

An Economic Analysis of Milk Production among Different Breeds of Milch Animals in Punjab

Jaspreet Singh and Parminder Kaur

Department of Economics and Sociology, Punjab Agricultural University, Ludhiana, Punjab, India

ABSTRACT

The present study was undertaken to estimate the costs and returns of milk production among different milch animals on different herd size categories in Punjab. The primary data for the year 2017-18 were collected from 80 farmers comprised of 40 small, 26 medium and 14 large dairy farmers from two highest milk producing districts namely Ludhiana and Patiala in central region of Punjab. The study revealed that on an average, the annual net cost of rearing a buffalo, crossbred cow and indigenous cow was estimated to be Rs. 81715.10, Rs. 82645.75 and Rs. 64261.60 respectively, yielding a net income of Rs. 33470.62, Rs. 25609.99 and Rs. -1419 respectively. Feed and fodder was the major cost component in variable cost followed by labour cost. The average cost of milk production per litre for buffalo, crossbred and indigenous cow was estimated to be Rs. 28.80, Rs. 21.53 and Rs. 28.63 respectively. The average net returns per litre of milk for respective milch animals were Rs. 11.76, Rs. 6.57 and Rs. -0.42. The study revealed that buffaloes were more economical than crossbred and indigenous cows as the price of buffalo milk (Rs. 40.59) was higher than that of cow milk (Rs. 28.21) due to the high fat content in it. Thus, the buffalo rearing was more popular in the study area as their percent share in total milch animals was 69.14 percent. The cost of milk production and income measures obtained in the study suggested that buffalo milk production is relatively more profitable than crossbred cow and indigenous cow.

Key words: Milk production, milch animals, cost and returns.

JEL Classification: Q11, Q12, Q 13

Introduction

Animal husbandry and dairying have been part of human life since the beginning of civilization contributing not only low cost and nutritious food to millions of people but also in providing animal power and maintaining ecological balance. There exists a close link between livestock sector and agriculture sector. The sector supports agriculture by providing critical inputs and can supplement incomes of even those who are engaged primarily in other occupations. Dairy farming is one of the alternatives to the wheat-rice system in Punjab, which offers regular income and employment to households. Milk production is predominantly a domain of small and marginal farmers and the landless who keep one or two milch animals generally as a part of mixed farming system (Bardhan and Sharma, 2012).

Punjab one of the major milk producing states contributing 6.82 per cent in total milk production of India ranks sixth in the country. Total milk production in the state increased from 1.84 million tonnes in 1967-68 to 11.28 million tonnes in 2016-17. In terms of availability per capita of milk (1075 gms/day) Punjab stands first among all the states of India (Anonymous, 2017_a). Bovine productivity is the highest in Punjab state. The average milk yield of crossbred cow, buffalo and indigenous cow was about 12.72 kg/day, 8.21 kg/day and 6.59 kg/day respectively in 2016-17 (Anonymous, 2017_b). To boost the production of milk in the state, an ambitious program has been set up for genetic improvement of local breeds of buffaloes and cows through upgrading and crossbreeding. Other measures, such as the provision of good quality feed, adequate animal health, the organization of milk collection centres and the establishment of milk processing plants

of milk for distribution to urban consumers, have been implemented over the last decades.

Milk production is a costly affair and most of the farmers do not know exactly about incurring profits or losses. Huge investment is incurred in the purchase of milch animals and feed constitutes about 70 to 80 percent of the total maintenance cost (Sharma, 2013; Kamble *et al.*, 2014; Lal and Chandel, 2016; Singh, 2018). There is a great variation in the relative economic efficiency of different breeds of milch animals reared on different situations due to variations in genetic characters, feeding and management practices. Ultimately, all these factors affect milk production. The input prices are increasing more rapidly than the price of milk. The sufficient knowledge of the costs and returns of milk production among different milch animals is also vital for formulating pricing policy and providing incentives to milk producers. In the backdrop of this, the present study was conducted to estimate the costs and returns of milk production among different milch animals on different herd size categories in Punjab (Nagral *et al.*, 2007).

