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Milk Procurement Cost for Co-operative and Private Dairy Plants in Tamil Nadu – A Comparison

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I

INTRODUCTION

The triumph of dairy industry is extremely influenced by operations, viz., procurement of milk, processing and distribution of milk and its products. Among these three components, milk procurement is the edifice of the dairy industry on which economic efficiency of dairy industry lies. Efficiency of milk procurement is heavily dependent on the operational efficiency, viz., milk collection, transportation, chilling and reception of milk.

In India, dairy plants have different systems of milk procurement, namely, contractor system, co-operative system or their own collection network. Efficient milk procurement by dairy plants minimise the cost of procurement and lead to improvement in the milk procurement and marketing efficiency of dairy plants. In the liberalised era, co-operative dairy plants are facing severe competition from private dairy plants, milk vendors, contractors and other agencies dealing with milk procurement. In this situation, the analysis of procurement cost in dairy plants would help in reducing the unnecessary costs in dairy plants.

Researchers such as Rao (1976), Khokhar (1985), Sharma *et al.*, (1974), Sandhu (1980), Rawat and Singh (1984), Ram and Singh (1987), Chauhan (1987), Pundir (1988) and Malik (1989) studied the cost of collection of milk, cost of transportation and chilling of milk in North western India. Scant attention has been made to compare in depth the economics of milk procurement by co-operative and private dairy plants so far. Keeping this in view, the present study is an attempt to compare the cost of milk procurement by co-operative and private dairy plants in Tamil Nadu.

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II

MATERIAL AND METHOD

To compare the procurement aspects of milk, one dairy plant from the co-operative sector and one dairy plant from the private sector were selected purposively in Coimbatore district of Tamil Nadu. The installed capacity of the co-operative dairy plant was 2 lakh litres per day. The average daily milk procurement of the plant was 1,25,000 litres. The milk was collected through 545 milk producer co-operative societies on 41 milk collection routes and chilled at four chilling centers, covering the entire Coimbatore district. The installed capacity of the private dairy plant was 2 lakh litres per day. The average daily milk procurement was 1,50,000 litres. The milk from the collection centers was transported through forty-three milk collection routes.

For the purpose of working out collection cost per litre of milk for co-operative and private dairy plants, 20 milk producer co-operative societies and 20 milk collection centres were selected by probability proportion to sample size method based on quantity of milk collected. For ascertaining transportation cost, twenty routes from co-operative plant and twenty routes from private plant were selected by probability proportion to sample size method based on quantity of milk transported. To work out chilling cost, all the chilling centres which were attached with co-operative and private dairy plants were selected. To study the seasonal variation in the procurement cost of milk, the year was decomposed into four distinct seasons (based on quantity of milk procured in different months, milk production and availability of milk in the region), viz., Flush season (April-July), Transitory season I (August-October), Lean season (November-January) and Transitory season II (February-March).

The information on all the inputs, fixed cost, variable cost components, salaries and wages of procurement staff and administrative staff, transporter's payment, penalty levied for spoiled milk and total quantity of milk procured for each month was collected from the records maintained in the milk procurement section of the selected dairy plants for the financial year 2001-02.

*Costing Methodology**Milk Procurement Cost*

Cost of milk procurement was ascertained by taking into account the cost of collection, transportation cost, chilling cost and cost of reception of milk at the reception dock.

Cost of Collection

Total cost incurred on the cost of collection comprised the fixed and variable costs. Fixed cost included (a) Salaries and wages paid to the procurement and

administrative staff (apportioned as per the utilities derived) engaged in the process of procuring the milk, (b) Depreciation on fixed assets and (c) Interest on fixed assets.

Fixed assets for collection centres were valued in terms of equipment supplied by the plants to the various co-operative societies, the milk cans, furniture and fixtures, etc., maintained at the society level. Depreciation on value of fixed assets was taken from books and accounts section of the respective dairy plants. Interest on the fixed assets was calculated at the prevailing rate of 6.25 per cent per annum respectively during the year.

