Indian Journal of Animal Sciences **90** (7): 1065–1069, July 2020/Article

Economics of milk production and profitability of different cow unit sizes in Srinagar

H HAMADANI*, A A KHAN, SHABIR A WANI, H M KHAN, M T BANDAY and SARFARAZ A WANI

Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shuhama, Alusteng, Srinagar, Jammu and Kashmir 190 006 India

Received: 28 September 2019; Accepted: 26 November 2019

ABSTRACT

Dairy farming is one of the choice options for business startups among budding entrepreneurs and progressive farmers in the valley. However, the apprehensions of profitability as well the size of cow unit (CU) to begin with, do exist in their minds. Keeping this in view, a study was planned with an objective of analyzing the economics of milk production *viz-a-viz* various cow-unit sizes in Srinagar. The study was carried out zone-wise as well as cow unit wise to assess the viability of dairying in the district and to find out the profitable size of the cow unit respectively. A total of 616 farmers were included in the study. It was found that dairy farming was a profitable venture in Srinagar District with Net Returns per litre of milk being ₹3 on an average. However, profitability seemed to be dependent on the size of the cow-unit as well with Net returns per litre of milk being ₹ –1.98, ₹ 2.90, ₹ 12.77 and ₹ 16.02 in CU 1, CU 2–4, CU 5–9 and CU above 10 respectively. This clearly indicates that a dairy venture can be started with a CU 2–4 at the beginning to gain experience, which can be later expanded to a CU 5–9 and eventually to CU more than 10 up to a suitable and sustainable level depending upon farmer's individual situation.

Keywords: Economics, Employment, Milk, Net-returns, Profits

Agriculture plays a prominent role for development of economy in J&K. According to the J&K Economic Survey, about 70% of the population in J&K gets livelihood directly or indirectly from the agriculture and allied sectors (Anonymous2015a). Animal Husbandry here is an important part of agriculture sector and rural economy. Livestock sector has gained prominence during the past three decades owing to its impressive growth and increasing Gross Domestic Product (GDP) contribution within the agricultural sector. The contribution of livestock sector stood at 3.9% to national GDP and 24.8% to agricultural GDP at current prices, and 3.9% to national GDP and 26.1% to agricultural GDP at constant prices (2011–12) during 2013–14 (Anonymous 2015b). Livestock sector is not only a sustainable livelihood option, but also an appropriate medium of socio-economic growth. About 5.5% of total working population of India is engaged in animal husbandry sector (Sharma and Tiwari 2011). Dairy production has become an important component of rural development programmes of India. It is considered as an instrument for social and economic change, to improve income and quality of life of dairy farmers (Nagrale *et al.* 2015). Dairying is a potential source of income for the rural masses especially in the hilly areas where crop cultivation is difficult. The contribution of dairying sector to the national income is invaluable. Milk is the biggest agricultural produce of the country, contributing around 22% to agricultural GDP (Anonymous 2013). This sector provides insurance against crop failures. This sector helps in increasing the crop production by providing the drag power, organic manure and cash income on a regular basis.

Dairy farming has gained popularity among the budding entrepreneurs and the progressive farmers in the valley. With shrinking employment options, many educated youths across the valley including Srinagar are coming forward to start their own ventures and dairy farming appears to be their choice option. There are however many apprehensions in the minds of these budding entrepreneurs regarding the viability of this enterprise. Size of the cow unit to be started with is also an important question raised by such people. Keeping these things in view, a study was planned to assess the economic viability of dairy farming and shortlist the most profitable cow unit size in Srinagar.

MATERIALS AND METHODS

The study was carried out in two parts in Srinagar district of Jammu and Kashmir: (I) Zone-wise to assess the viability of dairying in the district and (II) Cow unit wise to find out the profitable size of cow unit. For zone-wise study, the study area was divided into three zones corresponding to three revenue subdivisions viz. Srinagar East (Zone 1), Srinagar West (Zone 2) and ACR Srinagar (Zone 3). Twenty per cent of the villages from each zone were selected and from each selected village twenty livestock owners were

*Corresponding author e-mail: endolf123@gmail.com

included in the survey. A total of 616 farmers were included in the study, with 203, 208 and 205 farmers selected from Zone 1, Zone 2 and Zone 3 respectively. For cow unit wise study, the selected farmers were redistributed into four groups depending upon the number of cows owned by them. The groups were classified as CU 1 (farmer owning a unit of 1 cow), CU 2–4 (farmer owning a unit of 2–4 cows), CU 5–9 (farmer owning a unit of 5–9 cows) and CU above 10 (farmer owning more than 10 cows). Information was sought from them regarding the inputs and outputs in their dairy enterprises. Different concepts and estimating procedures (Wani *et al.* 2010) used in the study are outlined below.

