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Research Article

BUFFALO MILK PRODUCTION IN BANASKANTHA DISTRICT OF GUJARAT: AN ECONOMIC ANALYSIS

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Abstract: Livestock rearing is one of the most important economic activities in the rural areas of the country contributing significantly to the national economy and it provides income to household dependent on agriculture and for many landless households. The data for this investigation was collected from 120 dairy farmers of Banaskantha district of Gujarat and these dairy farmers were classified based on land holdings as marginal, small, medium and large categories of dairy farmers, which were 28.33, 25.84, 27.50 and 18.33 per cent respectively. The average cost of milk production by buffalo was Rs. 60928.12 per animal per year. It includes fixed cost and variable cost, which was Rs. 7220.72 and 53707.40 per animal per year, respectively. The overall cost of per litre milk production has been found Rs. 33.70. Overall net income was Rs. 32743.07 per animal per year and Rs. 89.70 per animal per day. On the basis of observations, it is concluded that net income from crossbred cows was highest for large farmers followed by medium, marginal and small category of dairy farmers.

Keywords: *Buffaloes, Categories of Farmers, Fixed Cost, Variable Cost, Net Income*

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Introduction

Livestock rearing is one of the most important economic activities in the rural areas of the country contributing significantly to the national economy. It provides income to household dependent on agriculture and for many landless households. The total livestock population is 536.76 million in the country, showing an increase of 4.8 % over Livestock Census-2012. The total buffalo population in the country is 109.85 million showing an increase of about 1.1 % over previous census [1]. In case of Gujarat total livestock population was reported 2,68,70,500 during 20th Livestock Census whereas, buffalo population is 1,05,43,250 [2]. In Banaskantha district, buffalo population was 1501537 [3].

As Banaskantha is leading in milk production as well as processing in the country; having largest milk processing plant operated by co-operative sector is a lifeline of the farmers of the operational area. Also, dairy development activities are increase day by day with mechanization and introduction of new technology, where considerable milk production can be increased and this could be possible, if we have to introduce new invention as well as farmers shall adopt those inventions to produce the milk more economically.

Looking towards present scenario of dairy sector, input cost is increasing day to day and net return is declining, resulted into develop inroads in the development of this sector. Therefore, present study was plan to know the economics of buffalo farming, where commercial dairy farming is increasing day by day.

Material and Methods

The study was conducted in Banaskantha district of Gujarat. A multistage sampling technique was used to select the respondents from the Banaskantha district of north Gujarat and information were collected in the predefined questionnaire from the farmers through direct interview. The district having 14 talukas and study was conducted in two talukas were selected purposively *viz*: Vadgam and Palanpur, because commercial dairy farming activities are increasing day by day in these talukas since last few years and this occupation of rural households is becoming a in source of livelihoods.

A total of six villages from each taluka and ten respondents were selected from each village randomly, which becomes about 120 respondents from two talukas of Banaskantha district. Respondents/dairy farmers were classified into four different categories *viz*: marginal (0 to 1 ha.), small (1.01 to 2 ha.), medium (2.01 to 4 ha.) and large (above 4 ha.) on the basis of land holding of the farmers.

Cost of milk production

The cost of milk production includes the total fixed cost and total variable cost. The details of these are given here as below:

Fixed cost

The expenditure borne by dairy farmers on the housing, equipment's and animals were included to calculate the fixed cost, where interest and depreciation on fixed capital was calculated on annual basis.

Interest: The annual interest on dairy animal, housing and equipment's maintain by different categories of dairy farmers of Banaskantha district of Gujarat was calculated as per prevailing interest rate at time of investigation *i.e*., at 6.0 per cent per annum.

Depreciation is the cost of an asset as a result of its use resulted into decline its value due to wear and tear, accidental damage and time obsolescence. It is worked out separately for animal shed, machinery and equipment's like: tractor, milking machine, chaff cutter, milking cane etc. and other items required on the dairy farms *viz*: buckets, chain, ropes *etc*. The depreciation on these was calculated by straight line method [4].

