

**49. PROFILE ON DAIRY PROCESSING  
EQUIPMENT**

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## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of dairy processing equipment with a capacity of 536 units per annum. The dairy processing equipment includes milk container and cream churner. Milk container is deep round aluminum vessel with a wide mouth used for collecting / distributing milk. Cream churner or churn is simple equipment in which milk is shaken; beaten or otherwise agitated in order to make butter.

The major raw materials required are SS plates, SS sheets, mild steel rods, mild steel sheets, SS rods and SS sections, which have to be imported.

The present demand for the proposed product is estimated at 700 units per annum. The demand is expected to reach at 1,815 units by the year 2018.

The total investment requirement is estimated at about Birr 5.24 million, out of which Birr 2 million is required for plant and machinery. The plant will create employment opportunities for 26 persons.

The project is financially viable with an internal rate of return (IRR) of 26.91 % and a net present value (NPV) of Birr 4.17 million, discounted at 8.5%.

The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.

## **II. PRODUCT DESCRIPTION AND APPLICATION**

The growth of urbanization in the regions has opened the scope of setting up milk dairies in towns and cities. This industry is expected to grow fast which will bring opportunity for manufacture of dairy equipment. Dairy equipment like storage tanks, mixers, and

butter churns and others required in organized dairies are very important for improving the productivity of the operation and functions.

### III. MARKET STUDY AND PLANT CAPACITY

#### A. MARKET STUDY

##### 1. Past Supply and Present Demand

Dairy processing equipments are used for processing of milk to produce such as cream, cheese, butter and the like. Currently there is no plant that manufactures dairy processing equipments in the country. Hence, the country imports different types of dairy processing equipments mainly from India, China, Turkey, Italy and other parts of the world. Import of dairy processing equipments in the past 10 years is shown in Table 3.1.

**Table 3.1**  
**IMPORT OF DAIRY PROCESSING EQUIPMENTS ( NUMBER)**

Year	Centrifugal cream Separators	Dairy Machines	Milking Machines	Total
1997	22	2	20	44
1998	90	124	-	214
1999	19	7	19	45
2000	2	-	1	3
2001	240	6	5	251
2002	81	-	-	81
2003	46	2	1	49
2004	1	5,848	34	5,883
2005	181	109	27	317
2006	64	3	31	98
Total	746	6,101	138	6,985
Average	75	610	14	699

*Source:- Ethiopian Customs Authority*

Table 3.1 reveals that import of dairy processing equipment in the past 10 years has been very erratic with out a trend. If the data is grouped in to two periods i.e. 1997-2001 and 2002-2006 the following points can be observed.

- The annual average level of import in the first five years i.e. 1997-2001 is about 111 units. The quantity imported ranged from 3 to 251 units. The highest quantity imported is during year 1998 and year 2001 which is 214 and 251 units respectively. The lowest quantity imported is during year 2000 which is only 3 units. During year 1997 and 1999 the quantity imported is almost similar which is 44 and 45 units, respectively.
- The annual average level of import during the period 2002-2006 was about 1,285 units. As could be seen from the data an exceptionally very high quantity has been imported during year 2004 which amounts to 5,883 units. In the remaining yeas the quantity imported ranged from the lowest 49 to the highest 317.

The high fluctuation in the data set could be mainly due to a stock carry over from years where import has been very high. The other probable reason is that imports of such equipment could increase substantially in periods when new modern dairy farming are established.

In the absence of a trend in the data set the 10 years average is taken to fairly reflect the current effective demand for dairy processing equipment. Accordingly, present effective demand is estimated at 700 units of dairy processing equipment

## **2. Projected Demand**

Demand for dairy processing equipments is expected to rise with the modernization of the agricultural sector in general and the livestock sub sector in particular. During the past few years the government has implemented improved extension services to address

problems of production and productivity of farmers. Special programmers are also designed for the development of the livestock sector through improved breeds, forage development and veterinary services.

