76. PROFILE ON THE PRODUCTION OF VETERINARY MEDICINE

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I. SUMMARY

This profile envisages the establishment of a plant for the production of veterinary medicine with an annual capacity of 405 tons of drugs (113tons of antibiotics 258 tons of anthelimentics and 34 tons of antiprotozoals) and 693.38 thousand liters of acaricides. Veterinary medicine is used for treatment of sick livestock.

The country`s requirement of veterinary medicines is met through import. The present (2012) demand for veterinary medicines is estimated to be about 416 tons of solid drugs (100 tons of antibiotics 282 tons of anthelimentics and 34 tons of antiprotozoals) and 692.38 thousand liters of acaricides. The demand for veterinary medicines is projected to reach 1,131 tons of solid drugs (272 tons of antibiotics 767 tons of anthelimentics and 92 tons of antiprotozoals) and 1.88 million liters of acaricides by year 2022.

The principal raw materials required are albendazole, berenil, flucanazole (flukazole), torpidol and strepts penicillin which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 28.38 million. From the total investment cost the highest share (Birr 22.93 million or 80.81%) is accounted by fixed investment cost followed by pre operation cost (Birr 2.99 million or 10.54%) and initial working capital (Birr 2.45 million or 8.66%). From the total investment cost Birr 14.18 million or 49.96% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 33.09% and a net present value (NPV) of Birr 31.90 million, discounted at 10%.

The project can create employment for 66 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create forward linkage with the livestock sector and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

The most frequently used veterinary medicines in Ethiopia and their specific application area are briefly discussed below.

Albendazole:-Albendazole is a benzimidazole anthelmintic produced in syrup (5ml), and tablets (1.5gm). It is used to control gastrointestinal roundworms, hungworms, tapeworms and trematodes in cattle, sheep and goats**.**

Berenil:-Berenil is often chemically referred by the name diminazene aceturate which is an aromatic dizmidine derivative related to pertamidine, and is an antiprotazoal agent which is used in the treatment of trupanosomiasis ("Yekola Zinb") and babesisis. In Ethiopia it is also used to fight against "Gendi". The solution usually contains oxytertacyline. It is produced in 5 mg / injection.

Flukazol:-Flukazol is a triazole antifungal drug which inhibits tungol cytochrome dependent enzymes resulting in blocked ergosterol synthesis. It is active against aspergillus, blastomayces dermatitidis, etc. In Ethiopia, it is used as anthelminthic, and can be produced in 200 mg tablets.

Sterepto Pencillin:-It is an antibiotic injection used, for example, against “Gorerssa." In the envisaged plant strepto pencillin is produced in 2.5 gm per injection.

Torpidol:-Torpidol is an anthelmitic tablet, 1gm/tablet, and widely used to treat horses and donkeys. Torpidol usually contains fendendazol.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Although Ethiopia has the largest cattle population in Africa, insufficient supply of veterinary medicines, especially anti-parasite drugs, causes losses in animal production.

The present population of cattle, sheep, goats and camels, which are the main sources of demand for veterinary medicine, is depicted in Table 3.1.

Table 3.1

ESTIMATED NUMBER OF CATTLE, SHEEP, GOATS AND CAMELS (2010)

Animal Type	Number of Animals (Species)
Cattle	48,202,500
Sheep	26,143,800
Goat	24,039,300
Camel	2,293,800

Source: *CSA, Statistical Abstract, 2010.*

According to the information obtained from the Ministry of Agriculture, the major livestock diseases in country are shown in Table 3.2.

Table 3.2

MAJOR ANIMAL DISEASES

Animal Type	Major Diseases
Cattle	Pleuropneumonia, food and mouth disease, anthrax, blackleg, pasteruellosis, gastro- intestinal parasitism, external parasitism
Camel	Trypanosomasis, mange mite, respiratory diseases, anthrax, pasteruellosis, gastro-intestinal parasitism, wound
Sheep and Goat	Contigious caprine, pleuropneumonia, goat plague, anthrax, pasteurellosis, foot rot, sheep and goat pox, gastro-intestinal parasitism, mange mite, tick

The most commonly used drugs to treat the above diseases are:

- Antibiotics
  - Oxytetracycline
  - Sulfa drugs (sulfadimidine)
- Antiprotozoals
  - Dimenazene aceturate

- Anthelimenthics
- Albendazole

- Acaricdes
  - Ethion/Cethion

The average drug requirement and dosage in species is given in Table 3.3.

