



Livestock produce and their disposal pattern in Ladakh region of Jammu and Kashmir

AFZAL HOQUE AKAND¹, B P SINGH², MAHESH CHANDER³ and N AHMED⁴

ICAR-Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh 243 122 India

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Ladakh is one of the highest habitable regions in the world with an altitude ranging from 2,600 to 7,672 m, having unique physiography and climatic conditions. Although, agriculture and animal husbandry are the main sources of livelihood, the earlier is limited by small land holdings, poor soil fertility, inclement weather and shorter growing seasons leading to malnourished and different nutritional deficiency diseases among the majority of people (Dar *et al.* 2014). However, livestock relatively plays a more precious role in proving nutritional security particularly during winter besides its economic contribution in this region, Milk alone meets about 33 to 80% of dietary fat requirement among the selected livestock farmers in both the district of Ladakh region (Akand *et al.* 2017). Similarly, the region contributes major portion of the India's total pashmina production, i.e. 40–50 tonnes harvested from nearly 2 lakh goats whose net value is approximately ₹ 35 crores, which, in turn fetches value approximately ₹ 200 crores after value addition (Shakyawar *et al.* 2013) from where a pashmina herder earn a net return of about ₹ 1,000/animal which is highest to any other goat species in India (Wani *et al.* 2009) indicating the multifaceted role of livestock in this region that remain isolated from rest of the country for about half year. Still there is a dearth of knowledge about the level of livestock produce and their consumption pattern including income from such important livestock in this difficult area. The present study was therefore undertaken on livestock produce and their disposal pattern in Ladakh region of Jammu and Kashmir.

The study was carried out in two districts of Ladakh. Two blocks from each district were selected at random (Nyoma and Chuchot from Leh Kargil and TSG from Kargil

district). Further, 10 livestock farmers each from 12 villages, i.e. three villages each from selected blocks formed the sample size (total 120 livestock farmers). Direct observation and a semi-structured interview schedule comprising different dimension as mentioned below regarding livestock contribution was used for collection of relevant information.

Different descriptive statistical analysis tools, viz. frequency distribution, arithmetic mean, standard deviation were used to describe variability of parameters under study. Further, one way ANOVA was used to compare the parameters with respect of different blocks.

Artificial Insemination (AI) with exotic blood have increased the milk production in Ladakh region particularly in selected areas of both the districts. A considerable proportion (about 50%) of farmers belonging to Kargil, TSG and Chochut blocks, nearer to district township produced 6–10 or more than 10 litres of milk/day/family, sufficiently justified for claiming more than 30% of cattle in this region were brought under cross breeding programme. However, farmers belonging to distant place (Nyoma block) from the city/town produce less than 5 litres of milk/day/family because of not having any crossbred animals and thereby cannot be compared with other blocks under study. Among the rest three blocks, Chochut had significantly higher average milk production indicating higher density of crossbred cattle in this block. However, other factors which contributed for such variation were composition of herd size (crossbred and local cattle), plane of nutrition, management practices etc. Unlike a wide variation in daily milk yield among the crossbred at government farm and village level, ranging from 1.5–4.5 litre in crossbred of Ladakh (Arup *et al.* 2017), the present study recorded a non-significant difference in milk productivity across the block except in Nyoma. However, higher average (2.30 litres/day/cow) of milk production as compared to present finding (1.70 litres/day/cow) was recorded by Khan *et al.* (2013) in Gurej valley which might be due to the difference in grazing system as pointed by Muia *et al.* (2011), besides differences in ambient temperature, plan of nutrition, lean period etc.

Milk consumption among the farmers is solely based on the production of same in their house and generally do not

Present address: ¹Assistant Professor (afzalhakand@gmail.com), Division of Veterinary and Animal Husbandry Extension, Faculty of Veterinary Science and Animal Husbandry, SKUAST-Kashmir, Shuhama, Srinagar, Jammu and Kashmir. ²Principal Scientist (bpsingh_ext@rediffmail.com), Joint Directorate of Extension Education; ³Principal Scientist and Head (drmahesh.chander@gmail.com), Division of Extension Education. ⁴Subject Matter Specialist (animaldr2@gmail.com), KVK-Budgam, SKUAST-Kashmir, Jammu and Kashmir.

