

# **ETHIOPIAN MEAT & DAIRY INDUSTRY DEVELOPMENT INSTITUTE**

**FEASIBILITY STUDY FOR THE ESTABLISHMENT OF MILK  
PROCESSING PLANT WITH CAPACITY OF 10,000 LIT/DAY**



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## **1. EXECUTIVE SUMMARY**

The Ethiopian Government has projected to increase the national milk production, a surplus of 2501 million liters over projected domestic consumption requirements in the year 2020. A 93% increase in national cattle milk production over the GTP II period (from 4132 in 2015 to 7967 liters in 2020) is an opportunity for the already existed to expand their milk processing and the new entrants to be involved in the dairy businesses.

The growing population, urbanization and huge public expenditure created job and market opportunity for development of the dairy sector. The legal system also allows new entrants into business to setup dairy farming and milk processing to produce different types of milk products.

This dairy sector investment opportunity brief highlights for the establishment of a dairy processing facility to produce milk products that have an extended shelf life. The processing capacity of the facility is assumed to be 10,000 liters per day of raw milk into four product categories; pasteurized milk, cheese, butter, and cream. Total land area required is 5000 square meters out of which 500 square meters are built – up area. The construction cost of buildings and civil works at a rate of Birr 6000 per m<sup>2</sup> is estimated.

The total investment requirement is estimated at approximately Birr **11,441,572**. The plant will create employment opportunities for 30 individuals and provide steady and secure income for dairy producers (out-growers). The project is financially viable. The project NPV & BCR shows that its acceptability and Profitability. Thus, investing on dairy processing in Ethiopia is a profitable business for the investors.

## **2. INTRODUCTION**

Ethiopia is reported to be endowed with the largest livestock population in Africa. Ethiopia has also the largest number of milking cows in Africa, with 56.71 million cattle of which over 11.46 % are dairy cows. Due to the very important role that the dairy sector plays in the economy of the country, formulation of development plan regarding the sector is indispensable. Dairy has been identified as a priority area for the Government, which aims to increase Ethiopian milk production. In line with, the Government has projected to increase the national cow milk production, as a result of the proposed interventions, during the GTP II; period (2015–2020) is 93%, a surplus of 2501 million liters over projected domestic consumption requirements. This surplus of milk can then be substituted for imported milk products and used domestically for new or additional industrial uses, or exported as milk powder or UHT to raise foreign exchange earnings.

A future milk surplus could be realized through investment in better genetics, feed and health services, improving both traditional dairy farms and commercial-scale specialized dairy production units. The Government is actively supporting the private sector to produce UHT milk and is making supporting investments in supply-chain infrastructure, training, and improved breeds, and dairy-focused Agricultural Commercialization Clusters (ACCs). Ethiopia has close proximity to large regional consumers of milk such as Sudan and Kenya, as well as to the Middle East markets.

Milk production and processing business have become the key industry in Ethiopia as well as all across the world. Only 5% of the milk produced in Ethiopia is sold in commercial markets. The Ethiopian Government has the view that strengthening competitiveness and promotion of enterprises remain cornerstones for the growth of the economy and the creation of decent work opportunities. This means that there will be a great opportunity to jump into commercial dairy farming and milk processing business. Hence, investing in dairy processing in Ethiopia is a profitable activity.

## **3. BRIEF DESCRIPTION OF THE PROJECT AND PRODUCT**

Dairy products currently sold in the Ethiopian market can be categorized into milk products, such as raw, pasteurized, UHT and powder milk; butter products, such as fermented and pasteurized butter; and other products, such as cottage and other type of cheese, sour milk and yogurt. Among these products powder milk are not produced in Ethiopia at the moment, and are usually imported. Pasteurized (table/bread) butter, yogurt and various type of cheese (apart from cottage cheese) are both imported and locally produced.

Development of successful and sustainable dairy industry will be realized by strategic interventions of the investors in to all parts of possible entry points along the milk value chain especially on the innovation of new products. Accordingly, several entry points to produce new products can be considered as intervention opportunity in the dairy industry value chain with varied degree of resource requirement and level of competitions.