Table 3.3

DRUG REQUIRMENT AND THERAPEUTIC MARGIN IN SPECIES

Species/Drug	Average Frequency of treatment	Average Unit dose Prescribed per kg of body weight	Average Total Dose Prescribed per Animal
Cattle			
Antibiotic	2	5mg	1.25 gm
Anthelimetic	4	7.5 mg	1.875 gm
Antiprotozoal	1	3.5 mg	0.875gm
Acarcides	4	Covering all body area	7 liters (diluted)
Sheep & Goat			
Antibiotic	3	5 mg	0.45 gm
Anthelimetic	4	7.5 mg	0.90 gm
Antiprotozoal	1	3.5 mg	0.11gm
Acarcides	4	Covering all body area	4 liters (diluted)
Camel			
Antibiotic	3	7 mg	2.1 gm
Anthelimetic	4	7.5 mg	2.25 gm
Antiprotozoal	3	3.5 mg	1.05 gm
Acarcides	4	Covering all body area	7 liter (diluted)

In order to determine the current country-wide veterinary medicine demand, the drug requirement and dosage rate in species developed in Table 3.3 was applied on the data pertaining to number of species (Table 3.1) and the result is shown as Table 3.4.

Table 3.4

ESTIMATION OF ANNUAL VETERINARY MEDICINE REQUIREMENT AT COUNTRY LEVEL

Species/Drug	Estimated Number	Average Annual Dose Per Animal (gm)	Total Annual Requirement (ton)
Cattle			
Antibiotic	48,202,500	2.5	120.51
Anthelimetic		7.5	361.52
Antiprotozoal		0.875	42.18
Acaricides		28 litre (diluted)*	674,835 liters
Sheep & Goat			
Antibiotic	50,183,100	0.45	22.58
Anthelimetic		0.9	45.16
Antiprotozoal		0.105	5.27
Acaricides		16 liters (diluted)	401,465 liters
Camel			
Antibiotic	2,293,800	6.30	14.45
Anthelimetic		9.00	20.64
Antiprotozoal		3.15	7.23
Acaricides		28 liters (dilute)	64,226 liters

** 1 liter of Acaricide is mixed with 2000 liters of water for dilution*

Table 3.4 shows that, assuming a 100% treatment coverage the total requirement of veterinary medicines would be about 640 tons of drugs (capsules, tablets and vials), and 1.14 million liters of acaricides for deep bathing. However, since 100% coverage is unlikely to be attained, based on knowledgeable opinion, the following rates of coverage are assumed:

Species	Treatment coverage
Cattle	70%
Sheep & Goat	50%
Camel	30%

After adjusting the results in Table 3.4 accordingly, the present demand for veterinary medicines is estimated to be about 416 tons of drugs (100 tons of antibiotics 282 tons of Anthelimentics and 34 tons of antiprotozoals) and 692.38 thousand liters of acaricides.

2. Demand Projection

The future demand for veterinary medicines depends on the increase in the population of cattle, sheep, goats and camels as well as the increase in use of these medicines due to improved awareness of farmers about animal health owing to improved availability of the medicines and extension services.

According to CSA's "Statistical Abstract" the livestock population in Ethiopia over the period 2000--2010 has exhibited an average growth rate of 5.8%. However, as noted earlier, future demand for veterinary medicines is not only a function of livestock population growth since a host of factors contribute toward their increased application by farmers. Hence, in order to take account of these demand stimulating variables, a growth rate of 8% per annum is deemed to be reasonable. The demand projection executed on this basis is shown in Table 3.5.

Table 3.5

PROJECTED DEMAND FOR VETERINARY MEDICINES

Year	Antibiotic (ton)	Anthelimetic (ton)	Antiprotozoal (ton)	Acaricides (lit.)
2013	108	305	37	747,776
2014	117	329	40	807,598
2015	126	355	43	872,205
2016	136	384	46	941,982
2017	147	414	50	1,017,340
2018	159	447	54	1,098,728
2019	171	483	58	1,186,626
2020	185	522	63	1,281,556
2021	200	564	68	1,384,080
2022	216	609	73	1,494,807
2023	233	658	79	1,614,391
2024	252	710	86	1,743,543
2025	272	767	92	1,883,026

3. Pricing and Distribution

Currently, veterinary drugs are sold to farmers at the following prices:

Drug type	Unit	Unit Price (Birr)
Antibiotic		
o Oxytetracycline	Vial (100 cc)	32
o Sulfadimine	Vial (100 cc)	20
Antiprotozoa		
o Dimenazene	Sachet	8
Antihelimetics		
o Albendazole 2500 mg	Bolus	4
Acaricides		
o Ethion/Cethion	Litre	170

Since the regional Agricultural Bureaus are selling veterinary medicines to farmers without any profit margin, on cost recovery basis, the above prices could approximate ex- factory prices for the envisaged factory.

