COST BENEFIT ANALYSIS OF EMULSION MEAT PRODUCTS

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ABSTRACT

The present study was carried out to estimate the economics of emulsion meat products on different categories of processing plants. The primary data on input use and output yield of products were taken from studies of NRCM and was analysed using cost benefit analysis, feasibility measures. The results revealed that average cost of production of emulsion products was Rs. 389.42 with variable costs of Rs. 319.06 and fixed costs of Rs.70.35 per kg. The results showed that the emulsion processing unit is feasible and viable with NPV of 67.1 lakhs, IRR of 56% ,BC ratio of 1.97pay back period was estimated as 2.52 years with annual returns of Rs. 23.7 lakhs. Debt service coverage ratio of 4.17 indicated that the risk is less in emulsion meat processing. Economies of scale is evident for all the products from all perspectives like production costs, profits, discounting measures. Break even analysis showed that emulsion products break even at 63.02% and 37.81% of full and utilized capacity respectively with 36.98% of margin of safety.

Key words: Emulsion, products, meat, economics, feasibility, economies of scale

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Introduction

With the advance of science and technology the meat processing has undergone transformation from primary processing to further processing. Primary processing includes tenderization, grinding, flaking, freezing and case ready fabrication and packaging where as further processing includes curing, smoking, marination, injection, emulsifying, forming and cooking. The purpose of further processing of meat is to produce value added meat products and provide the variety. It also serves for better presentation, transportation and distribution to larger population(A.R.Sen,2013). Further processing has paved the path for meat industry growth. Many technologies have been developed to produce value added products through further processing. These technologies include emulsion technology, cured meat technology, enrobed , restructured meat technology. No of value added products have been developed in each of these technologies for the benefit of consumers. Among these further processed products emulsion products have gained popularity among the consumers due to their low cost and more no of product availability.

Emulsion meat products are type of products prepared from meat emulsion. An emulsion is a mixture of two immiscible liquids one of them being dispersed into the other in the form of liquid droplets and/or liquid crystals. When fat is dispersed as fine particles in the matrix of salt and protein, a multiple phase system is formed which meat technologists referred to as meat emulsion. Emulsion is prepared by grinding or chopping meat and water with the addition of common salt (Nacl) to a fine meat forming the matrix in which fat is dispersed.

Many formulations could be developed based on the ingredients, their levels and the imagination of the meat product processor. Based on the composition of ingredients, three types of emulsion formulations were reported by the researchers. These include prime, choice and economy types. In prime type emulsion, chicken content should not be less than 67%. Chicken fat could be used as fat source. However no skin or other byproducts and non meat ingredients like vegetables are permitted. Finished prime products give more meaty flavor and tasty. In case of choice type of emulsion, chicken meat should not be less than 50 percent and chicken fat and byproducts (skin, gizzard, heart) could be used but not non meat ingredients. Cooked meat from deboned meat could also be used. The products have good texture, juiciness and more flavourful. For economy type, chicken meat 40-49%, chicken fat, by products, cooked

meat, eggs, vegetables, soya nuggets, bread crumbs could also be used. The products have good tender texture and more nutritious with combination of proteins and providing fibre and antioxidants. Economy type of emulsion costs less compared to prime and choice type of emulsions.

Advantage of Emulsion meat productsinclude efficient utilization of meat from spent and culled birds low value cuts with high connective tissue content. Comminution eliminates toughness associated with meat. Lowers energy cost for cooking. They Facilitate addition of local spices and seasonings to incorporate local flavor.They Allow inclusion of non meat ingredients cereals, legumes, nuts, milk and soya products, fruits and vegetables and other beneficial bioactive compounds. They result in profitable utilization of heart, gizzard, skin and other byproducts for incorporation in emulsion meat products. Provides higher profits, variety, convenience, and ease of preparation with better keeping quality(NRCM, 2011).

Variety of emulsion meat products viz nuggets, sausages, patties, enrobed eggs, kebabs, meat balls, vada, samosa can be prepared from a single emulsion (NRCM,2011).Production process for all these products have been standardized and they have proved to be superior on technical grounds. They have been proved to be tasty and are acceptable from point of sensory evaluation. However economic worthiness of these products has not been established by the studies. Though some studies(Deogade, 2008) have estimated economics of emulsion products, their study has in limitation that they have stopped at individual product level and application of the results for commercial production of these products has been missing. To bridge this research gap an attempt has been made to study the economics of emulsion meat products for commercial production.

Data and Methodology

For achieving the objectives of the study the required data were collected from the studies of NRCM. 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. All the products in the emulsion group were selected for working out economics and investment worthiness. Comparison was also made among small, medium and large scale units for all the products.

Various economic measures were used for evaluating the economics of emulsion products. Financial efficiency measures like liquidity ratios, profitability ratios and investment ratios were employed for analysing financial viability of processing plant. Financial feasibility ofinvestment was examined by usingthe regular project evaluation techniques like Net Present Value (NPV), Internal Rate of Returns(IRR), Benefit –Cost Ratio(B-C ratio), Payback Period etc. Break even analysis was also carried out. 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.

