narrow produce base, technological obsolence, high cost of raw materials etc.

Processing of agricultural products is beset with various problems in India. The major problems relate to (1) technology (2) infrastructure (3) raw material (4) packaging (5) cost (6) marketing (7) quality and hygiene (8) organisation.

There is a preponderance of cottage and small scale units in the food processing sector. In case of fruits and vegetables processing more than 90% belong to this category. Small scale and cottage scale are also high in food grain milling industry. The units are unorganised and based on traditional technologies.

Co-operatives also play a significant role in the food processing industries. In the sugar industry co-operatives play a dominant role by contributing nearly 58% of the national sugar production. A good number of Co-operatives are also functioning in the dairy, edible oil, foodgrain milling, fruit and vegetable industry and fish processing. By and large co-operatives are at the small scale industry level and are based on medium level technologies which have been developed indigenously.

Although majority of the food processing units belong to the cottage and small scale units and co-operative, the number of corporate business concerns which include both medium and large scale units has increased significantly in the recent years especially since economic reforms have been initiated. These units are being set up with or without foreign collaboration. During the period from August 91 till date 3573 IEMs (Industrial Entrepreneur Memoranda) envisaging an investment of Rs.43429 crores have been filed for food processing projects.

Foreign investment in the sector is leading to the import of the latest technologies and thus helping technological upgradation of the food processing industries.

CONSTRAINTS

However, the major problem which has beset this industry is the lack of availability of adequate finances. This is borne out from the fact that over the years financial institutions are not placing requisite priority about financing the food industry.

Table I below indicates:

ASSISTANCE PROVIDED BY AFI*

(Rs. in crores)

Year	Total amount sanctioned			Amount Disbursed		
	ALL INDS.	FOOD INDS	% OF ALL INDS	ALL INDS	FOOD INDS.	% OF ALL INDS
1989-90	13546.60	698.50	5.15	8962.30	574.40	6.41
1990-91	16981.50	946.00	5.57	11081.40	610.20	5.54
1991-92	22057.40	1011.50	4.58	15636.70	721.80	4.61
1992-93	32220.50	1113.69	3.46	22188.10	922.20	4.40
1993-94	40209.10	1384.40	3.44	25409.60	908.00	3.58
1994-95	60317.60	2442.10	4.05	32427.80	1640.00	5.00

*AFI refer to IDBI, IFCI, ICCI, LIC, SCICI, UTI, GIC, RCTC, TDICI, TFCI

Although in terms of total quantum term loan has doubled from 88-89 to 93-94, in percentage terms of investment it has reduced from 5.2% to 3.3%. Similar is the situation in the matter of disbursement.

This includes finances to the sugar industry. If sugar is taken out of the purview, total amount disbursed to the food industry other than sugar is still comparatively low which is as follows:-

Table II (Rs. in crores)

Year	Food Processing Industries excluding sugar	% all industries
1988-89	402.3	4.62
1989-90	362.4	4.04
1990-91	417.52	3.76
1991-92	457.81	2.93
1992-93	650.16	3.06
1993-94	644.83	2.54

How much resources this industry willneed, will depend on the rate of growth and consequently on the rate of capital formation. If we visualise capital formation at 25% per year, with the rate of inflation 7% the real capital formation will work out to 18%. With

25' capital formation the net fixed assets of the industry will rise to three times the present level. This would mean that in 97-2002 the total net investment in the food industry will have to be Rs.29 thousand crores. Apart from the fixed capital requirements industry will need working capital. The ratio of working capital to fixed capital is about 60%. Hence the additional need for working capital for the industry in the 9th Plan will be approximately Rs.17 thousand crores. Bulk of the long term capital will have to come from the internal resources including depreciation, equity and bond market as also term loans from the financial institutions. The short term working capital and a part of the long term capital will have to come from the banking sector. The internal resources including depreciation will be mainly retained earnings. This will depend on the rate of profitability and the payment of dividends. The food processing industry earns lower gross profit as compared to industry as whole. In 93-94 profits before tax, interest and depreciation as per cent of sales were 12.4% in processing as against 15.4% for all other industries.

	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	93-94
Food	8.8	9.4	10.3	10.6	11.2	11.4	12.4
All Cos.	11.6	12.5	13.5	13.3	14.6	14.9	15.4

The food processing industry, therefore, is not in a position to generate large internal resources for further investment and has to depend mainly on external resources of finance.

Since beginning of 90s the primary market has become an important source of finance to all industry. Food processing industries were able to tap the market and mobilise nearly Rs.1589 crores in 94-95. This was fifteen times the amount the industry was able to raise in 1991. However, the share of food processing industry in total capital issues in 94-95 was only 4.4%. This was because the food processing industry is generally regarded as more risky both by the institutions as also by the retail investors. The profitability of the food processing industries is also lower than any other industries. The industrial units are generally of smaller size and as such do not generate confidence amongst the investing public. The industry would need to raise about Rs.10 thousand crores as equity capital during the 9th Plan.

Nearly two thirds of the finance for the food processing industries has come from the term lending institutions like IDBI, IFCI, ICICI, SCICI and the commercial banks. There appears to be some reservation on the part of the financial institutions in extending term loans to the food processing industry. The hesitation is due to the fact that the industry handles perishable goods and therefore exposes itself to higher commercial risks. The share of food processing industry in the loans given by the premier term lending institutions was only about 5% to 6%. If the banks woud ensure the loans being given to the food processing industries against adverse circumstances then the hesitation on their part to lend to this sector may not be there. It is also essential that the insurance should be not only for small entrepreneurs but also for big entrepreneurs with less commercial risks so that the risk is spread over a large group and the premium amount is low.

The food processing industry also faces problems with the banking sector as well. there are problems common toall industries like shortage of funds and the high rate of interest. In addition, banks tend to discriminate against food processing industries because of seasonality of production and higher risk factors. Unfortunately, financial institutions are also not fully geared to advise entrepreneurs to formulate the project reports suitable to their requirements. This tends mainly from the fact that over the years they have neglected food industry. Earlier the food industry which has grown in the country has come up as an extension of normal trading activities of agricultural commodities and have generally been financed from the entrepreneurs own resources. But to put the industry on modern lines, assistance from the financial institutions becomes important.

Of late, various new types of ventures which were hitherto not seen in India earlier are also being proposed by the entrepreneurs. Lack of understanding of these industries at the financial institution level are also the cause of delay of non-sanctioning of loans from the financial institutions. Although in some financial institutions and banks particularly at the field level do not have the specific expertise to appraise the new types of food industry which are now being proposed.

The methodology used in the financial analysis of agro industrial enterprise is generally similar to that which is applied to any other commercial enterprise. But different norms exists for many of the financial ratios and the financial performance depends upon different factors. The manufacturing industry faces ;medium and long term business cycles. It also has to do periodic market adjustments due to changes in technology and/consumer preferences. The agro processing industries face all these cycles and changes. In addition, it is also dependent on the long term commodity market cycle. The industry needs to adjust to the changes in the high and low price of raw materials and all this is dependent on the acceleration and delay of starting the processing. The industry also requires adequate flexibility and financial reserves to absorb losses or reduce costs in order to survive the down cycle.

Most agro industrial products have distinct seasonal cycles in the market. Prices of raw materialsare are usually low during harvest period. Within the established domestic market traditional seasonal consumption patterns are generally evolved to accurately predict the demand.If the enterprise is proposing to store or preserve a traditionally seasonal product so that it can be made available to domestic consumers over a longer period of the year, it must take into consideration its marketing capability. The situation may be quite different if the product is being aimed at export markets. In the first case a large investment in storage facility is needed for this strategy, besides a large working capital to buy and carry inventory.

