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RESEARCH ARTICLE

Feasibility Analysis of Meat processing plant –Case of medium scale plant for Restructured chicken products

***K.Varalakshmi**
Scientist, National Research Centre on Meat (NRCM),Hyderabad, India.

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****Corresponding Author***

K.Varalakshmi

Abstract

This paper analyzes the economic feasibility of meat processing plant producing restructured chicken bites with a capacity of 150kg/day. The primary data on input use and output yield were taken from studies of NRCM and data was analysed using investment appraisal techniques like NPV, IRR(%),BC ratio, and Break even analysis and Sensitivity analysis. The results indicated that the processing unit is economically feasible with NPV of Rs. 44.74 lakhs and IRR of 31% and a B-C ratio of 1.78. The project will pay back its investment in less than 3years (2.72). Annual undiscounted cashflows and discounted cashflows were estimated as Rs. 21.03 lakhs and 5.59 lakhs respectively. Break Even Point of output is estimated as 41.15% of Installed Capacity. Sensitivity analysis showed that variable cost and selling price had major impact on profitability compared to other variables like capacity and fixed cost.

INTRODUCTION

Food Processing industry is one of the fastest growing sectors registering a growth rate of 8%per year. Commodity wise analysis of growth rates indicates that the growth of the Meat Processing industry is growing at the rate of 4% per year(D&B). Though India is a major player in Livestock and Meat Production, only small amount of Meat is Processed(2%) compared to other developed countries where the share of processed meat is more than 60%. More over the majority of this processed Meat is in the form of Frozen or Fresh Meat. The share of processed Meat Products is very negligible. This small share creates large scope for Ventures in Meat Processing Sector. Inspite of large scope for growth of this sector, there is less response from the domestic business players especially small and medium Enterprenuers to take advantage of this opportunity largely because of lack of knowledge on Feasibility of investment on Meat products processing plants. For any long term Investment it is important to have the information on Financial Feasibility i.e Returns on Investment, NPV, IRR, Break Even Point, Debt Service Coverage Ratio(DSCR),Risk Analysis etc. Thus Ex ante Evaluation of the project is necessary to take investment decisions. As there is no systematic information on all these aspects regarding Meat Products Processing plants this project has been taken up to generate first hand information on Profitability of Meat Processing Ventures .

As a part of the project economics of restructured chicken bites also studied. Restructured meat product is a type of product that is partially or completely disassembled and then reformed into the same or different form. These products may differ in composition, particle size, non meat ingredients and certain manufacturing procedures and in final appearance of products. If particle size is reduced too much, the finished texture will resemble that of ground meat. Commonly Flakes are made in a range of sizes from 0.76 -42mm(Naveena,2011).

With this background this paper presents the financial feasibility of medium scale meat processing plant producing restructured products(chicken bites) to help the business players interested in venturing into the Meat Processing sector to gain knowledge on feasibility of investment in the Meat processing ventures and acts as a guide in decision making process.

Material and Methods

Secondary data on commercial lending rates, schemes for Processing Ventures, Govt support etc were collected from available sources like websites of Commercial Banks, Finance Corporations, Facilitating bodies like APEDA, Ministry of food processing industries etc

Primary data on input use and output yield was collected from experiments of NRCM.

Data was analysed using various project Evaluation techniques like NPV, IRR, BC Ratio, Payback period, DSCR, BEP, financial viability ratios etc. Sensitivity analysis was also used to find out the sensitivity of profits to the changes in the variables. Scenario analysis was also applied to compare the profits under different scenarios(best, most likely and worst case scenario) with the base scenario.

Results and Discussion

Basic assumptions used in the study are given in the following table and are discuused below

Table 1 :Basic assumptions used

Particulars	Assumption	Particulars	Assumption
Construction and Finance		***Working Capital***	
Source of Finance	25% Equity, 75% loan.	Raw Material	12days
Bank interest	12%	Work in progress	3
Discount cashflow	12%	Finished products	12 days
Escalation& Contingencies	10%of project cost excluding Preliminary expenses	Accounts receivable	6 days
Land	Own land	Credit sales	50%
Production		Norm for bank assistance	70% of raw material cost
Capacity(final output)	150kg /day	***Depreciation***	
Capacity Utilization	60%, 70%, in the 1st and 2nd years and levelling off at 80% from 3rd year onwards	Building	10%
Shifts/ day	1	Machinery	20%
No of working days/annum	300	Miscellaneous assets	10%

***1.1Production/ Capacity*:**It is assumed that the facility will process 150kg/day and operate an eight hour shift, six days a week, 50 weeks a year with a capacity utilization rate of 60%,70%,in the first two years and 80% from third year onwards.

1.2.Construction and Finance

Source of Finance: contribution of banks and equity will be in the ration of 3:1 including subsidy component**.**

***1.3.Interest Rates*:**For calculation of IRR and net present value(NPV) of the project, cost of capital/interest rate of 12% set by commercial banks for long term loans has been taken Whereas, cost of working capital is taken as at 15% as per the rates fixed by the banks.