Livestock produce	Measurement
Milk (litres/day)	Quantity produced (litres/day/family) Quantity consumed (litres/day/family) Quantity sold (litres/day/family)
Wool (kg/year)	Quantity of production (kg/year/family) Quantity used for self / own purpose (kg/year/family) Quantity sold (kg/year/family)
Goat fibre (Pashmina in kg/year)	Quantity (kg/year/family)**
Animal slaughtered (sheep and Goat) for self-consumption (nos./year)	Number(s) of small ruminant slaughtered for self-consumption/year /family
Animal sold (nos./year)	Small ruminant sold during preceding year of investigation (no/family)
Income from livestock and its produce	Cash income earned from livestock and its produce during preceding year of investigation (₹/ family)

**Pashmina fibre is not utilized for self-use.

consume it by procuring from market as revealed in the present study. Almost all the farmers except in Nyoma block consume up to 2 litres of milk (either in fresh or its product) per day per family (Table 1). The farmers on an average consumed 1.5 litres/day, much higher as reported by Dar *et al.* (2014), i.e. 161 g/person/10 days. Though per capita availability of milk and its product, seems comparable with the finding of Srivastava *et al.* (2015) for this region (131.36), there is a wide gap between states overall per capita availability (370 g/day) and the present finding, which may be because of limited crossbred cattle and low production level. Farmers of Nyoma, also consume milk particularly during May to September derived from goat which yields 170–500 ml/day (Ganai *et al.* 2011). Therefore, the result depicted here may not reflect the actual milk consumption among the pashmina herders of Nyoma.

Selling pattern revealed that most of the respondents (about 50 to 60%) sold between 1–5 litres of milk on daily basis followed by 26.67 – 33.33% respondents who sold

up to 10 litres per day except in Nyoma (Table 1). The result revealed a much higher number of farmers who sell the milk compared to earlier finding of merely 29% farmers selling the milk in cold desert (Wani *et al.* 2014).

Production of wool in Nyoma block (average 42.97 kg/family/year) was much higher compared to other blocks because of their sole traditional activity and larger flock size (Table 2). The average wool production per animal in the sheep/goat dominated area of Nyoma was about 650 g/year which was in accordance with the findings of Farooquee (2000) who reported 750 g in local breeds of sheep. But wool production per household (42 kg) in the region was much higher from the earlier findings of Namgail *et al.* (2007) who reported 24.2 kg among the Changpas indicating an increased population of sheep in the region.

India is one of the few countries that produce world famous Pashmina fibre by pastoralist of Nyoma block (Chnagthang), which is the major source of income for them. The entire amount of pashmina produced are sold

Table 1. Milk production and their disposal pattern among the livestock farmers

Milk	Kargil		Leh		Kargil	Leh	Pooled
	Kargil	TSG	Chochut	Nyoma			
n	30	30	30	12	60	42	102
<i>Milk production (litres)</i>							
Nil	0 (0.00)	0 (0.00)	0 (0.00)	4 (33.33)	0 (0.00)	4 (9.52)	4 (3.92)
Low (1–5)	13 (43.33)	17 (56.67)	13 (43.33)	8 (66.67)	30 (50.00)	21 (50.00)	51 (50.00)
Medium (6–10)	15 (50.00)	12 (40.00)	11 (36.67)	0 (0.00)	27 (45.00)	11 (26.19)	38 (37.25)
High (> 10)	2 (6.67)	1 (3.33)	6 (20.00)	0 (0.00)	3 (5.00)	6 (14.28)	9 (8.88)
Mean	6.20 ^b ±2.46	5.83 ^b ±2.53	9.46 ^c ±9.39	0.56 ^a ±0.80	6.02±2.48	5.02±7.94	5.52±7.9
<i>Milk consumption (litres)</i>							
Nil	0 (0.00)	0 (0.00)	0 (0.00)	4 (33.33)	0 (0.00)	4 (9.52)	4 (3.92)
1–2 litres	28 (93.33)	29 (96.67)	29 (96.67)	8 (66.67)	57 (95.00)	37 (88.09)	94 (92.15)
> 2 litres	2 (6.67)	1 (3.33)	1 (3.33)	0 (0.00)	3 (5.00)	1 (2.38)	4 (3.92)
Mean	1.63 ^b ±0.60	1.43 ^b ±0.52	1.61 ^b ±0.60	0.56 ^a ±0.80	1.53±0.57	1.09±0.87	1.31±0.81
<i>Milk sold (litres)</i>							
Nil	2 (6.67)	3 (10.00)	1 (3.33)	12 (100.00)	5 (8.33)	13 (30.95)	18 (17.64)
Low (1–5)	18 (60.00)	19 (63.33)	16 (53.33)	0 (0.00)	37 (61.67)	16 (38.09)	53 (51.96)
Medium (6–10)	10 (33.33)	8 (26.67)	8 (26.67)	0 (0.00)	18 (30.00)	8 (19.04)	26 (25.49)
High (> 10)	0 (0.00)	0 (0.00)	5 (16.67)	0 (0.00)	0 (0.00)	5 (11.90)	5 (4.90)
Mean	4.56 ^b ±2.16	4.40 ^b ±2.95	7.85 ^c ±9.11	0.00 ^a ±0.00	4.48±2.34	3.93±7.49	4.20±5.97