Since most agricultural crops have distinct annual harvest period of short duration, a processing plant is required mainly to have sufficient capacity to handle the whole year's crop in perhaps 4-8 weeks, and most plants are very specialised and cannot be used for other purposes during non-harvest periods of the year. As a result the factory may sit idle for most of the years and fixed cost per unit of output will be correspondingly higher. The solution usually lies in extending the harvest period with improved agronomic practices or extending the processing period by performing similar operations on a number of different raw materials. This naturally calls for investment in agriculture itself, besides undertaking extension among farmers to transfer the technology. This will involve some cost which should also be taken as capital investment in the initial period of three years or so.

The perishable nature of most agricultural produce creates the problems of short harvest season. Either the processing capacity must be adequate to keep up with the seasonal availability or expensive storage facilities need to be built to preserve the quality of the raw material. This again adds to fixed costs. In addition for financing food industry factors like technology and marketing need to be taken into consideration.

The most important factor is that a food processing project must assure itself of the raw material supply of requisite quality. For this it has to undertake significant research and development and extension activities and development of suitable backward linkage with the farmers. Initial cost of such R&D and extension could be high. This also needs to be taken into account while calculating the overall requirement of finance.

The financial institutions generally prefer having a debt equity ratio of 1:1 or 1:1.5 as they cosnider agro industry projects high risk projects. For new types of ventures where financial institutions are reluctant to invest, it is the venture capital which has helped such new types of industry but in India the venture capital funds are very difficult to obtain.

Since financial institutions do not have sufficient expertise for appraising and funding the food processing projects, one solution could be to create a specialised Development Bank for Food Processing Industries. This bank could have an equity base which could be subscribed by different financial institutions like RBI, NABARD, SIDBI, SCICI, Commercial banks etc.

This concept of new financial institutions for financing/re-financing agro food industry has not been accepted by NABARD and others. While there could be some validity in the objection for setting up some new financial institutions, the fact remains that this industry requires specialised attention and expertise in financing. If this can be achieved by creating a window in NABARD the problem can be solved to some extent.

The recent pronouncement of the Finance Minister to set up State level agricultural banks and District level banks for financing agriculture and agro processing needs may possibly solve this problem provided of course resources are pooled up in the State level bodies or in NABARD for appraising and financing agro food industries.

Another solution could be inviting foreign banks which have specialised in financial agricultural and food processing industries to India for co-sponsoring of projects. Some banks like Rabo Bank of Netherlands and Swiss Bank have showed an interest in setting up Trade Offices in India for giving trade finance to agro-processing industries.

There are doubts in different quarters whether foreign specialised banks will be able to charge a reasonable rate of interest. The issue is not the rate of interest, but appraising the viability of agro food industry and its special needs. In fact, the existing banking institutions is not very clear about the needs of agro food industries particularly the innovative types of industries that are being set up. These specialised banks can possibly help bringing about this kind of expertise in the country.

PACKAGING

BACKGROUND

PREAMBLE

Packaging in India, until recent years, was considered a luxury. This perception was mainly due to the fact that most materials were available for consumption without any packaging and the packed materials of the same commodity were more expensive than otherwise. As utilisation has increased as also consumesr awareness and the standard of living has increased the need for packaged commodities has also increased.

The packaging industry in India appeared only in the 1950's and only after almost a decade in 1960's it became noticeable. The industry grew in dimensions in the 1970's and assumed significance in the 1980's. If the potentials witnessed during the 80's and shifts and trends seen are any index then it is very encouraging for the '90s and thus the 1990's is p;oised for a leap for the packaging industry. Changing scenario in the field of packaging supported by sophisticated and modern technologties are geared to develop the requisite packaging media and systems envisaging a dramatic turn in the marketing of food and non-food products particularly in consumer value added forms.

PACKAGING INDUSTRY STATUS

Most of the raw materials requirements of the packaging industry are generally met by indigenous production, probably with the exception of tin-plate and some plastics and asceptic kaging. Though the supply of various packaging media have n increasing over the period of years the demand supply ition has been widening. There are a large numbers of kaging material manufacturing and converting units. Whereas ut 150 large scale units are engaged in the basic material duction, over 500 large and medium scale units and over 19000 ts in the small scale sector are engaged in packaging version. During 1995-96 the quantum of packaging materials duced\consumed is placed at 6.00 million tonnes valued at roximately Rs.10,000 crores.

Turning to the machinery sector there are about 750 its involved in machinery design, development and commercial duction of various types of machineries required by the kaging related industries. Of these 30 are in the organised tor and 40 have overseas collaboration\technical knowhow. It envisaged that by the year 2000 atleast another 250 units ld be going into this field of packaging machinery.

This situation thus offers excellent opportunities and tentials to both the material and machinery sectors.

CONSUMPTION PATTERN AND DEMAND

The consumption pattern of some of the primary packaging dia in India is indeed found to be in contrast to kthe world tuation. Of the total world average of consumption of astics is 36 percent in packaging the figure in India is only percent. In respect of paper and paperboards the situation 36 percentage as world average and in India accounts for 55 rcent. That the consumpotion of packaging media in India is much lower than that in the developed part of the world would be revealed from the fact that the per capita consumption of paper and board in India is 1.3 kg as against 310 kg in USA and in plastics it is only 0.7 kg in India as against 50-90 kg in the developed countries. Whereas this analysis should be taken as indicative it should be remembered that the maximum consumption would be in the selected urban metros and practically negligible in most rural areas. It should also be borne in mind that over sixty percent of the population lives in rural places and hence a potential virgin potential for packaged food in the days to come.

The consumption and estimated demand for various forms of packaging media is envisaged to grow at the rate of about 10 percent. However, various factors and industry liberalisation, shifts and trends, new areas should and would change the scenario further in favour of packaging and hence increased quantum of consumption and demand.

GROWTH POTENTIAL

The growth rate of consumption and demand for packaging is envisaged to be of the order of 12 percent per annum. The rise in levels in respect of some major packaging media is estimated to be Tinplate 45 percent, Plastics 104 percent, Paoer and Board 48 percent, Flexibles 100 percent, Glass 51 percent, by 2000 AD, Thus the total demand\consumption pattern by 2000 AD indicates that the total requirement of all packaging together would be about 10.20 million tonnes from the present level of about 6.0 Million tonnes, an increase of about 55 percent.

However, current fiscal and industrial policies, towards industrialisation and globalisation, various shifts and trends, thrust in food processing industries, adoption of new technologies, exports, besides consumer awareness with increasing purchasing power would change the scenario further in favour of packaging resulting in considerably increased level of demand.

ANALYSIS OF SHIFTS AND DEMAND

The foregoing gave a picture of consumption and demand pattern in the normal growth rate situation. It should however be noted that the changing scenario assumes greater significance and is likely to affect the eco situation as well.

Such possible situations could be analysed considering the following aspects:

PACKAGING MATERIAL REQUIREMENTS FOR PUBLIC DISTRIBUTION SYSTEMS

One of the common means of reaching esential needs of food to the general public in the developing countries is through public distribution system more popularly known as PDS System. Daily needs like wheat, rice, sugar and edible oils are reached to the public by such system but the interesting feature is that in spite of the large quantum involved and area of distribution these commodities are supplied loose and hence is a potential area for packaging. Taking the quantum of estimates for distribution by 1996 the quantity of tinplate required is 0.12 million tonnes valued at 3400 million Rupees, plastic pouches and plastics bottles at 0.52 million tonnes valued at Rs. 2100 crores. Thus the total of these media for PDS System by 1996 would be of the order of 0.64 Million tonnes and estimated to raise to 1.4 Million tonnes by 2002 AD valued at Rs. 6000 crores. This is just over 12 percent of the demand for packaging media estimated at normal rate of growth of the industry. Thus there will be a direct addition of 12 percent increased waste generated for disposal.