Data Sources and Methodology

In order to achieve stipulated objectives of the study, the central region of Punjab was purposively selected being developed and highest milk producing region of the state. Multistage simple random sampling was used for selection of sample. In first stage, two districts namely Patiala and Ludhiana having highest milk production above the state average were selected. In second stage, Nabha and Raikot blocks were chosen from the respective districts. Two villages from each block namely Laloda and Sangatpura from Nabha, and Kalsiyan and Lohatbadi from Raikot were chosen randomly at the third stage of sampling. After the selection of villages, a list of all the dairy farmers with number of milch animals (cows and buffalos) maintained on each farm was prepared. A sample of 20 respondents from each chosen village was selected randomly. Thus, a total of 80 farmers comprised of 40 small (having 1-5 milch animals), 26 medium (having 6-12 milch animals) and 14 large (having more than 12 milch animals) households were selected for the purpose of the study. The number of dairy households in each category were selected in proportion to the total number of farm households in that category. The primary data were collected for the year 2017-18 for different seasons i.e. for summer (March to June), rainy

(July to October) and winter (November to February).

Results and Discussion

Cost and returns from buffalo milk production:

The annual costs of rearing a buffalo across different herd size categories are presented in Table 1. The total cost constituted fixed and variable cost. The total cost per buffalo was estimated to be Rs. 89090.74, Rs.85215.86 and Rs. 80472.37 on small, medium and large dairy farms, respectively. The overall average total cost per buffalo came out to be Rs. 85073.48 of which 15.66 and 84.34 percent were fixed and variable costs, respectively. The component wise breakup of variable cost indicated that feed cost accounted for 75.51 percent of total cost for overall farms. The share of value of labour in the total cost constituted second highest proportion after feed and fodder i.e. 6.25 percent on small sized dairy units while 6.43 and 6.59 percent on medium and large dairy units respectively. This is in conformity with the findings of earlier studies (Singh *et al.*, 2012; Lal and Chandel, 2016)

The gross income was highest on large dairy farms (Rs. 126056.54) followed by medium (Rs. 120688.67) and small (Rs. 117020.20) dairy farms. The overall average net cost per buffalo per annum was estimated to be Rs. 81715.10. The relatively higher net cost was observed on small dairy farms (Rs. 84628.44) followed by medium (Rs. 80577.54) and large (Rs. 75503.87) dairy farms. The cost of producing a litre of buffalo milk was higher small farms (Rs. 30.30) followed by medium (Rs. 28.26) and large sized dairy farm (Rs. 25.69). On an average, per litre cost of buffalo milk was estimated to be Rs. 28.80. The net returns per litre of milk were higher on large sized dairy farms (Rs. 15.51) followed by medium (Rs. 12.44) and small (Rs. 10.00) dairy farms. This might be due to the fact that large dairy farmers were rearing better milch animals and following better management practices as compared to medium and small dairy farmers. On an average, the net returns per litre of buffalo milk came out to be Rs. 11.76.

It was found that per litre cost of buffalo milk production decreased with increase in herd size indicating the prevalence of economies of scale on large farms.

Cost and returns from crossbred cow milk production: A perusal of Table 2 reveals that the annual cost of maintaining a crossbred cow in respect

Table 1. Costs and returns from milk production across different herd size categories in Punjab, 2017-18
(Rs. /buffalo)

Particulars	Small	Medium	Large	Overall
Fixed cost				
Depreciation on fixed assets	7744.35 (8.69)	7051.33 (8.27)	6345.99 (7.90)	6931.42 (8.15)
Interest on fixed assets	7959.15 (8.93)	7357.18 (8.63)	5264.92 (6.54)	6386.87 (7.51)
Total fixed costs	15703.50 (17.63)	14408.51 (16.91)	11619.91 (14.44)	13318.29 (15.66)
Variable cost				
Green fodder	7469.43 (8.38)	7812 (9.17)	6552 (8.14)	7420.22 (8.72)
Dry fodder	11591.2 (13.01)	10388 (12.19)	8864 (11.01)	10722.9 (12.60)
Concentrates	46759.5 (52.49)	45063 (53.88)	46129 (57.32)	46097.8 (54.19)
Total feed cost	65820.13 (74.88)	63263 (74.24)	615455 (76.48)	64240.92 (75.51)
Labour	5568.6 (6.25)	5481.3 (6.43)	5303.12 (6.59)	5493.77 (6.46)
Veterinary charges	506.5 (0.57)	523.5 (0.61)	512.5 (0.64)	513.07 (0.60)
Transportation charges	296.2 (0.33)	328.4 (0.39)	317.66 (0.39)	310.19 (0.36)
Electricity charges	349.50 (0.39)	394.60 (0.46)	365.34 (0.45)	366.12 (0.43)
Interest on variable cost	846.31 (0.95)	816.56 (0.96)	809.04 (1.01)	830.12 (0.98)
Total variable cost	73387.24 (82.37)	70807.36 (83.09)	68852.5 (85.56)	71983.2 (84.34)
Total cost (a+b)	89090.74 (100)	85215.86 (100)	80472.37 (100)	85073.48 (100)
Average annual milk production (litres)	2793.00	2851.36	2939.03	2837.52
Income from milk	112557.90	116050.35	121088.04	115185.72
Income from dung	4462.30	4638.32	4968.50	4608.09
Gross income	117020.20	120688.67	126056.54	119793.81
Net cost(total cost -value of dung)	84628.44	80577.54	75503.87	81715.10
Net income	27929.46	35472.81	45584.16	33470.62
Price of milk	40.30	40.70	41.20	40.59
Cost per litre	30.30	28.26	25.69	28.80
Net returns per litre of milk	10.00	12.44	15.51	11.76

