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Cost of milk production among different types of dairy farms in Kerala#

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Abstract

The present study was carried out to study the variation in the cost of milk production among different types of dairy farms in Kerala. A stratified multistage random sampling procedure was used to select the area of study and respondents. The farmers/farm households were categorized into small or subsistence farms (1-2 cows), medium (3-10 cows), and large farms (more than 10 cows). When calculated on a milch animal basis, the average costs of production per litre of milk (cost B) were rupees 28.09, 28.49, 25.68, and 27.69 in small, medium, large and overall farms, respectively. The average costs/litre of milk after deduction of imputed family labour (cost A) were 19.93, 22.78, 24.93, and 21.81 in small, medium, large, and overall farms, respectively. It was observed that on the milch animal basis, the average cost/litre of milk (cost B) were 32.51, 34.29, 29.08, and 32.29 in small, medium, large, and overall farms, respectively. The average cost per litre of milk after deduction of imputed family labour cost (cost A) were 22.02, 26.33, 27.08, and 24.34 in small, medium, large, and overall farms, respectively. The present study indicated that the average cost of milk production in the state of Kerala was very high, and the milk price has to be regulated accordingly so that dairy farming becomes a lucrative livelihood opportunity for poor farmers.

Keywords: *Dairy economics, crossbred cattle, cost of production*

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Profitability is the keyword that drives any enterprise. The cost of production of milk is a function of several variables. Capital investments include the cost of animals, housing, etc., along with the expenditure to develop the permanent infrastructure of the enterprise. Recurring expenditure is accounted for the cost of feedstuff, labour, and other contingent expenses. The scale of production is another factor that influences cost-effectiveness. The cost of production is a crucial function determining the selling price of milk and formulating various schemes to support the dairy farmers. But there were only a few reports available regarding the cost of milk production incurred by the dairy farmers of Kerala, belonging to different categories of farms. Hence the present study was undertaken to analyse the cost of milk production of small, medium, and large dairy farms of Kerala.

Materials and methods

The respondents selected for the present study were dairy farmers, who were members of dairy co-operatives and were enrolled in the Direct Benefit Transfer (DBT) scheme of the Government of Kerala. Since the total population of milk producers under the DBT members scheme were nearly two lakhs, a total sample size of 350 farmers was selected for the study. The farmers/farm households were categorized into small or subsistence farms (1-3 cows), medium farms (4-10 cows), and large farms (more than 10 cows) (KAU, 2010). Out of the 350 farmers selected for the study, the numbers of small, medium and large farms were fixed as 175, 100, and 75 respectively. A stratified multistage random sampling procedure was used to select the area of study and respondents. In the first stage, the state of Kerala was stratified into five agro-climatic zones (NARP, 1989). In the second stage, one district from each zone (strata) was randomly selected. In the third stage, from each district, two blocks were randomly selected.

The sample size for each category of farms in each block was determined in proportion to the number of farmers belonging to each category (probability proportion to size technique). For this, all the farmers in the selected blocks were enumerated and classified into small, medium, and large farms based on the number of cows. The respondents in each group were chosen randomly in each block, proportional to their number in each block. Primary data were collected by means of observation, in-depth interviews, and questionnaires.

The data were subjected to tabular analysis for estimation of fixed capital investment to analyse the investment pattern and cost of milk production in different farm sizes.

Investment pattern

The income-generating capacity of a dairy owner was reflected through the investment pattern. The fixed investment in the farm was considered for this study which included,

1. Investment for milch animals
2. Investment for farm buildings
3. Investment for machinery and equipment

The proportionate investment on the above items was worked out separately for various categories of the farm.

Costs and returns concepts

The maintenance cost of animals was calculated separately for per milch animal, and milch animal per day basis. The returns were also calculated separately for per milch animal, and milch animal per day basis. The cost of production per litre of milk was also estimated for milch animal and milch animal per day basis.

Fixed cost: It is the expenditure incurred whether or not the production is carried out. It includes interest on fixed capital and depreciation calculated based on standard animal units.

The components of fixed cost were interest on fixed capital investment (@12% annually) and depreciation on fixed capital. The depreciation on fixed capital comprises depreciation on milch animals @ 12.5% and

Table 1. Cost of milk production per litre on milk animal basis in small, medium, large, and overall average value of all the farms.