PROCESSED FOOD PACKAGING

The food processing industry is consodered as the thrust and focus area during the decade. From the present level of less than one percent of fresh fruits and vegetables and food grains appreciable increase in processing of these fresh produces is expected. The quantity of these product that would come as packaged goods is estimated at 45 million tonnes. Even if only 5 percent of food grains and 10 percent of fruits and vegetables are processed and packed the package requirement, if the five major packaging media are taken into consideration is estimated at 3.64 million tonnes by 1996. This figure should by 2002 ADm become 8.2 million tonnes. Thus this alone will add to 85 percent of additional packaging to the estimated 10.2 million tonnes.

PROCESSED FOOD SECTOR

The composition of the processed food industry is estimated at present as:

Oils and fats	:	36.0 percent
Dairy Products	:	18.9 percent
Cold beverages	:	15.6 percent
Hot beverages	:	15.3 percent
Indian food	:	1.4 percent
Western foods	:	1.5 percent
Bakery products	:	6.5 percent
Confectionery	:	3.5 percent
Processed fruits & Vegetables	:	1.3 percent

The growth of the processing industry and developments in food could mainly be attributed to the induction of modern technology for processing and packaging and the entry of host of new organisations from all sectors of economy that would include large Indian houses, multinations, Government owned orgnisations and small entrepreneurs. Some interesting and encouraging features in respect of the processed food industry are the enviable growth of some specific sectors. The bakery and confectionery sector currently is of the order of 3.5 million tonnes. The chocolate industry is of the order of 32000 tonnes.

Quantitywise the requirement of packaging materials required by the processed food industry was about 2.5 million tonnes in 1995 and likely to double by 2002 AD.

OTHER SECTORS

While the fresh fruit and vegetables and processed foods area is considered the most potential sources of demand for packaging materials, other sectors are also expected to kbe equally important segments for demand of variety of packaging media.

THE FUTURE SITUATION

The current level of package quantity consumption of 6.00 million tonnes should reach a level of 10.2 million yonnrd by 2002 AD, under normal industry growth rate. Thrust areas receiving more attentioon and infrastructure as well as new segments going into packaging concepts would considerably alter the consumption pattern and quantum. Distribution of most essential commodities through the Public Distribution System in packaged form would alone add an additioinal package quantity of 1.4 million tonnes by 2002 AD. Similarly the fresh agri-horticulture produce processing and packaging would bring into the packaging fold an additional quantum of 8.2 million tonnes of packaging materials. Other processed foods would further add on 4 million tonnes. The total of these alone would account to 21.86 million tonnes of solid waste by 2002 AD which is a four fold increase of the present situation. Besides the food sector and the normal growth pattern of the other non-food areas, among the latter also a few specific product and industry areas are geared for a much higher growth pattern and hence to that extent the demand and consumption of packaging media stands to show an upward trend.

THE RECENT TRENDS AND APPROACH

Package user industry being conscious of the trends in other parts of the world kand being influenced by the market compulsions as well as the economies move towards new concepts of packaging. Some of the highlights would be:

- Bulk to retail consumer packs
- Conventional to newer systems
- Long life to optimum life
- Ease in handling and convenience
- Ease in production and distribution systems and
- Overall economy

SOLID WASTE MANAGEMENT

The importance of solid waste management has been receiving the attention in the country more seriously since the recent past. The quality of waste generated in urban areas depends on a number of factors. The solid waste includes waste generated both in residential and commercial areas. Various measures are being effected and contemplated to overcome their disposal problems besides converting them into useful resources. The latter includes incineration for power generation, anaerobic digestion and biogas generation, composting the fuel pallets. However solid waste management face problems and difficulties owing to various factors thereby affecting its efficiency. The major impediments are lack of financial infrastructure and information facilities, non-availability of appropriate technology and lack of appreciation and knowledge. Often the adoption of recycling technology also suffers from the fact kthe uniform quantity and grade of materials are not available, higher volumes resulting in khigh transportation cost, inadequate facility for sorting, grading, mixing and processing technologies and higher degree of contamination. Recycling and reuse of waste definitely offer many advantages such as economies, reduced problem of waste and pollution, less environmental problems and saves disposal space.

Paper and board constitute a major component of packaging and such media are generally accepted as ecofriendly due to their being biodegradable and recyclable. The production of paper and board during 1995-96 was 1.5 million tonnes andd estimated to go up to 2.2 million tonnes by the turn of the century. However the waste paper utilisation currently is only about 30 percent and expected to be of the order of 50 percent by 2000 AD. Wood and bamboo contribute totally to the extent of 66 percent of the raw material required by the paper industry but if the situation continues the country will face a considerably depleted forest resources. In the field of plastics it is observed that though unorganised a fairly high quantum of plastics are recollected and reprocessed. The reprocessed materials could be used both for packaging and non-packaging applications. The extent of recollection and recycling could be placed at 50 percent.

Tinplate is yet another prime material used for packaging. It is estimated that about 0.60 million tonnes of tinplate was consumed during 1995-96. Indications are that about 35000 tonnes are available for recycling which however accounts for less than 10 percent of the volume consumed. It is further noted that about 10 smelting plants are established for waste recovery. In respect of metal containers and drums one interesting feature is reuse of these after reconditioning. However, the hygienics of such reconditioned ones is debatable.

In respect of jute and hessian these are put to use multitrips and often get into households for use. Waste generated by most other materials might not be appreciable.

In the absence of any serious felt problems the country has not implemented any major schemes to control the waste or its recovery or reuse. Having, however seized of the situation a number of programmes are being planned and action initiated. The start made is envisaged to lay the foundation to meet the challenges of the future. The action plan envisages utilisation of solid waste or resource recovery, environmental impact assessment, technology for solid waste disposal, greater use of solid wastes, recycling of solid wastes, etc. To promote some of the schemes national standards are also evolved to encourage eco-friendly packaging materials.

Fresh and processed foods constitute the major consuming and growth areas for packaging. In essence the growth of these two sectors are complementory. The world situation is equally true.

The latest statistics indicate the production of fresh fruits and vegetables at around 104 million tonnes and cereals and food grains at around 180 million tonnes. The increased levels of output during the last 4-5 tonnes were consistant and encouraging. However, the quantum of processing of these fresh produce continues to be abysmally low at below one percent, whereas over 60 percent is witnessed in many developed and developing countries in the world.

Absence of appropriate and scientific post harvest systems and technology, and infrastructural facilities have primarily contributed to the heavy losses of such fresh produce which the country cannot afford any more. The low temperature storage and insulated/refrigerated transport systems available are far below the requisite needs resulting in perishing of the produce.

Lack of awareness of the scientific principles and their advantages, training and education have also lead to poor handling, storage and packaging practices adding to the problems in the post harvest stream. Processing and packaging is looked upon as a myth. A myth that reflects the loss of taste and flavour as well as nourishments. This has kept away the consumer preferences for processed and packaged products. This inertia should be removed if the newer technologies of storage, handling, packaging etc. are to be successfully adopted.

The food sector also has shown considerable growth in exports and more thrust is being provided. Exports in value added consumer packs is also identified as a thrust area.

Growth of the food sector will have a direct bearing on the development and growth of the packaging sector - basic materials, converted media, packaging machinery and ancillaries.

STRATEGIES FOR 9TH PLAN

1. The packaging conversion industry in India by and large being in the Small Scale Sector suffers from inadequate Research and Development facilities. This to a very large extent hinders the growth and developmental activities. The industry needs to be de-regulated.

2. Considering the input needed and the dynamics of the packaging technology centralised laboratory and pilot scale facilities need to be established in selected institutions to cater to the need of the packaging conversion industries and package user industries. These facilities should help in the development and adoption of modern, sophisticated and contemporary packaging systems besides being in conformity with the current needs of various import markets.

