
EXPERIMENT 8 PREPARATION OF PROJECT REPORT TO SET UP A SMALL DAIRY PLANT

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8.1 INTRODUCTION

There has been tremendous improvement in milk production, which increased from 17 million tones in 1951 to 91.4 million tones in 2004-05. The per capita availability of milk during 2004-05 reached to 232 gram (g) as against the minimum nutritional requirement of 250 g recommended by the Indian Council of Medical Research (ICMR). Due to the increasing disposable income of 250 million middle class families, expanding population and growing urbanization, the demand for milk is expected to increase to 160-170 million tones by 2020. Together with the increase in demand and production of milk which has nearly grown at a rate of 4 per cent per annum attracted the multinationals to set up milk plant in India. In the scenario of demand and supply of milk, total milk handling capacity of the dairy plants has increased from 55909 thousand litres per day (LPD) to 81378 thousand LPD during 1996-2004. But the installed capacity of the milk plants is still remaining unutilized thereby resulting in high unit cost of processing. Volume of milk handling and the energy conservation in a milk plant are the two important aspects, which affect the cost of milk processing and products manufacturing. The organized dairy sector (both cooperatives and private) is presently handling about 15 percent of total milk production in the country.

In order to ensure the regular milk supply to dairy plants, the procurement of milk by the organized sector needs to be strengthened. The consumer will get the milk and milk products at competitive price only when the plants will run at full handling capacity or more than that.

Another step was taken in 1989, to augment rural income by launching Technology Mission on Dairy Development (TMDD), which aims at applying modern

technology to improve productivity, reduce costs of operation and thus ensure greater availability of milk and dairy products.

8.2 OBJECTIVES

- 1 to prepare a project report for setting a small dairy plant; and
- 1 to know different requirements for a milk processing plant.

8.3 REQUIREMENTS OF PROJECT (10000/ LITRE/DAY)

- i. **Land:** Building is the primary requirement for establishment of any enterprise. Land space is required for fixing machines, future expansion, parking of transport vehicles and for empty cans. About 1.5 acres of land is required for a milk processing plant handling 10000 litres of milk per day. The built up area to total area should be in the ratio of 1:3 (NABARD Model bankable projects).
- ii. **Location:** The location of a plant should be as near as the milk producing area in case of products manufacturing. The location of site should have proximity to road/rail facilities, services, such as water, electricity and effluent mains, social infrastructure, etc.
- iii. **Site Development:** Preferably the entire site should be fenced with barbed wire or compound wall is constructed with gates at suitable places. Internal roads should be of Metallic, Bricked or RCC depending upon the soil conditions, rainfall and the number of vehicles moving every day.
- iv. **Layout and Buildings:** The civil work comprises of factory building, quarters, office, garages, security post etc. The total covered area depends on the processes involved, products manufactured, the quantity of milk handled and the equipments selected for services and product manufacturing. About 4000 sq.ft. area of building is required for handling 10000 litres of milk.
- v. **Plant and Machinery:** In these days, Plants are mostly automatic and make use of the state-of-the-art PLC (Programmable Logic Control) system. The PLC system is a storehouse of programmes, which controls all the instruments and accessories in a logical and sequential manner. This system of the Dairy Plants are being established by Alfa Laval employing hi-tech Swedish automation technology. The PLC system is operated on the software SATTCONTROL A.B. developed by MALMO SWEDEN licensed to Alfa Laval.

8.4 INFRASTRUCTURAL FACILITIES FOR RAW MATERIAL AND UTILITIES

i. Raw Material

The main component of raw material for processing plant is milk. The size of the plant depends upon the milk-shed area, milch animal population, average milk yield, percentage of animals in milk, marketed surplus, etc. The method of procurement, transportation of milk and input supply to the farmers is required to

be ascertained. The availability of other inputs and raw material such as packing materials, regular power supply and consumables should be ascertained.