Cost parameter (Rs)	Small		Medium		Large		Overall	
	Mean	% of the gross cost	Mean	% of the gross cost	Mean	% of the gross cost	Mean	% of the gross cost
Average cost/ l of milk on milk animal basis (cost B)								
Interest on milk animal	13.03	5.67	13.92	6.86	16.74	6.71	14.08	6.22
Depreciation on milk animal	8.44	3.67	9.36	4.61	12.3	4.93	9.53	4.21
Interest on shed	7.66	3.33	6.08	3	10.43	4.18	7.8	3.45
Depreciation on shed	6.53	2.84	6.4	3.15	6.36	2.55	6.46	2.85
Interest on equipment	0.37	0.16	1.2	0.59	2.55	1.02	1.08	0.48
Depreciation on equipment	0.31	0.13	0.97	0.48	1.64	0.66	0.78	0.34
Green fodder	35.28	15.35	25.45	12.54	47.32	18.97	35.05	15.48
Hay/Straw	5.91	2.57	8.58	4.23	5.24	2.1	6.53	2.88
Total roughage feed	41.18	17.92	34.03	16.76	52.56	21.07	41.58	18.37
Concentrate feed	105.3	45.82	87.88	43.29	107.2	42.98	100.7	44.5
Artificial insemination	0.82	0.36	0.54	0.27	0.5	0.2	0.67	0.3
Professional charges	2.93	1.28	3.21	1.58	3.37	1.35	3.1	1.37
Total veterinary services cost	3.75	1.63	3.75	1.85	3.87	1.55	3.78	1.67
Cost of labour	39.97	17.39	35.97	17.72	31.71	12.71	37.06	16.37
Insurance cost	3.26	1.42	3.48	1.71	4.12	1.65	3.51	1.55
Total maintenance cost	229.81		203.04		249.51		226.38	
Average cost/ l of milk (cost B)	28.09		28.49		25.68		27.69	
Average cost/l of milk after deduction on milk animal basis (cost A)								
Family labour for fodder	26.35	16.08	9.01	5.41	1.32	0.55	16.03	8.84
Family labour	39.55	24.13	27.59	16.58	6.78	2.81	29.11	16.06
Total imputed cost for family labour	65.9	40.2	36.59	21.98	8.1	3.36	45.14	24.91
Total maintenance cost	163.91		166.45		241.42		181.24	
Average cost/l of milk (cost A)	19.93		22.78		24.93		21.81	

depreciation on cattle shed and equipment. The depreciation on cattle shed was calculated by the type of building, considering their foundation, superstructure, and roof. Based on this, the value and productive life of the buildings was estimated for calculation of depreciation. The buildings were classified into five types with the depreciation of 3, 5, 10, 20, and 30 percent. The depreciation on equipments was estimated at 10 per cent level.

Variable cost: Variable costs include the costs incurred on variable factors of production and can be altered in the short run. It includes feed cost, labour cost, veterinary cost, and insurance cost.

i. Cost of feed & fodder: It includes the cost of feed materials like concentrates, green fodder, and hay/straw consumed by the animals.

ii. Labour cost: It was estimated including the family and paid labour costs. The hired labour was calculated on the basis of actual cost incurred. In the case of family labour, the imputed value obtained depending upon the time spend in dairying and wage rates as fixed by minimum wages fixed by the Government of Kerala. The labour cost was apportioned on a standard animal unit basis (Kumbhare *et al., 1983)*.

Table 2. Cost of milk production per litre on milch animal basis in small, medium, large and overall average value of all the farms

Cost parameter (Rs)	Small		Medium		Large		Overall	
	Mean	% of the gross cost	Mean	% of the gross cost	Mean	% of the gross cost	Mean	% of the gross cost
Average cost/ l of milk on milch animal per day basis (cost B)								
Interest on milch animals	13.03	5.77	13.92	6.16	16.74	7.41	14.1	6.23
Depreciation on milch animals	8.44	3.73	9.36	4.14	12.3	5.44	9.53	4.22
Interest on shed	7.66	3.39	6.08	2.69	10.43	4.62	7.8	3.45
Depreciation on shed	6.53	2.89	6.4	2.83	6.36	2.81	6.46	2.86
Interest on equipment	0.37	0.16	1.2	0.53	2.55	1.13	1.08	0.48
Depreciation on equipment	0.31	0.14	0.97	0.43	1.64	0.73	0.78	0.35
Green fodder	35.28	15.61	25.49	11.28	26.66	11.8	30.6	13.55
Hay/Straw	5.91	2.62	8.58	3.8	5.24	2.32	6.53	2.89
Total Roughage Feed	41.18	18.22	34.07	15.08	31.9	14.12	37.2	16.44
Concentrate Feed	98.15	43.43	78.42	34.7	92.33	40.85	91.3	40.38
Artificial Insemination	0.82	0.36	0.55	0.24	0.5	0.22	0.67	0.3
Professional Charges	2.94	1.3	3.21	1.42	3.37	1.49	3.11	1.38
Total Veterinary services Cost	3.76	1.66	3.75	1.66	3.87	1.71	3.78	1.67
Cost of labour	43.32	19.17	40.48	17.91	37.37	16.54	41.2	18.24
Insurance Cost	3.26	1.44	3.48	1.54	4.12	1.82	3.51	1.55
Total maintenance cost	226.01		198.14		219.6		216.68	
Average cost/ l of milk (cost B)	32.51		34.29		29.08		32.29	
Average cost/l of milk after deduction on milch animal basis (cost A)								
Family labour for fodder	26.35	16.81	9.01	5.77	1.32	0.65	16	0.65
Family labour	42.9	27.36	33.03	21.16	14.05	6.88	33.9	0.65
Total imputed cost for family labour	69.25	44.17	42.03	26.92	15.37	7.53	49.9	0.65
Total maintenance cost	156.77		156.11		204.22		166.75	
Average cost/l of milk (cost A)	22.02		26.33		27.08		24.34	

