

## Economic Analysis of Milk Production Adopted at Selected Dairy Herds in Etawah District of Uttar Pradesh

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**Abstract** Study was conducted to find out the economic analysis of the various selected dairy herds in Etawah district of Uttar Pradesh. Data were collected from 200 dairy farmers by personal interview methods. These dairy herds were divided into small, medium and large category according to herd size, land holding and milk production. To determine the cost of milk production, different recurring and non recurring expenses has been taken into account to develop an understanding of the complex process of milk secretion with the use of roughage and coarse grains.

**Keywords** Small, Medium and large dairy herds, Milk production.

### Introduction

The total household in rural India 73% own livestock, (11<sup>th</sup> five year plan 2007–2012 Deptt. A. H. and Dairying), more importantly small and marginal farmer's accounts for three quarters of these household. Thereby, livestock sector provides self employment to 22.5 million people, either part time or full time, both to educated and uneducated youths. The smaller

unit will primarily provide employment for the family members, while products may not necessarily enter the processing chain on the other hand, big livestock enterprises provides much more employment at different stages starting from livestock management, production, processing and finally marketing. In animal husbandry promotes gender equity over three fourth of the labor in livestock production comprises women.

The very basis of a successful dairy operation rests in scientific feeding and housing. It is well established that the expenditure on feeding along accounts for over half of the total costs of milk production. Milk production can be enhanced through : (i) Better feeding of the milking animals ; (ii) Genetic improvement ; (iii) Animal's health care and better economic management.

It has been observed that proper feeding alone could increase the milk production more than by 50%. In the economics of milk production, feeds represent more than 60% of the cost of milk. The livestock sector alone contributes nearly 25.6% of value of output at current prices of total value of output in agriculture.

### Materials and Methods

#### Selection of the sample

The present study has been conducted at Etawah.

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Etawah district situated in South Western part of the Uttar Pradesh at Chambal and Yamuna River. Etawah in Uttar Pradesh is famous for its Bhadawari breeds of the buffalo and Jamunapari breed of goat. Etawah has 05 Tahsil and 08 development blocks. Among the 08 development blocks, 05 blocks have been selected randomly. From each block 10 villages were selected and each selected village 4 families, which were having in milk bovine, have been taken randomly in the sample for intensive study. Thus, the present study covers 200 households in the district.

#### Collection of data

The primary data were collected through personal interview with the dairy farmers. By the aid of the schedule designed for the study. Personal observation of the facts were also given due consideration.

#### Period of study

Period of the data related to this study is between May 2015 to June 2016.

#### Research tool and techniques

The cost and benefits of the dairy herds have been estimated through a standard accounting approach. The inputs utilization and the milk output have been studied through appropriate tabulation methods.

#### Cost analysis

The term cost indicates the amount of the expenditure (Recurring and non-recurring) incurred on or attributable to a given thing.

*Fixed cost* : This cost remains fixed in total amount and does not increase or decrease when the volume of production changes. The important items of fixed cost in dairying are cost of milch bovine, cost of building/shed and cost of equipment.

*Variable cost* : The cost tends to vary in direct proportion of the volume of output. In other words, when volume of output increases, total variable cost also increases and when volume of output decreases total

variable cost also decreases. The important item of variable cost in dairying is, fodder, feed, labor, water and veterinary.

#### Return analysis

Return in this context includes the value of milk produced, value of dung and value of calf.

*Value of milk* : Value of milk produced is calculated by multiplying the quantity of milk produced with the milk procurement price. The average sale price of buffalo milk is Rs 30 per liter and local cow milk is Rs 20 per liter.

*Value of dung* : The value of dung is determined at the prevailing rate per quintal, which is Rs 300 per quintal.

*Value of calf* : Value of calf is valued at prevailing market price.

### Results and Discussion

In economic analysis of milk production, cost of milk production has been worked out through incurring expenses in the process of milk production which depends on : 1. Milk yield per animal and breed ; 2. Feeding proportion of green to dry fodder and concentrate per animal ; 3. Number of milking animals on dairy farms ; 4. Water and veterinary expenses ; 5. Different management factors i.e. care and supervision ; 6. Expenses on labor.

Further the economic analysis has been done on the factors including fixed and variable cost. The following table shows the Non-recurring and recurring cost accruing on the different types of dairy herds viz. small, medium, large and collective as a whole. In non-recurring cost herd expenses, building expenses and equipment cost has been taken. The total cost, depreciation and interest cost has been calculated on different types of dairy herds in herd, building and equipment category.

