



E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
www.agronomyjournals.com
2024; SP-7(2): 134-141
Received: 05-12-2023
Accepted: 30-01-2024

Khalandar S
Consultant, Agri-export cell,
KAPPEC, Vijayapura, Karnataka,
India

Ravinder Sharma
Professor, Y S Parmar University
of Horticulture and Forestry,
Nauni, Himachal Pradesh, India

Mahin Shariff
Consultant, Agri-Export Cell,
KAPPEC, Vijayapura, Karnataka
India

Rohit Bashist
Professor, Y S Parmar University
of Horticulture and Forestry,
Nauni, Himachal Pradesh, India

Ramu G
Research Scholar, UAS, Bangalore,
Karnataka, India

Corresponding Author:
Mahin Shariff
Consultant, Agri-Export Cell,
KAPPEC, Vijayapura, Karnataka
India

International Journal of Research in Agronomy

Socio-economic and marketing channels of dairy farms in Western Himalayas of India

Khalandar S, Ravinder Sharma, Mahin Shariff, Rohit Bashist and Ramu G

DOI: <https://doi.org/10.33545/2618060X.2024.v7.i2Sb.435>

Abstract

The socio economic profile of the Dairy farmers in study area revealed that majority (49.20%) of the farmers belongs to small category followed by medium category (33.00%) and large (17.80%) category. The distribution of average family size was highest in case of large farmer category i.e., 6.26 members followed by medium category (6.04) and small category (4.81). The findings in case of gender distribution of the dairy household head (DHH) across the farm categories showed the dominance of male across the different categories. In small categories 89.84 percent, DHH were male whilst 10.16 percent were females. Similar trends were observed in case of medium and large categories i.e., 91.60 percent and 99 percent were males and 8.90 percent and 1 percent were females respectively. The marketed surplus across the dairy farm categories is depicted in the table 1. The perusal of table depicts that in case of overall category, the average daily milk production per household per day was 20.03 liters, which varied from 7.00 liter in small farmers to 50.56 liter in the case of large farmers. It was found that the milk production had a direct relationship with land holding size of sampled households. Present findings are in consonance with the findings of Thakur (2010). The percentage of marketed surplus of milk was observed to be highest in the case of large category farms (85.00%), followed by medium farms (79.09%) and small category farms (74.41%).

Keywords: Socio-economic, marketing channels, dairy farms

1. Introduction

1.1 Socio-economic profile of sampled dairy farms in Himachal Pradesh

Socio-economic status is a measure of a farmer's social position relative to others which is linked to average standards, material possession, social participation and other factors. Socio-economic status plays an important role in influencing the adoption of recommended dairying practices and there may have impact on higher technical efficient farming. Evidence suggest that the farm size, education, age, family size, and herd size of cattle were inherently associated with dairy farming position in terms of income generation. The information on the socio-economic characteristics of farmers would help us gain a better understanding of their influence on the investment in dairying. Hence, the results of analysis of socioeconomic variables are presented in Table 1

The socio economic profile of the Dairy farmers in study area revealed that majority (49.20%) of the farmers belongs to small category followed by medium category (33.00%) and large (17.80%) category. The distribution of average family size was highest in case of large farmer category i.e., 6.26 members followed by medium category (6.04) and small category (4.81). The results revealed that dominance of small and medium category farms (82.80%) especially in hilly areas of the state were due to sustenance in dairying (i.e. most of farmers were rearing animals for their own consumption), less availability of land, lack of marketing facilities and inadequate infrastructure and capital for adopting technically efficient farming. whereas, the large farms (17.80%) were mainly in plain regions of the state who were highly advanced with market connectivity and high demand for milk.

The findings in case of gender distribution of the dairy household head (DHH) across the farm categories showed the dominance of male across the different categories. In small categories 89.84 percent, DHH were male whilst 10.16 percent were females.

Similar trends were observed in case of medium and large categories i.e., 91.60 percent and 99 percent were males and

8.90 percent and 1 percent were females respectively.

Table 1: Socio-economic profile of sampled dairy farms in Himachal Pradesh

		(Percent)			
Particulars		Small farms (n=177)	Medium farms (n=119)	Large farms (n=64)	Pooled farms (n=360)
Average Family size (No)		4.81	6.04	6.26	5.48
Distribution of Family Members					
Gender of head of household	Male	89.84	91.60	99.00	93.40
	Female	10.16	8.40	1.00	6.60
Adult	Male	45.13	40.90	41.15	42.39
	Female	41.15	42.14	37.90	40.40
Children	Male	7.62	11.96	12.22	10.60
	Female	6.10	5.00	8.73	6.61
Family structure	Nuclear	80.80	63.87	62.50	69.05
	Joint	19.20	36.13	37.50	30.95
Age category	Young (<35)	25.42	8.40	18.75	17.52
	Middle (35-50)	32.20	42.85	43.75	39.60
	Old (>50)	42.38	48.75	37.50	42.88

The findings with respect to distribution of gender of family across the categories indicate that about 45.13, 40.90 and 41.15 percent were adult males across small, medium and large categories, respectively and 41.17, 42.10 and 37.90 percent females across the small, medium and large categories, respectively. The findings revealed that adult males were highest in case of small and adult females were least in case of large category, whereas, percentage of children was also highest in case of large farmer category. Ranganath (2008) [86] obtained similar results who reported that male family members increased with farm size. In case of family structure, Nuclear families were dominated compared with joint families across the farm categories.

