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Contribution of livestock in livelihood: Ladakh region

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ABSTRACT

Contribution of livestock in terms of income, milk based nutrition, man days generated, FYM, socio-cultural importance was assessed among 120 livestock farmers of Ladakh in Jammu and Kashmir. Data were collected using semi-structured interview schedule. The study revealed that livestock's contribution towards total house hold income ranged from 16.32 to 86.59%. Milk contributed about 1/3rd of dietary fat requirement of the farmers except among the farmers of Nyoma block where it contributed more than 80%. Similar trend was also observed in milk based protein (22–25%) and calcium intake (5–6%) in fulfilling the family requirement of Kargil, TSG and Chochut blocks. FYM obtained by the farmers was highest in Chochut (1.99 q/year) and lowest in Nyoma (0.67 q/year). But employment (man days/year) generated by livestock enterprise was more in Nyoma (561.91) as compared to the famers of other blocks that ranged from 294.11 to 326.67 per annum per family. Use of animal for mitigating the uncertainties in the region was not a common practice.

Key words: FYM, Income, Livestock, Man days, Nutrition, Pashmina

The state of Jammu and Kashmir comprises 3 regions, viz. Kashmir region (temperate), Jammu region (sub-tropical) and Ladakh region (cold arid) having its stable production environment to the particular crop-livestock scenario. Agriculture is the mainstay upon which about 70% of population depends directly or indirectly and contributed 21.19% in 2011–12 (Economic Survey 2012–13). The development of agriculture is uneven across the region (Singh and Andrabi 2015). Broadly, there are 2 main sectors that constitute Ladakh's land-based economy: Agriculture and livestock husbandry which are under siege today (Ladakh Vision Document 2025). With more and more employment avenues, their need to depend on the land-based economy is decreasing.

Ladhak remains isolated about half of a year from rest of the world; during this period animal products play a pivotal role in meeting nutritional security. But the 'traditional' agro-pastoral land use system of Ladakh has seen manifold changes in recent years due to the household income diversification which is similar to other high mountain regions of South Asia (Kreutzmann 2006, Nüsser and Gerwin 2008). Therefore, an attempt was made to ascertain the contribution of livestock in different facet of life among the Ladakhis's livelihood.

MATERIALS AND METHODS

The study was carried out in Ladakh region that comprises Kargil and Leh districts. Two community development blocks from each district were selected at random (Nyoma and Chuchot from Leh and Kargil and TSG from Kargil district). Of these 4 blocks, Nyoma was the most remotely located block (180 km away from Leh) resided by pastoral people whereas other 3 blocks were comparatively nearer to their respective district headquarter, wherein the people mostly rear crossbred dairy cattle. Further, 3 villages from each selected block were selected at random from where 10 livestock farmers were chosen to make the sample size of 120 respondents. A semi-structured interview schedule comprising 6 dimensions of livestock contribution was used for collection of relevant information, as mentioned in the succeeding paragraphs.

Contribution of livestock to the total household income: It was conceptualized as the % contributed by livestock towards the total family gross income. Different income sources were classified as agriculture - included cash income from all the agro- based product, viz. vegetables, fruits, fodder and cereals; livestock - included value of output from the dairy, sheep and goats; service - included salaries; others- included income from all other sources such as tourism, commercial activities etc.

$$C_{LS} = (I_{LS} / \Sigma I_i) \times 100;$$

where C_{LS}, contribution of livestock towards total family income; I_{LS}, income from livestock; ΣI_I, sum of income from all the sources.

Milk based nutritional security: Consumption of protein, fat and calcium from milk produced at farmer's own farm compared to daily dietary requirement (Anonymous 2011)

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in % per family basis.

Nutrients to the farm: Farm yard manure for the present investigation was a mixture of dung and soil. Farmer sprinkle dry soil on the floor after partially cleaning the animal shed which they collect twice a year and use as farm yard manure (FYM). Total quantum of such mixture containing dung and soil in the ratio 70:30 (as per farmer's perception) was recorded, where from NPK was calculated using conversion formula given below (Gautam 2007).