1.4.Depreciation:Depreciation rates for WDV method as given by Companies Act 1952 are considered for calculation of depreciation schedule. Depreciation rates of 10%, 20% and 10% are considered for Buildings,Machinery and Miscellaneous assets respectively.

1.5.Land: As cost of land is not financed by banks, it is assumed that the entrepreneurs builts processing unit on his own land.

2.Capacity of processing plant

2.1. Installed Capacity

Capacity of the plant is 150kg/day of Restructured bites. Product yield of 90% is taken for Restructured bites after considering cooking loss of 10%.Considering 300 working days in a year and yield of the products, the unit has an installed capacity of 40500 kg Restructured bites. Product yield and Production at full capacity will be as follows

Table 2: Capacity of processing plant

S.No	Product	Product yield	Days	Per day Capacity	Annual output(100% capacity)
1	Restructured bites	90%	300	150	40500

2.2.Capacity utilization

The capacity utilization varies depending on the capital availability, staff efficiency and availability of raw material. 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.

Table3: Annual Capacity /capacity utilization for processing plant

Year	1	2	3	4	5	6	7	8
Installed Capacity	40500@ 150kg/day *300days*90%							
Capacity Utilisation	60.00%	70.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%
Output	24300	28350	32400	32400	32400	32400	32400	32400

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

Project cost comprises investment for establishing an enterprise. The significant elements of project cost are land and site development, building, machinery, other fixed assets, license fees, working capital margin , preliminary and preoperative expenses including interest during construction period and contingency costs .

The total project outlay has been estimated at Rs.57.32 lakhs. The break up of project set up costs has been given below in table 4 and the individual components are discussed in this section.

3.1.Land and land development

Processing unit requiresa total area of 1500sq. ft of which 1288sq.ft will be covered by factory and office buildings, stores, etc.The land development cost varies considerably from place to place. Land development cost of Rs.150 per sq.ft has been considered for this unit. The total cost of land development@150 per sq.ft will be Rs. 2.25 lakhs.

3.2.Building and civil structures

The processing hall and other utilities would require construction of around 1288sq.ft. ofbuilding at a total cost of Rs.10.30 Lakh. The construction cost is assumed as Rs. 800 per sqft. Item wise breakup of building is given in **Annexure-1**

3.3. Preliminary & Preoperative Expenses

This works out to Rs.4.69 lakhswhich includes interest during construction, firm trial and registration.

3.4.Plant& Machinery

Plant & Machineryincluding equipment works out to Rs. 28.37 lakhs andthe cost of Misc. Assets works out to Rs.2.83 lakhs. Item wise breakup of Plant & Machinery is given in **Annexure-2**

3.5.Contingencies

Contingency is a provision made for escalation of cost of equipment, between plan preparation and project implementation. An amount of 4.38 lakhs is estimated towards escalation and contingencies for the first year to allow for price changes.

Table 4: Project cost of Meat processing plant

S.No	Description	Rs. lakhs
1	Land and Fencing	2.25
2	Building	10.30
3	Machinery and Equipment(M&E)	28.37
4	Miscellaneous Assets	2.84
5	Escalation &Contingencies(10%of above total)	4.38
6	Preliminary&Preoperative Expenses	4.69
7	Working Capital Margin	4.50
	Total	**57.32**

4.Means of Finance

The project will be funded through both equity and debt in a 25% to 75% ratio. The debt will be repaid in a time period of 7 years including 1 year grace period.

The project is proposed to be financed with a debt equity ratio of 3:1 and the means of finance is as follows

Table 5: Means of Finance

S.No	Source of funds	Rs .Lakhs
	Total Project cost	57.32
1	Equity	14.33
2	Subsidy	13.77
3	Effective bank loan	29.22

Credit linked subsidy of Rs. 13.77 lakhs is also availed through the subsidy scheme of Ministry of Food Processing Industry, GoI called Scheme of Technology Upgradation / Establishment/ Modernisation of Food Processing Industries under National Mission on Food Processing(NMFP) implemented jointly with State Governments which provides financial assistance to food processing units in the range of 25% (33.33% in subject to a maximum of Rs. 75 lakhs in difficult areas and 50% in North Eastern States including Sikkim) subject to a maximum of Rs.50 lakhs in general areas

5.Workigng Capital

Table 7 depicts the estimates of Working capital, the resources used to support a business until it is able to generate resources to support itself.

