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An Economic Analysis of Share and Importance of Livestock in Household Economy of the Farmers

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Authors' contributions

This work was carried out in collaboration among all authors. The work is based on author Yasmeen PhD thesis entitled 'Economic Interdependence of agriculture and livestock enterprises in north-eastern Karnataka' under supervision of co-authors SSP, ATJ, GMH, BGK and JR submitted to the University of Agricultural Sciences (UAS), Raichur, Karnataka, India. All authors read and approved the final manuscript.

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ABSTRACT

Livestock production is the backbone of Indian agriculture and source of employment in rural areas since centuries, in which the entire system of rural economy has revolved around it. Livestock was revealed with multi-faceted contribution to socio-economic development of rural masses. Due to the inelastic absorptive capacity for labour in other economic sectors, livestock sector has greater scope for generating more employment opportunities, especially for the marginal and small farmers and landless labourers who own around 70 per cent of the country's livestock. The study was conducted to know the role of livestock in farmer's economy in North-eastern Karnataka (NEK) region of Karnataka state. In the study area milch buffaloes were reared by the farmers as they preferred buffalo milk for home consumption than cow milk. Further, it was easier to maintain buffaloes than

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cross-bred milch cow. All the farmers used paddy crop as dry fodder since they produced it, but landless labourers purchased the same. For each litre of milk produced the marketed surplus was 88 and 90 per cent for crossbred and local cow milk followed by 84 and 80 per cent for crossbred and local buffalo milk. The total income from dairy enterprise was earned by large and small farmers with relatively higher than landless labourers and marginal farmers, which was due to the large and small farmers had maintained more number of crossbred cows than landless labourers and marginal farmers.

Keywords: Livestock; household economy; animal husbandry; socio-economic development.

1. INTRODUCTION

Indian agriculture is a diversified farming system in which crop production and animal husbandry are devoted for efficient and economic utilization of land, labour and capital. In India, 62.5 per cent of the population is directly or indirectly associated with agriculture and animal husbandry [1]. In order to earn regular income and employment throughout the year, rearing of milch animals along with the crop production need to be encouraged [2]. In a mixed farming system, the practice of livestock rearing was for food security, income, employment, manure, draught, fuel savings, socio-cultural activities and as an insurance for urgent cash needs. The capital asset function of livestock is important in areas where they lack the formal insurance and credit mechanisms. Keeping livestock is an insurance against events requiring (unexpected) appreciable cash outlays such as a wedding, funeral, hospitalization of a household member, renovation of the house, education expenses for children and other social obligations for religious functions or symbolic exchange in hospitality [3].

Globally, the livestock wealth comprises of 298.2 million of buffaloes, 995.7 million of cattle, 1520.6 million of goats, 2605.2 million of sheep, 128.5 million of horses, 108.5 million of donkeys and 93.9 million of camels [4]. The distribution of livestock population across the globe showed that ruminants, cattle and sheep dominated in Asia, Africa and Oceania, while the proportion of cattle, sheep and goat population was almost same in Europe. In North, Central and South America, population of cattle dominated, while goats are primarily found in Asia (51%) and Africa (41%). Asia accounts for 46 per cent of sheep and 62 per cent of swine population. About 95.65 per cent of world's total livestock population was found in Asia whereas 78 per cent of camel population was in Africa [5].

India supports approximately 22 per cent of world's human and 16 per cent of livestock population on 2.9 per cent of its geographical area where livestock has emerged as a driving force in the growth of agricultural sector. Further, this sector accounts for a GDP of 2681 billion contributing 4.87 per cent to the total GDP and 21.84 per cent to the agricultural GDP [6]. However, the growth rate of total GDP during 2015-16 was 2.1 per cent and 3.9 per cent in terms of value of output for livestock sector. Besides, the sector contributed 239.16 million tons of milk, 71.52 billion of eggs, 36.41 million kg of wool and 6.83 million tons of meat respectively [7]. In 2016-17, the proportion of milk, egg, meat and wool were recorded with growth rate of 6.0, 5.9, 16.8 and 6.2 per cent respectively. The growth in livestock sector was observed at an annual rate of 5.3 per cent during 1980s, 3.9 per cent during 1990s and 3.7 per cent during 2000s respectively. Despite deceleration, growth of the sector remained about 2.1 per cent higher than the crop sector which revealed that, the growth of sector was found to play critical role in cushioning the agricultural growth [7].

