37. SOYA BEAN MILK

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I. SUMMARY

This profile envisages the establishment of a plant for the production of Soya Bean Milk with a capacity of 3 million per annum.

The present demand for the proposed product is estimated at 12.68 million per annum. The demand is expected to reach at 16.04 million by the year 2010.

The plant will create employment opportunities for 22 persons.

The total investment requirement is estimated at Birr 4.7 million, out of which Birr 2.1 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 12.6% and a net present value (NPV) of Birr 0.9, discounted at 8.5 %.

II. PRODUCT DESCRIPTION AND APPLICATION

Soya bean milk is a relatively stable emulsion milky liquid produced from ground soya bean with heat treatment, fine reduction and water dispersion. It is an imitation milk widely used as food for infants that are suffering from malnutrition, and for individuals afflicted with certain allergies, diabetes and other diseases associated with diet. Soya bean milk has approximately the same protein content as cow milk.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Soya bean milk is not currently produced in the county. But the county imports some varieties of milk and butter milk that are not concentrated, sweetened or unsweetened and in solid forms. However due to the aggregation of the data, it is found difficult to identify the share of imported soya bean milk. On the other hand, pasteurized cow milk is produced in Addis Ababa. According to CSA, the annual production has reached to about 90,000 H.L and is consumed mainly in Addis Ababa and its surroundings.

Soya bean milk is imitation milk widely used as food for infants that are suffering from malnutrition and for individuals affected with certain allergies, diabetes and other diseases associated with diet. Soya bean milk and cow-milk have approximately the same protein content.

Soya bean milk is one of the products whose protein value is utilized in countries where protein deficiency is common. It would substitute for cow- milk for low and medium income groups particularly in protein deficient areas where meat consumption is very low. Hence, if the product is promoted properly it would have a wide market in the country due to the above reasons. Since there is no data on the supply and demand situation, data obtained from Household Income, Consumption and Expenditure Survey conducted by CSA has been utilized for soya been milk. This is taken with the assumption that soya bean milk is a substitute for other types of milks. Milk and butter milk consumption by expenditure group is shown in Table 3.1 and 3.2, respectively.

Table 3.1
MILK CONSUMPTION BY EXPENDITURE GROUP

Expenditure Group (Birr)	Household Estimate	Consumption P.H.H. (cc)	Total Consumptions (liters)
Below 600	14,600	-	-
600 - 699	88,153	185	16308
1000 – 1399	213,078	1435	305767
1400 – 1999	593,706	7009	4161285
2000 – 2599	955,546	6948	6,639,148
2600 _ 3399	1,641,941	12.708	20,865,888
3400 _ 4199	1,731,550	16,722	28,954,979
4200 - 5399	2,141,178`	25617	54,850,557
5400 _ 6599	1,423,497	31635	33,032,328
6600 – 8999	1,430,129	41353	59,140,125
9000 – 2599	750,269	33133	33,861,891
12600 – 16199	244,782	46821	11,460,938
16200 – 19999	95,567	69147	6,608,171
20000 & over	140,615	71972	10,120,343
Total	**11,464,682**		**282,017,727**
Per capita Consumption P.H.H			**24.60**

Source: - *Income, Consumption and Expenditure Survey, CSA, 2001.*

Table 3.2
BUTTER MILK CONSUMPTION BY EXPENDITURE GROUP

Expenditure Group	Household Estimate	Consumption P.H.H (cc)	Total Consumption (liters)
Below 600	14660	255	3738
600 -999	88153	1144	100847
1000 - 1399	213078	4621	984633
1400 - 1999	593706	4622	2744109
2000 - 2599	955548	5655	5403624
2600 - 3399	1,641,949	9615	15787340
2400 - 4199	1,731,550	14631	25334308
4200 - 5399	2,141,178	17331	37108756
5400-6599	1,423,497	30781	43816661
6600- 8999	1,430,129	27318	39068264
9000 - 12599	750,269	39649	29747416
12600 - 16199	244,782	26094	6387342
16200 - 19999	95567	10461	999726
20000 & over	140615	10010	1407556
Total	**11,464,681**		**208,894,320**
Per capita Consumption P.H.H			**18.22**

