



Feasibility Analysis of Tray Dried Meat Production in India

KEYWORDS

meat drying; India; economics; value addition; tray drying

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ABSTRACT

The economic analysis of dried meat production in India was studied on large scale processing unit. Comparison was also made among the different dried meat products for estimating the value addition in dried meat production. The data on input use and output yields were used to work out Comparative economics for dried chunks, dried powder and value added products produced by drying, powdering, and cooking. High capital investment (Rs.72.38 lakhs) has been found in value added products than drying (Rs.61.49 lakhs) indicating capital intensive nature of further processing. Cost of production per kg was found to be highest (Rs.757.59/kg) for value added products. Cost of further processing over drying worked out to be Rs.6.9 and 90.49 /kg for powder and value added products respectively. Value-addition was highest for value added products (99.54/kg) compared to dried powder (7.19/kg). The results showed economic potential and worthiness of dried meat products with higher profits in further processed products with potential application in defence services to provide variety of meat products with long shelf life.

INTRODUCTION

India is the largest producer of meat with 5.94 million tons in the year 2012-13(www. dahd.nic.in). Out of which only 2% of production is processed (APEDA 2008) and the remaining is consumed as fresh. Out of this further processed meat products share is negligible and most of these products are refrigerated products with limited shelf life. To increase the shelf life of the processed meat products dried meat technology has been developed by the researchers and has been evaluated for its technical worthiness.

Dried meat technology is a type of technology that makes the meat available round the year. But its high cost limits its application/its reach. Drying is a mass transfer process consisting of the removal of water or another solvent by evaporation from a solid, semi sold, or liquid(www. en.wikipedia.org). Dried meat products are made by rubbing with salt, spice mix and other ingredients(NRCM, 2009). Final product characteristics such as water sorption, porosity, color, and texture depend on drying methods used (Ekechukwu, 1999) . Several methods have been used in drying process like Solar drying and machine drying. Drying of foods including meat by sun drying is practiced from ancient times in India. With the development of science, modern methods have been developed for machine drying of foods. Tray drying is one such technology. Tray drying is frequently used in food industry (www.ncbi.nlm.nih.gov). The tray dryer is widely used in a variety of applications because of its simple design and capability to dry products at high volume

(www.ncbi.nlm.nih.gov).

Various tray drying methods such as Use of techniques such as tray dryers, fluid bed dryers, vacuum freeze dryers etc has resulted in better product quality than that of open sun drying (Mujumdar 2008; Chen 2008; Jangam 201). Tray drying is a method of drying the products in the trays after rubbing with salt and spices under controlled temperatures. Dried meat technology is not much spread in India. Research at the various institutes like National Research Centre on Meat has well documented worthiness of tray

drying over sun drying in terms of physical , eating qualities and sensory qualities(NRCM, 2009).

Further it is established by researchers that variety of dried products like dried meat chunks, dried meat powder and value added dried meat products can be developed by tray drying from different processes like powdering, cooking which have been proved to be helpful in improving eating qualities and consumers acceptability and thus posing superiority over dried chunks(NRCM, 2009).But worthiness of further processes has not been quantified/proved in terms of quantum of value addition, economic benefits and feasibility of investment of processing units for production of dried products by different processing methods.

Further processing gives value addition to the dried products compared to dried chunks and brings profits to the producers. But at the same time it adds additional costs on account of additional steps involved in further processing compared to dried chunks. These additional costs and benefits have to be quantified in order to assess the value addition and economic worthiness of integrating drying process with powdering or both powdering and cooking to judge the superiority of further processing. Keeping in view importance of economic evaluation of technologies, the present study has been taken to evaluate the economics of dried meat products and also value addition in further processing in comparison to dried process.

Hence an attempt has been made in this paper to evaluate the comparative profitability of different processing methods for dried meat products.

METHODOLOGY

For the purpose of estimating economics and value addition, comparison was made among three types of dried chicken meat products prepared by three different processes on large scale unit. These products include dried meat chunks, dried powder and value added products produced by tray drying method.