In Karnataka, agriculture and allied sector contributes about 32 per cent to the state GDP occupying a significant portion in state's economy [8]. It has strong welfare dimensions, as it provides stable and dependable income to the rural households. The contribution of livestock sector to the state's GDP is 9.12 per cent [8]. According to the 19th livestock census (2012), the livestock population in Karnataka was 9.51 million of cattle, 3.47 million of buffaloes, 9.58 million of sheep, 4.79 million of goats, 1.21 million of pigs and 32 million of poultry respectively. The dominant species of livestock in the state includes buffalo, cattle, goat, sheep and poultry [8]. The state ranks 17th in total livestock population and 14th in poultry population in India. Besides, it accounts for roughly 2.89 per cent of total livestock population and 3.51 per cent of poultry population in the country [7].

In North-eastern Karnataka (NEK) region, the population of total livestock increased from 4.89 million in 1982 to 6.59 million in 2012. Among

livestock, cattle population was 2.01 million, 0.79 million of buffaloes, 2.23 million of sheep and 1.56 million of goats, respectively (livestock census, 2012). In the NEK region ownership of the livestock was unevenly distributed and considerable regional diversity was observed in livestock productivity as well as in stocking rates of species. In this region, livestock rearing has all along been an indispensable, complementary activity to agriculture.

Livestock is an integral part of farming in the agricultural scenario of the country as well as the state. Since ancient times, cattle and buffaloes are maintained to meet the daily requirements of milk, draught power, field operation and for valuable organic manure. Sheep, goats, poultry and pigs are used to extract the meat, which is the major source of animal protein in the country. There is a definite relationship between crop and livestock sector, which was established through input-output linkages *i.e.,* the product or byproduct of crop sector is used as input for the livestock sector and *vice-versa.* Similarly, income from dairy is used to purchase dairy inputs as well as the inputs required for the purpose of agriculture. However, very few studies have been conducted so far on the importance of livestock in farmer's economy. Hence, the present investigation is an attempt to study the inter linkages and importance of livestock by considering the different categories of farmers.

2. METHODS

The present study was conducted in the North-eastern karnataka, wherein Kalaburagi, Bidar and Raichur districts are selected because in these districts livestock is the main income generating source for Small and Marginal farmers and they mainly depend on livestock enterprise for their household income. The study was carried out during 2017, wherein the multistage random sampling technique was adopted for the selection of sample farmers. In the first stage, three districts namely Kalaburagi, Bidar and Raichur were selected based on the highest number of livestock population (cattle, buffalo, sheep and goat). In the second stage, two talukas from each district were selected based on potentiality and highest number of cattle, buffalo, sheep and goat population. In the third stage, four villages from each selected taluk *i.e.,* a total of twenty four sample villages were randomly selected from the six talukas and in turn ten sample respondents from each village were selected, which constituted 240 sample respondents for the study as a whole. The data was collected using pre-structured and pre-tested schedules. The data pertains to pattern of livestock holding across different category of farmers and availability of livestock resources such as feed, fodder, labour, veterinary care, composition of livestock and inputs used for livestock *etc.* Personal interview method was adopted to ensure that the data obtained from the respondent is relevant, comprehensive and reasonably correct and precise. Tabular analysis was used to analyse the share and relative importance of livestock in the household economy of the farmers.

3. RESULTS AND DISCUSSION

3.1 Livestock Asset Position of Sample Farmers

Livestock possessed by different categories of farmers are presented in Table 1. More than 70 per cent of the farmers in all categories possessed milch cow and buffaloes. Whereas, 35 (72.91%) landless, 39 (70.90%) marginal, 47 (78.33%) small and 58 (75.32%) large farmers had maintained seven to eight crossbred cows, followed by 20 (41.66%) landless, 30 (54.54%) marginal, 35 (58.33%) small and 40 (51.97%) large farmers had maintained three to five local cows respectively. Overall, 179 (74.58%) crossbred cows and 125 (52.08%) local cows were maintained by the sample farmers who possessed average of seven crossbred and four local cows in the study area. Overall, 62 (25.83%) farmers possessed the young stock milch cow in the study area.

