MUSHROOM PROCESSING

1.0 INTRODUCTION

Mushroom is a nutritious vegetarian delicacy and has many varieties. It contains many vitamins and minerals but is low on sugar and fat. It can be grown in artificially created and controlled environment. It can be ideally grown in hilly areas or in in artificially controlled sheds in plains. Fresh mushrooms can be readily sold in market or processed and dried. There are two main varieties of mushroom Button type or the oysters' variety. Oyster mushrooms are easy to cultivate and do not require huge investment. Fresh mushroom have very limited shelf life, but processed and dried mushrooms if properly packed can be stored over a long period.

This project profile on Mushroom Processing is for production of processed and canned mushroom with installed processing capacity of 500 kg of fresh mushroom/ day. Considering 150 working days per annum due to seasonal cultivation of mushroom, the unit will have processing capacity of 75 tonnes per annum. The yield of finished product depend on different factors like quality of dryer, moisture content in fresh mushroom, etc. It is assumed that recovery of finished product from fresh mushroom is at 25% and the finished product will be packaged in 1/2 kg capacity tin cans. Based on these assumptions, the unit will have production capacity of 37,500 nos of canned mushroom per annum.

While it is advisable to grow captive mushroom for processing, this project profile has not considered the cost of cultivating mushroom. Instead, the cost of fresh mushroom has been assumed at market rates.

2.0 PROCESS DETAILS

2.1 Process of Cultivation

Three aspects are to be taken care of for a successful cultivation of mushroom. These are good compost, reliable spawn and right temperature during growing period. Natural compost is prepared from horse dung and wheat or barley straw. Some quantity of chicken manure may be added. Compost preparation is very crucial. Mushrooms are grown in wooden trays or boxes. These are filled with compost and pressed firmly, leaving a small space on top. The spawn is scattered on the surface and covered with a thin layer of compost. The trays are then covered with old newspaper and water is sprayed to provide humidity. The trays are then stacked vertically. At a temperature 24-25°C, white cottony mycelium spreads and permeates through the compost. It takes around 12 to 15 days for the complete spawn running. Ultimately, the surface of the compost is covered with half to one inch level of casing soil. It is sterilized to kill insects. The casing soil is spread over plastic sheet and treated with formalin and stirred frequently for a week to remove formation of fumes. After casing, the temperature has to be maintained at 24-25°C for three days after which, it must be lowered to 18°C. Thus, batches of trays must be arranged in such a way that there is regular daily production.

2.2 Mushroom Processing

Fresh mushrooms have very limited life hence processing is recommended to enhance the shelf life. Initially, mushrooms are washed in cold water then blanched in boiling water for 3-4 minutes. They are then dehydrated in drier and packed. It is advisable to pre treat mushroom in brine solution to prevent discoloration. Packing is very crucial as formation of moisture contaminates mushroom very quickly. The yield depends on many factors as moisture content in fresh mushroom, type of drier , process employed, moisture content require in the finished product etc. Average yield is 25%. Plain cans and brine of 2% salt and 0.2% citric acid are used for packing. The cans are vacuumed before sealing at 19°C for 7-8 minutes, sealed and processed under pressure for 20-25 minutes.

3.0 MARKET POTENTIAL

Mushroom is a vegetarian delicacy and is a suitable substitute for meat or eggs. It is easily digestible. It is very popular in most of the developed countries and is being accepted in many developing countries. Market for mushroom is growing rapidly because of its rich nutritional value and special taste aroma, flavour etc. Many exotic preparations are made from them like soup, pickles, etc. It can also be cooked in traditional way as standard vegetable. It is used as stuffing for various food preparations and for garnishing.

Mushrooms have very short life after being harvested and are sold in fresh form. Their shelf life is enhanced if processed and packed properly. This can then be stored and transported for selling in far off markets.

Mushrooms are very popular item in most of the star hotels and in urban households. Thus, there is a good market for the processed mushroom. Processed and preserved mushrooms will ensure the availability through out the year. The major limitation with the bulk of green vegetables is that they are grown in a limited period lasting only for 3-4 months and thus their availability is restricted to this period. Properly preserved and canned mushrooms also helps in exporting the product to other countries.

4.0 COST OF THE PROJECT

The estimated project cost is given below.

Particulars	Amount (Rs lacs)
Land & Site Development	-
Building & Civil Works	4.57
Machinery & Equipment	2.63
Misc. Fixed Assets	1.15
Preliminary & Pre-operative Expenses	0.58
Contingencies & Escalation @ 3%	0.25
Working Capital	0.93
TOTAL	10.11

4.1 Land & Site Development: No cost has been considered for land & site development. It is assumed that the project will be set up in existing land.