Total Fixed Costs (*TFC*): Fixed costs may be defined as those costs which do not affect the volume of output, even if the latter is zero. The fixed costs remain unchanged, irrespective of production. In case of livestock farming TFCs include depreciation of animal and building costs and interest on fixed capital.

Standard animal unit (*SAU*): SAU was worked out by assigning 1 SAU to each cow/heifer/bullock/bull, ½ SAU to each young stock (1–3 years) and ¼ SAU to each young stock below 1 year.

Depreciation: Depreciation is the loss of value of an asset due to its use, wear and tear and time. It represents the amount by which a farm asset decreases in value. In case of milch animals, no depreciation was charged up to third lactation, subsequently 10% depreciation was charged for the animals in fourth and fifth lactation and 20% for the animals in sixth lactation and above. Annual depreciation on cattle sheds, building and farm equipment was calculated by straight line method (Kar 2006) using the following formula:

$$\text{Annual Depreciation} = (\text{Cost of asset} - \text{Scrap value})/(\text{Estimated life of years})$$

The depreciation on cattle shed was worked out after apportioning the investment on cattle shed for milch and draft animals based on standard animal units (SAU) and allocated for the milch animals accordingly.

Interest on fixed capital: Interest on fixed capital assets, including the animals, was worked out at the rate of 6% per annum. This rate of interest on the fixed investment was charged on the assumption that if farmers had invested their funds in terms of deposits for a period of three years, they could have earned 6 percent interest from the bank.

Total Variable Costs (*TVC*): The variable costs are those for which the variable factors are responsible and are thus dependent in total magnitude upon the volume of output. Variable costs vary with the output. TVCs include the cost of feed and fodders, human labour and miscellaneous expenditure etc.

Human labour: The amount of labour used to maintain animals was estimated by recording the amount of time spent on different operations. The cost of hired labour was based on the actual wage rate prevailing in the study area. The cost of family labour was calculated on the basis of average wage paid to a permanent labour in the area. All types of labor viz. male, female and child used in different operations was converted into man-equivalent days. A man day of 8 h was taken as equivalent to 1.5 woman work day and 2 work days of child.

Miscellaneous expenditure: The cost of veterinary medicines, expenditure incurred on the minor repairs of cattle shed, implements, hand tools, irrigation structures, grazing charges and other minor costs of ropes, buckets etc. were included in miscellaneous expenses. The joint costs were apportioned and were allocated on the basis of standard animal units.

Calculations: Various parameters used to study the dairy economics were calculated by using the following formulas: *Gross Cost = Total Fixed Cost+Total Variable Cost; Net Cost = Gross Cost–Value of dung; Gross Return= Sale price of milk × Milk production; Net Return = Gross Return – Net Cost; Cost of production per litre of milk = Net Cost/ Milk production; Net Returns per litre of milk = Net Returns/ Milk production.*

RESULTS AND DISCUSSION

Zone wise: Zone wise depiction of various costs and returns involved in the economics of milk production are given in Table 1. Total Fixed Cost was slightly higher in zone 1, followed by zone 2 and then by zone 3. However, Total Variable Cost was highest in zone 3 followed by zone

Table 1. Zone wise economics of milk production (per cow/day)

Parameter	Zone (N=203)	Zone 2 (N=208)	Zone 3 (N=205)	Overall (N=616)
Depreciation on animals (₹)	4.69	4.70	4.07	4.56
Depreciation on building (₹)	1.85	2.55	2.26	2.22
Depreciation on equipment (₹)	0.08	0.07	0.07	0.08
Interest on fixed capital (₹)	14.85	13.70	14.18	14.23
Total Fixed Cost (₹)	21.48	21.02	20.58	21.09
Green fodder cost (₹)	31.30	7.31	11.03	16.07
Dry fodder cost (₹)	24.21	50.98	52.14	42.90
Concentrate cost (₹)	74.32	97.41	96.97	89.66
Total Feed Cost (₹)	129.84	155.70	160.13	148.63
Labour Cost (₹)	65.18	65.88	71.28	67.94
Miscellaneous Cost (₹)	2.25	2.24	2.24	2.25
Total Variable Cost (₹)	197.27	223.82	233.65	218.82
Gross Cost (₹)	218.75	244.84	254.23	239.91
Value of dung (₹)	10.84	4.66	11.69	9.02
Net Cost (₹)	207.91	240.18	242.54	230.88
Sale price of 1 litre of milk (₹)	25.80	33.58	28.67	29.69
Milk production (litres)	8.98	7.93	9.10	8.65
Gross Return (₹)	231.72	266.33	260.84	256.82
Net Returns (₹)	23.82	26.15	18.30	25.94
Cost of production/ litre of milk (₹)	23.15	30.28	26.66	26.70
Net returns/litre of milk (₹)	2.65	3.30	2.01	3.00