Figures in parenthesis indicate percentage, 'n' indicate sample size. Values having same superscript do not differ significantly.

Table 2. Wool production and their disposal pattern among the livestock farmers

Wool	Leh		Kargil		Leh	Kargil	Total
	Chochut	Nyoma	Kargil	TSG			
n	20	30	24	24	50	48	98
<i>Wool production (kg)</i>							
Nil	8 (40.00)	0 (0.00)	5 (20.83)	4 (16.67)	8 (16.00)	9 (18.75)	17 (17.34)
Low (1–25)	12 (60.00)	5 (16.67)	19 (79.16)	20 (83.33)	17 (34.00)	39 (81.25)	56 (57.14)
Medium (26–50)	0 (0.00)	16 (53.33)	0 (0.00)	0 (0.00)	16 (32.00)	0 (0.00)	16 (16.33)
High (>76)	0 (0.00)	9 (30.00)	0 (0.00)	0 (0.00)	9 (18.00)	0 (0.00)	9 (9.18)
Mean	2.50 ^a ±3.47	42.97 ^b ±32.52	6.13 ^a ±4.11	5.27 ^a ±2.06	22.73±32.12	5.70±2.42	14.22±29.31
<i>Wool consumption (kg)</i>							
Nil	8 (40.00)	0 (0.00)	5 (20.83)	4 (16.67)	8 (16.00)	9 (18.75)	17 (17.34)
Low (1–10)	12 (60.00)	17 (56.67)	19 (79.16)	20 (83.33)	29 (58.00)	39 (81.25)	68 (69.37)
11–20	0 (0.00)	13 (43.33)	0 (0.00)	0 (0.00)	13 (26.00)	0 (0.00)	13 (13.26)
Mean	1.57 ^a ±2.16	12.63 ^b ±6.01	2.77 ^a ±1.42	3.22 ^a ±1.35	7.10±7.15	3.00±1.36	5.05±5.90
<i>Wool sold (kg)</i>							
Nil	16 (80.00)	0 (0.00)	12 (50.00)	13 (54.16)	16 (32.00)	25 (52.08)	41 (41.83)
Low (1–10)	4 (20.00)	2 (6.67)	12 (50.00)	11 (45.83)	6 (12.00)	23 (47.91)	29 (29.59)
Medium (11–20)	0 (0.00)	11 (36.67)	0 (0.00)	0 (0.00)	11 (22.00)	0 (0.00)	11 (11.22)
High (21–30)	0 (0.00)	17 (56.67)	0 (0.00)	0 (0.00)	17 (34.00)	0 (0.00)	17 (17.34)
Mean	0.93 ^a ±2.49	30.33 ^b ±25.13	3.37 ^a ±3.28	2.03 ^a ±2.85	15.63±27.32	2.70±2.14	9.17±23.17

Figures in parenthesis indicate percentage, 'n' indicate sample size. Values having same superscript do not differ significantly.

