

41. PROFILE ON ANIMAL FEED

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I. SUMMARY

This profile envisages the establishment of a plant for the production of 5,000 tonnes of animal feed per annum.

The current demand for the proposed product is estimated at 5,074 tonnes per annum and it is projected to reach 9,632 tonnes by the year 2015.

The project will create employment opportunities for about 32 persons.

The total investment cost of the project is estimated at about Birr 3.19 million, out of which Birr 928,200 is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 20% and a net present value (NPV) of Birr 1.825 million discounted at 10.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Cattle feed can be prepared from oil cakes, agro-residues, flour mill by-products, etc. It contains protein, minerals and other nutrients which are useful for beef and milk production and survival of the animals. All the raw materials required for the preparation of animal feed are available in the country in sufficient quantity.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past supply and Present Demand

The demand for livestock/ animal feed depends on the number of livestock in the region. According to the "Resource Potential Assessment" undertaken by IPS in 2003, the total number of livestock in Benishagul Gumuz Regional State (BGRS) is estimated at 252,056 tropical livestock unit (TLU) which include 253,702 cattle, 102,289 sheep, 240, 848 goats, 24,317 equines and 505,411 poultry.

The resource potential assessment has further revealed that there is animal feed shortage particularly during the dry season due to high concentration of different ruminant species. In the dry season, herdsmen migrate to far distance places while in the wet season they travel short distance to find better grazing area. The study has also pointed out that the current climatic change has made livestock production more difficult and fragile. Nutritional deficiency in terms of quality and quantity is a major factor constraining animal production. Insufficient nutrition usually causes low growth rate, poor fertility, high mortality, susceptibility to various diseases and low level of production.

Current production of livestock feed is mainly concentrated in Addis Ababa and its vicinities. However since the livestock has high potential for export and domestic market, the establishment of modern animal feed processing plants in regions such as BGRS is very essential. The past supply of animal feed is presented in Table 3.1

Table 3.1
DOMESTIC PRODUCTION OF LIVESTOCK FEED (TONNES)

Year	Quantity
1996	4601
1997	5453
1998	4991
1999	5576
2000	7049
2001	8399
2002	4762
Average	5833

Source: - CSA, Statistical Abstract.

Domestic production of livestock feed as depicted in Table 3.1, between the periods 1996-1999 production was almost constant ranging between 4,601 tonnes to 5,576 tonnes. But during the years 2000 and 2001 supply has increased to about 7,049 and 8,399 tonnes, respectively. Again in 2002 supply has declined sharply to 4762 tonnes. However, it has to be noted that the domestic production figure obtained from CSA covers only medium and large scale industries. Livestock feed which is produced by small scale industries and cattle fattening enterprises for their own consumption is not included in the data. Hence, the actual production is much more than the figures reported in Table 3.1.

In order to estimate the current demand for animal feed in BGRS an end use approach, i.e, cattle population of the region has been taken as a base. Accordingly, of the total cattle population in the region, only 5% are assumed as a target market for the product. These are mainly dairy farms, fattening and holding centers and individuals households with some cattle in urban areas.

Therefore, assuming an average of 400 kg/ cattle/ annum (excluding goat, sheep, equines & poultry), the current effective demand for animal feed is estimated at $(253,702 \times 0.05 \times 400)$ 5,074 tonnes per annum.

2. Projected Demand

The demand for livestock feed is function of livestock and overall livestock marketing system development. From the point of view of the export diversification effort of the government and increase of demand for livestock and livestock products, the sector has untapped potential. Moreover, increased awareness of farmers on modern livestock rearing will create demand for animal feed. Based on these favourable conditions, future demand is projected to grow by 6% annually. The projected demand is present in Table 3.2.

Table 3.2
PROJECTED DEMAND OF ANIMAL FEED IN BGRS

Year	Quantity (Tonnes)
2004	5074
2005	5378
2006	5701
2007	6043
2008	6406
2009	6790
2010	7198
2011	7629
2012	8087
2013	8572
2014	9086
2015	9632

3. Pricing and Distribution

Livestock feed price in the market varies with season as well as the raw materials used to produce the product. Generally, factory-gate price ranges between Birr 80 and 100 per quintal. The proposed price for the envisaged project is Birr 900 per tonne.

Livestock feed can be directly distributed to large purchasers. Agents can also be used to distribute the product to relatively far places where there is some amount of demand.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

In this study, a plant with annual capacity of 5,000 tonnes is envisaged. The plant will operate a single shift of 8 hours a day, and 300 days a year. Sundays and national holidays amount to 65 days. If maintenance and repair works are to be conducted, it will be during holidays.