4.2 Building & Civil Works: Details of building & civil works are given below.

Particulars	Area (Sqm)	Rate (Rs)	Amount (Rs)
Work shed (Half brick wall, CGI sheet roof, Concrete Floor)	80	3500	280000
Store Room (Brick wall, CGI sheet roof, Concrete Floor)	30	4500	135000
		Sub total	415000
Add: Electrification, etc @ 10%			41500
		TOTAL	456500
		Say (Rs. in lacs)	4.57

4.3 Machinery & Equipment: Details of machinery & equipment are given below.

Particulars	Qty	Rate (Rs)	Amount (Rs)
Baby Boiler	1	60000	60000
Tray-type Dehydrator	1	70000	70000
Can Seamer	1	20000	20000
Can Reforming with Rollers, Flanger, etc	1	25000	25000
Exhaust Box with motor	1	15000	15000
Steam Jacketted Kettle	1	30000	30000
Miscellaneous items	LS	LS	10000
		Sub total	230000
Add: Installation, transportation, etc @ 10%			23000
		TOTAL	263000
		Say (Rs. in lacs)	2.63

4.4 Misc. Fixed Assets: Details of miscellaneous fixed assets are given below.

Particulars	Qty	Rate (Rs)	Amount (Rs)
Water supply system (STW boring, 3 HP motor, storage, pipes & fittings)	1	100000	100000
Furniture & Fixtures	LS	LS	10000
Miscellaneous items	LS	LS	5000
		TOTAL	115000
		Say (Rs. in lacs)	1.15

4.5 Preliminary & Pre-operative Expenses: Details of preliminary & pre-operative expenses are given below.

Particulars	Amount (Rs lacs)
Travelling expenses	0.20
Professional & other fees	0.20
Interest during implementation	0.13
Miscellaneous expenses	0.05
TOTAL	58

4.6 Contingencies & Escalation: Contingencies & escalation has been assumed at 3% of the cost of building & civil works, machinery & equipment and misc. fixed assets.

4.7 Working capital: Details of working capital are given below.

Particulars	Period (Days)	Amount (Rs lacs)		
		Year 1	Year 2	Year 3
Raw Materials & Consumables	30	0.71	0.83	0.95
Power	30	0.02	0.03	0.03
Salary	30	0.20	0.20	0.20
Total		0.93	1.06	1.18
Working Capital Margin in Year 1 (100%)		0.93		

5.0 MEANS OF FINANCE

The means of finance for the project is estimated as below.

Particulars	Percent	Amount (Rs lacs)
EQUITY		
A. Equity from Promoters	40%	4.05
B. Subsidy from Central/State Govt.	-	
DEBT		
Term Loan from Banks/FIs	60%	6.07
TOTAL	100%	10.11

6.0 PROFITABILITY STATEMENT

(Rs. in lacs)

Particulars	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
A. INCOME					
Production at installed capacity (Nos)	37500	37500	37500	37500	37500
Capacity utilisation	60%	70%	80%	80%	80%
Production at capacity utilisation	22500	26250	30000	30000	30000
Price of canned mushroom (Rs/can)	60	60	60	60	60
Income per annum	13.50	15.75	18.00	18.00	18.00
B. OPERATING EXPENSES					
Raw Materials & Consumables	8.66	10.11	11.55	11.55	11.55
Power	0.28	0.33	0.38	0.38	0.38
Salary	2.42	2.43	2.44	2.46	2.47
Repair & Maintenance	0.12	0.13	0.14	0.15	0.17
Selling expenses	0.14	0.16	0.18	0.18	0.18
Miscellaneous Expenses	0.07	0.08	0.09	0.09	0.09
Total Operating Expenses	11.68	13.23	14.78	14.81	14.83
Less: Working expenses capitalised	0.93	0.00	0.00	0.00	0.00
Operating profit	2.75	2.52	3.22	3.19	3.17
C. FINANCIAL EXPENSES					
Depreciation	0.36	0.36	0.36	0.36	0.36
Interest on Term Loan	0.48	0.40	0.29	0.18	0.06
Net Profit	1.90	1.75	2.57	2.65	2.74
Net cash accruals	2.27	2.11	2.93	3.02	3.10
Principal Repayment	0.36	1.43	1.43	1.43	1.43

6.1 Production Capacity: Total Nos. of canned mushroom per annum at 100% capacity utilisation is estimated as below.

Rated capacity of machinery (kg/day of mushroom)	500
No. of days/annum (Seasonal Production)	150
Total quantity per annum (kg)	75000
Recovery rate of processed mushroom (%)	25%
Total quantity of finished mushroom (kg)	18750
Capacity of packing cans (kg)	0.50
Total nos. of canned mushroom per annum at installed capacity	37500