Herd expenses constitute the cost incurred in maintaining herd on dairy farmers, depreciation cost and interest on the cost.

**Table 1.** Non-recurring cost incurred on the different types of dairy herds.

| Particulars                         | Cost (Rs) depreciation (Rs) interest @ 12.5% | Small dairy farmers (0-5) | Medium dairy farmers (6-10) | Large dairy farmers (up to 10) | Overall dairy farmers |
|-------------------------------------|--|---------------------------|-----------------------------|--------------------------------|-----------------------|
| Herd expenses                       | 1. Cost                                      | 3055613                   | 8123472                     | 13210890                       | 23686872              |
|                                     | 2. Depreciation                              | 195052                    | 457884                      | 893123                         | 1369500               |
|                                     | 3. Interest                                  | 381951                    | 1015434                     | 1651361.25                     | 2960859               |
|                                     | Total  | 3632919                   | 9596790                     | 15755374.25                    | 28017231              |
| Building expenses (40 yrs Exp life) | 1. Cost                                      | 175450                    | 537750                      | 719280                         | 1432480               |
|                                     | 2. Depreciation                              | 4386.25                   | 13444                       | 17982                          | 35812.25              |
|                                     | 3. Interest                                  | 21931.25                  | 67219                       | 89910                          | 178970.28             |
|                                     | Total  | 201767.5                  | 618413                      | 827172                         | 1647334.5             |
| Equipment expenses (10 yrs)         | 1. Cost                                      | 105600                    | 229310                      | 270060                         | 604970                |
|                                     | 2. Depreciation                              | 7920                      | 17198                       | 20254                          | 45372                 |
|                                     | 3. Junk value                                | 26400                     | 57327                       | 67515                          | 151242                |
|                                     | 4. Interest                                  | 13200                     | 28664                       | 33757                          | 75622                 |
| Total                               | 153120                                       | 332499                    | 391586                      | 877206                         |                       |

Total cost of small, medium, large and overall dairy herds category is 3055616, 8123472, 13210890 and 23686872 respectively (Table 1). In small category of dairy herds on an average the purchase cost is Rs 25253. In medium category on dairy herds it is Rs 24177, Rs 24510 on large dairy herds and Rs 23782 on overall dairy farmers. The total number of animals in

small category of dairy herds is 121, medium 336, large 539 and on overall dairy herds it is 996 milking animals on an average. It can be seen that the purchasing cost of animals is more in case of medium dairy herds which is higher than the purchasing cost on smaller and larger dairy herds which in turn is more than overall dairy farmers. The cost of animal pur-

**Table 2.** Recurring cost incurred in the different types of dairy herds.

| Particulars |               | Small dairy farmers (0-5) | Medium dairy herds (6-10) | Large dairy herds (up to 10) | Overall  |
|-------------|---------------|---------------------------|---------------------------|------------------------------|----------|
| Labor cost  | a. Per animal | 6429                      | 5760                      | 4800                         | 4430.76  |
|             | b. Per farm   | 11958                     | 25804.8                   | 43200                        | 22153.8  |
|             | Total         | 777909                    | 1935360                   | 2587200                      | 4413036  |
| Concentrate | a. Per animal | 18600                     | 18150                     | 18000                        | 17925    |
|             | b. Per farm   | 34596                     | 81312                     | 162000                       | 86625    |
|             | Total         | 2250600                   | 6098400                   | 9702000                      | 17853300 |
| Dry         | a. Per animal | 7500                      | 6750                      | 7236                         | 7125     |
|             | b. Per farm   | 13950                     | 30240                     | 65124                        | 35625    |
|             | Total         | 907500                    | 2268000                   | 3907440                      | 7096500  |
| Green       | a. Per animal | 8100                      | 8025                      | 7290                         | 7800     |
|             | b. Per farm   | 15066                     | 35952                     | 65610                        | 39000    |
|             | Total         | 980100                    | 2696400                   | 3900204                      | 7768800  |
| Water       | a. Per animal | 1650                      | 1573                      | 1530                         | 1500     |
|             | b. Per farm   | 3069                      | 7047                      | 13770                        | 7500     |
|             | Total         | 199650                    | 528528                    | 824670                       | 1494000  |
| Veterinary  | a. Per animal | 110                       | 108.5                     | 112                          | 109.75   |
|             | b. Per farm   | 204.6                     | 486.08                    | 1008                         | 548.75   |
|             | Total         | 13310                     | 36456                     | 60368                        | 109311   |
| Breeding    | a. Per animal | 87                        | 78                        | 82                           | 78.5     |
|             | b. Per farm   | 161.82                    | 349.44                    | 738                          | 392.5    |
|             | Total         | 10527                     | 26208                     | 44198                        | 78186    |

**Table 3.** Total cost incurred on different types of dairy herds.

| Particulars       | Small dairy farmers | Medium dairy farmers | Large dairy farmers | Overall  |
|-------------------|---------------------|----------------------|---------------------|----------|
| Per animal        | 67700               | 64621.5              | 63122               | 63479    |
| Per dairy farmers | 125922              | 289504.32            | 568098              | 317395   |
| Total             | 8184930             | 21712824             | 34085880            | 63479000 |

chase is less in the case of small dairy farmer's category (Khan et al. 2008).

