

# **Ethiopian Meat and Dairy Industry Development Institute**

## **Feasibility study for the establishment of Animal feed Processing**



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**Bishoftu- Ethiopia**

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## **1. EXECUTIVE SUMMARY**

According to CSA 2011/12 the animals feed requirement per annum is 95.83 million tons dry matter but the available feed is 65.64 million tones dry matter per annum. The difference between the supply and demand shows 30.2million tones dry matter shortage per annum.

This feasibility study envisages the establishment of a plant for the production of animal feed with a capacity of 15,000 tons per annum. The plant can produce by 85% capacity in early years. Animal feed is prepared for consumption by livestock. It contains protein, minerals and other nutrients which are useful for beef, egg and milk production as well as survival and growth of the animals.

The principal raw materials required are oil cake, molasses, bone meal, bran of cereals, maize, salt and limestone which are all available locally and premixes imported from abroad. The total investment cost of the project is estimated at Birr 78,588,102. From this 58,941,077birr(75%) banks loan and 19,647,025birr(25%) own equity of the investor. The investor can get lease financing for machineries and equipment from Ethiopian development bank. Also the investor will have get loan for working capital from commercial bank of Ethiopia.

The project can create employment for 32 persons. The project will create backward linkage with the agriculture and agro processing sectors and forward linkage with the livestock sector and also generates income for the Government in terms of tax revenue and payroll tax.

Based on the projected profit and loss statement, the project will generate a profit throughout its operation life continually with promising demand for product. The project financial measurement(NPV & BCR) shows as the project is accepted & has good return for the investors.

## 2. INTRODUCTION

Ethiopia has a large livestock population and diverse genetic resources, diverse agro-ecologies suitable for different kinds of Livestock production. However, the productivity and economic contribution of Livestock sector much below the potential due to shortage of feed supply in terms of both quantity and quality. According to CSA 2011/12 the animals feed requirement per annum is 95.83 million tons dry matter but the available feed is 65.64 million tones dry matter per annum. The difference between the supply and demand shows 30.2 million tones dry matter shortage per annum. The main sources of animal feeds are Natural pastures Crop residues ,Conserved forages, Agro industrial by products /wheat bran, Wheat midillings.oil cakes etc/ and Processed compound feeds.

Feed cost accounts for 60 to 70% of the total cost of Livestock production shortage of feed and escalating price of Livestock feed is adversely affecting the productivity and profitability of Commercial livestock operations. The feed milling industry and modern live stock production both are interdependent. The feed milling industry depends on the growth or success of commercial live stock production. The market for different compound feeds are concentrated along the Addis Abeba-Adama corridor, where the feed processing industries and modern Livestock farms (Poultry, dairy, pig, cattle fattening) are concentrated.

The existing feed industries capacity of the feed mills range widely from 20 quintals to 125 quintals per hour. The standard for feed mills is 2000 hours of operation annually but, feed mills in Ethiopia generally operating much lower than this standard i.e.below30 % of their designing capacity. The sources of compound feed production are purchased grains, agro-industrial-by products and imported vitamins and Minerals. Hence it is feasible for local and foreign investors to be engaged in field of animal feed industries in order to enhance feed development and full fill the shortage of animal feed supply both in quantity and quality in Ethiopia.

### 3. INVESTMENT OPPORTUNITIES

- ❖ High livestock population & Diverse agro-ecologies
- ❖ There is an increasing trend of intensification of livestock production especially the poultry industry. This opens the opportunity for a substantial increase in the demand of compound feeds
- ❖ A welcome trend in the increase of the commercial orientation of animal production in Ethiopia; the breeds/strains of animals have also started to change in line with advanced countries.
  