Production process of Emulsion products

The basic ingredient for emulsion products is emulsion. Emulsion is prepared by adding add salt, phosphates, ice flakes to the minced meat from boneless chicken or mutton and chopping to extract soluble proteins. Add onion garlic paste spice powders and binders and fillers one after the other as per the formulation and follow chopping till desired consistency of emulsion is achieved. One can prepare limitless no of products with this emulsion with good imagination and culinary practice and modification of ingredients in the formulation.

For the present study we have selected prime type of emulsion and economics were worked out for all the products. Flow chart of emulsion preparation is presented in Annexure-1. Process flow of individual products was not reported here and was available from publications of NRCM website.

The ingredients used in the preparation of prime type of emulsion include : deboned chicken meat(67%), chicken fat (13%), Maida(3%),Spice mixture(1.5%), condiments(3.5%), Ice flakes(9.7%), Poly phospahtes(0.3%),Salt(1.7%),Sugar(0.3%), Sodium nitrite(100ppm)(0.01). Composition of ingredients for emulsion and spice mixture is given in Annexures-2&3.

Basic assumptions

The study uses some basic assumptions for studying the economics and evaluating feasibility of emulsion meat product processing. These assumptions are related to construction

and finance, production, working capital and depreciation. All the results are based on these assumptions.

These basic assumptions are same across all types of processing units except capacity in production assumptions and raw material holding period in working capital assumptions. Regarding working capital assumptions raw material holding period of 4 days is taken for small units while 12 days period is assumed for medium and large units for almost all the products.

Regarding production, it is assumed that the facility will process 30kg/150kg/400kg/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. Regarding Finance, it is assumed that banks and owner will contribute in the ratio of 3:1. 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. Depreciation rates for WDV method as given by Companies Act 1956(amended from time to time) are considered for calculation of depreciation schedule. Depreciation rates of 10%, 20% and 10% are considered for Buildings, Machinery and Miscellaneous assets respectively. As cost of land is not financed by banks, land purchase cost is not included in the project cost but land development cost is included.

Results and discussion

1.Capacity of processing plant

Installed Capacity

Installed Capacity of the plant is assumed as 30,150 and 400kg/day of product for small, medium and large units respectively. Product yield of 90% is taken for Emulsion Nuggets, Kebab, Meat Balls, Chicken Vada ,Chicken Patty(cooked) and Sausage (Cooked). Output Yields of 135% for Chicken Samosa, 119% for Patty(Enrobed) were considered after considering yield gain of 35% and 19%. For smoked Sausages, 80% output yiled is considered after taking smoking loss of 20%.

Considering 300 working days in a year and yield of the products, the small, medium and large units will have the annual installed capacity of products as presented in table 1.

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.

Table1:Annual output of emulsion products on different categories of processing plants(Kg/yr)

Emulsion product	Small	Medium	Large
Emulsion Nuggets	8100	40500	108000
Croquettes	8100	40500	108000
Enrobed Eggs	8100	40500	108000
Kebab	8100	40500	108000
Meat Balls	8100	40500	108000
Chicken Vada	8100	40500	108000
Chicken Samosa	12150	60750	162000
Chicken Patty	8100	40500	108000
Patty(Enrobed)	10710	53550	142800
Sausage (Cooked)	8100	40500	108000
Sausage (Smoked)	7200	36000	96000
Average	**8624**	**43118**	**114982**

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

2.Capital Investment

Investment pattern on different size groups of units showed that an average investment of Rs. 54.48 lakhs is needed for setting up of meat processing plant for emulsion products. Across the size groups average investment of Rs.15.19,57.2 and 91.06 lakhs is required for small, medium and large units respectively.

Products also differs with respect to investment. For small scale production of emulsion products an average investment of Rs.15.19 lakhs is required with highest cost reported by enrobed eggs (Rs.23.75 lakhs) and lowest cost by chicken vada(Rs.12.9 lakhs)

Minimum of Rs. 48.73 lakhs is required for setting up of medium scale unit with maximum range of Rs.98.7 lalkhs. For large scale production investment ranges from Rs.70.63lakhs to Rs.210.88lakhs.

Table2: Project cost of processing plants for production of emulsion products (Rs.lakhs&Rs)

Emulsion Products(Prime)	Small		Medium		Large		Overall	
	Total	Per kg	Total	Per kg	Total	Per kg	Total	Per kg
Emulsion Nuggets	15.18	187.41	53.33	131.68	75.32	69.74	47.94	91.85
Croquettes	13.72	169.38	50.09	123.68	73.45	68.01	45.75	87.65
Enrobed Eggs	23.75	293.21	98.70	243.70	210.88	195.26	111.11	212.85
Kebab	14.54	179.51	51.35	126.79	76.38	70.72	47.42	90.85
Meat Balls	13.46	166.17	49.39	121.95	74.53	69.01	45.79	87.73
Chicken Vada	12.90	159.26	48.73	120.32	70.63	65.40	44.09	84.46
Chicken Samosa	14.72	121.15	56.27	92.63	86.35	53.30	52.45	66.98
Chicken Patty (Not Enrobed)	14.55	179.63	54.61	134.84	79.33	73.45	49.50	94.82
Chicken Patty(Enrobed)	15.88	148.27	59.39	110.91	89.29	62.53	54.85	79.47
Sausage	13.39	165.31	53.45	131.98	79.25	73.38	48.70	93.29

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Sausage (Smoked)	15.01	208.47	53.93	149.81	86.22	89.81	51.72	111.47
Average	**15.19**	**179.80**	**57.20**	**135.30**	**91.06**	**80.97**	**54.48**	**100.13**

Note: Total –Rs. Lakhs and Per kg –Rs/kg

Per unit capital investment regards reported in table 2 refers to installed capacity i.e total investment is divided by output at installed(100%) capacity.Regarding per unit investment small units exhibit highest investment per kg(179.8) where as on large units it was only 80.97per kg with average per unit investment of Rs. 100.13. Further per unit investment cost decreases along with capacity showing economies of scale.