Table 2. Per cent share of various costs to gross cost (Zone wise)

Parameter	Zone 1 (N=203)	Zone 2 (N=208)	Zone 3 (N=205)	Overall (N=616)
Depreciation on animals (₹)	2.15	1.92	1.60	1.90
Depreciation on building (₹)	0.85	1.04	0.89	0.93
Depreciation on equipment (₹)	0.04	0.03	0.03	0.03
Interest on fixed capital (₹)	6.79	5.59	5.58	5.93
Total fixed cost (₹)	9.82	8.59	8.09	8.79
Green fodder cost (₹)	14.31	2.99	4.34	6.70
Dry fodder cost (₹)	11.07	20.82	20.51	17.88
Concentrate cost (₹)	33.98	39.79	38.14	37.37
Total feed cost (₹)	59.35	63.59	62.99	61.95
Labour cost (₹)	29.80	26.91	28.04	28.32
Miscellaneous cost (₹)	1.03	0.92	0.88	0.94
Total variable cost (₹)	90.18	91.41	91.91	91.21
Gross cost (₹)	100.00	100.00	100.00	100.00

Table 3. Effect of cow unit size on the economics of milk production (per cow/day)

Parameter	CU 1 (N=280)	CU 2–4 (N=262)	CU 5–9 (N=61)	CU above 10 (N=13)
Depreciation on animals (₹)	7.65	2.79	3.40	11.06
Depreciation on building (₹)	2.99	1.65	1.50	0.70
Depreciation on equipment (₹)	0.11	0.08	0.05	0.05
Interest on fixed capital (₹)	15.25	12.86	14.40	14.28
Total fixed cost (₹)	26.00	17.38	19.35	26.09
Green fodder cost (₹)	6.86	24.50	16.17	27.69
Dry fodder cost (₹)	49.12	28.16	80.98	33.23
Concentrate cost (₹)	85.37	86.58	108.94	153.46
Total feed cost (₹)	141.35	139.25	206.09	214.38
Labour cost (₹)	85.84	78.22	41.05	28.76
Miscellaneous cost (₹)	2.26	2.24	2.24	2.24
Total variable cost (₹)	229.45	219.71	249.38	245.39
Gross cost (₹)	255.45	237.09	268.73	271.47
Value of dung (₹)	8.38	8.75	15.09	0.00
Net cost (₹)	247.08	228.34	253.63	271.47
Sale price of 1 litre of milk (₹)	27.51	29.92	36.18	42.69
Milk production (litres)	8.38	8.45	10.83	10.18
Gross return (₹)	230.46	252.85	391.95	434.51
Net returns (₹)	–16.61	24.52	138.32	163.04
Cost of production/ litre of milk (₹)	29.50	27.02	23.41	26.67
Net returns/litre of milk (₹)	–1.98	2.90	12.77	16.02

2 and lastly by zone 1. Net Cost was also highest in zone 3 followed by zone 2 and lastly by zone 1. Sale price of milk was highest in zone 2 followed by zone 3 and then by zone 1. Milk production per cow per day was highest in zone 3 followed by zone 1 and then by zone 2. Cost of production to produce 1 liter of milk was found to be highest in zone 2, followed by zone 3 and lastly by zone 1. Net Returns per liter of milk were highest in zone 2 followed by zone 1 and lastly by zone 3. Overall, Net Return per liter of milk in the Srinagar city was ₹ 3.00. The positive value of Net Returns have been reported in numerous economic studies on milk carried out in various agro-climatic zones of Jammu and Kashmir (Wani *et al.* 2010), and other parts of India (Sharma 2013, Vishnoi 2014, Jadav *et al.* 2016, Kumawat *et al.* 2016, Kashish *et al.* 2016, Dubey *et al.* 2017).

Per cent share of various costs to Gross Cost across the three zones is illustrated in Table 2. Feed cost followed by labour cost constituted the maximum share to the Gross Cost across all three zones.