The milch buffaloes *i.e.,* crossbred and local buffaloes were maintained by the farmer's in the study area with 12 (25.00%) landless, 18 (32.72%) marginal, 22 (36.66%) small and 24 (31.16%) large farmers maintained two to three crossbred buffaloes, followed by 5 (10.41%) landless, 11 (20.00%) marginal, 15 (25.00%) small and 15 (19.48%) large farmers had maintained one to two local buffaloes respectively. Overall, 76 (31.66%) crossbred buffaloes and 46 (19.16%) local buffaloes were maintained by the sample farmers who possessed average of three crossbred and one local cows in the study area. Overall, 33 (13.75%) farmers possessed the young stock milch buffalo in the study area.

The landless labourers did not possess any draught animals, whereas, 72 (30.00%) and 48 (20.00%) farmers maintained bullocks and cows

respectively for their agricultural operation. On an average of 154 (64.16%) and 184 (76.66%) sample farmers had maintained 31.16 sheep and 35.32 goats, respectively.

In the study area, on an average landless and marginal farmers possessed seven crossbred cows and three local cows, whereas, small and large farmers had eight crossbred cows and four local cows. Since, the cost of fodder was high, it was little difficult to maintain milch cow by landless labourers and marginal farmers. But in case of large and small farmers they used the fodder produced by farm and if there was any shortage of fodder, it was been purchased in the local area.

3.2 Annual Maintenance Cost of Livestock

The livestock expenditure per animal per year is shown in Table 2. All the farmers used paddy straw and jowar dry fodder on an average of 2.01 and 1.25 tonnes per animal per year, which was valued at Rs.12,075 and Rs.9,545 respectively. Farmers spent more on purchase of groundnut cake (Rs.18,139) and wheat bran (Rs.18,016). Whereas, landless labourers used 330 kgs of feeds valued at Rs.2,640, but marginal, small and large farmers used 129, 112 and 74 kgs, respectively. While, large farmers fed more groundnut cake (5926 kgs) and wheat bran (5675 kgs).

The cost incurred for veterinary services was Rs.840, Rs.1,800, Rs.1,500 and Rs.2,100 per animal per year for landless, marginal, small and large farmers respectively. Total livestock expenditure was highest (Rs.26,330) for large farmers, followed by small (Rs.21,552), marginal (Rs.21,064) and landless labourers (Rs.16,774).

The average livestock expenditure was more in large farm since they incurred more expenditure on groundnut cake and wheat bran to get higher milk yield per cow and also they used expensive medicinal care for the livestock.

3.3 Major Sources of Household Income

It is evident from Table 3 that 26 (54.16%), 20 (36.36%), 23 (38.33%) and 24 (31.16%) of landless labourers, marginal, small and large farmers, respectively have derived major income from dairy. Overall, 93 (38.75%) respondents have earned income from dairy enterprise. Further, 19 (34.55%) marginal, 29 (48.33%) small and 36 (46.75%) large farmers have realized major share of their family income from different crops. However, wages was the main source of income for landless and marginal farmers with 45.83 and 18.18 per cent respectively. The off-farm operations was carried out with 10 (20.84%) landless, 11 (20.00%) marginal, 13 (21.67%) small and 31 (40.26%) large farmers. In total, 65 (27.08%) farmers were engaged in off-farm business activities in the study area.

In contrast, income from cultivation of the crops was a major source of income to 47 per cent from large farmers, 48 and 35 per cent from small and marginal farmers respectively. It was due to small and large farmers have cultivated vegetables in irrigated lands, while vegetables yield higher returns. But, most of the marginal farmers do not have irrigation facilities, hence they grow majority of crops under rainfed condition, mainly for consumption purpose, but returns from the crops were very low and to supplement their income, they were usually practicing for rearing of livestock. These results were in conformity with the report of Vijaykumar et al. [9] who reported that the farmers who grow vegetables under irrigation condition were earning higher average annual income.

3.4 Livestock Income

The gross returns from livestock is shown in Table 4. The farmers produced crossbred and local cow milk with an average quantity of 10882 and 3312 litres per annum, respectively. Whereas, the crossbred and local buffalo milk was produced with an average quantity of 7922 and 1840 litres per annum respectively. The farmers sold 9675 litres of crossbred cow milk and 3030 litres of local cow milk. Further, they sold 6852 litres and 1490 litres of crossbred and local buffalo milk per annum respectively. Farmers consumed an average of 1207 litres of crossbred and 282 litres of local cow milk followed by 1070 litres of crossbred and 350 litres of local buffalo milk respectively.