Source:- *Income, Consumption and expenditure Survey, CSA, 2001.*

According to Table 3.1 and Table 3.2, the per capita consumption of milk and butter milk per household is 24.6 liters and 18.22 liters, respectively. This gives a total per capita consumption of 42.82 liters per household. Taking the present (2004) number of population in the country, i.e., 71.066 million and average household size of 4.8 persons, current consumption or demand for milk in general is estimated at 634 million liters.

Soya bean milk will be a new product to the market that requires intensive promotion. Taking this factor into consideration, soya bean milk is conservatively assumed to have a market share of only 2% during the first year of its introduction. Accordingly, the present effective demand for soya bean milk is estimated at 12.68 million liters.

2. Projected Demand

The demand for industrially processed milk from soya bean is highly influenced by urban population growth, income rise and attitude of households. Considering the above factors, demand for Soya bean milk is assumed to grow by 4% per annum. By taking the present demand as a base, the projected demand for Soya bean milk is given in Table 3.3.

Table 3.3.

PROJECTED DEMAND FOR SOYA BEAN MILK

Year	Projected Demand (Million Liters)
2004	12.68
2005	13.19
2006	13.72
2007	14.26
2008	14.83
2009	15.43
2010	16.04
2011	16.68
2012	17.35
2013	18.05
2014	18.77
2015	19.52

Table 3.3 reveals that demand for Soya bean milk will grow from 13.19 million liters in year 2005 to 16.04 million liters and 19.52 million liters by the years 2010 and 2015, respectively. Considering other new entrants, plant capacity is determined to be in the range of 3 to 4 million liters per annum.

3. Pricing and distribution

The ex-factory price of soya bean milk is fixed at Birr 1.7 per liter. The product can find its market outlet through the existing food stuffs distributing enterprises and retail shops.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

According to the market study, the demand for soya bean milk in year 2004 is 12.68 million liters, and this figure will grow to about 16 million liters by the year 2010, and to about 20 million liters by the year 2015. Considering a small scale plant, it would, then, be appropriate to establish a plant with an annual production capacity of 3 million liters. The envisaged plant will operate in a single shift of 8 hours a day, and for 300 days a year.

2. Production Programme

The plant will commence production at 75% of its rated capacity in the first year, and then will raise production to 85% and 100% in the second & third years of operation, respectively. The detailed production programme is shown on Table 3.4.

Table 3.4

PRODUCTION PROGRAMME

Year	1	2	3-10
Capacity utilization (%)	75	85	100
Production (litres)	2,250,000	2,550,000	3,000,000

IV. RAW MATERIALS AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The major raw material required for producing soya bean milk is food-grade soya bean. The estimated annual requirement of the raw material at full production capacity (i.e, 3,000,000 liters) is about 392 tonnes of food - grade soya bean.

Auxiliary materials required by the envisaged plant consist of water, sugar, salt, ingredients like sodium bicarbonate and natural or artificial flavour. Annual requirement of each of these auxiliary materials at full production capacity is given in Table 4.1.

Table 4.1

ANNUAL REQUIREMENT OF RAW AND AUXILIARY MATERIALS AND COST

Sr No.	Description	Qty.	Cost, ['000 Birr]		
			LC	FC	TC
1.	Food-grade Soya bean	392 tonnes	960.40	-	960.40
2.	Artificial flavour	107 tonnes	-	465	465
3.	Sugar	214 tonnes	1000	-	1000
4.	Salt	2.7 tonnes	3.0	-	3.0
5.	Sodium bicar bonate	1.34 tonnes	-	10.0	10.0
6.	Water (at 80^{o}C)	3750 m^3	6.0	-	6.0
7.	Detergents	759 kg	6.0	-	6.0
8.	Plastic bags (0.5 liter per bag	6 million pcs	1500.0	-	1500.0
	Grand Total		**3475.40**	**475.0**	**3950.40**

B. UTILITIES

The major utilities required by the plant are electricity, water for cleaning, steam, diesel oil, compressed air, lubricating oil and grease. The annual consumption of these utilities are shown in Table 4.2.

