

## MUTTON AND LAMB PROCESSING

### Introduction

India's total meat production is estimated at 5.8 million tones. Buffalo in India contributes about 30% of total meat production. The contribution by cattle, sheep, goats and poultry is 30%, 5%, 10%, 10.2% and 11.5%, respectively. Livestock sector plays a critical role in the welfare of India's rural population. It contributes nine percent to Gross Domestic Product and employs eight percent of the labour force. This sector is emerging as an important growth leverage of the Indian economy. In recent years, livestock output has grown at a rate of about 5 percent a year, higher than the growth in agricultural sector.

### Objective

The primary objective of the model report is to facilitate the entrepreneurs in understanding the importance of setting up unit of mutton and lamb processing. This model report will serve as guidance to the entrepreneurs on starting up such a new project and basic technical knowledge for setting up such a facility.

### Raw Material Availability

MP has a total livestock population of 16704 lakhs. Total meat production in the state in 2005-06 is 19300 MT. The state is first in India in number of indigenous cattle population with 11.9% share out of the total. Also it is seventh in the goat population (8142 lakhs with share of 6.55%) in the country.

### Market Opportunities

The per capita consumption of meat in India is comparatively low (0.9kg/per capita/annum), when compared to countries like Australia, New Zealand etc. The main reason for lower per capita availability of meat in our country is increase in human population with higher rates as compared to almost stagnant rate of production in meat. In spite of 5.3 per cent increase in production during the last decade, apparently very low growth in change in per capita availability has been observed. However, the lower per capita consumption gives a tremendous opportunity for India to promote meat in domestic market.

Goat and sheep meat forms about 4.9 per cent in quantity and about 9.7 per cent in value terms of the total meat exports. The export of mutton from India is primarily done in three forms:

- Chilled / Frozen Carcasses
- Frozen Boneless( pieces/cubes)
- Frozen With Bone ( Pieces/ Cubes)

Two types of processing techniques are adopted for export purpose i.e. Fresh/ Chilled and frozen. The major export from India is primarily in the lamb and sheep meat category and the per cent age shared out of total export, by various forms is as follows:

<b>Category</b>	<b>Export Qty( MT)</b>	<b>% Share</b>
Carcasses of Lamb(Chilled fresh)	669.90	13.47
Meat of Sheep With bone(Chilled fresh)	591.24	11.89
Boneless meat of Sheep (Chilled fresh)	674.60	13.56
Carcasses of Lamb (frozen)	2.25	0.05
Carcasses of Sheep (frozen)	717.63	14.43
Meat of Sheep With bone ( Frozen)	529.57	10.65
Boneless meat of Sheep (frozen)	333.186	6.70
Meat of Goats(Chilled fresh)	130.22	2.62
Carcasses of Sheep (chilled fresh)	1324.97	26.64
<b>Total</b>	<b>4973.60</b>	<b>100.00</b>

It is clear from the above, table that fresh/ chilled meat is the chief form of exporting shares major part of export, hence reveals its popularity. Out of the total export of 4973 MT, 68 per cent of the meat is exported in chilled/ fresh form and only 32 per cent meat export is done in frozen. In addition to it, the export of sheep meat in Carcasses or pieces is the main form of export (97 per cent), with goat meat's share is only 3 per cent.

### **Project description**

#### **Manufacturing process**

The technology for mutton processing in India is mix and match of Indigenous as well as imported machinery, however is mainly decided by two factors, viz

- Basic mechanism involving only slaughtering of animal and selling mutton either in fresh or chilled form. All the operations in this mechanism are done manually with simple tools like knives, bleeding table, which are available in the country. To facilitate storage of carcass for 24 hours duration, chillers are required which are available in India.
- For supplying processed meat to market in the form of frozen meat (carcass, cuts, and cubes) and value added products such as sausages, salami, slices and kabab, high tech machinery is required , which is being imported in India in the present scenario. The well equipped processing systems comprising Chain conveyors, shackles, processing conveyors, railings, stairs, foot guards, sanitary chain conveyors, head and offal discharging devices are imported in the country.
- For value added products machinery is available indigenously as well as imported, however for freezing the carcass, the technology is available in India only.