Purchase of drugs is made in bulk through competitive bidding by Regional Agricultural Bureaus, on the basis of aggregated requests from animal health units at Woreda level, which affect the ultimate sales to the farmers.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

Considering the time needed for developing production skill and setting a significant market share of the products, the capacity of the envisaged plant is summarized in Table 3.6. The capacity is defined based on the market study, and 300 working days per annum and one shifts per day.

Table 3.6

ANNUAL PRODUCTION CAPACITY

Sr. No.	product	Unit of Measure	Qty
1	Antibiotics	Ton	113
2	Anthelimetic	Ton	258
3	Antiprotozoal	Ton	34
4	Acaricides	liter	692,385

2. Production Program

Full capacity production may not be achieved just at the beginning of the production phase, because the local products require enough time to compete with the imported once and secure reasonable market share. Therefore, in the first and second year of production, the capacity utilization rate is assumed to be 75% and 90%, respectively. In the third year and thereafter, full capacity production will be achieved. The production program is indicated in Table 3.7.

Table 3.7

PRODUCTION PROGRAM (IN '000 PCS)

Sr. No.	Products	Production Year		
		1	2	3--10
1.	Antibiotics	84.85	101.82	113
2.	Anthelimetic	193.40	232.08	258
3.	Antiprotozoal	25.75	30.90	34
4.	Acaricides	519,288.6	623,146.30	692,385
Production percentage (%)		**75**	**90**	**100**

IV. MATERIAL AND INPUTS

A. RAW MATERIALS

The major raw materials are albendazole, berenil, flucanazole (flukazole), torpidol and strepts pencillin. The annual requirement of these chemicals and their cost is indicated in Table 4.1.

Table 4.1

RAW MATERIAL REQUIREMENT & COST

Sr. No.	Raw Material	Qty.	Cost ('000 Birr)		
			FC	LC	Total
1.	Albendazole	2.27	1272.20	254.4	1526.60
2.	Berenil	1.7	1595.30	319.1	1914.40
3.	Flucanozole	0.1	2241.70	448.3	2690.00
4.	Torpidol	2.2	516.10	103.2	619.30
5.	Strepto penicilline	1	1107.80	221.6	1329.40
6.	Packing materials	Lumsum	350.25	230.0	580.25
	Grand Total		**7,083.35**	**1,576.6**	**8,659.95**

B. UTILITIES

Electricity, fuel oil and water are the major utilities of the proposed project. The annual consumption and its cost is indicated in Table 4.2.

Table 4.2

UTILITY REQUIREMENT & COST

Sr. No.	Utility	Unit	Qty	Cost ('000 Birr)
1	Electricity	kWh	341,982	198.35
2	Fuel oil	lt	8,607	172.14
3	Water	m^3	4,418	44.18
	Total			**414.67**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The major operations of the plant are tablet making, syrup making and filling of capsules. The manufacturing of tablets consists of the following basic steps: formulation, mixing and milling, granulation, drying, lubrication, compression and coating.

The syrup making essentially consists of mixing the various ingredients in a jacketed kettle. The bottles to be used must be separated, washed, sterilized, dried and labeled.

The modern rotary die capsule machine is a self contained unit capable of continuously and automatically producing finished capsules from a supply of gelatin mass and filling material. Accurate filling under pressure and sealing of the capsule wall occur as dual and coincident operations, each delicately timed against the other.

2. Environmental Impact Assessment

The disposition of chemicals or waste materials from such industry may affect the environment up on exposition to direct sunlight, reaction with water and so forth. For this the envisaged plant will have the proper treatment and waste disposition and **i**ncineration mechanism that at the end of the day the operation ensures secured environment. The cost of waste treatment system is included in the cost of machinery and equipment.