These processes can also be categorized into with and without further processing . Main focus of the study is

comparison of "further processing" with dried chunks i.e without further processing. Comparisons were made on uniform size of plant with 400kg /day(large) of processing capacity

In without case fresh meat chunks was dried in tray dryers and are called dried chunks. In "with further process" dried chunks are subjected to further processing either through only powdering or both powdering followed by cooking processes . Here fresh meat chunks were dried and powdered or dried, powdered and cooked(fried) i.e one additional step is involved in dried powder and two additional steps are involved in preparation of value added products. With inclusion of one more steps to dried powder value added products will be prepared. Comparison was made between dried chunks, dried powder and value added products with regard to costs, returns and feasibility to estimate the value addition and evaluate the superiority of further processing of dried meat products.

For achieving the objectives of the study the required Primary data pertaining to input use , output yield were collected to compute cost of processing, production and to work out selling price. Data on project cost, cash flows were used to find out the viability of investment. Secondary data was used for outlining baseline assumptions.

Various economic measures were used for evaluating the economics of value addition of enrobing process. Financial efficiency measures like liquidity ratios, profitability ratios and investment ratios were employed for analysing financial viability of processing plant. Financial feasibility of investment was examined by using the regular project evaluation techniques like Net Present Value (NPV), Internal Rate of Returns(IRR), Benefit –Cost Ratio(B-C ratio), Payback Period etc.

Production process of dried products: flow chart of preparation of dried products is presented in Annexure-1. The figure presents steps in production of value added products. For dried powder cooking process is skipped and for chunks both cooking and powdering process are ignored.

RESULTS AND DISCUSSION

Table 1 presents the product yield and annual output at full capacity and raw material processed per day for all the dried products produced by three different processes on large scale unit.

1.Capacity of processing plant

1.1. Installed Capacity

Capacity of the 400kg/day is considered for large units for all types of products such as dried meat chunks, powder and value added products. Product yield of 45% is taken for dried meat chunks and powder after considering drying loss of 55%. For value added products, Product yield of 40.5% is considered considering drying loss and cooking los. Considering 300 working days in a year and yield of the products, the unit has an installed capacity of 54000 kg of dried meat chunks and dried meat powder 48600 kg of Value added products per year Product yield and Production at full capacity for three products for large unit will be as presented in table 1.

1.2.Capacity utilization

The plant is assumed to start production at 60% of its installed capacity in the first year and increase its production by 10% every year i.e70%,80% in the second, third years and levelling off to 80% from 3rd year onwards

respectively(table2). The results for costs and prices presented in the following section corresponds to 60% capacity utilization in first year.

Table 1: Annual output of dried meat products under different processes

S.No	Product	Product yield (%)	Days	Per day Capacity (kg)	Annual output @100% capacity (Kg/yr)
1	Tray dried meat chunks	45%	300	400	54000
2	Tray dried meat powder	45%	300	400	54000
3	Value added products from tray dried meat	40.5%	300	400	48600

Table 2: Annual Capacity /capacity utilization for processing plant

Product/ year	1	2	3	4	5	6	7	8
Tray dried meat chunks	32400	37800	43200	43200	43200	43200	43200	43200
Tray dried meat powder	32400	37800	43200	43200	43200	43200	43200	43200
Value added products from tray dried meat	29160	34020	38880	38880	38880	38880	38880	38880

2. Project set up costs/Capital Investment /Infrastructure required

Minimum of Rs. 61.49 lakhs is required for setting up of large scale dried meat products unit(Table3) with maximum range of Rs.72.38 lakhs. This cost varies with processing.

For only dried meat chunks production Rs. 61.49 lakhs is required. But if it is subjected to further processing to make dried powder it requires an initial cost of Rs.61.86lakhs where as Rs.72.38 lakhs is required if value added products are produced.