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## **Plant and Machinery**

The mutton processing plants set up in India have primarily being set up using mix and match of imported machinery and local machinery. Only critical parts are imported, rests are fabricated indigenously and other requirements such as utilities are available in the country only.

## **Process**

The various stages of mutton processing right from animal arrival up to final slaughtering, chilling and dispatch consists of following steps of series.

### **Arrival and Inspection**

Before taking the animals to slaughter house, Anti mortem inspection of animals is done to check the diseased and unhealthy animal from slaughtering. The animals are inspected from various angles such as presence of all body parts, normal salivation and digestive system. After inspections animals become ready for stunning.

### **Stunning**

The modern mechanical method of stunning is by shooting, consisting of two forms:

- Use of a captive bolt pistol which delivers a force (concussion) into the head of the animal to make it unconscious;
- Use of a penetrating free-bullet gun or firearm. Compression stunners with or without penetrating heads, using air (not cartridges) are also employed in immobilizing animal.

Older method in which a knocking or striking hammer was wielded on the head of the animal is now disallowed in humane practices in some countries, but in extreme and needy cases the hammer can be used to stun small ruminants by a quick blow at the back of the neck.

### **Shackling and Bleeding**

Stunned animal are than positioned for shackling. A vertical or hanging position is achieved by shackling below the hock of one hind leg and hoisting the animal (head down) to a convenient height. Alternatively, animals are placed horizontally on a concrete slab or a sturdy plastic pallet for bleeding.

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### **Skinning and Dehiding**

- **Legging:** In removing the skin, initial cutting of the skin is done around the leg to expose and loosen the tendon of the hock and using as a means of hanging the carcass.
- **Pelting:** A second step called pelting involves the removal of the entire skin and preparation of the animal body for evisceration.
- **Hoist Skinning:** With the animal body in the hoist position, using the skinning knife, legging is commenced at the back of the free (unsuspended) leg by removing the skin around the hock and working toward the toes.
- **Horizontal Skinning:** The animal is placed on its back on a flat raised surface, on a concrete slab. Cutting and flensing then begin at the forelegs, working toward the belly and sides of the animal, ending at the hind legs. The tendon between the hock and the toes is exposed and loosened.

### **Evisceration**

With the external structures like skin, feet and head removed, the next step is to cut open the animal body to dislodge the contents and produce the carcass.

### **Postmortem Inspection**

Each carcass is identified with its set of organs for inspection. Inspection is normally carried out by professional veterinarians but in some parts of the world trained public health inspectors are employed. Their duty is to examine the slaughter products for evidence of disease and abnormality and eliminate them from the public meat supply.

### **Packing**

Generally carcasses are wrapped under the cotton and then either packed with shell ice in crates or sent to blast freezer. After freezing the product is stored in cold chain. Refrigerated trucks are used to transport both frozen and chilled mutton upto consumption point.

### **Processed Mutton in India**

There are about 3600 slaughterhouses in the country primarily being meat processing houses administered by local authorities like district municipal corporations, municipal committees etc. Besides this, 9 modern abattoirs and 200 meat processing units licensed under Meat Products Order are also functioning in the country. In addition, a large proportion of meat production is slaughtered in houses or small-unlicensed establishments.

A large number of slaughter houses in the country have poor facilities, thus not maintaining proper hygienic and sanitary requirements. It is, hence, necessary to either improve/modernize existing slaughter houses or construct new ones to assist in providing safe and wholesome meat, gainfully utilize animal by-products, and prevent environmental pollution and cruelty to animals.

It is estimated by the Ministry of Food Processing that about 3 per cent of meat is processed out of which only 1% is converted into value added products like sausages, ham becon, luncheon meat, kababs, meat balls etc. However, this could be an under-estimate since a very large proportion of meat processing takes place in unregistered cottage industry meat processing units and in very small establishments which cater solely for local needs.

The mutton processing industry is still in a nascent stage of growth. Presently 96% of the production is sold as fresh mutton. Only 3% is processed and sold as frozen or other value added products.