B. ENGINEERING

1. Machinery & Equipment

The total cost of these items is estimated at Birr 16.68 million of which Birr 14.18 million is in foreign currency. The list of machinery and equipment is indicated in Table 5.1.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT

Sr. No.	Description	Qty
1	**Tablet Making Section**	
1.1	Powder mixer (75kg)	2
1.2	Mill unit	1
1.3	Horizontal granulators	2
1.4	Drying oven	1
1.5	Fluid bed dryer (100 kg)	1
1.6	Mechanical lifter	1
1.7	Drum mixer (SS)	1
1.8	Rotary tableting machine	2
1.9	Coating pans (SS)	2
1.10	Canvas polishing pan	2
1.11	Tablet /syrup packing machine	2
1.12	Blister packing machine	1
2	**Capsule Section**	
2.1	Double cone blender	1
2.2	Blender	1
2.3	Drum mixer (SS)	1
2.4	Capsule filling machine	1
2.5	Capsule counter	1
3	**Injection Liquid Section**	
3.1	Mixer	2
3.2	Cylindrical tank (SS)	2
3.3	Filler pressed	2
3.4	Industrial stirrer	2
3.5	Emulsifier	1
3.6	Bottle washing machine	1
3.7	Drying oven	1
3.8	Batch printing machine	1
3.9	Label gumming machine	1
3.10	Volumetric liquid filling machine	1
3.11	Capsule sealing machine	1
4	**Miscellaneous**	
4.1	Boiler	set
4.2	Steam and water piping	set
4.3	Pump, valves and other fittings	set
4.4	Material handling equipments	set
4.5	Weighing scales	set
4.6	Other misc. items	Lump-sum
4.7	Waste treatment system	set

2. Land, Building and Civil Works

The total area of the plant, including provision for open space, is 2,000 m^2, out of which 1,000 m^2 is a built-up area. Therefore, the cost of building is estimated at Birr 5 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.

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 $m^{2,}$ 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^2 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.

Moreover, the Addis Ababa City Administration has recently adopted a new land lease floor price for plots in the city. The new prices will be used as a benchmark for plots that are going to be auctioned by the city government or transferred under the new "Urban Lands Lease Holding Proclamation."

The new regulation classified the city into three zones. The first Zone is Central Market District Zone, which is classified in five levels and the floor land lease price ranges from Birr 1,686 to Birr 894 per m^2. The rate for Central Market District Zone will be applicable in most areas of the city that are considered to be main business areas that entertain high level of business activities.

The second zone, Transitional Zone, will also have five levels and the floor land lease price ranges from Birr 1,035 to Birr 555 per m^2 .This zone includes places that are surrounding the city and are occupied by mainly residential units and industries.

The last and the third zone, Expansion Zone, is classified into four levels and covers areas that are considered to be in the outskirts of the city, where the city is expected to expand in the future. The floor land lease price in the Expansion Zone ranges from Birr 355 to Birr 191 per m^2 (see Table 5.2).

Table 5.2

NEW LAND LEASE FLOOR PRICE FOR PLOTS IN ADDIS ABABA

Zone	Level	Floor Price/m^2
Central Market District	1st	1686
	2nd	1535
	3rd	1323
	4th	1085
	5th	894
Transitional zone	1st	1035
	2nd	935
	3rd	809
	4th	685
	5th	555
Expansion zone	1st	355
	2nd	299
	3rd	217
	4th	191

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^2 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 criterions are creation of job opportunity, foreign exchange saving, investment capital and land utilization tendency etc. Accordingly, Table 5.3 shows incentives for lease payment.

Table 5.3

INCENTIVES FOR LEASE PAYMENT OF INDUSTRIAL PROJECTS

Scored Point	Grace Period	Payment Completion Period	Down Payment
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^2 is estimated at Birr 532,000 of which 10% or Birr 53,200 will be paid in advance. The remaining Birr 478,800 will be paid in equal installments with in 28 years i.e. Birr 17,100 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The project will create job opportunities for a total of 66 persons. Annual cost of labor is estimated at Birr 1,253,040**.** The list of human resource and labor cost is indicated in Table 6.1.