- ❖ The improved breeds are dependent on commercial mixed feeds. This is expected to continue at a faster rate in the future;
- ❖ Rapid expansion of
  - ✓ Feed lot operations more than 120 with a holding capacity of 70-2000/operations
  - ✓ Dairy, poultry and pig farms
  - ✓ Presence of agro industrial by products (flour mills, oil, sugar factories)
  - ✓ 5 years GTPII plan of the country (2014/15-2019/20) aimed at filling the identified feed deficient gap
  - ✓ Price increment of feed from time to time
- ❖ Prospects of marked Increased consumer demands for Livestock products
- ❖ Prospects for increase in availability of raw materials & equipment i.e. Increase in the production of especially maize, Soybeans & oilseeds in terms of yield per unit area and encouraging development in manufacture of small capacity feed milling and mixing equipment locally
- ❖ The industries are importing premixes from abroad revealing existence of investment opportunities
- ❖ Fostering development of agro-industries( Increased availability of ingredients
  
- ❖ Increased consumer demands as a result of forecasted increase in income and purchasing power of the population;

- ❖ Potentially high demand in neighboring countries for compound feeds and livestock products and the comparative advantage of Ethiopia in supplying this demand.

#### **Incentives**

- ❖ Duty free feed machineries and necessary equipments
- ❖ Land
- ❖ Free consultancy , training ,investment facilitation and market promotion service (EMDIDI)
- ❖ Credit access in lease financing (25:75)

## **4. CHALLENGES/CONSTRAINTS**

- Shortage of feed ingredient supply due to Inadequate production& Poor efficiency of utilization of available feed resources
- Soaring of ingredient/compound feed prices due to shortage of feed ingredient supply; high transport costs; poor market orientation of feed production.
- Poor quality of ingredients: due to adulteration common practice. ; lack of access to feed laboratories resulting in no possibilities for checking on quality and deterioration in feed quality during storage common
- Lack of knowledge and skills for Feed industry personnel in Ration formulation ;Feed milling technology and Skills on physical tests on feed ingredient &mixed feed quality

#### **Strategic options for challenges**

- To increase production of quality feed in large-scale commercial operations, government investment policy needs to make large plots of land and credit available to investors at reduced rates to encourage them to invest in animal feed production and processing.
- The government needs to promote establishment and use of oil extraction and flour milling factories so that more by-products are made available for feed processing industries. Taxes or quotas also need to be levied to discourage imports.
- To promote the production of yellow maize for poultry.

- The Government needs to ensure that seasonal fluctuations in ingredients and compound feed prices are minimized and ensure sustainable feed production by advising feed processors to develop storage capacity for processed feeds and the ingredients required to produce these feeds.

## **5. PRODUCT DESCRIPTION AND APPLICATION**

Animal feed is a kind of feed prepared for oxen, cows, sheep, goat, poultry etc. reared for their milk, meat and egg. It contains protein, minerals and other nutrients which are useful for milk egg and beef production as well as survival and growth of the animals. Animal feed can be prepared from oil cakes, agro - residues, flour mill by - products, cereals, molasses, minerals and vitamins etc. The major animal feed consumers are large and small scale cattle rising and fattening farms.

## **6.MARKET STUDY AND PLANT CAPACITY**

### **6.1. Market Study Supply and Demand**

Ethiopia has a significant number of cattle. However, the production of cattle feed is not sufficient to support the development of this activity. Livestock feed includes natural pastures, crop residues, cultivated forages and agro-industrial by-products. But, the importance of natural pasture is gradually declining because of the expansion of crop production into grazing lands, redistribution of communal lands to the landless and land degradation. Commercial fattening and animal breeding enterprises have also grown significantly since recently. The establishment of these kind enterprises would increase the demand for cattle feed. Moreover, many animal feeds have alternative uses either for human consumption or for industrial use. There is also direct competition between human and livestock for cereal grains. The country faces severe feed shortage due to either the seasonality in the availability and the poorly developed animal feed conservation method for use during lean years. The current national animal feed demand is estimated at 95.83 million tons of DM, whereas the supply thereof amounts only to 65.6 million tons of DM (CSA 2011/12)—leaving an unsatisfied huge gap