6.2 Raw Materials & Consumables: Expenses on raw materials & consumables at installed capacity is estimated as below.

Particulars	Unit	Quantity	Rate (Rs)	Amount (Rs)
Fresh mushrooms	kg	75000	16	1200000
Cans	Nos	37500	3	112500
			Sub total	1312500
Add: consumables like salt, citric acid, cartons, etc @ 10%				131250
Total expenses on raw materials & consumables @ 100% capacity				1443750

6.3 Power: Expenses on power at installed capacity is estimated as below.

Particulars	Power (Kw)	hrs/day	kwh
Connected load (30 HP)	22.38	4	89.52
		Total power requirement/ day (Kw)	89.52

Days/annum	150
Rate per unit (Rs)	3.50
Expenses on power per annum at 100% capacity (Rs)	46998

6.4 Salary: Expenses on salary in the 1st year is estimated as given below. It is assumed that salary expenses will increase @ 0.5% every subsequent year.

Particulars of Employees	Numbers	Salary/Month (Rs)	Cost/annum (Rs)
Technicians/skilled workers	2	5000	120000
Salesman	2	3000	72000
Helpers	4	2500	50000
Expenses on salary in the 1st year (Rs)			242000

6.5 Repair & Maintenance: Expenses on repair & maintenance in the 1st year is estimated as given below. It is assumed that expenses on repair & maintenance will increase @ 10% every subsequent year.

Particulars	Cost (Rs)	Rate	Amount (Rs lacs)
Building & Civil Works	4.57	1%	0.05
Machinery & Equipment	2.63	2%	0.05
Misc. Fixed Assets	1.15	2%	0.02
Expenses on repair & maintenance in year 1			0.12

6.6 Selling Expenses: Selling expenses have been assumed at 1% of income

6.7 Miscellaneous Expenses: Miscellaneous expenses have been assumed at 0.5% of income.

6.8 Depreciation: Depreciation has been calculated by straight line method. The details of calculation are given below.

Description	Cost (Rs)	Rate	Amount/annum (Rs lacs)
Building & Civil Works	4.57	3.34%	0.15
Machinery & Equipment	2.63	5.28%	0.14
Misc. Fixed Assets	1.15	6.33%	0.07
TOTAL			0.36

6.9 Interest on Term Loan & Principal Repayment: Interest rate has been assumed at 8%. Duration of Loan repayment has been considered for a period of 5 years including moratorium period of 1 year with equal monthly instalments. The details of calculation are given below.

(Rs in lacs)

	Year	1	2	3	4	5
Month 1	Opening balance	6.07	5.71	4.28	2.86	1.43
	Repayment	0.00	0.12	0.12	0.12	0.12
	Interest (8%)	0.04	0.04	0.03	0.02	0.01
	Closing balance	6.07	5.59	4.16	2.74	1.31
Month 2	Opening balance	6.07	5.59	4.16	2.74	1.31
	Repayment	0.00	0.12	0.12	0.12	0.12
	Interest	0.04	0.04	0.03	0.02	0.01
	Closing balance	6.07	5.47	4.05	2.62	1.19
Month 3	Opening balance	6.07	5.47	4.05	2.62	1.19
	Repayment	0.00	0.12	0.12	0.12	0.12
	Interest	0.04	0.04	0.03	0.02	0.01
	Closing balance	6.07	5.35	3.93	2.50	1.07
Month 4	Opening balance	6.07	5.35	3.93	2.50	1.07
	Repayment	0.00	0.12	0.12	0.12	0.12
	Interest	0.04	0.04	0.03	0.02	0.01
	Closing balance	6.07	5.24	3.81	2.38	0.95
Month 5	Opening balance	6.07	5.24	3.81	2.38	0.95
	Repayment	0.00	0.12	0.12	0.12	0.12
	Interest	0.04	0.03	0.03	0.02	0.01
	Closing balance	6.07	5.12	3.69	2.26	0.83
Month 6	Opening balance	6.07	5.12	3.69	2.26	0.83