Variable cost included the expenditure incurred on consumable articles like EDTA (Ethylene diamine tetra acetic acid) powder, emulsifying agent, antifoaming agent, various detergents and chemicals, etc., used in the testing of milk, cleaning of cans, glass apparatus, books and forms, and stationery supplied by the plant. The milkotester service charges and rent paid for societies was also taken into account in the variable cost.

$$\text{Cost of collection per litre of milk} = \frac{\text{Total cost}}{\text{Total quantity of milk collected}}$$

Cost of Transportation

The milk collected at various collection centres is either transported to chilling centres or directly to the plant. The milk is transported by hired vehicles in milk cans to the chilling centres and directly to the plant from the areas around the milk plant and also milk is transported from chilling centres to the plant by the insulated milk tankers.

Taking these facts into consideration, the transportation cost was calculated in three phases: (i) from collection centre to the dairy plant directly; (ii) from collection centre to chilling centre and (iii) from chilling centre to plant.

Transportation cost was worked out by using the formula given below for the first two phases, viz., from collection centre to the dairy plant directly and from collection centre to the chilling centre.

Total transportation cost = Salary and wages paid to the procurement staff for the different routes + Payment made to the transporter on the different routes - the penalty levied for the spoiled milk on the different routes.

$$\text{Transportation cost per litre of milk} = \text{TC}_i / \text{MT}_i$$

Where

TC_i = Total transportation cost on the i-th route

MT_i = Total quantity of milk transported on the i-th route.

Cost of Chilling

The milk collected from various collection centres is transported to chilling centres. At the chilling centres, the milk is tested, weighed, chilled and stored in insulated storage tanks. The fixed expenditure at the chilling centre included the salary of managerial staff, depreciation and interest on fixed assets. Variable cost at the chilling centre comprised electricity charges, water charges, fuel charges, stationery cost, repairs and maintenance cost, cost of consumables, wages of labour, telephone charges and miscellaneous cost (cost of testing material, compressor oil).

Depreciation values on fixed assets were taken from books and accounts section of the respective dairy plants. Interest on the fixed assets was calculated at the prevailing rate of 6.25 per cent per annum as mentioned earlier.

$$\text{Cost of chilling per litre of milk} = \frac{\text{Total cost of chilling}}{\text{Total quantity of milk chilled}}$$

Transportation Cost from Chilling Centre to Plant

The hired insulated tankers are used by the plant for transporting the milk from chilling centres to the milk plant. All these routes were included in the study to estimate cost of transportation from chilling centre to plant.

$$\text{Cost of transportation/litre of milk} = \frac{\text{Total payment made to the transporter}}{\text{Total quantity of milk transported}}$$

Cost of Milk Reception

The milk is received at milk reception dock from various routes. Cost of milk reception was ascertained by taking into account the salaries and wages of procurement staff at milk reception dock, the amount of water and electricity consumed in cleaning, washing and sterilisation of cans, cost of spare parts, lubricants cost, repairs and maintenance cost and consumables cost. The depreciation and interest on fixed assets was also taken into account.

Depreciation values on fixed assets were taken from books and accounts section of the respective dairy plants. Interest on the fixed assets was calculated at the prevailing rate of 6.25 per cent per annum respectively.

$$\text{Cost of reception per litre of milk} = \frac{\text{Total cost}}{\text{Total quantity of milk received}}$$

The procurement cost of milk in co-operative and private sector dairy plants was worked out by tabular analysis for the financial year 2001-02.

III

RESULTS AND DISCUSSION

Procurement Cost of Milk

The procurement cost comprises cost of collection of milk, cost of transportation, chilling cost and cost of milk reception. The procurement cost components have been worked out and the results are discussed in this section for both the dairy plants.

Cost of Collection of Milk

The component-wise cost of collection per litre of milk has been estimated for selected twenty milk producer co-operative societies (MPCS) and 20 milk collection centres attached with co-operative and private dairy plants respectively. Table 1 indicates that in co-operative dairy plant, the overall average cost of collection per litre of milk was found to be 37 paise per litre. The average quantity of milk collected per society was 10,744 litres of milk per month. The share of fixed cost was 77 per cent and share of variable cost in the total cost was found to be 23 per cent. The salary of staff was maximum with 66 per cent followed by rent paid for societies which was 10 per cent and milko- tester service charges were around 4 per cent.