#### **4. CRITICAL FACTORS**

- National cattle milk production has been identified as a priority area for the Government, which aims to increase Ethiopian milk production in the GTP II period (2015-2020), from 4132 in 2015 to 7967 million liters in 2020.
- Quite a lot of incentive and support are available from the government at all level to ease the entry of investors into the dairy industry.
- Due to the important nutritional value of milk, increasing consumption of milk either directly or through fortified foods is often a priority of national health and nutrition programs.
- Ethiopia's priority is to supply enough milk and dairy products for its population though own production
- With the objective of promoting commercial dairy production and the inflow of foreign capital and technology into the country, the Ethiopian government provides various packages of regulatory fiscal incentives to both foreign and domestic investors engaged in establishing new enterprises and expansions.

#### **5. GEOGRAPHICAL POTENTIAL FOR THE INVESTMENT**

Ethiopia is ecologically suitable where there is enough manpower, potential of good market, well fertile soil to produce animal feed and suitable climatic condition for the production of good quality and quantity products. Milk production is given priority over other livestock production systems due to ecological conditions (rainfall, temperature, and soil types are conducive to forage production) and the population pressure that favor commercial dairy production and milk processing.

#### **6. MARKET BACKGROUND**

Dairying is practiced almost all over Ethiopia involving a vast number of small or medium or large-sized, subsistence or market-oriented farms. Of the total milk produced in the country only 5% is marketed as processed fluid milk due to the underdevelopment of the infrastructure in rural areas.

The volume and price of milk and other dairy product sales is increasing. For instance couple with inflation, the price of raw milk per litre has increased from about Birr 2 per litre to about Birr 15 at produced level within the last fifteen years. As a result of this many dairy cooperatives established, some cooperatives collectively formed unions for better marketing capability. In the past, increases in milk demand have been mainly driven by population growth, whereas nowadays they are increasingly also fuelled by rising per capita milk consumption in Ethiopia.

A variety of locally processed as well as imported milk products (fresh milk, pasteurized milk, UHT milk, cream, cheese, butter, butter-cook, butter-table, Gouda cheese, cottage cheese, mozzarella cheese, provolone cheese, cream cheese, fermented milk, and natural and flavored yoghurt) (Yilma *et al.*, 2011).

## **7. CURRENT SITUATION OF THE SECTOR AND INDUSTRY STRUCTURE**

There are thirty two formal sector dairy processors in Ethiopia and new processing facilities in various stages of development. Most processors benefit from urban and peri-urban milk supply systems, and in several cases have invested in their own dairy farms to ensure adequate milk supply and quality. Value chain actors are already investing in milk production, collection and processing, and increased demand would likely lead to increased investment. Market opportunity would lead to value chain deepening and upgrading, more solid horizontal and vertical relationships with the value chain, and investment in core value chain operations as well as needed services and inputs.

The legal system allows new entrants into business to setup businesses in different options. Depending on the resources, there are incentives for investors to start up their business. New businesses required to have certification of competency to get trade license for certain business. The entry of private firms in the formal milk-market is a significant development indicating the profitability and potential of private investment in the dairy sector in Ethiopia and that the policy environment is facilitating such entry.

## **8. OPPORTUNITY RATIONALE**

- Increasing population, urbanization and income and trend towards consuming more animal products
- Ethiopia has opted to raise milk production through genetics, feed and health interventions to improve traditional family cow dairy production and expand and improve specialized dairy production units over the GTP II period (2015-2020);

These interventions will result:

- ☞ A 93% increase in national cattle milk production over the GTP II period (from 4132 in 2015 to 7967 liters in 2020); and the production of a surplus of 2501 million liters of cow milk over projected domestic consumption requirements by 2020.
- The production can substitute for imported milk products and be used domestically for new or additional industrial purposes or exported as milk powder or UHT to raise foreign exchange earnings and stimulate production.
- The promotion on milk consumption by non-government organizations, initiatives by national level projects, demand for dairy products increased significantly. Presence of good government policy is an opportunity, which helps dairy industry to improve its position in the milk value chain.
- Dairy farmers in urban, per-urban and rural dairy production system demonstrated strong interest to expand dairying as one of the means of income generating activity. This is a great opportunity for the entrants to collect and process raw milk into different milk products, and supply for domestic and export markets.
- The future prospect of dairying is bright and much expected to be one of the major targets of the prospective agro-processing industries in the country.
- Possibilities/capacities for improvement are available.
- New product development to increase customer selection.
- Distribution into multiple market channels to reach more consumers.
- There is political stability, conducive investment climate, government policy reforms, and market orientation that is favorable for dairy investment.