Figures in parentheses indicate the percentages to the total cost.

Table 2. Costs and returns from milk production across different herd size categories in Punjab, 2017-18
(Rs. /crossbred cow)

Particulars	Small	Medium	Large	Overall
Fixed cost				
Depreciation on fixed assets	7294.35 (8.08)	6601.33 (7.73)	5904.99 (7.19)	6481.42 (7.50)
Interest on fixed assets	7584.32 (8.40)	7126.68 (8.35)	5012.30 (6.11)	6495.65 (7.52)
Total fixed costs	14878.67 (16.48)	13728.01 (16.08)	10917.29 (13.30)	12977.07 (15.02)
Variable cost				
Green fodder	7719.75 (8.55)	7796.40 (9.13)	6570.00 (8.00)	7543.46 (8.73)
Dry fodder	11406.30 (12.63)	10439.00 (12.23)	8864.29 (10.80)	10647.08 (12.32)
Concentrates	47358.80 (52.45)	44676.00 (52.34)	46928.60 (57.17)	46411.61 (53.71)
Total feed cost	66484.85 (73.63)	62911.40 (73.70)	62362.89 (75.98)	64602.14 (74.75)
Labour	5568.60 (6.17)	5481.39 (6.42)	5703.125 (6.95)	5563.77 (6.44)
Veterinary charges	1353.30 (1.50)	1256.30 (1.47)	1136.20 (1.38)	1283.78 (1.49)
Transportation charges	296.20 (0.33)	328.40 (0.38)	350.66 (0.43)	316.19 (0.37)
Electricity charges	845.00 (0.94)	826.00 (0.97)	792.00 (0.96)	829.55 (0.96)
Interest on variable cost	869.73 (0.96)	826.04 (0.97)	820.69 (1.00)	846.95 (0.98)
Total variable cost	75417.68 (83.52)	71629.44 (83.92)	71165.57 (86.70)	73442.38 (84.98)
Total cost (a+ b)	90296.35 (100)	85357.45 (100)	82082.85 (100)	86419.45 (100)
Average annual milk production litres	3818.46	3992.35	4353.93	3838.682
Income from milk	107680.60	113382.74	121474.60	108255.70
Income from dung	4462.30	4638.32	4968.5	4608.092
Gross income	112142.90	118021.06	126443.15	112863.83
Net cost(total cost -value of dung)	85834.05	80719.13	77114.35	82645.75
Net income	21846.53	32663.61	44360.29	25609.99
Price of milk	28.2	28.4	27.9	28.21
Cost per litre	22.48	20.22	17.71	21.53
Net returns per litre of milk	5.72	8.18	10.19	6.57

Figures in parentheses indicate the percentages to the total cost.