Depreciation on buildings

The depreciation on buildings like: animal shed, store room, milking parlour, storage for feed and fodders, shed for chaff cutter etc was included to calculate the depreciation with the help of following formula:

Depreciation on buildings= (Cost of Building – Residual value)/(Life span (25 years)) (1)

Table-1 Distribution of buffaloes among different categories of farmers of Banaskantha district

Taluka	Category of dairy farmers	Number of dairy animals			
		Milch buffalo	Dry buffalo	Other#	Overall
Palanpur	Marginal(N=24)	37(2.56)	11(0.76)	473(32.84)	521(36.16)
	Small(N=19)	41(2.84)	22(1.52)	355(24.64)	418(29.00)
	Medium(N=11)	23(1.59)	10(0.69)	171(11.88)	204(14.16)
	Large(N=06)	45(3.12)	10(0.69)	243(16.87)	298(20.68)
Vadgam	Marginal(N=10)	29(2.07)	22(1.57)	179(12.84)	230(16.48)
	Small(N=12)	23(1.64)	05(0.35)	229(16.41)	257(18.40)
	Medium(N=22)	30(2.14)	16(1.14)	440(31.54)	486(34.82)
	Large(N=16)	29(2.07)	13(0.93)	381(27.3)	423(30.30)
Overall	Marginal(N=34)	66(2.32)	33(1.16)	652(22.99)	751(26.47)
	Small(N=31)	64(2.25)	27(0.95)	584(20.59)	675(23.79)
	Medium(N=33)	53(1.86)	26(0.91)	611(21.55)	690(24.32)
	Large(N=22)	74(2.60)	23(0.81)	624(22.01)	721(25.42)
Total (N=120)		257(9.05)	109(3.85)	2471(87.1)	2837(100.00)

Note: Figures in the parenthesis indicates the percentage of animals of different class of respective talukas;
N= Number of respondents in of different class of respective talukas; # Other category includes heifer, milch and dry cows, bull and calf

Table-2 Fixed cost of rearing the milch and dry buffaloes kept on different categories of farms (Rs./animal/year)

Taluka	Category of dairy farmers	Interest over Investment on Animals		Interest on dairy farm buildings		Interest on dairy farm equipments		Depreciation on dairy farm buildings		Depreciation on dairy farm equipment	
		Milch Buffalo	Dry Buffalo	Milch Buffalo	Dry Buffalo	Milch Buffalo	Dry Buffalo	Milch Buffalo	Dry Buffalo	Milch Buffalo	Dry Buffalo
Palanpur	Marginal	3966	4096	1096	1108	407	255	657	665	543	340
	Small	4106	4080	972	788	326	502	583	473	435	669
	Medium	4096	4020	1372	1588	1128	1589	823	953	1504	2119
	Large	4024	4080	621	578	715	1342	372	347	954	1789
Vadgam	Marginal	4010	3944	798	421	135	100	479	252	180	133
	Small	4059	4116	908	1253	495	406	545	752	660	541
	Medium	3900	3911	1502	1106	1090	720	901	663	1454	960
	Large	4223	3738	869	838	1581	1693	521	503	2108	2258
Overall	Marginal	3985	3995	965	650	288	151	579	390	384	202
	Small	4089	4087	949	874	387	484	570	524	516	645
	Medium	3985	3953	1446	1291	1107	1055	867	775	1475	1406
	Large	4102	3887	718	725	1055	1540	431	435	1406	2054
Total		4045	3985	989	874	702	742	593	524	936	990

Table-3 Variable cost of rearing the milch and dry buffaloes kept on different categories of farms (Rs./animal/year)