The Plan for Accelerated and Sustained Development to End poverty (PASPED), MoFED, Sept 2006, reveals that agricultural sector value added will grow by an average of 6.2% per annum, during the period 2005/06-2009/10. The same source also reveals that an annual average real GDP growth rate of 7% per annum. In addition to these targets it is believed that awareness of farmers in the utilization of modern agricultural equipments will increase as a result of improved extension services and income rise. Considering the above factors, the demand for dairy processing equipments is estimated to grow by 10% per annum. The demand projection executed on this assumption is given in Table 3.2.

**Table 3.2**

**PROJECTED DEMAND FOR DAIRY PROCESSING EQUIPMENT (NO)**

<b>Year</b>	<b>Projected Demand</b>
2009	770
2010	842
2011	932
2012	1,025
2013	1,127
2014	1,240
2015	1,364
2016	1,500
2017	1,650
2018	1,815

Demand for dairy processing equipment will increase from 770 units during 2009 to 1,240 units and 1815 units by the year 2014 and year 2018, respectively

### 3. Pricing and Distribution

The price of dairy processing equipments varies greatly depending on the quality, capacity, manufacturing material and the like. An average price of Birr 500 is adopted as a factory gate price.

The product can be sold directly to end users whose individual order is large. The factory can also appoint an agent that can distribute to the various parts of the country.

## B. PLANT CAPACITY AND PRODUCTION PROGRAMME

### 1. Plant Capacity

Based on the market study and the economic scale of production, the annual gross production capacity of the envisaged plant for dairy equipment production is 536(gross) based on 300 working days and a single shift of 8 hours per day. Increasing the number of working hours per day can increase this capacity. Detailed annual production is as shown in table 3.3.

**Table 3.3**  
**PRODUCTION CAPACITY**

<b>Type Of Dairy Equipment</b>	<b>Production Capacity (Gross)</b>
Storage Tank	20
Ghee settling Tanks (1000 lts.)	12
Ghee settling Tanks (3000 lts.)	4
Double cone mixer	200
Micro pulveriser	50
Evaporation pans	50
Butter churns	200
<b>Total</b>	<b>536</b>

## 2. Production Programme

Table 3.4 shows the production programme of the envisaged project. At the initial stage of the production period, the plant requires some years to penetrate into the market. Therefore, in the first and second years of production, the capacity utilization rate will be 70% and 85%, respectively. In third year and thereafter, full capacity production shall be attained.

**Table 3.4**  
**PRODUCTION PROGRAMME**

Sr. No.	Product	Production Year		
		1	2	3-10
1.	Dairy Equipment (gross)	376	457	536
2	Capacity Utilization (%)	70	85	100

## IV. MATERIALS AND INPUTS

### A. RAW MATERIALS

The total annual cost of raw materials is estimated at Birr 189,250. Table 4.1 indicates the annual requirement of raw materials of the proposed project. All the raw materials are to be imported but the quantity required for the production is small, direct foreign purchase will not be feasible so that the plant can purchase these raw materials from importers.



**Table 4.1****RAW MATERIALS REQUIREMENT AND COST (AT FULL CAPACITY)**

<b>Sr. No.</b>	<b>Raw Material</b>	<b>Qty. (Tonnes)</b>	<b>Cost ('000 Birr)</b>
1.	SS plates	35	56
2.	SS sheets	35	52.6
3.	Mild steel rods	20	27
4	Mild steel sheets	20	26
5	SS rods	7	10.15
6	SS sections	7	10.5
7	Miscellaneous (LS)		7
	<b>Total</b>		<b>189.25</b>

**B. UTILITIES**

Electricity and water are the principal utilities of the project. The annual utilities requirement and cost are indicated in Table 4.2.