The share of gross returns from milk was higher when compared to other livestock products across all categories of farmers. Large farmers received annually Rs.1,57,000 from crossbred and Rs.52,650 from local cow milk, while it was Rs.1,20,600 and Rs.35,000 for small farmers respectively. With respect to marginal farmers and landless labourers it was Rs.99,800 and Rs.95,500 from crossbred while Rs.24,060 and Rs.14,420 from local cow milk respectively.

Table 1. Livestock asset position of sample farmers

Sl. No.	Particulars		Landless (n_1=48)		Marginal (n_2=55)		Small (n_3=60)		Large (n_4=77)		Total (n=240)	
			Farmers	Average	Farmers	Average	Farmers	Average	Farmers	Average	Farmers	Average
Livestock												
1	Milch cow (No.)	Crossbred	35(72.91)	8.00	39(70.90)	7.43	47(78.33)	8.19	58(75.32)	7.93	179(74.58)	7.00
		Local	20(41.66)	5.05	30(54.54)	3.66	35(58.33)	3.85	40(51.97)	3.95	125(52.08)	4.16
2	Milch cow (Young Stock) (No.)		8(16.66)	2.00	14(25.45)	2.5	19(31.66)	1.10	21(27.27)	1.42	62(25.83)	1.37
3	Milch buffaloes (No.)	Crossbred	12(25.00)	3.91	18(32.72)	2.88	22(36.66)	2.81	24(31.16)	3.12	76(31.66)	3.28
		Local	5(10.41)	1.20	11(20.00)	1.45	15(25.00)	1.66	15(19.48)	1.80	46(19.16)	1.63
4	Milch buffaloes (Young Stock) (No.)		2(4.16)	1.00	7(12.72)	1.14	10(16.66)	1.20	14(18.18)	1.28	33(13.75)	1.21
5	Draught animals a. Bullocks (No.)		0	0	16(29.09)	2.18	24(40.00)	1.75	32(41.55)	1.78	72(30.00)	2.13
	b. Cows (No.)		0	0	9(16.36)	1.66	15(25.00)	1.40	24(31.16)	1.16	48(20.00)	1.14
6	Sheep (No.)		20(41.66)	23.00	41(74.54)	30.48	45(75.00)	34.44	48(62.33)	36.16	154(64.16)	31.16
7	Goat (No.)		28(58.33)	30.00	49(89.09)	32.95	51(85.00)	35.49	56(72.72)	37.50	184(76.66)	35.32

Note: Figures in parentheses indicate percentage to the total farmers; No.: Number

Table 2. Annual livestock maintenance cost of the sample farmers(Value in Rs)

Inputs	Landless (n_1=48)		Marginal (n_2=55)		Small (n_3=60)		Large (n_4=77)		Overall (n=240)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Paddy straw (Tonnes)	1.50	2,250	2.25	3,375	2.10	3,150	2.20	3,300	2.01	12,075
Jowar dry fodder (Tonnes)	0.50	1,020	1.00	2,575	1.50	2,800	2.00	3,150	1.25	9,545
Fodder maize	-	700	-	900	-	558	-	1,318	-	3,476
Napier	-	116	-	143	-	135	-	312	-	706
Groundnut cake (Kgs)	251	3,216	342	4,347	360	4,650	453	5,926	374	18,139
Wheat bran (Kgs)	445	3,870	518	3,958	591	4,513	707	5,675	565	18,016
Bengal gram husk (Kgs)	60	472	70	547	23	340	28	390	45	1,749
Cotton cake (Kgs)	180	1,650	210	2,500	260	3,100	300	3,600	237	10,850
Feeds (Kgs)	330	2,640	129	919	112	806	74	559	161	4,924
Veterinary services	-	840	-	1,800	-	1,500	-	2,100	-	6,240
Total expenditure (Rs /year)	-	16,774	-	21,064	-	21,552	-	26,330	-	85,720

Table 3. Major source of income to the sample farmers (n=240)

Sl. No.	Enterprise	Landless (n_1=48)	Marginal (n_2=55)	Small (n_3=60)	Large (n_4=77)	Total
1	Dairy	26(54.16)	20(36.36)	23(38.33)	24(31.16)	93(38.75)
2	Crops	0	19(34.55)	29(48.33)	36(46.75)	84(35.00)
3	Wages	22(45.83)	10(18.18)	0	0	32(13.33)
4	Off-farm	10(20.84)	11(20.00)	13(21.67)	31(40.26)	65(27.08)

Note: Figures in parentheses indicate percentage to the total farmers
** The values will not sum-up to 100 per cent because of multiple response income*

Regarding sale of buffalo milk by the farmers, it was the highest for large farmers who received annually Rs.99,890 from crossbred and Rs.24,000 from local buffalo respectively, while it was Rs.75,850 and Rs.18,560 respectively for small farmers. With respect to marginal farmers and landless labourers, they received Rs.66,300 and Rs.42,050 from crossbred and Rs.42,050 and Rs.9,080 from local cow milk respectively. Among small ruminants, income from sheep and goat was Rs.40,575 and Rs.34,750 respectively.