The results showed that about 69.05 percent dairy household had nuclear type families followed by joint family (30.95%). Nuclear families were highest in case of small category, whereas, the joint families were highest in case large farms i.e., 37.50 percent. These results implied that modern social systems resulted in independent life. These findings are in consonance with Dar *et al.* (2017) [28].

The age of a respondent is an important socio-economic variable affecting the ability of decision making as well as experience of dairy farming across the different categories of farmers. In this case, only age of head of the family member was considered. Relatively higher proportion of old farmers was observed in small and medium category with 42.38 and 48.73 percent as compared to large category which has only 37.50 percent old members. The average age of small (17.52 years) and medium (39.60 years) farmers in the state was less than that of large farmers and this was reverse in large category (42.88) farms of the state. In general, the farmers of young and middle aged

group were enthusiastic and have more work efficiency. This finding is in line with the findings of Bordoloi *et al.* (2005) [19] who reported that average age of the head increases with farm size. Dar *et al.* (2017) [28] also reported that in Kashmir valley the Small category farmers were highest and majority of heads were old.

2. Educational profile of respondents of sampled dairy farms in Himachal Pradesh

Literacy level plays an important role in the efficient dairy farm management and more so in case of adoption of higher farm decisions. Table 2. presented the educational status of sample dairy farmers in the study area.

In case of small category farms, majority of the farmers attained education up to high school (21.45%) followed by graduates (21.23%) and primary education (18.64%), whereas, majority of medium category farmers attained education up to secondary school (20.31%) followed by illiterate (20.03%). The majority of large category farmers were educated up to graduate level (24.34%) followed by high school (19.33%). Similarly, in case of pooled farms the majority of farmers attained education up to the high school (20.05%) and graduate and secondary school level (18.17%). Literacy rate of male members in the sample households of state was highest (85.07%) as compared with the female members (71.66%). Across the farm categories literacy rate of male in small farm was highest (91.67%) followed by large farm (87.20%) and medium farm (79.52%). In case of female the literacy rate was also highest for small category (75.30%) followed by large category (68.52%) and was lowest in case of medium category (68.03%).

Table 2: Educational profile of sampled dairy farms in Himachal Pradesh

		(Percent)			
Particulars		Small farms (n=177)	Medium farms (n=119)	Large farms (n=64)	Pooled farms (n=360)
Illiterate		12.66	20.03	12.72	15.34
Primary		18.64	17.94	9.23	16.40
Middle school		8.67	12.10	17.71	11.84
High school		21.45	18.78	19.70	20.05
Secondary school		17.35	20.31	15.71	18.17
Graduate		21.23	10.85	24.94	18.17
Total		853 (100)	719 (100)	401 (100)	1973 (100)
Literacy rate	Male	91.67	79.52	87.20	85.07
	Female	75.30	68.03	68.52	71.66
	overall	86.11	78.77	85.71	83.00
Literacy index	overall	2.77	2.23	2.98	2.65

Literacy index which is an index of quality of education showed that the quality of education among the dairy households was low as their index varied between 2.23 to 2.98 with an overall index of 2.65. Literacy index (2.98) in case of large category farms was higher than small farms (2.77) and medium farms (2.23)

3. Occupational profile of sampled dairy farms in Himachal Pradesh

The occupational profile among the dairy farms play major role in analyzing the potential sources of income of the family. The results of occupational status across the farm categories depicted

in table 3. showed that, majority of farmers were involved in agriculture and allied activities in the state (66.16%) followed by business (23.96%) and service (9.89%). Across the categories majority of farmers in medium farms were involved in agriculture and allied activities (70.69%) followed by large farms (68.53%) and small farms (61.82%), which implied that as farm size increased the involvement in the dairy enterprises also increased. The proportion of dairy farms involved in business sector, in case of small farms was 24.42 percent followed by large farms (24.53%) and medium farms (22.89%). Similarly, 13.75 percent small dairy farms were involved in service sector as against of 6.93 percent in large category.

Table 3: Occupational profile of sampled dairy farms in Himachal Pradesh

Occupational Status (Percent)				
Categories	Small farms (n=177)	Medium farms (n=119)	Large farms (n=64)	Pooled farms (n=360)
Service	13.75	6.41	6.93	9.89
Business	24.42	22.89	24.53	23.96
Agriculture and allied	61.82	70.69	68.53	66.15
Average number of workers	2.32	3.14	5.25	3.57

Occupational distribution implied that more than 60 percent dairy farms were involved in agriculture and allied activities and service and business enterprises acted as additional source of employment to the family members.

