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## REVIEW ARTICLE

# A STUDY ON COST ANALYSIS OF PROCESSING OF FULL CREAM MILK IN HARYANA DAIRY CO- OPERATIVE SOCIETIES

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# A Study on Cost Analysis of Processing of Full Cream Milk in Haryana Dairy Co-operative Societies

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Now this is an accepted fact that, in order to meet the objectives, the milk plants have got to be financially efficient in the long run. The efficiency of milk plants is conditioned by the efficiency in the volume of raw milk purchased, processing of collected milk for its conversion into various milk products in demand and packaging, storage, distribution and proper marketing of the milk and its products. The whole process of efficiency of a milk plant essentially boils down to controlling of the cost of all the individual operations carried out by the plant. The cost effectiveness of all the operations is bound to the effect on the overall efficiency of the plant. Analysis of the cost of various operations in the plant is thus a major determinant of the resource use for the efficiency of the enterprise.

## MATERIAL AND METHODS:

The yearly data has been collected from plants for the cost analysis of full cream milk. The data were recorded for the ten years period, beginning from 2000-2001 to 2009-2010. All the expenses incurred on processing of milk, right from the point of the receipt of milk at the reception dock till it is converted into final product, fall under this head. The processing cost is divided in two heads; fixed costs and Variable costs. These heads further divided in sub heads like; Fixed costs includes: Management, Administration and Office, Depreciation on building, Interest on building, Depreciation on machinery, Miscellaneous and variable costs includes; Electricity, Steam, Refrigeration, Repair and maintenance, Labour and Supervision, Quality Control and Detergent and Sanitizer.

## PROCESSING COST:

The procedure milk is processed for its conversion into various grades of market milk as well as different milk products. The processing cost is composed of fixed and variable costs. Fixed cost includes five main cost components, i.e., management administration and office (Mgd. Adm. And office), depreciation on building, interest on building, depreciation on machinery, and

miscellaneous. In the same way variable cost has seven main cost components, viz., electricity, steam, refrigeration, repair and maintenance, labour and supervision, quality control, detergent and sanitizers. Nearly 85 percent of the marketed milk was handled by the informal segment comprising middlemen, private milk traders and direct sale from producer to consumer. Moreover, nearly 85 percent of all the milk that entered the exchange economy found its way into the urban areas. Thus, it is the urban demand that is the main source of cash for rural milk producers. There is significant variation in the share of informal segment in total marketed surplus. For example, in 1998, the share of unorganized trade in Orissa was estimated about 95 percent. Some observers attribute the low share of organized sector to unimaginative and staid procurement policies and the inflexible practices of the milk cooperatives (Kurup & Mittal, 1999).

The details of component wise processing cost for the study plants for ten years for fat corrected whole milk for both the plants A and plant B only are presented in tables 1, 2, respectively and the respective statistical attributes of component wise processing cost of these are presented in tables 3.

The component wise processing cost of full cream milk has been presented in Table 1 & 2. Close examination of the tables reveal that average processing cost per hundred kg products was Rs. 68.53 was for 2000-01 and 75.30 for 2009-10 at plant A it was maximum 112.53 in 2004-05 and least 66.92 in 2008-09 this variation at plant A was mainly due to variation in management admin & office cost, and electricity and repair & maintenance cost. Whereas at plant B it was 115.58 for 2000-01 and 132.98 for plant B it was highest 126.87 in 2004-05. It was observed that the fixed costs of both plants are almost in same phase. Building and civil structures are also important part of the processing unit, which consisted of office structures, storage, godowns, etc. In this regard, private sector occupied nearly 6.94 per cent of total investment. Whereas, in case of

cooperative sector also just about 7.18 percent of total investment. This revealed for heavy investment pattern in processing units as similarly indicated by Manjunatha (2003).

The processing cost of plant B is higher than that of plant A because the quantity processed at plant B is less than plant A. The processing cost at plant B was over all same for all components of fixed cost and variable costs but at plant A there was variation. In 2000-01 for plant B it was 133.51 and at plant A it was 54.83. There were big fluctuations at plant B but for plant A there was very less difference during the time

of research. The highest value for plant A was 80.02 but for plant B it was 384.82.