For Investment pattern among the products/processes showed that value added products need highest investment reflecting capital intensive nature of business as more no of machinery, buildings are required to further process the dried meat chunks to value added products as it involves two more processes of powdering and cooking compared to meat chunks. It is also higher than dried powder as one more step/process(cooking) is introduced along with it.

Per unit investment also shows similar trend as that of total investment where it increases along with further processing. It increases from Rs.113.9 for chunks to Rs.148.9 for value added products. value added products showed high-

er investment per kg of product. This can be attributed to lower yields due to cooking losses compared to dried meat chunks or dried powder which increases per unit cost. Though capacity and yield is same between chunks and powder difference in per unit investment was observed. This can be attributed to highest total investment of dried powder compared to meat chunks. These results are same across units.

It can be concluded from the investment pattern that both total and per unit investment shows positive relation processing. The differences in capital requirements for the production of the same quantity of products by different processes i.e for production dried products on same scale of unit by different processes comes (i.e chunks and powder) result from capital expenditure on equipment and processing building required for additional operations in further processes like powdering etc. Apart from additional expenditure on equipment and processing lower yield also contributes for highest investment (both total and per unit) for value added products. In case of variable costs difference comes from additional expenditure on labour, and low yield of cuts. Share of different items to total investment showed that machinery and equipment was the major item of cost contributing to 36.64% followed by Build-

ings(23.16%) and Working capital (16.04%) respectively on large units for meat chunks. Among the processes share of the cost items differs. For some items it increases and for some items it decreases. Share of all the items decreases along with processing except working capital where it increases from Rs. 16.04 to 24 lakhs for processing of dried chunks to value added products.

3.Working capital requirement

Working capital requirement(table 4) for Dried meat products was estimated to be Rs.29.11, 29.31 and 53.67 lakhs which translates into per unit working capital of Rs.53.9, 54.27 and 110.43 /kg for dried meat chunks, powder and value added products respectively.

Table 4: Working capital requirement for dried meat products

Product/process	Working capital	
	Total (Rs.lakhs)	Per kg(Rs)
Tray dried meat chunks	29.11	53.9
Tray dried meat powder	29.31	54.27
Value added products from tray dried meat	53.67	110.43

Table 3: Project cost of processing plant for different processes (Rs.lakhs&Rs)

S.No	Description	Tray dried meat chunks	%	Tray dried meat powder	%	Value added products from tray dried meat	%
1	Land and Fencing	3.75	6.10	3.75	6.06	3.75	5.18
2	Building	14.24	23.16	14.24	23.02	15.44	21.33
3	Machinery and Equipment(M&E)	22.53	36.64	22.53	36.42	24.03	33.20
4	Miscellaneous Assets	2.25	3.66	2.25	3.64	2.40	3.32
5	Escalation &Contingencies	4.28	6.96	4.28	6.92	4.56	6.30
6	Preliminary&Preoperative Expenses	4.58	7.45	4.76	7.69	4.83	6.67
7	Working Capital Margin	9.86	16.04	10.04	16.23	17.37	24.00
	Total cost(Rs.lakhs)	61.49	100.00	61.86	100.00	72.38	100.00
	Per unit cost(Rs/kg)	113.9		114.6		148.9	

4.Economics

4.1. Production costs

The information regarding annual and per unit estimates of costs (in the first year) in preparation of dried products has been depicted in Tables 5. Annual costs are presented in Rs. lakhs and per unit cost in Rs.

Results of table 5 indicate the annual expenditure large unit for the production of dried products @ 60% of capacity in first year. It showed that an annual expenditure of Rs. 216.14, 218.32 and 220.91 lakhs is required on small unit for processing dried chunks, dried powder and value added products respectively in the first year.

Per unit expenditure (table 5) comes to Rs.667.1/kg per kg of dried chunks. The cost increases with further processing. If dried chunks were processed into powder, Per unit cost for dried powder comes to Rs. 673.8 and further processing of powder to value added products gives per unit expenditure of Rs. 757.6 per kg.