TABLE 1. COMPONENT WISE AVERAGE MILK COLLECTION COST

Particulars (1)	(Rs./litre)			
	Milk producers' co-operative societies		Milk collection centres	
	Amount (Rs.) (2)	Per cent Cost (3)	Amount (Rs.) (4)	Per cent Cost (5)
(A) Fixed Cost				
Depreciation	124.82	3.16	146.85	3.74
Interest	299.56	7.60	306.80	7.81
Salary of staff	2602.50	65.99	2472.50	62.94
Sub-total	3026.88	76.75	2926.15	74.49
(B) Variable Cost				
Detergents	51.86	1.31	54.51	1.39
EDTA powder	24.88	0.63	26.01	0.66
Emulsifying agent	29.89	0.76	31.41	0.80
Antifoaming agent	47.70	1.21	35.39	0.90
Rent paid for societies	413.04	10.47	414.14	10.54
Books and forms	134.74	3.42	241.51	6.15
Milko tester service charges	172.20	4.37	152.08	3.87
Miscellaneous items	50.90	1.29	47.45	1.21
Sub-total	925.21	23.46	1002.50	25.52
Total cost (A+B) (Rs.)	3952.09	100.00	3928.65	100.00
Quantity of milk collected (lit)	10744.00		10505.00	
Cost of collection per litre of milk (Rs.)	0.37		0.38	

It is visualised from Table 1 that overall average cost of collection per litre of milk was 38 paise for milk collection centres of private dairy plant. The share of fixed cost and variable cost in total cost was found to be 75 per cent and 25 per cent respectively. The salary of staff was the highest with 63 per cent followed by rent paid for societies, books and forms and milko tester service charges of about 11 per cent, 6 per cent and 4 per cent, respectively. The average quantity of milk collected per milk collection centre was around 10,505 litres of milk per month. Thus, it can be concluded that there was a slight variation in the cost of collection of milk between MPCS and milk collection centres.

Seasonal Variation in the Cost of Collection of Milk

The per litre cost of collection and total quantity of milk collected per season was worked out for selected MPCS and milk collection centres of co-operative and private dairy plants. Table 2 shows that per litre cost of collection of milk varied in different seasons. The overall average cost of collection of milk varied from a minimum of 34 paise in flush season and to a maximum of 39 paise in lean season for co-operative dairy plant. The average quantity of milk collected in flush season was 11,522 litres and it was 10,068 litres in lean season for MPCS.

It is evident from Table 2 that the overall average cost of collection of milk varied from a minimum of 36 paise in flush season and to a maximum of 39 paise in lean season for private dairy plant. The average quantity of milk collected in flush season was 10,832 litres and it was 10,220 litres in lean season for milk collection centres. It could be revealed from the above analysis that the quantity of milk collected varied from season to season and so, the cost of collection also varied from societies and milk collection centres in different seasons depending upon the per day total milk collection. Thus, it is concluded that the cost of collection was low in flush season due to highest quantity of milk collected and it was high in lean season due to lowest quantity of milk collected for milk collection centres of co-operative and private dairy plants.

Cost of Transportation

The cost of transportation of milk depends on the total quantity of milk transported, the payment made to transporter, salary and wages to procurement staff and penalty levied for the spoiled milk. The cost of transportation has been worked out for three situations, viz., (i) from collection centre to dairy plant; (ii) from collection centre to chilling centre; and (iii) from chilling centre to dairy plant.