Among the products Enrobed eggs showed highest investment across all the categories of units reflecting capital intensive nature of business as more no of machinary, buildings are required to process raw eggs to enrobed eggs as more processing steps are involved compared to other products.

Overall investment pattern of processing units showed that machinery and equipment was the major item of cost contributing to 45.3% share followed by Buildings(19.9%) for products on all categories of units(not reported here).

2.Working capital

Table 3 shows the total working capital requirement (for the first year)for different products on different sizes of plants. Working capital is the resources required to support a business until it is able to generate resources to support itself. It varies with production level since it is directly related to variable operating expenses. Banks provide loans upto 70% of working capital requirement with an interest of 15%. The remaining 30% will be born by the owner in the form of equity.

Table 3:Working capital requirement of Emulsion products on differentprocessing plants(Rs.lakhs&Rs)

Product	Small		Medium		Large		Overall	
Emulsion Products(Prime)	Total	Per kg	Total	Per kg	Total	Per kg	Total	Per kg

Emulsion	1.68	34.57	10.38	42.72	23.57	36.37	11.88	37.92
Croquettes	1.51	31.07	9.38	38.60	21.45	33.10	10.78	34.42
Enrobed Eggs	4.35	89.51	19.94	82.06	50.62	78.12	24.97	79.73
Kebab	1.70	34.98	10.18	41.89	23.56	36.36	11.81	37.72
Meat Balls	1.69	34.77	10.15	41.77	23.63	36.47	11.82	37.75
Chicken Vada	1.60	32.92	9.94	40.91	22.97	35.45	11.50	36.73
Chicken Samosa	2.00	27.43	11.92	32.70	28.56	29.38	14.16	30.14
Chicken Patty (Not Enrobed)	1.58	32.51	9.93	40.86	22.90	35.34	11.47	36.62
Chicken Patty(Enrobed)	2.41	37.50	12.01	37.38	28.52	33.29	14.31	34.56
Sausage	1.92	39.51	11.68	48.07	27.43	42.33	13.68	43.67
Sausage	1.99	46.06	11.28	52.22	27.38	47.53	13.55	48.67
Average	**2.04**	**40.08**	**11.53**	**45.38**	**27.33**	**40.34**	**13.63**	**40.88**

Note: Total –Rs. Lakhs and Per kg –Rs/kg

Minimum of Rs. 13.63 lakhs is required to set up a emulsion processing unit ranging from Rs. 2.04 lakhs (small units) to Rs.27.33 lakhs (large units). Average Working capital per kg comes to Rs. 40.88.Similar to project cost, working capital was also highest for enrobed eggs among the products as it involves cost of boiled eggs and emulsion. On an average it requires working capital of Rs.24.97 lakhs that comes to Rs.79.73 per kg of enrobed eggs.

3.Cost structure

The information regarding annual and per unit estimates of variable costs, fixed costs and total costs (in the first year) in preparation of emulsion meat products has been depicted in Table 4-6. It is clear from variable costs reported in table4 that emulsion products requires variable expenses of Rs.104.81 lakhs with average per unit variable cost of Rs. 319.06/kg.

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Table 4: Variable costs of emulsion meat products on differentprocessingplants(Rs.lakhs&Rs)

Product	Small		Medium		Large		Overall	
Emulsion Products(Prime)	Annual	Per kg	Annual	Per kg	Annual	Per kg	Annual	Per kg
Emulsion	13.15	270.66	65.09	267.86	164.59	253.99	80.94	258.44
Croquettes	11.81	243.10	58.30	239.91	148.28	228.83	72.80	232.43
Enrobed Eggs	41.40	851.90	197.84	814.14	520.75	803.62	253.33	808.84
Kebab	13.21	271.77	64.64	266	164.99	254.62	80.95	258.45
Meat Balls	13.06	268.79	63.91	263.01	163.50	252.31	80.16	255.93
Chicken Vada	12.86	264.67	63.46	261.14	162.05	250.07	79.46	253.69
Chicken Samosa	16.56	227.16	80.34	220.4	207.54	213.52	101.48	216.00
Chicken Patty (Not Enrobed)	12.66	260.59	62.74	258.2	160.28	247.35	78.56	250.84
Chicken Patty(Enrobed)	21.20	329.98	103.72	322.82	268.55	313.43	131.16	316.71
Sausage	15.80	325.00	77.33	318.24	198.55	306.41	97.23	310.43
Sausage	16.13	373.3	77.06	356.78	197.40	342.71	96.87	347.94
Average	**17.08**	**335.17**	**83.13**	**326.23**	**214.22**	**315.17**	**104.81**	**319.06**

Note: Total –Rs. Lakhs and Per kg –Rs/kg

It varies with size of the plant and also type of product. It varies from Rs.17.08 lakhs for small units to Rs.214.22 lakhs for large units. Per unit variable cost varies from minimum of Rs.315.17 to maximum of Rs.335.17 per kg.Among the variable costs raw material cost accounts for major share of 54.85% followed by labour(not reported here).