Expenditure pattern showed that it increases along with processing. Among the cost items raw material showed

highest annual expenditure of Rs. 174.24 lakhs with share of 80.6%, 79.8%, 78.9% for dried chunks, dried powder and value added products respectively. Raw material cost is same across products.

Table 5: Expenditure pattern under different processes (Rs.lakhs & Rs, %)

Description/Year	Dried meat chunks			Dried meat powder			Value added products		
	An.l	Per kg	%	An.l	Per kg	%	An.l	Per kg	%
Raw Material	174.2	537.8	80.6	174.2	537.8	79.8	174.2	597.5	78.9
Stores& package	8.64	26.7	4.0	8.64	26.7	4.0	8.64	29.6	3.9
Power	1.26	3.9	0.6	1.26	3.9	0.6	1.62	5.6	0.7
Utilities	1.34	4.1	0.6	1.34	4.1	0.6	1.34	4.6	0.6
Wages and Salary	7.63	23.5	3.5	9.79	30.2	4.5	9.79	33.6	4.4
Repairs and maintenance	1.34	4.1	0.6	1.34	4.1	0.6	1.34	4.6	0.6
Rent, Taxes& Insurance	1.74	5.4	0.8	1.74	5.4	0.8	1.74	6.0	0.8
Admin expenses	6.19	19.1	2.9	6.19	19.1	2.8	6.19	21.2	2.8

Selling expenses	2.59	8.0	1.2	2.59	8.0	1.2	2.59	8.9	1.2
Interest on term loan	2.85	8.8	1.3	2.87	8.9	1.3	3.34	11.5	1.5
Interest on WC	1.44	4.4	0.7	1.44	4.4	0.7	2.72	9.3	1.2
Depreciation	6.77	20.9	3.1	6.77	20.9	3.1	7.25	24.9	3.3
P&P Amortization	0.09	0.3	0.0	0.10	0.3	0.0	0.10	0.3	0.0
Total	216.14	667.1	100	218.32	673.8	100	220.91	757.6	100

An.l – annual Rs.lakhs, Per kg-Rs

Unlike the total annual expenditure where raw material costs was same for all products for a comparative plant size , per unit Raw material cost per kg for value added products was more than chunks and powder. Raw material cost per kg increases form 537.8 for dried chunks to 597.5 for value added products.

This highest raw material cost of value added products in spite of same total expenditure for all products for a processing unit can be attributed to the lower yields due to cooking losses in further processing that spreads higher annual costs to lower output resulting in higher costs. It is clear from the table that both annual and per unit expenditure goes on increasing with processing.

Further comparison of shares among the processes/ products shows that Raw material cost accounts for major share of 80.6% for dried chunks and this share varies with processing. It's share decreases to 78.9% for processing of chunks to value added products. This decrease of raw material share along with processing was due to increased share of other items like labour (from 3.5% to 4.4%) and depreciation (from 3.1% to 3.3%) along with further processing which again can be attributed to increased requirement of labour and machinery, buildings for further processing.

It can be concluded that Share of Raw material shows opposite trends with labour and depreciation. While share of Raw material decreases with processing, share of labour and depreciation increases with processing. The opposite trends of raw material and depreciation shows that increased requirement of labour and machinery, buildings for further processing.

4.2.Cost and price structure

Variable costs

It is clear from variable costs reported in table6 that on an average per unit variable costs comes to Rs.596.71, 600 and 672.33 /kg for dried chunks, dried powder and value added products respectively. It varies with type of product/process. It varies from Rs. 596.71/kg for dried chunks to Rs.672.33/kg for value added products. Differences in variable costs can be attributed to the additional labour required for additional processes and lower yields due to cooking in further processed products.

Among the variable costs raw material cost accounts for major share of 90.13% for dried chunks. Further comparison of products shows that raw material share is higher for dried chunks. (90.13%) than other products(89.63%, 88.87%)

Fixed costs

fixed costs also shows similar results as that of variable costs. comparison among the processes shows that Fixed costs increases from Rs.70.38 to 85.25/kg with the share increasing from 10.55% to 11.25% of for processing of

chunks to value added products. It can be concluded that both variable and fixed cost increases with further processing. Among the fixed costs depreciation was the major item of costs accounting for 29.7%, 28.24%, 29.21% of fixed costs for dried chunks, powder and value added products respectively.