4. Annual income of sampled dairy households in Himachal Pradesh

Dairying require higher investment in green and dry fodder, seed and implements, which depends on higher income. Table 4. represents the annual income from different sources of different categories of farm in the state. There is a striking difference between the level of income from farming and non-farming of

small and large farms. Remarkable differences between income were also found among the different categories of dairy farms. Table 4 revealed that income of small farms from field crops (9.91%) was found two times lower than on large farms (19%). Average annual income was Rs. 3,92,952 per household for pooled farmers. Average annual income was highest on large farms with Rs. 6,80,594 followed by medium farms (Rs. 2,84,425) and small farms (Rs. 2,08,282). The main source of farm income among pooled farms was livestock sectors which constituted 33.56 percent of total farm income followed by horticultural crops enterprises (21.20%) while government job (9.70%) was the major source of non-income.

Table 4: Sources of annual income across the sample dairy farms in Himachal Pradesh

Sources (Percent)				
Sources	Small farms (n=177)	Medium farms (n=119)	Large farms (n=64)	Overall (n=360)
A. Total farm income				
1. Field crops	9.91	10.86	19.00	13.25
2. Horticultural crops	20.63	17.75	25.14	21.20
3. Livestock enterprises	32.12	33.78	34.80	33.56
Sub-total	63.00	62.20	79.00	68.13
B. Total off- farm income				
1. Agricultural labour	10	1.86	--	5.93
C. Total non-farm income				
1. Non-agricultural labour	3.11	1.77	--	2.44
2. Business	7.84	14.95	6.55	9.70
3. Government job	12.52	13.46	11.24	12.40
4. Private job	3.33	5.58	3.26	4.00
Sub-total	27.00	35.76	21.00	27.90
Total	100.00 (208282)	100.00 (284425)	100.00 (680594)	100.00 (392952)

Figures in parenthesis are total income per year per farm

Large farm generates major part of their income from farming enterprise (79%) followed by non-farm enterprise (21.00%). The share of farm income on the small, medium and large farms was 63, 62.20 and 79 percent respectively while non-farm income share was 27 percent, 35.76 and 21 percent of the total income.

The share of annual farm income from livestock enterprise was higher among large farms (34.80%) as compare to medium farms (33.78%) and small farms (32.12%), whereas, share of annual farm income from horticultural sector was higher among large farms (25.14%) per household as compare to small farms

(20.63%) in the state. It can therefore be inferred that, large farms with higher income generating activities are expected to have higher savings, thus higher investment for achieving the technically efficient dairy farming.

5. Livestock holding across the sampled dairy farms in Himachal Pradesh

The possession of dairy animals across different farmer categories is depicted in the table 5. The findings revealed that average number of SAUs was 5.27 on overall category among

the sampled household in the state of which 53.51 percent crossbred cattle and 41.85 percent of buffaloes. Only 4.63 percent were of local cattle. In case of large category, farmer possessed 67.13 percent (10.22 SAU) of crossbred cattle and 33.27 percent (5.06 SAU) buffaloes. The local cattle were not

reared by large category because of low milk yield and commercial scale of operation. In medium category buffaloes (3.05) were higher as compared with crossbred (1.43) and local cattle (0.49). In case of small category crossbred cattle (1.32) were higher as compared with local (0.19) and buffaloes (0.74).

Table 5: Livestock holding across the sampled dairy farms in Himachal Pradesh

(Percent)				
Particulars (%)	Small	Medium	Large	Overall
COW				
Local	0.19 (8.71)	0.49 (10.2)	- -	0.24 (4.63)
Crossbred	1.32 (58.61)	1.43 (28.71)	10.22 (67.13)	2.82 (53.51)
Buffalo	0.74 (32.66)	3.05 (61.27)	5.06 (33.27)	2.20 (41.85)
SAU per farm	2.27	4.98	15.28	5.27

Figures in parenthesis indicate percentage to SAU

The analysis further showed that the cross bred cattle varied between 28.71 on medium to 67.13 on large farms with an overall average of 53.52 percent of overall category. Analysis showed dominance of buffaloes on medium farms and crossbred on small and large dairy farms in the state.

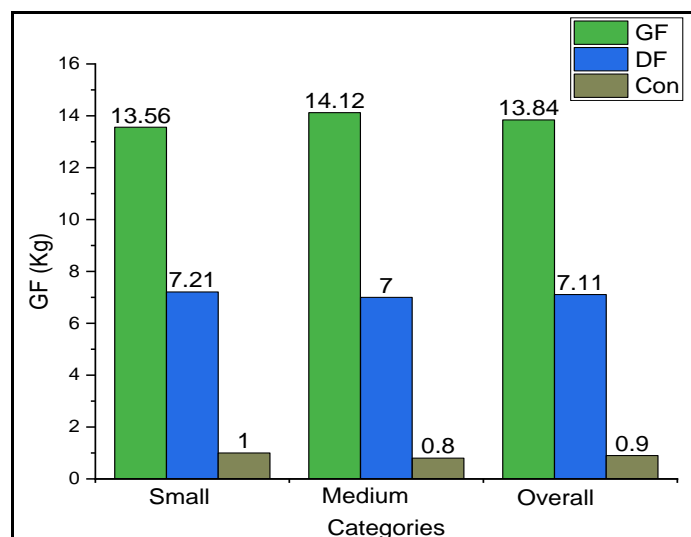
6. Feeding patterns of livestock across the sampled dairy farms in Himachal Pradesh