In cost of fixed components the management admin. & office was higher at both the plants in comparison to other fixed costs. The second higher fixed cost was for both plants were depreciation on machinery. If both plant A & plant B take care of machineries and have proper maintenance of machineries they can surely cut down the cost and that was beneficial for both plants. The least fixed cost after miscellaneous cost was depreciation on building for both plants.

PLANT A					TABLE 1					
PROCESSING COST OF FULL CREAM MILK										
Rs./100 kg										
COST COMPONENT/YEAR	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
I. FIXED COSTS:										
1.MANAGEMENT ADMIN & OFFICE	21.60	29.39	30.21	21.33	40.63	29.72	26.63	21.90	22.63	25.71
2.DEPRECIATION ON BUILDING	0.54	1.26	0.99	2.73	1.08	1.16	1.34	1.04	0.79	0.65
3.INTEREST ON BULIDING	0.68	2.40	2.39	1.94	3.31	2.18	3.01	2.39	2.02	1.86
4.DEPRECIATION ON MACHINERY	5.19	12.59	10.98	10.85	14.45	9.24	7.43	5.34	2.91	3.38
5.MISCELLANEOUS	0.03	0.03	0.03	0.04	0.04	0.06	0.06	0.08	0.08	0.10
SUB-TOTAL – I	28.03	45.67	44.60	36.89	59.51	42.35	38.46	30.75	28.43	31.71
II. VARIABLE COSTS:										
1.ELECTRICITY	26.53	23.83	22.27	20.61	30.73	32.50	28.32	23.54	20.56	20.89
2.STEAM	6.83	6.87	6.85	7.68	10.58	9.07	10.87	7.11	8.10	8.77
3.REFRIGERATION	0.10	0.10	0.16	0.10	0.35	0.92	1.23	0.63	0.80	0.71
4.REPAIR & MAINTENANCE	3.21	3.98	7.07	4.69	7.97	8.69	7.75	6.80	4.70	8.56
5.LABOUR & SUPERVISION	2.30	1.68	5.16	3.50	1.01	3.07	5.22	2.37	1.52	1.91
6. QUALITY CONTROL	0.75	0.82	0.80	0.96	1.44	2.30	3.12	2.44	2.16	1.98
7.DETERGENT & SANITIZER	0.78	1.03	0.94	0.76	0.96	1.42	0.92	0.90	0.65	0.78
SUB-TOTAL II	40.50	38.31	43.24	38.29	53.02	57.97	57.42	43.78	38.49	43.60
GRAND -TOTAL (I+II)	68.53	83.98	87.84	75.18	112.53	100.33	95.89	74.53	66.92	75.30
TOTAL QUANTITY OF MILK	474678.19	496603.59	543961.46	583225	428043	428511.81	572941.38	720966.72	851658.01	924801.17

PLANT B					TABLE 2					
PROCESSING COST OF FULL CREAM MILK										
Rs./100 kg										
COST COMPONENT/YEAR	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
I. FIXED COST										
1.MANAGEMENT ADMIN & OFFICE	14.05	16.91	19.85	20.95	18.90	22.16	33.89	35.64	44.52	41.15
2.DEPRECIATION ON BULDING	0.18	0.43	0.42	0.28	1.27	1.49	1.62	1.67	1.73	1.86
3.INTEREST ON BULIDING	1.10	1.84	1.72	2.02	2.59	2.22	2.33	2.44	2.32	2.55
4.DEPRECIATION ON MACHINERY	4.70	5.32	5.21	5.98	8.58	8.75	9.98	12.61	8.65	9.49
5.MISSCELLANEOUS	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.04
SUB-TOTAL – I	20.10	24.54	27.25	29.28	31.39	34.67	47.85	52.39	57.25	55.08
II. VARIABLE COST										
1.ELECTRICITY	62.55	55.64	48.52	45.62	55.34	49.97	38.06	37.85	31.26	37.33
2.STEAM	16.11	16.05	14.93	17.00	19.05	13.94	14.60	11.43	12.31	15.66
3.REFRIGERATION	0.23	0.23	0.36	0.22	0.62	1.42	1.65	1.01	1.22	1.26
4.REPAIR & MAINTENANCE	7.56	9.29	15.40	10.38	14.35	13.36	10.42	10.93	7.15	15.30
5.LABOUR & SUPERVISION	5.42	3.93	11.24	7.75	1.81	4.72	7.02	3.82	2.31	3.41
6. QUALITY CONTROL	1.78	1.92	1.73	2.12	2.59	3.53	4.19	3.92	3.29	3.54
7.DETERGENT & SANITIZER	1.84	2.40	2.04	1.68	1.73	2.18	1.23	1.45	0.99	1.38
SUB-TOTAL II	95.48	89.46	94.22	84.76	95.48	89.13	77.17	70.40	58.53	77.89
GRAND -TOTAL (I+II)	115.58	114.00	121.47	114.04	126.87	123.80	125.02	122.79	115.78	132.98
TOTAL QUANTITY OF MILK	201344.86	212646.01	249644.94	263473	237676	278713.08	426347.26	448342.52	560017.03	517587.38