2. Production Programme

The plant will start operation at 85% of its rated capacity in the first year. It will then build up its production capacity to 95% and 100% in the second and third year, respectively.

As the plant is new having new machinery, production build-up is made to start at reduced capacity and gradually rise to full capacity. The low production level at the initial stage is to develop substantial market outlets for the product. Machinery operators will also get enough time to develop the required skills and experience.

IV. MATERIALS AND INPUTS

A. RAW & AUXILIARY MATERIALS

The annual requirement for raw materials and their costs are indicated in Table 4.1. Accordingly, the basic raw materials are: oil cake, molasses, bone meal, bran of cereals, maize, salt and limestone. The auxiliary materials required include sacks, twine rope and others.

Table 4.1
RAW AND AUXILIARY MATERIALS REQUIREMENT AND COST

Sr. No.	Description	Unit of Measure	Qty	Cost ('000 Birr)
1.	Oil cake	Tonnes	1,150	472.13
2.	Bran of cereals	Tonnes	1,235	457.78
3.	Molasses	Tonnes	250	102.64
4.	Maize	Tonnes	2,000	1,020.00
5.	Salt	Tonnes	7	8.40
6.	Limestone (ground)	Tonnes	8	3.67
7.	Meal (bone or flesh or blood)	Tonnes	200	30.60
8.	Sacks (100 kg capacity)	Pcs	50,000	300.00
9.	Twine	lump sum		7.14
10.	Other grains (wheat, barely, etc)	Tonnes	150	183.60
	Grand Total			2585.96

B. UTILITIES

Utilities required by the plant consist of electricity, water and fuel oil. Electricity is required to run the production machinery and to provide lighting for the plant. Water is required for general purposes and for supplying to the boiler, where hot water is produced to be supplied to the molasses tank. Fuel oil is supplied to the boiler. The annual requirement and costs of these utilities are shown in Table 4.2.

Table 4.2
UTILITIES REQUIREMENT AND COST (AT FULL CAPACITY)

Sr. No.	Item	Annual Requirement	Cost ('000 Birr)
1	Electricity	45,000 kwh	21.285
2	Water (2m ³ /hr	4,800 m ³	9.60
3	Fuel oil (1561/hr)	374,000 lt	860.20
	Total		891.085

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

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

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 sifter, and then stored in the assorting tanks according to the kind of raw materials.

In assorting and measuring operation, 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 their use (cattle feed, hog feed, etc).

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 nutrient value of the feed. The feed obtained from the mixer is added with molasses.

After the feed is mixed with molasses, it is further crushed by means of the second crusher. Sometimes, second crushing is undesirable and can be avoided.

Assorted animal feed that is crushed into fine particles is further formed into pellets. The pellets, which are cylindrical type and come in sizes measuring 6mm in diameter and 2cm in length, are then dried. The product is next accommodated in the product tanks, then weighed and packaged.

2. Source of Technology

The following company could supply the required machinery and technology.

Goodrich carbohydrates Ltd.

R-146, Model-town S.C. O. 20k,

Secctor-12 Karnol - 132001 Haryana, India

Fax: 92- 184 - 2265157

B. ENGINEERING

1. Machinery and equipment

Machinery and equipment required by the plant, including the auxiliary equipment are given in Table 5.1. The total cost of plant machinery and equipment is estimated at Birr 928,200, of which Birr 714,000 is required in foreign currency.

Table 5.1
MACHINERY AND EQUIPMENT REQUIRED BY CATTLE FEED
PRODUCING PLANT

Sr. No.	Description	Qty.
1	Tank and silos for raw and auxiliary materials	1
2	Metal screen and shaker	1
3	Mixer	1
4	Hammer Mill (crusher)	1
5	Blender	1
6	Weighing scale (5 tons)	1
7	Bagging equipment	1
8	Dust collector	1
9	Product tank	1
10	Pellet producing equipment	1
11	Tanks for oil cakes and molasses	1
12	Boiler	1
13	Other accessories, set	1

2. Land, Building and Civil Works

The total land area of the plant including the open space is 1,000 m². The built-up area required by the plant is estimated at 600 m². The total cost of civil works and construction at the rate of Birr 840 per m² is estimated at Birr 840,000. The total cost of land lease on the basis of lease value of Birr 2.5 per m² for a period of 70 years is estimated at Birr 175,000. Thus, the total land, building and civil works cost assuming that the total land lease cost will be paid in advance is estimated at Birr 1.015 million.

3. Proposed Location

Based on availability of infrastructure, utilities and market, Assosa town is proposed to be an ideal location for the envisaged plant.