1 tonne FYM @ 8 kg N, 4 kg P_2O_5 and 16 kg of K_2O

Employment generation: It refers to total man days engaged by farmer's own family members or hired labour in a year. Engagement of 8 h in any livestock activity was considered to be one man day equivalent. But the manpower involved by the pastoralist was calculated as per estimate of Wani *et al.* (2009).

Security for uncertainties: It refers to the number of households which had sold out livestock exclusively in situation of uncertainties in past 2 years.

Status symbol: It refers to the households which consider the livestock as a symbol of wealth within or outside their community.

Collected data were subjected to different descriptive analysis i.e. frequency, percentage and mean. The means were further analyzed by using one way ANOVA technique.

RESULTS AND DISCUSSION

Contribution of livestock towards family income: Contributions of income from different sources revealed similar pattern across the blocks except in Nyoma which differ significantly from other blocks irrespective of income sources (Table 1). Salary was the predominant sources of income contributing 45.58% of total family's income in Chochut block, followed by in Kargil and TSG block and Nyoma block. This revealed that people are more dependent on employment as stated by Wani *et al.* (2011) that almost every family in Ladakh, has 1/2 members who earns from government jobs. Even 25% among out-migrants also engaged in permanent government jobs (Baba *et al.* 2011). But the employment status in Nyoma block was significantly lower because of their traditional pastoralism and location. Agriculture was the second largest contributor (about 1/4th) towards family income in Kargil and TSG block and least in Chochut and Nyoma blocks. Less dependency on agriculture is possibly contributed by the fact that more than 60% of the region's food requirement is met by means of public distribution system, cooperatives and commercial traders (Ladakh Vision 2005); further exaggerated by change in family composition due to diverse occupation in town (Jordan 2014). However, commercial vegetable cultivation, able the farmers to supply fresh vegetables (29 types) to the Army, through cooperative, meeting about 56% of total requirement of fresh vegetable in Ladakh sector in 2007–2008 (Mishra *et al.* 2010). But the scenario in distant located block (Nyoma) was quite different where livestock is the only source of income contributing significantly higher (more than 85%), as compared to the farmers belonged to other blocks because of their involvement in producing highly region specific products viz. wool / fiber in terms of generating household income (Tiwari and Shrestha 2004). Livestock-based earnings account 46–62% of total earnings among the transhumant pastoralists of Kumaun Himalaya (Farooquee 1999); much lesser than the pastoralist of Nyoma because of highly specialized farming and the higher market price of the livestock products like Pashmina.

Milk based nutritional security in family: Availability of nutrients in the diet varies greatly due to harsh agro-climatic conditions; socio-economic status and poverty further affect the health of the people in different regions of Ladakh (Dar and Rather 2014). Dietary requirement in terms of protein, respondents found to meet on an average about 1/3rd of their daily requirement through milk, with the exception in Nyoma block where more than 80% of the requirement was meet out through milk (Table 2). This difference was due to the time of data collection i.e. during mid-summer when goat produces about 272.74±5.04 ml of milk / animal / day (Ganai *et al.* 2011). The farmers belonged to other blocks were the dairy farmers who keep smaller amount of milk for their consumption to maximize the sale volume. Therefore, farmers in Nyoma block met their daily milk based nutritional requirement significantly higher as compared to the farmers of other blocks. The consumption of other milk based nutrients (fat and calcium) were calculated from the same amount of milk, accordingly availability for the same increased or decreased, proportionately. The protein consumed from milk in this

Table 1. Contribution of income from different sources towards total family income (N,120)

Income source	Kargil		Leh	
	Kargil	TSG	Chochut	Nyoma
Agriculture	26.26^{c}	24.03^{c}	14.63^{b}	1.91^{a}
Livestock	20.35^{a}	16.32^{a}	19.58^{a}	86.59^{b}
Service	33.09^{b}	28.03^{b}	45.58^{b}	6.38^{a}
Others	20.27^{b}	31.60^{b}	20.18^{b}	5.09^{a}

Figures having same superscript do not differ significantly across the rows.