To estimate the present demand for cattle feed the cattle population, the recommended average feed consumption and constraints such as awareness and income of potential users as well as products adaptability are considered. Accordingly, the total cattle population for the country is estimated to be about 53.6 million (LSA report, 2014) and the recommended rate is 2 kg/head a day. If the total population was to be fed with improved feed, 37.5 million tons would be needed. However, considering the constraints mentioned earlier, conservatively only 10% of the population are assumed to be relevant. Hence, the national present effective demand is estimated at 3.7 million tons which show that there is large scope to increase production of industrially processed feed. Furthermore, the enterprises in Addis Ababa are assumed to capture 10% of the market (considering Addis Ababa's advantage; central location, availability of better infrastructure and other facilities). Accordingly, the present effective demand is 370,000 tons.

### **Demand Projection**

The demand for industrially processed animal feed will ultimately depend on the awareness of farmers on the importance of the product, size of animal population and development of modern animal farms. The government's livestock policy objectives in the GTP are to increase livestock productivity through increases in improved breed's provision, animal health and increase forage production. Naturally, there are things that can be done to improve natural feed sources. However, there will be limitations due to factors enumerated above. Moreover, forage production alone is unlikely to satisfy the existing demand. One of the possible ways of overcoming these limitations is through increased production and supply of industrially processed feed. By considering the extension program being implemented by the Ministry of Livestock resource Development and Fish as well as other NGOs which is likely to impact demand for manufactured feeds positively (through awareness creation) and declining importance of natural pasture and the competing demands, as well as development of market oriented livestock production, an annual growth rate of 5% is applied in projecting the demand for the product.

Moreover, during the projection period the enterprise to be established in Addis Ababa is assumed to capture 10% of the market (considering Addis Ababa's advantage i.e. central location, availability of better infrastructure and other facilities).



Accordingly, Table 1 depicts the projected demand for manufactured animal feed at national level, unsatisfied demand and market share for Addis Ababa based enterprise(s).

**Table 1: Projected Demand for Manufacture Animal Feed (Tons)**

<b>Year</b>	<b>Projected Demand</b>	<b>Existing Production Capacity</b>	<b>Demand Supply Gap</b>	<b>Addis Ababa's Market Share</b>
2018	4,958,354	19,392	4,938,962	493,896
2019	5,206,272	19,392	5,186,880	518,688
2020	5,466,585	19,392	5,447,193	544,719
2021	5,739,914	19,392	5,720,522	572,052
2022	6,026,910	19,392	6,007,518	600,752

### **Pricing and Distribution**

Prices of animal feed depend upon the composition of the mix and the nutrients. The Current average price is Birr 660/quintal. This has been taken as ex-factory price for the envisaged project.

Current practice of feed product distribution involves sales at factory gate and to supply to major towns by opening sales store. The project can use both distribution mechanisms to expand its market outlets.

## **7. Plant Capacity and Production Program**

### **Plant Capacity**

Based on the projected demand for animal feed shown in the market study and considering the minimum economic scale of production, the envisaged plant is planned to have a capacity of 15,000 tons of animals feed per annum. This capacity is proposed on the basis of a single shift of 8 hours per day and 250 working days per annum.

### **Production Program**

The envisaged plant will start operation at 85% of its rated capacity which will grow to 95% in the second year. Full capacity production will be attained in the third year and onwards. Details of annual production program are shown in Table 2

**Table 2: Annual Production Program at Full Capacity Operation**

Item No.	Description	Unit of Measure	Production Year		
			1st	2nd	3rd & Onwards
1	Animal feed	Ton	12,750	14,250	15,000
2	Capacity utilization rate	%	85	95	100

## 8. MATERIALS AND INPUTS

### Raw Materials

The basic raw materials required for the production of animal feed include oil cake, molasses, bone meal, bran of cereals, maize, salt and limestone. All of the raw materials can be available locally. The annual requirement for raw materials at full capacity production and the estimated costs are given in Table 3.