Table 6.1

HUMAN RESOURCE REQUIREMENT & COST

Sr. No.	Manpower	Req. No.	Monthly Salary (Birr)	Annual Salary (Birr)
1	General manger	1	5,500	66,000
2	Office Secretary	2	2,000	48,000
3	Administration & Finance	1	3,500	42,000
4	Sales officers	2	2,000	48,000
5	Production & tech. head	1	4,000	48,000
6	Accountant	1	2,000	24,000
7	Typist	1	1800	21,600
8	Production	3	2,400	86,400
9	Operators	22	1,400	369,600
10	Assistance operators	12	1,000	144,000
11	Laborers	14	800	134,400
12	General service	6	800	57,600
Sub-Total		**66**	**27,200**	**1,089,600**
Benefits (15% BS)				163,440
Total				**1,253,040**

B. TRAINING REQUIREMENT

Training of manpower may take place during plant erection and commissioning by the experts of machinery supplier. This may cost about Birr 150,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the veterinary drug 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% equity
Tax holidays	5 years
Bank interest	10%
Discount cash flow	10%
Accounts receivable	30 days
Raw material imported	120 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

A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 28.38 million (See Table 7.1). From the total investment cost the highest share (Birr 22.93 million or 80.81%) is accounted by fixed investment cost followed by pre operation cost (Birr 2.99 million or 10.54%) and initial working capital (Birr 2.45 million or 8.66%). From the total investment cost Birr 14.18 million or 49.96% is required in foreign currency.

Table 7.1

INITIAL INVESTMENT COST ('000 Birr)

Sr. No.	Cost Items	Local Cost	Foreign Cost	Total Cost	% Share
1	**Fixed investment**				
1.1	Land Lease	53.20		53.20	0.19
1.2	Building and civil work	5,000.00		5,000.00	17.62
1.3	Machinery and equipment	2,500.00	14,180.00	16,680.00	58.77
1.4	Vehicles	900.00		900.00	3.17
1.5	Office furniture and equipment	300.00		300.00	1.06
	Sub- total	**8,753.20**	**14,180.00**	**22,933.20**	**80.81**
2	**Pre operating cost ***				
2.1	Pre operating cost	1,134.00		1,134.00	4.00
2.2	Interest during construction	1,856.69		1,856.69	6.54
	Sub-total	**2,990.69**		**2,990.69**	**10.54**
3	**Working capital**	**2,456.88**		**2,456.88**	**8.66**
	Grand Total	**14,200.77**	**14,180.00**	**28,380.77**	**100**

* *N.B Pre operating cost include project implementation cost such as installation, startup, commissioning, project engineering, project management etc and capitalized interest during construction.*

** *The total working capital required at full capacity operation is Birr 3.05 million. However, only the initial working capital of Birr 2.45 million during the first year of production is assumed to be funded through external sources. During the remaining years the working capital requirement will be financed by funds to be generated internally (for detail working capital requirement see Appendix 7.A.1).*

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 17.97 million (see Table 7.2). The cost of raw material account for 48.19% of the production cost. The other major components of the production cost are depreciation, financial cost and labor, which account for 22.11%, 9.94% and 6.06%, respectively. The remaining 13.70% is the share of utility, repair and maintenance, labor overhead and administration cost. For detail production cost see Appendix 7.A.2.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY (YEAR THREE)

Items	Cost (in 000 Birr)	%
Raw Material and Inputs	8,659.95	48.19
Utilities	414.67	2.31
Maintenance and repair	834.00	4.64
Labor direct	1,089.60	6.06
Labor overheads	163.44	0.91
Administration Costs	300.00	1.67
Land lease cost	-	-
Cost of marketing and distribution	750.00	4.17
Total Operating Costs	**12,211.66**	**67.95**
Depreciation	3,972.80	22.11
Cost of Finance	1,787.06	9.94
Total Production Cost	**17,971.52**	**100**

C. FINANCIAL EVALUATION

1. Profitability

Based on the projected profit and loss statement, the project will generate a profit through out its operation life. Annual net profit after tax ranges from Birr 3.57 million to Birr 7.34 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 66.61 million. For profit and loss statement and cash flow projection see Appendix 7.A.3 and 7.A.4, respectively.

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 for capacity utilization and sales value estimated by using income statement projection are computed as followed.

$$\text{Break-Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 9{,}434{,}630$$

$$\text{Break -Even Capacity utilization} = \frac{\text{Break- even Sales Value}}{\text{Sales revenue}} \times 100 = 41\%$$

4. Payback Period

The pay- back period, also called pay – off period is defined as the period required for recovering 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 3 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 33.09% 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 in to 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 10% discount rate is found to be Birr 31.90 million which is acceptable. For detail discounted cash flow see Appendix 7.A.5.