Fixed costs

Regarding fixed costs small units shows minimum of Rs. 5.02 lakhs where as larger units shows maximum of Rs. 41.09 lakhs with average fixed cost of Rs.22.89 lakhs for emulsion products.

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Table 5:Fixed costs of Emulsion meat products on differentprocessing plants(Rs.lakhs&Rs)

Emulsion Products(Prime)	Small		Medium		Large		Overall	
	Annual	Per kg	Annual	Per kg	Annual	Per kg	Annual	Per kg
Emulsion Nuggets	4.57	94.00	21.14	87	34.01	52.48	19.91	63.56
Croquettes	4.12	84.76	19.42	79.92	32.34	49.9	18.63	59.47
Enrobed Eggs	11.07	227.84	45.87	188.78	107.96	166.6	54.97	175.50
Kebab	4.56	93.89	20.13	82.85	33.96	52.41	19.55	62.43
Meat Balls	4.40	90.45	19.97	82.17	34.56	53.34	19.64	62.72
Chicken Vada	3.99	82.13	19.21	79.05	31.95	49.31	18.38	58.70
Chicken Samosa	4.58	62.88	20.59	56.48	36.07	37.11	20.41	43.45
Chicken Patty (Not Enrobed)	4.14	85.14	20.44	84.11	33.90	52.31	19.49	62.23
Chicken Patty(Enrobed)	4.72	73.40	21.44	66.74	36.78	42.93	20.98	50.66
Sausage (Cooked)	4.40	90.49	20.78	85.52	34.30	52.93	19.83	63.30
Sausage (Smoked)	4.71	109.01	19.14	88.63	36.18	62.81	20.01	71.88
Average	**5.02**	**99.45**	**22.56**	**89.20**	**41.09**	**61.10**	**22.89**	**70.35**

Note: Total –Rs. Lakhs and Per kg –Rs/kg

But regarding per unit fixed costs the results show different picture. Per unit fixed costs was highest in small units(Rs.99.45/kg) compared to larger units(Rs.61.1 /kg). This low cost of fixed cost can be attributed to the capacity increase and efficient utilization of fixed resources on large units. However emulsion products incurs average fixed cost of Rs.70.35/kg.

Among the fixed costs depreciation was the major item of costs accounting for 35.65% of fixed costs for overall category with its share ranging from 27.14 (large units)to 42.68%(small units). (not reported here).

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Table6: Cost of production of Emulsion meat products on differentprocessing plants(Rs.lakhs&Rs)

Emulsion Products(Prime)	Small		Medium		Large		Overall	
	Annual	Per kg	Annual	Per kg	Annual	Per kg	Annual	Per kg
Emulsion Nuggets	17.72	364.57	86.24	354.9	198.58	306.45	100.85	321.99
Croquettes	15.93	327.86	77.72	319.83	180.62	278.74	91.43	291.91
Enrobed Eggs	52.48	1079.7	243.70	1002.9	628.71	970.23	308.30	984.34
Kebab	17.77	365.66	84.78	348.87	198.94	307	100.49	320.86
Meat Balls	17.46	359.24	83.88	345.18	198.06	305.65	99.80	318.65
Chicken Vada	16.85	346.81	82.67	340.2	194.00	299.38	97.84	312.39
Chicken Samosa	21.14	290.05	100.92	276.88	243.61	250.63	121.89	259.46
Chicken Patty (Not Enrobed)	16.80	345.73	83.18	342.32	194.19	299.67	98.06	313.08
Chicken Patty(Enrobed)	25.92	403.38	125.17	389.56	305.33	356.36	152.14	367.38
Sausage (Cooked)	20.19	415.49	98.11	403.76	232.85	359.34	117.05	373.73
Sausage (Smoked)	20.84	482.31	96.21	445.42	233.58	405.52	116.88	419.82
Average	**22.10**	**434.62**	**105.69**	**415.44**	**255.32**	**376.27**	**127.70**	**389.42**

Note: Total –Rs. Lakhs and Per kg –Rs/kg

Economics analysis of emulsion meat Products indicated that among different units small units incurs more costs(Rs. 434.62/kg)(Table 6)due to high fixed costs associated with low capacity compared to other types of units. However annual total cost shows positive relation with capacity.