Table 6: Working Capital requirement and finance

Particulars	Days	Units (kg)	Rs/unit	Total (Rs.lakhs)	Norm for Bank Assistance (%)	Amount of Bank Assistance (Rs.lakhs)	Promoter's Contribution (Rs.lakhs)
Raw material	12	1125	213.00	2.40	70%	1.68	0.72
Stores, Consumables, Packing	12			0.24	70%	0.17	0.07
Goods in Process	3			0.50	75%	0.38	0.13
Finished Goods	12	1125	380.41	4.28	75%	3.21	1.07
Account Receivables	6	562.5	380.41	2.14	60%	1.28	0.86
Other expenses	30			1.65	0%	0.00	1.65
Total				**11.21**		**6.72**	**4.50**

Working capital varies with production level since it is directly related to variable operating expenses. Working capital is estimated to be Rs. 11.21 lakhs out of which Banks provide loans upto 70% (Rs. 6.72 lakhs)of working capital requirement with an interest of 15%. The remaining 30% (Rs. 4.5 lakhs)will be born by the owner in the form of equity.

6.Production Process

Conventional restructured meat products prepared from hot set binding of meat proteins extracted with the combined effects of salt, phosphate, and mechanical action(thumbling/massaging). Flow diagram of manufacturing steps for restructured bites is depicted in **Annexures-3.**

7. Project Economics

7.1.Production costs

The production estimates for products are based on their output yields. The output yield/ input output ratio is taken as 90% for restructured bites. Annual production cost was estimated as Rs. 94.81 lakhs which goes on increasing in the following years.

Breakup of production costs is given in table7 and the individual components are discussed in this section

Table7: Expenditure Statement (Rs.Lakhs)

Particulars/Year	1	2	3	4	5	6	7	8
Raw Material	57.51	67.10	76.68	76.68	76.68	76.68	76.68	76.68
Stores, Consumables& Packaging materials	5.83	6.80	7.78	7.78	7.78	7.78	7.78	7.78
Power	1.35	1.58	1.80	1.80	1.80	1.80	1.80	1.80
Utilities	0.53	0.62	0.70	0.70	0.70	0.70	0.70	0.70
Wages and Salary	10.22	11.93	13.63	13.63	13.63	13.63	13.63	13.63
Repairs and maintenance	0.53	0.62	0.70	0.70	0.70	0.70	0.70	0.70
Rent, Taxes&Insurance	0.72	0.84	0.96	0.96	0.96	0.96	0.96	0.96
Admin expenses	4.61	5.38	6.14	6.14	6.14	6.14	6.14	6.14
Selling expenses	2.59	3.02	3.46	3.46	3.46	3.46	3.46	3.46
Interest on term loan	2.63	3.51	2.92	2.34	1.75	1.17	0.58	0.00
Interest on Working Capital	0.50	1.18	1.34	1.34	1.34	1.34	1.34	1.34
Depreciation	7.69	6.29	5.16	4.25	3.50	2.90	2.40	2.00
P&P Amortization	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Total	**94.81**	**108.94**	**121.38**	**119.88**	**118.55**	**117.36**	**116.28**	**115.29**

7.1.1.Operational costs:

7.1.1.1.Rawmaterial:The main Raw materials required for production of restructured bites are Chicken and non meat ingredients. The composition and formulation of ingredients is given in **Annexure-4.**The raw material cost is worked out as Rs. 57.51 lakhs in the first year which increases in the subsequent years.

7.1.1.2.Power:Power consumption at 60% is estimated as 75units and the cost @ 6per unit comes to Rs. 1.35 lakhs for 300 days in the first year.

7.1.1.3.Labor requirements and related cost are detailed in **Annexure-5.** A total of 13 employees would be required for processing.

7.1.2.Fixed costs:

7.1.2.1.Interest:Interest was calculated by taking 12% and 15% for term loan and working capital loan respectively. Interest on term loan and working capital was worked out to be Rs.2.63 lakhs and Rs.0.5 lakhs in the first year.

7.1.2.2.Depreciation:Depreciation schedule was worked out by Written down value and it was estimated as Rs.7.69 lakhs in the first year which goes on decreasing in subsequent years.

7.2.Cost and price structure

Cost of production of Restructured bites is estimated as Rs.390.14/kg with variable cost of Rs.302.17and fixed cost of Rs.87.97. At 10% markup,selling price comes to Rs. 429.15/kg. The cost and prices are presented in the following table

Table8: Cost of production and price structure (Rs/kg)

S.No	Product	Variable cost	Fixed cost	Total cost	Markup price	Selling price
1	Restructured bites	302.17	87.97	390.14	39.01	429.15

7.3.Revenue

The year wise revenues and profit is given in table 9

7.3.1.Gross income

At this selling price of Rs.429/kg, the unit generates income of Rs. 104.29 lakhs in the first year and this revenue goes on increasing in the subsequent years as capacity increases.

7.3.3.Netincome:After considering taxes (Income tax and VAT), the profit is estimated as Rs. 9.01 Lakhs in the first year.