TABLE 2. SEASONWISE COST OF COLLECTION PER LITRE OF MILK FOR CO-OPERATIVE AND PRIVATE DAIRY PLANTS

Dairy plant name	(Rs./litre)								
	Co-operative dairy plant			Private dairy plant					
	Flush (1)	Transitory 1 (2)	Lean (3)	Flush (4)	Transitory 2 (5)	Lean (6)	Flush (7)	Transitory 1 (8)	Transitory 2 (9)
Particulars									
(A) Fixed Cost									
Depreciation	124.82	124.82	124.82	124.82	124.82	124.82	146.85	146.85	146.85
Interest	299.56	299.56	299.56	299.56	299.56	299.56	306.80	306.80	306.80
Salary of staff	2602.50	2602.50	2602.50	2602.50	2602.50	2602.50	2472.50	2472.50	2472.50
Sub-total	3026.88	3026.88	3026.88	3026.88	3026.88	3026.88	2926.15	2926.15	2926.15
(B) Variable Cost									
Detergents	53.75	53.00	53.00	51.67	49.00	52.63	55.50	55.50	54.40
EDTA powder	25.87	25.23	25.23	24.82	23.59	26.54	26.40	25.78	25.30
Emulsifying agent	29.25	30.50	30.50	30.16	29.63	30.00	32.00	30.75	32.88
Antifoaming agent	33.37	90.24	90.24	34.25	32.93	33.33	36.72	34.97	36.55
Rent paid for societies	414.38	412.50	412.50	412.50	412.78	416.88	417.50	412.17	410.00
Books and forms	134.00	135.83	135.83	133.25	135.88	207.63	238.08	263.58	256.75
Milkotester service charges	186.13	168.33	168.33	167.33	167.00	149.56	155.00	151.75	152.00
Miscellaneous items	54.13	45.45	45.45	53.03	51.00	47.88	46.58	45.08	50.25
Sub-total	930.88	961.08	961.08	907.01	901.81	964.45	1007.78	1019.58	1018.13
Total cost (A+B) (Rs.)	3957.76	3987.96	3987.96	3933.89	3928.69	3890.60	3933.93	3945.73	3944.28
Quantity of milk collected (litres)	11522.00	10802.00	10802.00	10068.00	10586.00	10832.00	10475.00	10220.00	10496.00
Cost of collection per litre of milk (Rs.)	0.34	0.37	0.37	0.39	0.37	0.36	0.38	0.39	0.38

Note: Flush season (April-July), Transitory season 1 (August-October), Lean season (November-January) and Transitory season 2 (February - March).

Total Cost of Transportation

Table 3 reflects that the cost of transportation was around 60 paise per litre from collection centres to the plant directly and while cost of transportation was 61 paise per litre from collection centres to chilling centres (42 paise per litre) and the chilling centres to plant (19 paise per litre). As a result, the average cost of transportation per litre of milk was estimated to be 61 paise per litre for co-operative dairy plant.

TABLE 3. TOTAL COST OF TRANSPORTATION PER LITRE OF MILK

Particulars (1)	From collection centre to plant directly (2)	From collection centre to chilling centre (3)	From chilling centre to plant (4)	Total transportation cost (Collection centre to chilling centre+ from chilling centre to plant) (5)	Average transportation cost of milk (paise/litre) (2 and 5) (6)
Cost of transportation per litre of milk for the co-operative plant (Paise)					
Flush	57	40	18	58	58
Transitory 1	61	42	20	62	62
Lean	62	42	21	63	63
Transitory 2	57	40	18	58	58
Overall average	60	42	19	61	61
Cost of transportation per litre of milk for the private plant (Paise)					
Flush	57	36	22	58	58
Transitory 1	60	38	23	61	61
Lean	62	39	21	60	61
Transitory 2	57	37	22	59	58
Overall average	58	37	22	59	60

As against co-operative plant, the overall average cost of transportation for the private plant was around 58 paise per litre from collection centres to plant directly and cost of transportation was 59 paise per litre from collection centres to chilling centres (37 paise per litre) and the chilling centres to plant (22 paise per litre). Hence, the average cost of transportation per litre of milk was estimated to be 60 paise for private dairy plant.

It shows that the overall average cost of transportation per litre of milk was 61 paise and 60 paise respectively for co-operative and private plants. The total cost of transportation was low in the flush season of about 58 paise and to a maximum of 63 paise in lean season for co-operative dairy plant. The private dairy plant had an edge over co-operative dairy plant in milk transportation cost. It was low in the flush season (58 paise per litre) and scaled to increase to 61 paise in lean season.