ii. Utilities

- i) **Power:** Normally a three-phase electric supply is required for milk processing plants. The power requirement depends upon the load to be connected and the necessary approval from SEB (State Electricity Boards) should be obtained for connection. Depending upon the position of power supply, standby generators are required to switch over to the generators during power cuts/failure.
- ii) **Water:** Availability of sweet and soft water is an added advantage to any milk plant. Soft and raw water is used in the plant. The soft water is used, particularly to avoid the formation of scale in the coils of the refrigeration and boilers. A milk processing plant requires the water in the ratio of 2:1 (2 litres of water for 1 litre of milk processed) for cleaning of equipment, cold storage and drinking purposes. . Accordingly, the size of the well is required to be designed and depends on the quality of water. The water softening plant may be equipped with the delivery of the bore well.
- iii) **Steam:** The steam requirement (kg/hr) for heating purpose depends upon the processes involved and the source of steam may be met by boilers operated with coal/ husk/oil/gas fired.
- iv) **Compressed Air:** It will be required for various pneumatic operations flow control operations as well as for cleaning purposes.
- v) **Vehicles:** The vehicles required for procurement and distribution of milk depends on the quantity of milk to be handled. The number of vehicles required, source of supply, rental charges etc. need to be furnished.
- vi) **Other Services:** Maintenance workshop is an important unit and integral part of milk processing for carrying out day to day repairs and maintenance of equipments.
- vii) **Manpower:** While selecting the site, the availability of manpower should be looked into and the total requirement of manpower depends on the operations involved and the quantity of milk handled.
- viii) **Effluent Treatment Plant:** According to the Industrial pollution act, 1976, dairy industry was considered as a source of polluting water. Therefore, wastewater from dairy plants is discharged to Effluent Treatment Plants, where the majority of the pollutants are removed. Waste load can be determined by a number of different measurements, including BODs, the biochemical oxygen demand; COD, the chemical oxygen demand, TSS, the total suspended solids concentration, TKN, the total Kjeldahl nitrogen content, and FOG, the concentration of fats, oils, and grease. The BODs concentration is measured in milligrams per litre (mg/l). The recommended level of BODs as per the I.S. I. Standards is up to 30 mg/l, if the water is to release into the Inland water, 300 ml/l, if the water is to release into the public sewerage and 100 ml/l for use of water in irrigation purposes.

8.5 EXPERIMENT

i. Requirements

Students shall be provided the Information on milch animal population, number of animals in milk, milk yield of different species of animals. In addition to this the students are required to have the information on types, make and capacity of the machines and the latest price.

ii. Procedure

Before establishment of any milk plant, a survey is required to be done to know the basic facilities and the marketed surplus. Number of animals in milk multiplied by the milk yield of different species of milch animals will give us the information on milk production potential in the area. The percentage of marketed surplus of the total production can be calculated on the basis of the survey of producers. Suppose the sample milk producers are selling on an average 60 % of the total milk produced and the total milk production potential is 1,00,000 litres per day then the approximate estimated marketed surplus is 60,000 litres per day. It depends on the ability of the plant how much it can procure from the estimated marketed surplus. If the plant can procure 20 % of the marketed surplus, the plant having capacity of 10000-12000 litres milk per day is recommended. After determining the capacity of the plant, the capital cost on the basis of the market price of the machinery, working capital and the civil work estimates will enable us to establish a milk plant.

iii. Results

The students will be provided with an example of a model project report. The cost is tentative. The students are required to prepare a project report on some different capacity milk plants using the latest costs of machinery and civil work and draw the income projections from the establishment of a milk plant for 5-6 years on the basis of the example given in the exercise.

8.6 PRECAUTIONS

While determining the milk handling capacity of the plant, due care has to be taken for estimating the marketed surplus of milk. If the capacity of the plant is recommended higher than the marketed surplus, the plant may run below its installed capacity. The techno-economic parameters with respect to cost, economics, repayment schedule and other terms and conditions are only indicative. While formulating the project reports the entrepreneurs need to revise their projects according to the specific situation obtaining in project areas. The financial viability and bankability of the scheme may have to be reworked considering the present tax structure and other levies put by different state governments wherever applicable.