Table9: Profit Statement (Rs.Lakhs)

Description/Year	1	2	3	4	5	6	7	8
Income	104.29	121.67	139.05	139.05	139.05	139.05	139.05	139.05
Expenditure	94.81	108.94	121.38	119.88	118.55	117.36	116.28	115.29
Profit Before Tax	9.48	12.72	17.67	19.17	20.50	21.69	22.77	23.75
Residual value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.46
Profit Before Tax	9.48	12.72	17.67	19.17	20.50	21.69	22.77	35.21
Taxable profit	0.00	0.00	0.00	0.00	0.00	16.27	17.07	26.41
Income tax	0.00	0.00	0.00	0.00	0.00	4.88	5.12	7.92
vat 5%	0.47	0.64	0.88	0.96	1.02	1.08	1.14	1.76
Total taxes	0.47	0.64	0.88	0.96	1.02	5.96	6.26	9.68
Profit after Tax	9.01	12.09	16.78	18.21	19.47	15.72	16.51	25.53
Non cash expenditure	7.78	6.39	5.26	4.34	3.60	2.99	2.50	2.09
Cash profit	16.79	18.47	22.04	22.55	23.07	18.72	19.00	27.62

8.Financial Evaluation

8.1.Financial Efficiency Measures

8.1.1.Ratio Analysis

On the basis of the projected income statement and related projections different financial ratios are calculated and shown in table10.

8.1.1.1.Profitability **:**According to the projected cashflow statement, the project will start generating the profits in the first year of operation.

Table $_{10}$:Financial feasibility Ratios of Restructured meat products

Financial feasibility Ratio	Year								
	1	2	3	4	5	6	7	8	Average
Profitability Ratios									
Gross profit margin(%)	27.66	27.66	27.66	27.66	27.66	27.66	27.66	27.66	27.66
Operating Profit margin (%)	12.10	14.31	15.77	16.43	16.97	17.40	17.76	18.05	16.10
Profit margin %	9.09	10.46	12.71	13.79	14.74	15.60	16.37	17.08	13.73
Net Profit margin (%)	8.64	9.93	12.07	13.10	14.00	11.31	11.87	18.36	12.41
Investment Ratios									
Return on Total investment(%)	15.71	21.09	29.28	31.77	33.97	27.43	28.80	44.54	29.08
Return on Equity(%)	62.86	84.36	117.14	127.08	135.89	109.73	115.19	178.16	116.30
Investment turnover ratio	6.36	4.74	3.41	3.15	2.94	3.65	3.47	2.25	3.75
Liquidity ratios									
Debt Equity Ratio	2.04	2.04	1.70	1.36	1.02	0.68	0.34	0.00	1.15
Debt to Capital Turn over	50.98	50.98	42.48	33.99	25.49	16.99	8.50	0.00	28.68
Debt Service Coverage Ratio	7.38	2.62	3.20	3.45	3.75	3.29	3.59		3.90
Operating ratio	87.90	85.69	84.23	83.57	83.03	82.60	82.24	81.95	83.90

Profitability ratios indicate that plant generates Gross profit margin of 27.66% and Operating Profit margin of 12.1% and profit margin of 9.09% and Net profit margin of 8.64% in the first year. Operating ratio was found to be 87.9%. Net profit margin indicates the actual profit that is left with the company after all expenses met and it is 8.64% in this case.

8.1.1.2.Liquidity

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 7.38, 2.04, 50.98% respectively.

8.1.1.3.Investment Ratios

Analysis of investment ratios shows that plant is able to generate enough returns of15.71%, 62.86% returns on total investment and equity respectively. Investment turnover ratio is kept at 6.36%.

8.2.Economic feasibility

In the present study, economic feasibility of processing unit was measured using discounted measures such as NPV, BCR, IRR and Pay Back period.

Table 11: Economic Feasibility measures for medium scale unit of restructured meat processing plant

S.No	Feasibility measures	Estimate	Required
1	NPV (Rs. Lakhs)	44.74	Should be positive
2	IRR(%)	31%	> cost of capital
3	BC	1.78	>1
4	Average Returns(undiscounted)	21.03	
5	Pay Back Period (Yrs)	2.72	Less
6	Average Returns(Discounted)	5.59	
7	DSCR	3.89	>1.5

The calculated IRR of the project is 31% and Net Present Value (NPV) at 12% discount is Rs. 44.74.Lakhs. The project's initial investment will be fully recovered in less than three years(2.72) with average annual net returns of Rs.21.03 lakhs per annum. Benefit Cost ratio was to be 1.78.

8.3.Break Even Analysis

Break Even Analysis indicates that BEP of output is 16834kgs which comes at 69.28% of utilized capacity and 41.57% of full capacity.