## **9. CHALLENGES IN MILK PROCESSING SECTOR**

- Only 5% of the raw milk is sold in commercial market. Lack of cooling facilities, inadequate means of transport, and poor communication add to the difficulties of collecting and preserving locally produced milk. These lead to surplus milk to be processed at the home into local cheese or butter
- Unhygienic production and transport conditions and use of plastic containers (not easy to clean).
- The monitoring and control of milk and dairy regarding quality remains limited.
- Adulteration may be done by adding water, starch, sugar, etc. to compensate for density in raw milk collection chain. These adulterants could act as contamination sources.

- Processors do not differentiate in payment to farmers for quality milk (fat content, hygienic quality, etc), mainly because there is no differentiated market for high quality milk products. The same price is paid for poor quality milk and high quality milk subject to good handling practices.
- Informal milk marketing (milk hawkers/traders), it limits raw milk traceability and lack of milk marketing policy.

## **10. SUPPLY AND DEMAND ASSESSMENT**

### **10.1. Present supply and demand**

There is inadequate supply of milk and milk products to urban consumers. The bulk of the increased demand for milk is in urban areas, particularly for processed, i.e. pasteurized milk and milk-products. There is also unstable supply of milk and milk products to urban consumers due to inefficient delivery system and inadequate market outlet for milk and milk products from rural areas. The contribution of imports of milk and milk-products to total consumption of milk has been rising over the past several years, due to lack of quality milk production.

### **10.2. Projected demand**

Demand for standard dairy products from the modern sector is met by domestic production and through imports. The demand for milk depends on many factors including consumer preference, consumer's income, population size, price of the product, price of substitutes and other factors. In general, increasing population growth (as in the following Table) and rising real income are expected to expand the demand for milk and milk products. Therefore, increase in population growth and consumer income in the future is expected to increase the consumption of milk products.

Year	Population in '000' based on current growth rate (2,27%)	Milk production, in million litres based on current growth rate, (4.1%)	Milk available for consumption (68% of the produce) in million litres	Demand for milk, in million litres based on FAO recommendation (62,5kg)	Gap between projected milk available for consumption and demand based on FAO's recommendation in million litres
2011	82 102	3 061	2 081	5 131	3 050
2012	84 335	3 186	2 166	5 271	3 105
2013	86 629	3 317	2 256	5 414	3 158
2014	88 985	3 453	2 348	5 562	3 214
2015	91 406	3 594	2 444	5 713	3 269
2016	93 892	3 742	2 545	5 868	3 323
2017	96 446	3 895	2 649	6 028	3 379
2018	99 069	4 055	2 757	6 192	3 435
2019	101 764	4 221	2 870	6 360	3 490
2020	104 532	4 394	2 988	6 533	3 545

Source: Yilma et al., 2011

The annual demand in Ethiopia for dairy products is increasing. This is as a result of the current high population and future growth trends, a growing number of urban centers and urbanized lifestyles, and finally steadies economic growth rates registered by the country and visible increased income levels of the general population. In Ethiopia, the demand for milk products is increasing while supply is lagging. As a result, imports have surged in recent years, which consist primarily of processed milk, including cheese and milk powder.

## 11. PRICING

The current factory- gate price of pasteurized milk in Addis Ababa is 22Birr/liter. The price of processed butter and cottage cheese is 180Birr/kg and 60Birr/kg, respectively. Distribution of the products could be undertaken through small retail outlets as well as large wholesalers and catering establishments. The product can be distributed by establishing own distributing stores in towns or the products will be delivered directly to the customers to avoid unnecessary price increment which will affect the purchasing power of customers.

The price of a product in the market is an important factor influencing consumer demand. Hence to be marketable, a dairy product must be competitively priced. This implies that the costs involved in raw material procurement, processing, packaging, storage, marketing and distribution must be kept as low as possible.

