

108. PROFILE ON HONEY PROCESSING

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I. SUMMARY

This profile envisages the establishment of a plant for the processing of honey with a capacity of 450 tonnes per annum.

The present demand for the proposed product is estimated at 4,340 tonnes per annum. The demand is expected to reach at 11,257 by the year 2017.

The plant will create employment opportunities for 25 persons.

The total investment requirement is estimated at about Birr 6.51 million, out of which Birr 3 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 17 % and a net present value (NPV) of Birr 2.65 million discounted at 8.5%.

II. PRODUCTION DESCRIPTION AND APPLICATION

Honey is the sweet substance produced by honey bees from the nectar of blossoms or from secretions of living parts of plants which they collect, transform and combine with specific substance, and store in honey combs in the nest.

Honey consists essentially of different sugars, predominantly glucose and fructose. Besides, honey contains protein, amino acids, enzymes, organic acids, mineral substances etc. The colour of honey varies from nearly colorless to dark brown. The flavor and aroma vary but are usually derived from its plant origin.

Honey is generally used as a nutrient food and commonly used in Ayurvedic medicine system.

In Ethiopia, honey is used almost everywhere for the preparation of the favorite national drink called Tej and also for food in the form of bread spread or as sweetener in home baking and medication.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

According to the resource potential study of SNNPR (IPS, October 2006) annual honey production in Ethiopia is estimated at about 25,000 tonnes, which is mainly derived from traditional bee hives. A significant portion of honey in Ethiopia is used for preparing the local drink "tej". Some amount of honey is also exported to various countries. Export of honey in the past seven years is presented in Table 3.1.

Table 3.1
EXPORT OF NATURAL HONEY (TON)

Year	Quantity	Value (Birr)
2000	1.5	28,083
2001	2.4	63,467
2002	3.0	78,253
2003	6.5	116,432
2004	19.2	569,712
2005	23.2	578,315
2006	140.2	3,702,705

Source:- Ethiopian Customs Authority

A glance at Table 3.1. Reveals that export of honey in the past few years has been increasing tremendously from year to year. The exported amount in year 2000 was only 1.5. tons . This has increased to 2.4. tons and 6.5. tons in the year 2001, and year 2003 respectively. Annual average increase during year 2000-2003 was more than 60%. The increase of honey export in the recent three years i.e. 2004-2006 was extremely high. Export of honey in 2004 and 2005 has reached 19.2 tons and 23.2. tons which is an increase of about 200% compared to year 2003. By the year 2006

export has reached 140.2 tone which is six fold compared to year 2005. This indicates that there is wide expert market if the necessary actions are taken.

Ethiopia also imports some amount of natural honey from overseas. Import of natural honey in the past seven years is given in Table 3.2.

Table 3.2
IMPORT OF NATURAL HONEY (TON)

Year	Quantity	Value (Birr)
2000	9.9	118,456
2001	4.2	65,614
2002	3.0	29,765
2003	3.5	48,334
2004	6.7	113,409
2005	8.4	87,576
2006	1.1	27,003

Source:- Ethiopia Customs Authority

As could be seen from Table 3.2. import of natural honey fluctuates from year to year without showing any trend. However, the yearly average import is about 5.3. tons.

The SNNPR is the most known potential area in the country in honey production. According to the Resource Potential Study of SNNPR (IPS, 2006) the SNNPR has 1,114,300 hives composed of 1,060,512 (95.2%) traditional, 50,980 (4.6%) modern or frame hive and 2,811 (0.3%) intermediate or Kenya Top Bar hives. Number of bee hives by type, zone and special woredas is given in Table 3.3.

The total annual honey yield from these hives is 7,383,925 kg or 7,384 tons. Of the total honey production the share of traditional, modern and intermediate is 71.8%, 27.6% and 0.6% respectively.

According to CSA, House Hold Income, Consumption and Expenditure survey, the per capital consumption of honey is about 60 grams. This indicaties a national consumption of about 4,200 tons. Thus, the balance is used for export and preparation of "tej".