Depreciation cost of the herd expenses has been calculated by the formulae:

$$\text{Annual D.C.} = \frac{\text{Purchasing cost of animal} - \text{Estimated value after productive life}}{\text{Numbers of years of productive life}}$$

It is assumed that the total number of years of productive life is 8 yrs. By assuming this, the annual depreciation cost comes to Rs 195052 in case of small category of dairy farmers, Rs 457884 in case of medium category dairy farmers, Rs 893123 in case of large category of dairy herds Rs 1369500 in case of overall category of dairy farmers. Per animal depreciation cost on small, medium, large and overall category of dairy herds Rs 1612, 1362.75, 1657 and 1375 respectively. We can see here that the depreciation cost is more in case of large category of dairy farmers. Interest of the purchasing cost of animal has been taken @ 12.5% of the purchasing cost of animal. This value comes to Rs 381951, 1015434, 1651361.25 and 2960859 in case of small, medium, large and overall dairy herds respectively.

Total herd expenses on the different category of dairy herds are Rs 2194895, 6475266, 9916521 and 18447295 in case of small, medium, large and overall

dairy herds respectively.

In case of building expenses, the cost incurred are cost of the building, depreciation over the life of the building and interest of the building expenses.

Cost of the building in different category of dairy herds has been given in the above table, which is 175450, 537750, 719280 and 1432480 in case of small, medium, large and overall dairy farmers.

Depreciation of the cost of the building per year has been calculated assuming the life of the building 40 years. The total cost of building is divided into expected life of the building which is Rs 4386.25, 13444, 17982 and 35812.25 in case of small, medium, large and overall category of dairy farmers.

Interest of the building expenses has been calculated @ 12.5% on annual basis. It is Rs 21931.25, 67219, 89910 and 178970.25 in case of small, medium, large and overall dairy farmers.

Total building expenses are Rs 201767.5, 618413, 827172 and 1647334.5 in case of different category of dairy herds viz. small, medium, large and overall.

An equipment expense includes different item used on the dairy herds like shovel, chain, bucket, chaff cutter milking pan basket. Which are present on

**Table 4.** Cost of production on different type of dairy herds.

| Particulars                         | Small dairy farmers | Medium dairy farmers | Large dairy farmers | Overall |
|-------------------------------------|---------------------|----------------------|---------------------|---------|
| Yield / day / animal (Lit)          | 7.93                | 7.79                 | 7.56                | 7.69    |
| Existing prices (A) (Rs / liter)    | 27.75               | 28.20                | 28.5                | 27.95   |
| Cost of production (B) (Rs / liter) | 28.43               | 27.65                | 27.60               | 27.62   |
| Differences (B-A) (Rs)              | -0.68               | 0.55                 | 0.90                | 0.33    |

the dairy herds for the different dairy farms operations ? It includes cost of the equipment, depreciation, interest and junk value of the equipment.

Equipment cost of different type of dairy herds is Rs 105600, 229310, 270060 and 604970 on small, medium, large and overall dairy farmers.

The value of depreciation is calculated by the formulae :

$$\text{Depreciation} = \frac{\text{Total cost of equipment} - \text{Junk value}}{\text{Equipment life in year}}$$

Sale value of junk material is taken as the 25% of the initial equipment cost and the average life of the equipment has been taken as 10 years.

This value comes to Rs 7920, 17198, 20254 and 45372 on small, medium, large and overall dairy farmers.

Junk value of the equipment is Rs 26400, 57327, 67515 and 151242 on the small, medium, large and the all over the dairy farmers.

Interest of the equipment has been calculated @ 12.5% of the equipment cost. According to table it is Rs 13200, 28664, 33757 and 75621 on different type of dairy farmers.

Total non-recurring cost on small, medium, large and overall dairy herds is Rs 153120, 332499, 391586 and 877206 respectively.