## **12. PLANT CAPACITY**

Processing raw milk produces a number of products such as, pasteurized milk, cream, yoghurt, cheese and butter, and investment could be on pasteurizing plants with a capacity of processing 10,000 litres per day. The processing plant will start production at 75% of its installed capacity, which will grow to 90% in the second year. Full capacity production will be attained in the third year and onwards.

## **13. RAW MATERIALS AND INPUTS**

The principal raw material required for the production of pasteurized milk, butter, cheese and cream is raw milk. In addition, small quantities of coagulation enzymes and salt are also required for the production process. The raw (whole) cow milk and salt are available locally while the coagulation enzymes have to be imported. The auxiliary materials required for the envisaged plant comprise packing materials like plastic bags, glycine paper and carton box. The plastic bags and carton boxes can be acquired from the local market while the glycine paper has to be imported.

## **14. PRODUCTION PROCESS**

The milk will be taken directly from the milking collection centre to a cooling tank for temporary storage and processed immediately. After cream separation process, the milk is filtered and sealed with plastic bags or bottled and distributed to the market. Pasteurized milk would be packed into 500 milliliter plastic containers, so two plastic containers would be used to package one liter of pasteurized milk. Cheese and butter would be packed into 250 and 500gram paper packages. Whole milk is partially or totally separated to produce standardized whole milk with 3% milk fat. After separation, cream is held in stainless steel tanks and refrigerated at (4°C).

## **15. ENVIRONMENTAL IMPACT**

Construction of effluent treatment plant is necessary in case of multiproduct large size plants for treating the effluents before discharging for proper disposal. The milk processing plants has to be hygienically designed and easily cleaned to prevent contamination of products by insects, birds, rodents or micro-organisms. The dairy products plant does not have any pollutant emitted from the production process, except the washing water, which has to be connected to appropriate sewerage line to get rid of. Thus, the envisaged project is environment friendly.

## 16. PROJECT COST SUMMARY

### 16.1. Project economics

Total land area required is 5000 m<sup>2</sup> out of which 500 m<sup>2</sup> are built – up area. The construction cost of buildings and civil works at a rate of Birr 6000 per m<sup>2</sup> is estimated.

The total investment requirement is estimated at approximately Birr **11,441,572**. The plant will create employment opportunities for 30 individuals and provide steady and secure income for dairy producers (out-growers).

### 16.2. Project financing

	<b>Investment</b>	<b>Own capital (25%)</b>	<b>Loan (75%)</b>
Total Physical Asset Investment	6,375,000	1,593,750	4,781,250
Working Capital	5,056,572	1,264,143	3,792,429
Pre-operational Expenses	10,000	10,000	-
<b>Total</b>	<b>11,441,572</b>	<b>2,867,893</b>	<b>8,573,679</b>

### 16.3. Project cost/capital Investment

<b>Working Capital Requirement</b>	<b>Annual</b>	<b>Requirement in no of days</b>	<b>Requirement in Birr</b>
Purchase of Raw Milk	40,851,000	15	1,678,808
Packaging material	7,496,976	90	1,848,569
Salaries	1,620,000	180	798,904
Benefits	243,000	180	119,836
Promotion and Advertisement	21,000	365	21,000
Rent	144,000	90	35,507
Car Running Expense	922,500	90	227,466
Interest Expense	743,637	90	183,363
Other Expenses (Utilities)	580,431	90	143,120
<b>Total</b>			<b>5,056,572</b>

#### 16.4. Machinery and equipment, Land; Buildings, and civil works

Investment			
Equipment	Total Investment	Own (25%)	Bank (75%)
Testing Equipment	10,000	2,500	7,500
Cream Separator	20,000	5,000	15,000
Homogenizer	100,000	25,000	75,000
Cooling Tank	100,000	25,000	75,000
Churner	25,000	6,250	18,750
Cheese Making Equipment	50,000	12,500	37,500
Milk Cans	20,000	5,000	15,000
Cold chain truck	1,500,000	375,000	1,125,000
Office furniture and equipment	50,000	12,500	37,500
Pickup	1,000,000	250,000	750,000
Deep Freezer	100,000	25,000	75,000
Pasteurizer	200,000	50,000	150,000
Packing machine	200,000	50,000	150,000
<b>Total Equipment cost</b>	<b>3,375,000</b>	<b>843,750</b>	<b>2,531,250</b>
<b>Buildings and construction</b>	<b>3,000,000</b>	<b>750,000</b>	<b>2,250,000</b>
<b>Total Physical Asset Investment</b>	<b>6,375,000</b>	<b>1,593,750</b>	<b>4,781,250</b>