For each litre of milk produced the marketed surplus was 88 and 90 per cent for crossbred and local cow milk followed by 84 and 80 per cent for crossbred and local buffalo milk. Relatively, low marketed surplus for the buffalo milk might be due to farmer's preference and consumption as it contained more fat percent than cow's milk.

While, the gross return was highest in crossbred cow milk, hence all farmers reared the crossbred cows for milk purpose and the farmers mainly depend on dairy in order to sustain their family income. But, the income produced from crossbred cow milk was higher than buffalo milk, due to the higher milk yield in crossbred cows (15-20 litres per day) as compared to buffaloes (5-7 litres per day). The similar findings were reported by Reddy et al. [10] and Pandey and Kumar [11].

3.5 Composition of Annual Net Income from Different Enterprises of Farm Family

It was evident from the Table 5, that the total sample farmers as a group earned an income of Rs. 2,05,300 (38.75%) from dairy enterprise. While, landless and marginal farmers earned an average wage income of Rs.48,400 and Rs.28,000, respectively. However, the farmers received an income for off-farm operations *i.e.,* Rs.19,250 in case of landless, Rs.21,540 from marginal famers, Rs.23,500 and Rs.45,800 from small and large farmers respectively. Totally, 65 (27.08%) farmers were engaged in off-farm business activities. Further, the total farmers as a group earned an income of Rs.25,325 (51.25%) from other livestock. Whereas, crops

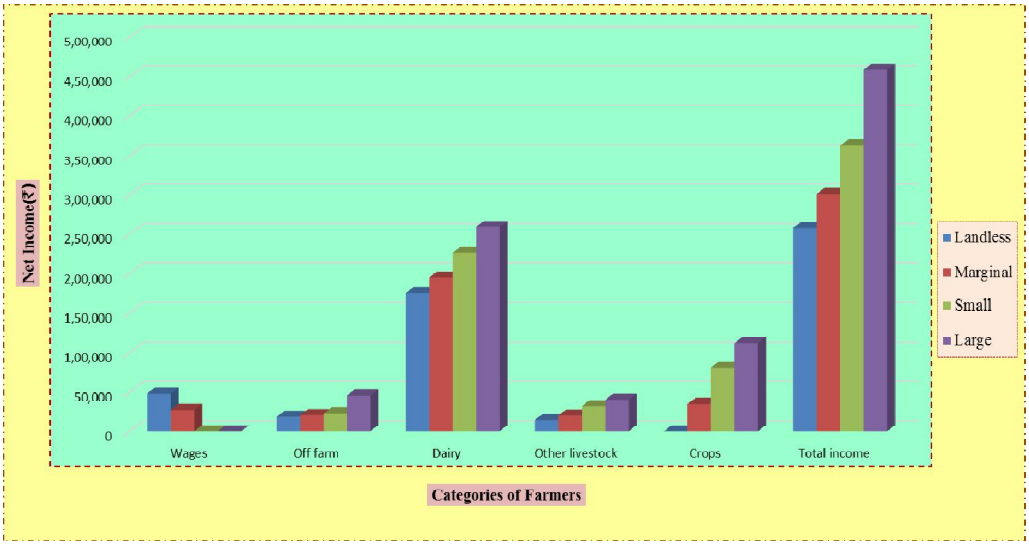

Fig. 1. Net income realized from different enterprises by the sample farmers

Table 4. Gross Income derived from livestock (Per farm) (Value in Rs)