**Table 3: Annual Raw Materials Requirement at Full Capacity and Estimated Costs**

Item No.	Raw Materials	Unit of Measure	Required Qty	Unit Price,	Cost (000 Birr)		
					F. C.	L.C.	Total
1	Oil cake	Ton	2827	6000	-	16,962.00	16,962.00
2	Bran of cereals	Ton	3657	4000	-	14,628.00	13,497.2
3	Cotton seed	Ton	2090	2800	-	5852.00	132.0
4	Maize	Ton	2582	4,000	-	10,328.00	21,092.0
5	Salt	Ton	85	1500	-	127.50	127.50
6	Limestone (ground)	Ton	63	250	-	15.75	15.75
7	Barce	ton	1437	3000	-	4311.00	3,980.0
8	Premixes	Ton	9	122167	1099.5	-	1099.5
<b>Total</b>				1099.5		<b>51,624.25</b>	<b>52,723.75</b>

The only auxiliary materials required for the operation of the envisaged plant are 50 kg plastic sacks and twine rope that are also available locally. The annual requirement for auxiliary materials at full capacity production of the plant and the estimated costs are given in Table 4.

**Table 4: Annual Auxiliary Materials Requirement at Full Capacity and Costs**

Item No.	Description	Unit of Measure	Required Qty	Unit Price (Birr)	Cost,('000 Birr)		
					F.C.	L.C.	Total
1	sack, 50 kg	pc	250,000	6.00	-	1,500.00	1,500.0
2	Twine rope	kg	2,000	1.50	-	3.00	3.0
<b>Total</b>					-	<b>1,503.0</b>	<b>1,503.0</b>

**Utilities**

The utilities required for the envisaged plant comprise electric power, water and fuel oil. Electric power is required to run the production machinery and to provide lighting for the plant. Water is required for general purpose and for the boiler which generates hot water to be supplied to the molasses tank. Fuel oil is required for the boiler. The annual requirement for utilities at full capacity production and the estimated costs are shown in Table 5.

**Table 5: Annual Utilities Requirement and Estimated Costs**

Item No.	Description	Unit of Measure	Required Qty	Unit Price (Birr)	Cost, ('000 Birr)		
					F.C.	L.C.	Total
1	Electric power	kWh	450,000	0.579		280	280
2	Water	m3	5,000	10.00		50.00	50.00
<b>Total</b>						<b>330.00</b>	<b>330.00</b>

**9. TECHNOLOGY AND ENGINEERING****Technology****Production Process**

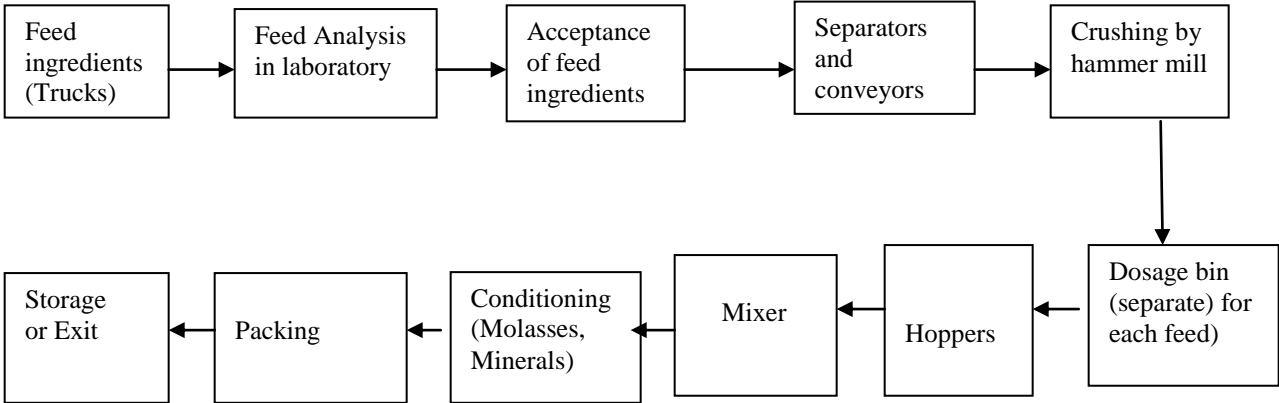
The major operations involved in the production of animal feed are: raw materials preparation, primary crushing, assorting and measuring, molasses mixing, and fine crushing and packing.