### **Products and packaging**

For distant markets the products could be blast frozen. In order to remain out of tax-net and price competitive the manually clipped poly packs can be used. For cut portions and value added products plastic trays can be used.

### **Pricing**

For chilled carcass the company would be competing with unorganized sector therefore pricing would need to be very competitive. Margins can be realized on cut portions and value added products. Since there is a seasonal and regional variation in the price of mutton products, flexibility may be needed in pricing. The long-term survival of the project would be only by replacing the unorganized sector, which can operate on low margins therefore for initial years the unit should resort to aggressive pricing.

### **Technical Aspects**

In this section the technical aspects related to project such as plant and machinery, process flows, building design considerations and configuration, quality control systems have been discussed.

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## Other required Utilities

### Refrigeration

#### ❖ Chilled and Frozen Meat

In the abattoir, the carcasses are immediately chilled down to the recommended chilled meat temperature of 0° to 4°C by a rapid chilling process using advanced refrigeration technology. The chilling temperature is maintained throughout the subsequent processing, handling, transport, storage, distribution and retail.

Chilled meat keeps its freshness for 3 to 5 days in display chiller or home refrigerator. It is convenient to use and can be cut into specific portions to the exact requirements of the user.

❖ **Frozen** meat is similarly processed from freshly slaughtered animals. The meat, which is in peak condition and freshness, is preserved by rapid freezing to colder than -18° and is then stored and distributed in this frozen form.

### Raw Water

Filtration and chlorination treat raw water or other means depending on initial quality, to reduce bacterial count and are pumped into the overhead tank. From here the water flows down to the water chilling plant, the process plant and other off-sites wash areas as well as all domestic water lines.

### Hot Water

Hot water is required for heating and sterilization for cleaning purpose.

### Compressed Air

The compressed air is at 8 bar and needs to be dried by a refrigeration drier. Alternatively it is possible to use a two columns silica gel system in which compressed air is constantly dried by one column while the other is in the process of regeneration.

### Vacuum

Vacuum is required for suction of lungs from carcasses using lung-sucking pistols.

**Project component and cost**

<b>PARTICULARS</b>	<b>Unit</b>	<b>Qty</b>	<b>Cost/unit</b>	<b>Total</b>
<b>LAND &amp; BUILDING</b>				<b>680.41</b>
Land	SqM	12,600	250.00	31.50
<b>Land Development</b>				
Land Area		12,600	1,500.00	189.00
<b>Building</b>				
Animal Shed	SqM	5,060	5,000.00	253.00
Slaughter Room	SqM	648	5,000.00	32.40
Chilling Room	SqM	340	5,000.00	17.00
Deep Freezer room	SqM	490	5,000.00	24.50
Store	SqM	88	5,000.00	4.40
Air Blast	SqM	180	5,000.00	9.00
Laboratory	SqM	56	5,000.00	2.80
Misc area	SqM	1,300	5,000.00	65.00
Administrative block	SqM	200	5,000.00	10.00
Contingencies		10%		41.81
<b>PLANT &amp; MACHINERY</b>				<b>633.60</b>
PLANT & MACHINERY	LS	1	57,600,000	576.00
Contingencies		10%		57.60
<b>MISCELLANEOUS FIXED ASSETS</b>				<b>38.50</b>
Misc Assets	LS	1	3,500,000	35.00
Contingencies		10%		3.50
<b>PRE-OPERATIVE EXPENSES</b>				<b>101.54</b>
Establishment		1	1,680,000	16.80
Preoperative Interest		1	5,754,000	57.54
Security Deposits		1	2,720,000	27.20
<b>TOTAL</b>				<b>1,454.05</b>

The cost of the various components will depend on the location of the project. Item wise assumptions are as under:

**Plant and Machinery**

Cost of equipment is based on the estimates and quotation received. Following facilities/ equipment are proposed:

❖ **Imported**

The imported equipment will consist of well equipped processing systems comprising Chain conveyors, shackles, processing conveyors, railings, stairs, foot guards, sanitary chain conveyors, head and offal discharging devices that will require for supplying processed meat to market in the form of frozen meat (carcass, cuts, and cubes) and value added products such as sausages, salami, slices and kabab, It is proposed to Import complete processing line.