3. The package user industries that include the exporters more often would find it difficult to establish infrastructural facilities to produce package systems as are required by the export markets. This is particularly so because of the large variety of products and wide cross section of the packages besides the shifts and trends. In order to bridge the gap and meet the commercial needs, contract packaging facilities ranging from intermediate technologies to high level technologies should be encouraged. Necessary industrial and fiscal and catalystic investment should be extended.

PILOT -CONTRACT PACKAGING - FACILITIES

The setting up of contract packaging facilities at important commercial centres operating on commercial lines should enable small users to run pilot trials. Introduction of full mod VAT system for such facilities will ensure the reduction in the incidence of the compounded levy structure.

4. The packaging media used and systems adopted vary considerably from product to product, exporter to exporter and may be market to market. The quality variations also is considerable. Export market needs are stringent and highly discriminative. Product-package- wise studies should be made and export package specifications should be drawn-up in detail and where necessary as code of practice. The documents should be widely publicised and exporters advised to adopt them. Investment for the same need to be made by the Government.

5. Adherence to quality standards and sustenance of the same is extremely important. Appropriate quality inspection system should be evolved and mechanism implemented.

As a means to promote the sense of quality attractive schemes could be introduced in line with those such as brand promotion, logo promotion etc. as are currently introduced by some commodity borads.

Exports from India over many years have been in bulk quantities. Since the recent past efforts are pursued to encourage more and more of value added consumer pack exports with brand identity. The establishment of source and country identity also assume equal significance. Therefore more efforts are to be guided towards developments of units value added packs, to start with export thrust products and subsequently to all products.

In the above context, the series of products that already have an established consumer pack market should be selected to further Indian products in the international scene. This could pave way for many more companies and products to follow.

6. Current testing - quality control and other laboratory facilities are available at the INDIAN INSTITUTE OF PACKAGING and its Regional Centres and at the Packaging Division of CFTRI besides in DFRL. These facilities need to be enhanced. Some of the equipments are obsolete and hence need to be replaced, updated and modernised. Further the facilities need to be made more exhaustive to cover all packaging media and products packaging. Considering the overall industrialisation and exports being effected from different centres in the country, Indian Institute of Packaging should also open more centres in the country, at important industrial points.

7. The Bureau of Indian Standards (BIS) has developed technical specifications for packaging vanaspati, oil and ghee. The packaging requirements relating to edible oil and a host of other processed foods and fruits like mango, tomato pulp and mushroom, etc. have still to be developed/ specified. BIS may be requested to develop these specifications in consultation with industry on priority, the sequence can be decided after an ABC analysis. It is also recommended that packaging should contain, in printed form, declaration to that effect, confirming that the specification has been followed. This step will be necessary in order to educate the consumers and, in case of detection of any abnormality, the consumer can take recourse to consumer protection services/consumer courts. The above not only applies to tinplate packaging, but also the whole industry including non-metallic.

8. The cost of packaging is equally important. As per world standards, packaging cost should constitute upto 10 to 15% of the total price of the product in packed condition. Keeping this in view, it may be necessary to develop suitable packaging material with the help of CFTRI and IIP. In case of tinplate, use of double reduced tinplate and Tin Free Steel (TFS) can be maximised to get the cost benefits. Necessary regulatory measures also should be implemented and mechanism evolved.

It is recommended that reuse or recycling of packaging material for edibles should legally be banned and should become a cognizable offence under relevant statute.

9. ORIENTATION AND AWARENESS PROGRAMMES

Many processors and exporters are still unaware of the developments taking place, importance of quality, quality testing schemes etc. It is equally true of the statutory regulations and their implications. It is, therefore, necessary that orientation programmes on a continual basis should be organised covering various packaging media, process and techniques, and product packaging besides quality assurance programmes.

Whereas currently the Indian Institute of Packaging has implemented certain packaging educational programmes towards development of packaging technologies, these efforts need to be supported and encouraged to meet the growing demand for such qualified and trained manpower. Manpower development should be taken up on a massive scale via expanding training facilities of Indian Institute of Packaging and encouraging packaging as a full subject in various IITs and Universities :. Programmes. Programmes need to be developed for "training the trainers".

With a view to providing an orientation on a continual basis to the export promotion agencies and the export communities, the Indian Institute of Packaging should develop a programme identifying product groups and conducting indepth studies on the existing system of packaging for domestic distribution as well as exports, collect information, samples and specifications and the trends in the international market scene and disseminate the same among the Indian packaging manufacturing and user industries including exporters and over a period of time identify sources of material and machinery manufacturers within the country to bridge the gap currently faced and to be in line with international system to meet the future requirements.

10. RESEARCH AND EDUCATION

The Indian Institute of Packaging and Packaging Division of CFTRI carry out research and provide bulk of the requirements of the industry needs. Though the work of Indian Institute of Packaging is fairly elaborate it is necessary to involve selected IITs or research institutes attached to the established engineering colleges to take up research as well as dissemination of new technology on packaging. Indian Institute of Packaging can run this programme as an All India Coordinated Project with the assistance of the identified institutions.

Packaging having assumed its significance both for domestic and export trade, the subject should be introduced at the academic level in general and as a specialisation at university curricula.

In the engineering colleges and agricultural universities, packaging should find as a subject for teaching. While for the engineering colleges, detailed syllabus can be followed covering the whole gamot of packaging industry in the agricultural universities it should be more on the kind of different packaging materials available, merit and demerit of each packaging material and cost economics of packing various agricultural commodities. In all these institutions recycling of the packaging material or the disposal of the wastes should form part of the syllabus.

11. INFORMATION UPDATE

Updated information on various aspects of packaging should be readily available to the industry and exporters. These would relate to materials and machinery and their sources, processes, techniques and systems. Data bank information centre (s) are the need of the day. Such data centres should also have international linkages. The IIP has made a beginning through setting up of a Data Bank Centre. This should be strengthened and expanded.

APEDA and IIP should be made Nodal agencies for collecting information on the fast changing environment protecion legislation being introduced by various countries to ensure that Indian exporters can continually upgrade/modify their facilities to meet such standards.

12. OVERSEAS EXPOSURES

Institutional and export individuals should have adequate opportunities for their continuous orientation and upgradation through participation in international symposia/meets and exhibitions.

13. Due to diversity of products and destinations the packaging requirement of various food products assumes a very wide range. Rationalisation and classification of

differ nt food products need to be carried out depending on -

The packaging protection and aesthetics requirements viz.

a) Cereals
b) Fresh Fruits
c) Food supplements
d) Pre-processed foods
e) Ready to eat or self eat foods
f) Meat and marine products

Research projects and activities related to the field of packaging needs support and encouragement. The equipment for processing and packaging industry should also be designed to utilise the indigenously available materials. Packaging media domestically made should be versatile enough to cover diverse industry applications. This would enable to import higher production technology and ventures particularly with cost benefits.

Research programmes using agricultural resources, agricultural wastes like jute cuttings could be promoted towards development of ecofriendly packages. Flexible bulks from jute and hessian with suitable barriers could be considered for products packaging.

The raw material for pulp and paper is mainly (around 60 percent) wood and bamboo. The country would face a considerably depleted forest resource and to overcome the shortage of raw material for paper, the aim should be to develop low cost pulp and paper for packaging application from natural fibre agro wastes. In this context the interesting development from CIRCOT of manufacture of paper from cotton stalks would need further studies and exploration.

14. Package development/research programmes are also carried out by various institutions and some of them need to be augmented and supported towards commercialisation. Typical of this would be the flexible laminated retortable pouch andaluminium cans for processed foods by DFRL, Mysore. The marine products packaging also has ahigh relevance particularly in the context of the possible use of aluminium based containers for meat and marine products packaging. Similar exercise and indepth studies also are needed for extensive application of laminates and co-extruded films for mass consumed products like edible oils and vanaspati. Newer techniques like cold seal for flexible packaging media is yet another area that could find extensive application in the country.