The feed and fodder is the major input in dairy farming, which encompasses of green and dry fodder and concentrates for the optimum growth of bovines and to enhance the milk production the judicious feeding practice must be followed with a balanced ration incorporating all the nutrients (energy, proteins, minerals and vitamins) in right proportions keeping in view the requirements of the animal body weight. Feed and fodder cost was major component (60%) among the cost components of production milk, so there is a need for economizing of feed to determine the level of profitability. Green fodder in the study area comprised of field crops such as berseem, jowar, wheat stovers, maize stovers and grasses and forest trees leaves. The most notable fact of the study area was that the animals were taken for grazing in case of small and medium category farms and only in case of large category farms the animals were stall fed at sheds. Animals were stall fed with home grown green fodder and crop residues. Dry fodder was given in the form of

wheat and paddy straw (Toda). Concentrate in the study area were generally homemade comprising of various proportions of grains, pulses, husks and rice bran. Mustard oilcake was also given separately and form major part of the concentrate. In the study area the cost of concentrates among the feed and fodder was highest (>50%). In fact, the farmers had to buy the feed from the retailers at the prevailing market price. So there is need for provision from the Himachal Pradesh milk federation (H.P. Milk Fed.) for supplying quality inputs (concentrates) to members at subsidized rate. The average quantity of feed and fodder intake of local cow, crossbred and buffalo is estimated and presented in table 6. The findings showed that overall intake of green fodder for local cow, crossbred cow and buffalo was 13.84 kg, 16.41 kg and 14.97 kg per day per animal, respectively. Intake of green fodder was highest in crossbred was followed by buffaloes because of their higher productivity. Lowest for local cattle because the milk yield was also lower. There was not much variation in feeding pattern of dry fodder across the species. However, concentrate consumption was highest for buffalo (4.6 kg) per day followed by crossbred (3.24 kg) and lowest for indigenous cattle (1.55 kg). Buffalo requires highest amount of concentrate because of the quality of milk i.e., the percentage of fat is highest which tends to quote the highest price of its milk (Rs 45-60 per liter).

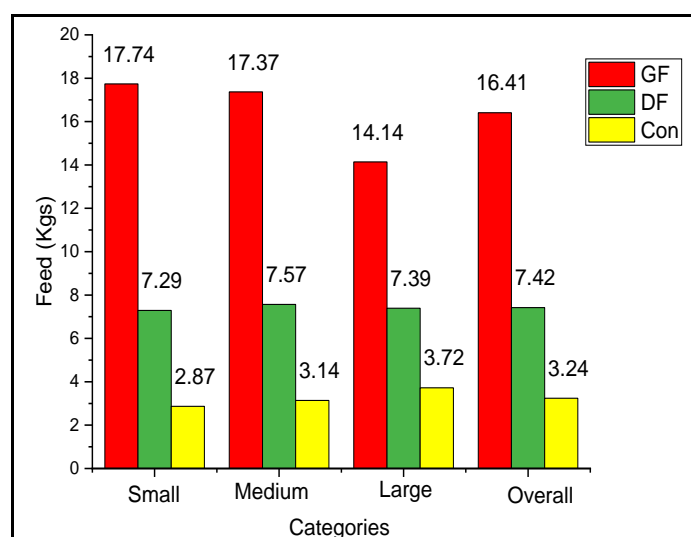
Table 6: Feeding patterns of livestock across the sampled dairy farms in Himachal Pradesh

(Kg/ SAU/ Day)									
	Local cow			Cross bred			Buffalo		
	Green fodder	Dry fodder	Concentrate	Green fodder	Dry fodder	Concentrate	Green fodder	Dry fodder	Concentrate
Small	13.56	7.21	1.00	17.74	7.29	2.87	15.16	8.54	3.61
Medium	14.12	7.00	0.80	17.37	7.57	3.14	14.58	7.42	5.08
Large	--	--	--	14.14	7.39	3.72	15.17	8.59	5.11
Overall	13.84	7.11	0.90	16.41	7.42	3.24	14.97	8.18	4.6