Table 3. Pashmina fibre production and their disposal pattern among the livestock farmers

Fibre	Leh		Kargil		Leh	Kargil	Total
	Chochut	Nyoma	Kargil	TSG			
n	9	30	15	24	39	39	78
<i>Fibre production (kg)</i>							
Nil	9 (100.00)	0 (0.00)	15 (100.00)	19 (79.16)	9 (23.07)	34 (87.17)	43 (55.12)
Low (1–25)	0 (0.00)	9 (30.00)	0 (0.00)	5 (20.83)	9 (23.07)	5 (12.82)	14 (17.94)
Medium (26–50)	0 (0.00)	12 (40.00)	0 (0.00)	0 (0.00)	12 (30.76)	0 (0.00)	12 (15.38)
High (51–75)	0 (0.00)	9 (30.00)	0 (0.00)	0 (0.00)	9 (23.07)	0 (0.00)	9 (11.53)
Mean	0.00	39.86	0.00	1.16	19.97	1.28	10.63
<i>Number of animals slaughtered (small ruminant) per year</i>							
n	30	30	30	30	60	60	120
Nil	22 (73.33)	0 (0.00)	16 (53.33)	14 (46.67)	30 (50.00)	22 (36.67)	52 (43.33)
1–3	8 (26.67)	15 (50.00)	14 (46.67)	16 (53.33)	30 (50.00)	23 (38.33)	53 (44.23)
4–6	0 (0.00)	15 (50.00)	0 (0.00)	0 (0.00)	0 (0.00)	15 (25.00)	15 (12.50)
Mean	0.53 ^b ±0.97	3.87 ^a ±1.59	0.77 ^b ±0.84	0.93 ^b ±1.04	2.20±2.12	0.85±1.00	1.53±1.77
<i>Number of small ruminant sold per year</i>							
n	30	30	30	30	60	60	120
Nil	10 (33.33)	0 (0.00)	1 (3.33)	4 (13.33)	10 (16.67)	5 (8.33)	15 (12.50)
1–5	18 (60.00)	8 (26.67)	24 (80.00)	24 (80.00)	26 (43.33)	48 (80.00)	74 (61.67)
6–10	2 (6.67)	10 (33.33)	5 (16.67)	2 (6.67)	12 (20.00)	7 (11.67)	19 (15.83)
>10	0 (0.00)	12 (40.00)	0 (0.00)	0 (0.00)	12 (20.00)	0 (0.00)	12 (10.00)
Mean	2.23 ^a ±1.94	15.02 ^b ±5.4	3.36 ^a ±2.61	2.90 ^a ±2.20	8.25±5.60	3.13±2.27	5.69±4.81

Figures in parenthesis indicate percentage, 'n' indicate sample size.

and do not use for themselves (Bhasin 2012). In this present study, 40% respondents produced 26–50 kg/year of pashmina fibre followed by equal number (30%) of respondents who could produce more than 50 kg and up to 25 kg per family per annum (Table 3). Little Pashmina production was also observed in TSG block (Kargil) due to government initiative to expand the pashmina production

in non-pashmina belt. The average pashmina production per household was recorded about 40 kg, much higher than the findings of Namgail *et al.* (2007) who reported 24.80 and 17.60 kg of Pashmina per household among Tibetan refugees and Changpas respectively. The result proves that the Pashmina herder had increased the number of goat considerably, probably due to the higher demand and better

