

Original Research Article

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Estimation of Production Cost of Ready to Cook Milk Based Snack ‘MILK CRISP’

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ABSTRACT

Keywords

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Beside nutritive value and acceptability, cost is very important criterion that determines the marketability of any milk and milk-based products. Therefore, in the present study, the cost of production of Ready to Cook Milk Based Snack (RTCMBS) with incorporation of starchy flours and extenders in comparisons with those of control was calculated. To produce quality products scientifically and hygienically, a mini milk processing plant is necessary for commercialization of RTCMBS ‘Milk Crisp’. Efficient costing system must generate information which can help to formulate realistic pricing of products. Cost analysis is also helpful to a business firm in controlling and ascertaining cost of production. Lowest retail price for 1 Kg of selected ready to cook milk-based snacks = Rs 359.36/kg *i.e.*, each 100 g packet can be sold at retail price of Rs. 36. However, margin of profit can be substantially increased by using commercial equipment’s for increasing per day production.

Introduction

Milk is an important agricultural produce of the country. As a single commodity, it has the highest value, even as high as the combined value of paddy and wheat. Milk has enjoyed pride of place among all foods in India, being regarded as “nectar” since the dawn of Indian civilization some 5000 years back. Milk is not

a status symbol but it is the symbol of nutrition.

Starches and starch derivatives have a long history of use in snack foods, especially as functional ingredients to help them achieve various textural attributes. They are the main constituents of the extruded snacks and are responsible for most of their structural

attributes. These snacks are dense in energy but are nutritionally poor and it is possible to add functional quantities of beneficial nutrients to them (Huang, 2000).

A snack should be balanced nutritionally, should provide quick energy, easy to eat and of great taste. One requirement transcends all others and is that, a snack should be perceived as healthy (Pikuda and Ilelaboye, 2009). Snack foods being convenient food items are most suitable for working women, school age children and highly mobile population (Lusas and Rhee, 1987). Snacks have become one of the major groups of the functional food products in diet (Roberts, 2002). It can serve the purpose of healthy food, entertaining and tasty food and ethnic cuisines of consumers (Anon, 1998).

Snacks incorporating Milk can open new avenues for small scale entrepreneurs and women co-operatives. These types of products can be marketed without need of refrigeration and have extended shelf life which may allow limitless marketing opportunities. Further the manufacturing of such products can be scheduled to coincide

with availability of raw materials or manufacturing capacity.

In view of the above facts, the present research study was conducted to develop a ready to cook (fry) crisp snack from milk (named as 'Milk crisp') with the objectives to estimate the production cost of 'Milk Crisp'.

Materials and Methods

Source of raw materials

Milk

Milk for pursuing this study was procured from the Dairy Technology Section of Indian Veterinary Research Institute, Izatnagar, Bareilly (U.P.). The milk procured was pasteurized one with combination of cow and buffalo milk as per daily production at dairy farm. Skim milk used in this study was prepared by separating the cream using a hand-driven centrifugal cream separator. The physico-chemical characteristics of the skim milk were analyzed before its use in product processing as mentioned below:

Ph	Fat	SNF	Density	Protein	Lactose
6.67±0.05	0.63±0.08	8.09±0.12	31.3±2.35	2.95±0.31	4.48±0.32

Ingredients

Starchy flour I, Starchy flour II and extender A and B (names concealed for patenting), salt, vegetable oil and spices etc were purchased from the local market of Bareilly.

Chemicals

All chemicals used were of Analytical grade and were obtained from standard firms (Qualigens, Mercks, Hi Media, SRL etc.).

Packaging material

Low density polyethylene (LDPE) films (250 gauge) in natural color were used from the manufacturer, M/s Hitkari Industries Ltd, New Delhi for packaging of the products for conducting storage studies.