Table 3.3**NUMBER OF BEE HIVES BY TYPE, ZONE AND SPECIAL WEREDA**

Aone/special wereda	Total area/km²	Traditional hives	Intermediate hives	Modern hives	Total hives	Hive per km²
Gurage	593.200	36,640	465	480	37,585	63
Hadiya	385.020	95,783	8	176	95,967	249
Kambata	152.360	14,079	0	53	14,132	93
Dawro	443.670	20,019	18	0	20,037	45
Silte	253.750	21,870	7	265	22,142	87
Sidama	697.210	53,428	577	12	54,017	77
Gedeo	134.700	17,007	12	258	17,277	128
Wolayita	447.130	15,439	491	212	16,142	36
Gamogofa	1,258.140	67,739	1,015	97	64,851	52
Debub Omo	2,353.500	132,594	84	9	132,687	56
Kefa	1,060.270	311,709	57	49,286	361,052	341
Sheka	213.430	108,470	54	42	108,566	509
Ben-Maji	1,996.580	85,264	5	5	85,273	43
Yem	72.450	4,963	18	69	5,050	70
Amaro	159.720	26,984	0	16	27,000	169
Alaba	85.500	10,000	0	0	10,000	117
Buriji	137.460	3,850	0	0	3,850	28
Basketo	40.750	1,500	0	0	1,500	37
Konso	235.430	14,547	0	0	14,547	62
Derashe	153.240	11,128	0	0	11,128	73
Konta	219.680	11,500	0	0	11,500	52
Region	11,093.190	1,060.513	2,811	50,980	1,114,304	

Source:-Resource potential study of SNNPR (IPS, 2006).

To estimate the current effective demand of natural honey for human consumption the export potential and the consumption estimated through per capita has been added. Tej production is excluded from the estimate since it believed not to utilize processed

honey. Based on the above assumption the current demand for processed honey is estimated below.

- For export = 140 tons
- domestic consumption = 4200 tons
- (exhaling "tej" = 4340 tons

2. Demand Projection for Processed Honey

Demand for processed honey is influenced by population growth, income, and the export potential. Population is growing at a rate of 3% and GDP during year 2004/05 has increased by 8.9%. The growth of export in the past seven years was substantial i.e. about 150% per year. Considering the above factor, demand for pressed honey in the domestic and export market is assumed to grow by 10% per annum see (Table 3.4.)

Table 3.4
PROJECTED DEMAND FOR PROCESSED HONEY (TON)

Year	Quantity
2008	4,774
2009	5,251
2010	5,777
2011	6,354
2012	6,990
2013	7,688
2014	8,457
2015	9,303
2016	10,233
2017	11,257

The demand projection shows that a number of plants can be established in various parts of SNNPR.

3. Pricing and Distribution

The price of honey varies according to its colour, purity and season. However, for the purpose of this project the unit price of exported honey in 2006 is considered. Accordingly Birr 26,448/ton is recommended.

Distribution for honey is recommended to use existing super markets,(food staff retailers) for local market. Honey can be exported to various countries using known agents.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

According to the market study, the demand of honey in the year 2008 will be 4,774 tones, whereas this demand will grow to 11,257Tones by the year 2017. Taking only about 8% of the demand of the year 2008, the envisaged plant will have an annual production capacity of 450 tones of honey will be installed. Production capacity is based on a schedule of 300 working days per annum and three shifts of eight hours per day.

2. Production Programme

The project is assumed to start operation at 83% of its rated capacity, which reaches 91% of the rated capacity in the second year. Full capacity production will be attained in the third year and thereafter.

IV. MATERIALS AND INPUTS

A. MATERIALS

The direct and indirect material required by the project at 100% capacity utilization is given in Table 4.1.