Table 4.2

ANNUAL REQUIREMENT OF UTILITIES AND COST

Sr. No.	Description	Qty.	Cost [Birr]
1	Electricity (kWh)	273,000	129,402
2	Water (cleaning, general purpose)	120 m^3	180
3	Steam, (3 bar pressure and flow rate of 150 kg/hr)	-	600
4	Diesel oil (liters)	18,000	54,000
5	Lubricating oil (liters)	25	400
6	Grease (kg)	6	250
	Total	**-**	**184,832**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Soya bean milk is one of the many products obtained by industrial processing of soya bean seeds. The production process involves two stage grinding, solid separation, mixing, filtration, pasteurization, storage and packing.

Clean & dry soya beans with water at 80^{o}C and sodium bicarbonate are charged into a receiver hopper. The mixture is subjected to a rapid hydration grinding process in a perforated plate grinder. The slurry coming out of the plate grinder is finely ground and homogenized in a second stage colloidal grinder. The bean hulls and other insoluble solids are discarded by centrifugation in a solid separator.

The dense slurry is pumped out of the separator into a mixing tank where it is diluted with the necessary amount of water. The milk, thus, prepared is pumped *via* in- line strainers into the pasteurizer.

The pasteurization step consists of heating the milk to 92^{o}C and holding it at this temperature for 10 minutes and then cooling it down to 4^{o}C. The pasteurized milk is finally collected into a buffer tank from which it is pumped into the packing and sealing machine.

2. Source of Technology

The technology of Soya bean milk production is available from an Italian Company called FRAU.

B. ENGINEERING

1. Machinery and Equipment

List of Machinery and equipment required for soya bean milk producing plant and estimated costs are given in Table 5.1.

Table 5.1

MACHINERY AND EQUIPMENT REQUIRMENT AND COST

Sr. No.	Description	Qty. (No.)	Cost ['000 Birr]		
			LC	FC	TC
1	Perforated plate grinder (Bean Crusher)	1	-	120	120
2	Colloidal grinder	1	-	160	160
3	Slurry pump	1	-	35	35
4	Decanter (centrifugal solids separator)	1	-	65	65
5	Screw conveyor	1	-	40	40
6	Centrifugal pump	1	-	35	35
7	Holding tank	1	20	-	20
8	Twin In-line strainer (Filter)	2	-	55	55
9	Pasteurizer with spiral holding tube	1	-	185	185
10	Product storage tank (1000 liters)	1	25	-	25
11	Buffer tank (100 litres)	1	15	-	15
12	Packer sealer machine	1	-	250	250
13	Hot water kettle (Boiler)	1	-	40	40
14	Steam generator	1	-	255	255
15	Air compressor	1	-	120	120
16	Water chiller	1	-	165	165
17	Air conditioning set for cold room	1	-	275	275
	FOB Price		**60**	**1800**	**1860**
	Freight, Insurance, Bank charge, etc.		250	-	250
	CIF landed cost		**310**	**1800**	**2110**

2. Land, Building and Civil works

Built-up area of the plant is comprised of main factory building, raw materials storage ware - house, offices and guard posts. These are considered to cover an area of about 160 m^2. Construction cost, at the rate of Birr 1000 per m^2, the cost of building is estimated at Birr 160,000. Considering land space required for building, for future expansion and open area for accommodating vehicles and gardening, the total site area is estimated to be 600 m^2. The cost of land leasing, at the lease rate of Birr 2.0 m^2 and for 70 years land holding, is estimated at Birr 84,000.