Categories	Produced				Sale												Marketed surplus (%)			
	Cow milk		Buffalo milk		Cow milk				Buffalo milk				Young stock		Sheep	Goats	Cow milk		Buffalo milk	
	CB	local	CB	local	CB		local		CB		local		Cow	Buffalo			CB	local	CB	local
	Qty. (lit)	Qty. (lit)	Qty. (lit)	Qty. (lit)	Qty. (lit)	Value	Qty. (lit)	Value	Qty. (lit)	Value	Qty. (lit)	Value	Value	Value	Value	Value				
Landless	9166	1600	5150	1100	8800	95500	1450	14420	4010	42050	950	9080	460	350	25000	21000	95	90	77	86
Marginal	10880	2650	7900	1450	8100	99800	2050	24060	6500	66300	1010	12050	520	410	35500	32000	74	77	82	69
Small	11352	3800	8500	2010	10500	120600	3700	35000	7400	75850	1500	18560	600	490	42500	38000	92	97	87	74
Large	12130	5200	10140	2800	11300	157000	4920	52650	9500	99890	2500	24000	800	540	59300	48000	93	94	93	89
Total	10882	3312	7922	1840	9675	114975	3030	31532	6852	71022	1490	15922	595	447	40575	34750	88	90	84	80
No. of farmers	179	125	76	46	-	179	-	125	-	76	-	46	62	33	80	110	-	-	-	-
Per cent of farmers	74.58	52.08	31.66	19.16	-	74.58	-	58.08		31.66	-	19.16	25.83	13.75	33.33	45.83	-	-	-	-

Note: Qty.: indicate quantity, lit: litres, CB: Crossbred

Table 5. Net income realized from different enterprises of the sample farmers (per year per farm) (n=240)

Sl. No.	Enterprise	Landless (n_1=48)		Marginal (n_2=55)		Small (n_3=60)		Large (n_4=77)		Pooled	
		No. of farmers	Income (Rs)	No. of farmers	Income (Rs)	No. of farmers	Income (Rs)	No. of farmers	Income (Rs)	No. of farmers	Income (Rs)
1	Wages	22(25.00)	48,400	10(12.72)	28,000	0	0	0	0	32(13.33)	35,500
2	Off farm	10(20.84)	19,250	11(20.00)	21,540	13(21.67)	23,500	31(40.26)	45,800	65(27.08)	29,680
3	Dairy	26(54.16)	1,75,500	20(36.36)	1,95,500	23(38.33)	2,26,300	24(31.16)	2,59,500	93(38.75)	2,05,300
4	Other livestock	36(75.00)	15,000	25(45.45)	21,000	32(53.33)	32,500	30(38.96)	40,800	123(51.25)	25,325
5	Crops	0	0	19(34.55)	35,315	29(48.33)	80,600	36(46.75)	1,12,500	84(35.00)	68,650
6	Total income	-	2,58,150	-	3,01,355	-	3,62,900	-	4,58,600	-	3,45,700

Note: Figures in parentheses indicate percentage to the total farmer

Contributed Rs.35,315 (34.55%) in case of 19 marginal farmers followed by Rs.80,600 (48.33%) and Rs.1,12,500 (46.75%) to small and large farmers respectively. However, the total net income received from different enterprises was highest (Rs.4,58,600) for larger farmers followed by small (Rs.3,62,900), marginal (Rs.3,01,355) and landless labourers (Rs. 2,58,150) respectively. The total sample size of 240 famers was considered with 48 landless labourers, 55 marginal farmers, 60 small farmers and 77 large famers in the study area as a whole (Fig. 1).

However, off-farm activities and crops contributed higher income to the sample farmers in the study area, but prices of these enterprises had widely fluctuated and lack of guarantee in receiving same income throughout the year. While, the price of milk does not fluctuate and thus, farmers received relatively stable and regular income from the dairy. On the other hand, the off-farm activity was contributed highest income to 31 (40.26%) large farmers, in which they earned Rs. 45,800 per annum from teaching profession, *etc*. The findings of the present study were in conformity with the findings of Jabir [12] and Ghulam et al. [13].

4. CONCLUSION

Livestock sector's role is as an instrument for social and economic change in the rural areas through higher income and employment opportunities have been well recognized. The small and marginal farmers, landless labourers and other vulnerable segments of the rural community rear one or two milch animals, mainly using crop residues and by-products and family labour especially from the women and children. In the absence of stable employment opportunities for these vulnerable segments of the rural population, dairy animals play an important role in offering a somewhat stable source of family income.

Livestock has been recognized as an important approach for sustained livelihood. It contributes manure and draught power to agriculture, while crop residues are major source of feed to the livestock and this system of interdependence had sustained for centuries. Further, the livestock is an important source of income and employment in rural sector. In addition, it helps to meet the equity task in rural development through their contribution to the cash income for small and marginal farmers and landless labourers. Thus, results of the study clearly shows the share and importance of livestock in household economy of the farmers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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