Cost of Chilling of Milk

The cost of chilling per litre of milk has been worked out for four chilling centres namely C₁, C₂, C₃ and C₄ chilling centres, which were attached with the co-operative plant. The average cost of chilling per litre of milk was found to be 28 paise, 29 paise, 34 paise and 33 paise for C₁, C₂, C₃ and C₄ chilling centres respectively. The overall average cost of chilling per litre was found to be 31 paise per litre (Table 4).

TABLE 4. OVERALL AVERAGE CHILLING COST ACROSS CHILLING CENTRES FOR CO-OPERATIVE AND PRIVATE DAIRY PLANTS

Dairy plant name	(Rs./litre)									
	Co-operative dairy plant					Private dairy plant				
Chilling centre name	C1	C2	C3	C4	Average cost (Rs.)	P1	P2	P3	P4	Average cost (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(A) Fixed Cost										
Depreciation	10937.50	11525.35	9608.75	9542.29	10403.47	9375.00	10239.58	10215.69	9090.69	9730.24
Interest	14875.00	20160.85	12311.00	11201.50	14637.09	19125.00	19075.00	20392.66	17567.66	19040.08
Salary of staff	105148.00	100313.00	85202.00	94315.00	96244.50	105328.00	90387.00	109879.00	89957.00	98887.75
Sub-total	130960.50	131999.20	107121.75	115058.79	121285.06	133828.00	119701.58	140487.35	116615.35	127658.07
(B) Variable Cost										
Cost of electricity	103218.58	97745.17	63279.25	63814.58	82014.40	97725.46	70066.33	118251.17	44689.71	82683.17
Cost of fuel	5065.42	4814.67	3086.67	3313.75	4070.13	4114.21	3497.58	5717.42	2243.08	3893.07
Cost of repairs and maintenance	2030.08	1877.00	3488.75	1308.83	2176.17	1717.25	1342.67	1945.67	858.29	1465.97
Cost of stationery	438.83	418.83	268.92	285.83	353.10	406.67	291.83	859.92	187.08	436.38
Cost of consumables	4318.58	4098.50	2625.42	5287.92	4082.61	3927.25	2957.83	4118.00	1865.67	3217.19
Telephone charges	454.92	445.58	399.33	451.75	437.90	432.50	454.58	651.67	310.38	462.28
Sub-total	115526.41	109399.75	73148.34	74462.66	93134.31	108323.34	78610.82	131543.83	50154.21	92158.06
Total cost (A+B) (Rs.)	246486.92	241398.95	180270.09	189521.46	214419.37	242151.33	198312.42	272031.19	166769.56	219816.13
Total quantity of milk chilled (litres)	870006.00	821375.00	529143.00	580916.00	700360.00	897035.00	643502.00	1069308.00	430827.00	760168.00
Chilling cost per litre (Rs./litre)	0.28	0.29	0.34	0.33	0.31	0.27	0.31	0.26	0.39	0.32

Similarly, Table 4 depicts a clear picture of chilling cost for four chilling centres namely P₁, P₂, P₃ and P₄ chilling centres, which were attached with the private dairy plant. The average cost of chilling per litre of milk was found to be 27 paisa, 31 paisa, 26 paisa and 39 paisa for P₁, P₂, P₃ and P₄ chilling centres respectively. The overall average cost of chilling per litre of milk was found to be 32 paisa.

Seasonal Variation in the Cost of Chilling of Milk

The cost of chilling per litre of milk and quantity of milk chilled was worked out for four chilling centers namely C₁, C₂, C₃ and C₄ chilling centers which were attached with Co-operative plant and as well chilling cost of four chilling centers namely P₁, P₂, P₃ and P₄ chilling centers was worked out for private dairy plant.