Taluka	Category of dairy farmers	Feeding cost		Labour cost		Treatment cost		Breeding cost		Water and electricity cost		Miscellaneous cost	
		Milch Buffalo	Dry Buffalo	Milch Buffalo	Dry Buffalo	Milch Buffalo	Dry Buffalo	Milch Buffalo	Dry Buffalo	Milch Buffalo	Dry Buffalo	Milch Buffalo	Dry Buffalo
Palanpur	Marginal	53610	21278	1790	1770	1084	936	837	774	153	183	679	901
	Small	70135	21907	2915	2163	932	778	577	623	195	147	670	809
	Medium	60391	21105	3196	2851	1102	902	664	641	327	273	794	792
	Large	51284	20840	2341	1530	372	622	719	485	240	92	324	558
Vadgam	Marginal	71685	23676	1245	923	377	387	337	263	253	297	443	294
	Small	75079	23260	1979	1306	484	650	803	855	145	163	379	578
	Medium	60524	22658	3567	3880	382	493	511	549	140	111	462	659
	Large	51052	20438	2858	3394	352	200	456	416	206	195	418	387
Overall	Marginal	61552	22876	1551	1206	773	570	617	433	197	259	575	496
	Small	71912	22157	2579	2004	771	754	658	666	177	150	566	766
	Medium	60466	22060	3406	3484	694	650	578	584	221	173	606	710
	Large	51193	20613	2544	2583	364	383	616	446	227	150	361	461
Total		60925	22026	2475	2238	639	595	619	530	205	189	517	607

Depreciation on machine or equipment

The farmers usually having tractor, milking machine, chaff cutter etc on the farm and depreciation on this machine / equipment was calculated by using the following formula:

Depreciation on equipment = (Purchase price of equipment – Residual value) / (Productive life) (2)

Variable cost

The variable cost includes the expenses incurred on feed and fodder, labour, veterinary and health care services, water and electricity charges and miscellaneous cost.

Feed and fodder cost

The expenditure on green fodder, dry fodder, concentrate and mineral mixture etc was worked out by multiplying quantities of feeds and fodders consumed by animals with their respective prevailing prices in the study area. Green fodder and dry fodder price in the study area was Rs. 2 to 4 per kg and Rs. 8 or 9 per kg, respectively. In case of concentrate, farmers procure from the Banaskantha District Cooperative Milk Producers Union Ltd @ Rs. 1000 to 1200 per 50 kg, while some of the farmers prepare at home by purchasing different ingredients from the market includes cotton seed cake, maize cake, maize barn, jowar barn, urad barn, toor dal chunni, bajara and isabgol husk (lali) price in study area Rs 36.25, 22.50, 26.00, 19.00, 24.00, 24.00, 17.50 and 34.00 per kg, respectively.

Labour cost

It included family as well as paid labour (hired labour). The hired labour was calculated considering type of work allotted and wages paid to them. In present investigation, it was observed that dairy farmers paid Rs. 6000 to 8000 per month per labour.

Treatment cost

It included the cost incurred on medicines and charges of veterinary doctor. But generally, treatment was given by the doctors of Banaskantha District Cooperative Milk Producers' Union Ltd and their charge were Rs. 100 per visit, while sometimes they asked the services of private doctors and actual payments given to him was includes in the expenses of treatment of animals.

Breeding cost

It included the cost incurred on natural service, Artificial Insemination (A.I.) charges by AI workers. An artificial insemination charge was around Rs. 120 to 150 per insemination in study area. Water and electricity charges: The charges for water and electricity were calculated based on the actual expenses on it. As dairy farmers paid for 7.5 HP motor Rs 5000 per annum as fixed charges, while some farmers paid bill on month basis of Rs. 1000 to 2000 per month. These dairy farmers used the water and electricity for domestic purpose, drinking of animal etc. So, water and electricity charges were calculated based on actual cost of water used for drinking of animals and cleaning of shed, equipment's *etc.*

Table-4 Total cost of rearing the milch buffaloes kept on different categories of farms