15. FISCAL - LEGAL NEEDS

With a view to discouraging and avoiding the use of second grade packaging media such as tin free steel/tin plate or recycled plastics, appropriate legislative and as are necessary fiscal measures should be imposed in the interest of the health of the common masses.

In respect of contaminations in glass as packaging media, similar measures are considered necessary.

Taking growing demand for bio-degradable packaging media more and more developmental projects in this field should be encouraged. Some initial inputs already are available from the Lax Research Institute/IPCL/IIT, Kharagpur which refers to technology development leading to biodegradable plastics from tapioca starch.

16. RESERVATION - A REVIEW

A large number of packaging conversion industry are currently reserved for small scale sector. This has come into effect about 3 decades back. The packaging industry over the years have grown and considerable modernisation and sophistication are brought into. This is primarily to suit the escalating market demands and finess cum accuracies needed.

Considering the technological developments and the standards of quality achieved elsewhere in other parts of the world and that need to be reached in India particularly for exports, the conversion industry in packaging will have to be opened up. In as much as the user industry is widely spread in respect of their requirements, spread of the conversion industry among small, medium and large scale would be helpful.

In this context adoption of conventional and traditional methods of manufacture and conversions of packaging media/forms has to be carefully reviewed, in as much as such processes would not be able to provide the desired quality outputs. They may continue to serve the lower end, cost conscious market ends but not the value added market ends.

PACKAGING
INDUSTRIAL - R&D - FISCAL AREAS
BUDGET PROVISION

The upgradation of technology needs, in all activities of post harvest stream would require industrial progress, extensive R&D and fiscal supports. This would demand allocation of adequate funds in the 9th plan period.

Funds required in respect of various programmes related to packaging are estimated and indicated against each head of activity, for the 5 years period, in the next 5 years plan. It may however be noted that these estimates do not cover infrastructural facilities such as storage houses, grading-cleaning-Blanching etc, cold/cool/refrigerated transport systems, fiscal incentives and the like.

1. Pilot Plants (5 Centres - one each at 5 identified centres (Institutions)

Land and Building Plant and equipments Facilities and Ancillaries Manpower Miscellaneous	Rs. 25 crores

2. Package Development (Domestic and Exports)

2.1 Fresh product (fruits/vegetables) (20 fruits + 20 vegetables). Farm study and analysis of current system + Laboratory Evaluation and Identification of improvement needs + developments + development of alternates prototypes + laboratory evaluation + shortlisting and improvements + commercial field trials + development of code of practice	Rs. 10 crores

2.2	Fresh produce (fruits and vegetables) (Exports)(10 each fresh fruits/vegetables) Analysis of existing system- overseas market study on competitive packs, Development of prototypes, laboratory analysis, finalisation of specifications, overseas market trials + development of code of practice Preparation of graphic design (Package or lebels)	Rs. 10 crores
2.3	Meat, Màrine and Poultry products 10 select products. Analysis of existing systems, identification of improvements needs, developments of alternates, laboratory and field evaluation Code of practice for packaging	Rs. 5 crores
2.4	Processed Foods (Domestic) (20 products - such as snack foods, extruded foods, processed foods - jams, jellies, preserved etc.) Areas as at 2.1	Rs. 10 crores
2.5	Processed Foods (Exports) 20 select products Areas as at 2.2	Rs. 10 crores

3. QUALITY STANDARDS
(Laboratory Facilities)

Upgradation of existing Institutional facilities and add - on new generation, testing, quality control and R&D equipments (Facilities build-up at 10 centres) (No provision for Land and Building	Rs. 20 crores

4. ORIENTATION AND Awareness Programmes:

(a) Management (b) Supervisory Middle Management and (c) Shop Floor

(a) 2-5 day programmes 24 per year (each batch of 20) at 6-8 centres/locations (Residential)	Rs. 2.0 crores
(b) 5-10 day programmes 24 per year (each batch of 20) 6 per year (each batch of 5-6) (Hands on practical training	Rs. 2.0 crores
(c) Shop floor training 50/year (250 in 5 years) personnel 4 week training-in specific areas @ 1,00,000 per trainee	Rs. 1.0 crores

5. R & D and Environmental: Programmes	Rs. 5.0 crores

6. INFORMATION UPDATE: on packaging Materials, package types, packaging machinery, Ancillaries, Laws and Regulations etc. Facilities to be built-up and updated in 10 institutions/Centres (with possible overseas connections)	Rs. 10 crores
7. OVERSEAS EXPOSURE: 2 delegations per year (Ministry + Institution + Industry 8 per team) (Food and packaging Expositions) (Each of 10-12 day duration)	Rs. 1.0 crores
	Rs. 111.0 crores

HUMAN RESOURCE DEVELOPMENT

With the projected growth of the food industry in the 9th Plan demand for trained manpower to man the growing needs of the food industry will also become tremandous. This is more so because the existing food industry will also require technology upgradation and diversification. Besides for management of quality control systems, trained manpower will be essential.

While the organised food industry will require formally trained manpower, there will also be need for developing entrepreneurs with certain amount of skill so that they can extend and absorb the technologies for upgrading their existing operations. Besides, with a view to extend the spread of this industry in the remote areas closer to the raw material sources, there will be need for training people for entrepreneurship and also certain amount of technology and skills for production, packaging and distribution of processed food products.

In addition to this, with increased demand for sofisticated food products, even the food distribution chains and some food outlets, particularly Fast Food Chains and Eateries will also require certain trained manpower to maintain the proper hygiene in handling and distribution of the food products. All these combined together will create a tremandous demand for the trained manpower for the industry.

Present status of training in food technologies in the related areas, in India are:

1. Certificate course in the areas of canning, packing, baking, milling etc. 120 persons per annum.

2. Diploma in food technology (2 institutions - 50 persons P.A.)

3. Bachelor degree in food technology (5 institutions - 100 persons P.A.)

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4. Degree in Agriculture with food technology as elective subject dairy, fishery technology, livestock technology (6 institutions - about 120 persons P.A.)

5. Post-Graduate Diploma in food technology (2 institutions - 30 persons P.A.)

6. M.Tech. in Agriculture and Food Engineering (2 institutions - 20 persons P.A.)

7. Post-Graduate degree in Agriculture and Food Technology (7 institutions 175 persons P.A.)

8. Post-graduate degree in subjects related to food technology Dairy, Fisheries, Horticulture etc. (7 institutions - 85 persons P.A.)

In addition, there are some 50-60 community canning centres operating throughout the country which train housewives and entrepreneurs in the technology of canning and fruits and vegetables preservation. The Ministry has also assisted different organisations in setting up about 250 Food Processing and Training Centres with a view to train up small entrepreneurs and transfer of technology skills for processing of various types of foods in the small scale sector. Output of these together by the end of the Plan will be around 4000-5000 persons per annum. However, the persons trained in the Food Processing & Training Centres may not necessarily be setting up their own units, but may work in some other food processing units. There are various institutions of hotel management, foodcraft institutions in the country which train people for food preparations and service and some of them also train personnel for quality check and to some extent processing and preservation.

The output of these instituions are generally utilised in the hotels and hospitality industry. However, the element of food science in most of these food craft courses are not so strong.

By the end of the 9th Plan (year 2001) requirement of manpower as indicated will be substantial. A typical Rs.10 crores turnover company will need the following food technologists for the following purposes:

1. Technology adoption, diversification and implementation of new project - 1 personnel

2. Supervision of production, quality control operations - 2 Graduates and 4 Diploma or Certificate Holders.

Thus, the ratio of 1:2:4 (Post-graduate:Graduate:Diploma/ Certificate Holder) can be used in arriving at human resource requirement from the data on quantum of processed food, value addition and growth rate of processed food industry. The estimated requirement to cater to the demand of certificate and diploma holders will be approx.6000 in number whereas Bachelor's degree holder will be approx. 3000 in number. Similarly, demand for Post-graduates will be approx. 1500 people. In addition, specialised manpower in the field of meat, poultry, fisheries etc. or even in the baking and milling industry, short-term courses will be required. The new dimensions of the human resource development would need strengthening of the existing systems or adding certain amount of facilities in the existing institutions or even opening new institutions for the purpose of manpower. The additional infrastructure may require an investment to the extent of approx. Rs.150 crores.