Table7: Average cost of production of Emulsion meat products(Rs.lakhs&Rs)

Product	Variable costs	Fixed costs	Total costs	Share in total costs

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	Annl.	Per kg	Annl.	Per kg	Annl.	Per kg	Annl.	Per kg
Emulsion Nuggets	80.94	258.44	19.91	63.56	100.85	321.99	80.26	19.74
Croquettes	72.80	232.43	18.63	59.47	91.43	291.91	79.63	20.37
Enrobed Eggs	253.33	808.84	54.97	175.50	308.30	984.34	82.17	17.83
Kebab	80.95	258.45	19.55	62.43	100.49	320.86	80.55	19.46
Meat Balls	80.16	255.93	19.64	62.72	99.80	318.65	80.32	19.68
Chicken Vada	79.46	253.69	18.38	58.70	97.84	312.39	81.21	18.79
Chicken Samosa	101.48	216.00	20.41	43.45	121.89	259.46	83.25	16.75
Chicken Patty (Not Enrobed)	78.56	250.84	19.49	62.23	98.06	313.08	80.12	19.88
Chicken Patty(Enrobed)	131.16	316.71	20.98	50.66	152.14	367.38	86.21	13.79
Sausage (Cooked)	97.23	310.43	19.83	63.30	117.05	373.73	83.06	16.94
Sausage (Smoked)	96.87	347.94	20.01	71.88	116.88	419.82	82.88	17.12
Average	**104.81**	**319.06**	**22.89**	**70.35**	**127.70**	**389.42**	**81.79**	**18.21**

Note: Annl. –Rs. Lakhs and Per kg –Rs/kg

It can be concluded from the cost structure that the annual variable, fixed and total costs shows positive relation with the capacity but per unit variable, fixed and total costs shows negative relation with the capacity.(capacity shows positive relation with annual costs(variable, fixed and total costs) but negative relation with per unit costs showing efficient utilization of resources)

From table 7 it is evident that on an average variable and fixed costs accounted for 81.79% and 18.21% of total cost of production.

Fixed costs varied from Rs.99.45(small units) to 61.1 (large units)with average of Rs.70.35 per kg(Table5). For variable costs this range is Rs.335.17 (small units) to 315.17(large

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units) per kg(Table4). Average cost of production of emulsion products was estimated as Rs. 389.42 with variable costs of Rs. 319.06 and fixed costs of Rs.70.35 per kg.

Further it is evident that all the costs(per kg) including variable and fixed costs goes on decreasing with the capacity due to efficient utilization of resources resulting in low production costs on larger units.

Highest cost of Rs. 984.34/kg was observed for enrobed eggs with variable cost and fixed costs of Rs.808.84 and Rs. 175.5 /kg. Among the products enrobed eggs shows highest annual and per unit costs(both variable and fixed costs).

4.Revenue structure

4.1.Selling prices

Table8 presents the estimated selling prices for emulsion products at 10% markup. On an average selling price of Emulsion products comes to Rs. 428.36/kg, with highest price reported by small units(Rs.478.09/kg) followed by medium and large units.

Similar to costsselling price also differs across the products with in the emulsion group (prime type). Among the products enrobed eggs registered highest selling price (Rs.1082.77/kg) followed by smoked sausage(Rs.461.8/kg) and cooked sausage(Rs.411.11/kg).

4.2.Gross income: With selling price at 10% markup,emulsion products generates gross income of Rs. 24.74, 118.23 and 285.54 lakhs in the first year on small, medium and large units respectively and this revenue goes on increasing in the subsequent years as capacity increases.

4.3.Netincome: After deducting expenditure on inputs, interest and taxes(Income tax and VAT), the net returns will come to Rs. 2.14, 10.21, 24.66 lakhs which is the actual returns or profits accrued to the producer.

Table8: Selling prices and returns of emulsion products on different size groups of units(Rs/kg&Rs. lakhs)

Emulsion	Size group of unit		

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Products(Prime)	Small	Medium	Large	Overall
Emulsion Nuggets	401.03	390.39	337.10	354.19
Croquettes	360.65	351.81	306.61	321.10
Enrobed Eggs	1187.73	1103.19	1067.25	1082.78
Kebab	402.23	383.76	337.70	352.95
Meat Balls	395.16	379.70	336.22	350.51
Chicken Vada	381.49	374.22	329.32	343.63
Chicken Samosa	319.06	304.57	275.69	285.40
Chicken Patty (Not Enrobed)	380.30	376.55	329.64	344.39
Chicken Patty(Enrobed)	443.72	428.52	392.00	404.12
Sausage (Cooked)	457.04	444.14	395.27	411.11
Sausage (Smoked)	530.54	489.96	446.07	461.80
Average	**478.09**	**456.98**	**413.90**	**428.36**
Average Gross returns	**24.74**	**118.23**	**285.54**	**142.84**
Average Net returns	**2.14**	**10.21**	**24.66**	**12.34**

Selling prices-Rs/kg, Average Gross &net returnsRs.lakhs

5.Financial Evaluation

5.1.Ratio Analysis

On the basis of the projected cashflow statement different financial ratios were calculated and shown in table9.

5.1.1.1.Profitability

Profitability ratios(Table9) indicate that on overall basis, emulsion chicken meat products generates Gross profit margin of 23.47% and Operating Profit margin of 15.39% and net profit margin of 12.0%.

Gross and Operating Profit margin of 23.47% and 15.39% indicates that the direct costs incurred in the production of emulsion meat products accounts for 76.53% and operating expenses including administrative expenses and direct costs account for 84.61% of the profits.