Taluka	Category of dairy farmers	Total cost of rearing milch buffalo (Rs./animal/year)			Rearing cost (Rs./animal/day)
		Fixed cost	Variable cost	Total cost	
Palanpur	Marginal	6669.84	58152.30	64822.14	177.59
	Small	6422.39	75424.41	81846.80	224.24
	Medium	8922.83	66473.65	75396.48	206.57
	Large	6686.24	55280.89	61967.13	169.77
Vadgam	Marginal	5602.45	74339.83	79942.28	219.02
	Small	6667.96	78868.83	85536.78	234.35
	Medium	8847.37	65584.60	74431.97	203.92
	Large	9301.28	55341.59	64642.86	177.10
Overall	Marginal	6200.85	65264.97	71465.82	195.80
	Small	6510.64	76662.23	83172.88	227.87
	Medium	8880.09	65970.40	74850.49	205.07
	Large	7711.04	55304.68	63015.72	172.65
Total		7265.36	65380.73	72646.09	199.03

Table-5 Total cost of rearing dry buffaloes kept on different categories of dairy farms

Taluka	Category of dairy farmers	Total cost of rearing dry buffalo (Rs./animal/year)			Rearing cost (Rs./animal/day)
		Fixed cost	Variable cost	Total cost	
Palanpur	Marginal	6464.00	25841.00	32305.00	88.51
	Small	6511.41	26426.14	32937.55	90.24
	Medium	10269.90	26563.10	36833.00	100.91
	Large	8134.90	24126.40	32261.30	88.39
Vadgam	Marginal	4848.82	25840.27	30689.09	84.08
	Small	7067.80	26811.20	33879.00	92.82
	Medium	7360.94	28349.81	35710.75	97.84
	Large	9030.23	25030.85	34061.08	93.32
Overall	Marginal	5387.18	25840.55	31227.73	85.56
	Small	6614.52	26497.44	33111.96	90.72
	Medium	8479.81	27662.50	36142.31	99.02
	Large	8640.96	24637.57	33278.52	91.17
Total		7115.46	26184.04	33299.50	91.23

Table-6 Total cost of milk production by buffaloes kept on different categories of dairy farms

Taluka	Category of dairy farmers	Average daily milk yield (liter/animal)	Total cost per liter milk production			
			Fixed cost (Rs./animal/Year)	Variable cost (Rs./animal/Year)	Total cost (Rs./animal/Year)	Total cost (Rs./liter)
Palanpur	Marginal	4.84	6622.67	50747.63	57370.29	32.45
	Small	4.67	6453.48	58313.90	64767.38	38.02
	Medium	4.42	9331.03	54379.55	63710.58	39.45
	Large	7.16	6949.64	49616.44	56566.07	21.63
Vadgam	Marginal	3.82	5277.35	53418.45	58695.80	42.06
	Small	6.00	6739.36	69572.82	76312.18	34.85
	Medium	4.17	8330.35	52633.37	60963.72	40.02
	Large	4.56	9217.38	45959.69	55177.07	33.15
Overall	Marginal	4.32	5929.63	52123.49	58053.12	36.83
	Small	5.08	6541.46	61778.18	68319.64	36.87
	Medium	4.28	8748.35	53362.73	62111.09	39.77
	Large	6.04	7931.54	48033.09	55964.63	25.40
Total		4.95	7220.72	53707.40	60928.12	33.70

Miscellaneous cost

The miscellaneous expenses born by farmers include the cost of repairs of machinery, shed / buildings like roof, flooring; white wash of shed, transportation of milk and stationary.

Cost of rearing dairy animals

It included the sum of total fixed cost and total variable cost of rearing the different categories animal was divided by number of different categories animal.

Total cost of rearing (per animal per year)=(Total fixed cost + Total variable cost) / (No.of animal) (3)

Income from dairy farming

The income from dairy farming was calculated by inclusive the value of sale of milk, sale of manure, sale of gunny bag and sale of surplus animals.