Table 2. Distribution of respondents according to milk based nutrition security (N,120)

Nutrients (% of total requirement)	Kargil		Leh	
	Kargil	TSG	Chochut	Nyoma
Fat	37.95^{a}± 18.74	30.30^{a}± 15.29	33.20^{a}± 16.29	82.77^{b}± 31.01
Protein	25.76^{a}± 100	20.57^{a}± 100	22.54^{a}± 100	56.18^{b}± 100
Calcium	6.81^{a}± 100	5.44^{a}± 100	5.96^{a}± 100	14.85^{b}± 100

Figures having same superscript do not differ significantly across the rows.

Table 3. Distribution of respondents according to use of animal as a security against uncertainties and as status symbol (N,120)

	Kargil		Leh		Kargil	Leh	Total
	Kargil	TSG	Chochut	Nyoma			
Use of animals in uncertainties							
Used	3 (10.00)	4 (13.33)	3 (10.00)	2 (6.67)	7 (11.67)	5 (8.33)	12 10.00
Not used	27 (90.00)	26 (86.67)	27 (90.00)	28 (93.33)	53 (88.33)	55 (91.67)	108 (90.00)
Flock size between user and non-user of animal during uncertainties							
Used	11.67	12.75	14	88	12.28	43.6	25.33
Not used	15.81	14.23	7.07	200.53	15.03	105.56	61.13
Herd size between user and non-user of animal during uncertainties							
Used	5	3.25	4	1.5	4	3	3.358
Not used	3.29	3.3	5.29	1.5	3.3	3.36	3.33
Income between user and non-user of animal during uncertainties							
Yes	108986.70	108145.00	125593.00	99925.00	108505.70	115326.00	111347.50
No	313179.60	317211.20	409260.40	248487.50	315157.40	327412.40	321398.30
Status symbol	——— No ———						

Figures in parenthesis indicate %.

region was quite high from the national average i.e. 9.28% (NSSO 2007), that was in accordance with the findings of earlier researcher, Dar and Rather (2014) who found average milk consumption in Kargil and Leh district was 153 and 170 g, respectively, per 10 days/ person (equivalent to 15 and 17g/ person / day). But higher per cent of contribution was reported by Biradar *et al.* (2013) in Maharashtra where livestock reported to contribute 81.30% of protein, 81.30% of fat and 81.31% of calcium in diet of the family.

Utilization of animal as security and status symbol: Use of livestock during uncertainties is not a common practice in Ladakh as it reveals from Table 3. Although livestock contributes about 20% of total family income (Table 1) except in Nyoma block where nearly 10% of them used the livestock in uncertainties during last two years. It indicated non-dependence on animals at emergency in the region. However, despite livestock as a major source of income in Nyoma block, respondents did not agree in utilizing the animal at the time of emergency which is generally done on regular basis. The different economic parameters as depicted in Table 3 also revealed little differences between user and non-user groups. However, farmers with low family income had used the animal more compared to other farmers during emergency. This was in accordance with the findings of Biradar (2013) who also reported that only 12% of the respondent's families used livestock for meeting uncertainties to avoid the bank loan. Similarly, the holding of animals in this region did not bear any significance of status symbol.