Table 5 reveals that per litre cost of chilling showed a seasonal variation in various seasons for Co-operative dairy. The chilling cost was lowest in the flush season at 27 paisa per litre and was observed to be of 32 paisa per litre in the lean season. The private dairy plant-chilling centres also exhibited a seasonal variation in chilling cost. The chilling cost was the least at 28 paisa in the flush season and to a maximum of 33 paisa in the lean season. It can be inferred that the chilling centres of co-operative and private dairy plants only exhibited a minor seasonal variation in chilling cost of milk.

Cost of Milk Reception

The milk collected at the collection centres and chilling centres is transported to the plant, received, tested and finally chilled. The cost of receiving the milk at co-operative and private dairy plants has been calculated and is presented in Table 6. The overall cost of reception for a litre of milk at co-operative dairy plant was observed to be 18 paisa (Table 6). The share of fixed cost was around 25 per cent and variable cost in the total cost was found to be 75 per cent. The share of fixed cost components like depreciation and interest was 10 per cent and salary of staff was around 15 per cent. The major component of cost in the variable cost was cost of water (38 per cent), followed by labour wages (29 per cent) and cost of can cleaning (6 per cent). The share of the remaining items was around 1 per cent in total variable cost. It varied from a minimum of 17 paisa to 19 paisa across seasons (Table 7). It was almost the same for all the seasons. Table 6 clearly reveals that the cost of milk reception for private dairy plant. The overall cost of reception was less compared to co-operative plant at 12 paisa per litre. The fixed cost share was around 35 per cent and variable cost was around 65 per cent in total cost of milk reception. The fixed cost components were salary of staff (21 per cent), depreciation and interest was 12 per cent to total fixed cost. The major cost components in variable cost was found to be cost of water (54 per cent), cost of can cleaning (8 per cent), cost of electricity (1 per cent) and the remaining items constituted 2 per cent of the variable cost.

TABLE 5. SEASONWISE CHILLING COST FOR CO-OPERATIVE AND PRIVATE DAIRY PLANTS

Dairy plant name	Co-operative dairy plant				Private dairy plant				
	Seasons (1)	Flush (2)	Transitory 1 (3)	Lean (4)	Transitory 2 (5)	Flush (6)	Transitory 1 (7)	Lean (8)	Transitory 2 (9)
(Rs./litre)									
Particulars									
(A) Fixed Cost									
Depreciation	10403.47	10403.47	10403.47	10403.47	10403.47	9730.24	9730.24	9730.24	9730.24
Interest	14637.09	14637.09	14637.09	14637.09	14637.09	19040.08	19040.08	19040.08	19040.08
Salary of staff	96244.50	96244.50	96244.50	96244.50	96244.50	98887.75	98887.75	98887.75	98887.75
Sub-total	121285.10	121285.10	121285.10	121285.10	121285.10	127658.10	127658.10	127658.10	127658.10
(B) Variable Cost									
Cost of electricity	86445.75	71052.67	88878.34	96648.79	82510.50	82510.50	88592.08	75727.00	84599.38
Cost of fuel	4027.63	4747.92	6556.84	4420.25	3632.66	3632.66	5016.34	3017.00	4043.13
Cost of repairs and maintenance	1958.63	1117.33	3253.83	2630.71	1740.44	1740.44	1299.71	216.08	3041.25
Cost of stationery	407.25	329.92	231.42	1011.17	364.94	364.94	386.75	197.75	1011.63
Cost of consumables	3527.25	6015.92	5629.00	3175.13	3225.63	3225.63	3743.08	3056.33	2652.75
Telephone charges	408.44	455.50	466.67	621.33	427.38	427.38	470.79	415.00	590.25
Sub-total	96774.95	83719.26	105016.10	108507.40	91901.53	91901.53	99508.75	82629.17	95938.38
Total cost (A+B)(Rs.)	218060.00	205004.36	226301.20	229792.40	219559.60	219559.60	227166.80	210287.20	223596.45
Total quantity of milk chilled (litres)	796833	653940	707789	813064	819281	819281	771729	698901	716500
Chilling cost per litre (Rs./litre)	0.27	0.31	0.32	0.28	0.28	0.28	0.31	0.33	0.33