Sale of milk

The main source of income to dairy farmers was from the sale of milk to the District Cooperative Milk Producers' Union Ltd. These farmers use about 3.0 to 5.0 litre of milk for home consumption and 0.5 to 1.0 litre of milk given to the labour on farm also included in the actual milk production of the farm and cost was calculated by multiplying milk yield of animal with the prevailing prices of milk in the study area.

Income from sale of milk=Quantity of milk produce on the farm × Milk price (per litre) (4)

Sale of manure

The income from manure was calculated based on the manure produce on the farm and farmers got the income from its sale to other farmers. Usually, they sold the manure @ Rs. 1500 per trailer and actually income received by the farmers from the sale of manure was included in this study.

Income from manure=Quantity of manure produce on the farm × Sale price of manure (5)

Sale of surplus animals

The income from sale of surplus animals was studied based on the actual income received from the sale of animal/s during year.

Income from sale of surplus animals= No.of animals sold× Sale price of animals (6)

Table-7 Total income from buffaloes kept on dairy farms

Taluka	Category of dairy farmers	Total income from the rearing of milch buffalo (Rs./animal/year)				
		Sale of milk	Sale of manure	Sale of surplus animals	Sale of gunny beg	Overall income
Palanpur	Marginal	85676.15	1890.15	8427.08	742.79	96736.17
	Small	83185.24	1887.33	4793.65	1009.40	90875.62
	Medium	75599.24	1498.24	1363.64	825.48	79286.61
	Large	132236.18	1284.64	2109.09	719.73	136349.64
Vadgam	Marginal	64096.86	907.59	215.69	918.12	66138.25
	Small	109369.64	2922.39	178.57	1402.54	113873.14
	Medium	73095.22	2073.17	7000.00	779.96	82948.35
	Large	79391.86	2963.26	4261.90	602.07	87219.10
Overall	Marginal	74559.55	1383.98	4196.97	833.11	80973.61
	Small	91241.98	2205.81	3373.63	1130.36	97951.78
	Medium	74141.20	1833.03	4645.57	798.99	81418.78
	Large	109355.13	2011.46	3041.24	668.78	115076.62
Total		87838.85	1851.54	3782.79	856.10	94329.28

Table-8 Net income from buffaloes kept on dairy farm by different categories of dairy farmers

Taluka	Category of dairy farmers	Net income			
		Total Income (Rs./animal/year)	Total Cost (Rs./animal/year)	Net income (Rs./animal/year)	Net income (Rs./animal/day)
Palanpur	Marginal	70070.05	63547.45	6522.59	17.87
	Small	99332.08	105194.10	-5862.02	-16.06
	Medium	89215.02	71205.65	18009.37	49.34
	Large	78006.22	50334.76	27671.47	75.81
Vadgam	Marginal	93677.50	80454.06	13223.44	36.23
	Small	94583.19	81822.76	12760.43	34.96
	Medium	101563.38	87885.16	13678.22	37.47
	Large	81960.68	70236.62	11724.06	32.12
Overall	Marginal	76286.01	67999.05	8286.96	22.70
	Small	97391.50	95643.67	1747.84	4.79
	Medium	98559.73	83828.00	14731.73	40.36
	Large	80500.57	62888.25	17612.32	48.25
Total		87447.18	76397.93	11049.25	30.27

Sale of gunny bags

The income from sale of gunny bags was calculated based on the number of empty bags and price of a gunny bag, which was consider Rs. 65 for jute bag.

Income from sale of empty gunny bags = No of jute or gunny bags x Sale price of jute or gunny bags (7)

Total income from dairy farming

The total income from the sale of milk and other dairy farm produce or waste was calculated by adding these values as per following formula:

Total income from dairy farm=A+B+C+D
Where,
A=Total income from sale of milk
B=Total income from sale of manure
C=Total income from sale of gunny bags
D=Total income from sale of surplus animals (8)

Net income from dairy farm

It was calculated from the following formula:

Net income from dairy farm =Total income from dairy farm-Total expenditure on the farm for respective class

Net income per milch animal per day= ((Total income from dairy farm-Total @expenditure on the farm for respective class)) / (No.of milch animals) (9)

Statistical analysis

To achieve the objectives of the study, the data collected from 120 dairy farms was processed, summarized, scrutinized, tabulated and analyzed with the help of software *i.e.*, Statistical Package for Social Sciences (SPSS).