Thus, the total investment on land, building and civil works assuming that the total land lease cost will be paid in advance is estimated at Birr 244,000.

3. Proposed Location

Soya bean can be grown in different parts of the region having temperature range of 20-28^oC. The major raw material can be made available from areas that grow the cereal. Considering factors like proximity to end -users, availability of infrastructure and utilities, it is proposed that the envisaged plant be located in Assosa.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The plant requires 22 persons including technical, production and administrative staff. Table 6.1 shows the details of manpower and the corresponding annual labour cost including fringe benefits.

Table 6.1

MANPOWER REQUIREMENT AND ANNUAL LABOUR COST

Sr. No.	Description	Req. No.	Monthly Salary (Birr)	Annual Expenditure
1	General manager	1	1,800	21,600
2	Production & maintenance head	1	1,000	12,000
3	Secretary	1	600	7,200
4	Clerk	2	280	6,720
5	Cashier	1	330	5,400
6	Store keeper	1	600	7,200
7	Operators	5	500	30,000
8	Assistant operators	3	280	10,080
9	Technicians	2	500	12,008
10	General services	3	200	7,200
11	Guards	2	200	4,800
	Sub –Total	**22**	**-**	**124,180**
	Employee Benefit (25% of BS)		-	31,033
	Total	**22**	**-**	**155,225**

B. TRAINING REQUIREMENT

Training on technology of Soya bean production, maintenance of production equipment and quality control is required for a period of one month. Training programme will be part of the contractual agreement with machinery supplier. Local, component of the training cost is estimated at Birr 20,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the Soya bean milk project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 years
Source of finance	30 % equity
	70 % loan
Tax holidays	3 years
Bank interest	7.5 %
Discounted cashflow	8.5 %

Repair and maintenance	3 % of the total plant and machinery
Accounts receivable	30 days
Raw material, local	30 days
Raw materials, import	90 days
Work in progress	5 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 4.7 million, of which 41 per cent will be required in foreign currency.

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

Table 7.1

INITIAL INVESTMENT COST

Sr. No.	Cost Items	Total ('000 BIRR)
1	Land lease value	84
2.	Building and Civil Work	160
3.	Plant Machinery and Equipment	2,110
4.	Office Furniture and Equipment	65
5.	Vehicle	375
6.	Pre-production Expenditure*	277.7
7	Working Capital	1034
	Total Investment cost	**4,690.6**
	Foreign share	**40.9%**

B. PRODUCTION COST

The annual production cost at full operation capacity of the plant is estimated at Birr 4.83 million (see Table 7.2). The material and utility cost accounts for 85.6 per cent while repair and maintenance take 1.0 per cent of the production cost.

* *N.B Pre-production expenditure includes interest during construction (Birr 252.7 thousand), training (Birr 20 thousand), and (Birr 5 thousand) costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)

Item	COST	%
Raw Material and Inputs	3,950	81.8
Utilities	185	3.8
Maintenance and repair	50	1.0
Labour direct	52	1.1
Factory overheads	5	0.1
Administration Cost	10	0.2
Total Operating Costs	**4,253**	**88.0**
Depreciation	368	7.6
Cost of Finance	210	4.3
Total Production Cost	**4,831**	**100**

C. FINANCIAL EVALUATION

1. Profitability

According to the projected income statement, the project will start generating profit in the 2nd 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 lifetime 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 including cost of finance when it starts to operates at full capacity (year 3) is estimated by using income statement projection.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable cost}} = 71\%$$

3. Pay-Back Period

The investment cost and income statement projection are used to project the pay-back period. The project's initial investment 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 12.6 % and the net present value at 8.5% discount rate is Birr 0.9 million.

D. ECONOMIC BENEFITS

The project can create employment for 22 persons. In addition to supply of the domestic needs, the project will generate Birr 0.1 million per annum in terms of tax revenue when it starts to operate at full capacity. Moreover, the Regional Government can collect employment, income tax and sales tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.