VI. MANPOWER AND TRAINING REQUIREMENTS

A. MANPOWER REQUIREMENT

The manpower requirement of the plant will be 32 persons, out of which 18 will be engaged in production activities and the remaining 15 will be involved in administrative activities. Table 6.1 shows the details of manpower requirement of the plant and estimated annual labour cost including fringe benefits.

Table 6.1.
ANNUAL MANPOWER REQUIREMENT AND ESTIMATED
LABOUR COST

Sr. No.	Description	No. of persons	Monthly Salary, Birr	Annual Salary, Birr
A.	ADMINISTRATION			
1	Plant Manager	1	1,800	21,600
2	Secretary	1	700	8,400
3	Accountant	1	700	8,400
4	Personnel Officer	1	600	7,200
5	Salesperson	1	600	7,200
6	Cashier	1	500	6,000
7	Clerks	2	500	6,000
8	General Service Staff	5	800	9,600
B.	PRODUCTION			
1	Production supervisor	1	900	10,800
2	Electrical/Mechanical Engineer.	1	700	8,400
3	Skilled Workers	9	2,700	32,400
4	Unskilled Workers	8	1,280	15,360
	Sub-total	32	11,780	147,360
	Benefit (20% BS)	-	2,356	36,840
	Total cost		14,136	184,200

B. TRAINING REQUIREMENT

On-site short term training by the machinery supplier is required for the production supervisor.

The cost of such training is estimated to be about Birr 12,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the animal feed project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	2 years
Source of finance	30 % equity
	70 % loan
Tax holidays	3 years
Bank interest	10.5%
Discounted cash flow	10.5%
Repair and maintenance	5 % of the total plant and machinery
Accounts receivable	30 days
Raw material, local	60 days
Work in progress	2 days
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days

A. TOTAL INITIAL INVESTMENT COST

The total initial investment cost of the project including working capital is estimated at Birr 3.19 million, of which about 22.32% will be required in foreign currency. The major breakdown of the total initial investment cost is shown in Table 7.1.

Table 7.1
INITIAL INVESTMENT COST ('000 BIRR)

Sr. No.	Cost Items	Foreign Currency	Local Currency	Total
1	Land	-	175.00	175.00
2.	Building and Civil Work	-	840.00	840.00
3.	Plant Machinery and Equipment	714.00	214.20	928.20
4.	Office Furniture and Equipment	-	75.00	75.00
5.	Vehicle	-	175.00	175.00
6.	Pre-production Expenditure*	-	397.06	397.06
	Total Investment cost	714.00	1876.26	2590.26
7	Working Capital	-	608.95	608.95
	Grand Total	714.00	2485.21	3199.21

B. PRODUCTION COST

The annual production cost at full capacity utilization of the plant is estimated at Birr 3.89 million (see Table 7.2). The material and utility cost accounts for 90 per cent while repair and maintenance take 1.1 per cent of the production cost.

* *Pre-production expenditure include interest during construction (Birr 347.06 thousand), training (Birr 12,000), and costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

Table 7.2**ANNUAL PRODUCTION COST ('000 BIRR)**

Items	Year			
	3	4	7	10
Raw Material and Inputs	2,327.6	2,456.77	2,586.00	2,586.00
Labour direct	79.57	84.00	88.42	88.42
Utilities	801.98	846.57	891.09	891.09
Maintenance and repair	41.77	44.09	46.41	46.41
Labour overheads	33.16	35.00	36.84	36.84
Administration cost	53.05	56.00	58.94	58.94
Total Operating Costs	3,336.99	3,522.43	3,707.99	3,707.99
Depreciation	189.82	189.82	189.82	144.82
Cost of Finance	201.32	188.98	143.66	82.51
Total Production Cost	3,728.03	3,712.25	3,897.48	3,852.48

C. FINANCIAL EVALUATION**1. Profitability**

According to the projected income statement, the project will start generating profit in the first year of operation. Important ratios such as profit to total sales, net profit to equity (Return on equity) and net profit plus interest on total investment (return on total investment) show an increasing trend during the life-time of the project. The income statement and the other indicators of profitability show that the project is viable.

2. Break-even Analysis

The break-even point of the project is estimated by using income statement projection.

$$\text{Be} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable cost}} = 24 \%$$

3. Pay-Back Period

The investment cost and income statement projection are used to project the pay-back period.

The project's initial investment and working capital will be fully recovered within 6 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 20 % and the net present value at 10.5% discount rate is Birr 1.825 million.

D. ECONOMIC BENEFITS

The project can create employment for 32 persons. In addition to supply of the domestic needs, the project will generate Birr 2.45 million in terms of tax revenue. Moreover, the Regional Government can collect employment, income tax and sales tax revenue.