$Table_{12}$:Break Even Analysis for medium scale unit of restructured meat processing plant

Particulars	1	2	3	4	5	6	7	8
Total output(kg/yr)	24300	28350	32400	32400	32400	32400	32400	32400
Break Even Point/Capacity(kg)	16834.26	17867.44	17958.04	16776.63	15730.24	14792.78	13943.31	13164.97
Break Even Point (as % of Capacity)	69.28	63.02	55.43	51.78	48.55	45.66	43.03	40.63
Break Even Point (as % of Full Capacity)	41.57	44.12	44.34	41.42	38.84	36.53	34.43	32.51
Total Revenue(Rs.lakhs)	72.25	76.68	77.07	72.00	67.51	63.48	59.84	56.50
Total Variable cost(Rs.lakhs)	50.87	53.99	22.80	50.69	47.53	44.70	42.13	39.78
Total Fixed Cost(Rs.lakhs)	21.38	22.69	54.26	21.30	19.98	18.78	17.71	16.72
Total Cost(Rs.lakhs)	72.25	76.68	77.07	72.00	67.51	63.48	59.84	56.50
Profit(Rs.lakhs)	0	0	0	0	0	0	0	0

8.4.Optimal Price Analysis

Optimal Price and quantity were estimated as Rs. 580/kg and 15747kg respectively. Profit at current and optimal units and price was worked out to be Rs. Rs.9.48 Lakhs and Rs.22.37 lakhs respectively.

Table $_{13}$: Optimum Price Analysis for restructured meat products

Particulars	Current	Optimum
Variable Cost per Unit	302	302
Fixed Cost	21.37	21.37
Selling Price per Unit	429	580
selling units	24300	15747
Maximum Capacity (kg/yr)	40500	40500
Revenue	104.29	91.33
Cost	94.81	68.96
Profit	9.48	22.37
NPV(Rs. Lakhs)	44.74	118.91
IRR(%)	31%	57%
BC	1.78	3.07
Average Returns(undiscounted) (Rs. Lakhs)	21.03	36.03
Pay Back Period (Yrs)	2.72	0.62
Average Returns(Discounted) (Rs. Lakhs)	5.59	14.86

8.5.Sensitivity Analysis

8.5.1.Sensitivity to production variables

Profits in any business is affected by many variables like variable cost, selling price, fixed costs, capacity etc.Hence for any business or investment appraisal, sensitivity analysis should be carried out in order to estimate the impact of these variables on the profits. In the present case we have analysed how sensitive are our profits to the changes in the variables. The results are presented in fig 1&2.

The results showed that if the variable cost decreases by 5% over the base scenario, the NPV increases by 50.3% (Rs.67.2 lakhs) and if variable cost increase by 5% the NPV will decrease by 39.5%(Rs.27Lakhs) over the base scenario.

Similarly if the Selling Price decreases by 5% over the base scenario, the NPV decreases by 58.6% (Rs.18.5 lakhs) and if Selling Price increases by 5% the NPV will increase by 69.1%(Rs.75.6 Lakhs)over the base scenario respectively. IRR also shows similar trend as that of NPV. It increases to 39% and decreases to 24% if variable cost changes by 5%(negative and positive). Decrease in selling price by 5% decreases IRR from 31% to 20% and increases from 31% to 42% if selling price increased.

Capacity also shows similar trend as that of selling price but its effect on NPV and IRR is less compared to Selling price. It shows positive relation with NPV and IRR. If the Capacity decreases by 5% over the base scenario, the NPV decreases by 13.6 % (Rs.38.6 lakhs) and IRR decreases to 28% from base value of 31%.

Similarly if the Capacity increases by 5% over the base scenario, the NPV increases by 24.1% (Rs.55.5 lakhs) and IRR increases to 35% from base value of 31%.