Raw and auxiliary materials are first charged into silos and tanks where they are made ready for further processing. They are then processed by primary crusher. Crushed materials are further separated by means of a lifter, and then stored in the assorting tanks according to the kind of raw materials.

In assorting and measuring operations, small amounts of additives are charged into the bins containing different assortments of raw materials. The raw materials stored in the assorting tanks are measured in accordance with the desired proportion.

The raw materials are then mixed by means of a mixer. In this process, fatty ingredients are added to the materials in order to raise the nutritional value of the feed. The feed obtained from the mixer is blended with molasses. Finally, the product is weighed and packed in plastic or jute bag.

**Process Flow Diagram**



**Engineering Machinery and equipment**

Plant machinery and equipment required for the envisaged project comprise raw materials tanks, screen shakers, hammer mill, blender, bagging machine, pellet making machine, boiler, etc. The total cost of machinery and equipment is estimated at Birr 12.25 million, out of which Birr 9.8 million is required in foreign currency. List of plant machinery and equipment and the estimated costs are shown in Table 6.

**Table 6: Machinery and Equipment Requirement and Estimated Costs**

Item No.	Description	Unit of Measure	Required Qty	Cost, ('000 Birr)		
				F.C.	L.C.	Total
1	Tank and silo for raw and auxiliary materials	Set	2	784.0	196.0	980.0
2	Metal screen and shaker	Set	1	882.0	220.5	1,102.5
3	Mixer	Set	1	784.0	196.0	980.0
4	Hammer mill (crusher)	Set	1	882.0	220.5	1,102.5
5	Weighing scale (5 tons)	Set	1	882.0	220.5	1,102.5
6	Bagging machine	Set	1	882.0	220.5	1,102.5
7	Dust collector	Set	1	490.0	122.5	612.5
8	Product tank	Set	1	588.0	147.0	735.0
9	Boiler	Set	1	784.0	196.0	980.0
10	Other accessories	Set	1	686.0	171.5	857.5
<b>Total</b>				<b>7644.00</b>	<b>1911.00</b>	<b>9555.00</b>

**Land, Buildings and Civil Works**

The total land area required for the plant is 1,000 m<sup>2</sup>, out of which 600 m<sup>2</sup> is built – up area. The construction cost of buildings and civil works at the rate of Birr 4,500 per m<sup>2</sup> is estimated at Birr 2.7 million.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 721/2004) 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.

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all new manufacturing projects will be located in industrial zones located in expansion zones. Therefore, for the profile a land lease rate of Birr 266 per m<sup>2</sup> which is equivalent to the average floor price of plots located in expansion zone 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 7 shows incentives for lease payment.

**Table 7: 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 land lease period for industry is 60 years.

Accordingly, the total land lease cost at a rate of Birr 266 per m<sup>2</sup> is estimated at Birr 266,000 of which 10% or Birr 26,600 will be paid in advance. The remaining Birr 239,400 will be paid in equal installments within 28 years i.e. Birr 8,550 annually.

Accordingly the project profile prepared based on the land lease price of Addis Ababa region. To know land lease price, police and regulation of other regional state of the country updated information is available at Ethiopian Investment Agency's website [www.eia.gov.et](http://www.eia.gov.et) on the factor cost.

## **10. Economic and Social Benefits**

The project will create backward linkage with the agriculture and agro processing sectors and forward linkage with the livestock sector and also generates income for the government in terms of payroll tax. The project can create employment for 32 persons

## **11. Environmental Impact**

The envisaged plant does not have any adverse impact on the environment, rather it have an advantage to minimize the methane mitigation by feeding the animals the compound feed. Thus, the project is environment friendly.