Human Resource Development programmes currently carried out by the various institutions are facing financial constraints which creates impediments for commercialisation of the existing and ongoing research activities. There is, therefore, a need to provide inputs to the institutions for pilot plant studies and upgrading the skills for using the research activities for new technologies.

Therefore, to create this additional manpower training facilities need to be created. These training facilities could be created in the existing engineering institutions or agriculture institutions and ITIs to create post-graduate, Graduate and Certificate level courses. It has been seen that some of the institutions have already started some courses for food technology. But most of these facilities are illequipped and therefore, it is desirable that these facilities are equipped fully. Similarly, investment has also to be made to train up manpower in these institutions. International assistance may also be taken for setting up of the additional training facilities in the existing agricultural or engineering institutions for different levels of food technology.

For training entrepreneurs and for transference of simple technologies it is necessary to set up FPTCs and upgrade some of the FPTCs as already indicated in the plan for horticulture based industries. Besides the food technology food engineering aspect is also to be taken up in some of the institutions. For this purpose a total fund of Rs.150 crores will be required, out of which approx. Rs.100 crores will be the public investment. Another Rs.50 crore could come from the private sector who may be interested to set up training institutions.

RESEARCH AND DEVELOPMENT

To update the Indian food processing industries to the international standards it is necessary to invest in research and development in a substantial manner. Up till now a number of R&D activities have taken place and new products and processes have been found, but majority of which are maintained at the laboratory scale. It is, therefore, necessary that during the 9th plan a number of these findings need to be upgraded to pilot projects and on commercial scale so that these could be transferred to the industry. For this purpose a coordinated activity between the research institutions and user organisations need to be undertaken. The technologies developed at the laboratories should be coordinated with these institutions and depending upon the needs of the industry collective research work can be taken up. These research and development activities can be created for the products or adoption of some new processing technologies.

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A number of these research projects identified have been indicated in different chapters. These includes R&D activities in the milk and milk products, fruits and vegetable products, fishery products, meat and poultry products, and packaging etc. In addition there could also be various R&D activities for various other food products like wines, alcoholic beverages or similar products and traditional food products. The thrust is needed to be given in the traditional food products sector to bring these products from the regime of only art to the real processed products. Development of these traditional food products will no doubt be helpful for the domestic markets, but also have possibilities of export.

The R&D activities can be carried out in the existing institutions and organisations in the country including the private organisations. However, in principle, all the commercial scale R&D activities need to be done in collaboration with the private sector or public sector industrial units so that transfer of these technologies is easier.

In addition to these the technologies already developed need to be disseminated in a wider scale. Simpler technologies including small and precise machinery need, to be transferred to the rural areas so that there is larger adoption of these amongst the rural entrepreneurs who intend to set up units in the rural areas. Use of the FPTcs, video films, literatures are need to be prepared for disseminating such technologies.

In addition to the industrial research some basic R&D on food safety needs to be carried out. The national facility for food safety which has already been created need to be strengthened. These organisations should primarily focus on suveillance and safety assessment of common food contaminants/additives in food and biotechnology research relevant to food safety. The main areas of work would consist of the surveillance programme with aspects of monitoring the levels of additives, pesticides residues, metals, microbial contaminants and adultrants in food. Based on the above

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studies, the total dietary intake of food contaminants/additives will be computed for various populations. The safety assessment will encompass the evaluation of safety of aforesaid toxicants and additives by employing WHO toxicology protocols. Due emphasis will be laid on developing simple kits to detect food adultrants/ contaminants/ additives. The facility will develop a Food Safety Data Base for selected food contaminants. The R&D component will lay emphasis on the development of sensitive methods for the detection of pathogenic bacteria, pesticides by chemical and biological methods. Development of health, designer and prophylactic foods will be given priority so that the results benefit the population. Safety analysis of Biotechnology derived products such as additives, proteins and genetically engineered foods should be emphasised. The effect of leaching of packaging materials into food and its interaction with food and the safety evaluation will be carried out. The inputs from these would help in developing appropriate systems in the country. This type of research work needs to be funded by the Central Government as this will be basically important for food safety and quality control. In the R&D activities the Research institution and organisation may be encouraged to obtain the patents of production in order to protect the Indian foods from piracy of the Individual Property Rights.

QUALITY CONTROL AND STANDARDISATION

In the field of food, there are a number of organisations responsible for the formulation of standards and for controlling their quality. These can generally be classified under two systems:

i) Those issuing Compulsory Licences, namely the Regulatory Bodies; and

ii) Those issuing voluntary standards and certification systems.

The aim of both these Systems, namely Regulatory Bodies and Voluntary Certification Systems is basically the same. The latter work on a voluntary basis and provide a Third-Party Guarantee to the consumer and ensure that the product conforms to the quality desired by the consumer, whereas the regulatory agencies ensure that the standards laid under the law are strictly observed by the manufacturers thereby protecting the consumer.

In the era of liberalisation it will be necessary to develop sufficient number of laboratories to undertake these activities of detection. Therefore, as has been indicated in many other chapters, assistance is required to be given for developing the food safety laboratories alongwith acreditation of these laboratories. These laboratories could be in the private or public sector, but recognition of the same need to be done by the authorities.

Along with that it will be necessary to encourage the industry to adopt appropriate quality control systems. This encouragement can be given in the form of assistance to those units who obtain ISO-9000 Certification etc. or other international standard system for quality control. The voluntary or standard formulation bodies should laid down the good manufacturing practices and encourage its adoption. In some cases good manufacturing practices could be made compulsory under the law. Adoption of these systems will require considerable time, however, during the 9th plan a beginning could be made for enforcing or encouraging good manufacturing practices, besides development and adoption of standards.

NEW INITIATIVES FOR THE 9TH PLAN

GRAIN PROCESSING

(1) A backward linkage between the farmers and the processing industry as a concept needs to be encouraged. This will create a demand for these products which in turn will enable the farmer to get remunerative prices for his produce. Apart from strengthening the scheme which is under operation in the fruit and vegetable processing sector, a similar scheme should be taken up for maize/coarse grain processing.

(2) In order to improve the efficiency of pulse milling industry in the country an appropriate scheme needs to be formulated for grant of financial assistance for installation of a drier and dust control system and modern pulse processing units.

(3) Measures are required to be initiated for training in Bakery science and technology suitable for small medium and large scale bakery industry.

(4) For increasing the shelf life of bakery products including bread, a project should be undertaken by C.F.T.R.I. to be funded by the Ministry of Food Processing Industries.

(5) Technology development for production of specific flours required by the bakery industry needs to be taken up for quality improvement.

HORTICULTURE BASED INDUSTRIES

(1) Lack of infrastructural facilities being one of the main constraints for the development of these industries adequate attention needs to be paid for providing newer types of storage systems, specific types of transportation having cool or cold chamber with proper support from the Government.

(2) Backward linkage between the producers of raw material and the processing industry will have to be strengthened as this would be beneficial to all concerned.

(3) Assistance would have to be provided for spice processing activities including development of technology as this would help the farmers in general and those of the North Eastern region in particular to increase their'income.

(4) Steps are required to be taken for growing cashewnuts in the States of Andhra Pradesh, West Bengal and Orissa.

(5) Action for producing value added products such as Salted/ roasted cashewnuts as also to promote processing facilities of cashew, applies etc. will have to initiated.