D. ECONOMIC AND SOCIAL BENEFITS

The project can create employment for 66 persons. The project will generate Birr 14.91 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. The project will also create forward linkage with the livestock sector and also generates income for the Government in terms of payroll tax.

Appendix 7.A
FINANCIAL ANALYSES SUPPORTING TABLES

Appendix 7.A.1
NET WORKING CAPITAL (in 000 Birr)

Items	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Total inventory	1,731.99	1,948.49	2,164.99	2,164.99	2,164.99	2,164.99	2,164.99	2,164.99	2,164.99	2,164.99
Accounts receivable	826.61	922.12	1,017.64	1,017.64	1,019.06	1,019.06	1,019.06	1,019.06	1,019.06	1,019.06
Cash-in-hand	26.52	29.84	33.15	33.15	33.39	33.39	33.39	33.39	33.39	33.39
CURRENT ASSETS	**2,585.12**	**2,900.45**	**3,215.78**	**3,215.78**	**3,217.44**	**3,217.44**	**3,217.44**	**3,217.44**	**3,217.44**	**3,217.44**
Accounts payable	128.24	144.27	160.30	160.30	160.30	160.30	160.30	160.30	160.30	160.30
CURRENT LIABILITIES	**128.24**	**144.27**	**160.30**	**160.30**	**160.30**	**160.30**	**160.30**	**160.30**	**160.30**	**160.30**
TOTAL WORKING CAPITAL	**2,456.88**	**2,756.18**	**3,055.48**	**3,055.48**	**3,057.14**	**3,057.14**	**3,057.14**	**3,057.14**	**3,057.14**	**3,057.14**

Appendix 7.A.2
PRODUCTION COST (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Raw Material and Inputs	6,928	7,794	8,660	8,660	8,660	8,660	8,660	8,660	8,660	8,660
Utilities	332	373	415	415	415	415	415	415	415	415
Maintenance and repair	667	751	834	834	834	834	834	834	834	834
Labour direct	872	981	1,090	1,090	1,090	1,090	1,090	1,090	1,090	1,090
Labour overheads	131	147	163	163	163	163	163	163	163	163
Administration Costs	240	270	300	300	300	300	300	300	300	300
Land lease cost	0	0	0	0	17	17	17	17	17	17
Cost of marketing and distribution	750	750	750	750	750	750	750	750	750	750
Total Operating Costs	**9,919**	**11,065**	**12,212**	**12,212**	**12,229**	**12,229**	**12,229**	**12,229**	**12,229**	**12,229**
Depreciation	3,973	3,973	3,973	3,973	3,973	230	230	230	230	230
Cost of Finance	0	2,042	1,787	1,532	1,276	1,021	766	511	255	0
Total Production Cost	**13,892**	**17,081**	**17,972**	**17,716**	**17,478**	**13,480**	**13,225**	**12,969**	**12,714**	**12,459**

Appendix 7.A.3
INCOME STATEMENT (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Sales revenue	18,360	20,655	22,950	22,950	22,950	22,950	22,950	22,950	22,950	22,950
Less variable costs	9,169	10,315	11,462	11,462	11,462	11,462	11,462	11,462	11,462	11,462
VARIABLE MARGIN	**9,191**	**10,340**	**11,488**	**11,488**	**11,488**	**11,488**	**11,488**	**11,488**	**11,488**	**11,488**
in % of sales revenue	50.06	50.06	50.06	50.06	50.06	50.06	50.06	50.06	50.06	50.06
Less fixed costs	4,723	4,723	4,723	4,723	4,740	997	997	997	997	997
OPERATIONAL MARGIN	**4,468**	**5,617**	**6,766**	**6,766**	**6,748**	**10,491**	**10,491**	**10,491**	**10,491**	**10,491**
in % of sales revenue	24.33	27.19	29.48	29.48	29.40	45.71	45.71	45.71	45.71	45.71
Financial costs		2,042	1,787	1,532	1,276	1,021	766	511	255	0
GROSS PROFIT	**4,468**	**3,574**	**4,978**	**5,234**	**5,472**	**9,470**	**9,725**	**9,981**	**10,236**	**10,491**
in % of sales revenue	24.33	17.31	21.69	22.81	23.84	41.26	42.38	43.49	44.60	45.71
Income (corporate) tax	0	0	0	0	0	2,841	2,918	2,994	3,071	3,147
NET PROFIT	**4,468**	**3,574**	**4,978**	**5,234**	**5,472**	**6,629**	**6,808**	**6,986**	**7,165**	**7,344**
in % of sales revenue	24.33	17.31	21.69	22.81	23.84	28.88	29.66	30.44	31.22	32.00