Raw material cost

The major determinant of product cost is raw materials, which determine the profit earned by producer. Raw materials used in the

processing of 'Milk Crisp' are milk coagulum, starchy flour I and II, extender A and B, table salt and citric acid. The retail prices for these ingredients are relatively stable in our marketing system. However, the cost of these ingredients can be reduced if purchased in bulk quantity from distributor/whole sale agent. The costs of raw ingredients are presented in Table 1 and costs of raw materials required per day for 100 kg formulation are given in Table 2.

Cost of processing equipment's

Processing machines are used to perform certain operations with speed and accuracy which may not be possible with manual labour. The approximate cost of processing and other machineries required for making 'Milk Crisp' are as follows in Table 3.

Depreciation rate = 10% per annum

=Rs.36630/annum

=Rs.122.10/day (300 working days /annum)

These processing equipment's can be potentially utilized in making other milk products simultaneously thereby decreasing the cost of inventory items.

Packaging cost

Milk Crisp' could be packaged in low density polyethylene bags (LDPE bags). About 2.5 kg LDPE bags are needed to pack the product prepared from 100 kg formulation, each containing 50/100 g finished product. 2.5 kg of printed LDPE bags cost Rs.300/day (Rs.120/kg). Thus, cost of packaging material is Rs.300/day. Cartons are also required for bulk packing and storage for transportation and distribution.

Labour cost

Presently the labour cost of skilled person is about Rs.300/day and that of unskilled person

is around Rs.165/day. For handling 100 kg formulation two skilled and three unskilled labours are required per day. The labour cost can be calculated as:

Skilled staff = 300 x 2 = Rs.600/day

Unskilled staff = 165 x 3 = Rs.495/day

Total labour cost = Rs.1095/day

Cost of electricity

The electricity charges have been calculated considering the charges of electricity under industry category (Rs. 5/KWh). Thus, the cost of electricity incurred on processing of 100 kg formulation can be calculated as shown in Table 4:

Therefore, cost of electricity = 65.2 x 5
= Rs.326 /day

Cost of water

Water is the basic requirement for setting up any food processing industry. The cost of water includes the cost of water pump sets, pipeline fitting and electricity incurred in pumping water. For preparing 1 kg of 'Milk Crisp' formulation, around 15 litre of water is required. So, for 100 kg it comes to about 1500 litres of water/day. For pumping 1500 litres water, one motor of 1 Horse Power is to be run for 1.5 hours which will utilise 1.5 units of electricity costing Rs. 7.5/day. So total cost of water/day can be calculated as follows:

Cost of bore well, water storage tanks and 1 pump set = Rs.50, 000/-

Depreciation / year @ 10% = Rs.5000/-
i.e. Rs.17/day

Therefore, total cost of water/day = Rs.24.5

*Sourcing potable water from municipal supply is cheaper.

Table.1 Cost of raw ingredients (per kg)

S. No	Ingredients	Cost (Rs/kg)
1.	Whole milk (4.5% fat)	25
2.	Skimmed milk coagulum (0.1% fat)	150
3.	Starchy flour I	55
4.	Starchy flour II	20
5.	Extender A	70
6.	Extender B	70
7.	Citric acid	400
9.	Table Salt	11

Table.2 Costs of raw materials required per day for 100 kg formulation

Ingredients	Control		Treatment A		Treatment B	
	Quantity (kg)	Cost (Rs)	Quantity (kg)	Cost (Rs)	Quantity (kg)	Cost (Rs)
Skimmed milk coagulum (0.1% fat)	55	8250	50	7500	45	6750
Starchy flour I	35	1925	35	1925	35	1925
Starchy flour II	10	200	10	200	10	200
Extender A	-	-	5	350	-	-
Extender B	-	-	-	-	10	700
Total	100	10375	100	9975	100	9575

Table.3 Cost of processing equipment's to prepare 100 kg formulation for 'milk crisp'