Table 3. Costs and returns from milk production across different herd size categories in Punjab, 2017-18**(Rs. /indigenous cow)**

Particulars	Small	Medium	Large	Overall
Fixed cost				
Depreciation on fixed assets	5944.35 (8.21)	5251.33 (7.56)	4554.99 (6.82)	5131.42 (7.38)
Interest on fixed assets	7259.74 (10.03)	6923.56 (9.96)	4635.45 (6.94)	6157.12 (8.85)
Total fixed costs	13204.09 (18.24)	12174.89 (17.52)	9190.53 (13.75)	11288.54 (16.23)
Variable cost				
Green fodder	7665.00 (10.59)	7884.00 (11.35)	8212.50 (12.29)	7981.66 (11.26)
Dry fodder	9125.00 (12.60)	9125.00 (13.13).00	8820.83 (13.20)	9016.83 (13.04)
Concentrates	35040 (48.39)	32850 (47.28)	32850.00 (49.16)	33041.63 (48.80)
Total feed cost	51830 (71.58)	49859.00 (71.75)	49883.33 (74.66)	50040.12 (73.10)
Labour	5568.60 (7.69)	5481.30 (7.89)	5703.12 (8.54)	5567.82 (8.00)
Veterinary charges	478.37 (0.66)	586.66 (0.84)	590.36 (0.88)	578.50 (0.77)
Transportation charges	296.20 (0.41)	328.40 (0.47)	350.66 (0.52)	333.50 (0.45)
Electricity charges	349.50 (0.48)	394.60 (0.57)	435.00 (0.65)	405.02 (0.55)
Interest on variable cost	682.76 (0.94)	660.91 (0.95)	664.56 (0.99)	656.19 (0.90)
Total variable cost	59205.43 (81.76)	57310.88 (82.48)	57627.04 (86.25)	57581.15 (83.77)
Total cost a+b	72409.52 (100)	69485.76 (100)	66817.57 (100)	68869.69 (100)
Average annual milk production litres	2190.00	2275.40	2342.10	2244.37
Income from milk	60882.00	63938.74	65813.01	62842.43
Income from dung	4462.30	4638.32	4968.50	4608.09
Gross income	65344.30	68577.06	70781.51	67450.52
Net cost(total cost -value of dung)	67947.22	64847.44	61849.07	64261.60
Net income	-7065.22	-908.70	3963.94	-1419.17
Price of milk	28.2	28.4	27.9	28.21
Cost per litre	31.03	28.50	26.41	28.63
Net returns per litre of milk	-2.83	-0.10	1.49	-0.42

of small, medium and large farm was Rs. 90296.35, Rs. 85357.45 and Rs. 82082.85, respectively. The variable cost accounted for about 85 percent of the total cost while the fixed cost was only 15 percent. The feed and fodder cost was the major component accounting for 74.75 percent of the total cost. It was observed that more expenditure was made on feeding concentrates to crossbred cows on all the categories of dairy units, which is consistent with the earlier studies carried out by Kalra *et al.*, 1995, Jaiswal and Singh, 2015 and Kumari *et al.*, 2016.

The average annual milk production on small, medium and large sized dairy farms was 3818.46, 3992.35 and 4353.93 litres respectively. On an average, the gross income, net cost and net income per crossbred cow per annum were estimated to be Rs. 112863.83, Rs. 82645.75 and Rs. 25609.99 respectively. The net cost came out to be Rs. 85834.05, Rs. 80719.13 and Rs. 77114.35 on small, medium and large farms respectively. It can be concluded that the cost of milk production was highest on small farms, this is in conformity with earlier studies of Lal and Chandel (2016). The net income was highest on large farms (Rs. 44360.29) followed by medium (Rs. 32663.61) and small dairy farms (Rs. 21846.53). The cost of milk production per litre decreased as the size of the herd increased indicating the prevalence of economies of scale on large farms. The cost of milk production on per litre basis was highest on small farms i.e. Rs. 22.48 per litre followed by medium with Rs. 20.22 per litre and large with Rs. 17.71 per litre. The net returns per litre were in the tune of Rs. 5.72, Rs. 8.18 and Rs. 10.19 on the respective farms.

Cost and returns from indigenous cow milk production: The costs and returns of indigenous cow milk production are presented in Table 3. The average annual total cost was estimated to be Rs. 68869.69 out of which fixed and variable costs were Rs. 11288.54 and Rs. 57581.15 respectively. The total cost was highest on small farms (Rs. 72409.52) followed by medium (Rs. 69485.76) and large (Rs. 66817.57) dairy farms. The total fixed cost was highest on large farms followed by medium and small farms. The total variable cost was higher on small farms followed by large and medium farms. The feed and fodder shared the highest proportion on large farms (74.66%) followed by medium (71.75%) and small farms (71.58%), while on average proportion came to be 73.10 percent. The labour charges were higher on large farms (Rs. 5703.12) followed by small