Differences (increase) in variable costs can be attributed to the additional labour required for additional processes and lower yields due to cooking losses in further processed products . Differences in fixed costs can be attributed to lower yields coupled with higher depreciation and interest costs arising from the additional machinery and buildings required for additional processes in further processed products which results in spreading the fixed costs among the lesser units of the product

Total costs/cost of production: In accordance with variable and fixed costs, Total cost structure(Table6) indicated that among different processes value added products incurs more costs(Rs.757.59/kg) compared to other processes(Rs.667.1, 674/kg). This high cost was due to higher both variable and fixed costs associated with lower yields of processing compared to other types of processing. Both annual and per unit total costs showed positive relation with the processing.

From table 6 it is evident that variable and fixed costs accounted for 89.45% and 10.55% of total cost of production for dried meat chunks . Further it is evident that the share of variable costs goes on decreasing along with processing (from 89.45% to 88.75%) while the fixed cost goes on increase(10.55% to 11.25%). This showed that more no of machinery and building is required for further processing of dried chunks to value added products due to inclusion of additional processes.

4.3.Revenue structure

Table6 presents the estimated selling prices for dried products in three different processes at 10% markup

At 10% markup selling prices were estimated as Rs.733.81, 741,833.35/kg for dried chunks, powder and value added products respectively. Similar to costs prices also increases with processing. Similar to costs selling price also shows highest estimates for value added products compared to dried chunks.

4.4. Cost of further processing and value addition

Cost of further processing

Additional fixed costs: Due to additional cost involved in further processing variable cost increases for dried powder, value added products compared to dried chunks. On an average drying of fresh meat to chunks increases variable cost by Rs. 356.71 /kg over fresh meat. Powdering process involves additional variable cost of Rs. 360/kg over fresh meat and Rs.3.29 over dried chunks. This additional variable cost of processing was estimated as Rs. 432.33/kg(table 7) for value added products over fresh meat, 75.62 over meat chunks and Rs.72.33 /kg over dried powder.

Table6:Cost and prices of products under different processing methods (Rs/kg,%)

S.No	Product	Variable cost	%	Fixed cost	%	Total cost	Markup price	Selling price
1.	Tray dried meat chunks	596.71	89.45	70.38	10.55	667.1	66.7	733.81

2.	Tray dried meat powder	600	89.02	74	10.98	674	67	741
3.	Value added products from tray dried meat	672.33	88.75	85.25	11.25	757.59	75.75	833.35

Additional fixed costs: similar to variable costs, fixed costs also shows increasing trend along with processing. Processing of dried chunks to powder involves additional fixed costs of Rs. 3.62/kg. further processing of powder to value added products involves additional fixed costs of Rs. 11.25 over dried powder and this increases was Rs. 14.87 over dried chunks. Additional fixed costs over fresh meat were not considered as fresh meat involves only variable cost and hence only variable cost was taken.

Additional total costs: additional variable and fixed costs in processing of dried products were reflected in terms of Additional total costs. On an average, Production of dried chunks incurs Additional total costs of Rs. 427.1/kg over fresh meat. Similarly further processing of chunks to powder incurs costs of Rs. 434/kg over fresh meat and Rs. 6.9/kg over chunks. These additional costs for processing of value added products were estimated as Rs. 517.59, 90.49, 83.59/kg over fresh meat, over dried chunks and over powder respectively.

Further comparison among the processes/ products shows that of these additional costs (variable, fixed and total costs) goes on increasing with processing. For example , additional variable costs over fresh meat increases from Rs. 356.71(chunks) to 360/kg for powder to 432.33/kg for value added products. Additional cost over chunks increases from Rs. 3.29 (powder)to 75.62/kg(value added products). Similarly fixed costs increases from 3.62 to 14.87. Total additional costs over fresh meat increases from Rs. 427.1 to 517.59/kg and total additional costs over chunks 6.9 to 90.49/kg.