### ❖ Indigenous

The indigenous equipment consists mainly of:

- Chilling Room ( 10m X 10m)
- Deep freezer cold room and Air blast
- Packing Machine
- Effluent treatment plant
- 1 no. 500 kg/hr Boiler form Thermax at a cost of
- 300mc/hr cooling tower
- Water system

Thus, the total cost of indigenous equipment amounts to RS 633.60 lacs.

### Building

The building will cost around Rs. 459.91 lakhs.

### Miscellaneous Assets

A provision of Rs. 38.50 lakhs would take care of all the requirements.

### Preliminary & Pre-operative Expenses

A provision of Rs. 101.54 lakhs take care of pre-production expenses like establishment, professional charges, security deposits etc.

### Working Capital Assessment

ITEMS	Year 1	Year 3	Year 5
PROCUREMENT & PACKING MATERIAL	22.20	37.00	37.00
SUNDRY DEBTORS	299.25	498.75	498.75
<b>TOTAL</b>	<b>321.45</b>	<b>535.75</b>	<b>535.75</b>
<b>MARGIN</b>	80.36	133.94	133.94
<b>MPBF</b>	241.09	401.81	401.81
<b>INTEREST ON WC</b>	28.93	48.22	48.22

### Means of Finance

<b>EQUITY CAPITAL</b>			46.74%	<b>717.21</b>
<b>CENTRAL SUBSIDY</b>	25%	50.00	3.26%	<b>50.00</b>
<b>TERM LOAN</b>				
FINANANCIAL INSTITUTIONS		10.00%	50.00%	<b>767.21</b>
<i>-Payable half yearly Installments</i>	12	63.90		
<b>TOTAL</b>			100%	<b>1,534.41</b>

### Profitability

Particulars	Year 1	Year 3	Year 5	Year 7
<b>INCOME</b>	2,137.50	3,847.50	3,847.50	3,847.50
<b>EXPENDITURE</b>	2,159.52	3,374.67	3,375.36	3,372.17
<b>VARIABLE</b>	1,436.59	2,560.25	2,555.38	2,550.51
<b>FIXED</b>	722.93	814.41	819.98	821.66
<b>GROSS PROFIT</b>	(22.02)	472.83	472.14	475.33
<b>PROFIT BEFORE TAX</b>	(293.37)	137.31	158.43	183.43
<b>RETAINED PROFIT</b>	(293.37)	137.31	158.43	183.43
<b>NET CASH ACCURAL</b>	(202.45)	228.22	249.35	274.35

### Cash flow statement

PARTICULARS	Year 1	Year 3	Year 5	Year 7
<b>SOURCES OF FUNDS</b>				
EQUITY CAPITAL	-	-	-	-
SUBSIDY				
NET PROFIT	119.97	327.58	316.08	309.29
(INTEREST ADDED BACK)				
DEPRECIATION	87.19	87.19	87.19	87.19
PRELIMINARY EXP.W/O	14.51	14.51	14.51	14.51
INCREASE IN TERM LOAN	-	-	-	-
INCREASE IN BANK BORROWINGS-WC	241.09	80.36	-	-
<b>TOTAL</b>	<b>462.75</b>	<b>509.64</b>	<b>417.77</b>	<b>410.99</b>

### Projected balance sheet

PARTICULARS	Year 1	Year 3	Year 5	Year 7
<b>LIABILITIES</b>				
EQUITY CAPITAL	717.21	717.21	717.21	717.21
RESERVES & SURPLUS	64.32	402.16	870.67	1,377.05
TERM LOAN	703.31	447.71	192.11	(0.00)
BANK BORROWINGS-WC	<b>241.09</b>	<b>401.81</b>	<b>401.81</b>	401.81
<b>TOTAL</b>	<b>1,725.92</b>	<b>1,968.88</b>	<b>2,181.79</b>	<b>2,496.06</b>