**Table 4.2****UTILITIES REQUIREMENT AND COST**

<b>Sr. No.</b>	<b>Utility</b>	<b>Unit of Measure</b>	<b>Qty.</b>	<b>Cost ('000 BIRR)</b>
1	Electricity	kWh	250,000	118.4
2	Water	m <sup>3</sup>	600	1.950
	<b>Total</b>			<b>120.35</b>

## **V. TECHNOLOGY AND ENGINEERING**

### **A. TECHNOLOGY**

#### **1. Production Process**

The manufacturing process of the above mentioned dairy equipment mainly involves shearing, cutting, bending, grinding, drilling, welding, riveting and next assembling of the unit. Non-metallic materials may be used for sealing but must be non-toxic and relatively non-absorbent. Welding of stainless steel requires high skill in operation. Internal surface finishing requires high polish, free from any scratch. The process does not have any adverse impact on environment since the scrapes to be generated in the manufacturing process will be recycled by metal industries who have foundries like Akaki Spare Part Share Company.

#### **2. Source of Technology**

Selam Technical and vocational college

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Addis Ababa

Ethiopia

### **B. ENGINEERING**

#### **1. Machinery and Equipment**

The list of machinery and equipment is indicated in Table 5.1. The total cost of machinery is estimated at Birr 2 million of which Birr 1.6 million is required in foreign currency.

**Table 5.1**

**MACHINERY AND EQUIPMENT REQUIREMENT TO MANUFACTURE DIARY  
PROCESSEING EQUIPMENT WITH ESTIMATED COSTS**

Sr. No.	Description	UOM	Qty. No	Cost ('000 Birr)		
				F.C	L.C.	Total
1	Oxyacetylene torch set complete	Set	4	100	-	100
2	Plate bending machine	Pcs	1	-	200	200
3	Air cooled Arc welding transformer 350 Amps and its accessories	Set	4	-	50	50
4	Welding Rectifier set 30 x 350 amps and its accessories	Set	2	30	-	30
5	Air compressor and its accessories	Set	2	160	-	160
6	Flexible shaft grinder	Set	4	40	-	40
7	Universal radial drilling machine 250mm capacity	Set	1	250	-	250
8	SS and SC lathe of center 1770 mm with accessories and attachments	Pcs	1	400	-	400
9	Bench drilling machine 15 mm cap.	Pcs	1	100	-	100
10	Power hacksaw 200 mm cap.	Pcs	1	-	40	40
11	5 t capacity hoisting crane with adjustable trolley, chain block and gantry	Set	2	300	-	300
12	Vessel rotator stands	Pcs	1	-	40	40
13	Double end bench grinder	Pcs	2	80	-	80
14	Work bench with vices	Pcs	4	80	-	80
15	Electric drying oven	Pcs	1	-	70	70
16	Hydraulic test pump	Pcs	1	60	-	60
	<b>Grand Total</b>			<b>1,600</b>	<b>400</b>	<b>2,000</b>

## **2. Land, Building and Civil Works**

The plant requires a total of 600 m<sup>2</sup> area of land out of which 400 m<sup>2</sup>. Out of the total built up area 340m<sup>2</sup> will be occupied by the building which accommodate the production hall and the store for raw material and finished in such a way that the underground will be used for the store and the first floor for production facility. The 60m<sup>2</sup> area will be covered by the office building. Assuming construction rate of Birr 2,300 per m<sup>2</sup>, the total cost of construction is estimated to be Birr 920,000.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 272/2002) in principle, urban land permit by lease is on auction or negotiation basis, however, the time and condition of applying the proclamation shall be determined by the concerned regional or city government depending on the level of development.

The legislation has also set the maximum on lease period and the payment of lease prices. The lease period ranges from 99 years for education, cultural research health, sport, NGO , religious and residential area to 80 years for industry and 70 years for trade while the lease payment period ranges from 10 years to 60 years based on the towns grade and type of investment.

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%.The lease price is payable after the grace period annually. For those that pay the entire amount of the lease will receive 0.5% discount from the total lease value and those that pay in installments will be charged interest based on the prevailing interest rate of banks. Moreover, based on the type of investment, two to seven years grace period shall also be provided.

However, the Federal Legislation on the Lease Holding of Urban Land apart from setting the maximum has conferred on regional and city governments the power to issue regulations on the exact terms based on the development level of each region.

In Addis Ababa the City's Land Administration and Development Authority is directly responsible in dealing with matters concerning land. However, regarding the manufacturing sector, industrial zone preparation is one of the strategic intervention measures adopted by the City Administration for the promotion of the sector and all manufacturing projects are assumed to be located in the developed industrial zones.