## **12.HUMAN RESOURCE AND TRAINING REQUIREMENTS**

### **Human Resource Requirement**

The total human resource required for the envisaged plant 32 persons. The human resource required and the estimated annual labor cost including the fringe benefits is shown in Table 8.





Accounts receivable	30 days
Raw material local	30 days
Work in progress	1 day
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days
Repair and maintenance	5% of machinery cost
Total processed feed production	127,500qt
Current average selling price of animal feeds	690birr/qt

### **Total Initial Investment Cost**

The total investment cost of the project including working capital is estimated as indicated bellow (See Table 9).

**Table 9: Initial Investment Cost (Birr)**

<b>Sr. No.</b>	<b>Cost Items</b>	<b>Local Cost</b>	<b>Foreign Cost</b>	<b>Total Cost</b>
<b>1</b>	<b>Fixed investment</b>			
1.1	Land Lease	2,660,000		2,660,000
1.2	Building and civil work	2,700,000		2,700,000
1.3	Machinery and equipment	1,911,000	7,644,000	9,555,000
1.4	Vehicles	2,660,000		2,660,000
1.5	Office furniture and equipment	2,700,000		2,700,000
	<b>Sub total</b>	<b>12,631,000</b>	<b>7,644,000</b>	<b>20,275,000</b>
<b>2</b>	<b>Other costs</b>			
2.1	Raw material cost(Ingredients)	52,613,800	109,950	52,723,750
2.2	Salary	656,592		656,592
2.3	Auxiliaries	1,503,000		1,503,000
2.4	Utilities	330,000		330,000
	<b>Sub total</b>	<b>55,103,392</b>	<b>109,950</b>	<b>55,213,342</b>
<b>3</b>	Pre operating cost	3,099,760		3,099,760
<b>Grand Total</b>		<b>70,834,152</b>	<b>7,753,950</b>	<b>78,588,102</b>

\* The above table show that the total needed initial cost the animal feed processing plant. Hence 78,588,102 birr is required to start and implement the project. The source finance is from banks 58,941,077Birr(75%) and Own equity 19,647,025 birr(25%).

### Purchase and Sales Estimation Feed Purchase and Sales

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Purchase Volume</b>					
Purchase of feed in qt	127,500	142,500	150,000	150,000	150,000
Net feed available	127,500	142,500	150,000	150,000	150,000
<b>Sales Volume</b>					
Processed feed in kg	127,500	142,500	150,000	150,000	150,000
<b>Sales in Birr</b>					
Processed feed sales	87,975,000	98,325,000	103,500,000	103,500,000	103,500,000
<b>Total Sales</b>	<b>87,975,000</b>	<b>98,325,000</b>	<b>103,500,000</b>	<b>103,500,000</b>	<b>103,500,000</b>
Raw material Purchase Cost	52,723,750	59,050,600	62,003,130	62,003,130	62,003,130

### Project Income Statement

Particulars	Year 1	Year 2	Year 3	Year 2	Year 3
Sales	87,975,000	98,325,000	103,500,000	103,500,000	103,500,000
Costs and Expenses					
Purchase of feed ingredients	52,723,750	59,050,600	62,003,130	62,003,130	62,003,130
Gross profit	35,251,250	39,274,400	41,496,870	41,496,870	41,496,870
Operational expense					
Salaries	656,592	656,592	656,592	656,592	656,592
Packing(Sacks)	212,500	244,375	255,593	255,593	255,593
Benefits(Incentives)	65,659.2	88,656	99,578	99,578	99,578
Depreciation	100,000	80,000	65,000	55,000	50,000
Promotion and Advertisement	45,000	45,000	45,000	45,000	45,000
Land lease payment	266,000	266,000	266,000	266,000	266,000
Car Running Expense	90,000	90,000	90,000	90,000	90,000
Interest Expense	7,072,929	5,658,343	4,243,758	2,829,172	1,414,586
Other Expenses	330,000	330,000	330,000	330,000	330,000
Total of operational exp.	8,838,680	7,458,966	6,051,521	4,626,935	3,207,349
Net profit/Income	26,412,570	31,815,434	35,445,349	36,869,935	38,289,521
Provision for Tax	4,641,405	8,556,753	9,812,064	9,812,064	9,812,064
Net profit /Income After Tax	21,771,165	23,258,681	25,633,285	27,057,871	28,477,457