#### Depreciation

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
Beginning Book Value equipment	3,375,000	2,700,000	2,160,000	1,728,000	1,382,400
<b>Depreciation for equipment</b>	<b>675,000</b>	<b>540,000</b>	<b>432,000</b>	<b>86,400</b>	<b>69,120</b>
Beginning Book Value for building	3,000,000	2,850,000	2,707,500	2,166,000	1,732,800
<b>Depreciation for building</b>	<b>150,000</b>	<b>142,500</b>	<b>135,375</b>	<b>108,300</b>	<b>86,640</b>
<b>Total Depreciation</b>	<b>825,000</b>	<b>682,500</b>	<b>567,375</b>	<b>453,900</b>	<b>363,120</b>

#### 16.5. Manpower required and labour cost

Position	Quantity	Salary	Total Salary	Monthly	Annual Salary
Manager	1	15,000		15,000	180,000
Supervisor/Technologist	3	8,000		24,000	288,000
Collector and Accountants	3	6,000		18,000	216,000
Processing Operators	6	5,000		30,000	360,000
Helpers	12	3,000		36,000	432,000
Driver	2	3,000		6,000	72,000
Security Guard	3	2,000		6,000	72,000
<b>Total</b>	<b>30</b>			<b>135,000</b>	<b>1,620,000</b>

### 16.6. Financial assumptions

The projected annual milk yield in GTP-II period (2015-2020) for the year 2017/18 from improved family dairy and specialized dairy system will be 739 and 863 million liters, respectively. Accordingly, the contribution of both systems, improved family dairy and specialized dairy system, may reach to a total of 1,602 for the year 2017/18. The envisaged dairy processing unit assumed to be a purchasing share of the business about 0.17% (raw milk contributed only from improved family dairy and specialized dairy system, regardless of other dairy system contribution).

<b>Milk production potential</b>	
Annual milk production of improved family dairy and Specialized dairy system	1,602,000,000 Liter
Purchasing share of the business	0.17%
Total Milk Collection	2,723,400 Liter
Daily milk collection capacity	7461 Liter

<b>Marketing Capacity</b>	
Year 1, 2018	75%
Year 2, 2019	90%
Year 3, 2020	100%
Projected annual dairy production growth	20%
Average Market Share growth	0.1%
Milk Wastage – leaks	1%

<b>Output (Product) Mix</b>	
Pasteurized milk	90%
Butter	0.40%
Cheese	0.80%
Cream	0.56%

<b>Purchasing and Selling Price of milk and milk products</b>	
Pasteurized milk	22 Birr per liter milk
Butter	180 Birr per kg
Cheese	70 Birr per kg
Cream	80 Birr per kg
Raw Milk Purchase Price	15 Birr per liter milk
Packaging material purchase	3 Birr per liter/kg produced

### Employee Salary & Benefit & Rent

Annual increment	10%
Employee Benefit	15%
Rent - storage	2000 Birr per month
Rent - Collection center	10,000 Birr per month
<b>Vehicle Running and Depreciation Expenses</b>	
Fuel and Lubricant per day	2500 Birr per day
Annual Vehicle Maintenance	10,000 Birr per annum
Vehicle operation days	365 days
Depreciation Rate for equipment	20%
Depreciation Rate Buildings	5%
Other expenses (utilities)	1%