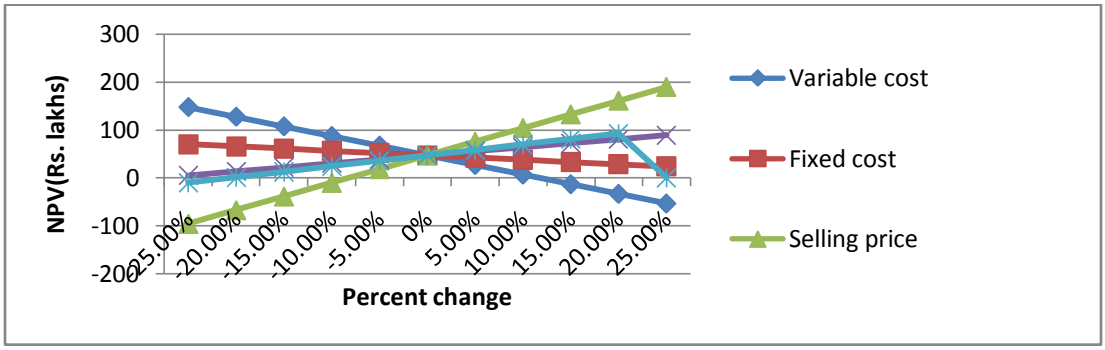


Fig1: Sensitivity of NPV to the changes in variables

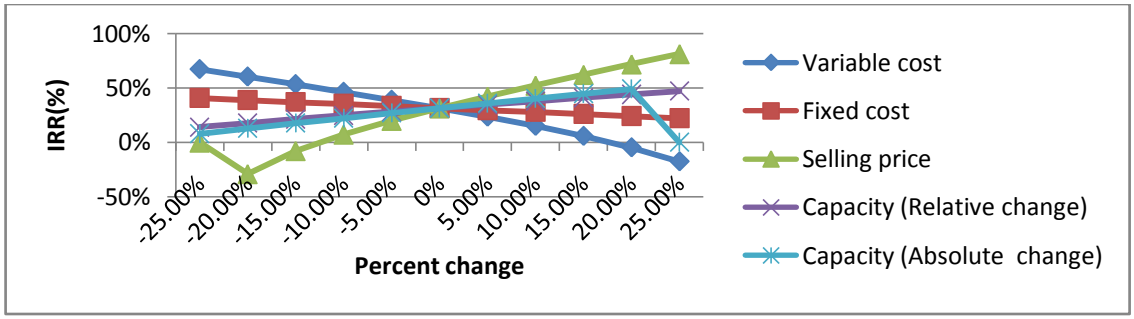


Fig2: Sensitivity of IRR to the changes in variables

8.6.Scenario Analysis

Table $_{14}$: Scenario Analysis of Restructured products

		Scenario			
		Current	Best case	Most likely case	Worst case
	Sales	**21870**	**24300**	**21870**	**14580**
	Sale growth	**5%**	**10%**	**7%**	**2%**
Casflows	**Price**	**429.16**	**468**	**449**	**429**
Casflows 1	(Rs. Lakhs)	8.11	17.97	12.23	5.38
Casflows 2	(Rs. Lakhs)	12.34	23.60	16.89	8.20
Casflows 3	(Rs. Lakhs)	17.22	30.03	22.23	11.45
Casflows 4	(Rs. Lakhs)	22.81	37.36	28.33	15.18
Casflows 5	(Rs. Lakhs)	29.21	45.70	35.30	19.44
Casflows 6	(Rs. Lakhs)	27.86	42.10	32.99	18.55
Casflows 7	(Rs. Lakhs)	34.20	50.29	39.85	22.77
Casflows 8	(Rs. Lakhs)	49.71	67.86	55.94	35.88
NPV(Rs. Lakhs)	(Rs. Lakhs)	52.75	120.08	78.25	17.04
IRR	(%)	29%	47%	36%	18%
BC ratio		1.92	3.10	2.37	1.30
Avg returns (Un Discounted) (Rs. Lakhs)	(Rs. Lakhs)	25.18	39.36	30.47	17.11
PBP	yrs	2.28	1.46	1.88	3.35

Scenario Analysis was carried out by assuming different scenarios and its effects on profitability. In the base scenario sales is assumed to be 90% of its utilized capacity and sales grows @5% per annum. The base values are changed to obtain three scenarios and its effect on profits. For best case scenario the sales volume is assumed as 100% of its utilized capacity which grows @10%. For most likely scenario sales volume is 80% with 7% growth and it is 60% sales with 2% growth for worst case scenario. The results are depicted in table 14.

NPV and IRR(%) were estimated to be Rs. 120.08, 78.25 and 17.04 lakhs and 47%, 36% and 18% for best, most likely and worst scenario respectively

Annexure-I

Building and civil structures

The building consists of 84square feet of Chilling Room,600square feet of processing hall (including 370sq.ftofRaw material Preparation Room, 160sq.ftof cooking room and 70sq.ft of Packaging Room)60 square feet of raw material storage room,140square feet of finished product storage area, 100 square feet of administration room, 64 square feet oflab, 100 square feet of Generator Room, and 90 square feet of Others (Toilets etc). The building layout isas per the guidelines of FSSAI.

Building and civil structures

S.No	Particulars	Area(Sq.ft)
1	Chilling Room	84
2	Other raw material storage room	60
3	Raw material Preparation Room	370
4	Cooking room	160
5	Packaging Room	70
6	Final product storage room	140
7	Generator Room	100
8	Lab	64
9	Administration Room	100
10	Sales room	52
11	Others (Toilets etc)	90
	Total covered area	**1288**
	Un covered area	212
	Total area	**1500**