It is evident from cost of processing that on an average processing of dried products incurs additional variable and total cost of Rs.383.01 and 459.56/kg over fresh meat.

Value addition/ premium

Similar to cost of production prices also show differences among the processes. Due to additional cost involved in further processing the cost and subsequent selling price increases for dried powder and value added products compared to dried meat chunks. Similar to additional costs, further processing of dried meat chunks also adds additional prices which is called value addition or premium for further processing.

Due to drying of meat chunks value addition reflected in terms of premium was estimated as Rs. 493.81/kg. Powdering process adds additional premium of Rs.501/kg over fresh meat and Rs.7.19 over dried chunks(table7). For value added products additional premium over fresh meat, chunks, powder were estimated as Rs. 593.35, 99.54, 92.35/kg. on an average value addition in dried products was estimated as. Rs. 529.39/kg over fresh meat. Similar to additional costs value addition also goes on increasing with processing and highest being in value added products. It can be concluded from the analysis that Further processing of dried meat products not only adds costs but also prices called premiums through value addition

Table7: Cost of further processing and Value addition under different processing methods (Rs/kg)

S.No	Product	Tray dried meat chunks	Tray dried meat powder			Value added products from tray dried meat		
		Over fresh meat	Over fresh meat	Over meat chunks	Over fresh meat	Over meat chunks	Over powder	
Cost of further processing	Variable cost	356.71	360.00	3.29	432.33	75.62	72.33	
	Fixed cost			3.62		14.87	11.25	
	Total cost	427.10	434.00	6.90	517.59	90.49	83.59	
Premium		493.81	501.00	7.19	593.35	99.54	92.35	

5. Investment analysis

Investment analysis was carried out to evaluate comparative feasibility of investment in cured products using discounted cashflows, Ratio analysis, Feasibility measures etc. results of feasibility analysis are discussed below

5.1. Ratio Analysis

On the basis of the projected cashflow statement different financial ratios were calculated and shown in table8.

Profitability ratios(Table8) indicate that value added products shows highest values of Profitability ratios with Gross profit margin of 19.49% and Operating Profit margin of 13.17%, profit margin of 10.27% and net profit margin of 9.16%.

Liquidity ratios like Debt Service Coverage Ratio (DSCR), Debt Equity Ratio, Debt to capital Turn over were found to be kept at an acceptable levels of 4.8, 1.15& 28.85 for value added products respectively. These ratios shows that the processing plant is able to meet its obligations on long term liabilities.

Investment ratios were found to be highest for cured cuts and shows that on an average meat plant is able to generate enough returns of 46.45%, 185.69% returns on total investment and equity respectively.

Table 8:Ratio analysis for dried products under different processing methods

Financial feasibility Ratio	Dried chunks	Tray dried meat powder	Value added products from tray dried meat
Profitability ratios			
Grossprofitmargin(%)	18.78	18.74	19.49
Operating Profit margin (%)	12.41	12.42	13.17
Profit margin %	10.58	10.60	10.27
Net Profit margin (%)	9.41	9.42	9.16
Investment ratios			
Return on Total investment(%)	46.42	46.27	39.23
Return on Equity(%)	185.69	185.07	156.91
Investment turnover ratio	2.22	2.23	2.63
Liquidity ratios			
Debt Equity Ratio	1.16	1.16	1.15
Debt to Capital Turn over	28.98	28.97	28.85
Debt Service Coverage Ratio	5.52		4.80
Operating ratio	87.59	87.58	86.83

Regarding processes, both return on investment and equity shows increasing trend with return on investment increasing from 35.42% to 43.97% and Return on equity increasing from 141.67% to 175.89% for processing of chunks to value added products. To sum up, the financial viability indicators revealed that production of dried meat products by different processes of on large scale unit was financially viable. Overall, the processing methods under study showed satisfactory performance on account of liquidity, profitability, investment for all products.