Regarding land allocation of industrial zones if the land requirement of the project is below 5000 m<sup>2</sup> the land lease request is evaluated and decided upon by the Industrial Zone Development and Coordination Committee of the City's Investment Authority. However, if the land request is above 5,000 m<sup>2</sup> the request is evaluated by the City's Investment Authority and passed with recommendation to the Land Development and Administration Authority for decision, while the lease price is the same for both cases.

The land lease price in the industrial zones varies from one place to the other. For example, a land was allocated with a lease price of Birr 284 /m<sup>2</sup> in Akakai-Kalti and Birr 341/ m<sup>2</sup> in Lebu and recently the city's Investment Agency has proposed a lease price of Birr 346 per m<sup>2</sup> for all industrial zones.

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all manufacturing projects will be located in the industrial zones. Therefore, for this profile since it is a manufacturing project a land lease rate of Birr 346 per m<sup>2</sup> is adopted.

On the other hand, some of the investment incentives arranged by the Addis Ababa City Administration on lease payment for industrial projects are granting longer grace period and extending the lease payment period. The criteria are creation of job opportunity, foreign exchange saving, investment capital and land utilization tendency etc. Accordingly, Table 5.2 shows incentives for lease payment.

**Table 5.2****INCENTIVES FOR LEASE PAYMENT OF INDUSTRIAL PROJECTS**

<b>Scored Point</b>	<b>Grace Period</b>	<b>Payment Completion Period</b>	<b>Down Payment</b>
Above 75%	5 Years	30 Years	10%
From 50 - 75%	5 Years	28 Years	10%
From 25 - 49%	4 Years	25 Years	10%

For the purpose of this project profile the average i.e. five years grace period, 28 years payment completion period and 10% down payment is used. The period of lease for industry is 60 years.

Accordingly, the total lease cost, for a period of 60 years with cost of Birr 346 per m<sup>2</sup>, is estimated at Birr 12.46 million of which 10% or Birr 1,245,600 will be paid in advance. The remaining Birr 11.21 million will be paid in equal installments with in 28 years, i.e., Birr 400,371 annually.

## **VI. MANPOWER AND TRAINING REQUIREMENT**

### **A. MANPOWER REQUIREMENT**

The manpower requirement of the envisaged project is 26 persons. The list of manpower is indicated in Table 6.1. The total annual labor cost including fringe benefits is estimated at Birr 376,500.

**Table 6.1**  
**MANPOWER REQUIREMENT AND LABOUR COST**

<b>Sr. No.</b>	<b>Description</b>	<b>Req. No.</b>	<b>Monthly Salary (Birr)</b>	<b>Annual Salary (Birr)</b>
1.	General Manager	1	4,000	48,000
2.	Secretary	1	1,000	12,000
3.	Production & technical Head	1	3,000	36,000
4	Accountant	1	1,500	18,000
5	Sales/purchase man	1	1,500	18,000
6	personnel	1	1,500	18,000
4.	Operators	4	2,400	28,800
5.	Fitters	4	2,400	28,800
6.	Welders	8	4,800	57,600
7.	Laborers	5	1,750	21,000
8	Guard	2	700	8,400
9	Driver	1	550	6,600
	<b>Sub-Total</b>	<b>26</b>	<b>15,250</b>	<b>301,200</b>
	Benefits (25% BS)		3,812	75,300
	<b>Grand Total</b>		<b>19,063</b>	<b>376,500</b>

## **B. TRAINING REQUIREMENT**

Currently, government, private and other institutions are providing training for several students on woodwork. In addition, experienced operators and fitters can be assigned for the job. Therefore, there is no need of training arrangement for the envisaged project.

## VII. FINANCIAL ANALYSIS

The financial analysis of the dairy processing equipment project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity 70 % loan
Tax holidays	3 years
Bank interest	8.5%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30 days
Raw material foreign	90 days
Work in progress	1 days
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days
Repair and maintenance	5% of machinery cost

### A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 5.24 million, of which 30 per cent will be required in foreign currency.