Results and Discussion

Information about the number of milch and dry buffaloes reared by different categories of farmers was collected and presented in [Table-1]. The number of milch buffaloes kept by different categories of dairy farmers shows that they were 2.32, 2.25, 1.86 and 2.60 per cent of marginal, small, medium, and large farmers, respectively. Similarly, dry buffaloes across different categories were 1.16, 0.95, 0.91 and 0.81 per cent on marginal, small, medium and large-sized farms respectively.

Fixed cost

The expenditure borne by dairy farmers on the animals, housing and equipment is included as a fixed cost. The details of these costs are discussed here as below, and the results are depicted in [Table-2]. Interest rate on milch and dry buffaloes was calculated Rs. 4045 and 3985 per animal per year respectively, irrespective of class of households. Kaur and Singh (2018) [5] reported value of interest on animal as Rs. 7.61, 8.06, 11.31 and 11.83 per day per animal respectively for domestic, small, medium and large farms. Interest rate on dairy farm building for milch, dry buffaloes was calculated Rs.989 and 874 animal per year respectively for all categories of dairy farmers. Kaur and Singh (2018) [5] suggested interest on buildings as Rs. 2.90, 3.18, 2.45 and 2.43 per animal per day for domestic, small, medium and large farmers, respectively.

Interest rate on dairy farm equipment for milch and dry buffaloes was calculated Rs. 702 and 742 per animal per year respectively for all categories of dairy farmers. Kaur and Singh (2018) [5] suggested interest on equipment was Rs. 1.31, 1.49, 0.97 and 0.54 per day per animal respectively for domestic, small, medium and large farmers, whereas, Ghule *et al*. (2012) [6] reported interest on fixed assets for buffaloes on small, medium and large farms as Rs. 10.00, 9.48 and 9.15 per animal per day, respectively.

An owner of the enterprises bears indirect cost in form of the reduction in value of any items. The depreciation on dairy farm buildings for milch and dry buffaloes was calculated and it was found Rs. 593 and 524 per animal per year respectively. Kamble *et al*. (2014) [7] suggested that depreciation on shed was Rs. 822.50 per animal per year, whereas Kaur and Singh (2018) [5] reported that depreciation on farm buildings was Rs. 1.38, 1.52, 1.16 and 1.16 per day per animal respectively for domestic, small, medium and large farms. The depreciation on dairy farm equipment for milch and dry buffaloes was calculated Rs. 936 and 990 per animal per year respectively by all categories of households.

Variable cost

The expenses incurred by farmers on rearing their animals, like feeding, breeding, labour, electricity charges, treatment, etc., are included as variable costs or operational costs of the farm. The details of these costs are discussed as below, and the results are depicted in [Table-3]. The feeding cost of a milch buffaloes was calculated at Rs. 60925 per animal per year by all categories of dairy farmers. The respective value for dry buffaloes was observed at Rs. 22026 per animal per year. It shows that the feeding cost of milch buffaloes was higher than dry buffaloes. However, Singh *et al*. (2017) [8] suggested the feeding cost of buffaloes kept on the small, medium and large dairy farms was Rs. 97.94, 88.45 and 35.25 per animal per day, respectively. The labour cost of milch and dry buffaloes was calculated Rs. 2475 and 2238 per animal per year respectively by all categories of dairy farmers. Lal and Chandel (2016) [9] reported labour cost for buffaloes on small, medium and large farms was Rs. 23.54, 35.23 and 24.53 per animal per day, respectively. The treatment cost of milch and dry was calculated Rs. 639 and 595 per animal per year, respectively. The observations of Ghule *et al*. (2012) [6] suggested that veterinary cost for buffaloes on large farms was Rs. 2.90 per animal per day. The value for treatment of buffaloes and cows reported by Meena *et al*. (2019) [10] was Rs. 2.85 and 3.35 per animal per day, respectively. Hence, it can be concluded that expenses on treatment by different categories of farmers of Banaskantha district were almost more or less similar to these reports of different workers. The annual per animal breeding cost of milch and dry buffaloes was observed Rs. 619 and 530, respectively for all categories of dairy farms. The overall annual cost of water and electricity for milch and dry buffaloes was beyond Rs. 205 and 189 per animal, respectively. Miscellaneous expenses include the cost of repairing fixed assets, buckets, ropes, insurance premiums, and other incidental charges for the management of all dairy animals. Miscellaneous cost for milch and dry buffaloes was calculated at Rs. 517 and 607 per animal per year, respectively, for all categories of dairy farmers.