	Repayment	0.00	0.12	0.12	0.12	0.12
	Interest	0.04	0.03	0.02	0.02	0.01
	Closing balance	6.07	5.00	3.57	2.14	0.71
Month 7	Opening balance	6.07	5.00	3.57	2.14	0.71
	Repayment	0.00	0.12	0.12	0.12	0.12
	Interest	0.04	0.03	0.02	0.01	0.00
	Closing balance	6.07	4.88	3.45	2.02	0.59
Month 8	Opening balance	6.07	4.88	3.45	2.02	0.59
	Repayment	0.00	0.12	0.12	0.12	0.12
	Interest	0.04	0.03	0.02	0.01	0.00
	Closing balance	6.07	4.76	3.33	1.90	0.48
Month 9	Opening balance	6.07	4.76	3.33	1.90	0.48
	Repayment	0.00	0.12	0.12	0.12	0.12
	Interest	0.04	0.03	0.02	0.01	0.00
	Closing balance	6.07	4.64	3.21	1.78	0.36
Month 10	Opening balance	6.07	4.64	3.21	1.78	0.36
	Repayment	0.12	0.12	0.12	0.12	0.12
	Interest	0.04	0.03	0.02	0.01	0.00
	Closing balance	5.95	4.52	3.09	1.67	0.24
Month 11	Opening balance	5.95	4.52	3.09	1.67	0.24
	Repayment	0.12	0.12	0.12	0.12	0.12
	Interest	0.04	0.03	0.02	0.01	0.00
	Closing balance	5.83	4.40	2.97	1.55	0.12
Month 12	Opening balance	5.83	4.40	2.97	1.55	0.12
	Repayment	0.12	0.12	0.12	0.12	0.12
	Interest	0.04	0.03	0.02	0.01	0.00
	Closing balance	5.71	4.28	2.86	1.43	0.00
Principal Repayment		0.36	1.43	1.43	1.43	1.43
Interest		0.48	0.40	0.29	0.18	0.06

7.0 DEBT SERVICE COVERAGE RATIO (DSCR)

(Rs. in lacs)

Year	1	2	3	4	5	TOTAL
Profit After Tax (Net Profit)	1.90	1.75	2.57	2.65	2.74	
Depreciation	0.36	0.36	0.36	0.36	0.36	
Interest	0.48	0.40	0.29	0.18	0.06	
Total	2.75	2.52	3.22	3.19	3.17	14.85
Interest	0.48	0.40	0.29	0.18	0.06	
Loan repayment	0.36	1.43	1.43	1.43	1.43	
Total	0.84	1.83	1.72	1.60	1.49	7.48
DSCR	3.28	1.37	1.87	1.99	2.13	

Average DSCR = 1.98

8.0 BREAK EVEN POINT (BEP)

(Rs. in lacs)

Year	1	2	3
A. Net sales	13.50	15.75	18.00
B. Variable cost			
Raw Materials & Consumables	8.66	10.11	11.55
Power	0.28	0.33	0.38
Selling expenses	0.14	0.16	0.18
Miscellaneous expenses	0.07	0.08	0.09
Total variable cost	9.15	10.67	12.20
C. Contribution (A-B)	4.35	5.08	5.80
D. Fixed & Semi-fixed Costs			
Salary	2.42	2.43	2.44
Repair & maintenance	0.12	0.13	0.14
Interest on Term Loan	0.48	0.40	0.29
Depreciation	0.36	0.36	0.36
Total fixed cost	3.38	3.33	3.24
E. BREAK EVEN POINT	77.71%	65.53%	55.80%
F. BEP at operating capacity	46.63%	45.87%	44.64%
G. Cash BEP	41.61%	40.85%	39.62%

9.0 INTERNAL RATE OF RETURN (IRR)

(Rs. in lacs)

Year	0	1	2	3	4	5
CASH OUTFLOW						
Capital Expenditure	8.35	0.00	0.00	0.00	0.00	0.00
Working Capital	0.00	0.93	0.12	0.12	0.00	0.00
Total (A)	8.35	0.93	0.12	0.12	0.00	0.00
CASH INFLOW						
Profit After Tax		1.90	1.75	2.57	2.65	2.74
Add: Depreciation		0.36	0.36	0.36	0.36	0.36
Add: Interest		0.48	0.40	0.29	0.18	0.06
Add: Salvage Value						
Total (B)	0.00	2.75	2.52	3.22	3.19	3.17
NET FLOW (B-A)	-8.35	1.82	2.40	3.10	3.19	3.17

IRR = 17%

MACHINERY SUPPLIERS

(a) Shiva Engineers
Patel Avenue, Plot No.165, Flat No.1, Right Bhusari Colony, Nr. Kothrud Bus Depot, Paud Road, Pune - 411038, Maharashtra, India

(b) Jwala Engineering Company
A-21, Laghu Udyog Kendra, I. B. Patel Road, Goregaon East, Mumbai -400063, Maharashtra, India

(c) Veenu Hitech
F-6, Ist Floor, St. Soldier Tower, PVR Complex, Vikas Puri, New Delhi - 110 018 (Delhi) India