(6) There is a need to promote walnut processed products which would bring in higher value in the domestic and international market.

(7) Steps would have to be initiated for promoting coconut-based industries by introduction of new technology as well as simpler technologies.

(8) There is need to provide assistance to the State Agro Industries Corporations for setting up mobile factory on wheels for processing of fruits and vegetables on the pattern of the concept developed by Karnataka Agro Industries Corporations.

(9) Pilot plants in selected centres to demonstrate some of the processing technologies for fruits and vegetables developed by CFTRI will have to be put up for which complete funding will have to be provided.

(10) Training courses in local languages to farm hands and supervisors on harvesting techniques and post harvest handling of fruits & vegetables to ensure that quality is maintained will be organised preferably by CFTRI to whom full assistance may have to be provided.

MILK PRODUCTS

(1) For the development of new dairy products, R&D activities have to be supported.

(2) Similarly for development of packaging machines for traditional milk products, support for R&D activities would be needed.

(3) Concerted efforts need to be made to obtain and disseminate market information.

(4) For achieving the standard of hygiene and quality of milk/milk products, chilling facilities at village level would be the most desirable step. Establishment of cold chain facilities for handling, transporting and storing of dairy products will enable long shelf life. Financial support in this regard would therefore be necessary.

(5) Adequate support would be required for market development which would inter alia include surveys, identification of markets, product profile, etc.

FISHERIES

(1) Creation of infrastructure for storage and transportation of fish in order to reduce wastage.

(2) strengthening the fish processing sector for greater value addition by adopting improved hygienic standards,

better quality control measures, product diversification, introduction of modern technology, strengthening of traditional technologies etc.

(3) Development of infrastructure facilities like raw material handling centres, cold storages, ice plants, chilling rooms etc.

PACKAGING

(1) Development of cost effective packaging both for domestic and export purposes.

(2) Upgradation of the existing institutional facilities as also adding new ones.

(3) Taking up Research & Development and Environmental Programmes.

ANNEXURES
(I - III)

ANNEXURE I

No. VSI/27(17)/96
Government of India
Planning Commission
(V.S.I. Division)

Yojana Bhawan, Sansad Marg,
New Delhi.
Dated the 17th January, 1996.

O R D E R

Subject: Constitution of the Working Group for Food Processing Industries for the Ninth Plan period

In the context of formulation of the Ninth Five Year Plan, it has been decided to set up a Working Group to study and assess the needs of the food processing industries sector during the Ninth Plan period. The composition and terms of reference of the Working Group shall be as under:

A. (i) COMPOSITION

i)	Secretary, Food Processing Industries	:	Chairman
ii)	Addl. Secretary & Financial Adviser, Min. of Food Processing	:	Member
iii)	Addl. Adviser (VSI), Planning Commission	:	Member
iv)	Joint Secretary, Plan Finance Division, Min. of Finance	:	Member
v)	Joint Secretary, Deptt. of Banking, Min. of Finance	:	Member
vi)	Joint Secretary, Deptt. of Animal Husbandry & Dairying	:	Member
vii)	Secretary, Food Processing, Govt.of West Bengal	:	Member
viii)	Secretary, Food Processing, Govt. of Uttar Pradesh	:	Member
ix)	Secretary, Industries, Govt. of Maharashtra	:	Member
x)	Secretary, Industries Govt. of Andhra Pradesh	:	Member

xi) Addl. Director General, Directorate General of Health Services, Govt. of India :

xii) Director (Food and Agriculture), Bureau of Indian Standards :

xiii) Director, National Horticulture Board, Gurgaon :

xiv) Chairman, The Marine Products Export Development Authority (MPEDA), Cochin : Member

xv) Chairman, Agricultural and Processed Food Products Export Development Authority (APEDA), New Delhi : Member

xvi) Chairman & Prof. Post Harvest Research Centre, IIT Kharagpur : Member

xvii) Managing Director, National Cooperative Development Corporation (NCDC), New Delhi : Member

xviii) Managing Director, National Bank for Agriculture and Rural Development (NABARD), Bombay : Member

xix) Managing Director, NAFED, New Delhi : Member

xx) Managing Director, National Dairy Development Board (NDDB), New Delhi : Member

xxi) Director, Central Food Technology Research Institute, (CFTRI), Mysore : Member

xxii) Director General, Fishery Survey of India Bombay : Member

xxiii) Director, Indian Institute of Packaging (IIP), Bombay : Member

xxiv) Director General, Confederation of Indian Industries (CII), New Delhi : Member

xxv) President, Indian Meat and Livestock Exporters Association, Bombay : Member

xxvi) President, All India Food Preservers Association, New Delhi : Member

xxvii) President, Sea Food Exporters Association, Bombay : Member

xxviii) President, National Federation of Fishermen's Cooperatives Ltd., New Delhi : Member

xxix) Managing Director, Orissa Agro Industries Corporation, Bhuvaneshwar : Member

xxx) Managing Director, Tamil Nadu Agro Industries Corporation, Madras : Member

xxxi) Director, Himachal Pradesh Horticulture Produce Marketing & Processing Corporation Corporation, Shimla : Member

xxxii) Sh. C. K. Basu Joint Secretary, Min. of Food Processing Industries : Member-Secretary

B. **TERMS OF REFERENCE**

i) To review the progress of food processing and horticulture industries during the Eighth Plan period in terms of capacity, production, technology, domestic demand and exports.

ii) To estimate domestic demand for food processing and horticulture products by the end of the Ninth Plan period as well as for the Perspective period up to 2012 AD.

iii) To estimate export possibilities of agro foods and horticulture products by the end of the Ninth Plan and also up to 2012 AD with details of steps to be taken to achieve the targetted level of exports.

iv) To recommend capacity and production targets for each year up to 2002 AD as well as perspective plan period of 10 and 15 years to meet the estimated requirements keeping in view the desirable and feasible level of exports.

v) To indicate the yearwise phasing of investment and working capital requirements, separately in public and private sectors, for the period up to 2002 AD, including the sources of finance.

vi) To assess the infrastructure requirements in terms of railways, port facilities, warehouses, air transport and terminal facilities etc. required for supporting the level of recommended capacity creation during the Ninth Plan period and up to 2012 AD.

vii) To review the progress of FPO 1955, recommend suitable measures for upgradation of quality standards to satisfy the hygenic standards and requirements for exports during the Ninth Plan and to suggest suitable changes in FPO 1955.

viii) To assess the categorywise (skilled, semi-skilled and unskilled) additional employment likely to be generated in the food processing sector - both rural and urban areas, direct and indirect, during the five year period up to 2002 AD and also prepare a perspective plan upto 2007 AD for human resources availability, training and upgradation of skills.

ix) To assess the requirements of technological upgradation, machinery and equipment etc. and to identify areas where foreign collaborations/ joint ventures would be required, keeping in view the production and export targets set for the Ninth Plan. The Group may also prepare a perspective plan upto 2012 AD covering these aspects.

x) To assess the existing R&D programmes, evaluate the R&D capabilities of existing R&D infrastructure for FPI, and to suggest R&D programmes for the Ninth Plan period considering technological requirements, quality standards, availability of packaging materials etc. The Group may also prepare a perspective plan for R&D in FPI upto 2012 AD.

xi) To assess the tax structure of the processed foods and horticulture products and to recommend such fiscal measures as are required to ensure proper development of the industry, both domestically and for exports.

xii) To review the availability of packaging materials for food processing industries and make appropriate recommendations for ensuring desired packaging standards keeping in view the requirements of quality, hygiene, suitable changes in FPO, etc.

xiii) To suggest ways to improve the availability and reliability of data for the food processing sector.

xiv) To make such other recommendation(s) as may be appropriate.