iii. Veterinary cost: It was estimated considering the various costs incurred for breeding, vaccination, medicines, and professional charges.

iv. Insurance cost: For all milch animals @ premium rate of 3 per cent per annum

Gross cost: The gross cost was calculated by adding all the variable costs and total fixed costs.

Gross cost = Total fixed cost + Total variable cost

Net cost: For calculating net cost, the imputed value of dung is deducted from the gross cost @ Rs. 0.9/Kg).

Net cost = Gross cost – Imputed value of dung

The cost per litre of milk was estimated by dividing the average gross maintenance cost per day by average daily milk production.

Cost per litre of milk (Rs) on milk animal basis =

$$\frac{\text{Gross maintenance cost per milk animal/day}}{\text{Wet agerage on the day}}$$

Cost per litre of milk (Rs) on milch animal basis =

$$\frac{\text{Gross maintenance cost per milk animal/day}}{\text{Dry agerage on the day}}$$

Two types of cost concept were used in this study,

Cost A = Cost without imputing family labour

Cost B = Cost with the value of imputed family labour

Results and discussion

Cost of milk production per litre on milk animal basis

The cost of milk production per milk animal per day basis is presented in Table 1. The average total maintenance cost of a lactating or milk animal per day was Rs. 229.81, 203.04, and 249.51 in small, medium and large farms, respectively. The overall average daily maintenance cost for all the farms was Rs. 226.38. The average cost of production per litre of milk (cost B) was 28.09, 28.49, 25.68, and 27.69, in small, medium, large farms and overall average value of all farms, respectively. The average cost/litre of milk after deduction of imputed family labour (cost A) was 19.93, 22.78, 24.93, and 21.81 in small, medium, large and overall average value for all farms, respectively. The cost of concentrate constituted 43.43, 34.7, and 40.85 per cent of total maintenance cost in small, medium and large farms.

Cost of milk production per litre on milch animal basis under different farms

The details of cost of milk production per litre on milch animal basis in the farms are presented in Table 2. The total maintenance cost (Rupees) in small, medium, large, and overall average values of all farms was 226.01, 198.14, 219.6, and 216.68, respectively. The average cost/litre of milk (cost B) was 32.51, 34.29, 29.08, and 32.29 in small, medium, large, and overall average values of all farms, respectively. The average cost per litre of milk after deduction of imputed family labour cost (cost A) was 22.02, 26.33, 27.08, and 24.34 (Rs/litre) in small, medium, large, and overall average values of all farms, respectively. The major share of maintenance cost was contributed by the cost of concentrate which was 43.43, 34.7, 40.85 and 40.38 percent, respectively, in small, medium, large, and overall average values of all farms. The total roughage cost constituted 18.22, 15.08, 14.12, and 16.44 per cent respectively in small, medium, large, and overall average values of all farms. The share of labour was 19.17, 17.91, 16.54, and 18.24 per cent in small, medium, large, and overall average values of all farms, respectively.

As per Unnithan *et al*. (2010), the average gross cost of milk production in the state of Kerala was Rs. 26.75. They also reported that the corresponding net cost of production was Rs. 26.27. They also noted that the actual production cost was higher than the procurement price (Rs. 18.63) fixed for cow milk with 3.5 per cent fat and 8.5 per cent SNF at that time in the state. They also reported that nearly 48 per cent of the overall cost was on feeding, 32 per cent on labour, 12 per cent on maintenance of dry cows, and loss in value of cows comprised the remaining 8 per cent. The study also identified variation in cost among different herd size. The net cost of production was Rs. 29.65 and 18.88 among single cow holder and medium-sized farms owning ten or more cows, respectively.

Conclusion

The present study indicated that the average cost of milk production in the state of Kerala was very high, and the milk price has to be adjusted accordingly so that dairy farming becomes a lucrative livelihood opportunity for poor farmers. The cost after deduction of imputed labour was much better and was lower in small farms signalling the major contribution of family labour in small farms. Since the cost of concentrate feed constituted the major share of the milk production, strategies for better scientific feeding of dairy cattle and support from government are to be included in the planning of projects.

Conflict of interest

The authors declare that they have no conflict of interest.

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