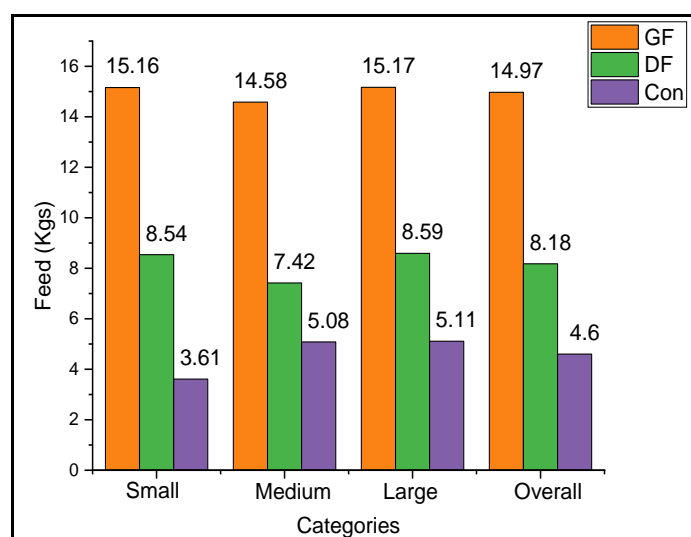
GF-Green fodder, DF- Dry fodder, Con- Concentrates

Fig 1: Feeding patterns of Indigenous cattle across the sampled dairy farms in the state



GF-Green fodder, DF- Dry fodder, Con- Concentrates

Fig 2: Feeding patterns of crossbred cattle across the sampled dairy farms in Himachal Pradesh



GF-Green fodder, DF- Dry fodder, Con- Concentrates

Fig 3: Feeding patterns of buffalo across the sampled dairy farms in Himachal Pradesh

7. Reference

1. Anonymous. Annual report, Department of Animal Husbandry, Economic and Statistical Adviser. Government of Himachal Pradesh; c2018-19.
2. Anonymous. Annual reports. Basic animal husbandry statistics, Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare, New Delhi; c2015.
3. Anonymous. Data book. Ministry of Finance, Government of India; c2017.
4. Anonymous. Economic Survey. The Directorate of Economics and Statistics, Government of Himachal Pradesh; c2019.
5. Anonymous. Economic Survey. Department of Economic Affairs. Ministry of Finance, Government of India; c2019-2020.
6. Anonymous. Economic Survey. Economics and Statistics Department. Government of Himachal Pradesh; c2021
7. Anonymous. Economic Survey. Department of Economic Affairs. Ministry of Finance, Government of India; c2021-2022
8. Bardan D, Sharma ML. Technical efficiency in milk production in underdeveloped production environment of India. SpringerPlus. 2013;2:65-62.
9. Bardhan D, Dabas YPS, Srivastava RSL. An economic analysis of milk production from indigenous cows in Udham Singh Nagar district of Uttaranchal. Indian Dairyman. 2004;56:31-38.
10. Basavarajappa DN, Talathi JM, Chinnappa B. Marketable surplus of milk and price spread in marketing of milk in Shimoga district of Karnataka. International Journal of Commerce and Business Management. 2012;5:113-114.
11. Battese GE, Coelli TJ. A Model for Technical Inefficiency Effects in a Stochastic Frontier Production Function for Panel Data. Empirical Economics. 1995;20:325-332.
12. Bayan B. Impacts of dairy cooperatives in smallholder dairy production systems: A case study in Assam. Agricultural Economics Research Review. 2018;31:87-94.
13. Bhawar RS, Dixit PK, Balakrishnan A, Sivaram M. Production, marketed surplus and disposal pattern of milk in northern dry zone of Karnataka. Journal of Pharmacognosy and Phytochemistry. 2019;8:1919-1922.
14. Bhowmik P. Economics of milk production and analysis of technological change in dairying in south Tripura. Journal of the Indian Society of Agricultural Statistics. 1993;59:36-41.
15. Birlhal P, Negi DS. Livestock for Higher, Sustainable and Inclusive Agricultural Growth. Economics and Political Weekly. 2012;July:18-19.
16. Birlhal P, Rao P. Technology options for sustainable livestock production in India: proceedings of the Workshop on Documentation, Adoption, and Impact of Livestock Technologies in India. ICRISAT-Patancheru, India; c2001. p. 18-9.
17. Birlhal PS, Taneja VK. Livestock sector in India: opportunities and challenges for small holders: workshop on small holder livestock production in India; Delhi; c2006.
18. Bohra B, Singh M, Kumar A, Singh V. Milk Production, Marketing and Consumption Pattern at Peri-Urban Dairy Farms in the Mountains: a Case from Lohaghat in Uttaranchal. Environmental Information System Bulletin. 2004, 12.
19. Bordoloi JP, Laskar SK, Haquque A, Bola NN. Socio-economic characteristics of dairy households of Guwahati