## 16.7. Financial analysis

### Milk collection volume and sales

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Purchase Volume</b>					
<b>Milk Purchase</b>	2,723,400	3,270,803	3,650,000	3,650,000	3,650,000
Milk Loss	27,234	32,708	36,500	36,500	36,500
Net milk available	2,696,166	3,238,095	3,613,500	3,613,500	3,613,500
<b>Sales Volume</b>					
Pasteurized milk	2,426,549	2,914,286	3,252,150	3,252,150	3,252,150
Butter	10,785	12,952	14,454	14,454	14,454
Cheese	21,569	25,905	28,908	28,908	28,908
Cream	15,099	18,133.33	20,236	20,236	20,236
<b>Sales in Birr</b>					
Pasteurized milk	53,384,087	64,114,288	71,547,300	1,547,300	1,547,300
Butter	1,941,240	2,331,429	2,601,720	2,601,720	2,601,720
Cheese	1,509,853	1,813,333	2,023,560	2,023,560	2,023,560
Cream	1,207,882	1,450,667	1,618,848	1,618,848	1,618,848
<b>Total Sales</b>	<b>58,043,062</b>	<b>69,709,717</b>	<b>77,791,428</b>	<b>7,791,428</b>	<b>7,791,428</b>
<b>Purchase Cost</b>	<b>40,851,000</b>	<b>49,062,051</b>	<b>54,750,000</b>	<b>4,750,000</b>	<b>54,750,000</b>

### Projection of Income Statement

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Sales</b>	<b>58,043,062</b>	<b>69,709,717</b>	<b>77,791,428</b>	<b>77,791,428</b>	<b>77,791,428</b>
<b>Costs and Expenses</b>					
Purchase of Raw Milk	<b>40,851,000</b>	<b>49,062,051</b>	<b>54,750,000</b>	<b>54,750,000</b>	<b>54,750,000</b>
Gross profit	<b>17,192,062</b>	<b>20,647,666</b>	<b>23,041,428</b>	<b>23,041,428</b>	<b>23,041,428</b>
Packaging material	7,496,976	9,003,868	10,813,645	10,813,645	10,813,645
Salaries	1,620,000	1,782,000	1,960,200	1,960,200	1,960,200
Benefits(Incentives)	243,000	267,300	294,030	294,030	294,030
Depreciation	825,000	682,500	567,375	567,375	567,375
Promotion and Advertisement	21,000	21,000	21,000	21,000	21,000
Lease/rent	144,000	144,000	144,000	144,000	144,000
Car running expense	922,500	922,500	922,500	922,500	922,500
Interest Expense	1,028,841.48	823,073.18	617,304.89	411,536.59	205,768.30
Other Expenses (Utilities)	580,431	697,097	777,914	777,914	777,914
<b>Total Costs and Expenses</b>	<b>12,881,748</b>	<b>14,343,338</b>	<b>16,117,969</b>	<b>15,912,201</b>	<b>15,706,432</b>
Net Income	4,310,314	6,304,328	6,923,459	7,129,227	7,334,996
Provision for Tax	431,031.40	630,432.80	692,345.90	712,922.70	733,499.60
<b>Net Income After Tax</b>	<b>3,879,282.60</b>	<b>5,673,895.2</b>	<b>6,231,113.1</b>	<b>6,416,304.3</b>	<b>6,601,496.4</b>

## Project Cash flow Statement

Particulars	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Cash in flow</b>						
Own equity	2,867,893					
Loan received	8,573,679					
Cash sales		58,043,062	69,709,717	77,791,428	77,791,428	77,791,428
<b>Total Cash inflow</b>	<b>11,441,572</b>	<b>58,043,062</b>	<b>69,709,717</b>	<b>77,791,428</b>	<b>77,791,428</b>	<b>77,791,428</b>
<b>Cash outflow</b>						
Investment expense	6,385,000					
Purchase of raw milk		40,851,000	49,062,051	54,750,000	54,750,000	54,750,000
Packaging material		7,496,976	9,003,868	10,813,645	10,813,645	10,813,645
Salary		1,620,000	1,782,000	1,960,200	1,960,200	1,960,200
Depreciation		825,000	682,500	567,375	567,375	567,375
Overhead cost		1,910,931	2,051,897	2,159,444	2,159,444	2,159,444
Interest expense		1,028,841.48	823,073.18	617,304.89	411,536.59	205,768.30
Loan repayment		1,714,735.80	1,714,735.80	1,714,735.80	1,714,735.80	1,714,735.80
<b>Total Cash outflow</b>	<b>6,385,000</b>	<b>55,447,484</b>	<b>65,120,125</b>	<b>72,582,705</b>	<b>72,376,936</b>	<b>72,171,168</b>
Net cash flow	<b>5,056,572</b>	<b>2,595,578</b>	<b>4,589,592</b>	<b>5,208,723</b>	<b>5,414,492</b>	<b>5,056,572</b>
Beginning cash balance		5,056,572	7,652,150	12,241,742	17,450,465	22,864,957
Ending Cash Balance		7,652,150	12,241,742	17,450,465	22,864,957	27,921,529