Table 4.1
RAW MATERIALS AND INPUTS REQUIREMENT

No.	Description	Unit of Measure	Qty	Cost ('000 Birr)		
				F.C	L.C	Total
1	Crude honey	kg	500,000	-	7,000	7,000
2	Sanitary chemicals	kg	46,800	379.08	42.12	421.20
3	Filter aids	pc	390	-	390.00	390.00
4	Glass jars	pc	780,000	-	390.00	390.00
5	Plastic containers	pc	975	-	195.00	195.00
6	Drums for bulk honey	pc	975	-	146.02	146.02
7	Lids	pc	975	-	97.50	97.50
8	Cartons	pc	39,000	-	117.00	117.00
9	Glue	lumpsum		-	39.00	39.00
10	Labels	pc	390,000	-	3.90	3.90
11	Other Chemicals	kg	lumpsum	-	50.00	50.00
	Total			379.08	8,471.00	8,850.08

B. UTILITIES

Electric power and water are the two basic utilities required by the plant. When the plant operates at full capacity, it will require 100,140 kWh of electric power and 250000 lts. Furnace oil. Likewise, the plant is expected to consume 2,000 m³ of water per annum.

Annual estimated cost of utilities at full capacity operation of the plant is given in Table 4.2.

Table 4.2
ESTIMATED ANNUAL UTILITY COST

No.	Description	Unit of Measure	Annual Consumption	Cost ('000 Birr)		
				F.C	L.C	Total
1	Electric power	kWh	100,140	-	47.426.	47.426
2	Water	m ³	2,000	-	20	20
3	Furnace oil	lt	250,000	-	1352.5	1352.5
	Total				1372.5	1372.5

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Honey contains pollen, dust and air bubbles, which tend to include granulation (crystallization). Heating the honey to 45 C⁰ to dissolve the crystals present in honey can retard the granulation. Filtration then removes part of pollen, foreign particles and wax .

To prevent fermentation and to destroy yeasts, honey is heated to a temperature of 65 C⁰-70 C⁰ for specified time. Proper temperature and control and heating time is a most important factor in honey processing activity. Excessive heating increases the quality of Hydroxy- Meyhyl- furfal(HMF) which is desirable. High temperature also affects the color and flavor of honey. Honey is then cooled before it is packed to keep it for a longer period without contamination and granulation. The process of honey is divided in to three steps.

- A. Filtration to remove wax, foreign particles after heating honey to 45 C⁰. It may be noted that heating up to 45 C⁰ (below the melting point of bees wax) is required to decrease the viscosity of honey.
- B. Honey is then heated to 60 C⁰-65 C⁰ for 10 to 15 min and passed in to a falling film evaporator. Vacuum is simultaneously applied to boil the water in honey at a lower temperature so that moisture is separated which can be collected separately. This procedure also helps in destroying yeasts.
- C. Cooling the honey to atmospheric temperature and storing in closed vessel for 24-48 hrs. is the next step. Storing honey for period of 24-28 hrs. is necessary to allow air bubbles to go out . Honey is then packed and sealed immediately.

2. Source of Technology

The honey processing technology can be acquired from American, Asian or European firms. The address of one such firm is given below

BAVISHI EXPORTS

Tel: 91-22-6797 5536

Fax: 91-22-2578 5139

Cell phone: 98202 38792 mumbai, India

B. ENGINEERING

1. Machinery and Equipment

The machinery and equipment required by the project will be procured from foreign sources. The total cost of machinery and equipment is estimated to be Birr 3,000,000 of which Birr 2,200,000 is in foreign currency. The plant needs vehicles (one pick-up) for transportation of finished product and for office activities. The total cost of the vehicles is estimated at Birr 320,000.

The plant machinery and equipment required by the plant are listed down in Table 5.1.