- in Assam. *Indian Veterinary Journal*. 2005;82:427-423.
20. Cabrera VE, Solís D, Corral J. Determinants of technical efficiency among dairy farms in Wisconsin. *Journal of Dairy Science*. 2010;93:387-393.
 21. Chand R. Livestock in Himachal Pradesh: Factors affecting growth, composition and intensity. *Indian Journal of Agricultural Economics*. 1995;50:299-210.
 22. Chand S, Jeykumar S, Srivastva RC, Ganesh BK, George Z, Roy K. Socioeconomic status of dairy farmers of Middle Andaman. 36th Dairy Industry Conference; c2008. p. 148-56.
 23. Chauhan AK, Sharma SP. Economic analysis of milk production in tribal area of Udaipur (Rajasthan). *Indian Journal of Dairy Sciences*. 2006;59:328-336.
 24. Chauhan DS, Kamble VJ, Padghan PN, Sawant RC, Kamble RR. Impact of farmers status on milk production in tribal area of Kinwat Tahasil (Marathwada region). *Indian Journal of Animal Research*. 2004;38:137-140.
 25. Chauhan SK, Gupta M. Production and disposal of milk in rural area of Himachal Pradesh - an economic analysis. *Indian Journal of Agriculture Marketing*. 1993;7:95-104.
 26. Chuahan SK. Trends in milk production in Himachal Pradesh. *Indian Journal of Animal Science*. 1995;65:583-88.
 27. Chuahan SK. Trends in Bovine population in Himachal Pradesh. *Indian Journal of Animal Science*. 1995;65:1125-30.
 28. Dar PA, Khan AA, Shah AA, Wani T, Qadri IA, Sheikh FA. Socioeconomic status of buffalo rearing farmers in Kashmir Valley. *Indian Journal of Dairy Science*. 2017;71:204-207.
 29. Das S. Economic efficiency of milk production and marketed surplus in rural area of Burdwan district (West Bengal). Unpublished M.Sc. Thesis, ICAR-National Dairy Research Institute (Deemed University), Karnal, India; c2004.
 30. Datta KK, Bulbul GN, Chauhan AK. An analysis of constraints faced by dairy farmers in Vidarbha region of Maharashtra. *Indian Journal of Dairy Sciences*. 2015;68:390-94.
 31. Desai M. An economic analysis of milk production and disposal pattern of milk in rural area of Bidar district (Karnataka). Unpublished M.Sc. Thesis, ICAR-National Dairy Research Institute (Deemed University), Karnal, India; c2005.
 32. Deshetti MB, Teggi MY, Hosamani SV. Milk Production and resource use efficiency of dairy farming under stall-fed condition in Karnataka. *Indian Journal Dairy Science*. 2017;70:466-470.
 33. Dogra A K. Dairy Development in Himachal Pradesh. *Journal of Advanced Scientific Research*. 2016;12:366-368.
 34. Feroze SM, Singh R, Sirohi S. Economics of milk production and factors affecting milk yield in Meghalaya: estimating the seasonal effect. *Indian Journal of Dairy Science*. 2019;72:328-335.
 35. Gadad PC, Mundinamani SM. An economic analysis of milk production by dairy entrepreneurs of Belagavi milk union. *Journal of Farm Science*. 2018;31:310-314.
 36. Gangasagare PT, Karanjkar LM. Status of milk production and economic profile of dairy farmers in the Marathwada region of Maharashtra. *Veterinary World*. 2009;2:317-20.
 37. Garret HE, Woodworth RS. *Statistics in Psychology and Education* Vakils. Jeffer and Simons Private Limited; c1969.
 38. Girma H. Estimation of technical efficiency of dairy farms in central zone of Tigray National Regional State. *Heliyon*. 2019;5:1-24.
 39. Gonçalves RML, Vieira WC, Lima JE, Gomes ST. Analysis of technical efficiency of milk-producing farms in Minas Gerais. *Economics Application*. 2008;12:321-35.
 40. Gopi R, Narmatha N, Sakthivel KM, Uma V, Jothilakshmi M. Socio-economic characteristics and its relationship with information seeking pattern of dairy farmers in Tamil Nadu, India. *Asian Journal of Dairy and Food Research*. 2016;36:16-20.
 41. Gopi R, Manivannan A, Sindhu MG, Soundararajan C. Socio-Economic Profile and Constraints of Dairy Farmers in Cuddalore District of Tamil Nadu, India. *International Journal of Current Microbiology and Applied Sciences*. 2020;9:1320-26.
 42. Gopi R, Sindhu MG, Thilakar P, Manivannan A, Mathialagan P. Information Management Behaviour of Dairy Farmers in Cuddalore District of Tamil Nadu. *International Journal of Livestock Research*. 2016;8:119-124.
 43. Inamke O. Consumption pattern of milk and milk products in western Maharashtra. *Indian Journal of Agricultural Economics*. 1998;49:315-327.
 44. Jeyakumar S, Rai RB. Economics of cow milk production-a micro level study in Andaman and Nicobar Islands. *Indian Journal of Dairy Sciences*. 2006;59:395-400.
 45. Jose E, Meena HR, Meena BS. Genesis of dairy based farmer producer companies in Kerala. *Indian Journal of Dairy Science*. 2019;72:218-222.
 46. Jose E, Meena HR, Verma AP. Case Studies of Dairy Based Farmer Producer Companies in Kerala. *International Journal of Current Microbiology*. 2019;8:501-505.
 47. Kale RB, Ponnusamy K, Chakravarty AK, Sendhil R, Mohammad A. Assessing resource and infrastructure disparities to strengthen Indian dairy sector. *Indian Journal of Animal Science*. 2016;86:720-725.
 48. Kashish, Kaur M, Sekhon MK, Dhawan V. Marketable surplus, pattern and constraints faced by smallholder dairy farmer in Punjab. *Economic Affairs*. 2014;59:641-647.
 49. Kemboi E, Feroze SM, Singh R, Ahmed J, Tyngkan H. Yield gap in milk production is considerable in Indian Himalayan state of Meghalaya. *Journal of Dairy Science*. 2021;72:1-7.
 50. Khalandar S, Sivaram M, Dixit PK. Spatio-temporal analysis of milk production in Karnataka State. *Indian Journal of Dairy Science*. 2019;72:525-33.
 51. Khoveio M. Economics of milk production, marketed surplus and its disposal pattern in Nagaland. Unpublished M.V.Sc., Thesis, ICAR-National Dairy Research Institute (Deemed University), Karnal, India; c2011.
 52. Kumar A, Mishra AK, Parappurathu S, Jha GK. Farmers' Choice of Milk-marketing Channels in India. *Economic Polity Weekly*. 2018;53:59.
 53. Kumar A, Staal SJ, Baltenweck I, Lapar LL. Traditional milk market in Assam: potential for income and employment generation. *Indian Journal of Agricultural Economics*. 2010;65:747-759.
 54. Kumar A. Technical efficiency in milk production in indo-gangetic plain of India: status and determinants. *Indian Journal of Animal Sciences*. 2012;82:624-628.
 55. Kumar M, Gupta J, Radhakrishnan A, Singh M. Socio-economic Status and Role of Livestock to Improve Livelihood of Tribes of Jharkhand. *Research Journal of*