TABLE 6. COST OF MILK RECEPTION AT CO-OPERATIVE AND PRIVATE DAIRY PLANTS

Dairy plant name	Co-operative dairy plant			Private dairy plant		
	Amount (Rs.) (2)	Per cent cost (3)	Per unit cost (Rs./litre) (4)	Amount (Rs.) (5)	Per cent cost (6)	Per unit cost (Rs./litre) (7)
<i>(Rs./litre)</i>						
(A) Fixed Cost						
Depreciation	7008.25	3.72	0.01	7008.25	5.14	0.01
Interest	11819.80	6.27	0.01	11819.80	8.67	0.01
Salary of staff	28362.00	15.05	0.03	28362.00	20.81	0.02
Sub Total	47190.05	25.04	0.05	47190.05	34.62	0.04
(B) Variable Cost						
Cost of water consumed	71508.53	37.95	0.07	73228.45	53.73	0.06
Cost of electricity	1614.32	0.86	0.00	1626.80	1.19	0.00
Cost of can cleaning	11300.98	6.00	0.01	11411.95	8.37	0.01
Cost of spares	885.33	0.47	0.00	784.38	0.58	0.00
Cost of lubricants	-	-	-	274.00	0.20	0.00
Cost of repairs and maintenance	424.73	0.23	0.00	303.90	0.22	0.00
Cost of stationery	-	-	-	428.08	0.31	0.00
Cost of consumables	895.40	0.48	0.00	818.48	0.60	0.00
Labour wages	54630.00	28.99	0.05	-	-	-
Miscellaneous cost	-	-	-	223.87	0.16	0.00
Sub total	141259.30	74.96	0.14	89099.92	65.38	0.08
Total cost (A+B)(Rs.)	188449.35	100.00	0.18	136289.97	100.00	0.12
Total quantity of milk received (litres)	1032235.00			1157145.00		
Cost of milk reception per litre (Rs.)	0.18			0.12		

It can be concluded that the cost of milk reception per litre was less for private dairy plant than the co-operative dairy plant. It was due to lower amount of milk received and higher labour wages paid in co-operative plant. This varied from a minimum of 11 paise and to a maximum of 13 paise across seasons. It was exhibiting minor variation in the cost for all seasons (Table 7).

Cost of Milk Procurement

The procurement cost comprises cost of collection of milk, cost of transportation, chilling cost and cost of milk reception.

TABLE 7. SEASONWISE COST OF MILK RECEPTION AT CO-OPERATIVE AND PRIVATE DAIRY PLANTS

Dairy plant name	Co-operative dairy plant					Private dairy plant			
	Flush (1)	Transitory 1 (2)	Lean (3)	Transitory 2 (4)	Flush (5)	Transitory 1 (6)	Lean (7)	Transitory 2 (8)	Flush (9)
(Rs./litre)									
Particulars									
Seasons									
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Particulars									
(A) Fixed Cost									
Depreciation	7008.25	7008.25	7008.25	7008.25	7008.25	7008.25	7008.25	7008.25	7008.25
Interest	11819.80	11819.80	11819.80	11819.80	11819.80	11819.80	11819.80	11819.80	11819.80
Salary of staff	28362.00	28362.00	28362.00	28362.00	28362.00	28362.00	28362.00	28362.00	28362.00
Sub-total	47190.05	47190.05	47190.05	47190.05	47190.05	47190.05	47190.05	47190.05	47190.05
(B) Variable Cost									
Cost of water consumed	65109.00	70734.00	76191.67	74634.50	74735.25	77862.33	73307.33	66457.00	
Cost of electricity	1586.50	1466.00	1756.67	1652.50	1723.75	1611.33	1685.67	1469.50	
Cost of can cleaning	7975.00	11148.00	14185.00	12176.00	9123.25	12235.33	13577.67	10825.00	
Cost of spares	1467.25	261.00	774.00	1008.50	1388.25	120.00	700.00	896.50	
Cost of lubricants	0.00	0.00	0.00	0.00	342.50	314.00	171.67	262.50	
Cost of repairs and maintenance	132.00	483.33	703.33	398.00	30.00	168.33	685.33	353.50	
Cost of stationery	0.00	0.00	0.00	0.00	477.50	645.67	356.67	215.00	
Cost of consumables	772.25	707.67	1080.00	1039.50	601.50	861.33	912.33	920.00	
Labour wages	54900.00	55200.00	55200.00	53100.00	0.00	0.00	0.00	0.00	
Miscellaneous cost	0.00	0.00	0.00	0.00	574.50	0.00	282.67	0.00	
Sub-total	131942.00	140000.00	149890.67	144009.00	88996.50	93818.32	91679.33	81399.00	
Total cost (A+B)(Rs.)	179132.05	187190.05	197080.72	191199.05	136186.55	141008.38	138869.38	128589.05	
Total quantity of milk received (litres)	992558.00	982324.00	1138576.00	1017120.00	1266165.00	1163089.00	1084905.00	1103582.00	
Cost of milk reception per litre (Rs.)	0.18	0.19	0.17	0.19	0.11	0.12	0.13	0.12	