Feed cost followed by labour cost constituted maximum part of the Gross Cost in the present study. Feed cost has been reported as a major cost by various authors in their respective studies on dairy economics (Mahajan *et al.* 2013, Kumar and Parappurathu 2014, Jadav *et al.* 2016, Kumawat *et al.* 2016, Prusty and Tripathy 2016, Chand *et al.* 2017, Dubey *et al.* 2017). Kumawat *et al.* (2016) and Akturk *et al.* (2010) reported labour cost as a second major cost after feed cost which is in agreement with the present study, but Chand *et al.* (2017) described labour cost as a third major cost after feed cost and fixed cost.

Cow unit wise: Cow unit (CU) wise depiction of various costs and returns involved in the economics of milk production are given in Table 3.

Total Fixed Cost was highest in CU above 10, followed by CU 1, CU 5–9 and lastly by CU 2–4. Total Variable Cost was highest for CU 5–9, followed by CU above 10, CU 2–4 and lastly by CU 1. Labour cost was highest in CU 1 and decreased with increase in CU number. Net cost was highest for CU above 10, followed by CU 5–9, CU 1 and lastly by CU 2–4. Sale price of milk was lowest in CU 1, which increased with increase in CU numbers. Milk production per cow per day was highest in CU 5–9 followed by CU above 10, CU 2–4 and then by CU 1. Cost of production per litre of milk decreased with increase in the cow units in the present study as is also reported by Vishnoi (2014) and Sharma (2013) in their respective studies. Net Return per litre of milk was ₹ –1.98 in CU 1, which increased as the CUs increased in number. Negative value of Net Returns in CU 1 may be due to higher labour cost which gets divided as the number of cows increase. The increase in Net Returns with the increase in herd size have also been reported by Sharma (2013), Kumar and Parappurathu (2014) and Vishnoi (2014). Large-scale production of milk has been suggested to bring in economies of scale which further reduces the costs resulting in higher returns (Kumar and Parappurathu 2014). The negative value of Net Return in CU 1 group may be attributed to higher

Table 4. Per cent share of various costs to gross cost (Cow unit wise)

Parameter	CU 1 (N=280)	CU 2–4 (N=262)	CU 5–9 (N=61)	CU above 10 (N=13)
Depreciation on animals (₹)	2.99	1.18	1.27	4.07
Depreciation on building (₹)	1.17	0.70	0.56	0.26
Depreciation on equipment (₹)	0.04	0.03	0.02	0.02
Interest on fixed capital (₹)	5.97	5.43	5.36	5.26
Total fixed cost (₹)	10.18	7.33	7.20	9.61
Green fodder cost (₹)	2.69	10.33	6.02	10.20
Dry fodder cost (₹)	19.23	11.88	30.14	12.24
Concentrate cost (₹)	33.42	36.52	40.54	56.53
Total feed cost (₹)	55.33	58.73	76.69	78.97
Labour cost (₹)	33.60	32.99	15.28	10.59
Miscellaneous cost (₹)	0.89	0.95	0.83	0.83
Total Variable Cost (₹)	89.82	92.67	92.80	90.39
Gross cost (₹)	100.00	100.00	100.00	100.00

labour cost and lesser milk selling rates in this group as compared to groups with more than one cow units (CU 2–4, CU 5–9 and CU above 10). The negative value of Net Returns has also been reported in a study involving majority of the farmers with one cow only (Farooq 2016).

Per cent share of various costs to Gross Cost across the different CUs is illustrated in Table 4. Total Fixed Cost constituted 10.18%, 7.33%, 7.20% and 9.61% to the Gross Cost in CU 1, CU 2–4, CU 5–9 and CU above 10. Share of total feed cost to Gross Cost increased with increase in CUs, but share of labour cost decreased with increase in CUs. The decrease in the labour cost with increase in the cow unit number may be a probable reason behind the increased profitability with the increase in the cow unit number.

It was concluded that net returns in dairy farming were towards the positive side across all three zones of the Srinagar city, in spite of the constraint of fodder availability, inadequate grazing lands and costlier labour compared to villages resulting in high production cost, which appeared to be compensated by higher milk rates fetched in the city markets. These results clearly gave a green signal towards the viability of dairy farming in other parts of the valley as well where fodder and labour are cheaply available compared to the city. However, marketing needs a special attention in such places so that good milk rates are fetched by the farmers. There is still a scope of increase in the Net Returns if farm yard manure is also utilized in a proper manner which is mostly wasted off. Profitability appeared to depend on the size of the cow-unit as well with Net Returns per litre of milk being ₹ –1.98, ₹ 2.90, ₹ 12.77 and ₹ 16.02 in CU 1, CU 2–4, CU 5–9 and CU above 10 respectively. These facts suggested that a beginner can start a dairy farm with CU of 2–4 with a provision of expansion to gain experience and insight into all perspectives of dairying in his conditions. Later the same can be expanded to a CU of 5–9 and eventually to CU of more than 10 upto a suitable and sustainable level depending upon farmer's individual situation. One cow unit appeared to be suitable for domestic purpose and not on commercial lines. In this case, family members were involved in rearing of the cow and milk obtained was utilized by the family only. However, excess milk if any was sold to nearby consumers/vendor.