Rearing cost

The rearing cost of milch and dry buffaloes includes total fixed cost and total variable cost. The details of rearing cost are discussed here as below and results are depicted in [Table-4] and [Table-5].

Rearing cost of milch buffaloes

The total rearing cost of milch buffaloes kept on dairy farms by different categories of dairy farmers in Banaskantha district of Gujarat is presented in [Table-4]. It was revealed from the table that overall total cost of rearing the milch buffaloes was Rs. 72646.09 per animal per year. It includes fixed cost and variable cost, which was Rs. 7265.36 and 65380.73 per animal per year, respectively.

The overall rearing cost of milch buffaloes for all categories of dairy farmers was Rs. 199.03 per milch buffaloes per day. However, it was highest for small farmers (Rs. 227.87), followed by medium (Rs. 205.07), marginal (Rs. 195.80) and large (Rs. 172.65) category of dairy farmers. It shows that large farmers bear less expense for rearing the milch buffaloes as compare to other categories of dairy farmers. It might be due to proper utilization of resources as compare to other category of farmers. These findings are in agreement of the reports of earlier workers *viz* : Lal and Chandel (2016)[9], Kaur and Singh (2018) [5] and Meena *et al*. (2019) [10], while views of Singh *et al*. (2017) [8] and Anbukkani (2018)[11] are not in agreement of present findings.

Rearing cost of dry buffaloes

The total rearing cost of dry buffaloes kept by different categories of dairy farmers in Banaskantha district of Gujarat is presented in [Table-5]. It was revealed from the data that overall total cost of rearing the dry buffaloes was Rs. 33299.50 per animal per year. It includes fixed cost and variable cost, which was Rs. 7115.46 and 26184.04 per animal per year, respectively. The overall rearing cost of a dry buffalo was Rs. 91.23 per animal per day. However, it was highest for medium farmers (Rs. 99.02), followed by large (Rs. 91.17), small (Rs. 90.72) and marginal (Rs. 85.56) category of dairy farmers. It shows that marginal farmers incurred less expense for rearing the dry buffaloes as compared to other categories of dairy farmers.

Cost of buffalo milk production

The total cost of milk production by buffaloes managed by different categories of dairy farmers in Banaskantha district of Gujarat was depicted in [Table-6]. It was revealed from the data that overall rearing cost of buffalo was Rs. 60928.12 per animal per year. It includes fixed cost and variable cost, which was Rs. 7220.72 and 53707.40 per animal per year, respectively.

The average cost of one liter milk production has been calculated Rs. 33.70. However, it was highest for medium farmers (Rs. 39.77), followed by small (Rs. 36.87), marginal (Rs. 36.83) and large (Rs. 25.40) category of dairy farmers. It shows that large farmers produce the milk at a lower cost as compare to other categories of dairy farmers. Similar kinds of realizations have been observed by Lal and Chandel (2016) [9] and Meena *et al*. (2019) [10], whereas present findings are in contrast with the findings of Kamble *et al*. (2014) [7], Singh *et al*. (2017) [8], Kaur and Singh (2018) [5] and Anbukkani (2018 [11].