Table 9:Financial feasibility Ratios of Emulsion products on different sizes of plants

Emulsion Products(Prime)	Gross Profit Margin(%)	Operating Profit Margin (%)	Net Profit Margin (%)	Return on Investment	Return on Equity (ROE%)	Debt Service Coverage ratio	Debt equity ratio
Emulsion Nuggets	25.17	15.99	12.42	30.36	121.45	3.97	1.15
Croquettes	25.99	16.12	12.53	29.40	117.62	3.86	1.16
Enrobed Eggs	17.78	13.43	10.69	38.31	153.23	4.75	1.16
Kebab	24.59	15.79	12.27	30.49	121.95	3.97	1.16
Meat Balls	24.45	15.47	12.01	30.96	123.86	4.01	1.16
Chicken Vada	24.64	15.52	12.03	31.47	125.88	4.08	1.16
Chicken Samosa	22.89	15.04	11.69	32.41	129.63	4.16	1.16
Chicken Patty (Not Enrobed)	25.32	16.17	12.57	29.30	117.20	3.85	1.16
Chicken Patty(Enrobed)	20.63	14.12	11.1	36.32	145.29	4.54	1.16
Sausage (Cooked)	22.62	14.86	11.54	33.30	133.20	4.26	1.15
Sausage (Smoked)	24.07	16.74	13.13	36.02	144.08	4.48	1.15
Average	23.47	15.39	**12.0**	**32.58**	**130.31**	**4.17**	**1.16**

Note: The above estimates corresponds to pooled data of three processing units.

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It can also be depicted as the earnings before interest and taxes is 15.39%. Administrative and selling expenses accounted for 8.08% of profits. Interest and taxes accounts for 2.14% and 1.24% of profits. Net profit margin after deducting interest and taxes was estimated as 12.0%.

5.1.1.2.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 4.18, 1.16, 28.91% respectively. These ratios shows that the processing plant is able to meet its obligations on long term liabilities.

Further decreasing trend (not reported here) of all these ratios shows that the Debt obligations goes on decreasing over the years and also along with capacity.

5.1.1.3.Investment Ratios

Analysis of investment ratios shows that on an average meat plant is able to generate enough returns of 32.58%, 130.31% returns on total investment and equity respectively. Investment turnover ratio is kept at 3.43%.

To sum up, the financial viability indicators revealed that all the processing units of all emulsion meat products financially viable. Overall, the processing plants 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 processing unit was measured using discounted measures such as NPV, BCR, IRR and Pay Back period.

The calculated average IRR of the emulsion products is 56% and Net Present Value (NPV) at 12% discount is Rs. 67.1 lakhs. The positive NPV (Table 10) implied that the discounted worth of benefits was greater than disconnected worth of cost steams. The project's initial investment will be fully recovered in less than three years(2.52 years) with average annual net returns of Rs.23.7 lakhs per annum. BC ratio of Rs.1.97 indicates that the processing unit generates Rs. 1.97 for every rupee of investment.

Table 10: Economic Feasibility measures for emulsion product processing plant

Emulsion Products(prime)	NPV (Rs.lakhs)	IRR (%)	BC	Pay Back Period (Yrs)	Average Returns (Rs.lakhs)
Emulsion Nuggets	46.78	51%	1.83	2.71	19.43
Croquettes	62.27	49%	1.94	2.56	18.03
Enrobed Eggs	63.95	70%	1.95	2.54	53.44
Kebab	65.18	51%	1.95	2.54	19.29
Meat Balls	66.92	52%	1.96	2.53	18.81
Chicken Vada	68.73	54%	1.98	2.51	18.41
Chicken Samosa	70.59	56%	1.99	2.49	22.43
Chicken Patty (Not Enrobed)	72.45	48%	2.00	2.48	19.51
Chicken Patty(Enrobed)	74.44	67%	2.02	2.45	26.10
Sausage (Cooked)	76.36	58%	2.03	2.44	21.20
Sausage (Smoked)	78.41	62%	2.04	2.43	24.08
Average	**67.10**	**56%**	**1.97**	**2.52**	**23.70**

Note: The estimates above corresponds to pooled data of three processing units.

5.3.Break Even Analysis

Break Even Analysis indicates that BEP of output is 5174kgs, 25871kgs, 68989kgs which comes at 69.8%, 68.57% and 60.51% of utilized capacity and 41.76%,41.02% and 36.31% of full capacity of small, medium and large units respectively.Table 11 shows that minimum quantity of 5174kgs, 25871kgs, 68989kgs per year should be produced in case of small, medium and large units so as to continue production process without sustaining losses. The remaining output (30.2%, 31.43% 39.49%) is considered as margin of safety where profits starts generating.

Table₁₁:Break Even output of emulsion products on different size groups of units.