Table 4. Income level from livestock and their produces

	Kargil		Leh		Kargil	Leh	Total
	Kargil	TSG	Chochut	Nyoma			
Milk	25762.00 ^{b±}	17424.00 ^{b±}	55297.00 ^{c±}	0.00 ^{a±}	21593.00±	27648.50±	24620.75±
	11556.74	8691.49	66132.64	0.00	10975.12	54102.64	38989.92
Wool	505.00 ^{a±}	305.00 ^{a±}	140.00 ^{a±}	7550.00 ^{b±}	405.00±	3845.00±	2125.00±
	628.40	428.78	373.56	7469.97	542.80	6438.60	4866.51
Fibre	3100.00 ^{b±}	2300.00 ^{b±}	0.00 ^{b±}	128266.66 ^{a±}	2700.00±	64133.33±	33416.66±
	4787.55	3281.61	0.00	80297.69	4089.25	85743.89	67859.04
Small ruminant	20426.66 ^{a±}	19240.00 ^{a±}	11956.66 ^{a±}	60733.33 ^{b±}	19833.33±	36345.00±	28089.16±
	13513.84	15453.07	10204.07	34642.81	14404.77	35297.91	28095.28
Total	49793.66 ^{a±}	39269.00 ^{a±}	67393.66 ^{a±}	196550.00 ^{b±}	44531.33±	131971.83±	88251.58±
	20225.35	20299.16	63744.29	115560.40	20778.91	113146.75	92135.19

market strategy. The average production of pashmina calculated to be 280 g, a little higher than the earlier researchers (Ganai *et al.* 2011) and (Wani *et al.* 2009) who found 248.60 and 130–311 g respectively. The difference might be due to the age and sex composition of flocks which influence the production.

Slaughtering of animal for self-consumption is a common practice in this cold desert region more particularly among the pastoralist who consumed the meat as fresh, smoked, salted or dried, but number of animals slaughtered for food varies according to the wealth of the household (Bhasin 2012). Results revealed that half of the farmers except in Chochut block slaughtered 1–3 animals and other half slaughtered 4–6 animals (sheep/goat) during the last winter for their self-consumption (Table 3). Also degree of animal sickness determines the preference to slaughter. Hagalia (2004) reported that the nomad slaughter on an average 4.5 of sheep/goat per year which may go high as 25 per family.

There is no thumb rule for number of animals to be sold; it depends on financial requirement and the flock size of the farmers. It was found that 60–80% farmers except in Nyoma block sold 1 to 5 small ruminants during the last year, which was justified by their flock size. On the contrary, majority of the respondents (40%) sold more than 10 small ruminant followed by the respondents who sold 6–10 (33.33%) and 1–5 (26.67%) during the last year in Nyoma (Table 3). More numbers of animals sold by respondents from Nyoma block was obviously because of their larger flock size. According to the study of Hagali (2004), the number of animals sold per household in Changthang area (Nyoma) varied greatly, i.e. 3–60.

Income from milk, wool or fibre varied greatly as per the production and consumption pattern (Table 4). Significant difference was observed in terms of earning from milk across the blocks. Chochut, nearer to Leh town had the highest demand of milk due to the placement of Indian Army cantonment and this situation has increased the crossbred animals and accordingly enhanced the income of herders. On the other hand, pashmina herder never sold the milk who otherwise earns their entire livelihood from wool and thereby they had more earnings as compared to others.

SUMMARY

This study was carried out in a sample of 120 livestock farmers selected from four blocks belonging to two districts of Ladakh region in Jammu and Kashmir to ascertain the role played by livestock in terms of their produce, viz. milk, wool/fibre, live animal and their consumption pattern including income derived out of these animals. The study revealed the average milk production/family/day was much higher in all blocks and varied from 5.83 to 9.46 litres/day/family except in Nyoma where the corresponding figure was merely 0.56 and accordingly the consumption and sale volume. Sheep wool and goat fibre (Pashmina) were the dominant product of farmers belonging to Nyoma block with an average production of 42.97 and 39.86 kg/family/year respectively. Although all farmers slaughtered small ruminant during winter for self consumption, it was higher in Nyoma (3.87 family/year) than other blocks (about 1/family/year). Similar was the case with respect to number of small animal sold/family/year which was highest in Nyoma (15.02) as compared to other block that ranged between 2.23 to 3.36 on average value. The average income earned from all livestock sourced was recorded highest in Nyoma block, i.e. ₹ 196,550, whereas the same recorded for other blocks were between ₹ 39,269 to ₹ 67,393.66. The study reveals that the livestock production and their product consumption entirely depends on production system including the composition of the herd they maintain. Therefore, the developmental approaches should be local specific to address the local issues. Parallel emphasis may also be directed towards the value addition and marketing of livestock produces to influence both nutritional and economic impact among the livestock farmers.

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