Annexure-II

Processing Machinery and Equipment

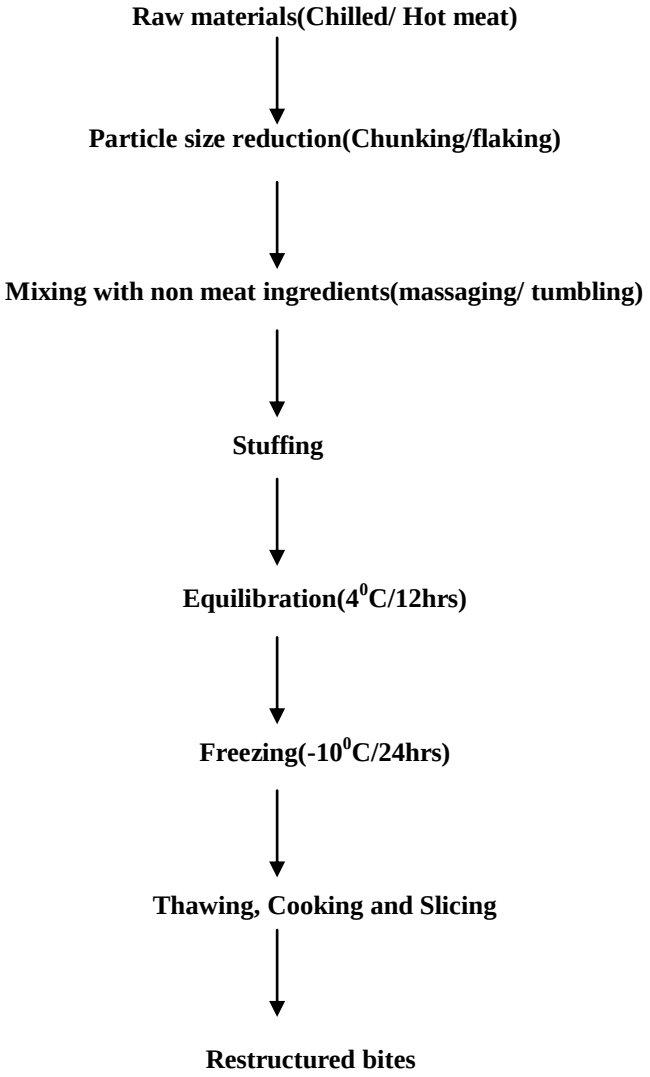
Machinery and equipment varies with the type of processing and product to be produced. Accordingly the following processing equipments have been identified for the preparation of Restructured bites.

Processing Machinery and Equipment

S.No	Name of Machinery	No	Unit cost(Rs)	Total cost (Rs)
1	Meat Mincer	1	150000	150000
2	Bowl Chopper	1	500000	500000
3	Commercial mixer/ grinder	1	40000	40000
4	Stainless Steel Tables	3	10000	30000
5	Refrigerator	1	120000	120000
6	SS Moulds(Tiffin boxes)	160	50	8000
7	Pressure Cookers/steam cooker	1	180000	180000
8	Vaccum packaging Machine	1	250000	250000
9	Ice flaking Machine	1	100000	100000
10	Two wheeler fitted with ice box	1	50000	50000
11	Three wheeler(Tempo)	1	300000	300000
12	shelves for stores room			12000
13	Tumbler	1	300000	300000
14	Chiller room	1	180000	180000
15	Refrigeration system for finished product	1	240000	240000
16	Flaking /slicing machine	1	210000	210000
17	Miscellaneous items			166500
	Total			**28,36,500**

Annexure-III

Process Flow of Restructured bites



Annexure-IV

Formulation for restructured blocks/slices

S.No	Ingredients	Proportion of ingredients
1	Lean meat	80-85%
2	Iceflakes	8-10%
3	Salt	1.6-1.7%
4	Polyphosphate	0.3-0.4%
5	Sugar	0.3-0.5%
6	Sodium Nitrite	0.01%(100mg/kg product)
7	Binder	2.5-3%
8	Seasonings	2.5-3%
	Total	**100**

Source: NRCM

Annexure-V

Human Resource /Man power Requirement

Skilled and Semi skilled workers are needed to manage the operation of the processing unit. These workers will look after the production, technical and cleaning operations at the processing unit. The personal needed for the processing unit is given below.

Human Resource /Man power Requirement

S.No	Particulars	No	Salary(Rs)	Salary Per month(Rs)
1	**Operational salaries**			
	Highly skilled	2	8000	16000
	Unskilled	11	5000	55000
	Sub total			71000
	Benefits@20%			14200
	Total			**85200**
2	**Administrative Salaries**			
1	*Administration*			
	Administrative Officer	1	8000	8000
	Accounts officer	1	8000	8000
	Stores Supervisor		5000	
	Electrical Officer	1	5000	5000
2	*Lab*			
	Analyst	1	6000	6000
	Assistants	1	5000	5000
	Sub total			32000
	Benefits@20%			6400
	Total			**38400**
3	**Sales and Marketing**			
	Sales Man	3	6000	18000
	Sub total			18000
	Benefits@20%			3600
	Total			**21600**
	Grand total (2+3)			**60000**

Discussion

In this paper we have evaluated the Feasibility of medium scale processing plant for restructured chicken products. Production data was taken from studies of NRCM and analysed using economic criteria like NPV,IRR ,BC ratio, Breakeven analysis. Sensitivity analysis was also performed to test the sensitivity of results to changes in variables. Total cost of production was found to be Rs. 390 and selling price at 10% markup comes to Rs. 429/kg. Based on ratio analysis performed, average gross profit margin, operating profit margin , profit margin and net profit were found to be 27.66% , 16.1%, 13.73% and 12.41% respectively. Gross and Operating Profit margin of 27.66% and 12.1%(first year) indicates that the direct costs incurred in the production of restructured bites accounts for 72.34% and operating expenses including administrative expenses and direct costs account for 87.9% of the profits. Difference between these two (15.56%) gives administrative and selling expenses. It can also be depicted as the earnings before interest and taxes is12.1%. Profit margin indicates the profits before taxes is 9.09% and difference between Operating Profit margin and Profit margin indicates the interest incurred by the project which accounts for 3.01% of profits. It indicates the cost of the capital which is very important in investment decisions. It is used to compare across regions or financing institutions which will affect policy decisions.