3. The Working Group may co-opt such official(s) or non-official(s) as members of the Group as considered necessary.

4. The expenditure on TA/DA of official members will be borne by the parent Department/Ministry/State/Organisation to which the officer belongs. The non-official members of the Working Group will be entitled to TA/DA as permissible to Group 'A' officers of the Government of India and this expenditure will be borne by the Ministry of Food Processing Industries.

5. The Working Group is expected to submit its report in six months.

(Gurjot Kaur)
Director (Admn.)

To

Chairman and Members of the Working Group.

Copy to:

1. Secretary, Ministry of Food Processing Industries, Panchsheel Bhawan, Khel Gaon Marg, New Delhi.

2. Sh. C.K. Basu, Joint Secretary, Ministry of Food Processing Industries, Panchsheel Bhawan, Khel Gaon Marg, New Delhi.

3. Addl. Adviser (VSI), Planning Commission, Yojana Bhawan, New Delhi.

4. Secretary (Expenditure), Ministry of Finance, North Block New Delhi.

5. Secretary (Banking), Ministry of Finance, Jeevan Deep Bldg., Parliament Street, New Delhi.

6. Secretary, Department of Animal Husbandry and Dairying, Shastri Bhawan, New Delhi.

7. Chief Secretary, Government of West Bengal, Writers Bldg. Calcutta.

8. Chief Secretary, Government of Uttar Pradesh, Secretariat, Lucknow.

9. Chief Secretary, Government of Maharashtra, Mantralaya, Bombay.

10. Chief Secretary, Government of Andhra Pradesh, Secretariat, Hyderabad.

11. Director General, DGHS, Nirman Bhawan, New Delhi.

12. Director General, Bureau of Indian Standards, Manak Bhawan, IP Estate, New Delhi.

13. Director, National Horticulture Board, Gurgaon.

14. Chairman, MPEDA, Panampilly Avenue, Cochin-682 036.

15. Chairman, APEDA, 6 Bhikaji Cama Place, New Delhi-66.

16. Chairman, Post Harvest Research Centre, IIT Kharagpur. West Bengal.

17. Managing Director, NCDC, 4 Siri Institutional Area, Hauz Khas, New Delhi-16.

18. Managing Director, NABARD, 10 Bahadurshah Zafar Marg, New Delhi-2.

19. Managing Director, NAFED, NAFED House, 1 Siddhartha Enclave, Ashram Chowk, New Delhi-14.

20. Managing Director, NDDB, Safdarjung Enclave, New Delhi-29.

21. Director, Central Food Technology Research Institute (CFTRI), Mysore-570 013.

22. Director General, Fishery Survey of India, Bottawalla Chambers, Sir Ferozeshah Mehta Road, Bombay-1.

23. Director, Indian Institute of Packaging, Bombay.

24. Director General, Confederation of Indian Industries, 23-26 Institutional Area, Lodi Road, New Delhi-3.

25. President, Indian Meat and Livestock Exporters Association, Unit No. 3, 11th floor, MVIRDC, No. 1 Bldg. Cuffe Parade, Bombay-5.

26. President, All India Food Preservers Association, 206 Aurobindo Place, Aurobindo Marg, Hauz Khas, New Delhi-16.

27. President, Sea Food Exporters Association, Sea Food House, Wellington Island, Cochin-682003.

28. President, National Federation of Fishermen's Coop. Ltd. New Delhi.

29. Managing Director, Orissa Agro Industries Corpn., 95 Satya Nagar, Bhuvaneshwar-7

30. Managing Director, Tamil Nadu Agro Industries Corpn., Industrial Estate, Guindy, Madras-600 032.

31. Managing Director, Himachal Pradesh Horticulture Produce Marketing & Processing Corporation Ltd.

- with the request that the name of the representative of the Ministry/Department/Organisation may kindly be intimated to the Member-Secretary of the Working Group under intimation to Shri B.D. Jethra, Addl. Adviser (VSI), Planning Commission, New Delhi.

गुरजोत कौर 19/11/96

(Gurjot Kaur)
Director (Admn.)

Copy also forwarded to:

(1) PS to Deputy Chairman
(2) PS to Member(MS)
(3) PS to Member-Secretary
(4) PS to Special Secretary
(5) PS to Additional Adviser(VSI)
(6) Deputy Adviser(SSA)/(SGR)/(SD)
(7) VSI Division

गुरजोत कौर 19/11/96.

(Gurjot Kaur)
Director (Admn.)

ANNEXURE - II

1

PROJECTED DEMAND/TARGET FOR THE TERMINAL YEARS OF THE 9TH PLAN

Items	Units	1995-96	2001-2
A. GRAIN PROCESSING SECTOR			
1. Output form Roller flour Mills	Million Tons	9	12
2. Output from Rice Mills	"	120	133
3. Maize Processing	Lakh Tons	80	154
4. Pluse Processing	"	14	17
5. Bakery Products			
a) Biscuits, Rusks etc.	"	12	44
b) Bread, Cakes etc.	"	14	30
6. Pasta Products	"	1.4	6.5
7. Pulses based products (Bhujia etc.)	"	3.6	4.6
8. Cereals & Pulses based Mixes & Valued added primary processed products	"	1.2	4.5
B. HORTICULTURE BASED PRODUCTS			
1. Fruits & Veg. products covered under F.P.O.	"	10	30
2. Fruits & Veg. in Informal Sector	"	1.6	30
3. Coconut based products	Thousand Tons	20	100
4. (a) Cashewnut	Lakh Tons	3.7	8
(b) Value added Cashewnut Products	"	10	50
5. (a) Walnut	Thousand Tons	25	35
(b) Value added Walnut Products	"	Negligible	10
6. Ground Spices mix	"	95	250
7. Spice oil, Oleoresin & mixed valued added spices flavours	"	10	30

Items	Units	1995-96	2001-2
C. MILK PRODUCTS			
1. Milk Products inlcuding Baby food	Thousand Tons	200	300
2. Malted Food	"	48	100
3. Condensed Milk (Other than Khoya)	Thousand Tons	9	20
4. Butter	"	68	120
5. Ghee	"	115	200
6. Cheese	"	5	20
7. Casein	"	1	8
8. Lactose	"	Negligible	10
9. Traditional Products like Khoya & Paneer	Lakh Tons	5.5	15
D. MEAT & POULTRY PRODUCTS			
1. Buffalo meat	Million Tons	1.2	1.8
2. Beef	"	1.26	1.6
3. Mutton & goat	"	0.68	0.9
4. Pork	"	0.4	0.5
5. Poultry meat	"	0.45	1.0
6. Processed meat & Poultry products	Lakh Tons	0.5	1.5
7. Processed Egg products	"	0.4	2.0
E. FISHERY PRODUCTS			
1. Production of Fish	Million Tons	4.8	6.5
2. Proceesed Fish products	Lakh Tons	4.0	8.0

Items	Units	1995-96	2001-2
F. CONSUMER FOODS			
1. Beer	Million Litres	350	600
2. Potable alcohol	"	620	800
3. Coca Products	Thousand Tons	44	70
4. Soft Drinks	Million Tons	165	400
5. High protein foods	Thousand Tons	15	20
6. Soya products	"	30	60
7. Energy foods	"	120	400

Annexure-III

TOTAL INVESTMENT REQUIRED IN ALL THE SECTORS PROJECTED UPTO THE YEAR 2001-02

(Rs. in crores)

	PRIVATE	PUBLIC			TOTAL
F&VP, Coconut, Nuts & Spices	8240	Central	State	Total	10370
Milk Products	5500	1130	1000	2130	6000
Meat & Poultry Products	2500	250	250	500	3000
Cereals & Grains	2830	300 80	200 -	500 80	2910
Fisheries	2845	315	160	475	3320
Packaging	2050	100	-	-	2150
Research and Manpower Development Quality Control	350	100	50	150	500
Grand Total	24315	2275	1660	3935	28250