It was observed that the share of fixed cost in total processing cost was higher in plant B in comparison to plant A. It is visible from Table 1&2 and the graph below that the total fixed cost of plant A ups and down throughout the research duration it was 28.03 in 2000-01 then became 45.67 in 2001-02, in 2003-04 it came down to 36.89 and in 2004-05 it raised up to 59.51 in coming years it went down and became 28.43 in 2008-09 and finally in 2009-10 it raised again and became 31.71. But for plant B it was continuously on increase it starts from 20.10 in 2000-01 and raised up to 57.25 in 2008-09 then there is a slightly decrease in 2009-10 that is 55.08.

The fixed cost percentage of full cream milk is almost 50% for plant A but for plant B it was around 25% till 2005-06 and after that it increases up to 49.45% in 2008-09. At plant A it was highest in 2001-02 i.e. 54.38% and then it was decreases continuously till 2009-10 with little bit plus and minus. In the year 2000-10 for plant A it was 40.91% and for the year 2009-10 it was 42.11%. The lowest fixed cost was in 2006-07 i.e. 40.11%. These fluctuations in both plants are due to changes in management administration & office costs and deprecation on machineries.

Of the total processing cost the variable cost for plant A electricity was highest it was almost 50% higher than other variable costs. The steam and repair and maintenance cost were neck to neck during the research period except in 2000-01 and 2001-02 the cost was 6.83 and 6.87% 3.21 and 3.98% respectively. For 2002-03, 4005-06, 2007-08 and 2009-10 the costs were almost same. The contributing share of other variable cost like quality control, labour and supervision, refrigeration and repair and maintenance are very less. Among these costs the cost of refrigeration and detergent & sanitizer costs were least because at plant A butter is the only products which need refrigeration other products required refrigeration for very less time.

Some of the major variable cost components at plant B like electricity went highest in 2005-06 i.e. 32.50 although the cost of electricity is highest among other variable costs at plant B. The cost of steam and repair & maintenance are higher than Plant A and in plant B itself. The next higher variable cost after these are labour & supervision, quality control and followed by refrigeration and detergent & sanitizer. The plant B also spends least on refrigeration & detergent & sanitizer. If plant B cut down its variable cost of electricity it will get more profit in processing of full cream milk.

As far as variable costs of both the plants are concerned the variable cost of plant is much higher than the variable cost of plant A. throughout the duration of research the cost of plant B is almost double of the cost of plant A. this increased cost was due to increase in the cost of electricity, steam, repair & maintenance, labour & supervision, quality control and detergent & sanitizer. All variable costs are almost double at plant B as compared to plant A as shown in the table no. 1 & 2. For plant A electricity cost was 26.53 in 2000-01 and it went down finally it became 20.89 in 2009-1 but for plant B it was 62.55 in 2000-01 and became 37.33 in 2009-10.