Difference between Profit margin and Net Profit margin indicates that the taxes incurred by the unit accounts for 0.45% of the profits/sales. It is used to compare the tax structure of the countries or states or regions and it has implications for policy making for the growth of sector. All the profitability ratios show an increasing trend over the years.

Liquidity ratios shows that the processing plant is able to meet its obligations on long term liabilities. Further decreasing trend (Table 13)of all these ratios shows that the Debt obligations goes on decreasing over the years. Though the DSCR which measures enterprise's capacity to meet term-loan-cum-interest and other long-term commitments/ obligations decreases in the second year it showed increasing trend through out the period and is kept at acceptable level of 3.9 indicating that the plant generates surplus, adequate to meet repayment obligations. Debt equity ratio which measures the extent to which the promoter's funds are leveraged to procure loans is kept at 1.15. Hence Risk is found to be at the accepted levels and goes on decreasing over time.

All the liquidity ratios showed that the debt obligations decrease over time and surpluses generated by plant will go on increasing.

To sum up, the financial viability indicators revealed that the processing unit is financially viable. Overall, the processing plant under study showed satisfactory performance on account of liquidity, profitability, investment.

According to the NPV criteria the processing plants under study turned out to be economically viable projects. The positive NPV (Table 11) implied that the discounted worth of benefits was greater than disconnected worth of cost steams. Benefit cost ratio being greater than unity(1.78)reaffirmed that processing plant is viable and on average the plant will give a return of 1.78 on every rupee investment

Break Even Analysis showed that in order to reach BEP one has to produce 16834 kgs of Restructured bites where the expenditure and income will be equal and profit will be zero. The remaining output(31%) is considered as margin of safety where profits starts generating. Further time to reach BEP goes on decreasing in subsequent years. BEP Attainment of BEP at lesser time (Table 12) at higher levels of capacity utilization indicates that the plant is financially feasible.

Optimal Price Analysis(Table 13) showed that by selling optimal units of 15747kgsinstead of 24300kgsat optimum price of Rs. 580/kg over current price of Rs.429/kg gives more profit (Rs.22.37 lakhs) than current profits(Rs.9.48 Lakhs).

NPV(Discounted) IRR increases to Rs. 118.91 lakhs and 57% with optimal price and quantity. Project yield Rs.1.29 more returns for every rupee invested over current price and units.

We can conclude from Sensitivity Analysis that in the present case the selling price can not be reduced beyond 5% over the base scenario as NPV becomes negative beyond 5% reduction in selling price. Similarly variable cost can not be increased beyond 10% due to negative NPV(Rs.-13.2 lakhs) beyond 10% increase. In both the cases the investment turns out to be unviable or unprofitable. Sensitivity Analysis(fig 1&2) showed that Profits measured in terms of NPV and IRR(%) are more sensitive to variable cost and selling prices compared to other variables like capacity and fixed costs. Capacity (both relative and absolute change) has negligible impact on profitability of unit.

The results of Scenario Analysis showed that NPV increases by 127.6% (Rs.120.08 lakhs), 48.3% (Rs.78.25 lakhs) in best and most likely scenarios over the base scenario(Table14). But in case of worst scenario NPV decreases by67.6%(Rs.17.04 lakhs). IRR increases from 29% to 47% and 36% in first two scenarios and decreases to 18 % in third scenario. B-C ratio increases from 1.92 to 3.1, 2.37 in first two cases and decreases to 1.3 worst scenario. Overall scenario analysis showed that if the sales volume decreases by 66% coupled with 40% decrease in sales growth the business becomes less profitable as indicated by lower NPV(Rs 17.04 lakhs), IRR(18%) and BC ratio(1.3).

Conclusions

Investment analysis of Processing plant for restructured chicken products showed that the processing plant (medium scale) is economically feasible with NPV of Rs. 44.74 lakhs and IRR of 31% and a B-C ratio of 1.78. The project will pay back its investment in less than 3years(2.72). Annual undiscounted cashflows and discounted cashflows are estimated as Rs. 21.03 lakhs and 5.59 lakhs respectively. Keeping in view of profitability and scope, processing of meat products has to be encouraged and enterpreneurs should come forward to reap the benefits of meat processing business.

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