The major breakdown of the total initial investment cost is shown in Table 7.1.



**Table 7.1**  
**INITIAL INVESTMENT COST ( '000 Birr)**

<b>Sr. No.</b>	<b>Cost Items</b>	<b>Local Cost</b>	<b>Foreign Cost</b>	<b>Total Cost</b>
1	Land lease value	1,245.60	-	1,245.60
2	Building and Civil Work	920.00	-	920.00
3	Plant Machinery and Equipment	400.00	1,600.00	2,000.00
4	Office Furniture and Equipment	100.00	-	100.00
5	Vehicle	450.00	-	450.00
6	Pre-production Expenditure*	445.29	-	445.29
7	Working Capital	86.16	-	86.16
	<b>Total Investment Cost</b>	<b>3,647.05</b>	<b>1,600.00</b>	<b>5,247.05</b>

\* *N.B Pre-production expenditure includes interest during construction ( Birr 295.29 thousand), and Birr 150 thousand costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

## **B. PRODUCTION COST**

The annual production cost at full operation capacity is estimated at Birr 1.39 million (see Table 7.2). The cost of depreciation account for 26.90 % of the production cost. The other major components of the production cost are financial cost and raw material and labour direct which account for 16.86 %, 13.54% and 12.93 % respectively. The remaining 21.16 % is the share of utility, repair and maintenance, administration cost and labour overhead.

**Table 7.2****ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

<b>Items</b>	<b>Cost</b>	<b>%</b>
Raw Material and Inputs	189.25	13.54
Utilities	120.35	8.61
Maintenance and repair	100.00	7.15
Labour direct	180.72	12.93
Labour overheads	75.30	5.39
Administration Costs	120.48	8.62
Land lease cost	-	-
<b>Total Operating Costs</b>	<b>786.10</b>	<b>56.24</b>
Depreciation	376.00	26.90
Cost of Finance	235.58	16.86
<b>Total Production Cost</b>	<b>1,397.68</b>	<b>100</b>

**C. FINANCIAL EVALUATION****1. Profitability**

Based on the projected profit and loss statement, the project will generate a profit throughout its operation life. Annual net profit after tax will grow from Birr 596.16 thousand to Birr 1.01 million during the life of the project. Moreover, at the end of the project life the accumulated cash flow amounts to Birr 10.29 million.

**2. Ratios**

In financial analysis financial ratios and efficiency ratios are used as an index or yardstick for evaluating the financial position of a firm. It is also an indicator for the strength and weakness of the firm or a project. Using the year-end balance sheet figures and other

relevant data, the most important ratios such as return on sales which is computed by dividing net income by revenue, return on assets ( operating income divided by assets), return on equity ( net profit divided by equity) and return on total investment ( net profit plus interest divided by total investment) has been carried out over the period of the project life and all the results are found to be satisfactory.

### **3. Break-even Analysis**

The break-even analysis establishes a relationship between operation costs and revenues. It indicates the level at which costs and revenue are in equilibrium. To this end, the break-even point of the project including cost of finance when it starts to operate at full capacity ( year 3) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 23 \%$$

### **4. Payback Period**

The pay back period, also called pay – off period is defined as the period required to recover the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project's initial investment will be fully recovered within 4 years.

### **5. Internal Rate of Return**

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money

in a bank account. Accordingly, the IRR of this project is computed to be 26.91 % indicating the viability of the project.

## **6. Net Present Value**

Net present value (NPV) is defined as the total present (discounted) value of a time series of cash flows. NPV aggregates cash flows that occur during different periods of time during the life of a project into a common measuring unit i.e. present value. It is a standard method for using the time value of money to appraise long-term projects. NPV is an indicator of how much value an investment or project adds to the capital invested. In principle a project is accepted if the NPV is non-negative.

Accordingly, the net present value of the project at 8.5% discount rate is found to be Birr 4.17 million which is acceptable.

## **D. ECONOMIC BENEFITS**

The project can create employment for 26 persons. In addition to supply of the domestic needs, the project will generate Birr 2.53 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.