- Agricultural Sciences. 2015;86:71-67.
56. Kumar N, Suhag K S, Kumar S, Kumar J, Chaudhary K R. Resource use efficiency of cattle and buffalo milk production in Haryana. *Indian Journal of Animal Sciences*. 2012;82:930-934.
 57. Kumar R. Economic analysis of dairy farming among Nomadic and Resettled Van Gujjars in Uttaranchal: a comparative study. Unpublished Ph.D. Thesis, ICAR-National Dairy Research Institute (Deemed University), Karnal, India; c2006.
 58. Kumar V. Decomposition analysis of output change under new production technology in dairy farming. *Indian Journal of Animal Sciences*. 2001;71:966-969.
 59. Kumar M N P, Pande Y S, Soni K S, Saha N, Chand S, Arya. Socio-Economic Status and Problems Faced by Dairy Farmers of Sardhana Block of Meerut District. *Indian Journal of Livestock Research*. 2019;9:120-128.
 60. Kumari B, Malhotra R. Milk production function and resource use efficiency of women dairy co-operatives in Begusarai district of Bihar. *Indian Journal of Dairy Sciences*. 2016;71:98-101.
 61. Kumawat PR, Singh NK. Analysis of cost and returns of milk production in Rajasthan. *Economic affairs*. 2016;61:71-74.
 62. Kumawat R, Singh NK, Meena CL. Economic analysis of cost and returns of milk production, extent of adoption of recommended management practices on sample dairy farms in Bikaner District of Rajasthan. *Global Journal of Science Frontier Research*. 2014;14:47-54.
 63. Lakner S. Technical efficiency of organic milk-farms in Germany – the role of subsidies and of regional factors. IAAE conference in Beijing; c2009. p. 1-14.
 64. Lal P, Chandel BS. Total factor productivity in milk production in Haryana. *Agriculture Economic Research Review*. 2017;30:279-284.
 65. Lal P, Chandel BS, Chauhan AK, Kumari B. What determines the technical efficiency of dairy farmers in Sirsa cooperative milkshed. *Indian Journal Dairy Sciences*. 2020;73:600-07.
 66. Mahajan S, Chauhan AK. Resource use efficiency in milk production in rural and peri-urban dairy farms in Ludhiana district (Punjab). *Indian Journal of Dairy Sciences*. 2011;64:148-153.
 67. Manoharan R, Selvakumar KN, Pandian ASS. Efficiency Of Milk Production In Pondicherry : A Frontier Production Approach. *Indian Journal of Animal Research*. 2005;38:20-4.
 68. Meena GL, Tiwari B. Marketed surplus, consumption and disposal pattern of milk in Banswara district of Rajasthan. *The Asian Journal of Animal Sciences*. 2015;10:193-197.
 69. Meena GL, Sharma L, Mishra S, Choudhary S. An economic analysis of milk production of buffalo and cow in Rajasthan. *Indian Journal of Animal Nutrition*. 2019;36:158-163.
 70. NABARD. Farmers' Producer Organisations. Frequently Asked Questions (FAQs). National Bank for Agriculture and Rural Development; c2005.
 71. Nakanwagi TT, Hyuha TS. Technical Efficiency of Milk Producers in Cattle Corridor of Uganda: Kiboga District Case. *Modern Economy*. 2015;6:846-856.
 72. Nga BT, Cuoug TH, Ha LTT, Lebailly P. Milk production and marketing in small diary holder in the northern area of vitenam :A case study in Phu Dong. *Vitenam Socio Economic Development*. 2013;13:287-297.
 73. Pandian ASS, Selvakumar KN, Prabu M, Kumar GB. Technical Efficiency Of Milk Production In Tamil Nadu of India: Frontier Production Function Approach. *Journal of Dairying, Foods and Home Science*. 2012;31:264-267.
 74. Panse VG, Amble VN, Puri TR. Cost of milk production in Delhi. ICAR Report Series No.6, New Delhi; c1961.
 75. Patel RK. Present Status and Promise of Dairying in India. *Indian Journal of Agricultural Economics*. 1993;1:2-33.
 76. Pathania MS, Sharma A. Economic analysis of milch animals in Jaisinghpur tehsil of district Kangra. *Himachal Journal of Agriculture Research*. 2016;42:37-46.