Type of Unit	Installed capacity(kg/yr)	Output at utilized capacity (1st year@60%)	BEP (kg) of output	BEP as a % of utilized capacity	BEP as a % of installed capacity
Small units	8624	5174	3601.29	69.8	41.76
Medium units	43118	25871	17689	68.57	41.02
Large units	114982	68989	41750	60.51	36.31
Average	**55575**	**33345**	**21013**	**63.02**	**37.81**

Attainment of BEP at lesser time (Table 11) at higher levels of capacity utilization indicates that the plant is financially feasible. It is evident from table11 that margin of safety shows positive relation with capacity showing higher profits on large units. However small units(5174kg), medium units(25871kg) and large units(68989kg) have processed emulsion more than breakeven level indicating that all units are running under profitable conditions. Further variation in these breakeven points was due to efficient utilization of resources. We can conclude from the Break Even Analysis that on an average, emulsion products break even at 63.02% and 37.81% of full and utilized capacity respectively with 36.98% of margin of safety. Further margin of safety goes on increasing in successive years as capacity increases showing increased profitability in successive years.

CONCLUSIONS

- Processing of emulsion meat products is highly capital intensive business as reflected by high initial investment, working capital, total costs.
- In emulsion meat products , the highest share in total cost was constituted by variable cost with a share of 81.79% of total costs. Fixed costs account for 18.21% oftotal costs. The results revealed that the cost of meat production was higher in the case of small units followed by medium and large units which reflected the economies of scale.

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- Economies of scale were observed in emulsion meat products as indicated by negative relation between cost and capacity and positive relation between capacity and returns. Across the units, large units were found to be more profitable and viable.

- Among the emulsion products enrobed eggs shows higher estimates with respect to all the parameters like highest investment ,working capital, cost and returns.

- Higher estimates were reported by large units across units and enrobed eggs among the products.

- It is concluded from ratio analysis that emulsion meat production is profitable on all categories of plants for all the products with variations in magnitude of estimates.

- The results of the feasibility analysis showed that all the discounting measures (NPV, IRR and BC) were quite high for all the categories of the units for all the products which clearly indicate the financial worthiness of emulsion meat production .

- This calls for evolving policy measures by the planners to promote the processing units on large scale. Moreover, it will provide impetus to the food processing industry.
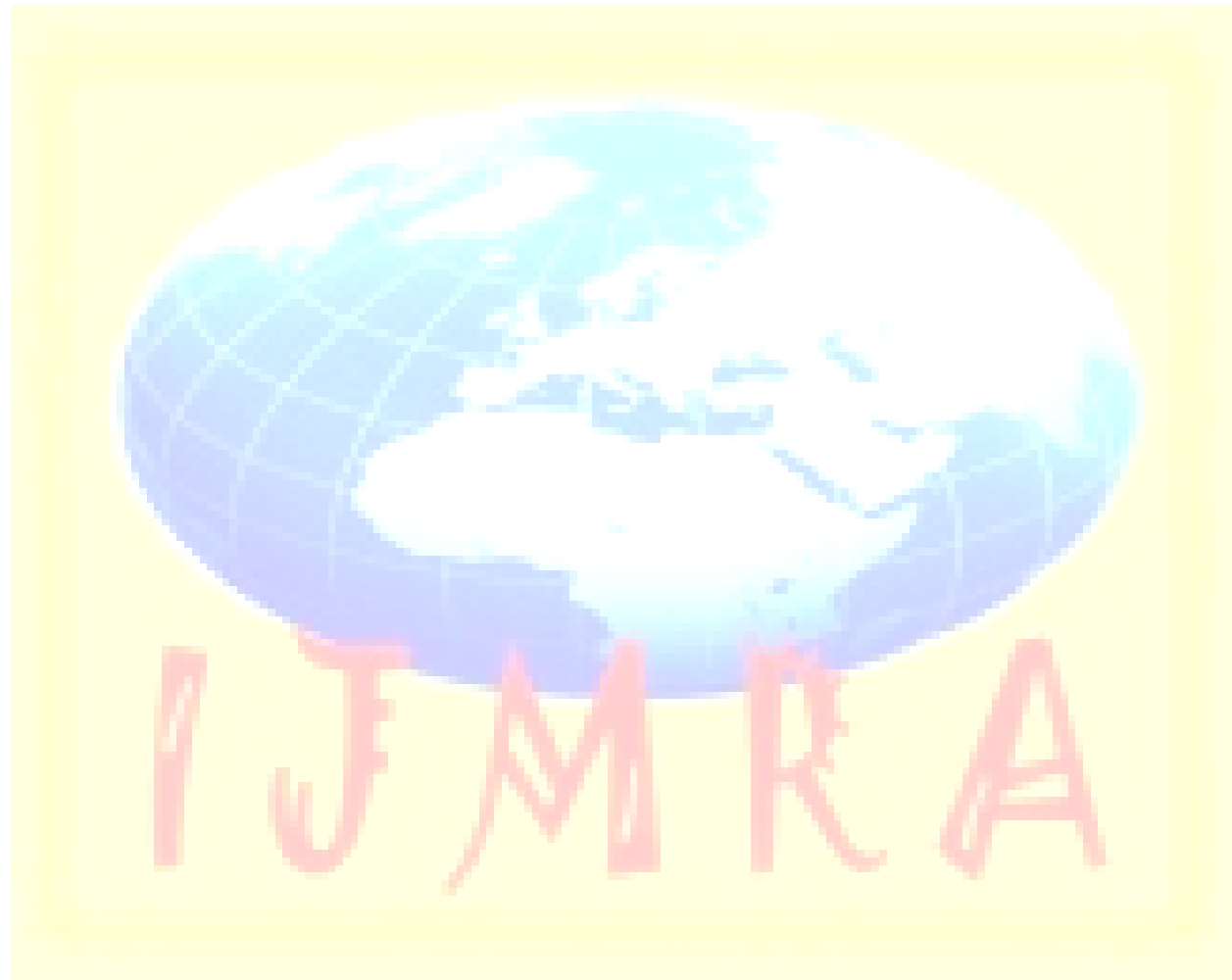
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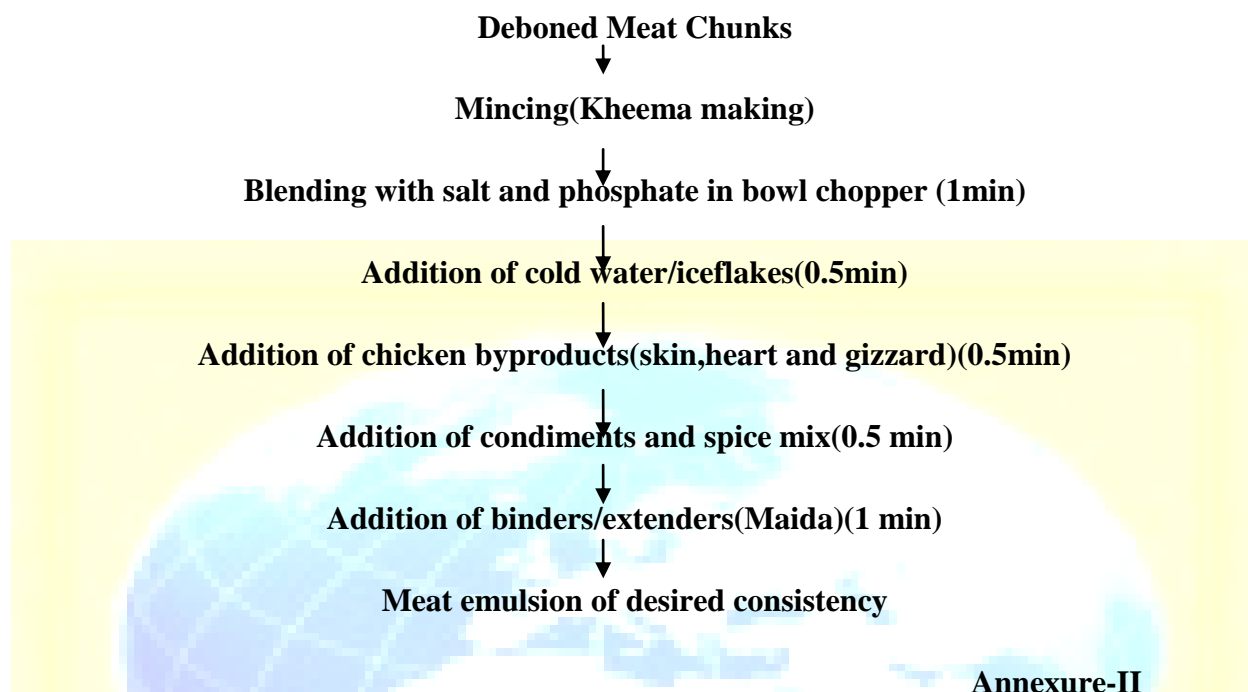**International Journal of Marketing and Technology**
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Annexure-I