Table 8 shows that the overall average procurement cost per litre was found to be Rs. 1.48 for the co-operative dairy plant. The procurement cost also varied across seasons. In flush season, the cost of procurement was estimated to be Rs. 1.38 per litre. In transitory season I and II it increased to Rs. 1.50 and Rs. 1.47 per litre respectively. However, in lean season it was found to be the highest of Rs. 1.55 per litre. The component of collection, transportation, chilling and reception cost was 37 paise, 61 paise, 32 paise and 18 paise per litre respectively in the procurement cost. These results reinforce the findings of Rawat and Singh (1984), Khokhar (1985), Rangasamy (2001) that seasonal variation in the cost of milk procurement exists and increase in quantity of milk procurement could help in reducing the cost of milk procurement.

TABLE 8. TOTAL PROCUREMENT COST OF MILK PER LITRE

Seasons (1)	Collection cost (2)	Transportation			Reception cost (5)	Total procurement cost (6)
		cost (3)	Chilling cost (4)			
(paise)						
Co-operative dairy plant						
Flush	34	58	28	18	138	
Transitory 1	37	62	32	19	150	
Lean	39	63	36	17	155	
Transitory 2	37	58	33	19	147	
Average	37	61	32	18	148	
Private dairy plant						
Flush	36	58	28	11	133	
Transitory 1	38	61	31	12	142	
Lean	39	61	32	13	145	
Transitory 2	38	58	33	12	141	
Average	38	60	31	12	141	

As against co-operative plant, Table 8 indicates that the overall average procurement cost per litre was found to be Rs. 1.41 for private plant. The procurement cost varied from a minimum of Rs. 1.33 in the flush season and to a maximum of Rs. 1.45 in lean season. In transitory season I and II, the average cost of procurement cost was Rs. 1.42 and Rs. 1.41 respectively. The component of collection, transportation, chilling and reception cost was 38 paise, 60 paise, 31 paise and 12 paise per litre respectively in the procurement cost of private dairy plant.

V

CONCLUSIONS AND POLICY IMPLICATIONS

The per litre procurement cost of milk was higher in co-operative dairy plant than the private dairy plant and the same increased between flush, transitory and lean seasons. It could be attributed to increase in the reception cost of milk and marginal increase in transportation cost of milk in the co-operative dairy plant.

The following policy measures are being suggested that might change the milk procurement efficiency of co-operative sector dairy plant.

- (1) Milk is a highly perishable commodity and their production takes place in millions of rural dairy farms. Development of efficient milk collection centres and transportation networks at farmers level by co-operative dairy plant would help strengthen the linkages between dairy farmers and dairy industry.
- (2) Co-operative dairy plant should make regular payments or advance payments to milk producer members and can avoid members selling milk to private dairy plants or milk vendors.
- (3) Efforts should be made to install bulk milk coolers in rural areas to facilitate reduction in transportation cost.
- (4) Imparting training about clean milk production to dairy farmers at Milk Producers' Co-operative Society level will improve the quality of milk procured.

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