## 16.8. Measure of project worthiness

Net Present Value (NPV) and Benefit ratio (BCR) computation at 12% discount rate

Year	Investment	Gross Cost (oper+prod.cost)	Discount factor	Present Value(birr)	Gross Benefit(birr)	Discou nt factor	Present Value(birr)
0	6,385,000	6,385,000	1.000	6,385,000			
1		12,881,748	0.893	11503400.96	17,192,062	0.893	15,352,511
2		14,343,338	0.797	11431640.39	20,647,666	0.797	16,456,190
3		16,117,969	0.712	11475993.93	23,041,428	0.712	16,405,497
4		15,912,201	0.636	10120159.84	23,041,428	0.636	14,654,348
5		15,706,432	0.567	8905546.944	23,041,428	0.567	13,064,490
<b>Total</b>	<b>6,385,000</b>	<b>74,961,688</b>	<b>0.734</b>	<b>53,436,742.06</b>	<b>106,964,012</b>	<b>0.734</b>	<b>75,933,036</b>

## Net Present Value (NPV)

$$\begin{aligned} \text{NPV} &= \text{Present value of gross benefit} - \text{Present value of gross cost} \\ &= 75,933,036.00 - 53,436,742.06 \\ &= \underline{22,496,293.94} \end{aligned}$$

The net present value is greater than zero. Therefore, this milk processing project is accepted and viable. So its implementation will provide good benefit for the investor.

## Benefit- Cost Ratio (BCR)

$$\begin{aligned} \text{BCR} &= \frac{\text{Present Value of gross benefit}}{\text{Present Value of gross cost}} \\ &= \frac{75,933,036.00}{53,436,742.06} \\ &= \underline{1.42} \end{aligned}$$

The ratio is greater than one. This means that the project owner will recover the investment, it is profitable.

## Loan Repayment Schedule

Year	Principal Outstanding	Installment due payable	Interest at 12%	Total Payment
1	8,573,679.00	1,714,735.80	1,028,841.48	2,743,577.28
2	6,858,943.20	1,714,735.80	823,073.184	2,537,808.98
3	5,144,207.40	1,714,735.80	617,304.888	2,332,040.69
4	3,429,471.60	1,714,735.80	411,536.592	2,126,272.39
5	1,714,735.80	1,714,735.80	205,768.296	1,920,504.10
<b>Total</b>	<b>0</b>	<b>8,857,893</b>	<b>3,086,524.44</b>	<b>11,660,203.44</b>

## 17. CONCLUSIONS

The future prospect of dairying in Ethiopia is bright since the entry of private firms in the dairy production and processing businesses will have a significant development indicating the profitability. Investing in milk processing plant for long-life milk production in Ethiopia is a promising opportunity for dairy-related investors. Investing on dairy processing in Ethiopia is a profitable business since financially viable with having a high internal rate of return. The dairy processing investments could increase capacity in dairy products into a range of markets including export.

## 18. RECOMMENDATIONS

- Ethiopia has the untapped dairy resource potential and market i.e., its population, the market is tremendous and overwhelming in the years ahead. Thus, investing on dairy processing in Ethiopia is a profitable business.
- Private investment in the dairy sector has an opportunity of high volumes raw milk as raw material, available in central highland regions.
- Dairy industry currently lacks some categories of products in terms of variety, quality and quantity in Ethiopia. The processors can seek ways to increase capacity, and invest aggressively in product development.
- Dairy producers and processors already have the passion to reinvest in their operations and develop new, innovative products for the neighbouring countries and to the rest of the world at large to enjoy.

## 19. REFERENCES

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