Process Flow of Emulsion

Deboned Meat Chunks
↓
Mincing(Kheema making)
↓
Blending with salt and phosphate in bowl chopper (1min)
↓
Addition of cold water/iceflakes(0.5min)
↓
Addition of chicken byproducts(skin,heart and gizzard)(0.5min)
↓
Addition of condiments and spice mix(0.5 min)
↓
Addition of binders/extenders(Maida)(1 min)
↓
Meat emulsion of desired consistency

Annexure-II

Composition of Spice mixture

S.No	Ingredients	Grams per litre of water
1	Anise(soant)	10
2	Black Pepper(kali mirch)	5
3	Capsicum(Mirch)	10
4	Caraway(Ajwain)	10
5	Cardamom(Elaichi)	4
6	Cinnamon(Dalchini)	4
7	Cloves(Laung)	2
8	Corriander(Dhania)	15
9	Cumin(Zeera)	20
10	Dry ginger(Sont)	10
11	Turmeric(Haldi)	10
	Total	**100**

Source:NRCM

Annexure-II

Composition of ingredients for Emulsion

S.No	Ingredients	Percentage Composition		
		Prime	**Choice**	**Economy**
1	Deboned Chicken Meat	67	57	47
2	Chicken Fat	13	8	
3	SGH		15	15
4	Bottle Guard			5
5	Cabbage			5
6	Cooked Potato			5
7	Whole Egg Liquid			5
8	Maida	3	3	3
9	Spice mixture	1.5	1.5	1.5
10	Condiments	3.5	3.5	3.5
11	Ice flakes	9.7	9.7	7.6
12	Poly phospahtes	0.3	0.3	0.4
13	Salt	1.7	1.7	1.7
14	Sugar	0.3	0.3	0.3
15	Sodium nitrite	0.01	0.01	0.01
	Total	**100**	**100**	**100**