Employment generation through livestock rearing: Employment generated or workforce absorption in livestock sector is determined by the size of operational holding as well as social status of the livestock rearers (Khan and Iqbal 2008) and accordingly varied in the present study also. Majority of the respondents from all the blocks, except Nyoma, generated up to 365 man days with an average of about 300 days indicating a man's entire years of involvement in livestock husbandry activities (Table 4). A little more man days i.e. 469, 427 and 143 man days, per annum per family generated by dairy, sheep and goat and piggery enterprises, respectively, in Andhra Pradesh (Satyanarayana *et al.* 2010). But Biradar *et al.* (2013) concluded that livestock generate annual employment of 140.79 man- days for adult women and 95.35 man days for adult men (236.14 together). The difference between present and previous researchers may be due to the several factors including those reported by Satyanarayana and Rao (2013) like social status, land holding and expenditure pattern that explained the variation in the employment generation to the extent of 54.00%. Respondents in Nyoma block generated on an average 1.5 man days / day / family round the year because of larger flock size and solely dependence on small ruminant, which is quite justifiable.

Table 4. Distribution respondents according to employment generation through livestock rearing per year per family (N,120)

Man days/year	Leh		Kargil	
	Chochut	Nyoma	Kargil	TSG
1-365	17 (56.67)	6 (20.00)	23 (76.67)	19 (63.33)
366-730	13 (43.33)	15 (50.00)	7 (23.33)	11 (36.67)
> 730	0 (0.00)	9 (30.00)	0 (0.00)	0 (0.00)
Mean	$326.67^{a}\pm$ 132.70	$561.91^{b}\pm$ 220.22	$294.11^{a}\pm$ 102.57	$309.20^{a}\pm$ 98.69

Figures in parenthesis indicate %.

Nutrients to the farm in terms of dung utilization: Quantum of FYM produced by farmers belonged to Chochut, TSG, Kargil and Nyoma were 1.99, 1.43, 1.41 and 0.67 q/year/ family, respectively. The production of FYM/ family/ year in Chochut was significantly higher in comparison to the other blocks. Similar trend was also observed in all the components. Components of FYM

Table 5. Distribution of respondents according to dung utilization in terms of FYM (mean and SE)

Mean FYM/year	Leh		Kargil	
	Nyoma	Chochut	TSG	Kargil
FYM (q)	0.67[a]± 0.40	1.99[c]± 1.18	1.43[b]± 0.50	1.41[b]± 0.65
Nitrogen (kg)	5.40± 3.20	15.92± 9.46	11.48± 4.04	11.32± 5.21
Phosphorus (kg)	2.70± 1.60	7.96± 4.73	5.74± 2.02	5.66± 2.60
Potassium (kg)	10.80± 6.41	31.84± 18.92	22.96± 8.08	22.64± 10.42

production in the present study (Table 5) were much lesser as compared to the earlier researcher Biradar *et al.* (2013) who found 89.33 44.69 and 178.86 kg nitrogen, phosphorus and potassium/year/farmer in Maharashtra, respectively. Farmers of the region do not produce FYM from the collected cow dung. Rather the farmer sprinkle sufficient quantum of dry soil on the floor of cow shed wherein they deliberately left cow dung at the time of cleaning. The floor of the shed is clean in November and March with all sediment and applies in agriculture land. The cow dung collected on regular interval used for dung cake was not considered in present investigation, it was therefore the quantum of FYM produced/family/year was much lesser compared to findings of other researchers.

Livestock husbandry is an important sector of agriculture economy. It plays a vital role more particularly in cold desert of Ladakh where agriculture is constraints by many factors, viz. shorter cropping season, harsh climate, marginal land holding and many more. It not only provides as a source of income, but also ensures household nutritional security and employment generation. But the dependency of farmers on the livestock varies significantly across the region of Ladakh which is contributed by several factors. The role of livestock husbandry is moving from traditional to commercial and associated problems also increasing in magnitude, which demand a proper planning to keep the pace of development and animal husbandry as a lucrative enterprises both for pastoral and crossbred owning dairy farmers. Therefore, the future planning for livestock keeper of this region need to be addressed keeping in view the realistic situation of the region, efforts has to be made by developmental agencies to increase the man-days of the farmers distant place like Nyoma, to stop their migration to the town or cities.

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