 77. Patil C. Dynamics of cattle population during last five livestock census in India. Unpublished M.Sc. Thesis, ICAR-National Dairy Research Institute (Deemed University), Karnal, India; c2022.
 78. Patil. Constraints Faced by the Dairy Farmers in Nagpur District while Adopting Animal Management Practices. *Veterinary world*. 2009;2:111-112.
 79. Paul D, Chandel BS. Improving Milk Yield Performance of Crossbred Cattle in North-Eastern States of India. *Indian Economic Research Review*. 2010;23:69-75.
 80. Prasad R, Rao GN, Jayarana KV. An analysis of milk production from buffaloes in Tirupati. *Indian Veterinary Journal*. 2001;78:257-259.
 81. Priyamvada S, Mishra BK. Economic analysis of dairy cattle farms under town milk supply scheme in Jorhat district of Assam. *Indian Journal of Dairy Sciences*. 2019;72:318-327.
 82. Prusty SR, Tripathy S. Economics of milk production in organized and unorganized sector in Cuttack district of Odisha- a comparative analysis. *Indian Journal of Dairy Sciences*. 2016;69:360-367.
 83. Pundir RS, Mishra S, Mahera AB, Zala YC, Trivedi MM. Economics of milk production and its disposal pattern in Central Gujarat. *Indian Journal of Dairy Science*. 2018;71:611-619.
 84. Rai CK, Singh K, Arti. A study of socio-economic profile and communication behaviour pattern of tribal dairy farmers in the Himachal Pradesh. *Research Journal of Agricultural Sciences*. 2017;8:386-339.
 85. Raju SS, Chand R. Agricultural Insurance in India Problems and Prospects. NCAP Working Paper No. 8. New Delhi: National Centre for Agricultural Economics and Policy Research (Indian Council of Agricultural Research); c2008.
 86. Ranganath PW. Economics of milk production in western Maharashtra scarcity zone. Unpublished M.Sc. Thesis, ICAR-National Dairy Research Institute (Deemed University), Karnal, India; c2008.
 87. Rao VM. Dairy farming: socio- economic analysis of milk production. Reliance publishing house, 1st Edition, New Delhi; c1991.
 88. Raval RJ, Chandawat MS. Constraints faced by dairy farmers of Kheda district of Middle Gujarat in adoption of improved animal husbandry practises. *Indian Journal of Field Veterinarians*. 2011;3:17-21.
 89. Raval RJ, Chandawat MS. Extent of knowledge of improved animal husbandry practices and socio-economical characteristics of dairy farmers of in Kheda district, Gujarat. *International Journal of Farm Sciences*. 2011;1:129-137.
 90. Reddy G. Importance of livestock in farm economies. An economic analysis in Kolar district of Karnataka. Unpublished M.Sc. Thesis, UAS (GKVK), Bengaluru, Karnataka; c2019.
 91. Sadlika AL. Factor affecting marketable surplus and income

- of dairy farmers of South Srilanka. Veterinary research. 2011;4:104-108.
92. Saha KP, Gupta JN. Economics of milk production in murshidabad district of West Bengal. Asian Journal of Dairy and Food Research. 2000;19:14-21.
93. Saravanakumar V, Jain DK. Technical efficiency of dairy farms in Tamil Nadu. Journal of Indian Society of Agricultural Statistics. 2008;62:26-33.
94. Sarkar D, Ghosh BK. Economics of Milk Production in West Bengal: Evidence from Cooperative and non-cooperative Farm. Journal of Economics and Business. 2008;9:132-152.
95. Sarker D, Ghosh BK. Constraints of milk production: A study on cooperative and non-cooperative dairy farms in West Bengal. Agriculture Economics Research Review. 2010;23:303-313.
96. Sathyanarayan K, Jagadeeswary V, Murthy V C, Ruban S W, Sudha G. Socio-economic status of livestock farmers of Narasapura Village-A Benchmark analysis. Veterinary World. 2010;3:215.
97. Sharif M, Dixit PK. Dairy farming in southern Karnataka: an economic analysis under varying groundwater regimes. Indian Journal of Dairy Sciences. 2015;68:65-62.