### Profitability

Particulars	Year 1	Year 3	Year 5	Year 7
<b>INCOME</b>	1,795.50	2,992.50	2,992.50	2,992.50
<b>EXPENDITURE</b>	1,573.83	2,563.23	2,574.73	2,581.51
<b>VARIABLE</b>	1,271.78	2,090.51	2,090.51	2,090.51
<b>FIXED</b>	302.05	472.71	484.22	491.00
<b>GROSS PROFIT</b>	221.67	429.27	417.77	410.99
<b>PROFIT BEFORE TAX</b>	14.32	225.01	239.06	257.84
<b>RETAINED PROFIT</b>	14.32	225.01	239.06	257.84

### Key Indicators

NET PRESENT VALUE at current Inflation (Rs. in lakhs)	<b>1,713.26</b>
INTERNAL RATE OF RETURN %	<b>20.05</b>
AVERAGE DSCR	<b>1.89</b>
BREAK EVEN POINT %	<b>71.41</b>
PAY BACK PERIOD ( YEARS)	<b>5.46</b>

### Manpower Requirement

PARTICULARS	NO.
<b>SUPERVISORY STAFF</b>	
ASTT MGR-QUALITY	1
SHIFT SUPERVISOR	2
MAINT SUPERVISOR	1
REF. ENGINEER/SUPERVISOR	1
<b>ADMINISTRATIVE STAFF</b>	
MANAGER- ADMIN & MARKETING	1
MANAGER- MARKETING & EXPORTS	1
ADMN ACCOUNTS & MKTG STAFF	5
<b>WORKERS</b>	
SKILLED WORKERS	8
UNSKILLED WORKERS	8
HELPERS	12

### Assumptions

<b>Project &amp; Financing</b>			
Contingencies on Building			10%
Contingencies on Equipment			10%
Term Loan			50%
Rate of Interest on Term Loan			10%
Subsidy Considered	Subject to ceiling		25%
Expected time of Installation		Months	10
Moratorium		Months	6
<b>CAPACITY</b>			
Rated Capacity Per Annum	80% of Installed capacity	TPA	2520
Number of Operational Days	DAYS		360
Working Hours Per day	Hrs		14
<b>CAPACITY UTILIZATION</b>			
Year I			60%
Year II			80%
Year III			100%
<b>SALES PRICE</b>			
W S Price			
Export			115000
Domestic			120000
<b>OTHER EXPENSE</b>			
Commission			10.0%
Marketing Expenses			2.5%
<b>POWER</b>			
Connected Load	HP		500
<b>DEPRICIATION AS PER COMPANY'S ACT</b>			
BUILDING			3.34%
PLANT & MACHINERY			10.34%
MISC. FIXED ASSETS			7.07%
LAND & SITE DEVELOPMENT			1.63%
<b>MAINTENANCE</b>			
BUILDING			1.00%
PLANT & MACHINERY			3.00%
MISC. FIXED ASSETS			2.00%
LAND & SITE DEVELOPMENT			1.00%

### Source of Technology

The companies that are well known internationally for supplying mutton processing machinery are:

- Norman Groupe Breteche industry, [info@norman-sa.fr](mailto:info@norman-sa.fr), <http://www.norman-sa.com>
- TAESA GROUPO industrial, National Ctra. 1 km 161 09400 Aranda de Duero Towns I telephone +34 947 51 06 24, fax +34 947 50 82 82
- MACPRO abt, PO Box 226 7 Devon Rd, Hamilton, NZ New Zealand,  
Phone: 64.7.847.7060, Fax: 64.7.847.7047,  
Tollfree: E-mail: [office@macpro.co.nz](mailto:office@macpro.co.nz), Website: [www.macproabt.com](http://www.macproabt.com)
- Couedic Madore equipment COUEDIC MADORE EQUIPEMENT - ZAE du Ridor-BP 2 –  
22210 PLEMET-France, Tél : +33 (0)2 96 66 30 30 –  
Fax : +33 (0)2 96 66 30 60 Email : [infos@couedic-madore.com](mailto:infos@couedic-madore.com)

**The actual cost of projects may deviate on change of any of the assumptions.**