Total income

The total income from the rearing of milch buffaloes kept on dairy farms by different categories of dairy farmers in Banaskantha district of Gujarat is presented in [Table-7]. It shows that overall income from milch buffaloes to dairy farmers was Rs. 94329.28 per animal per year. However, it was highest for large farmers (Rs.115076.62), followed by small (Rs. 97951.78), medium (Rs. 81418.78) and marginal (Rs. 80973.61) category of dairy farmers. Income from sale of milk to all categories of dairy farmers was Rs. 87838.85 per animal per year. However, it was highest for large farmers (Rs. 109355.13), followed by small (Rs. 91241.98), marginal (Rs. 74559.55) and medium (Rs. 74141.20) category of dairy farmers.

The present findings are in harmony with that of Kamble *et al*. (2014) [7], Lal and Chandel (2016) [9], Singh *et al*. (2017) [8] and Kaur and Singh (2018) [5].

Income from sale of manure to all categories of dairy farmers was Rs. 1851.54 per animal per year. However, it was highest for small farmers (Rs. 2205.81), followed by large (Rs. 2011.46), medium (Rs. 1833.03) and marginal (Rs. 1383.98) category of dairy farmers. The findings were in accordance with the reports of earlier workers, Kamble *et al*. (2014) [7], Payal *et al*. (2015) [12], Lalrinsangpuii *et al*. (2016) [13] and Kaur and Singh (2018) [5]. The findings were contradictory with the finding of earlier workers Ghule *et al*. (2012) [6].

Income from sale of surplus animal by all categories of dairy farmers was Rs. 3782.79 per animal per year. However, it was highest for medium farmers (Rs. 4645.57), followed by marginal (Rs. 4196.97), small (Rs. 3373.63) and large (Rs. 3041.24) category of dairy farmers. Income from sale of gunny bag to all categories of dairy farmers was Rs. 856.10 per animal per year. However, it was highest for small farmers (Rs.1130.36), followed by marginal (Rs. 833.11), medium (Rs. 798.99) and large (Rs. 668.78) category of dairy farmers. This can be interpreted from the analysis that the livestock farmers get good amount of returns from selling of milk due to well established co-operative dairy sector in the study area and fair demand of manure and gunny bag from local farmers.

Net income

The net income from milch buffaloes is depicted in [Table-8]. It shows that overall income from buffalo to all categories of dairy farmers was Rs. 93855.19 per animal per year and overall cost was Rs. 61112.12 per animal per year. Therefore, net income was Rs. 32743.07 per animal per year and Rs. 89.70 per animal per day. However, it was highest for large farmers (Rs. 161.95) followed by small (Rs. 81.18), marginal (Rs. 62.80) and medium (Rs. 52.90) category of dairy farmers.

The present findings are in accordance with the reports of earlier workers *viz*: Kamble *et al*. (2014) [7] and Meena *et al*. (2019) [10], but these findings are contradictory with the reports of Ghule *et al*. (2012) [6], Lal and Chandel (2016) [9], Anbukkani (2018)[11], Sunil *et al*. (2016) [14], Horo and Chandel (2019) [15] and Athare *et al*. (2019) [16].

Conclusion

From the results of the investigation, it can be concluded that the per day rearing cost of milch buffaloes was 2.19 times higher than dry buffaloes. Net income from buffalo farm was highest for large farmers and lowest for small category of farmers.

Net income of marginal and small farmers can be improved by reducing total cost, this can be achieved by adopting better feeding and management practices by the dairy farmers of the region.

Application of research: The present investigation helps to understand economics of milk production of buffalo and costs bear by livestock farmers of different category in Banaskantha district of Gujarat state.

Research Category: Agricultural Economics, Veterinary Science & Animal Husbandry

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Study area / Sample Collection: Banaskantha District

Cultivar / Variety / Breed name: Mehsana Buffalo

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