8.7 EXERCISE

Statement -1

TENTATIVE COST ESTIMATE FOR 10000 LITRE MILK PROCESSING PLANT

Sr. No.	Cost components	Specifications	Quantity	Unit cost (Rs. in lakh)	Total cost (Rs. in lakh)
A Land building and civil work					
1	Purchase of land including all administrative expanses	Good quality land	1.5 Acre	10 / /acre	15 .00
2	Development charges like gate, fencing and roads	Iron gate, barbed wire fencing and brick road		0.75 Lump sum	0.75
3	Water supply bore well, tank and pump	Submersible		1.78 Lump sum	1.78
4	Building of the plant	RCC	2500 Sq. feet	600/ Sq.ft.	15.00
		ACC	1000 Sq.ft	450/Sq. ft.	04.50
5	Supervisor and worker's quarter	ACC	1000 sq.ft.	450/ Sq.ft.	04.50
Total (A)					41.53
B Plant and machinery					
1	Boiler and accessories	250kg. /hour	1	Lump sump	09.50
2	Milk reception SS tanks and pumps	10000 litres	1	Lump sum	07.50
3	Refrigeration machines, equipments and other attachments		With two compressors	Lump sum	16.50
4	Milk pasteurization and fittings	5000 lit/hour	1	Lump sum	08.75
5	Storage tank	5000 lit.	1	Lump sum	01.00
6	Cream separator	2000-5000 lit/hour	1	Lump sum	02.00
7	Packaging machines for ghee, milk pouches and accessories			Lump sum	09.75
8	Ghee boiler and ghee storage tank	500kg. /and 1000lit.	1 + 1	Lump sum	02.10

9	Dahi making unit	-	1	Lump sum	00.50
10	Milk chiller	3000-5000 Lph	1	Lump sum	00.80
11	D.G. Set	55 KVA	1	Lump sum	02.50
12	Electrical fittings, . panels, fans, lights etc	-	-	Lump sum	03.30
13	Pumps		4	0.20/pump	00.80
15	S.S pipes and fittings	-	-		01.50
16	Detergent Tank for cleaning	1000 lit. Water	1	Lump sum	00.30
17	Dump tank	1000 litres	1	Lump sum	00.60
18	Other small miscellaneous machinery, equipments and accessories used in different sections and cold stores, milk can, plastic crates, trolleys etc.	-	-	Lump sum	00.95
19	Effluent treatment plant pump, motors and assembly	-	-	Lump sum	02.25
19	Erection and commissioning	-	-	Lump sum	02.00
Total (B)					72.60

C Miscellaneous fixed Assets

1	Furniture and fixtures				01.00
2	Computers, Fax machine and accessories				01.20
3	Quality control lab. Equipments	-	-	Lump sum	00.75
4	Water softener			Lump sum	00.25
5	Fire fighting equipments			Lump sum	00.30
Total (C)					03.50

D Vehicles

1	Jeep/multi-utility vehicle		1	5.00	5.00
2	Scooter/motorcycle		1	0.45	0.45
Total (D)					05.45

E Other expenditures and security deposits etc.

1	State electricity boards			Lump sum	0.35
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2	Telephone	Lump sum	0.25
3	Project preparation	Lump sum	0.25
4	Market survey/ area survey	Lump sum	0.40
5	Salary and wages	Lump sum	10.00
6	Traveling	Lump sum	00.25
7	Administrative expenses	Lump sum	01.00
8	Consultancy	Lump sum	01.00
Total (E)			13.50
F	Contingency (@ 5 % of the cost building, plant and machinery and misc. fixed assets		06.15
Total (F)			06.15
G	Margin money for working capital (25 % of the first year requirements) Total working capital in the first year has been approximately worked out for store of packing material, fuel, milk, chemical & detergents, other raw material for products etc. equal to the sum of 7. 25 lakh		01.81
Total (G)			01.81
H	Grand Total (A+ B+C+D+E+F+H)		144.54
	Interest on fixed capital @10 % per annum		14.27

Note: The rate of interest on capital is assumed 10 % Per annum.