5.2. Economic feasibility

In the present study, economic feasibility of the dried products under different processes and on different size groups of processing units was analysed using discounted measures such as NPV, BCR, IRR and Pay Back period. The investment appraisal was prepared on the basis of the planned initial investment and expected cash flows for a 8year period discounted at bank rate of 12%.

Table 9: Economic Feasibility measures for different processing methods

S.No	Feasibility measures	Dried chunks	Tray dried meat powder	Value added products from tray dried meat
1	NPV (Rs. Lakhs)	98.00	98.87	87.70
2	IRR(%)	94%	48%	72%
3	BC	2.59	2.60	2.21
4	Average Returns (undiscounted)	32.51	32.76	32.64
5	Pay Back Period (Yrs)	1.89	1.88	2.21
6	Average Returns (Discounted)	12.25	12.36	10.96

An IRR of 94% is indicated for the drying method and a net present value (NPV) of Rs.98 lakhs over a 8-year period, discounting at a 12% discount rate (Table 9). Initial investment will be achieved in 1.89 years with average returns of Rs. 32.51 lakhs per year and BCR of 2.59. .

Dried powder production generates average NPV of Rs. 98.87 lakhs with IRR of 48% and BCR of 2.6. pay back period was estimated as 1.88 years with average returns of Rs. 32.76 lakhs per year. For value added products these values were estimated as 87.7 lakhs, 72%, 2.21, 2.21 and 32.64 lakhs respectively.

Except IRR and payback period all the measures were in favour of dried meat powder. Lower values of discounting measures for value added products can be attributed to lower yields coupled with higher investment costs. The profitability of value added products can be increased by through the premiums by increasing the markup percent to increase the prices.

5.3. Break Even Analysis

Breakeven analysis was employed to estimate the level of production required to recover the fixed capital used on processing units. This concept is very important in the business as it indicates minimum amount of business necessary for operating business without loss.

For large units BEP of output is 16634.56, 16934, 15439.63 kgs which comes at 51.34%, 52.27% ,52.95% of utilized capacity and 30.8%, 31.36% ,31.77% of full capacity of dried chunks, powder and value added products re-

spectively in the first year.

Table 10 shows that minimum quantity of 16634.56, 16934, 15439.63 kgs per year should be produced in case of dried chunks, powder and value added products so as to continue production process without sustaining losses. The remaining output (45.94%, 43.29%, 41.09%) is considered as margin of safety where profits starts generating.

Comparison across years: Further it is observed that BEP is achieved in 32.85% and 26.28% of utilized and full capacity in the eighth year resulting increased margin of safety of 67.15% compared to first year (only 45.94%) for dried meat chunks. For dried meat powder BEP increases decreases from 52.27% to 34.27% and for value added products it decreases from 52.95% to 33.61%.

It can be concluded from break even analysis that irrespective of product/process time to achieve BEP goes on decreasing in successive years indicating increased margin of safety and profits in successive years. Attainment of BEP at lesser time at higher levels of capacity utilization in the successive years indicates that the plant is financially feasible.

Comparison across processes: unlike the duration, time to achieve BEP goes on increasing with further processing irrespective of time. For example BEP is achieved in 51.34% of utilized capacity in case of dried chunks but it increases to 52.27% for dried powder with same level of installed capacity indicating higher fixed costs due to additional processing step. This is true for value added products also where BEP increases from 51.34% to 52.95% of utilized capacity. Difference in BEP for value added products can be attributed to higher investment couple with lower yields. Comparison of BEP across processes indicate decreased profits resulting from decreased margin of safety. However profits can be increased by increasing selling price with higher markup percentage.