Correlation with milk yield were significant and positive for green fodder costs, concentrate costs and fixed costs in his study (Tolone et al. 2011, Zhong Zhen and Chen ShuFen 2014).

Table 2 the first head explains the labor expenses which are given in the table under different category of dairy farmers. The average expenses of labor per animal is Rs 6429, 5760, 4800 and 4430.76 and per dairy farmer 11968, 25804.8, 43200 and 22153.8 on small, medium, large and overall dairy herds for 300 days. Total expenses are 777909, 1935360, 2587200 and 4413036 respectively on small, medium, large and over-

all dairy farmers.

The feeding expenses include concentrate, dry and green fodder. The total expenses on concentrate are 2250600, 6098400, 9702000 and 17853300 on small, medium, large and overall dairy herds for 300 days of milking animal. The total expenses on dry roughage are 907500, 2268000, 3907440 and 7096500 respectively on four different types of small, medium, large and overall dairy farmers. The total expenses on green fodder for 300 days are 980100, 2696400, 3900204 and 7768800 on small, medium, large and overall dairy farmers.

The total expenses on water utilization for animal nutrition and different activities of dairy farmer Rs 199650, 528528, 824670 and 1494000 on small, medium, large and overall dairy herds respectively.

The total expenses on health and veterinary services for the whole milking days are Rs 13310, 36456, 60368 and 109311 respectively on small, medium, large and overall dairy farmers. In the line recurring expenses include the breeding cost for 300 milking days which Rs are 10527, 26208, 44198 and 78186 respectively on small, medium, large and overall dairy farmers. For the calculation of total cost of milk production of the milk recurring and non-recurring expenses must be included for the attainment of the aforesaid objective. For this purpose the total cost table has been given below on per animal and per dairy farmer basis (Uddin et al. 2010, Ndambi et al. 2008, Rajavi 2012, Martinsohn and Hansen 2013, Tolone et al. 2011).

Table 3 shows the cost of production (recurring and non-recurring cost) for the different types of animals on different category of dairy herds viz. small, medium, large and overall dairy farmers. These values are Rs 67700, 64621.5, 39122, and 63479 for small, medium, large and overall dairy herds on per animal basis. On the large category of dairy herds this cost of total milk production is very less, where is the total cost is high on small dairy farmers.

In second case the total cost of production per dairy farmer's basis is Rs 125922, 289504.32, 352098 and 317395 respectively on small, medium, large and

overall dairy farmers. The total cost incurred on different types of dairy herds is Rs 8184930, 21712824, 2108700 and 63479000 for small, medium, large and overall dairy herds respectively.

For the cost of production it is very pertinent that the above recurring and non-recurring cost should be added for the calculation of total cost incurred in any of the production process. Hence, it is important that total cost should be divided by the total yield for the calculation of production.

The given following table represents the yield per day per animal in liter of production existing prices (A) in Rs per liter cost of production in different category of dairy farmers. Finally the different has been shown to depict the profit / loss in the milk production process which is subtracted from cost of production (B) to the existing cost.

For the calculation of yield per day per animal in liter the total yield has been divided by 300 milking days and total number of animals on different dairy herds exclusively regarding small, medium, large and overall dairy farmers. Labor cost were the largest component of total production costs accounting for the approximately 20% but significant variation between dairy herds were observed. Feed cost made up approximately 15% of total costs calculation of these costs took into account costs of purchasing feed and also of sheds, fertilizers and pesticides for forage production (Prabhu et al. 2010).

Higher herd strength groups are more beneficial to maintain and manage at organized the yield per day per animal in liter in case of small dairy farmer is 7.93 liter, 7.79 liter in case of medium dairy farmer and 7.56 and 7.69 liter in case of large and overall dairy herds respectively (Badukale et al. 2008). This study use the data and prices collected in the year 2016 in the prevailing market, hence for this purpose the existing price of milk (A) in Rs per liter is 27.75, 28.20, 28.5 and 27.95 for the small, medium, large and the overall dairy herds respectively has been recorded

(Table 4). The cost of production (B) in Rs per liter for the different category of farmers has been calculated as given in the above table which is Rs 28.43, 27.65, 27.60 and 27.62 for the small, medium, large and overall dairy herds respectively which shows a negative value in small size of dairy herds Rs 0.68, and the medium, large and overall dairy herds were shows a positive Rs 0.55, 0.90 and 0.33. So the medium and large dairy herds were more beneficial in comparison to small size of dairy farmers (Prabhu et al. 2007, Lerdon Ferrada et al. 2010, Karbauskas A 2010, Deller 2007, Basavarajappa and Chinnappa 2013).

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