REFERENCES

Akturk D, Bayramoglu Z, Savran F and Tatldil F. 2010. The factors affecting milk production and milk production cost. *Journal of Faculty of Veterinary Medicine University of Caucasus* **16**(2): 329–35.

Anonymous. 2013. Dairy sector set to touch $140 billion by 2020: Report. *The Economic Times*. http://articles.economictimes.indiatimes.com/20131020/news/43221462_1_dairysectordairyindustrydairyproducts

Anonymous. 2015a. *Agriculture and allied sectors*. pp. 77–121. Economic Survey 2014–15. Directorate of Economics and Statistics. Government of Jammu and Kashmir, J&K.

Anonymous. 2015b. *Basic Animal Husbandry and Fisheries Statistics.* AHS series 16. Department of Animal Husbandry, Dairying and Fisheries. Government of India. New Delhi, pp. 1–165.

Chand P, Sirohi S, Mishra A and Chahal V P. 2017. Estimation of costs and returns from dairying in Malwa region of Madhya Pradesh. *Indian Journal of Animal Sciences* **87**(3): 381–86.

Dubey M, Singh V P, Pandey R K and Chaubey A K. 2017. Economic Analysis of Feeding Management and Milk Production at the University Dairy Farm. *International Journal of Current Microbiology and Applied Sciences* **6**(2): 480–86.

Farooq F. 2016. 'Economics of Milk production in Pulwama District of Kashmir Valley'. MVSc thesis submitted to Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar.

Jadav S J, Durgga R V, Tyagi K K and Singh R R. 2016. Economic performance of rural and periurban dairy farmers. *Journal of Livestock Science* **7**: 215–19.

Kar S. 2006. 'Corporate depreciation accounting practices in India: a critical study'. PhD thesis submitted to University of Burdwan, Kolkata.

Kashish K M, Sekhon M K and Dhawan V. 2016. Economic analysis of milk production among small holder dairy farmers in Punjab: A case study of Amritsar district. *Indian Journal of Economics and Development* **12**(2): 335–40.

Kumar A and Parappurathu S. 2014. Economics of dairy farming and marketing: Micro-level perspectives from three major milk producing states of India. *Indian Journal of Animal Sciences* **84**(2): 204–09.

Kumawat R, Pramendra and Singh N K. 2016. Analysis of cost and returns of milk production in Rajasthan. *Economic Affairs* **61**(1): 71–74.

Mahajan S, Chauhan A K, Datta K K, Azad M S and Sharma V K. 2013. Economics of milk production in rural and periurban dairy farms in Ludhiana, India. *Asian Journal of Dairy and*

Food Research **32**(1): 25–29.

Nagrale B G, Datta K K and Chauhan A K. 2015. An analysis of constraints faced by dairy farmers in Vidarbha region of Maharashtra. *Indian Journal of Dairy Science* **68**(4): 391–94.

Prusty S R and Tripathy S. 2016. Economics of milk production in organized and unorganized sector in Cuttack district of Odisha—A comparative analysis. *Indian Journal of Dairy Science* **69**(3): 360–67.

Sharma A. 2013. 'Economic viability of commercial dairy farms in Jabalpur district of Madhya Pradesh'. M.V.Sc. thesis submitted to NDRI, Karnal.

Sharma M C and Tiwari R. 2011. *Contribution of livestock in rural economy*. 5th Sovenir of National Seminar on Multi Sectoral Innovations for Rural Prosperity, NDRI, Karnal, 19–21, May.

Vishnoi S. 2014. 'Economics of milk production and optimization of herd size of commercial dairy farm in Jaipur District (Rajasthan)'. M.Sc. thesis submitted to NDRI, Karnal.

Wani S A, Mattoo F A, Shaheen F A, Sehar H and Rasool R. 2010. Economics of milk production by smallholders across agro-climatic zones of Jammu and Kashmir. *Indian Journal of Dairy Science* **63**(5): 1–7.