Table 5.1**LIST OF MACHINERY AND EQUIPMENT**

No.	Description
1	Liquifier
2	Filter press
3	Falling film Evaporator
4	Vacuum pump
	Storage/settling tank
	Water circulation pump
	Pre heating tank
	Processing tank
	Cooling tank/condenser
	Moisture condensing tank
	Honey circulation SS gear pump
	Insulation (Optional)
	Control panel, Level indicators, pressure gauges, temperature gauges, SS pipes and fittings.
5	Packing machines
6	Labeling machine
7	Working tables
	Total

2. Building and Civil Works

The plant requires a total of 600 m² area of land out of which 300 m² is built-up area which includes Processing area, raw material stock area, offices etc. Assuming construction rate of Birr 2500 per m², the total cost of construction is estimated to be Birr 750,000. The total cost, for a period of 80 years with cost of Birr 1 per m², is estimated at Birr 600. The total investment cost for land, building and civil works is estimated at Birr 750,600.

3. Proposed Location

According to the resource potential study of the region, the raw material is identified in Amaro S/ woreda , Kemba , Bonke woredas. Based on the availability of raw material infrastructure, utility and market out let Kemba town of Kemba woreda is selected and recommended to be the location of the envisaged plant

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The proposed project will require 25 employees of whom 10 are direct production workers and 15 are administrative workers. The annual labour cost of the project is estimated to be Birr 157,680. The list of labour together with the corresponding salary cost is presented in Table 6.1.

Table 6.1
MANPOWER REQUIREMENT ANNUAL SALARY

No.	Position	No. of persons	Salary (Birr)	
			Monthly	Annual
1	Plant manager	1	1,200	14,400
2	Personnel	1	700	8,400
3	Commercial manager	1	1,000	12,000
4	Secretary	1	600	7,200
5	Purchaser	2	400	9,600
6	Sales man	1	400	4,800
7	Accountant	1	600	7,200
8	Accounting clerks	2	400	9,600
9	Shift leader	1	700	8,400
10	Operators-mechanics	3	400	19,200
11	Production workers	4	420	18,000
12	Guards	6	150	5,400
13	Drive	3	300	7,200
	Sub Total	2	10,950	131,400
	Workers benefit (20% of Basic salary)	25	2,190	26,280
	Grand total	-	13,140	157,680

B. TRAINING REQUIREMENT

Four operators and shift leader should be given four weeks training on production technology, machine operation and maintenance. On-the-job training on the operation of machines is required by an expert from the supplier of the machinery equipment during the erection and trial-run, production period. The total cost of training is estimated at about Birr 50,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the honey processing 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 % loan
Tax holidays	5 years
Bank interest	8%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	15 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 investment cost of the project including working capital is estimated at Birr 6.51 million, of which 36 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 Cost (‘000 Birr)
1	Land lease value	48.0
2	Building and Civil Work	750.0
3	Plant Machinery and Equipment	3,000.0
4	Office Furniture and Equipment	100.0
5	Vehicle	250.0
6	Pre-production Expenditure*	390.9
7	Working Capital	1,973.1
	Total Investment cost	6,512.0
	Foreign Share	36

* *N.B Pre-production expenditure includes interest during construction (Birr 240.92 thousand) training (Birr 50 thousand) and Birr 100 thousand costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 11.13 million (see Table 7.2). The material and utility cost accounts for 91.81 per cent, while repair and maintenance take 1.02 per cent of the production cost.

Table 7.2**ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

Items	Cost	%
Raw Material and Inputs	8,850.08	79.49
Utilities	1372.5	12.33
Maintenance and repair	113.65	1.02
Labour direct	78.84	0.71
Factory overheads	26.28	0.24
Administration Costs	52.56	0.47
Total Operating Costs	10,493.91	94.25
Depreciation	429.9	3.86
Cost of Finance	210.43	1.89
Total Production Cost	11,134.24	100

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 including cost of finance when it starts to operate at full capacity (year 3) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 52 \%$$

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 17 % and the net present value at 8.5% discount rate is Birr 2.65 million.

D. ECONOMIC BENEFITS

The project can create employment for 25 persons. In addition to supply of the domestic needs, the project will generate Birr 1.8 million in terms of tax revenue.