As total variable cost of plant B is higher than plant A so as the percentage of variable cost of plant B is higher than plant A but from 200-01 to 2005 -06 the percentage was very but after the gap was on decrease from 2006 -07 and in 2009-10 there was only 1% difference between the plants. The processing of plant A was Rs. 68.53 in 2000-01 and it reached up to Rs.75.30 in 2009-10 but at plant B it was 115.58 in 2000-01 and 132.98 in 2009 10. The processing cost at plant A was highest in 2004-05 i.e. Rs. 112.53. The processing cost of full cream milk in the present study was higher than the findings of Sangu 1993 he observed that the processing cost was 25.99 to 51.70 and 66.39 to 105.54 Rs. per hundred litres for two cooperative dairies in Meerut in 1988 and 1990. (Sangu, 1993)

The highest variable mean value for plant A is of electricity. The maximum difference was in electricity i.e. for plant A it was 24.98 and for plant B it was only 4.12. The difference in mean values of all fixed cost components was highest in depreciation on machinery and the minimum difference was between miscellaneous. Among variable costs the highest difference between quality control and minimum was between refrigeration.

Magnitude of CV revealed that cost incurred on depreciation on machinery was highest among other costs of fixed components for both the plants. The second highest was depreciation on building for plant A and on management for plant B. the least cost for plant A was of management and for plant B it was of interest on building.

The coefficient of variation of costs of variable components was studied that it was highest on refrigeration for both the plants. The second highest was for labour & supervision and it was followed by quality control. The least variation was for electricity for both the plants.

STATISTICAL ATTRIBUTES OF PROCESSING COST OF FULL CREAM MILK							Table 3
Rs. 100/kg							
COST COMPONENT/ATTRIBUTES	PLANT A			PLANT B			DIFFERENCE OF MEAN/PLANT
	MEAN	S.E.	C.V.	MEAN	S.E.	C.V.	
I. FIXED COST							
1.MANAGEMENT ADMIN & OFFICE	26.97	5.63	20.88	26.80	10.37	38.70	0.17
2.DEPRECIATION ON BUILDING	1.16	0.58	49.92	1.09	0.65	59.01	0.06
3.INTEREST ON BUILDING	2.22	0.67	30.29	2.11	0.43	20.55	0.10
4.DEPRECIATION ON MACHINERY	8.24	3.78	45.95	7.93	2.42	30.53	0.31
5.MISCELLANEOUS	0.05	0.02	44.57	0.04	0.01	21.09	0.01
SUB-TOTAL – I	38.64	10.69	191.62	37.98	13.88	169.87	0.66
II. VARIABLE COST							
1.ELECTRICITY	24.98	4.12	16.48	46.21	9.47	20.50	21.24
2.STEAM	8.27	1.44	17.39	15.11	2.10	13.93	6.84
3.REFRIGERATION	0.51	0.38	75.59	0.82	0.52	63.89	0.31
4.REPAIR & MAINTENANCE	6.34	1.91	30.19	11.41	2.88	25.28	5.07
5.LABOUR & SUPERVISION	2.77	1.39	50.11	5.14	2.70	52.56	2.37
6.QUALITY CONTROL	1.68	0.79	47.34	2.86	0.89	31.13	1.18
7.DETERGENT & SANITIZER	0.91	0.20	21.95	1.69	0.42	24.69	0.78
SUB-TOTAL II	45.46	10.24	259.05	83.25	19.00	231.97	21.24
GRAND -TOTAL (I+II)	84.10	20.93	450.67	121.23	32.88	401.84	21.58

## CONCLUSION:

The total cost of processing of full cream milk ranged from Rs. 479.88 to 682.67 for plant A and for plant B Rs. Rs. 534.46 to Rs. 626.99. The share of procurement cost being Rs. 277.35 to Rs. 378 and Rs. 347.10 to Rs. 374 at two plants respectively. Processing cost of hundred kg milk was Rs. 68.53 to Rs. 75.30 for plant A and for plant B Rs. 115.58 to Rs. 132.98, which was 57.80% to 55.46% and 64.94% to 59.75% of the total cost at the two plants respectively.

In the processing cost, the share of fixed cost was 40.91% to 42.08% at plant A and 17.39% to 41.42% at plant B. The corresponding shares of variable cost to the processing cost were 59.09% to 57.89% and 82.61% to 58.58% at the two plants. Within the processing cost components, management admin & office (31.52% to 34.15%), (12.16% to 30.94%) and electricity (38.71% to 27.75%), (54.12% to 27.75%) at plant A and B respectively and to was at the highest and accounted for at both the plants. The contribution of packaging cost towards the total cost was 5.42% to 7.18% at plant A and 4.86% to 7.82% plant B during the course of study. Inter unit distribution cost was always less than that of market distribution cost.

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