Appendix 7.A.4
CASH FLOW FOR FINANCIAL MANAGEMENT (in 000 Birr)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
TOTAL CASH INFLOW	**24,067**	**22,802**	**20,671**	**22,966**	**22,950**	**22,950**	**22,950**	**22,950**	**22,950**	**22,950**	**22,950**	**7,967**
Inflow funds	24,067	4,442	16	16	0	0	0	0	0	0	0	0
Inflow operation	0	18,360	20,655	22,950	22,950	22,950	22,950	22,950	22,950	22,950	22,950	0
Other income	0	0	0	0	0	0	0	0	0	0	0	7,967
TOTAL CASH OUTFLOW	**24,067**	**14,361**	**15,976**	**16,867**	**16,296**	**16,060**	**18,644**	**18,465**	**18,286**	**18,108**	**15,376**	**0**
Increase in fixed assets	24,067	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	2,585	315	315	0	2	0	0	0	0	0	0
Operating costs	0	9,169	10,315	11,462	11,462	11,479	11,479	11,479	11,479	11,479	11,479	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income tax	0	0	0	0	0	0	2,841	2,918	2,994	3,071	3,147	0
Financial costs	0	1,857	2,042	1,787	1,532	1,276	1,021	766	511	255	0	0
Loan repayment	0	0	2,553	2,553	2,553	2,553	2,553	2,553	2,553	2,553	0	0
SURPLUS (DEFICIT)	**0**	**8,441**	**4,695**	**6,099**	**6,654**	**6,890**	**4,306**	**4,485**	**4,664**	**4,842**	**7,574**	**7,967**
CUMULATIVE CASH BALANCE	**0**	**8,441**	**13,136**	**19,235**	**25,888**	**32,778**	**37,085**	**41,569**	**46,233**	**51,075**	**58,649**	**66,616**

Appendix 7.A.5
DISCOUNTED CASH FLOW (in 000 Birr)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
TOTAL CASH INFLOW	**0**	**18,360**	**20,655**	**22,950**	**22,950**	**22,950**	**22,950**	**22,950**	**22,950**	**22,950**	**22,950**	**7,967**
Inflow operation	0	18,360	20,655	22,950	22,950	22,950	22,950	22,950	22,950	22,950	22,950	0
Other income	0	0	0	0	0	0	0	0	0	0	0	7,967
TOTAL CASH OUTFLOW	**26,524**	**10,219**	**11,365**	**12,212**	**12,213**	**12,229**	**15,070**	**15,146**	**15,223**	**15,300**	**15,376**	**0**
Increase in fixed assets	24,067	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	2,457	299	299	0	2	0	0	0	0	0	0	0
Operating costs	0	9,169	10,315	11,462	11,462	11,479	11,479	11,479	11,479	11,479	11,479	0
Marketing and Distribution cost	0	750	750	750	750	750	750	750	750	750	750	0
Income (corporate) tax		0	0	0	0	0	2,841	2,918	2,994	3,071	3,147	0
NET CASH FLOW	**-26,524**	**8,141**	**9,290**	**10,738**	**10,737**	**10,721**	**7,880**	**7,804**	**7,727**	**7,650**	**7,574**	**7,967**
CUMULATIVE NET CASH FLOW	**-26,524**	**-18,383**	**-9,093**	**1,646**	**12,383**	**23,104**	**30,984**	**38,788**	**46,515**	**54,165**	**61,739**	**69,706**
Net present value	-26,524	7,401	7,678	8,068	7,333	6,657	4,448	4,004	3,605	3,245	2,920	3,072
Cumulative net present value	-26,524	-19,123	-11,445	-3,377	3,956	10,613	15,061	19,066	22,671	25,915	28,835	31,907

NET PRESENT VALUE	31,907
INTERNAL RATE OF RETURN	33.09%
NORMAL PAYBACK	3years