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Economics of milk production in Puducherry

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Abstract
The cost of milk production has been computed for six different combinations by considering depreciation on cost of animal and returns from sale of manure (Rs. 22.86 per litre), by considering depreciation on cost of animal and returns from sale of manure and sale of calf (Rs. 22.46 per litre), by considering depreciation on cost of animal and not including returns from sale of manure and sale of calf (Rs. 29.18 per litre), by not considering depreciation on cost of animal and considering returns from sale of manure (Rs. 21.22 per litre), by not considering depreciation on cost of animal and considering returns from sale of manure and sale of calf (Rs. 20.78 per litre), by not considering depreciation on cost of animal and not including returns from sale of manure and sale of calf (Rs. 27.54 per litre). If own labour was used, there could be a reduction of Rs. 3.17 per litre in the cost of milk production in all combinations. Average procurement cost of milk was Rs. 28.29 per litre.

Keywords: Cost of milk production, Puducherry, dairy farmers, marketing of milk

Introduction
The dairy sector is considered as an important subsidiary occupation to the vulnerable sections of rural population. Small scale milk market agents and chains supplying fresh milk and traditionally processed dairy products still play a large role in most of the developing countries. They often provide the main outlet for small holder dairy producers, and the main source of fresh milk for resource poor consumers. The presence of milk cooperatives all over the country helps to organize the industry and give this sector a distinct advantage (Miltan, 2013).

Materials and methods
The sampling procedure followed for this study was stratified proportionate random sampling. Here, a sample size of n = 451 has been determined using the formula $n=Z^2pqN/e^2$ (N-1) $+z^2pq$. The sample size of 451 was randomly distributed based on the population of dairy farmers in each of the communes and municipalities.
The semi-structured interview schedule was designed to obtain data on the various parameters of the study. This was pre-tested among 20 dairy owners. Based on the pilot study some questions were modified, some deleted and some added.
The pilot study also gave an idea on the time taken to interview each respondent.
Cost of Milk Production: Cost of milk production is computed by collecting the details on fixed cost variables (cost of animal, cost of the shed and cost of the equipment), variable cost variables (Feed, Labour, Insurance, Veterinary Aid, Electricity and water) and Returns (Milk yield, Sale of calves, Sale of manure and Sale of Gunny bags).
Marketing of milk: It refers to the channels involved in marketing, to estimate the marketing cost, market margins, price spread in different marketing channels of milk in Puducherry region.

Results and Discussion
Information on economics of milk production is beneficial to all those involved in dairy farming. The computation involves all expenses incurred in production of milk like fixed cost and variable cost.
In this study, the economics of milk production has been computed by considering the lactation length as 280 days and dry period as 120 days. For the computation of economics of milk production, the fixed cost and variable cost have been worked out as follows.

a. Fixed cost

Fixed cost has been worked out considering the fixed cost variables as depreciation on animal purchase cost, building cost and equipment cost as well as interest on animal purchase cost, building cost and equipment cost. The fixed cost has been worked out for 400 days. The total of depreciation and interest constitutes total fixed cost.

While computing the depreciation of animal cost, the productive life of animal has been considered as 7 years and the estimated value of the purchased animal after productive life as 30 per cent of cost of animal.

While computing the interest on animal purchase cost, the rate of interest has been considered as 12 per cent.

While computing the depreciation on building cost, the approximate life of shed was considered as 10 years and the rate of interest has been considered as 12 per cent. Accordingly, the depreciation and the rate of interest on cost of shed have been worked out.

Similarly, while computing the equipment cost, expenses under fixed cost, the approximate life of equipment was considered as 4 years and the rate of interest has been considered as 12 per cent. Accordingly the depreciation and the rate of interest on cost of equipment have been worked out.

Thus the total of animal purchase expense, building expense and equipment cost constitutes the total fixed cost.

b. Variable cost: Feed cost

Cost of milk production has been worked out considering the variable cost variables as feed cost during lactation period (280 days) and dry period (120 days).

While computing the fixed cost during lactation period and dry period, data on concentrates required, green fodder required and dry fodder required were collected and the feed cost during lactation length and dry period was calculated by considering the corresponding prevailing market rates.

b. Variable cost: Other expenses

Data on cost of insurance (400 days), cost of labour (400 days), cost of veterinary aid (400 days), electricity and water charges (400 days) were also collected and used for computation of variable cost. The daily wages was considered as Rs. 25.00.

Cost of milk production has been worked out using the formula.

$$\text{Cost of milk production} = \frac{\text{(Total fixed cost + Total variable cost) for 400 days}}{\text{(Milk yield per day} \times \text{milk procurement cost} \times \text{280days)}}$$

If own labour was used, there could be a reduction of Rs. 3.17 per litre in the cost of milk production in all combinations given below. Average procurement cost of milk was Rs. 28.29 litre.

Cost of milk production has been computed for six different combinations as follows (Table 1)

1. By considering depreciation on cost of animal and returns from sale of manure.
2. By considering depreciation on cost of animal and returns from sale of manure and sale of calf.
3. By considering depreciation on cost of animal and not including returns from sale of manure and sale of calf.
4. By not considering depreciation on cost of animal and considering returns from sale of manure.
5. By not considering depreciation on cost of animal and considering returns from sale of manure and sale of calf.
6. By not considering depreciation on cost of animal and not including returns from sale of manure and sale of calf.

Table 1: Cost of milk production on different combinations

Cost of milk production on different combinations	With sale of		Without sale of
	Manure	Manure & calf	Manure & calf
With depreciation on cost of animal	22.86	22.46	29.18
Without depreciation on cost of animal	21.22	20.78	27.54

The average fixed cost, feed cost, other cost and total expenditure has been computed by considering the depreciation on cost of animal and not considering the depreciation on cost of animal. The results obtained are presented in Table 2.

Table 2: Comparing expenditure and income on cost of milk production

Comparing expenditure and income on cost of milk production	Expenditure				Income
	Average (Rs.) - 400 days				280 days
	Fixed Cost	Feed Cost	Other Cost	Expenditure	(from mlk)
With depreciation on cost of animal	9741 (15%)	41045 (66%)	11865 (19%)	62651 (@157/d)	62419
Without depreciation on cost of animal	6163 (10%)	41045 (70%)	11865 (20%)	59074 (@148/d)	62419

The proportion of fixed cost, variable cost as feed cost and other variable cost was in the ratio 15: 66: 19 when the depreciation on cost of animal was not considered. However, when depreciation on animal cost was considered, the ratio of fixed cost, variable cost as feed cost and other variable cost was 10: 70: 20.

This observation is line with Unnithan (2010) [6] who found that the average cost of production per litre milk was Rs. 26.00 in Kerala and is in contrast with Manoharan (2000) [2] who reported that the average cost of production per litre of milk was Rs. 8.00 in Puducherry and Raju *et al.*, (2016) [4] who reported that the average cost of production per litre milk was Rs. 14.27 in Rajasthan.

Conclusion

The profit margin with respect to six different combinations by considering depreciation on cost of animal and returns from sale of manure (Rs. 5.43 per litre), by considering depreciation on cost of animal and returns from sale of manure and sale of calf (Rs. 5.83 per litre), by considering

depreciation on cost of animal and not including returns from sale of manure and sale of calf (Rs. -0.89 per litre), by not considering depreciation on cost of animal and considering returns from sale of manure (Rs. 7.07 per litre), by not considering depreciation on cost of animal and considering returns from sale of manure and sale of calf (Rs. 7.51 per litre), by not considering depreciation on cost of animal and not including returns from sale of manure and sale of calf (Rs. 0.75 per litre).

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