### Cash Flow Statement

Particulars	Pre-operating period	Year				
		1	2	3	4	5
Cash in flow						
Own equity	19,647,025					
Loan received	58,588,102					
Cash sales		87,975,000	98,325,000	103,500,000	103,500,000	103,500,000
Total Cash inflow	78,588,102	87,975,000	98,325,000	103,500,000	103,500,000	103,500,000
Cash outflow						
Investment expense	23,374,740					
Purchase of ingrid.		52,723,750	59,050,600	62,003,130	62,003,130	62,003,130
Salary		656,592	656,592	656,592	656,592	656,592
Land lease payment		266,000	266,000	266,000	266,000	266,000
Depreciation		100,000	80,000	65,000	55,000	50,000
Overhead costs		743,159.20	798,031	820,171	820,171	820,171
Interest expense		7,072,929	5,658,343	4,243,758	2,829,172	1,414,586
Loan repayment		11,788,215	11,788,215	11,788,215	11,788,215	11,788,215
Total Cash outflow	23,374,740	73,350,645	78,297,781	79,842,866	78,418,280	76,998,694
Net cash flow	55,213,362	14,624,355	20,027,219	23,657,134	25,081,720	55,213,362
Beginning cash balance		55,213,362	69,837,717	89,864,936	113,522,070	138,603,790
Ending Cash Balance	55,213,362	69,837,717	89,864,936	113,522,070	138,603,790	252,125,860

### 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)	Discount factor	Present Value(birr)
0	23,374,740	23,374,740	1.000	23,374,740			
1		8,838,680	0.893	7,892,941	35,251,250	0.893	31,479,366
2		7,458,966	0.797	5,944,796	39,274,400	0.797	31,301,697
3		6,051,521	0.712	4,308,683	41,496,870	0.712	29,545,771
4		4,626,935	0.636	2,942,731	41,496,870	0.636	26,392,009
5		3,207,349	0.567	1,818,567	41,496,870	0.567	23,528,725
Total	23,374,740	53,558,191	0.734	46,282,458	199,016,260	0.734	142,247,569

### Net Present Value (NPV)

$$\begin{aligned} \text{NPV} &= \text{Present value of gross benefit} - \text{Present value of gross cost} \\ &= 142,247,569 - 46,282,458 \\ &= \underline{95,965,11} \end{aligned}$$

The net present value is greater than zero. Therefore, this animal feed processing project is accepted and profitable.

### Benefit- Cost Ratio (BCR)

$$\begin{aligned} \text{BCR} &= \frac{\text{Present Value of gross benefit}}{\text{Present Value of gross cost}} \\ &= \frac{142,247,569}{46,282,458} \\ &= \underline{3.07} \end{aligned}$$

The ratio is greater than one. This means that the project owner or the investor will recover the investment.

### Loan Repayment Schedule

Year	Principal Outstanding	Installment due payable	Interest at 12%	Total Payment
1	58,941,077	11,788,215	7,072,929	18,861,144
2	47,152,862	11,788,215	5,658,343	17,446,558
3	35,364,647	11,788,215	4,243,758	16,031,973
4	23,576,431	11,788,216	2,829,172	14,617,388
5	11,788,216	11,788,216	1,414,586	13,202,802
<b>Total</b>	<b>0</b>	58,941,077	21,218,788	80,159,865

## 16. CONCLUSIONS

As it is known Ethiopia has huge investment potentials for feed processing industry subsector, and the climatic condition is favorable for growing different vegetation and crops which are an excellent source of processed fodder preparation.

The financial analysis of this feed processing investment pre-feasibility study shows that the project is worth profitable and acceptable as the discounted measures of the project worth shows positive trend if investors are engaged in the area.

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