Table10 : Break Even Analysis for different processing methods

Particulars	1	2	3	4	5	6
Total output(kg)/yr	32400	43200	32400	43200	29160	38880
Break Even Point(Capacity)	16634.56	14190.38	16934	14804	15439.63	13067.41
Break Even Point (as % of Capacity)	51.34	32.85	52.27	34.27	52.95	33.61
Break Even Point (as % of Full Capacity)	30.80	26.28	31.36	27.41	31.77	26.89
Total Revenue	122.07	104.13	125.52	109.73	128.67	108.90
Total Variable cost	99.26	84.68	101.62	88.83	103.81	87.86
Total Fixed Cost	22.81	19.45	23.91	20.90	24.86	21.04
Total Cost	122.07	104.13	125.52	109.73	128.67	108.90
Profit	0	0	0	0	0	0

We can conclude from Overall analysis of break even point analysis that time to achieve BEP shows negative relation with time and positive relation with processing.

However all the units have processed products more than breakeven level in all years indicating that all units are running under profitable conditions and all processes on all

units are profitable. Further variation in these breakeven points across time, process was due to lower fixed costs and higher output in successive years and higher fixed costs coupled with lower yields of the further processing.

Conclusions

This study investigated feasibility of dried meat production in India. It also examined the potential returns from value addition through different processes in producing tray dried meat products. Comparative economics were worked out for tray dried meat chunks, dried powder and value added products on large units. Feasibility analysis was also carried by taking homogeneous unit with a capacity of 400kg/day.

Total and Per unit investment were highest for value added products due to lower yields arising from drying and cooking losses

Overall investment pattern of processing unit showed that machinery and equipment was the major item of cost followed by Buildings and working capital margin.

Bothe total and per unit expenditure shows positive relation with both processing

Total cost of production found to be highest for value added products (Rs.757.59/kg) compared to dried chunks and dried powder (Rs. 667.51, 674/kg)

Similar to costs selling price also shows highest estimates for value added products (Rs.833.35/kg) compared to dried chunks and powder (Rs. 733.81, 741/kg).

Cost and price structure shows that both costs(variable, fixed an total) and prices increases with processing

Raw material , labour and depreciation accounts major share of total costs

On an average variable and fixed costs accounted for 89.45% and 10.55% of total cost of production for dried products. Further it is evident that the share of variable costs shows negative relation with processing while the fixed cost shows positive relation with processing showing capital intensive nature of further processing of dried products due to more no of machinery and building requirement for further processing due to inclusion of additional processes .

Among the processes value added products showed highest additional costs due to highest fixed costs coupled with lower yields.

Dried powder costs Rs. 6.9 more than dried chunks per kg.

Value added products involves additional cost of Rs. 90.49 over drying and Rs. 83.59/kg over powdering processes.

Similar to additional costs value addition also goes on increasing with processing highest being in value added products

Value addition in powdering process reflected in terms of premium was estimated as Rs.7.19 over drying process. Cooking process adds additional premium of Rs. 99.54, and 92.35/kg over drying, powdering

Ratio analysis showed satisfactory performance of all the processes under study on account of liquidity, profitability, investment for all products

Breakeven analysis showed that all the units have processed products more than breakeven level indicating that all units are running under profitable conditions and all processes are profitable.

Difference was observed between the financial performance of the processes but all the further processes showed better performance regarding feasibility compared to only drying method.

All the discounting measures being slightly in favour of the further processing the further processing especially value added products could become economically superior by increasing the premiums further.

All the discounting measures showed higher estimates for further processed products compared to dried products showing worthiness of further processing(especially value added products) compared to other methods

It can be concluded from the analysis that Further processing of dried meat products not only adds costs but also prices through value addition.

The study indicated that incorporation of further processing in the production of dried products has the potential to provide more financial benefits than dried chunks. Since further processing is more capital intensive as reflected by capital investment and working capital that limits the commercial production of value added products, financial support in the form of easy credit availability, working capital, subsidy could help in reaping the benefits of value addition of dried meat products. Overall the study showed that dried meat production in India can be a profitable business and profits increases with further processing of dried meat products. This dried meat technology with variety of products can fully be exploited in the defence services to provide the defence personnel with not only products with longer shelf life but also with variety of products.

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