Equipment's	No.of items Required	Rate (Rs./item)	Total (Rs.)
Processing equipment's			
Cream separator	1	50000	50000
Steam cooker	1	5000	5000
Hot air oven/ drier	1	50000	50000
Electric grinder/ mixer	1	5000	5000
Impulse sealer	1	5000	5000
Weighing balances	1	5500	5500
Cooling equipment's			
Refrigerators (500L)	2	20000	40000
Split a/c (1.5 ton)	3	30000	90000
Utilities			
Gas burner setup	1	3000	3000
Gas cylinder	2	1400	2800
Geyser	1	10000	10000
Utensils and furnitures (knives, pressing wooden box, tables etc.)	--	--	100000
Total			366300

Table.4 Electricity charges for industrial processing of ‘Milk Crsip’

Equipment	Watts x hr	KWh
Cream separator	1000 x 1	1.0
Impulse sealer	100 x 2	0.2
Refrigerator	150 x 2 x 20	6.0
Hot air oven/ incubator	150 x 1 x 20	3.0
Geyser	2000 x 6	12.0
Fans/ weighing balances	500 x 10	5.0
Electric grinder/ mixer	1000 x 2	2.0
Air conditioners	1500 x 3 x 8	36.0
Total units		65.2

Table.5 Cost (Rs.) of 100 kg formulation of RTCMBS/day

Particulars	Control	Treatment A	Treatment B
Raw material cost	10375	9975	9575
Cost of machineries (depreciation cost)	122.10	122.10	122.10
Packaging cost	300	300	300
Labour cost	1095	1095	1095
Cost of electricity	326	326	326
Cost of water	24.50	24.50	24.50
Rent	333	333	333
Maintenance	150	150	150
Total Processing expenditure (Rs.)	12725.60	12325.60	11925.60
Dealer commission (10%)	1272.56	1232.56	1192.56
Transportation cast (3%)	381.77	369.77	357.77
Marketing cost (13%)	1654.33	1602.33	1550.33
Total expenditure (Rs.)	14379.93	13927.93	13475.93

Rent

Renting a building large enough to run a small-scale processing plant with all facilities will cost around Rs.10, 000/ month in semi urban areas. Thus, the cost of rent comes to about Rs.333/day.

Maintenance costs

These are incurred on materials of daily use like telephone, detergents, soaps, sanitizers, hand wash and solid waste material disposal etc. which can be taken approximately Rs.150/day.

Total processing expenditure

The sum of all above cost (4.4.1 to 4.4.8) account for total cost for the production. Cost of production of product from 100 kg formulation per day is shown in Table 5.

Marketing costs

For marketing a processed milk product, the commission to be paid for wholesalers/agents/dealers and retailers come to about 10%; the cost of bulk packaging and transportation to around 3% of retail prices of finished products. Therefore, the total

marketing cost works out to be 13% of the retail price of the product.

Gross profit

A gross profit of 12-15% is considered the optimum for processed food items, which is produced in a small-scale industry. i.e. average gross profit for producers = Rs. 12%

Profit from 100 Kg of product = Rs1765.90, 1711.66 and 1657.42/day for control, treatment A and B respectively.

Product yield

The cooking yield was around 35.93%,

37.72% and 42.50%, for control, Treatment A and B respectively. However, a safety margin of 1-2% is to be considered to compensate for losses that might occur during various steps of processing, packaging and marketing. Thus, a final yield of 35%, 37% and 42 % can be considered practical.

Retail cost of ready-to-cook milk-based snacks

Cost of 1 kg product =

$$\frac{\text{Total expenditure} + \text{gross profit}}{\text{Product yield}}$$

Formulations	Calculation	Cost/kg
Control	$\frac{14379.93+1725.59}{35}$	=Rs.460.16/kg
Treatment A	$\frac{13927.93+1671.35}{37}$	= Rs.420.14/kg
Treatment B	$\frac{13475.93+1617.11}{42}$	= Rs.359.36/kg

In conclusion, therefore, suggested lowest retail price for 1 Kg of ready to cook milk-based snacks (treatment B) = Rs 359.36/kg i.e each 100 g packet can be sold at retail price of Rs. 36. However, margin of profit can be substantially increased by using commercial equipment's for increasing per day production.

Declaration of interest

The authors report noconflicts of interest. The authors alone are responsible for the content and writing of the paper.

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