(Rs. 5568.60) and medium (Rs. 5481.30) sized dairy farms. The cost per litre of milk was estimated to be Rs. 31.03, Rs. 28.50 and Rs. 26.41 on small, medium and large dairy farms, respectively. On an average it came out to be Rs. 28.94 per litre. The gross income was highest on large farms (Rs. 70781.51) followed by medium (Rs. 68577.06) and small (Rs. 65344.3) dairy farms. The net returns per litre were found negative on small (Rs. -2.83) and medium (Rs. -0.10) farms and positive while on large farms the net returns per litre of milk were positive but low (Rs. 1.49).

Conclusions and Policy Implications

The study brought out that buffaloes were more economical than crossbred and indigenous cows as the price of buffalo milk (Rs. 40.59) was higher than cow milk (Rs. 28.21) due to the high fat content in it. The buffalo rearing was more popular in the study area as their share in total milch animals was 69.14 percent as compared to crossbred cows (26.36%) and indigenous cows (4.50%). It was revealed that feed and fodder was the major cost component in variable cost followed by labour cost. The average cost of per litre production of milk for buffalo, crossbred and indigenous cow was Rs. 28.80, Rs. 21.53 and Rs. 28.63 respectively. The average net returns per litre of milk for respective milch animals were Rs. 11.76, Rs. 6.57 and Rs. -0.42.

The cost of milk production and income measures obtained in the study suggested that buffalo and crossbred cow milk production was profitable while indigenous milk production was not profitable as it incurs losses. Currently, the purchase price for milk is arbitrarily fixed according to fat and SNF content of milk without taking into account the cost structure of milk production. The major share in the total milk production was of variable costs (about 84%) which are completely ignored while fixing the milk price. Therefore, the cost of milk production should be taken into account by policy makers while providing incentives to milk producers as in the case of rice and wheat, where the minimum support price is established on the basis of a comprehensive analysis of cost of cultivation.

References

- Anonymous 2017a. Basic Animal Husbandry and Fisheries Statistics, Ministry of Agriculture, Department of Animal Husbandry, Dairying and Fisheries, Krishi Bhawan, New Delhi.

- Anonymous 2017b. Statistical Abstract of Punjab, Economic and Statistical Organization, Government of Punjab, Chandigarh.
- Bardhan D and Sharma M L 2012. Economics of milk production in Kumaun region of Uttarakhand. *Indian Journal of Dairy Science* **65**: 416–422.
- Jaiswal P and Singh K R 2015. Economics of milk production and determinants of market participation for small holder dairy farmers in Raipur district of Chhattisgarh. *Indian Journal of Dairy Science* **68**: 619–628.
- Kalra K K, Singh Rajvir, Singh R and Chauhan R 1995. Economic analysis of milk production and disposal in rural areas of Haryana. *Indian Journal of Dairy Science*. **48**: 546-555.
- Kamble S H, Kolambkar R A, Chavan R V and More A S 2014. Economics of production of buffalo milk in vicinity of Parbhani city. *Research Journal of Animal Husbandry and Dairy Science* **5**: 10-13.
- Kumari B, Malhotra R and Chauhan A K 2016. Impact of women dairy co-operatives on economics of milk production in Begusarai district of Bihar. *Indian Journal of Dairy Science* **69**: 487–491.
- Lal P and Chandel B S 2016. Economics of milk production and cost elasticity analysis in Sirsa district of Haryana. *Economic Affairs* **61**: 405-411.
- Nagral B G, Datta K.K and Singh S R 2007. Cost of milk production in Vidarbha region of Maharashtra. *Indian Journal of Dairy Science* **64** :514–19.
- Sharma A 2013. *Economic viability of commercial dairy farms in Jabalpur district of Madhya Pradesh*. M.V.Sc. Thesis, submitted to Dairy Economics, Statistics & Management Division, National Dairy Research Institute, Karnal, India.
- Singh Jaspreet. 2018. *Technical efficiency in milk production in Punjab*. M.Sc. Thesis, submitted to Punjab Agricultural University, Ludhiana.
- Singh K M, Meena M S, Bharati Ramesh and Kumar A 2012. An economic analysis of milk production in Bihar. *Indian Journal of Animal Science* **82**: 1233-1237.

Received: January 20, 2020 Accepted: April 12, 2020