Statement-II

Income Projections for Processing Milk

S. No	Quantity of milk procured and output of products	Unit	Milk Handling	
			I st year	2 nd year
1	Milk procured	litres/day	7000	9000
2	Yield per day*			
	i) Toned milk (3% fat)	litres/day	4375	5600

	ii) Standard milk (4. 5% fat)	litres/day	2200	2800
	iii) Salable cream (50% fat)	Kg./day	100	135
	v) Ghee	kg/day	142	206
3	Income per day			
	i) Toned milk (Rs.16.00/ litre)	Rs. Lakh	0.700	0.896
	ii) Standard milk (18.00 / litre)	Rs. Lakh	0.396	0.504
	iii) Cream (Rs.70/ litre)	Rs. Lakh	0.070	0.095
	iv) Ghee (Rs. 160.00/kg)	Rs. Lakh	0.227	0.330
4	Total income/day	Rs. Lakh	1.393	1.825
5	Income per year (for 365 days)	Rs. In lakhs	508.44	666.12

*Yield figures and Income projections pattern for 9000 litre milk processing have been obtained from the document of NABARD on model bankable projects.

Note: In the first year only toned milk, standard milk Ghee, creams are to be manufactured and taken in to account.

It is assumed that the plant will procure 7000/lpd in the Ist year and 9000/lpd in 2nd year.

The plant will work all the 365 days in a year.

Statement-III

Expenditure projections for processing milk per day

Sr. No.	Particulars	Unit	I st year	2 nd year
1	Milk processing per year	Lakh litre per year	7000/lpd multiplied by 365 =25.55	9000/lpd multiplied by 365 =32.85
2	Raw material- milk	Rs. 11.40/litre	287.85	374.49 Lakh
3	Commission on milk collection	Rs. 0.20/litre*	5.05	6.57
4	Transportation charges	Rs. 0.20/litre*	5.05	6.57
5	Power and fuel charges	Rs.0.42/ litre*	10.60	10.84
6	Packing material	Rs.0.40/litre*	10.10	13.14
7	Chemicals and detergents	Rs.0.07/litre*	1.77	2.30
8	Salaries and wages (As per statement-I)		10.00	10.00

9	Repairs and maintenance	Rs.0.05/litre*	1.26	1.64
10	Interest on capital	Rs.0.43/litre	10.85	14.13
11	Overhead expenses	Rs.0.21/litre **	5.30	6.90
12	Milk distribution cost	Rs.0.60/litre*	15.15	19.71
13	Total operational cost		357.93	466.29

Note: Overhead expenses include depreciation on building, machinery equipments, computers, furniture and expenses on insurance, telephone etc.

* Techno-economic parameters have been obtained from the document of NABARD on model bankable project.

** Techno-economic parameters have been obtained from Research Bulletin No. 21 on Economic analysis of manufacturing milk products in a dairy plant, NDRI, Publication.

Statement IV

CASH FLOW ANALYSIS (Rs. In lakhs)

Sr.No.	Particulars	I st year	II nd year
1.	Costs		
	i) Capital cost (Rs.)	142.73	-
	ii) Recurring cost	357.93	466.29
	Total cost	502.47	466.29
2.	Benefits (As per statement II)	508.44	666.12
	Total benefits	508.44	662.12
3	Net benefits (Total cost –total benefits)		
4	D F at 15%	0.869	0.756
	a) Present value of costs @ 15% DF	436.65	352.51
	b) Present value of benefit @ 15% D F	441.83	500.56
			BCR =1:1.19

Note: The capital cost considered excludes the capitalized margin money (1.81 Lakh) on working capital.

D. F. Discounted Factor can be seen from the table of discounting factor or can

be calculated for first year as $\frac{1}{(1+R)^1} = \frac{1}{(1+0.15)^1}$ and for second year $\frac{1}{(1+0.15)^2}$ and so on.

B.C.R (Benefit cost ratio) = Present value of benefits for Ist and IInd year divided by present value of costs for Ist and IInd year, or $PVB \div PVC$

The students can work out the cash flows for third year to sixth year and then work out the cost benefit ratio for 6 years.